

Johannes Lunde Hatfield

**Determinants of motivation and
self-regulation in aspiring musicians**

The mental edge of musicianship



**Norges
musikkhøgskole**
Norwegian Academy
of Music

**NMH-publikasjoner
2017:2**

Johannes Lunde Hatfield

**Determinants of motivation and
self-regulation in aspiring musicians**

The mental edge of musicianship

Dissertation for the PhD degree
Norwegian Academy of Music, Oslo 2017
NMH-publikasjoner 2017:2

NMH Publications 2017:2
© Norwegian Academy of Music and Johannes Hatfield

ISSN 0333-3760
ISBN 978-82-7853-223-2

Norwegian Academy of Music
PB 5190 Majorstua
NO-0302 OSLO

Tel.: +47 23 36 70 00
E-mail: post@nmh.no
nmh.no

Print: 07 Media, Oslo, 2017

Music is the thesis, the instrument is the antithesis and the synthesis is the performance. Music lives within us, in our brain, in our consciousness, our emotions, our imagination; its "domicile" can be accurately established: it is our hearing. The instrument exists without us; it is particle of the objective outside world and as such must be studied, must be mastered and made to comply with our inner world, and obey our creative will.

The Art of Piano Playing – Heinrich Neuhaus

Acknowledgements

First of all I would like to express my deepest appreciation to The Norwegian Academy of Music for believing in me and for making it possible for me to pursue my dream and passion. The three years of work at the academy has been a tremendous journey thanks to all the wonderful people that I have had the privilege to get to know. I would first like to thank all my participants who agreed to share their experiences, views and stories with me. I can't express how much gratitude I feel towards your interest and openness. I then would like to express my deepest gratitude to my two supervisors, Siw G. Nielsen (Norwegian Academy of Music) and Pierre-Nicolas Lemyre (Norwegian School of Sports Sciences) for all their priceless support and advice throughout this meandering journey toward completing my Ph.D. Your kindness, wisdom, generosity, openness and honesty have made this journey tremendously fruitful. In addition, I would like to thank my mentor in statistics, Hallgeir Halvari, for great collaboration and friendship (I look forward to the many motivation conferences to come with you and Ed Deci!!!). Professor Glyn Roberts, thanks for your wonderful opposition, and for letting me try out some real nerves during the mock dissertation defense. I also would like to thank Harald Jørgensen for inspiring and encouraging my research. Writing this acknowledgment section at the very end of my Ph.D. journey, I realize that the Norwegian Academy of Music is a place filled with genuine, interesting and benevolent people in all departments. In particular I would like to thank all my wonderful Ph.D. colleagues. Lise Lotte,

Jan Gunnar, Kjersti and Adrian; it has been such a pleasure to share an office with you. I will miss all the jokes and good conversations both in and out of the office. I wish you all the best in your futures as wonderful professors. In addition, I would like to thank cello professor Aage Kvalbein for cello lessons and all the random nice conversations in the corridor and for inviting me to your wonderful home. I also would like to thank Kjetil Myklebust for being a great friend and colleague and for establishing the running group. I look forward to participating in Holmenkollstafetten for many years to come!! I also would like to acknowledge the administration and the library for always being helpful, collaborative and kind. Last but not least, I would like to thank my family, my mother, father and my wonderful siblings for warmth and great support.

Preface

I was about 16 years old when I made the decision to become a cellist. The decision was made after one year off from cello playing and practicing. From that day on, my first priority was to become as good as possible at playing sublime music from the rich cello repertoire. Practicing five to seven hours became a daily habit as I aspired to new musical heights. While studying at an institute for talented musicians, there was one afternoon, after having practiced my six hours, I ran into an ambitious fellow student. The meeting resulted in our return to the institute. A competition consisting of who could practice the most had just started. After having practiced the entire night and the entire following morning, we called the competition even. We could finally go home for some long-awaited sleep. During this early stage of artistic development, nobody had ever taught me how to practice instrumentally. I just went on and on, just like the saying “practice, practice, practice and you’ll make it to Carnegie Hall.” Not surprisingly, I started to suffer from physical pain, which I for many years interpreted as a natural part of becoming a professional musician: “no pain no gain.” Due to rapid development and promising cello playing nobody seemed to foresee the impact of my approach to practice. However, many years later, after my master’s exam (which went brilliantly) I realized what a cello cripple I had become during six intense years of higher music education. After having worked a few months in orchestra, I was told by my doctor that continuing to work in orchestra with my over-practiced limbs would not be possible.

Consequently, I decided to do something entirely different resulting in my application for studies in sport science. Learning basic anatomy, biology and sport psychology triggered a new interest in the physical and mental aspects of instrumental practice and performance. It struck me how well organized and deliberate some aspiring athletes were in their pursuit of excellence, which was partly thanks to decades of research and practice within sport science and psychology. Identifying the numerous similarities between how music and sports are learned, I started to question why music students in pre-conservatory and higher music education were not taught how to instrumentally practice. By practically and intellectually introducing sport psychological approaches to my own instrumental practice, I realized what beneficial potential these approaches might have for aspiring musicians. Besides preventing injuries, sport psychology can maximize music students' potential, motivation and joy of music practice and performance (Weinberg & Gould, 2011).

List of papers

Paper 1

Hatfield, J. L. (accepted). Goal Setting and Self-Determination in Music Making: Tenets of Becoming an Organized and Motivated Music Practitioner. *Nordic Research in Music Education Yearbook, Vol. 18*. (The yearbook will publish a revised version of the article.)

Paper 2

Hatfield, J. L., Halvari, H., & Lemyre, P.-N. (2016). Instrumental Practice in the Contemporary Music Academy: A Three-Phase Cycle of Self-Regulated Learning in Music Students. *Musicae Scientiae*. doi: 10.1177/1029864916658342

Paper 3

Hatfield, J. L., & Lemyre, P.-N. (2016). Foundations of Intervention Research in Instrumental Practice: Constructing a Psychological Skills Intervention for Musicians. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2015.02014

Paper 4

Hatfield, J. L. (2016). Performing at the Top of One's Musical Game: The Mental Edge of Musicianship. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2016.01356

Summary

Music touches us in manifold ways. We go to concerts and are blown away by incredible performances during which the musical message is poetically communicated through free expression. As musicians we sometimes experience total symbiosis with music while performing, enabling what is known as peak performance. What is it that enables such experiences? The present thesis aims to better understand the determinants of such musical experiences highlighting motivation and self-regulation as key tenets. Three empirical studies were conducted with the aim of investigating and enhancing music students' routines of practice and performance. Under the supervision of a senior consultant in coaching and psychology at the Norwegian School of Sport Sciences, techniques deriving from sport psychology were implemented and examined from an interventional and inventorial standpoint. Currently, there are no well-developed motivational frameworks for implementing and interpreting the efficacy of psychological skills training (PST) in music. Accordingly, psychological skills training techniques (i.e., goal setting, arousal regulation, concentration/attentional focus, internal dialogue/acceptance training and imagery) were organized into an adapted theoretical model based on Zimmerman's (1989; 2002) cyclical model of self-regulated learning (Figure 2). In essence, the adapted model incorporates theoretical concepts from both social cognitive theory (goal setting, self-efficacy, attribution theories) and from a motivational theory embedded in basic psychological needs (self-determination theory) (Bandura, 1997; Deci

& Ryan, 2000; Lock & Latham, 2002; Weiner, 1985). This model served as both a practical and theoretical basis for the current research project.

The few studies that have tried to use psychological skills training with musicians have, with one exception (Clark & Williamon, 2011), been short-term interventions (e.g., Hoffman & Hanrahan, 2012; Osborne, Greene, & Immel, 2014). Therefore, an in-depth understanding of how music students' practice may evolve due to use of psychological skills is needed. In addition, an appropriate conceptual framework for such work in the context of music is needed. The present research aims to investigate and, in turn, suggest new directions for enhancing musicians' instrumental practice and performance.

The present thesis is organized in four analytical incisions. The first analytical incision (Paper 1) actualizes motivational concepts (i.e., goal setting and self-determination) commonly applied for performance enhancement within organizational settings and sports. The second incision provides an overview of music students' current patterns of instrumental practice in relation to the main motivational framework of the thesis. The third incision tries out, adapts, evaluates and optimizes the tailoring of psychological skills training from sports to the context of music (Paper 3, pilot study). The final incision attempts to apply psychological skills training used in sports among music students (Paper 4, intervention study). These four steps are covered in four peer-reviewed articles, which have been published or are under review in international journals of music education and psychology.

The first paper is a theoretical article presenting key theoretical concepts on which the research is based. The aim of this paper is to actualize motivational perspectives such as goal setting and self-determination in relation to the practice, teaching and performance of music. Goal setting and self-determination are introduced separately and subsequently discussed in relation to one another. Strengths and limitations of each theory are discussed and conclusively tied to a model synthesizing the two theoretical approaches. Instead of chronologically summing up the key-concepts discussed, the conclusion of the article gives hypothetical case examples of how principles of goal setting and self-determination are applied to teaching and instrumental practice in the conservatoire context. Moreover, Paper 1 presents key theoretical hypotheses that have been subsequently empirically operationalized in the present research studies.

By applying structural equation modeling (SEM), the first empirical study (Paper 2) tests an adapted model of self-regulated learning (Zimmerman, 1989) among 204 music conservatoire students. Study results revealed that forethought phase constructs (i.e., goal setting and self-efficacy) positively predicted use of psychological skills (self-observation, arousal regulation, imagery, concentration and self-control), and, indirectly, self-reflection phase constructs (i.e., coping and perceptions of progress). Students' use of psychological skills partly predicted adaptive coping in the face of failure and perceptions of progress. Finally, self-reflection phase constructs positively predicted forethought phase constructs. Adaptive cyclical patterns of learning were thus found in music students who were considered self-regulated learners. However, the descriptive findings revealed that only a minority of the students were applying psychological skills training techniques. This confirmed a need for implementing PST to the context of music.

The purpose of the second study (Paper 3) was to evaluate, implement, and adapt psychological skills applied in sports to the context of music acquisition and performance. This pilot intervention study was practically and theoretically based on principles from self-regulated learning and self-determination theories (Zimmerman, 2002; Deci & Ryan, 2000). Multiple intervention tools were evaluated (i.e., use of questionnaires, performance profiling, iPads, electronic practice journals, and the perceived value of individual and combined work). Generally the results revealed that the intervention tools were of imperative value to the overall intervention. Results also showed that an emphasis on constituting basic psychological needs (Deci & Ryan, 2000) in regard to both environmental and interpersonal factors during training facilitated the participants' motivation. Finally, the evaluation study found that the practical application of psychological skills training significantly increased the effect of the overall intervention.

In the last study, a mixed method approach (Creswell, 2009) was applied in investigating personal benefits, perceptions and the effect of a 15-week sport psychological skills training intervention for music conservatory students. Pre-intervention findings indicated that music students had little experience with planning and goal setting for instrumental practice. Further, thematic analysis (Braun & Clark, 2006) revealed that this was tied to perceived lack of concentration, outcome fixation, volition and physical pain. Results based on the completed intervention showed that use of psychological skills facilitated cyclical self-regulated learning in the participants (goal setting/

planning, self-observation, self-efficacy, and coping in the face of failure). In addition, the intervention found that the appliance of psychological skills (i.e., goal setting, arousal regulation, concentration/attentional focus, internal dialogue/acceptance training and imagery) enabled the participants to cope with worry in more adaptive ways than they had done prior to the program. The results thus revealed a quantitative and qualitative reduction in participants' worry and perfectionistic concerns. Finally, an eight-month follow up interview found that the participants were still actively applying the psychological skills.

The motivational frameworks applied in the abovementioned studies turned out to inform patterns of instrumental practice theoretically and practically. In essence, the use of theory informed the structure of the interventional part of the research, which in turn facilitated participants' motivation for instrumental practice and performance. Moreover, this embedding of theory into practice contributed to a wider understanding of the determinants of motivation.

Sammendrag

Musikk berører oss på utallige måter. Vi kan bli berørt gjennom konsertopplevelser der vi opplever at musikeren er i ett med musikken. I tillegg kan vi som musikere tidvis oppleve en total symbiose med musikken i det vi presterer på vårt absolutt beste. Med andre ord kan vi gjennom genuin innlevelse både som tilhørere og formidlere av musikk oppleve å komme i en flyttilstand der musikken geleider oss.

Hva er det som setter oss i kontakt med disse opplevelsene? Foreliggende doktorgradsprosjekt har som formål å undersøke hvordan vi kan motivere studenter til selvregulert øving. Gjennom dette undersøker jeg hva slags rolle motivasjon og selvregulert læring har i musikkstudenters øving og fremføring av musikk.

Foreliggende doktorgradsarbeid består av tre empiriske studier der de overordnede formål er å undersøke, prøve ut ulike verktøy og forbedre musikkstudenters rutiner rundt egenøving og fremføring. Gjennom veiledning fra en erfaren idrettspsykolog ble ulike teknikker fra idrettens mentale treningslære prøvd ut blant utøvende musikkstudenter. Per dags dato finnes det ikke noe velutviklet teoretisk rammeverk for implementering av mentale ferdigheter blant musikere. Som et resultat av dette ble de mentale teknikkene (målsetting, spenningsregulering, konsentrasjon, indre dialog/aksept trening og forestilling) organisert gjennom en teoretisk modell basert på Zimmermans (1989; 2002) teoretiske rammeverk rundt selvregulert læring

(Figur 2). Denne modellen inkorporerte teoretiske konsepter fra både sosial-kognitiv læringsteori (målsettingsteori, selveffektivitetsforventingsteori og attribusjonsteori) samt motivasjonsteori forankret i grunnleggende psykologiske behov (Selvbestemmelsesteori) (Bandura, 1997; Deci & Ryan, 2000; Lock & Latham, 2002; Weiner, 1985).

Det er oppsiktsvekkende få vitenskapelige studier som har prøvd ut mentale ferdigheter fra idrettspsykologi blant musikkstudenter. Med unntak av en studie (Clark & Williamon, 2011), er alle disse studiene korttidsstudier (Hoffman & Hanrahan, 2012; Osborne et al., 2014). Dette indikerer således et behov for langtidsstudier på området.

Foreliggende doktorgradsarbeid ble organisert i fire analytiske snitt. Det første analytiske snittet bestod i å presentere, diskutere samt aktualisere målsettingsteori og selvbestemmelsesteori hyppig brukt i forbindelse med forbedring av ytelse i det private næringsliv og innen idretten. Det andre analytiske snittet besto i å undersøke hvordan musikkstudenter øver i lys av det anvendte teoretiske rammeverket. Det tredje analytiske snittet besto i å adaptere, evaluere og optimalisere implementeringen av mentale ferdigheter fra idretten til musikkkontekst (pilotstudie). Det siste og fjerde analytiske snittet besto i å aktivt prøve ut det evaluerte mentale treningsopplegget over tid blant musikere. De fire stegene ble dokumentert i form av fire fagfellevurderte artikler.

Den første artikkelens (teoretisk) formål var å introdusere, aktualisere og diskutere sentrale motivasjonsteorier (målsettingsteori og selvbestemmelsesteori) i lys av instrumentaløving og musikkundervisning. Teoriene ble både diskutert isolert og i relasjon til hverandre. Den teoretiske diskusjonen ender opp i en syntese av de to teoriene. Den teoretiske syntesen er videre bearbeidet gjennom fiktive kasus (situert i høyere musikkutdanning). Målet med denne kontekstualiseringen var å gi en pekepinn på hvordan teoriene hypotetisk sett kan fungere i forhold til instrumentaløving og i undervisningspraksis. Det teoretiske materialet diskutert i den første artikkelen er videre empirisk operasjonalisert i resten av avhandlingen.

Formålet med den første empiriske studien (Artikkel 2 -spørreundersøkelse) var å prøve ut det teoretiske rammeverket (selvregulert læringsmodell) opp mot musikkstudenters øvingsvaner. Modellen ble testet ved bruk av strukturell ligningsmodellering. Kort oppsummert viste resultatene at bevisst bruk av målsetting i planlegging av instrumental øving korrelerte

sterkt med høy selveffektivitetsforventing. Videre viste stianalysen at det var sterke signifikante direkte bånd mellom forberedelsesfasen (målsetting og selveffektivitetsforventing) og bruk av ulike mental og metakognitive strategier (Selvobservasjon, spenningsregulering, forestilling, konsentrasjon og selvkontroll). Analysen fant videre indirekte statistisk signifikante bånd fra forberedelsesfasen (målsetting og selveffektivitetsforventing) til selvrefleksjonsfasen (Takling/håndtering, opplevd progresjon). Bruk av mental ferdigheter viste seg å delvis predikere konstruktene i selvrefleksjonsfasen. Sist men ikke minst viste konstruktene i selvreguleringsfasen å signifikant predikere forberedelsesfasens konstrukt. Kort forklart indikerte resultatene at musikkstudenter som er involvert i selvregulert læring også er involvert i en positiv syklisk læringsprosess basert på nøye planlegging, bruk av mental strategier og realistisk hensiktsmessig evaluering. Til tross for oppklarende statistiske funn, viste den deskriptive statistikken at det bare var en mindre prosent av utvalget/musikkstudentene som benyttet seg av selvregulert læring og mentale øvingsstrategier. Disse funnene indikerer et behov for veiledning, bevisstgjøring og implementering av mentale ferdigheter blant musikkstudenter.

Formålet med den andre empiriske studien (Artikkel 3) var å evaluere, adaptere og implementere idrettspsykologiske strategier i musikkøvingskontekst. Denne pilotstudien var teoretisk forankret i selvreguleringsteori samt selvbestemmelsesteori (Zimmerman, 1989; Deci & Ryan, 2000). I tillegg til å evaluere kombinert bruk av gruppe og individuell veiledning, ble intervensjonsverktøy som spørreskjema, selvevalueringsprofil, elektronisk øvingsdagbok evaluert. Intervensjonen la i tillegg stor vekt på tilrettelegging av et læringsmiljø basert på grunnleggende psykologiske behov (autonomi, kompetanse, og tilhørighet) (Deci & Ryan, 2000). Studien ga verdifull informasjon rundt hvordan de ulike verktøyene fungerte i praksis. Dette tilrettela for videre optimalisering av et øvingsintervensjonsprogram for musikkstudenter (se artikkel 3 for mer informasjon).

Den siste empiriske studien (Artikkel 4) var basert på foregående pilotstudie og hadde som formål å undersøke effekten og musikkstudenters erfaringer rundt applisering av mental trening. Både kvantitative og kvalitative funn viste at musikkstudenter hadde liten erfaring med det å planlegge og sette klare mål for egenøvingen. Denne intuitive/tilfeldige måten å øve på ble videre forbundet med et overdrevet fokus mot det å nå det endelige resultat fortest mulig. Dette resultatfokus viste seg å gå på bekostning av

identifisering av de mindre byggeklossene i øvingsprosesser. Denne resultatorienteringen viste seg videre å være forbundet med fysisk smerte, liten forutsigbarhet i forhold til mestring i fremførings situasjoner samt tilfeldige øvingsrutiner. Empiriske funn basert på gjennomført øvingsintervensjon viste at studentene ble generelt mer involvert i selvregulerte læringsrutiner. En grunnleggende kilde til selvregulert læring var planlegging og bruk av målsettingsstrategier. Denne evalueringen og organiseringen av øvingen hadde videre positive innvirkning på studentenes selveffektivitetsforventning, bruk av øvingsstrategier, fornemmelse av fremgang, samt evnen til å takle motstand i øvingen. Videre viste studien at bruk av mental strategier som aksepttrening, forestilling, spenningsregulering samt konsentrasjonstrening gjorde studentene mer robuste og trygge ved fremføring. Oppfølgingsintervju gjennomført åtte måneder etter intervensjonslutt viste at studentene fortsatt aktivt brukte de ulike mentale strategiene.

Det teoretiske rammeverket bidro inn i interpretasjonen av funn samt i struktureringen av det praktiske på intervensjonsnivå. Denne praktiskteoretiske forankringen viste seg å bidra positivt i forhold til deltakernes motivasjon for øving og fremføring. Med andre ord bidro denne nære forbindelsen mellom teori og praksis til å utvide forståelsen av ulike kimer til kvalitativ god motivasjon i musikkøving og utøving.

Contents

	Acknowledgements	v
	Preface	vii
	List of papers	ix
	Summary	xi
	Sammendrag	xv
1	Introduction	1
1.1	Background and purposes of thesis	1
1.2	Research questions	4
2	Research and theoretical frameworks	5
2.1	Instrumental practice frameworks	5
2.1.1	Defining instrumental practice	6
2.1.2	Deliberate practice	7
2.1.3	Other practice-related components of interest	9
2.2	Psychological and theoretical framework	10
2.2.1	Psychological skills training	10
2.2.2	A social-cognitive view	13
2.2.3	Self-regulated learning	14
2.2.4	A cyclical model of self-regulated learning	15
2.2.5	The adapted cyclical model of self-regulated learning	19
2.2.6	Concluding theoretical reflections	27

3	Material, methods and methodology	31
3.1	Personal methodological standpoint	31
3.2	General overview of design and study methods	32
3.2.1	Case study	32
3.3	Procedures, participants and data collection	35
3.4	Questionnaire and measures	39
3.5	Data Analysis	41
3.6	Ethical considerations	45
3.6.1	Implementation of psychological skills	45
3.6.2	Manifold research roles	46
4	Summary of papers	49
5	Discussion	59
5.1	Discussion of the general research questions	60
5.2	General discussion	75
5.2.1	Contributions	76
5.3	Implications	81
5.4	Strengths and limitations	83
6	Conclusion	87
6.1	Future research and directions	89
	References	91
	Paper 1	109
	Paper 2	137
	Paper 3	161
	Paper 4	191
	Appendices	231

1 Introduction

1.1 Background and purposes of thesis

Music students might spend as many as 7,800 hours individually practicing over five years of higher music education (Jørgensen, 1996). The majority of these hours are in many cases spent without having explicit knowledge on how to carry out effective instrumental practice (Burwell & Shipton, 2013; Gaunt, 2009). Findings from a study on instrumental top-soloists reported that they had all been specifically guided by a competent other in their instrumental practice during childhood and youth (Lehmann & Ericsson, 1997). The authors suggest that student and amateur musicians would benefit from implementing techniques used by experts (individual training, structured practice and monitoring of feedback). Sloboda, Davidson, Howe and Moore (1996) found support that *formal* practice (i.e., mindful, deliberate and analytical practice) is a strong determinant of performance achievement. In contrast, *informal* practice (i.e., aimless, amusing and intuitive instrumental practice) did not correlate with performance achievement. However, a combination was found to particularly facilitate performance achievement. Moore, Burland and Davidson (2003) found that social support (parental and educative) and teaching styles (balance between “not too relaxed” and “not too pushy”) seemed to enable young musicians’ participation in instrumental practice over time. The most successful adult musicians were the ones who had taken part in more concerts and improvisation during childhood. A study investigating students’ habits of planning instrumental practice found that only a minority of the students (21%) made

specific plans for their instrumental practice and that more than 50% of the students never made plans in relation to their instrumental practice (Jørgensen, 1996). Clearly, there is a potential for improvement in teaching music students how to practice and enhance their performance. In addition, these results indicate that this work might be favorable when based on specific guidance within a context highlighting social support.

In recent years, a growing body of research in music education has focused on self-regulation in music students (Leon-Guerrero, 2008; McPherson, Nielsen & Renwick, 2013; Miksza & Tan, 2015; Nielsen, 2004, 2015). These research studies have found positive relationships between self-regulation, practice strategies, self-efficacy and optimal learning environments. However, less attention has been given to the implications of providing music students with self-regulated learning (SRL) and psychological strategies with the goal of enhancing instrumental practice and performance from an interventional standpoint. Except for the intervention study done by Clark and Williamon (2011), the few studies that have taken such an interventional approach have mainly been shorter pilot studies emphasizing effect sizes (i.e., Hoffman & Hanrahan, 2012; Kageyama, 2007; Osborne et al., 2014). Among these studies, only Clark and Williamon (2011) and Osborne et al. (2014) found a significant increase in effect size from pre – to post intervention. From a sport psychology context, Weinberg and Gould (2011) highlight the importance of proper psychological skills training (PST) interventions (Weinberg & Gould, 2011). They suggest that psychological skills interventions should last between three and six months, while continuous adaptation to various performance contexts over time is recommended. To date, there have been no psychological skills interventions in music that have followed sport psychological implementation recommendations. Undoubtedly, there is a need for long-term psychological skills interventions during which participants are given multiple opportunities to internalize and apply psychological skills over time. With this in mind, the present research constitutes a multidimensional approach highlighting three analytical incisions:

- 1 Explore music students' ongoing use of, and relationships between, PST and SRL habits.
- 2 Optimize PST implementation in the context of music practice and performance.
- 3 Investigate the possible impact of applying PST through the lens of SRL on music students' instrumental practice and performance.

Accordingly, the present research constitutes a long-term individual mixed-method approach that highlights continued application of psychological skills in various performance contexts. In short, the present research project is the first to cover the multifaceted nature of PST.

At the present time, there are no well-developed motivational frameworks for implementing and interpreting the efficacy of psychological skills training in music. Accordingly, the present research integrates motivational frameworks embedded in both motivation for learning and basic motivational needs in human beings (Zimmerman, 1989; Deci & Ryan, 2000). In essence, the use of theory (i.e., goal setting, self-efficacy, self-determination and attribution theories) in the present research aims at underscoring both practical and interpretative aspects of psychological skills intervention in music. Embedded in several motivational theories (e.g., self-efficacy, expectancy-value, achievement goal theory, attribution theory), self-regulated learning theory seeks to explain the various phases (i.e., forethought, performance, and self-reflection) of learning processes from a macro-theoretical perspective (Zimmerman, 1989, 2002). I presume that such a framework is useful in organizing and structuring psychological skills interventions for musicians, as well as interpreting the outcome of the interventions. Self-determination theory seeks to explain motivational processes in regard to basic psychological needs of human beings (Deci & Ryan). It might therefore facilitate the motivational climate of psychological skills interventions. The present research is the first of its kind to introduce psychological skills training through a practical and theoretical lens of self-regulated learning theory. An adapted model of self-regulated learning (see Figure 2) was developed in order to fit the research context. The model consisted of psychological skills from sports and applied theory (i.e., goal setting, self-efficacy, self-determination, and attribution theories). The adapted model of self-regulated learning became a theoretical package, the aim of which was to facilitate the implementation and the interpretation of psychological skills training.

In sum, aspiring musicians invest a tremendous number of hours practicing their instrument before and during higher music education. However, many students are not able to fulfill their potential because of inadequate aimless practice, lack of guidelines and lack of knowledge about healthy, deliberate and motivating ways of carrying out instrumental practice. Hence, this significant need to learn both the art of instrumental practice and how to mentally prepare for performances was the main purpose for the present

research. A second overarching aim was to provide music students and educators with both practical and theoretical frameworks that foster both long-term motivation and deliberate forms of instrumental practice and performance.

1.2 Research questions

The overall aim of the present research was to develop a multidimensional understanding of the main phenomena of interest: determinants of motivation and self-regulated learning in aspiring musicians. Accordingly, the research aim was three-fold:

- 1 Get an overview of music students' current habits of practice in regard to cyclical self-regulated learning and use of psychological skills.
- 2 Develop, refine and adapt psychological skills training intervention applied in sports to the context of music.
- 3 Investigate personal benefits, perceptions, and the effect of a 15-week sport psychological skills intervention for musicians.

Based on these aims, the present research has three general research questions, one main research question (marked in bold letters) and two sub research questions:

- 1 **What impact does the application of psychological skills through the framework of self-regulated learning have on music students' practice and performance?** (Papers 2, 3 and 4)
- 2 To what extent do psychological skills contribute to adaptive instrumental practice and cyclical learning through Zimmerman's (1989) model of self-regulated learning? (Papers 2 and 4).
- 3 Which components should be included to form a holistic psychological skills training program for music students? (Papers 3 and 4).

2 **Research and theoretical frameworks**

This chapter presents, discusses and links together main theoretical concepts applied in the current thesis. Although the main emphasis is on psychological frameworks, a basic understanding of the present research's view on instrumental practice will be given in order to give the research necessary context and foundation. First, we learn that instrumental practice is a multi-faceted phenomenon. Thereafter, deliberate practice (e.g., Ericsson et al., 1993) is presented, discussed and tied to a specific interpretation of instrumental practice. Subsequently, psychological skills training (e.g., Weinberg & Gould, 2011) and its constituents are introduced and actualized in relation to instrumental practice and self-regulated learning. Next, the main theoretical framework, self-regulated learning (SRL) (e.g., Zimmerman & Schunk, 1989) is presented along with its key components within a social-cognitive framework (e.g., Bandura, 1986). And lastly, SRL's sub-processes are then tied to its psychological concepts of relevance such as goal setting (Locke & Latham, 2002), self-efficacy (Bandura, 1977), self-determination (Deci & Ryan, 1985, 2000) and attributions (Weiner 1985).

2.1 **Instrumental practice frameworks**

Understanding the many facets of instrumental practice is of crucial interest for the present research. Thus, how instrumental practice is understood

and explained is essential in order to grasp how it leads to its practical use. Accordingly, this section provides a general overview of how instrumental practice and related sub-elements will be treated.

2.1.1 Defining instrumental practice

Instrumental practice has been defined as a multifaceted activity that includes memorizing, acquiring technical, musical skills and being mentally equipped for performance (Hallam, 1997). Building on Hallam's definition, instrumental practice has been defined as a four-stage process, including:

- 1 Identifying and overcoming technical problems
- 2 Memorization
- 3 Performing the piece as whole
- 4 Maintenance (Chaffin, Imreh & Crawford, 2002)

Chaffin's definition of practice represents a general progression that has been, and is still, broadly used and is coherent with how classical musicians themselves perceive and define instrumental practice (e.g., Heimberg, 2007). Moving toward a more specific understanding of the constituents of instrumental practice, the legendary pianist and teacher Heinrich Neuhaus (1993) views instrumental practice as a triadic phenomenon including the musician, the instrument and (most importantly) the music. Neuhaus warns against being overly preoccupied with technique. At the same time, he emphasizes the necessity of mastering the instrument as a means of conveying the musical language. Moreover, in order to practice meaningfully, one needs to determine and fully comprehend what one is aiming toward (i.e., this includes an understanding of the content, musical meaning, substance, theory and the form of the music) (Neuhaus, 1993).

Researchers have also distinguished *formal* (i.e., mindful, deliberate and analytical) and *informal* (i.e., aimless, amusing and intuitive instrumental) practice (Sloboda, Davidson, Howe, & Moore, 1996). They found that formal practice correlated more strongly with performance achievement than informal practice. The best performance achievement was associated with integration of both formal and informal practice (Sloboda et al., 1996). Accordingly, a combination of both formal and informal practice is considered here to be essential in instrumental practice. Fun playing, improvising and sight-reading are considered important ingredients in a music student's

practice, in addition to goal-oriented mindful practice, as described above. However, deliberate formal practice is considered the most important predictor of progress and performance achievement. Moreover, both formal and informal practice are believed to be significant to students' drive, motivation and progress. Consequently, finding a balance between freedom and discipline is considered a foundation for musical aspiration, motivation and joy (Galamian, 1999; Green & Gallwey, 1986; Snowman, 1981). In this thesis, the formal components of instrumental practice are tied to the field of deliberate practice (e.g., Ericsson et al. 1993).

2.1.2 Deliberate practice

Deliberate practice is a scientific field of research that investigates how experts gain expertise. Deliberate practitioners are described as highly structured in their efforts to improve performance. They overcome weaknesses by inventing specific tasks that are then carefully monitored during task execution. Furthermore, it is claimed that deliberate practice is not inherently enjoyable. Rather, motivation springs forth as a result of experiencing how practice improves performance (Ericsson, Krampe, & Tesch-Romer, 1993).

Ericsson (2006) underline that expertise in individuals is mainly a result of deliberate, effortful practice, rather than talent. However, more experience doing an activity is not enough. Often when one first starts to participate in a hobby or leisure activity, one increases one's level to a certain extent. Once a plateau is reached, the only way to further increase one's level is to create specific activities specially designed to enhance performance. Furthermore, the authors stress the importance of significant others in this process. Creativity and innovativeness are considered to be key goals of deliberate practice. The result of rigorous systematic practice is usually freedom of expression (Ericsson, 2006). In a key study on deliberate practice, Ericsson et al. (1993) compared accumulated hours of practice between "best violinists," "good violinists" and violinists from the music education department at the Berlin Academy of Music. Their findings revealed that the best violinists had accumulated more practice hours than the good violinists. Music education students had the lowest amount of accumulated practice hours. Furthermore, the best students paid more attention to getting the necessary amount of rest and thus slept more than the good violinists

and the music education students (Ericsson et al., 1993). Think-aloud protocols applied in reviews of deliberate practice have revealed that superior performance is obtained by preparing, planning, reasoning and evaluating practice (Ericsson, 2006). Accordingly, in a study comparing Olympic medalists/champions with non-medalists in the Sarajevo and Los Angeles Olympics, findings revealed that medalists/champions were generally more committed to pursuing excellence by including daily goal setting/planning, getting appropriate rest, and continuing evaluation (Orlick & Partington, 1988). As addressed above, music students tend to skip pre-practice routines such as planning and scheduling of practice (Jørgensen, 1996). Lehmann and Ericsson (1997) found correlations between the amounts of precise practice guidance top soloists had accumulated from competent others as youngsters/teenagers and their current level and success. Evidently, specific guidance from competent others plays a central role in the development and mastery of music making. Based on research in deliberate practice, Ericsson developed the four-hour per day/ten years and 10,000 hours rule, which indicates the accumulated deliberate practice hours needed for reaching the highest levels in any given field (Ericsson, 2006). Unsurprisingly, deliberate practice is commonly misinterpreted due to its emphasis on quantitative factors (e.g. accumulated practice hours). However, in deliberate practice it is taken for granted that quality of practice is inextricable from the quantity (see Ericsson & Charness, 1994). In regard to time-management and quality of instrumental practice, several researchers suggest using diaries/practice journals for monitoring and planning instrumental practice (Green & Gallwey, 1986; Jørgensen, 2011; Renwick & McPherson, 2009; Sloboda et al., 1996; Zimmerman, 2002). The author and double bassist Barry Green actualized the use of such diaries in his book *The Inner Game of Music*, successfully working on long, medium and short-term goals with his students (Green & Gallwey, 1986).

Based on the above findings, it is reasonable to question whether students entering the music conservatory, (not having undergone the kind of mentoring mentioned above) despite their maturity, still need to learn *how* to carry out instrumental practice. This thesis emphasizes the quality of practice as the primary concern and interest. Accordingly, instead of investigating the significance of accumulated practice hours, I am more interested in techniques and efforts applied by deliberate practitioners (i.e., expert musicians). Nevertheless, the quantity of instrumental practice is significant in

terms of *time management* (i.e., planning the total amount of daily practice, the number of practice sessions, and the length of each practice session). Effective time management allows students to achieve optimal concentration, get necessary rest and avoid over-practicing. (Bruser, 1997; Ericsson, 2006; Heimberg, 2007; Jørgensen, 2011; Martens, 1919; Neuhaus, 1993). In this regard, practice journals, planning/goal setting, monitoring, and evaluation are essential for deliberate instrumental practice and for the applied work carried out during the interventional stages of the present research (for further elaboration see Chapter 3).

2.1.3 Other practice-related components of interest

Deliberate musicians commonly divide the piece they are working on into smaller chunks that are subsequently studied through repetition and then gradually put together in larger sections and finally the entire piece of music (Gruson, 1998; Howard, 1982; Miklaszewski, 1989; Nielsen, 2001). In relation to musicians' use of chunking, Carter (2013) investigated the benefit of *random practice schedules*. In what Carter refers to as a random practice schedule, the practitioner repeats the various chunks a number of times and thereafter randomly jumps to the next planned chunk. After having completed all the intended chunks, the practitioner returns to the previous ones in a random order. When a randomized practice routine has been completed successfully, the practitioner may have completed an equal amount of repetitions as *blocked practice schedule* practitioners (i.e., those who repeat a phrase over and over without varying), however, with far more variation and brain activation. Furthermore, musicians involved in random practice schedules were able to internalize their practice far more efficiently compared to blocked practice schedule students. Moreover, brain activation decreases when stimuli are repeated over and over (Carter, 2013).

Random practice schedules are, for the interventional part of the present thesis, considered an integral tool in varying students' deliberate instrumental practice. In general, I find the above views on instrumental practice to provide both the breadth and depth needed for understanding the phenomena of interest, instrumental practice.

2.2 Psychological and theoretical framework

This section will chronologically explore in depth the psychological frameworks used in this thesis. The overarching theoretical framework (i.e., socio-cognitive theory including self-regulated learning theory and its cyclical model of self-regulated learning) will be presented. This will further be tied to the main theories (see Figure 2) applied in the adapted model of cyclical self-regulated learning (goal setting, self-efficacy, self-determination and attribution theories). Because PST plays a central role in the thesis' main research questions, the main tenets of PST will be presented first.

2.2.1 Psychological skills training

Since the late 19th century, sport psychology has increasingly taken a central role in the enhancement of sport training and competition (Weinberg & Gould, 2011). However, it was not until the late 1960s that the greatest advances in the field took place in the Western world. The first international conference of sport psychology was held in 1965, and the first international journal of sport psychology was established in 1970. This progress took place during a time when the world was divided by the Cold War. Besides generating political opposition, the Cold War generated a tremendous sports rivalry between the superpowers. To their surprise, Western sports psychologists discovered decades later that the Soviet Union had a tremendously well-developed system of mental preparation that was way ahead the Western system. When Avksenty Tcezarevich Puni's (1898–1986) essays and theorization on sport psychology were translated to English, they revealed a holistic model including *realistic goal setting*, *arousal regulation*, *self-regulation*, and *high tolerance of distractions and stress* (Stambulova, Wrisberg & Ryba, 2006). The model is remarkably similar to current models of mental/psychological preparation. *Psychological skills training* (PST) is defined as

[...] a systematic and consistent practice of mental or psychological skills for the purpose of enhancing performance, increasing enjoyment, or achieving greater sport and physical self-satisfaction" (Weinberg & Gould 2011, p. 248).

PST, also called the canon of mental preparation, is the most common model of mental preparation in international sport psychology today (Weinberg & Gould, 2011).

Based on decades of research, PST comprises five core techniques, namely *goal setting*,¹ *arousal regulation*,² *attentional focus/concentration*,³ *internal dialogue/acceptance*,⁴ and *imagery*⁵ (e.g., Beauchamp, Halliwell & Fournier, 2012; Beauchamp, Harvey & Beauchamp, 1996; Burton, 1989; Fournier, Calmels, Durnad-Bush & Salmela, 2005; Sheard & Golby, 2006; Kyllö & Landers, 1995; Orlick & Partington, 1988; Thelwell, Greenlees & Weston, 2010; Thomas, Murphy & Hardy, 1999). These techniques are designed to make athletes resilient, mentally tough, and balanced while competing. During psychological skills training the main goals are to:

- 1 Automate and overlearn the skills.
- 2 Systematically integrate PST in performance situations.
- 3 Simulate the skills in various performance-related contexts
(Weinberg & Gould, 2011).

PST is sometimes mistakenly believed to provide a “quick fix.” Learning psychological skills takes time and effort. Furthermore, as people have completely different needs, PST ought to be carried out in an individualized manner (Weinberg & Gould, 2011). Consequently, individual assessment of personal strengths and weaknesses is the first concern in the initial phase of PST (Andersen, 2000; Butler & Hardy, 1992; Hays, 2009). At this stage, a performance profile is commonly applied (Andersen 2000). There are several

-
- 1 Goal setting in sports is, to a great extent, based on Locke and Latham’s (2002) theory of goal setting (discussed in detail in the section on theory). However, goals in sports can be broadly categorized as outcome, performance and process goals. Outcome goals are goals that focus on a competitive result. Performance goals focus on achieving a specific standard or performance objective, independent of other competitors. Process goals are concerned with the concrete action a performer must engage in while performing in order to perform well (Weinberg & Gould, 2011).
 - 2 Arousal regulation refers to the capacity to regulate physical and mental arousal in accordance with situational demands (Weinberg & Gould, 2011).
 - 3 Attentional focus (AT) contains the following: a) selective attention (i.e., identifying the relevant cues for each task), b) maintenance of AT over time, c) being aware of the situation and performance errors, and d) shifting focus when necessary.
 - 4 Acceptance training/self-talk aims to building self-confidence. Athletes who are insecure tend to avoid doing mistakes, while self-confident athletes are willing to take chances during competition (for further review see Weinberg & Gould, 2011). Acceptance training in the present research was based on principles of acceptance and commitment therapy (see Hayes & Strosahl, 2004).
 - 5 Applying imagery, one can recreate and memorize previous positive experiences, and/or picture and imagine new situations to mentally prepare for performance (Weinberg & Gould, 2011).

advantages to performance profiling. Use of performance profiles has been shown to enhance self-awareness and evaluation of performance as an initial basis for goal setting and planning. Furthermore, as performance profiling is based on self-assessment, it has been shown to positively increase self-determination and intrinsic motivation (Butler & Hardy, 1992; Graham, 1993; Weston, 2005). Finally, Weinberg and Gould (2011) identify self-regulation as the ultimate goal of PST.

The PST used in the current research generally followed the above-presented guidelines. First, it was paramount that participants have enough time to internalize and apply the skills. For example, learning to concentrate on task-relevant events during performance or to stay calm under pressure requires systematic, thorough practice. Second, it was important that the participants be given multiple opportunities to perform in front of others trying out the skills that they were working on. Third, an individual, personalized hands-on approach was used. Accordingly, a performance profile was applied for initial assessment. Studies implementing psychological skills from sport psychology in the performance and practice of music (i.e., Clark & Williamon, 2011; Hoffman & Hanrahan, 2012; Kageyama, 2007; Osborne et al., 2014) are few. The longest intervention lasted for 9 weeks (i.e., Clark & Williamon, 2011). The remaining intervention studies lasted for 3 weeks or less. In addition, these studies taught psychological skills in group settings. Only Clark and Williamon (2011) did some individual work (i.e., 30-minute weekly sessions). The results from these studies were based on effect size measures applying surveys and control groups. First, the limited amount of PST research in music reveals the need for intervention research that thoroughly sticks to sport psychological recommendations for delivery. Second, the literature needs intervention research that is individually tailored and qualitatively reported. Third, there is a need for longitudinal intervention research in which participants can internalize and actively apply the skills in multiple performance contexts. The present research is, as far as I know, the first research study in music to investigate PST in accordance with general recommendations for PST delivery (see Weinberg & Gould, 2011; Andersen, 2000).

In accordance with Weinberg and Gould's (2011) notion that the ultimate goal of PST is self-regulation, it was hypothesized that PST delivery is facilitated structurally and theoretically through the lens of self-regulated learning theory.

2.2.2 A social-cognitive view

With the exception of self-determination theory (Deci & Ryan, 2000), the theories (i.e., goal setting, self-efficacy, attribution theories) applied in the present research are all based on a social-cognitive perspective (Bandura, 1977; Locke & Latham, 2002; Weiner, 1985). *Social cognitive theory* (SCT) was founded as a reaction to and a means of developing earlier learning theories based on behaviorism (e.g., Skinner, 1974). Instead of considering learning solely as a response to interaction with the environment, SCT recognized the importance of human cognition (Bandura, 1977). In essence, Bandura found human behavior to be the result of stimuli (i.e., environment), cognition (i.e., person), and behavior (i.e., based on both environment and cognition) (Bandura, 1986). Moreover, the social-cognitive view explains the process of self-regulation as a reciprocal relation between 1) the *environment*, 2) an individuals' *cognitive processes*, and 3) *behavioral factors* (e.g., self-regulated learning). This interrelation outlining determinants of human behavior is referred to as *reciprocal determinism* (see Figure 1) (Zimmerman & Schunk, 1989).

Furthermore, the mechanisms of reciprocal determinism are an essential source of goals, motivation and personal development. Social cognitive theory gives special attention to vicarious learning, a process in which one

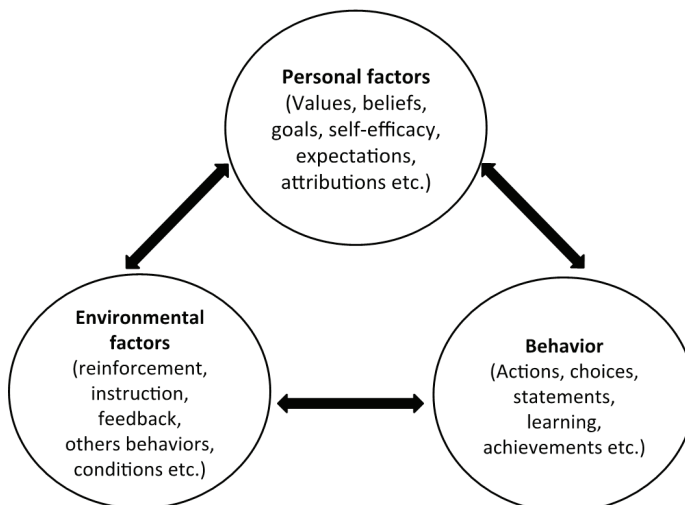


Figure 1: The social cognitive model of reciprocal determinism (Based on Zimmerman & Schunk, 1989)

learns from observing competent others. In this observational process, the observer is as important as the model being observed since the observer uses his or her cognition to create meaningful achievements and outcomes through constituted behaviors. Accordingly, social cognitive theorists believe in a combination of enactive and vicarious learning. *Vicarious learning* is based on observing how others behave or perform tasks, while *enactive learning* is a cumulative consequence of one's own actions (Zimmerman & Schunk, 1989). Moreover, vicarious learning depends on environmental factors, while enactive learning comes from within.

In music acquisition, vicarious learning might take place as a student observes a soloist perform in concert. In essence, the student observer then might accommodate the external stimulus by trying to imitate the same patterns of execution. For instance, as musicians, we can easily recognize the discrepancy between a well-prepared music performance and a performance based on aimless non-deliberate practice. The quality of execution is usually dependent on the quality of on-going enactive learning. For example, if a violin student discovers how to avoid scratchy sounds on the instrument by adjusting the pressure and the angle of the bow, it is considered an enactive learning process. In this process, cognitive control and regulation “includes the types of cognitive and metacognitive activities that individuals engage in to adapt and change their cognition” (Pintrich, 2000, p. 460). Progress towards goals is monitored in relation to the desired goal achievement. Moreover, as the discrepancy between goal progress and the actual goal decreases, the closer one gets to the desired result. Moreover, when instrumentalists are able to metacognitively monitor their behavior, they are also able to control their motivation and their belief in their ability to master a task (Pintrich, 2000). This meta-perspective of one's own progress and the ability to reflect on and monitor goal-attainment, making new practice plans and goals, is considered a substantial source in the development and progress of instrumental practice.

2.2.3 Self-regulated learning

Self-regulated learning (SRL) is characterized on a general level by learners who are metacognitively, behaviorally, and motivationally active in their own learning processes (Zimmerman & Schunk, 1989). Furthermore, Zimmerman outlines an overview of multiple directions within self-regulation such as

cognitive constructivist, Vygotskian, phenomenological, volitional, and social-cognitive views. The present thesis is based on the social cognitive view discussed in the previous section. Pintrich (2000) gives what he calls a general working definition of self-regulated learning:

An active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment. These self-regulatory activities can mediate the relationship between individuals and the context, and their overall achievement. (Pintrich, 2000, p. 453).

This definition highlights four basic characteristics:

- 1 Learners are viewed as active participants. Moreover, the practitioners/learners actively construct their own goals, strategies and learning processes from the external environment, the social world and from within (i.e., reciprocal determinism).
- 2 Self-regulation assumes that there is a potential of control through which the learners are able to regulate, monitor and control their own cognition, behavior and motivation.
- 3 Self-regulated learning theory assumes there is a criterion or norm against which the participants can measure their progress and evaluate whether to continue in the same fashion or change strategies to reach the desired standard.
- 4 Self-regulatory processes are broadly viewed as having a mediating role between the personal, contextual characteristics and the actual achievement.

The thermostat metaphor is adequate for describing self-regulation. When we observe that the standard or norm of learning or level of competence has changed, we seem to adjust to the new standard. Zimmerman (2002) has taken this work further, integrating the ideas into a cyclical model of self-regulated learning. This model forms the main theoretical framework of the present research.

2.2.4 A cyclical model of self-regulated learning

Self-regulated learning takes place as a result of

[...] self-generated thought, feelings, and actions that are oriented to attaining goals. These learners are proactive in their efforts to learn because they

are aware of their strengths and limitations and because they are guided by personally set goals and task related strategies (Zimmerman, 2002, p. 66).

Zimmerman’s theory of self-regulation suggests a triadic cyclical view of learning consisting of three phases: *forethought phase*, *performance phase* and *self-reflection phase*, as illustrated in Figure 2. Self-regulation theory has previously been applied in research on advanced music students (e.g., Nielsen, 1999), and in research on younger music students (e.g., McPherson & McCormick, 2006). The present research suggests adapting Zimmerman’s cyclical model as illustrated in Figure 2. This chapter presents the general theoretical underpinnings of Zimmerman’s model (Figure 3), and then discusses the original model in relation to the proposed adapted model.

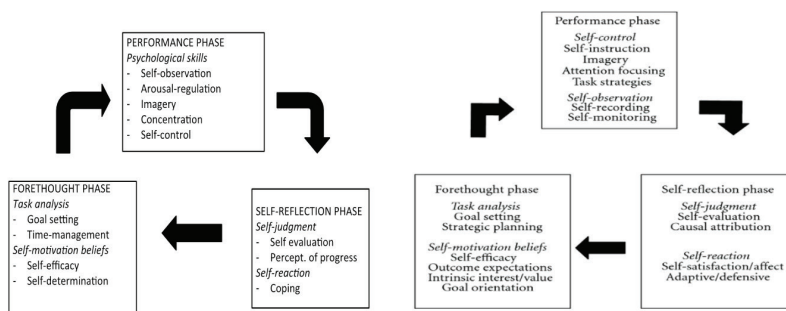


Figure 2: (Left) The adapted model of self-regulated learning in music

Figure 3: (Right) Zimmerman’s cyclical model of self-regulated learning (Zimmerman, 2002)

The forethought phase

This phase consists of two key categories: *task analysis* and *self-motivation beliefs*. Both are dependent on each other and influence the types of goals set and the quality of motivation for further effort. First, *goal setting* and *strategic planning* are sub-categories of task analysis. Self-regulation research has revealed that experts

[...] display high levels of self-motivation and set hierarchical goals for themselves with process goals leading to outcome goals in succession [...] Experts plan learning efforts using powerful strategies and self-observe their effects (Zimmerman & Risemberg, 1997, p. 74).

Schunk and Rice (1989) underlines the significance of setting proximal goals day by day leading towards a temporally distant goal. Students’ self-efficacy

beliefs have also been shown to be considerably stronger when working toward specific short-term goals (Bandura, 1977; Locke et al., 1981; Schunk & Rice, 1989). Last but not least, Zimmerman points out the important distinction between *proactive* and *reactive* learners. “Proactive learners self-regulate more effectively because they engage in high-quality forethought phase, which in turn improves their self-regulatory functioning during subsequent phases. In contrast, reactive learners self-regulate less effectively because they rely mainly on self-reflective phase processes to improve their performance” (Zimmerman, 2008 p. 277). According to self-regulated learning, reactive students are less able to cope in the face of adversity because they do not acknowledge the real causes of failure and they lack specific goals. As a result, reactive learners usually set vague/general goals, or no goals based on affective intuitive experiences (Zimmerman, 2008).

The forethought phase depends on *learners' beliefs* about themselves, their level of *self-efficacy*, *task value*, *outcome expectations* and *goal orientation*⁶ (see Figure 3) (Zimmerman, 2002). According to Zimmerman (2002), self-motivational belief facilitates the quality of actions carried out during the performance phase. SRL research has revealed that if a student believes he or she can succeed in learning tasks (i.e., self-efficacious student), he or she is more likely to achieve greater success than a student who is pessimistic about goal accomplishments (i.e., self-inefficacious students) (Zimmerman, Bandura & Martinez-Pons, 1992). Self-determination theory has also been tied to SRL (i.e., Reeve, Ryan, Deci & Jang in Schunk & Zimmerman, 2008). Intrinsic interest/value is central in such a perspective. *Autonomous self-regulation* is the most central concept when analysing self-determination theory in relation to self-regulation theory. This will be further elaborated below. Outcome expectation and goal orientation are also factors that affect subsequent effort in the cyclical model (see Nielsen, 2008 and Nicholls, 1984). These factors will not be discussed as they are beyond the scope of the present research.

The performance phase

This phase is organized into two categories, *self-control* and *self-observation*. The second class, self-observation, consists of “metacognitive monitoring

6 Due to the vast amount of constructs included in Zimmerman's framework of SRL and the purpose of the present research, task value, goal orientation and outcome expectation are not included in the adapted model of SRL (Figure 2).

or physical record keeping of specific aspects of one's performance, the conditions that surround it, and the effects that it produces" (Zimmerman in Elliot & Dweck, 2005, p. 516). The first sub-category in this phase, self-control, refers to "the deployment of specific methods or strategies that were selected during the fore-thought phase" (Zimmerman, 2002: 68). *Self-instruction* is, within SRL, a strategy to enhance the learner's focus on relevant aspects of the task. *Imagery*, is interpreted by SRL as a cognitive technique that might enhance learning/skill acquisition, preparation/pre-performance and performance of automatized tasks (Zimmerman & Kitsantas, 2005). *Attention focusing/concentration* "are designed to improve one's concentration and screen out distracting events" (Zimmerman & Kitsantas, 2005, p. 516). Generally, the use of task strategies is a prolongation of strategic planning in the forethought phase. *Self-observation* refers to "self-recording personal events or self-experimentation to find out the cause of these events" (Zimmerman, 2002, p. 68). Within the category of self-observation, self-monitoring is defined as "one's cognitive tracking of personal functioning" (Zimmerman, 2002, p. 68). This is a fundamental part of recording when learning seems to develop in the right direction. As Zimmerman and Kitsantas (2013) point out, "Because poorly self-regulated learners fail to set selective goals, they are often overwhelmed metacognitively by the amount of information that must be self-monitored, and they cannot adjust their strategies optimally" (p. 516).

Self-reflection phase

The self-reflection phase is divided into two major categories, *self-judgment* and *self-reactions*. Self-judgment is linked to how we attribute our learning performance and causal attributions of our learning outcomes (Zimmerman & Kitsantas, 2005; Moreno, Cervello & Gonzalez, 2010). This attribution is often linked to a norm or standard, either a standard reached by others or one that is self-defined, independent of others (Zimmerman, 2002). Zimmerman points out that learners with a high ability to self-regulate learning often stick to their personal standards because they have set specific goals beforehand (Zimmerman, 2002). Furthermore, "Poorly regulated learners attribute their errors to uncontrollable variables such as fixed ability, whereas highly regulated ones attribute errors to controllable variables such as solution strategies" (Zimmerman & Kitsantas, 2005, p. 517). Zimmerman further points out two key forms of self-reaction,

self-satisfaction and *adaptive inferences*. “Self satisfaction refers to perceptions of satisfaction or dissatisfaction and associated affect regarding one’s performance” (Zimmerman & Kitsantas, 2005, p. 517). Adaptive or defensive inferences “are conclusions about how one needs to alter his or her approach during subsequent effort to learn. Highly regulated learners make adaptive inferences, such as by choosing a more effective strategy, but poorly regulated ones resort to defensive inferences, which serve primarily to protect them from future dissatisfaction and aversive affect” (Zimmerman & Kitsantas, 2005, p. 517). When one is caught up in defensive inferences one “protects one’s self-image by withdrawing or avoiding opportunities to learn and perform” (Zimmerman, 2002, p. 68).

Failure and unsuccessful outcomes lead to stagnation and negative attributions (Zimmerman & Schunk, 1989). Finally, the three cyclical phases of self-regulation have a reciprocal effect on one another (Zimmerman, 2002). Moreover, self-reactions to learning ought to affect some sort of motivation for further effort. Adaptive self-reactions are associated with appropriate goal setting and self-motivational belief (Zimmerman & Kitsantas, 2013).

2.2.5 The adapted cyclical model of self-regulated learning

As illustrated in Figure 2, this thesis uses an adaptation of the cyclical model of self-regulated learning. This model was adapted first of all in order to fit PST into a theoretical framework. Second, the adaption was also designed to create a theoretical frame that facilitates both the structural and interpretative elements of PST delivery. The principles of cyclical learning are the same as in Zimmerman’s 2002 model. However, several of Zimmerman’s concepts have been removed and replaced with concepts from psychological skills training and self-determination theory. Moreover, the present research emphasizes goal setting (Locke & Latham 1990), self-efficacy (Bandura, 1977), self-determination (Deci & Ryan, 1985, 2000) and attributions (Weiner, 1985), which were all relevant to the implementation of PST and the overall understanding of music students’ self-regulated learning styles in the studies that comprise the thesis. Furthermore, the foundational structure of the cyclical model of self-regulated learning is viewed as a holistic approach to comprehending the multidimensionality of instrumental practice and performance. The main theories in the adapted model are presented below.

Goal setting

The self-regulated learning model proposed here is largely based on *goal setting* as a key psychological skill. Drawing on Locke and Latham’s (1990) theory on goal setting, Zimmerman and Kitsantas (2005, p. 510) explain that “*the key self-regulatory process of goal setting*” is applied to specify intended actions or ends that initiate other self-regulated learning processes. An in-depth elaboration of how various goal processes within self-regulated learning work is needed to explain this notion further.

Since its early development in the 1960s, goal setting theory (GST) has investigated how, what and why goals work in multiple contexts and situations (e.g., Locke, 1968; Locke, Saari, Shae & Latham, 1981). Basically, GST is made up of four basic elements: *goal core*, *moderators*, *mechanisms* and *performance*. These components explain how performance and motivation are affected by goal setting as illustrated in Figure 4.

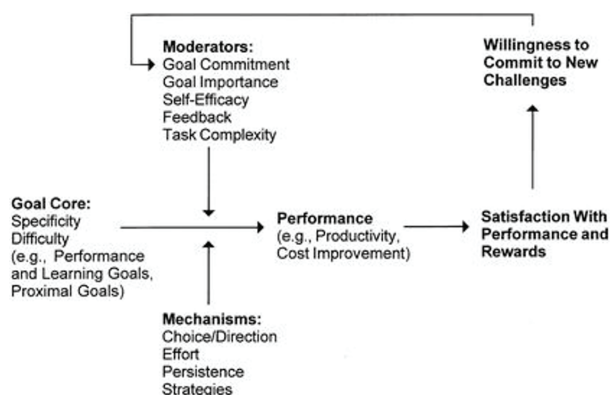


Figure 4: Main components of Locke and Latham’s goal-setting theory, printed with permission from Edward Locke (Locke & Latham, 2002).

The core of goal setting is choosing where to focus attention. By setting *specific goals* one is able to focus one’s attention on “goal-relevant tasks and away from goal-irrelevant tasks” (Zimmerman, 2008, p. 268). Furthermore, students who set very *easy goals* or very *difficult goals* are less likely to be successful and motivated compared to students who set difficult and attainable goals (Locke & Latham, 2002). Moreover, *goal difficulty* best predicts effort, persistence, and performance satisfaction when goals are challenging yet attainable (Locke & Latham, 1990). Mechanisms such as *direction*, *effort*, *persistence* and *choice* of strategies have, through much research,

been shown to be altered by setting goals that are specific and proximal (i.e. specific daily directions about how to complete tasks) and at the same time difficult and in congruence with students' level and ability (Bandura & Cervone, 1983; Locke, Frederick, Lee & Bobko, 1984; Locke et. al., 1981; Schunk & Rice 1989; Zimmerman & Kitsantas, 1997). Goal moderators such as *goal commitment, goal importance, self-efficacy, feedback* and *task complexity* play a central role in overall performance and further commitment (Locke & Latham, 2002). For instance, goal importance and commitment are affected by goal origin and locus of control (e.g., deCharms, 1977; Deci & Ryan, 1985; Erez & Kanfer, 1983). In line with views on self-determination, personal acceptance of the goal (e.g., giving clear rationales for how, why and what to accomplish) has been proved to be more important than goal origin (Locke, Latham & Erez, 1988). In accordance with socio cognitive perspectives, self-efficacy and feedback are central determinates of motivation and performance in goal setting, as self-efficacy contributes to human functioning (Bandura & Locke, 2003). A high personal perception of self-efficacy has been found to be associated with setting more challenging goals (Zimmerman, Bandura & Martinez-Pond, 1992). In a related fashion, self-efficacy and goal setting were found to strongly predict an increase in students' final grades (Zimmerman & Bandura, 1994) Task complexity is, according to Locke and Latham (2002), a predictor of performance and motivation. The complexity of a task is determined by the extent of strategies applied in in the execution of the task. When trying to learn a difficult piece of music, for example, students need a greater repertoire of strategies in order to progress through complex challenges. According to Zimmerman (2008), the use of strategies is best defined by specific and realistic goals that challenge the students. Locke and Latham (2002) claim that *learning goals*⁷ are more appropriate during acquisition than are *performance goals*,⁸ which are favorable for optimal performance. Zimmerman and Kitsantas (1997, 1999) have taken this notion further investigating which goals are adequate for acquisition/automation of tasks and the performance of automatized tasks. They found that a conscious shift from learning to performance goals caused the best performance, while skill acquisition was best achieved by setting learning goals. Locke and Latham's construct of goal setting has not previously

7 Learning goals emphasise specificity and use of relevant task-strategies when acquiring new skills.

8 Performance goals focus on cues/strategies relevant for performance after the acquisition of skills has been automatized.

been considered in relation to instrumental practice research. However, in line with Zimmerman (2008), I assume that goal setting plays a key facilitative role among the three phases of self-regulated learning.

Elaborating on Lock and Latham's (2002) model of goal setting (see Figure 4), I also assume that music students who are deliberate in their forethought and planning of instrumental practice (i.e., specific goal setters who set goals in relation to a goal hierarchy) are involved in task-relevant practice. They both exert effort and demonstrate persistence, having outlined exactly what it takes to accomplish daily tasks. On the other hand, when a student starts to practice reactively, his or her choice of what to work on becomes random. The world famous cellist and pedagogue Janos Starker (1975) recounted being amazed by the amount of instrumental practice spent on things that his students already knew and mastered, or simply on daydreaming and mindless repetition. Accordingly, investing both time and effort in the forethought phase of instrumental practice is hypothesized to be a key determinant of deliberate practice.

Self-efficacy

*Self-efficacy*⁹ is defined as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p. 2). A high sense of self-efficacy is associated with persistence and mastery of tasks, well-being, persistence in the face of failure, perception of threatening situations as opportunities to learn, and attributes leading to strategy use and further work and exploration (Bandura, 1994). Beliefs about self-efficacy are, according to Bandura (1977), determined by four sources, namely *mastery experiences*, *vicarious learning*, *social persuasion* and *physiological indexes*. The primary source of self-efficacy is mastery experiences. If a music student experiences multiple situations of mastery through performances, the product of such experience is more likely to produce higher levels of self-efficacy than if a significant other encourages/persuades the student, or if a peer student masters a similar difficult task (i.e., vicarious learning). If students are self-inefficacious, they are more likely to interpret somatic and emotional stressors as threats and signs of weakness, which in turn lowers their

9 Self-efficacy and goal setting are fundamentally different from self-determination, as self-determination is based on basic psychological needs, while self-efficacy is based on social learning theory and its reciprocal determinism.

self-efficacy. Bandura emphasizes that it is not the somatic or emotional state per se that is detrimental, but the way individuals interpret their physiological arousal (Bandura, 1982). This notion has been taken further in sport psychology by emphasizing the art of accepting perceived inappropriate performance (Gallwey, 1997; Green & Gallwey, 1986; Hayes & Strosahl, 2004). Research within music has revealed that students high in self-efficacy apply a greater number of strategies and more goal-direction in instrumental practice (Miksza & Tan, 2015; e.g. Nielsen, 2004). As Bandura (1994) points out, self-efficacy is expected to influence the performance and self-reflection phases in the cyclical model of self-regulated learning. Accordingly, music students high in self-efficacy are expected to apply a greater amount of psychological skills, leading to on-going self-regulated learning.

Self-determination

Self-determination has been theorized to influence the quality of motivational states (e.g. Deci & Ryan, 1985; Deci & Ryan, 2000). Research on self-determined motivation has, since the late 1960s, established the robust construct of self-determination theory (SDT). SDT focuses on why people engage in activities (e.g., because they have to or because they want to). This distinction between reasons for engagement is determined by the extent to which individuals feel controlled by external forces. For example, do you practice your instrument because your teachers and peers expect you to play flawlessly, or do you practice because you enjoy practicing Beethoven in a particular way? Within SDT, the latter kind of practice is associated with *intrinsic motivation*, while the former is an example of introjected *extrinsic motivation*. *Cognitive Evaluation Theory*, a mini-theory within SDT, claims that a controlled motivational environment dominated by contingent incentives, rewards, deadlines, coercion, and external expectations/pressure might overshadow the intrinsic qualities individuals experience as the result of a change of perceived locus of control. Moreover, when a persons' motivation is driven by external control, their autonomy is inhibited. SDT has found that rewards that relate to and emphasize competence or improvement have a positive effect on intrinsic interest and well-being (Reeve, Ryan, Deci & Jang, 2008). When an activity is driven by an *internal perceived locus of control*, the practitioner has identified and made the activity part of his or her belief system (e.g., practicing a Brahms sextet because you can't wait to play it with the five others). The quality of motivation is

further determined by the extent to which externally prescribed regulations are integrated coherently with one's sense of self (Deci & Ryan, 2000). *Organismic Integration Theory*, the second mini-theory of SDT, views extrinsic and intrinsic motivation on a continuum (see Figure 5).

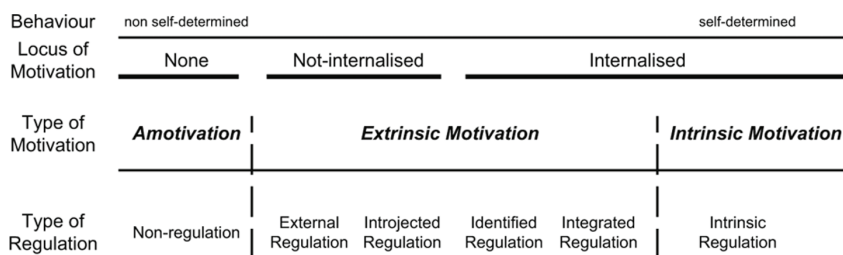


Figure 5: The organismic integration model of SDT illustrated with permission from Edward Deci (Deci & Ryan, 2000).

As illustrated, there are four types of extrinsic motivation. Of the four, *identified* and *integrated motivation* are the ones that are associated with *autonomous motivation*. When an external regulation is identified, the receiver starts to evaluate and accept the nature of the activity. When the regulation is valued and endorsed, it is integrated and thus become part of the receiver's sense of self (Deci & Ryan, 2000). *External regulation* and *introjected regulation* are both controlled motivational elements that thwart an individual's need for resourcefulness, creativity, curiosity and well-being (Deci, Kostner & Ryan, 1999). The key findings of SDT led to a third mini-theory, *Basic Psychological Needs Theory*, reflecting students' "innate, universal psychological needs as sources of autonomous motivation" (Reeve, Ryan, Deci & Jang, 2008, p. 227). When the context of learning fulfills the basic needs (i.e., *autonomy*, *competence* and *relatedness*), intrinsic, autonomous motivation, and general psychological well-being are the results (Deci & Ryan, 2000; Reeve et al., 2008).

In the present research, SDT is applied within the frame of SRL, as students' inner resources and engagement in proactivity are believed to be enabled as a result of autonomous need-satisfying contexts (Reeve et al., 2008). Moreover, SDT provides concrete guidelines (e.g., Reeve & Jang, 2006) in relation to the provision of contextual need support within self-regulated learning. For instance, using self-assessment and performance profiling,

participants acknowledge and define their own needs, giving them a sense of ownership and a rationale for continued work (Butler & Hardy, 1992). Furthermore, through a non-coercing style of coaching, participants are challenged to identify, reflect and define aspects of their instrumental practice that trigger further discovery and motivation. Based on this theory, I presume that such a style of learning gives music students a sense of autonomy, competency, and relatedness which alters the experience of joy and well-being. Moreover, I believe that principles deriving from SDT appear to have the potential to facilitate the overall process of implementing PST.

Attributions

How we attribute our outcomes has a great impact on self-regulated learning, motivation and self-efficacy (Weiner, 1985). Thus, *attribution theory* plays a central role in the self-reflection phase of self-regulated learning. According to Weiner (1985) success and failure can be attributed to three properties: *causal locus* (within or outside the person), *causal stability* (stable vs. unstable), and *causal control* (changeability, controllability). Along these dimensions, Weiner refers to common outcome attributes (success–failure) such as ability/aptitude, effort, difficulty and luck (Weiner, 2014). In relation to self-regulated learning, attributions are seen within a frame of socio-cognitive theory (Schunk, 2008). For example, if a music student practices a difficult piece of music over a long period of time, investing both effort and hard taxing work, but, despite this, fails to master the piece, the student might (if coping adaptively) attribute failure to inappropriate strategy use (i.e., unstable/internal/controllable factors). Such a reaction would most likely lead to further self-regulated learning and re-monitoring (still having a high self-efficacy for the task). A second and less adaptive reaction to the same outcome would be to attribute failure of mastery to lack of ability (i.e., stable/ internal cause/uncontrollable factors). Such a reaction would most likely make the student give up on the task. If success is attributed to good luck (external, uncontrollable and unstable), it is theorized to cause lower self-efficacy than success attributions of effort and ability. Similarly, if failure is attributed to bad luck, it is less detrimental than ability attributions, since bad luck is unstable and therefore does not inhibit self-efficacy for further effort (Schunk, 2008).

In the present research, and in line with self-regulated learning, attributions leading to adaptive coping (e.g., attributions of failure leading to change of

strategies and continued adequate effort) are expected to be a result of the application of psychological skills and self-observation (see Schunk, 2008). Moreover, attributions might predict the likelihood of further self-regulated learning and type of effort carried out.

Theoretical and structural functions within the adapted model

As illustrated above, PST has been incorporated into Zimmerman's model of self-regulated learning, taking a subordinate role (Zimmerman, 2002). SRL theory and PST have multiple overlapping elements (e.g. goal setting, self-instruction, imagery, concentration/attention focusing, see Figure 3) and are suggested hierarchically within the three-phase cyclical model of self-regulated learning. Consequently, PST will be treated as a sub-category within an overarching framework of self-regulated learning. Furthermore, due to the overarching nature of SRL, several psychological concepts (i.e., goal setting, self-efficacy, self-determination and attributions) are incorporated as part of the framework. A music student's self-efficacy for instrumental practice and performance is most likely tied to how he or she attributes failure or success. In turn, success is often a result of setting specific goals. Further, the goal setting process is facilitated when the context constitutes self-determination, which enhances the quality of motivation, among other things (see Zimmerman, 2008). Therefore, I consider goal setting, self-efficacy, self-determination and attributions to be complementary elements in understanding the multifaceted nature of different motivational processes of interest.

The adapted model's forethought phase includes goal setting and time management as part of task analysis. In sport psychology (PST) it is common to apply task analysis in which an athlete's physical and psychological condition is assessed as a basis for goal setting (Burton, Pickering, Weinberg, Yukelson & Weigand, 2010; Weinberg & Gould, 2011; Zimmerman, 2002). Principles deriving from goal setting theory are central in Zimmerman's cyclical model of self-regulated learning and will be considered in relation to deliberate work, persistence and motivation. In addition, time management has been added to the forethought phase of the adapted model. Time management is connected to music students' planning of the duration of both practice sessions and overall daily practice.

As demonstrated in Figure 2, self-motivational beliefs have been reduced to self-efficacy and self-determination. It would have been beyond the present

research scope to include all the theoretical frameworks that Zimmerman includes in his cyclical model. The adapted model already includes four major theoretical frameworks (i.e., goal setting, self-efficacy, self-determination and attributions), which were found to be the most useful for the main purposes of the theoretical framework (as noted above). All four constructs are frequently applied in relation to sport psychology (e.g., Weinberg & Gould, 2011). In essence, all four constructs provide practical information regarding how and why to motivate human behavior and learning. At the same time, the four constructs are related to one another (e.g., a student who attributes failure to lack of personal ability is likely to have low self-efficacy). For instance, achievement goals (goal orientation) are frequently referred to in sport psychology (e.g., Treasure & Roberts, 1995), and could have been an interesting perspective to bring into the present research. However, it was necessary to avoid including too many theoretical concepts.

The performance phase in the adapted model consists of psychological skills deriving from PST, plus self-observation deriving from SRL. As pointed out, all five psychological skills were implemented in the adapted model's performance phase, and goal setting remained as part of the forethought phase. This made sense from both a structural and theoretical point of view (see Zimmerman, 2002)

The adapted model's self-reflection phase includes self-evaluation, perceptions of progress and coping. Self-evaluation was operationalized in accordance with Zimmerman (1989, 2002). Coping indicated to what degree students attributed success and failure to positive or negative attributes.

2.2.6 Concluding theoretical reflections

Taking a closer look at the definitions of the main constructs presented in this chapter (i.e., deliberate practice, psychological skills and self-regulated learning), we can see multiple overlaps. All the constructs emphasize goal attainment, performance improvement, assessment of strengths and weaknesses and systematically structured practice. Accordingly, one might question whether they are distinguishable enough to be included as multidimensional constituents. Corroborating the use of multiple similar constructs, it is believed that the constructs supplement one another enabling a richer perspective of the issues of interest.

Deliberate practice research has been mainly occupied with the investigation of determinants of expertise in different fields. The information gained from research in deliberate practice is highly relevant for both SRL and PST. Hence, the many discoveries within deliberate practice scientifically inform and enable the application of effective techniques associated with peak performance (Starkes & Ericsson, 2003). Moreover, deliberate practice is an exploratory field of research interested in learning how experts become experts. PST is, first of all, a practical phenomenon providing athletes with performance enhancing techniques applied in pursuit of excellence (Andersen, 2000). Because of its focus on applicability, PST gives very specific guidelines about how and what to apply in different situations. Moreover, I believe that PST is more appropriate at a micro-level of interventional research. Lastly, SRL is an overarching motivational and energizing concept providing the learning context with both directionality and conceptual knowledge concerning the tenets of learning. Accordingly, because they cover both theoretical and practical issues of learning, I believe that SRL and PST supply one another. Moreover, SRL is adequate on a macro-level for explaining motivational issues conceptually (including self-efficacy, self-determination, use of strategies and attributions) in relation to learning, thus highlighting the “why” of actions and motivation. SRL also provides guidelines concerning “what” and “how” to implement strategies. However, it does so to a lesser extent than PST. Consequently, SRL in music students is enriched by PST’s focus on practical functionality. On the other hand, the delivery, implementation and evaluation of PST are facilitated by SRL’s focus on motivational issues of learning as cyclical concepts. The four underlying concepts (i.e., goal setting, self-efficacy, self-determination and attributions) are accordingly viewed as different components that broaden the overall understanding of the functionality of SRL. In order to clarify this further, I will end this chapter with a practical example of how these four elements of SRL are expected to work cyclically in relation to one another (e.g., Zimmerman, 2002, 2008) in music students’ instrumental practice.

Before setting goals, music students assess their current level. Thereafter, goals are set in relation to the initial assessment. If students are generally high in self-efficacy they are expected to set more difficult goals than students low in self-efficacy. However, the goal setting process per se is also expected to alter students’ self-efficacy since the whole practice process has been analyzed beforehand making the practitioner aware of the bigger

picture. The practitioner feels personally attached to the tasks at hand because personal involvement and self-determination (i.e., identifying needs and aims in the practice process) lay the basis for further effort. Based on the above-presented research, I believe that when students have both strong self-efficacy beliefs and set specific goals, they apply a wide repertoire of different practice strategies designed to solve the identified challenges and problem spots. The evaluation and attributions in the practice process are tied to the specific work executed. Moreover, substantial information aiding more realistic attributions (e.g., strategy attributions rather than ability attributions) is based on the specific planning executed in the forethought process (see Zimmerman, 2008). Accordingly, such realistic attributions are expected to give substantial feedback enabling the practitioners to set more suitable goals for their continued practice. In contrast, when music students skip the planning carried out during the forethought phase, attributions in the face of failure (i.e., lacking specific goals and self-monitoring) are more likely to make students question whether they have what it takes to achieve their goals. Such maladaptive attributions might cause the practitioner to give up, or to try harder in an excessive manner. Such attributions are also expected to lower the practitioner's self-efficacy substantially. The combination of psychological constructs within the adapted cyclical model of SRL thus enable a broader understanding of the why, what and how of learning. However, as mentioned above, it was found necessary to reduce the amount of theoretical constructs to a manageable amount.

The main aspects of the theory applied in the present research have not previously been tied to survey research or intervention research. This thesis thus provides a new theoretical lens through which PST and self-regulated learning can be investigated and interpreted.

3 Material, methods and methodology

This section of the thesis first presents the researcher's methodological standpoint. Subsequently, an overview of the research design and study methods is given (i.e., case study, mixed methods and triangulation). The chapter then continues with a chronological presentation of the procedures, participants and data collection used in the studies comprising the thesis. The chapter ends with a discussion of ethical considerations related to the present research.

3.1 Personal methodological standpoint

The word method is most commonly understood to refer to procedures, tools, or strategies of doing research. Methodology, on the other hand, encompasses reasons and reflections about why certain strategies are chosen. Accordingly, methodology is tied to philosophical embedment, which, in turn, influences choice of study design (Giacobbi, Poczwadowski, & Hager, 2005, p. 23). Dichotomizing quantitative positivistic and qualitative constructivist paradigms creates unnecessary limitations for the material investigated. Moreover, if a method is chosen solely based on personal epistemological belief, the phenomena of interest might not be adequately investigated due to one's ontological position. From an axiological perspective, pragmatists have pointed out that there is a false dichotomy

between positivism and constructionism (Johnsen & Onwuegbuzie, 2004). Accordingly, quantitative research does not necessarily have to be embedded in positivism (Onwuegbuzie & Leech, 2005). Indeed, “Researchers who ascribe to epistemological purity disregard the fact that research methodologies are merely tools that are designed to aid our understanding of the world” (Onwuegbuzie & Leech, 2005, p. 377). The choice of methods for this study was based on a pragmatic standpoint that took into account both the material of interest and the nature of the study. In the same vein, after thorough evaluation I decided to mix both qualitative and quantitative methods.

3.2 General overview of design and study methods

Instead of presenting the procedures ad hoc, some basic ideas behind the choice of methods and design will be presented and elaborated.

3.2.1 Case study

Case study design was applied in two of the three studies (Papers 3 and 4) included in the thesis. Case study research empirically investigates real-life contextual phenomena in depth (Yin, 2009). A case study

[...] is expected to catch the complexity of a single case. A single leaf, even a single toothpick, has unique complexities – but rarely will we care enough to submit it to case study. We study a case when it itself is of very special interest. We look for the detail of interaction with its contexts. Case study is the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances (Stake, 1995, p. 16).

With this in mind, case study was selected as an appropriate method of inquiry, resonating with PST’s emphasis on individual assessment, work and development over time. Moreover, since every single case implement PST to their instrumental practice, it is essential to question and examine how the cases/students perceive and apply psychological skills to their own instrumental practice context and *why* they might benefit from doing so. The main benefit of using case studies are “that they can expand our knowledge about the variations in human behavior” (Gerring, 2007, p. 197). Furthermore, flexibility concerning the application of multiple procedures and methods of data collection is also an advantage of case studies (Stake, 1995). Accordingly,

the case studies conducted as part of the research for the thesis combined multiple methods including mixed method design and triangulation.

However, case studies have several disadvantages as well. Due to their small sample sizes, they are hardly ever scientifically generalizable to a larger population. However, theoretical generalizability is not uncommon for case studies (Marczyk, DeMatteo & Festinger, 2005). Case studies are also commonly criticized for being tedious and complex, and do not result in concrete causal explanations. On the other hand, case studies are mostly interested in possible explanations of why or how something works or doesn't. Yin (2009) emphasizes the advantage of using a questionnaire in intervention studies for monitoring components pre-existing the designation of interventions (Yin, 2009). Accordingly, the formal designation of the intervention program (i.e. participants' habits of instrumental practice and performance prior to the intervention) will accordingly work as a control monitoring change throughout the intervention from Time 1 to Time 2 (see Paper 4).

Instrumental case study

In instrumental case studies, "a particular case is examined to provide insight into an issue or refinement of theory. The case is of secondary interest; it plays a supportive role, facilitating our understanding of something else" (Stake, 1995, p. 3). The research questions in my case studies relate to why and how psychological skills might work and facilitate music students' instrumental practice and performance. The main interest is thus not the music student per se, but how music students experience and perceive how and why psychological skills might work or not work in instrumental practice and music performance contexts. This implies that the case/participants has/have a secondary instrumental role in providing the researcher with information to the main phenomena of interest, namely the function of PST interventions for music students.

Multiple and cross-case studies

In order to strengthen a study's hypotheses one might use multiple cases. Yin (2009) and Stake (1995) simply distinguish single and multiple/collective case studies by the amount of participants.¹⁰ Gerring (2007) has made

¹⁰ Yin (1995) uses the term *multiple case study*, while Stake (1995) uses the term *collective case study* to describe the same phenomenon.

a slightly more complex distinction by adding the expression cross-case study. The advantage of cross-case studies is that they enable both comparisons across cases and a broader theoretical generalization of the studied phenomena. The present research combined multiple case studies with a cross-case study analysis emphasizing each case's development, followed by a comparison of the individual processes (more detail is provided in the analysis section).

Mixed methods and triangulation

My interpretation of mixed methods is based on Creswell's definition:

Mixed methods research is research design (or methodology) in which the researcher collects, analyses, and mixes (integrates or connects) both quantitative and qualitative data in a single study or multiphase program of inquiry (Johnson, Onwuegbuzie & Turner, 2007, p. 119).

Johnson et al. (2007) investigated key researchers' interpretations of mixed methods and found that 15 of 19 important investigators interpreted that qualitative and quantitative procedures were what was being mixed. According to Creswell (2009), four components are of particular interest in mixed methods: *interaction* (i.e., to what extent the qualitative and quantitative elements are dependent/independent of one another in the research question, data collection and analysis), *priority* (i.e., to what extent quantitative and qualitative elements are prioritized), *timing* (i.e., when and in which order the two elements are applied), and *mixing* (i.e., when and how the two elements are mixed). In the mixed method intervention study (Paper 4), quantitative methods of inquiry had a secondary role, which was treated separately from the qualitative data. Quantitative elements were first discussed in relation to the qualitative findings in the research report. However, as part of the structuring of the PST intervention, the questionnaire was applied as a quantitative source paving the way for further qualitative data analysis (i.e., personalized semi-structured interviews). This method of inquiry enabled individual tailoring of the PST intervention. Creswell (2009) refers to this type of mixing between quantitative and qualitative data as *concurrent nested design*. The advantage of concurrent nested design is that it can identify and explain contradictions and the complexity of survey responses. However, the complexity in nested designs commonly generates qualitative responses that fit into interrelated conceptual themes. This makes the whole process of analysis more complex (Creswell, 2009).

Mixed methods is often confused with triangulation, a method of research including multiple data sources that allow triangulation. “The most important advantage presented by using multiple sources of evidence is the development of converging lines of enquiry” (Yin, 2009, p. 115). In response to the tendency in the literature to define triangulation in a general way, Denzin (2009) expanded the definition to cover *data, investigator, theory*, and methodological triangulation. The present thesis applies data, theory and *methodological* triangulation (Papers 3 and 4). Furthermore, a distinction is made between a) *within-methods triangulation* and b) *between-methods triangulation*.¹¹ Basically, Denzin’s (2009) definition of between-methods triangulation is similar to Creswell’s (2009) definition of mixed methods. The present research depends on Creswell’s definition of mixed methods. However, the mixed-method design integrates within-methods triangulation including three qualitative sources (i.e. semi-structured interviews, case journals, and a research log). This emphasis on triangulation enabled multiple perspectives on the phenomena of interest. More context concerning the use of methods and study design is given in the upcoming analysis section.

3.3 Procedures, participants and data collection

Paper 1

The first paper is a theoretical paper discussing goal setting and self-determination in relation to music acquisition and music teaching. Since this study was purely theoretical, it did not involve any empirical procedures, participants or data collection. However, on a procedural level, the study provided a presentation and review of the theories discussed. Furthermore, the study critically discussed goal setting and self-determination theories in relation to one another suggesting a synthesis of the theories in regard to the practical contexts of instrumental practice and the teaching of music. Moreover, the article was meant as a preliminary theoretical discussion of issues empirically investigated in the three remaining papers.

¹¹ Within-methods triangulation combines either (exclusively) qualitative data, or quantitative data. Between-methods triangulation combines both qualitative and quantitative methods.

Paper 2

The first empirical study of the overall research was a survey study investigating music students' instrumental practice habits. The general aim of this study was to test the predictive power of an adapted cyclical model of self-regulated learning based on Zimmerman (1989) in the context of higher music education.

Participants (N=204) were music students (men=52.9%, women=47.1%), the majority of which were in music performance (53%) music education and other programs (40%) and music composition and music therapy (7%). The majority of the students were studying at undergraduate level (67.9%). The other students were either at the master's or post-master's level. Furthermore, three quarters of the participants were classical musicians, whereas the rest were studying jazz, folk music or other genres. Three quarters of the students were either pianists (27%), string players (26%) or woodwind players (20%). The rest were vocal, brass or guitar students. Most of the participants (77%) practiced between 1 and 7 hours daily (M=3.3, SD=1.9).

Data collection and recruitment

During the preliminary recruitment process, an email requesting participation in the study was sent to 754 music students at the Norwegian Academy of Music during the spring semester of 2015. The mail consisted of information about the study, its aim and rules of anonymity. Contact between the researcher and tentative participants was carried out through the electronic survey package SurveyXact. The survey was available online for two months. Friendly follow-up mails were sent every other week to tentative participants. After the recruitment and data collection were closed, the total response rate was 27%.¹²

The Norwegian Social Science Data Service (NSD) approved the study's general procedures.

12 The response rate was fairly small due to the sub-optimal methods of recruitment. The questionnaire was sent electronically to a general list that was provided by the institution that included inactive students, part-time students and students taking only one subject. Additional screening was difficult as no list of fulltime students was provided.

Paper 3

Paper three reported a two-month pilot intervention study with the aim of optimizing the delivery and content of a PST intervention for musicians. Various intervention tools and ways of carrying out PST interventions were assessed.

As part of the recruitment process, emails were sent to bachelor's students at the Norwegian Academy of Music communicating the aim and participation implications (i.e., estimated time, procedures, different practice tasks, and information concerning full anonymity). Two participants (i.e., last-year undergraduates) were finally selected based on availability, time, interest, and recommendation from their respective teachers. In essence, both participants were described by their teachers as average achievers struggling somewhat with continuity and progress. The intervention lasted for two months during the second half of the autumn semester of 2014. Meetings took place on a weekly basis shifting between individual and group meetings (i.e., two group and two individual meetings per month). The length of each meeting varied from 60 to 90 minutes depending on the content and the participants' needs.

A survey assessing music students' habits of instrumental practice was sent to the participants one week prior to the first individual meeting. The questionnaire provided an initial overview of practice habits, paving the way for further semi-structured interviews. Subsequent semi-structured interviews were partly designed based on the answers given in the first round of quantitative assessment. In addition to weekly research logging, data collection was based on pre- and post-testing assessing the overall program development, program content and participants' perceptions of the intervention tools applied.

Paper 4

The last of the three studies was a mixed method intervention study trying out PST within a framework of SRL among six higher music education performance students. A pre-post study design was applied to measure both quantitative and qualitative data. In mixed methods it is common to report both qualitative and quantitative measures in relation to one another (Creswell, 2009). Furthermore, mixed methods studies seldom treat qualitative and quantitative data as equal entities (Creswell, 2009). The qualitative

methods of inquiry were the main body of data. The quantitative data (effect size) supplemented the qualitative data, providing context for the development from Time 1 to Time 2. Furthermore, the qualitative measures were triangulated (i.e., semi-structured interviews, research log, and participants' diaries), using a "combination of methodologies in the study of the same phenomenon" (Denzin, 2009, p. 25). Triangulation was expected to provide a broader view of the phenomena of interest (Stake, 1995).

Practice diaries were installed on iPad minis which were handed out to all six participants at the beginning of the intervention. In the diaries, students were asked to report how the instrumental practice worked out (pros and cons), their level of concentration and whether they reached their goals (tentative solutions). The research log was based on reflections that I, the researcher, wrote down during the intervention. This log provided information concerning the progress and the work of each participant. Semi-structured interviews were conducted in relation to pre- and post-intervention assessing participants' strengths and weaknesses, and their overall perceptions of the program. In addition to assessing participants' perception of the PST, the post-interview served as a source for understanding if, how, and why PST had affected their overall instrumental practice. A follow-up interview was sent to all participants 8 months after the completion of the program with the aim of assessing to what extent the participants had continued to apply psychological skills, and whether they were interested in continuing to use PST.

Twenty-six tentative participants were registered after the first round of online recruitment. Due to this high interest rate, an electronic survey was developed to assess recruits' availability, interest and previous experience with PST (for review see Paper 4). Following a thorough screening process, six participants were selected from the Academy's bachelor 's in performance program (four in Western classical music, two in jazz/improvised music). The six participants were sent a consent form, which ensured full anonymity and provided general information concerning implications of participation. Information regarding study year was not provided out of concern for anonymity. The Norwegian Social Science Data Service (NSD) approved the study and its procedures.

3.4 Questionnaire and measures

The survey was partly based on three questionnaires:

- Self-Regulation Scale (SRS) (Toering, Elferink, Jonker, Van Heuvelen & Vissdher, 2012), Chronbach's alpha between 0.73 and 0.85.
- Achievement Goal Questionnaire (AGQ), (Elliot & McGregor, 2001), Chronbach's alpha between 0.83 and 0.92.
- Athletic Coping Skills Inventory (ASCI) (Smith, Schutz, Smoll & Ptacek, 1995), Chronbach's alpha of 0.87.

In addition, questions were added in order to fit the questionnaire to the context of instrumental practice and performance. The first version of this questionnaire consisted of a total of 86 items (11 items were background variables) intending to measure students' self-regulatory skills, psychological skills and goal orientation. After initial confirmatory factor analysis (SPSS) and further principal components analysis (LISREL), the items were greatly reduced to a total of 49 items (11 items were background variables). The final version of the questionnaire was named the Self-Regulated Learning in Music Questionnaire (SLMQ) and consisted of a total of 11 subscales (*goal setting, self-efficacy, time management, worry, self-observation, concentration, self-control, imagery, arousal regulation, self-evaluation and coping*) and one additional key question concerning perception of *general progress*. In relation to the analysis of Paper 2, *psychological skills* became a meta-variable including self-observation, concentration, self-control, imagery, and arousal regulation. This was done to assess use of psychological skills in general in relation to the forethought phase and self-reflection phase of Zimmerman's cyclical model of self-regulated learning as illustrated in Figure 2 above (Zimmerman, 2002).

The goal-setting scale (6 items, $\alpha = .80$) measured students use of goal setting. The items covered deliberate practice planning including specific and hierarchical goals set prior to instrumental practice (e.g., "In relation to long- term goals, I set specific short term goals for my practice. On a daily or weekly basis, I set very specific goals for myself that guide what I do").

The self-efficacy scale (4 items, $\alpha = .77$) measured self-efficacy for instrumental practice. The items emphasised belief in the ability to complete various practice tasks (e.g., "I strongly believe that I have what it takes to

accomplish what I start working on. I can solve most problems if I invest the necessary effort”).

The time management scale (3 items, $\alpha = .73$) measured to what extent music students managed overall instrumental practice time and the time of each practice session (e.g., “I have a specific plan for how long each practice session should last”). The questions also referred to the quantity of instrumental practice.

The worry scale (4 items, $\alpha = .74$) measured the fear of failing while performing in relation to others and oneself (e.g., “I often think to myself, ‘what if I am not prepared enough for this performance.’ I am afraid of performing below the other students’ standard”). This scale was based on Elliot and McGregor’s (2001) construct of avoidance goals. The items are related to *perfectionistic concerns* (i.e., concerns about not living up to social and personal expectations of a high standard) (Stoeber & Eismann, 2007).

The self-observation scale (3 items, $\alpha = .74$) measured to what degree students were involved in self-monitoring, metacognitively checking quality and precision while practicing (e.g., “I observe my practice from an analytical perspective. I check my accuracy while progressing through a practice task”).

The self-control scale (3 items, $\alpha = .63$) measured to what extent music students stuck to deliberate, appropriate ways of practicing (e.g., “I am tempted to hastily practice new pieces in the original tempo. I am unfortunately not consistent enough in my instrumental practice. I tend to lose focus towards tasks while practicing due to a desire to master the task immediately”). The self-control involved in investing the right kind of practice effort was the main interest of this measure.

The concentration scale (3 items, $\alpha = .64$) measured to what extent music students managed to focus on task-relevant activities while practicing (e.g., “It is easy for me to direct my focus towards what I am practicing”; “It is easy for me to keep distracting thoughts from interfering with my instrumental practice”).

The imagery scale (2 items, $\alpha = .87$) simply measured to what extent music students applied imagery in relation to instrumental practice and music performances (e.g., “I often use imagery in relation to instrumental practice”; “I use imagery in relation to concerts and performances”).

The arousal regulation scale (3 items, $\alpha = .58$) measured negative mental and physical arousal (e.g., “I often get overly tense during concerts and I am severely influenced by this”; “I usually communicate negatively with myself while practicing”).

The self-evaluation scale (3 items, $\alpha = .73$) measured to what extent music students evaluated their instrumental practice over time (e.g., “When having practiced something over a longer period, I look back to see if I did the right procedures”; “I keep track of my instrumental practice over time”).

The coping scale (3 items, $\alpha = .69$) measured to what extent music students found new ways of practicing and strategies in the face of failure (e.g., “When I’m not achieving the desired results, I carefully search for plausible reasons that lead to new appropriate goals”; “When things turn out badly during concerts, I try to think about how I can do things better next time”).

Perception of progress was measured on one single item (i.e., “I believe that my current progress reflects the amount of hours spent on practicing”).

All scores were recorded on a five-point Likert scale ranging from (1) “strongly disagree” to (5) “strongly agree.” Some of the questions were “negative”, and in these cases the five-point Likert scale was reversed.

3.5 Data Analysis

Paper 2

The data was analyzed using SPSS version 23 for Mac, and LISREL 8.80 (Jörskog & Sörbom, 2006). Music students’ (N=205) habits of self-regulated learning in instrumental practice were assessed with a total response rate of 27%. One hundred fifty-four students completed the full questionnaire, while 51 partly completed it. Little’s Missing Completely At Random Test (MCAR) was conducted using SPSS 23, and revealed that the data were missing completely at random ($\chi^2 = 39.30$, $df = 50$, $p = .86$). Bivariate analysis was then conducted using Pearson’s r . Subsequently, data were computed in LISREL 8.80 for further structural equation modeling. Four models were developed, two structure models and two measurement models. Confirmatory factor analysis approved the reliability of the measurement scales. Both the

structure models and the measurement models had good fit indices (Marsh, 1995; Hu & Bentler, 1999).

Measurement model 1: Chi-square = 319.52 (df =175), $p < .001$, CFI = 0.94, IFI = 0.94, and RMSEA (90% CI) = 0.066 (0.053–0.075). SRMR = 0.066

Measurement model 2: The measurement model revealed a good fit chi-square = 554.83 (df =361), $p < .001$, CFI = 0.94, IFI = 0.94, and RMSEA (90% CI) = 0.051 (0.043–0.060). SRMR = 0.064

Structure model 1: Chi-square = 340.18 (df =182), $p < .001$, CFI = 0.93, IFI 0.93, and RMSEA (90% CI) = 0.065 (0.055–0.076). SRMR = 0.069

Structure model 2: Chi-square = 671.88 (df =380), $p < .001$, CFI = 0.92, IFI 0.92, and RMSEA (90% CI) = 0.062 (0.054–0.069). SRMR = 0.077.

Both direct and indirect paths were analyzed following completion of the measurement models. Finally, a multiple regression analysis was conducted applying SPSS 23 to test the models' cyclical nature (i.e. the predictive power of Zimmerman's self-reflection phase on forethought phase constructs).

Papers 3 and 4

Both Papers 3 and 4 were based on qualitative data analysis. The widely used qualitative analytic method *thematic analysis* worked as a guideline and basis for qualitative analysis in both studies. Thematic analysis outlines a six-step approach to systemizing qualitative analysis:

- 1 Familiarization with data.
- 2 Initial coding.
- 3 Generating potential themes.
- 4 Reviewing themes.
- 5 Defining and naming themes.
- 6 Producing the report.

Papers 3 and 4 undertook the following procedures:

- 1 **Familiarization with the data:** Before transcribing the data into written language, I listened to the interviews in their entirety many times to gain an overview of the stories told (making initial notes). This gave me the opportunity to get an initial overview of each participant's story. The emphasis on listening to the recordings over and over (i.e., listening to the real voices of the

participants) is believed to have facilitated a more comprehensive overview than solely reading the transcribed manuscript. Subsequently, the data were transcribed. Instead of transcribing all the material verbatim, I chose to transcribe only the sections that were relevant to the research questions (i.e. the parts concerning current status of instrumental practice, perceptions of intervention tools and the PST). Sections that were not included in the final transcription consisted of:

- a Phrases in which the participants would repeat themselves.
 - b Stories less relevant to the studies' research questions (i.e., personal stories concerning family situation, place of birth, detailed stories about teachers indicating instrument and way of teaching that might have deprived the participants and their respective teachers of their right to anonymity).
 - c Incomplete phrases without meaning.
- 2 **Generating and developing codes:** Since both studies were theory-driven, each specific research question worked as a basis for the coding. Following the transcription process the data were downloaded using a priori codes indicating intervention tools (e.g., iPads, performance profiling, self-determination, individual/group work), and codes indicating participants' perception of the PST intervention (e.g., arousal regulation, goal setting, concentration) were generated (Paper 3). The codes in Paper 4 were based on self-regulation theory.

Subsequently, the entire qualitative data sets were downloaded to NVivo for Mac version 10.2.1 for further analysis. In line with recommendations on thematic analysis, the initial analysis included as many codes as possible (see Guest, MacQueen, & Namey, 2012). Consequently, several elements of the text fit into multiple codes (e.g., specific goal setting and learning goals). After having systematically analyzed all the qualitative data as a whole in Nvivo, I experienced that the overall story of each participant tended to lose context when using only the Nvivo coding system.

- 3 **Forming individual coding profiles for each case:** As a result of the initial coding in Nvivo, I chose to form individual profiles re-coding each case manually through using color codes. This

method gave more substantial information concerning each participant's personal development throughout the overall program. After this additional coding process, I started to search for themes.

- 4 **Initial development of individual and cross-analytical themes:** This phase of analysis began with re-reading all the individual codes and all the codes in Nvivo and forming mind-maps that were organized into theme piles. This initial identification of relations among the codes and themes served as a basis for the construction of main themes forming a greater conceptual understanding of each individual case as well as overall trends of the PST program.
- 5 **Reviewing the themes:** During this process, I searched for coherent patterns both on an individual level and from an individual perspective in relation to the overall findings. At this stage, the themes from the personal profiles of each participant were organized into pre- and post-intervention data summing up personal instrumental practice behavior (e.g. goal setting, practice habits, perfectionistic patterns, type of practitioner, etc.). Based on this thorough analysis of each participant, collective patterns and themes were further developed. This enabled new discoveries of similarities and dissimilarities among the six participants resulting in a better overview of both individual and overarching stories across the data set. Thereafter, final themes were defined and named. The essence of each theme was then once again identified and deliberated. Moreover, each theme's story was considered and viewed in relation to the overall data.
- 6 **Writing the final report:** The write-up of the data was done in several phases. The initial reporting of the data resulted in a too great amount of data (e.g. individual development profiles throughout the program), thus necessitating a reduction process (i.e., omitting detailed information of each individual participant's practice habits and characteristics). Vivid and relevant quotes were chosen and systemized in relation to the individual summarized profiles. The richest quotes were included in the final report/article to underscore important trends and directions within the data.

Thematic analysis is an analytic method within psychology commonly used to identify, analyze, find themes and report patterns within the data (Braun & Clarke, 2006). In congruence with the nature of the hypotheses/research questions, an a priori thematic analysis approach was chosen outlining themes based on theory and overall aims. Consequently, the coding process was based on theory applied in the present research (i.e., self-regulation theory with its sub-theories; see Figure 2).

The aim of the quantitative analysis (Paper 4) was to supplement the qualitative analysis explicated above (i.e., concurrent nested design). A paired sample t-test was applied in measuring the effect size from Time 1 to Time 2. Four of 11 sub-scales from the questionnaire did not meet the Kolmogorov-Smirnov criteria for normal distribution (K-S). Consequently, the non-parametric equivalent of a paired sample t-test, the Wilcoxon signed-rank test, was chosen for effect size measurement for the non-normal data. Moreover, the qualitative analysis formed the basis for an understanding of the overall effect of the program at the group level. Furthermore, and in line with mixed methods research, the qualitative and quantitative data were intertwined in the general results section of the reporting article (Creswell, 2009).

3.6 Ethical considerations

In research, ethics provides "a systematic foundation for interpreting moral and normative questions. Often ethics is defined as the theory of moral. However, ethics and moral might be interpreted as equals" (Befring, 2002, p. 54). Moreover, ethics expresses what is right, wrong, deplorable, respectable, acceptable etc. Ethics thus becomes an instrument for fine-tuning scientific research (Befring, 2002).

3.6.1 Implementation of psychological skills

The first ethical consideration I find imperative to address is my role as an "instrumental practice coach" implementing psychological skills to music students. The sport psychologist Mark B. Andersen addresses the question of *who can and should employ sport psychology?* This question has been hotly debated within sport psychology societies.

What we know, and what we do, need not be limited by what we call ourselves. Is helping someone learn a new behaviour, change a belief, or change thinking considered education, counselling, or therapy? I believe it is a part of each and all three, therefore it can be done by an educator, counsellor, or therapist who has acquired the necessary knowledge, skill, and experience to do so (Andersen, 2000, p. 15).

Furthermore, Andersen recalls and underlines the inadequacy of this question: "The question of who can do sport psychology... is a naive and alienating question from the field's infancy. We already have a relatively simple, but thoroughly adequate, answer" (Andersen, 2000, p. 16). However, this question should be viewed in relation to the practitioner's background, competence, experience and, last but not least, special knowledge within their applied field. "Sport psychologists should take into consideration if they want to become qualified in the applied field, under the premise that the greater their specialisation in a sporting discipline, the better the service they can offer" (Dosil, 2006, p. 95). Nicholls and Jones (2013) note that psychology is a missing component within sports coaching, and many athletes could benefit from being taught different psychological skills. This is also the case for music students who I believe would benefit (just as athletes) from acquiring PST as part of their overall practice schedule. Through having studied sport science, I have had the opportunity to employ psychological skills in my own instrumental practice. This has given me distinct practical knowledge of how things work in practice (Dosil, 2006). This research prioritizes a "hands on" approach that strives to create concrete experiences of PST in multiple settings. Moreover, through multiple experiences one gains the knowledge needed to become a self-regulated individual, which is the ultimate aim of PST (Weinberg & Gould, 2011).

3.6.2 Manifold research roles

There are obviously both strengths and limitations to occupying manifold roles in one's own research project. Advantages of a researcher having multiple roles include "reduction of implementation problems, pre-existing knowledge and experience base about the situation and the people involved, practitioner-research synergy, practitioner insight and role help in the design, carrying out and analysis of useful and appropriate studies" (Robson, 2002, p. 535). Moreover, having multiple roles might enable the researcher get closer to the essence of the research. However, disadvantages such as

timeframe, and what Robson (2002) refers to as "insider problem" (i.e., indicating blindness due to being overly attached to the research of interest), might result in a prejudicial development of meaning around the questions of interest (Robson, 2002). Consequently, it is paramount that researchers remain open to considerations and external perspectives during the research processes (e.g., supervisor feedback). Furthermore, being aware of and alert about one's own limitations is similarly important. For example, for the present research it is important to distinguish between what I, as implementer, can and cannot do (e.g., I am not willing or qualified to work with heavily traumatised individuals) (Andersen, 2005; Weinberg & Gould, 2011).

The intersection between intervention and research observation is probably the most critical manifold research role in the present research, and was inherent in the structure of the studies. While interacting with participants, I was fully focused on the implementation of PST; however, during the meetings, I might have written down key words indicating a change or need. Immediately after the meetings, I wrote down notes concerning the work and the participant's progress and development. Most importantly, a distinct limit was set between the various roles. Planning and clarifying the various roles and continuously documenting the various intervention processes became a prerequisite to dealing with the insider problem.

4 Summary of papers

This chapter summarizes the aims, scope and results of the four articles written as part of the thesis.

Paper 1 Goal Setting and Self-Determination in Music Making: Tenets of Becoming an Organized and Motivated Music Practitioner. *J. L Hatfield* (revised version to be printed).

Paper 1 is based on a discrepancy between experienced-based views on music acquisition and performance (e.g., Heimberg, 2007; Leimer & Giesecking, 1972; Neuhaus, 1993) and research results found in research studies conducted within music education and performance science (e.g., Jørgensen, 2000; Jørgensen, 1996; Miksza & Tan, 2015; Nielsen, 2004). While both strands of literature recommend deliberate practice, research-based literature has found that music students tend to be less proactive in their approach to instrumental practice. The theoretical article aims to present, actualize and discuss theories of motivation such as goal setting theory and self-determination in relation to music acquisition and performance. Further, the aim of the article is to contribute to a better conceptual understanding of different qualities of motivation and potential pitfalls in relation to the acquisition of music and performance. The main questions of interest were:

- 1 How do we set goals, and what kind of goal setting might have the potential to motivate individuals for continuity, persistence and joyfulness in music making and performance?
- 2 What characterizes a milieu that might stimulate music students to set goals that facilitate long-term motivation?

First, the article presents main findings within goal setting theory (e.g., Locke & Latham, 2002) characterizing the construct and the goals that have been associated with best practices and continuing motivation (i.e., specific, proximal, hierarchical, challenging, self-referenced, time-bound, and realistic goals). These goals were then linked to the acquisition of music and performance referring to both research and practical examples.

Self-determination theory (SDT), (Deci & Ryan, 2000; 1985) is then presented in relation to the second theoretical question in the article. The theory is then actualized as a contributing theory to GST facilitating conceptual knowledge on the quality of motivation and learning climate. Main elements from SDT's mini-theories are presented and discussed in relation to GST and music acquisition and similarities and differences are identified. In essence, GST principally considers the "how" and "what" of goal setting while being less concerned with the discreet intentions behind actions. SDT, on the other hand, is found to be more concerned with the "why" of actions. For example, SDT asks whether we engage in an activity because we have to or because we want to. Moreover, even though GST is concerned with self-reference and identification of rationales for engaging in a task, it is principally an instrumental theory because it focuses on contingencies of goal achievement, efficiency, performance and productivity. SDT, on the other hand, is not explicitly interested in productivity, efficiency and goal-achievement, but rather in the quality of motivation and the locus of causality of actions. In contrast to GST, SDT proclaims that basic psychological needs (i.e. autonomy, relatedness and competence) ought to be satisfied to create identified, integrated and intrinsic forms of motivation. This in turn, equips humans to motivate themselves. The article suggests a synthesis of both theories, discussing potential benefits (i.e., music teaching styles supporting both students' need for autonomy while still being given specific and challenging goals). The theorization ends by proposing a model of *self-determined goal setting* that might actualize potential, yet undiscovered, benefits. Finally, prolonging the synthesis, the article presents two contrasting hypothetical case examples. The first hypothetical case (Daniel) demonstrates motivational

characteristics (i.e. maladaptive attributions, thoughtless practice, introjected motivation/controlled motivation) that led to potential stagnation as a result of a need-thwarting environment. The second hypothetical case (Rita) is presented with a combination of need-satisfying environments and appropriate use of goal setting. The adaptive effects of such stimuli resulted in the evolution of autonomous forms of motivation, boosting Rita's self-confidence, progress, practice efficacy and self-initiative. These hypothetical examples are intended to emphasize the motivational potential of music acquisition and provide the reader an overview of the two theoretical tenets (i.e., self-determination and goal setting).

Paper 2 Instrumental practice in the contemporary music

academy: A three-phase cycle of self-regulated learning in music students. *J. L. Hatfield, H. Halvari, and P.-N. Lemyre*

This article presents a survey study testing a socio-cognitive model of self-regulated learning (Zimmerman, 1989). The aim of the article is to better determine the degree to which music students self-regulate their instrumental practices. To this end, an adapted three-phase cycle of self-regulated learning was tested. In line with previous literature (e.g., Zimmerman 2008; McPherson, Nielsen & Renwick, 2013) on self-regulated learning, four hypotheses were developed. First, it was hypothesized that forethought phase constructs, including goal setting, self-efficacy and time-management, are positively correlated to use of psychological skills (i.e. self-observation, arousal regulation, imagery, concentration, and self-control). Second, use of psychological skills was hypothesized to correlate with self-reflection phase constructs, including coping and perception of progress. Third, and in congruence with self-regulated learning, it was hypothesized that forethought phase constructs were indirectly related to reflection phase constructs through psychological skills. Finally, it was hypothesized that forethought phase constructs could be predicted and altered by self-reflection phase constructs.

Initial bivariate findings revealed significant positive correlations among the forethought, performance and self-reflection constructs. The model found the strongest relationships between goal setting and self-efficacy ($r = .45^{***}$), goal setting and self-control ($r = .42^{***}$), goal setting and self-observation ($r = .51^{***}$), goal setting and coping, ($r = .49^{***}$), and goal setting

and self-evaluation ($r = .61^{***}$). Furthermore, strong positive relationships were found between goal setting and psychological skills ($r = .58^{***}$), and between self-efficacy and psychological skills ($r = .41^{***}$). However, low and non-significant relationships were found between time-management and performance-phase and reflection-phase constructs.

Further structural equation modeling (SEM) revealed similar patterns. Positive significant paths were found from goal setting to all the performance phase latent variables, except arousal regulation. The strongest paths were from goal setting to self-observation ($r = .66^{***}$), to concentration ($r = .41^{***}$), and to self-control ($r = .37^{***}$). Self-efficacy turned out to have strong paths to arousal regulation ($r = .43^{***}$) and to self-control ($r = .42^{***}$). Goal setting accounted for 40% of the variance in self-observation and 10% of the variance in imagery. Self-efficacy accounted for 27% of the variance in arousal regulation. Goal setting and self-efficacy accounted for 48% of the variance in self-control, and 30% of the variance in concentration. Few significant paths were found from performance phase to self-reflection phase, however, a strong path was found from self-observation to coping ($r = .41^{***}$) and a moderate one from arousal regulation to coping ($r = .25^{***}$). Forty-four percent of the variance in coping was accounted for by self-observation and arousal regulation. Finally, two moderate predictive paths ($r = .31^{***}$) were found from self-control to time management and perception of progress. When the performance phase variables were combined in a single maximum variable, the results revealed that goal setting had a very strong path to use of psychological skills ($r = .79^{***}$). Self-efficacy had a moderate path to psychological skills ($r = .22^{***}$). Both independent variables accounted for 82% of the variance in the dependent variable psychological skills. Furthermore, a very strong path was found from psychological skills to coping ($r = .73^{***}$, $R^2 = .54$). A moderate path was found from psychological skills to perception of progress ($r = .29^{***}$). Time management was found to have a non-significant path to psychological skills. Positive indirect paths were found from goal setting to coping (IE=.42^{***}) through self-observation and through self-control (IE=.18 $p < .10$). Self-efficacy was indirectly positively linked to coping through arousal regulation (IE=.16 $p < .10$) and to perception of progress through self-control (IE=.18 $p < .10$). Final multiple regression analysis revealed that self-reflection phase constructs significantly predicted forethought phase constructs. Moreover, the results showed that music students who were involved in setting specific goals for themselves were higher in

self-efficacy and applied a greater amount of psychological skills. In essence, psychological skills such as being self-observant, concentrated on the task at hand, adequately aroused physically and mentally, and practicing deliberately and thoroughly were skills particularly accounted for by specific goal setting and self-efficacy. Students who were able to adequately regulate their arousal, and who were self-observant, were found to be more likely to cope in the face of failure, probably because they were motivated to set new, more appropriate goals. Furthermore, music students high in self-efficacy who set specific goals in their instrumental practice were indirectly predicted to cope when faced with failure having better perception of their progress than students low in goal setting and self-efficacy. However, time management did not appear to alter any of the qualitative practice behaviors included in the psychological skills. Moreover, this might indicate that the quantitative aspects of instrumental practice per se (i.e., planning accumulated daily hours of practice, planning the length of each practice session) were not associated with the qualitative nature of performance phase components (i.e., psychological skills). Moreover, the cyclical nature of learning in self-regulated music learners was mainly supported in the study.

Paper 3 Foundations of intervention research in instrumental practice: Constructing a Psychological Skills Intervention for Musicians. *J. L. Hatfield and P.-N. Lemyre*

The goals of the pilot intervention study were to evaluate, implement, and adapt psychological skills used in the realm of sports in and to music performance through the lens of self-regulation and self-determination theories (Deci & Ryan, 2000; Zimmerman & Schunk, 1989). Previous research has found that music students are given very little knowledge about the art of practicing deliberately (e.g., Atkins, 2009; Gaunt, 2009). At the same time, this kind of practice seems to be the foundation for reaching musical goals, thus making the teaching of the art of practicing one of the most important tasks of the music pedagogue (Leimer & Gieseking, 1972). Therefore, the overarching aim of the study was to develop a better understanding of how to implement and guide music students toward optimal instrumental practice and performance. To this end, the study evaluated the use multiple intervention tools including questionnaires, performance profiling, iPads, electronic practice logs, recording the perceived value of individual and

combined work, as well as the effectiveness of different forms of communication. The study was based on four hypotheses:

- 1 Self-assessment through questionnaires and performance profiling motivates students for further work by enabling them to identify individual key issues.
- 2 Music students using iPads with a practice application with a diary and video-recording possibility to keep track of accumulated practice, experience improvement in concentration and self-reflection relative to their music practice.
- 3 PST intervention is best implemented through a combination of individual and group sessions.
- 4 Implementation of PST is intrinsically motivating, when emphasizing self-referenced learning through non-controlling communication. This facilitates the participant's personal development and experience of the program.

Two performing music bachelor students participated in the two-month intervention receiving weekly 60-minute sessions, which included two group and two individual sessions per month.

Results revealed that performance profiling enabled ownership and goal setting based on personal identified strengths and weaknesses. The participants expressed eagerness and enthusiasm based on the primary assessment which motivated them to set self-referenced and specific goals for their instrumental practice. The iPads (i.e., with the installed practice applications) made the students practice more efficiently in terms of managing their time, keeping track of progress, observing their practice and evaluating their goals and making adjustments when necessary. This, in turn, made the students more self-aware and self-regulated. The diary function of the application also facilitated their overall reflection and understanding of what to focus on and how to approach practice tasks. Despite these advantages, the participants also expressed that it was hard to maintain the continuity of the practice diary as it took a good deal of volition and willpower to keep up with it. However, when using the diaries, both participants reported ease of practice and motivation because of the predictability the diaries created. The use of both individual and group meetings turned out to balance the intervention's hands-on approach and individual perspective. Nevertheless, the participants expressed a need for more frequent individual meetings. It was suggested that weekly individual meetings would have provided

greater continuity to the individual work and thus to the implementation of psychological skills. Participants' perceptions of group meetings were generally positive. Both participants expressed that the groups setting created a concert-like situation in which they had a higher arousal than in the practice room. This was perceived as an optimal semi-stressed situation in which they were able to apply the skills they were working on. This made them more equipped for other high-pressure performance situations. Finally, the students responded positively to the inductive ways of communicating used in the program. As the participants were challenged to reflect on their courses of action, they seemed to become autonomously motivated, feeling volitional and competent. The coach consciously communicated a rationale for practice when instructing students. Accordingly, the participants were able to identify and integrate the instructions given throughout the intervention. A communicational style emphasizing autonomy, support and self-reference seemed to engage the students in becoming more self-regulated learners (Deci & Ryan, 2000).

Paper 4 **Performing at the Top of one's Musical Game:** The Mental Edge of Musicianship. *J. L. Hatfield*

Anchored in a frame of self-regulated learning, the aim of the mixed method study was to investigate music students' perceptions of the personal benefits and the effect of a 15-week PST intervention. Previous research implementing mental skills in music education has generally focused on group interventions (Clark & Williamon, 2011; Hoffman & Hanrahan, 2012; Osborne et al., 2014). Additionally, these studies (except Clark & Williamon) have been short-term interventions lasting for three weeks at the most. In line with recommendations from the sport psychology literature (e.g., Weinberg & Gould, 2011; Andersen, 2000), the present study had an individual focus; each participant received a tailored PST program based on their strengths and weaknesses. Moreover, each participant took part in individual and group sessions, which made the researcher able to personally follow the students' progress in these sessions. The study was based on three research questions:

- 1 How can PST facilitate music students' instrumental practice and performance?
- 2 Can the use of psychological skills have a positive impact on music students' perceived self-efficacy, motivation and satisfaction with progress and performance?
- 3 Can the use of psychological skills lessen music students' anxiety and worry about performing?

Because the study emphasized individuality, each participant was expected to develop differently.

The quantitative findings concerning the effect of the program revealed a substantial increase in all the mean measures from Time 1 (pre-intervention) to Time 2 (post-intervention) with the exception of worry, which showed a substantial decrease (positive effect). In essence, goal setting, imagery, arousal regulation, concentration, self-observation (paired sample t-test), worry, self-evaluation, and coping were deemed significant (Wilcoxon's signed rank). Self-efficacy, time management, self-control and perception of progress were non-significant. Further analysis revealed that self-efficacy was also non-significant due to the low number of participants. Four out of the six participants had a significant increase in self-efficacy, while the two remaining participants demonstrated high self-efficacy before and after intervention.

The qualitative results found that the participants (N=6) shared several factors. First, all the participants set general goals and reactively planned their instrumental practice. They therefore depended mainly on intuitive ideas while practicing. Second, the students did not have any particular experience or knowledge concerning how to set goals prior to their instrumental practice. Third, the participants reported that they had experienced/ currently experienced physical fatigue and pain due to instrumental practice. Fourth, all the participants reported suffering from a lack of concentration, making it a common issue. Fifth, four out of six participants reported that they were particularly non-volitional and struggled to maintain continuity and progress. Finally, four of the participants reported struggling with perfectionistic tendencies that debilitated their performances and instrumental practice.

Several patterns emerged during the implementation of psychological skills. First, as the participants got involved in specific goal setting and planning,

their concentration, general satisfaction and the structure of their practice improved. In this, the practice journals facilitated the participants' self-awareness, self-observation, self-evaluation and their ability to cope adaptively in the face of failure. While several of the participants previously had tended to give up due to failure, they reported that they became more attentive and self-reflective when being able to point out why they had failed and how they could adjust their goals. All of the participants (IP 4 perfectionists) benefited from working on accepting mistakes by regulating their physical and mental arousal. This made them more self-initiative self-efficacious, mentally tough and able to cope with adversities. Even though the participants had their ups and downs during the program, they appeared to be particularly prone to learning from their less successful experiences, transforming them to new instrumental practice styles and goals for their future performances and practice sessions.

An eight-month follow up interview showed that all the participants (one participant did not answer due to change of study) were still actively using the mental skills and reported feeling that their practice habits had benefited from their participation in the intervention. Moreover, the PST intervention's focus on individual development and frequent application of psychological skills seemed to have made each participant more self-regulated, self-efficacious, mentally tough and self-aware on a long-term basis.

5 Discussion

This chapter will discuss the thesis' three general research questions (i.e., two general sub-research questions and one main research question). The three research questions reflect different determinants of motivation and self-regulation in instrumental practice and performance of music. The general discussion sums up these questions, forming a meta-discussion of the overall findings. This is the primary motive of the present chapter as the three empirical studies¹³ emphasize three different analytical incisions:

- 1 Ongoing use of, and relationships between, PST and SRL habits in music students.
- 2 Optimization of PST implementation in the context of music practice and performance.
- 3 The impact of applying PST through the lens of SRL on music students' instrumental practice and performance.

Moreover, this three-fold approach to investigating PST through SRL aims to provide multidimensional perspectives on music students' practice habits and to enhance music acquisition and performance.

¹³ The first analytical incision presented in the summary section in the beginning part of this thesis (i.e., actualization and use of goal setting and self-determination in music acquisition) will not be treated in the current discussion, since paper 1 already profoundly elaborates and discusses this incision.

The first analytical incision (Paper 2) concerns music students' use of SRL in instrumental practice and performance. Paper 2, thus, concerns the very nature of music students' practice habits. Accordingly, it will be discussed first. The second analytical incision (Paper 3) concerns how PST can be adapted for use within the field of music performance suggesting directions for future research. The goal of discussing such issues is to further substantiate the discussions initiated in both Papers 3 and 4 concerning the optimization and implementation of PST in the context of instrumental practice and performance. The third analytical incision aims at understanding how PST and SRL together contribute to enhancing instrumental practice and music performance. However, an in-depth understanding of the present study's third analytical incision (i.e., the main research question) would not be feasible without discussing its foundational aspects (i.e., elaborated through the first and second general research questions). The three incisions are thus viewed as reciprocal entities. Finally, the overall findings are combined and elaborated in the general discussion.

5.1 Discussion of the general research questions

General research question 1

To what extent do psychological skills contribute to adaptive instrumental practice and cyclical learning through Zimmerman's (1989) model of self-regulated learning? (Papers 2 and 4).

Summary of the results:

- Descriptive results revealed that music students were sometimes involved in SRL and PST.
- Only a small quantity of music students were consistently involved in deliberate planning and goal setting.
- Music students involved in planning/goal setting in relation to instrumental practice were found to be self-observant, more concentrated/less prone to distraction, involved in imagery and more deliberate in their practice.
- Forethought phase constructs were positively correlated with coping and self-evaluation.

The first general research question reflects a preliminary curiosity deriving from the initial phase of the Ph.D. project. In order to implement PST through a frame of SRL, I found insight in music students' current habits of instrumental practice to be a significant prerequisite. By investigating practice patterns on micro level during instrumental practice, Nielsen (2001) developed a preliminary cyclical model of self-regulated learning. However, this study only to a lesser extent investigated how goal setting and planning prior to instrumental practice affect the quality and execution of instrumental practice. Moreover, apart from Nielsen (2001), I was not able to find any music education research investigating the cyclical nature of SRL (see Zimmerman 1989; 2002). Interestingly, Weinberg and Gould (2011) describe self-regulation as the ultimate goal of PST. Accordingly, questions about the extent to which music students were involved in SRL, and to which extent self-regulating music students applied psychological skills became the foundation for better understanding the need to implement SRL and PST in the applied context of music acquisition. Structural equation modeling (SEM) enabled the testing of directional assumption in music students' SRL patterns and use of PST (Paper 2). Gaining such preliminary knowledge not only provided insight into music students' use of SRL, but also contributed to understanding to what extent SRL and PST might benefit music students' instrumental practice and performance. With this in mind, I will continue the present discussion, identifying and linking main findings from the survey study (Paper 2) to the relevance of implementing and trying out PST in the context of higher music education (Papers 3 and 4).

Previous research on instrumental practice has investigated the extent to which instrumentalists think about their practice in terms of hours accumulated (e.g., Ericsson et al., 1993; Jørgensen, 1996) and the quality of practice (e.g., use of learning strategies) carried out (e.g., Nielsen, 1999, Nielsen, 2001; 2004; Miksza & Tan, 2015). These studies have typically linked practice time, use of practice strategies, quality and performance achievement to theoretical constructs such as goal orientation (e.g., Miksza, 2009; Schmidt, 2005; Smith, 2005) and self-efficacy (e.g., Nielsen, 2004; McCormick & McPherson, 2003; McPherson & McCormick, 2006). The extent to which music students apply performance-enhancing techniques deriving from sport psychology has not previously been studied in relation to instrumental practice. Thus, a need for investigating the use of performance-enhancing techniques deriving from sport psychology is evident in music education research.

The descriptive findings revealed that only a small quantity of music students were fully involved in SRL. Key questions concerning music students' use of specific goal setting revealed the following:

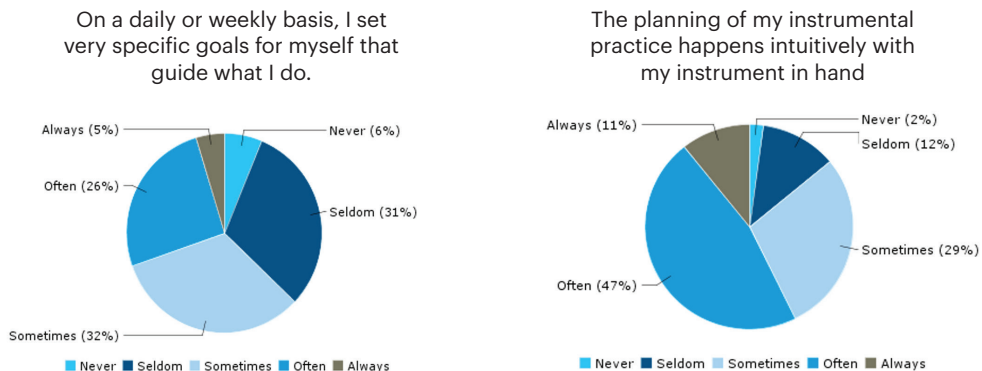


Figure 6: Pie charts showing percentages answered on a five-point Likert scale

Figure 6 illustrate a discrepancy between proactive and reactive practice suggesting that most instrumental practice in the music academy is based on a reactive approach (i.e., not planning instrumental practice before having the instrument in hand). A similar discovery was made in the intervention study (Paper 4) , which revealed that most of the participants were reactive instrumental practitioners. Furthermore, descriptive results from the survey study (Paper 2) found that music students were sometimes involved with psychological skills ($M=3.17, SD=.49$). However, *self-regulated* music students applied psychological skills to a much greater degree (i.e., goal setting, concentration, arousal regulation, imagery, self-control, self observation). Moreover, self-regulated music students were involved in cyclical learning. These general main findings provided important information about what determines cyclical adaptive learning in music students.

The above results have central implications. First, the fact that few music students were actually involved with SRL reveals a need to help music students becoming better at self-regulating their instrumental practice. Second, the positive instrumental practice patterns found in self-regulated

practitioners using techniques deriving from PST indicate that SRL and PST might have a positive impact on music students who are less self-regulated. The general implication is clear, forethought processes preceding learning influence students' motivational potential.

SRL and PST – reciprocal benefits

Engaging with Weinberg and Gould's (2011) assertion that self-regulation is the ultimate goal of PST, the present section discusses the relationships between PST and SRL.

Looking back upon the process of preparing, carrying out and analyzing the results of the present research, I realize that there are no simple answers to the first general research question. In comparing SRL with PST, I realized that the two phenomena share common ground. However, PST is a method that specifically aims to enhance performance and increase joy and motivation (Weinberg & Gould, 2011). Accordingly, PST was applied as a tool kit for performance enhancement. SRL theory (e.g., Zimmerman, 1989), with its emphasis on cyclical learning (see Figure 2), facilitated the application of PST. Moreover, the cyclical model of SRL contributed to a greater psychological conceptualization of learning processes. In essence, this knowledge contributed to identifying how, why and what to highlight during the initial stages of PST. Although literature on PST emphasizes the significance of initial screening (e.g., Hays, 2009; Weinberg & Gould, 2011), it does not provide the same theoretical foundation as SRL does (e.g., goal-orientation, self-efficacy, personal value etc.). Moreover, SRL theory includes reflection on motivational states related to learning efforts (Zimmerman 1989; 2002). Hence, PST and SRL benefit reciprocally.

Both Paper 2 and Paper 4 indicate continuity in self-regulated music students. Paper 2 found that self-regulated music students seemed to be involved in cyclical learning processes, while the Paper 4 found that participants had continued to apply psychological skills in their daily instrumental practice eight months after finishing PST. These findings were in line with Weinberg and Gould's (2011) emphasis on self-regulation as the ultimate goal of PST. Moreover, PST fostered long-term self-regulation in the acquisition

and performance of music. Henceforth, the SRL framework facilitated the implementation, applicability, and interpretation of PST. Therefore, I presume that future PST interventions would benefit from integrating the SRL framework.

General research question 2

Which components should be included to form a holistic psychological skills training program for music students? (Papers 3 and 4).

Summary of the results:

- Factors such as intervention duration, individual tailoring and practical appliance of psychological skills were found to facilitate the efficacy of PST.
- Self-assessment, use of performance profiling and iPads were found to boost music students' motivation. Moreover, self-reference and self-determination were found to be factors motivating music students to continue PST.
- Goal setting and careful planning had an imperative role in the practical implementation of PST. This also seemed to effect participants' motivation and the effort applied to task-related practice.

After having examined to what extent music students apply techniques deriving from PST, and to what extent such techniques are part of cyclical SRL (Question 1), the next goal was to establish a suitable way of implementing PST to music students. Hence, the second general research question aimed at investigating and refining conditions, tools and prerequisites of PST in the context of higher music education.

Prerequisites of PST for musicians

PST has been systematically applied and developed for decades in the field of sports. One of the key prerequisites of PST delivery is being familiar with the specific field one is working in (Andersen, 2000; Dosil, 2006; Hanrahan & Andersen, 2010; Hays, 2009; Nicholls & Jones, 2013). Having an understanding of the field enables coaches or educators to develop a suitable program and organize the practical work. Hence, it is not given that a PST program designed specifically for cross-country skiers or tennis players would work equally well for musicians. Hence, in-depth, insider knowledge of the field

in question is a necessity for the best possible implementation of PST (Hays, 2009).

At the beginning of the present research project, I had to ask myself the following question: What makes PST effective? This general query generated a lot of tentative answers; however, after having reviewed the literature on PST (e.g., Andersen, 2000; Hays, 2009), I arrived at the following three main pillars:

- 1 Appropriate amount of time for accommodating and learning the skills
- 2 Making the program personally valuable
- 3 Focusing toward continued appliance of the various skills (i.e., rather than overestimating theory).

These main pillars of PST make sense within the field of higher music education. First, Weinberg and Gould (2011) recommend that psychological interventions last for 3 to 6 months. Previous studies implementing psychological skills with musicians (e.g., Osborn et al., 2014; Hoffman & Hanrahan, 2012) have lasted for 3 weeks or less. The longest mental skills intervention carried out in the music context lasted for 9 weeks (Clark & Williamon, 2011). This is still far less time than recommended by sport psychological literature (e.g., Weinberg & Gould, 2011; Andersen, 2000). Second, in music, it makes sense to personally tailor the skills, as music students practice individually most of the time. This, of course, does not mean that a specific way of working only works for a particular participant. However, personally tailoring PST to each participant not only makes it individually relevant, but also prevents students becoming involved in a program that might be counterproductive or not relevant to them. Previous studies (i.e., Osborn et al., 2014; Hoffman & Hanrahan, 2012; Clark & Williamon, 2011) trying out mental skills among musicians mainly implemented the skills in groups (i.e., making the individual approach less significant). Tailoring the skills to each student and following each individual over a longer period of time naturally requires more time and effort on the part of the researcher. However, I believe that the extra time and effort invested in the present research (Paper 4) have paid off in the long run.

Clark and Williamon's (2011) study revealed that music students who had participated in a mental training program retroactively requested more interpersonal discussions and opportunities to try out the various skills in

front of others These requests resonate with Weinberg and Gould's (2011) three general work goals for PST:

- a Automate and overlearn the relevant skills.
- b Systematically integrate PST in performance situations.
- c Simulate the skills in various performance-related contexts.

These factors were found to have several implications for PST in the field of music (Papers 3 and 4). PST has to be learned, applied and maintained. Hence, having the opportunity to actively try out the skills in practice became a primary focus in the present research project. Moreover, working with the instrument in hand or exercising mentally (e.g., working on developing imagery vividness including all the senses, or working actively on centering) was important. In accordance with the second work goal of PST (see above), it became vital to expose the participants to multiple performance-related situations. Accordingly, group sessions became an arena in which the participants would try out the various skills they were working on individually. The group sessions also provided a forum for group discussions and communication across the group. These discussions were highly appreciated by the participants. Retrospectively, I believe that the positive results found in the intervention study (Paper 4) are primarily due to this emphasis on "hands-on" experience. In fact, both the pilot intervention and the intervention study found that students perceived the group sessions as a relatively pressured situation in which they had the same symptoms of anxiety as when performing publicly. Moreover, it is well-established that gaining performance experience enhances confidence in performing.

In regard to the second general research question, both the pilot study (Paper 3) and the intervention study (Paper 4) revealed that the efficacy of PST was substantially determined by the extent to which participants had set goals and planned when, why and how to apply the various skills. In addition to working on identified strengths and limitations (in particular), identifying each individual's optimal/desired mental state became an imperative basis for the PST. Making the students perceive each performance as a unique opportunity to apply the mental skills (rather than an examination) turned out to be particularly productive. Accordingly, specifically defining what they wanted to try out beforehand was of paramount importance for the students (Andersen, 2000; Hays, 2009). During this process, goal setting became a powerful PST technique that initiated continued work on PST. Moreover, through the accumulation of individualized PST over

time, multiple performance opportunities, group discussions and continued individual work appeared to strengthen the overall outcome of the interventions.

Interpersonal relationships as a spring to motivation

In accordance with the literature on PST, the present research aimed at making the program as available and simple as possible (i.e., it was important that the participants not experience the program as loads of homework and training). Moreover, participants' motivation is central when starting to work with individuals (Hays, 2009). The question of how to motivate the participants, and how to make them motivate themselves, for continued PST was an initial concern. Sport psychology has been concerned with motivation in sports for decades (e.g., Orlick & Partington, 1988.; Lemyre, 2005). The SRL framework seeks to explain motivational factors preceding and succeeding learning processes (i.e., self-efficacy, goal orientation and attributions). These theories are mainly interested in explaining to what extent personal and environmental factors contribute to or inhibit motivation in human beings (Bandura, 1986; Dweck, 1975; Nicholls, 1984; Weiner, 1985). SDT is also concerned with personal and environmental contributions to human behavior. However, SDT is concerned with explaining motivation in terms of satisfying basic psychological needs (see Deci & Ryan, 2000). Accordingly, SDT was found to be a particularly suitable theory for explaining human motivation, as well as a guide for understanding how to foster interpersonal motivation. Reeve et al. (2008) give specific guidelines concerning how to constitute a need-satisfying learning environment. Consequently, a primary goal of the intervention studies (Papers 3 and 4) became to increase participants sense of autonomy and self-determination (Deci & Ryan, 2000).

Results from the pilot study revealed that self-assessment (e.g., performance profiling) and open-ended questions boosted participants' motivation (Papers 3 and 4). Providing the participants with rationales that initiated identification and integration of external regulations also increased participants' motivation (Paper 3) (e.g., Reeve et al., 2008). Self-reference is emphasized by both Zimmerman (e.g., 1989, 2002), and Deci and Ryan (2008) as a basis for ongoing motivational processes. Accordingly, in PST programs, performance profiling has been developed for both practical and motivational purposes (Butler & Hardy, 1992). Subsequent studies have revealed that the motivational profiles of athletes involved with such performance profiling

increased as a result of perceiving self-reference and ownership (Weston, 2005). Similar results were revealed in Papers 3 and 4 of this thesis. The participants demonstrated eagerness and motivation to set specific goals based on self-assessment. Furthermore, they expressed that they had never thought about their instrumental practice from such a point of view. Such findings indicate both the motivational benefits of making people look at their own activity and the need for metacognition in instrumental practice.

Edward Deci (co-founder of SDT) describes motivation as being fundamentally dependent on the degree to which we are able to show genuine interest toward one another (based on my conversations with Deci). Hence, in working with participants, SDT provided valuable information regarding interpersonal factors. Moreover, SDT contains qualities that have the potential to elevate teacher–student relationships.

Goal setting—the underlying workhorse of PST

Lock and Latham (2002) argue that goals work the best when they are few, optimally challenging and specific. Similarly, the pilot study (Paper 3) revealed that the training worked the best when goals were specific and few. Thus, making the participants choose one or two main focus areas at the time turned out to be advantageous (Papers 3 and 4). For example, one of the participants, who reported that maintaining concentration was one of his major weak spots, started to systematically integrate centering (see Paper 4). We then decided that his work on centering was enough for the first few weeks. However, when centering became an integrated component of his daily practice, we could start to work more thoroughly on his imagery skills. Overall, I noticed that having very few, yet specific, focuses at a time made the participants more efficient and self-confident. Weinberg and Gould (2011) similarly warn against setting multiple goals in PST, which turns out to be a common error of that technique. Moreover, working on all psychological skills simultaneously is believed to be more debilitating than facilitating.

In parallel to working on general issues on macro level (i.e., planning, concentration, visualization, arousal regulation and acceptance/self-talk), the interventions also required a particular focus on writing down and planning the daily course of instrumental practice (Papers 3 and 4). This implies two levels of work in PST for musicians:

- 1 General psychological aims (e.g., including which mental skills to generally work on based on self-assessment).
- 2 Very specific goals based on how, what and why instrumental practice is carried out (i.e., intertwining psychological skills).

Trying to master the music as soon as possible was a common tendency for the participants in both the pilot and intervention studies (Papers 3 and 4). However, it amazed me that the organization and identification of *how*, *what* and *why* of practice was of less interest to students. Studies within music have found that music students who are less impulsive and more deliberate in their approach to instrumental practice attain greater performance achievement and satisfaction than impulsive intuitive practitioners (Miksza, 2006; 2009). Barry (1992) investigated the role of structured (i.e., containing specific practice-related goals) and free practice habits in relation to performance achievement. He found that the structured practitioners gained significantly greater performance achievement than the free condition practice group. The intervention study (Paper 4) found that assisting the participants in making specific work-plans based on suggestions given by their teachers was foundational for learning how to set various types of goals. Additionally, implementing psychological skills to these individually tailored plans became the main subject of the individual PST sessions. In essence, helping music students become good at planning and setting adequate goals for their daily practice (without having too many goals) was a necessity in the PST interventions.

The positive effects of goal setting were not surprising as it is one of the most applied and documented skills within sports and organizational settings. In fact, reviews have concluded that goal setting has a highly motivational effect on behavior (e.g., Burton & Weiss, 2008; Locke et al., 1981). However, as I mentioned earlier, it is not simply a question of setting goals but a question of what types of goals are applied to practice. This will be further discussed in relation to the main research question.

Music as means to music

The legendary pianist and pedagogue Heinrich Neuhaus¹⁴ recalls that his teacher, Leopold Godowsky, emphasized two main aspects of his teaching:

14 Heinrich Neuhaus (1888–1964) taught for more than four decades at the Moscow Conservatory. Among his students were musical greats such as Radu Lupu, Sviatoslav Richter, Emil Gilels, and Vladimir Horowitz.

weighty playing and freedom of expression (see Neuhaus, 1993). However, how can one achieve freedom of expression? This is one of the main questions that was central in the present research. Naturally, there is no one answer to such a question. However, I believe that one is better able to approach such a question when one has extensive experience as a professional performer. I therefore recognized that I could combine my knowledge and experience from organizing instrumental practice (as a professional musician) with my experience with PST. Moreover, by combining these two interwoven factors, I noticed that an imperative overarching factor was simply the music itself. Thus, when implementing PST with musicians, it became important to sit down with the musical works and to ask specific questions related to musical, technical and personal factors. Hence, musical expression, technical demands and personal prerequisites became three factors that in many ways established a direction for further work with PST. A study investigating what drives top musicians toward excellence found that top musicians have a strong commitment to music and non-materialistic goals based on an abiding love for and enjoyment of music and music making. The study also found that music itself triggered positive perspectives based on continued growth and learning (Talbot-Honeck & Orlick, 1998). In a similar fashion, I believe that PST in the music context works optimally when starting and ending in musical matters.

Main research question

What impact does the application of psychological skills through the framework of self-regulated learning have on music students' practice and performance? (Papers 1, 2, 3 and 4)

Summary of the results:

- Music students were found to become generally better at self-regulating their instrumental practice when applying psychological skills.
- PST facilitated music students' concentration, self-efficacy for practice and performance, self-observation/evaluation and coping in the face of failure.
- Music students became increasingly more resilient, more self-efficacious and less worried about mistakes in performance situations after the PST intervention.

PST as facilitator in instrumental practice and performance

Limited research has investigated psychological enhancement of instrumental practice and performance (Clark & Williamon, 2011; Hoffman & Hanrahan, 2012; Kendrick, Craig, Lawson & Davidsson, 1982; Osborne et al., 2014).

Previous studies on PST in music mainly address enhancement of psychological skills through group implementation. In contrast, the intervention carried out in this thesis was designed to personalize PST for individual students and to provide them with enough time to integrate the skills into their daily work. In this section I will discuss the various sources of performance enhancement.

Neuhaus beautifully states that

[...] the clearer the goal (the content, music, perfection of performance), the clearer the means of attaining it. This is an axiom and does not require proof. The 'what' determines the 'how', although in the long run the 'how' determines the 'what' this is a dialectic law (Neuhaus, 1993, p. 2).

The "content" is what Neuhaus calls "the artistic image." In essence, careful exploration of "content" (poetic sense or artistic image) enables music students to explore the various components and practice strategies that are necessary for conveying the content to an audience. "Any improvement of technique is an improvement of art itself and consequently helps to reveal the 'content'" (Neuhaus, 1993, p. 2) In the present study, this dialectic law was evident through phases of learning that provided feedback for what to prioritize in the PST. Zimmerman (1997, 1999) discusses the appropriateness of changing from learning goals to performance goals. In essence, he explains that once a skill has been learned in a technically correct manner, focusing on performance cues becomes more appropriate. A key discovery in the present study was the impact of planning and goal setting on subsequent learning processes.

Structure, planning and goal setting

All three studies in the thesis found that forethought phase components (i.e., planning, goal setting and practice journals) facilitated both adaptive instrumental practice and, at the same time, greater awareness. In essence, forethought phase activity was found to have a profound impact on continued learning efforts during the performance and self-reflection phases in Zimmerman's cyclical model (i.e., Zimmerman, 1989). Within PST and SRL, planning and goal setting are considered main motivators for further

efforts and a significant source of motivation during learning tasks (Burton et al., 2010; Zimmerman & Kitsantas, 2005). Weinberg and Gould (2011) stress that goal setting has a positive indirect effect on other psychological factors (i.e., confidence, anxiety, attentional focus and performance). For instance, Burton (1989) found that swimmers who were considered high in goal setting ability showed greater confidence, less anxiety and better performance than swimmers considered low in goal setting ability. All three studies in the present research (Papers 2, 3 and 4) showed a link between planning, goal setting and the appliance of SRL and other psychological skills (arousal regulation, concentration, self-control, imagery, self-observation, coping and self-evaluation). These findings coincide with SRL theory, which explains appropriate task analysis (i.e., planning and goal setting) in relation to task-specific focus during performance (Zimmerman, 2008). Task analysis is also considered to have an indirect positive effect on self-reflection phase activity. Zimmerman (2008) explains this as a result of self-regulated individuals' ability to monitor their efforts while performing. Moreover, planning and goal setting seem to direct learners' focus towards task-relevant actions. In essence, proper self-evaluation is enabled because the learner knows what, how and why he is carrying out the activity. Accordingly, when unsuccessful attempts take place, the learner is more able to identify why he succeeded or failed when having concretely defined the course of action beforehand. Consequently, self-regulated learners are more likely to adaptively cope in the face of failure (Cleary & Zimmerman, 2001; Zimmerman 2002; 2008).

In the present research, Zimmerman's cyclical model contributes to understanding not only why planning and goal setting seem to work, but also the consequences of planning and goal setting. All three studies (Papers 2,3 and 4) revealed that music students tend to ignore forethought processes preceding instrumental practice. A majority of the participants in both the pilot and the intervention study (Papers 3 and 4) defined themselves as reactive practitioners who never set goals. These participants also reported that they tended to give up in the face of failure. Moreover, they experienced that their level of performance varied a lot, which made them worried and anxious. Opposite patterns of self-regulated learning were also identified. The present research found that one of the main sources of this lack of confidence was simply the failure to properly define the task at hand. Instead of

investing time to deliberately plan the course of action, participants spent time on outcome-oriented practice (Papers 3 and 4).

Research within sports comparing outcome-oriented participants¹⁵ with task-oriented participants¹⁶ has generally found that outcome-oriented participants show greater levels of anxiety, worry, arousal, negative self-talk and coping (e.g., Burton, 1989; Burton, Naylor & Holliday, 2001; Filby, Maynard & Graydon, 1999). These studies also found that setting goals as part of a hierarchy (i.e., staircase approach) is the most effective method of goal setting. A meta-analysis investigating the influence of deliberate practice on musical achievement found a remarkably strong relationship between task-specific practice and objectively measured musical achievement (Platz, Kopiez, Lehmann & Wolf, 2014). Moreover, goal setting entails qualities that have a tremendous motivational potential. Refinement of musical excellence requires discipline, structure and patience (Bruser, 1997; Neuhaus, 1993; Starker, 1975). Moreover, when discussing the efficiency of planning and goal setting, one has to recall that such actions have the potential to help music students reach a level of automation that enables effortless music performance, and thus a foundation to express the music freely. Music education research has addressed the relevance of goal setting and planning (e.g., Jørgensen, 2011; Lehmann and Ericsson, 1997). However, more research on the efficacy of goal setting in the context of music is certainly needed.

Mental and physical states in instrumental practice

The intervention study (Paper 4) found that music students became increasingly more resilient and less worried about mistakes while performing. Generally, this finding was tied to students' mental and physical states while practicing and performing. In sport psychology, there is an emphasis on identifying and defining personalized optimal mental and physical states during training and competition (Weinberg & Gould, 2011). The intervention study (Paper 4) revealed that the participants complained about insufficient concentration, perfectionistic concerns, physical fatigue/pain and

15 Outcome-oriented learners are involved with practice/training based on a distant outcome (e.g., winning a medal, playing flawlessly, practicing 6 hours per day etc.) (Burton, 1989).

16 Task-oriented learners are involved with practice/training that improves and equips the learner progressively through improvement of specific skills (e.g., identified weaknesses, use of a flexible wrist in specific bow strokes, use of breathing while performing difficult passages etc.)

non-volitional practice styles. In essence, it became evident that the participants' physical and mental states were intricately intertwined. For example, several of the participants suffered from what Neuhaus (1993) refers to as an inherent timidity, showing signs of insecurity resulting in a tense style of playing through which they failed to use the natural weight of their body, which led them to play wrong notes. Physical insufficiencies tended to affect mental states and vice versa. On a similar note, findings (Paper 4) revealed that four out of six participants were concerned about perfectionism. Stoeber and Eismann (2007) found that music students who were concerned about perfection, suffered from performance anxiety, somatic complaints and emotional fatigue. In addition, the perfectionistic individuals were extrinsically motivated and worried about not living up to general performance norms/expectations. Acceptance and arousal regulation training turned out to have a positive effect on these participants. Recent research has shown that avoiding negative feelings might be counterproductive in performance situations (Pekrun, Maier & Elliot, 2009). Accordingly, instead of applying thought-stopping techniques commonly used in traditional PST interventions, the present research applied acceptance techniques deriving from acceptance and commitment therapy (Hayes & Strosahl, 2004; Russel, 2006). More specifically, the intervention study found that acceptance training combined with arousal regulation had a remarkably positive effect on the participants' practice and performance (see Paper 4). Moreover, refining these psychological skills, both individually and in front of the other participants, significantly reinforced internal confidence, use of natural weight and a more effortless style of playing in participants struggling with perfectionistic concerns. In general, teaching music students that they can develop adequate mental focus to accompany physical work over time facilitated personal progress and motivation.

Towards peak performance—overlearning psychological skills

As discussed in the previous section, structure, planning and goal setting were found to be the very foundations for making psychological skills facilitative in regard to music performance. As part of this process, the accumulation of appropriate mental and physical states over time in instrumental practice laid the foundation for mock-performances. Pre-performance routines (focusing attention on task-relevant events) strengthened the participants' resilience during performance situations. In essence, the routines

seemed to enable the participants to fully focus on the music and the task at hand while performing. Research within sports has found that the most successful athletes are involved in making detailed pre-competition plans in order to stay focused on the task at hand during competition (e.g., Greenleaf, Gould & Dieffenbach, 2001; Orlick & Partington, 1988). Weinberg and Gould (2011) emphasize the importance of implementing such pre-performance routines, not only prior to performances, but also during performance. The intervention study (Paper4) found that none of the participants consciously rehearsed their performances or made plans for their performances beforehand. Accordingly, simulating and systematically rehearsing the musical performances became a central part of the PST. As part of this training, the participants systemized pre-performance routines. By doing so, not only did the participants gain greater self-efficacy for their upcoming performances, they also learned how to bounce back from potential distractions. The choice of exactly what to focus on during a performance turned out to be highly personal; however, most of the participants preferred either to focus on musical aspects of the piece, or on mental states (e.g., letting things happen, accepting mistakes). Spending time on preparation and trying out coping strategies for dealing with high-pressure situations is highly effective. However, this kind of preparation seems to be underestimated in instrumental practice. In sum, instrumental teachers and music students should put more emphasis on practicing performance as part of instrumental practice routines.

5.2 General discussion

The desire to help both music teachers and students to better understand tenets of effective music practice was a primary motivator for the present research project. Studies presented in this thesis are the first of their kind to investigate PST from the perspective of SRL theory. Assessing, evaluating and refining ways of implementing PST to the music context, as well as providing music students with long-term PST, afforded a unique insight into determinants and mechanisms of performance enhancement and motivation. By taking such a multidimensional approach, the present project provides the applied fields of music acquisition and music education with research findings that may readily impact the work habits of current and future music students.

Two of the present studies (Papers 3 and 4) are novel in that they are the first studies reporting the implementation of PST in accordance with sport psychology traditions (i.e., recommending qualitative, long-term personally tailored interventions) in the field of music. Previous studies implementing psychological skills from sport psychology are few (Clark & Williamon, 2011; Hoffman & Hanrahan, 2012; Kageyama, 2007, Osborn et al., 2011), they were mainly short-term studies (Hoffman & Hanrahan, 2012; Kageyama, 2007, Osborn et al., 2011) as they lasted for three weeks or less. None of these studies were in line with sport psychology recommendations of 3 to 6 months of training as a minimum for internalizing and learning the skills (Weinberg & Gould, 2011). Thus, the validity of previous psychological skills interventions in music is limited.

An overarching aim of the present research was to gain a multidimensional view of determinants of performance enhancement and motivation in music performance students. This population was of interest because music conservatory performance students aspire to professional careers as full-time musicians.

5.2.1 Contributions

The theoretical article (Paper 1) is the first theoretical enquiry (regardless of field) discussing goal setting theory (Lock & Latham, 1990) and self-determination theory (Deci & Ryan, 2000) in regard to one another. The theories were found to be of particular interest in music acquisition as they have separately proven to be effective in different performance contexts (e.g., Lock et al., 1984; Deci & Ryan, 2000). While being different in nature (e.g., quantity of motivation vs. quality of motivation), there is great strength in assessing them together as they represent different motivational qualities. While goal setting theory (Locke & Latham, 1990) is principally preoccupied with “what”, and “how” people are motivated, self-determination theory is more into the “why” of motivation (see Paper 1). Synthesizing the core aspects of these two contrasting approaches provides the potential of expanding and renewing music students and educators didactical repertoire. Furthermore, the theoretical article contributed theoretically and practically as a body of reflection (see Figure 3 in Paper 1) that is relevant for generating future research hypothesis (in multiple fields of research).

Making a unique contribution to the field, the survey study (Paper 2) tested an adapted model of self-regulated learning investigating directional relationships between SRL and use of psychological skills. Few studies have investigated SRL in the context of higher music education (Araújo, 2015, Miksza & Tan, 2015; Nielsen, 1999; 2004; 2015). Most existing studies conducted targeted patterns of self-regulated learning in children and adolescents (e.g., McCormick & McPherson, 2003; Miksza, 2006). Furthermore, most of these studies addressed the use of practice strategies *during* instrumental practice. Miksza and Tan (2015) included “grit” (i.e., the determination to accomplish short- and long-term goals) as one of the predictor variables. The findings were consistent with the findings in Paper 2 which revealed that grit strongly predicted practice efficiency, flow and self-efficacy for self-regulation. Mean measures of *grit* ($M = 3.25$) in Miksza and Tan’s study reveal a similar outcome to *goal setting* in Paper 2 in the present research ($M = 3.20$), thus indicating a potential for greater involvement in forethought phase processes. Accordingly, the potential for achievement based on setting specific goals was demonstrated in a meta-analysis on deliberate practice. The findings revealed a remarkably strong relationship between task-specific practice and music achievement (Platz et al., 2014). Moreover, investing time and effort on strategic planning (goal setting, task analysis) prior to instrumental practice seems to have a huge impact on the quality of subsequent actions (see Zimmerman, 2008).

In general, Paper 2 found strong evidence of cyclical self-regulated patterns among self-regulated music students. The main contribution of this study was practical. Music students who invested time and effort in planning and setting goals for their instrumental practice were high in self-efficacy, involved with psychological skills, and were able to adaptively cope in the face of failure. However, the study also revealed that only a moderate number of students were considered self-regulated learners. The survey study (Paper 2) is the first to investigate the cyclical nature of SRL in music students by applying structural equation modeling (SEM). In addition, no other studies have included psychological skills variables (i.e., goal setting, arousal regulation, imagery). Besides actualizing the usefulness of applying SRL as a framework for psychological skills, the survey study (Paper 2) also verified the need for assisting music students to become more organized and self-regulated in their daily practice. It also contributed to extending our

understanding of how adaptive motivational processes in instrumental practice enable continuity in self-regulated learning.

Despite anecdotal recommendations of PST delivery (e.g., Andersen, 2000 and Hays, 2009), surprisingly few studies (i.e., regardless of field) have piloted and evaluated the delivery of PST. Most studies have generally evaluated the efficacy of applying PST (e.g., Thelwell et al., 2010). Evidently, there is a need for research on optimization of PST delivery. One of the few studies that evaluates the delivery of PST to applied field of sports investigated athletes' perception of PST and long-term application of the skills. Findings revealed that the program was effective in increasing athletes' knowledge and use of the four psychological skills (i.e., goal setting, imagery, arousal regulation, mental preparation), as well as how important they perceived the skills to be. The findings revealed that the most effective techniques were the ones that were practically applied during camp practice (i.e., arousal regulation and imagery). The article discussed that goal setting and mental preparation, in particular, should be implemented in future PST during camp practice (Gould, Petlichkoff, Hodge & Simons, 1990). Similar findings were reported by Clark and Williamson (2011), who revealed that participants requested more opportunities to try out skills in an applied context.

The second major contribution of the present research is based on an extensive evaluation of the process of optimizing the delivery of PST in the field of music. Based on Thelwell and Greenlees' (2001) assumption that a combination of psychological skills should relate to the specific sport targeted, Paper 3 evaluates both the impact of motivational climate in PST delivery and the use of specific tools (i.e., quantitative self-assessment followed up by qualitative assessment, performance profiling, use of iPads, and combining individual meetings with group meetings). Paper 3 is the first study in music research to evaluate PST delivery and its findings have practical implications. One key finding was that individual tailoring of PST enabled participants' sense of ownership (i.e., self-reference), which in turn enabled multiple experiences of mastery (see Deci & Ryan, 2000). The use of technological tools such as electronic practice journals including protocols for goal setting and self-evaluation facilitated participants' overall self-regulation. Last, but not least, the pilot study also verified Gould et al. (1990) and Clark and Williamson's (2011) assumptions regarding the potential efficacy

of prioritizing continued practical application of psychological skills in an applied context.

To my knowledge only four PST-like interventions studies have been conducted in the field of music (i.e., Clark & Williamon, 2011; Hoffman & Hanrahan, 2012; Kageyama, 2007; Osborne et al., 2014). Hoffman and Hanrahan (2012) introduced mental/psychological skills (i.e., imagery, cognitive reconstruction, and thought stopping) to music students, amateurs, and professional musicians through three group sessions with mixed results. The study revealed a moderate reduction in performance anxiety in the treatment group. However, no significant reduction was found in state/trait anxiety or heart rate from pre- to post-test or between the experiment group and the treatment group. Kageyama (2007) assessed the efficacy of three different mental skills programs (i.e., physiological, psychological, and psycho-physiological) tailored to advanced music majors. The outcomes were compared to a non-treatment group. The results were inconclusive; no statistically significant results were found regarding performance quality and task focus after the 1.5 hour training session (Kageyama, 2007). Osborne et al. (2014) piloted a three-week performance psychology training program for music conservatory students. Results revealed that 7 out of 21 subscales showed significant changes in the expected direction (i.e., self-reported music performance anxiety, performance preparation, confidence, courage, focus, concentration and performance resilience). In sum, the program showed that such training has a promising effect in music students. Clark and Williamon (2011) found similar results in their nine-week study regarding mental/psychological training for college-level music students. The experimental group had a significant increase in imagery vividness and self-efficacy for performance. Qualitative feedback from participants revealed improved confidence, self-awareness and anxiety-control along with healthier work habits.

Two out of four studies had significant results (i.e., Osborne et al., 2014 and Clark & Williamon, 2011). The two studies (i.e., Hoffman & Hanrahan, 2012; Kageyama, 2007) that revealed weak and inconclusive non-significant results, were both short-term interventions with a maximum of only three training sessions. Most studies investigating the effects of PST in sports were longitudinal (e.g., Bernier, Thienot, Codron, & Fournier, 2009; Fournier et al., 2005). Thus, PST should be viewed as part of a longer educational process (Hayes, 2009). In contrast to previous studies (reviewed above), Paper

4 individually tailored psychological skills over a 15-week intervention. The study (Paper4) was also unique in offering consistent, practical long-term training with group performances every other week throughout the program. In fact, the group sessions turned out to be the most important training ground for active application of the psychological skills. In general, the qualitative and quantitative results were positive and significant.

Goal setting is the first psychological skill acquired in PST (Andersen, 2000; Weinberg & Gould). With the exception of Clark and Williamon (2011), previous psychological skills interventions in music do not mention goal setting, either explicitly, or implicitly. The present research is the first of its kind to thoroughly investigate the use of goal setting in relation to Locke and Latham's (1990; 2002) theory of goal setting in regard to the field of music. The thesis studies generally revealed that music students were inexperienced at setting specific goals for their instrumental practice. However, goal setting was shown to have a remarkable motivational effect. By setting difficult yet realistic goals as part of a goal hierarchy, the participants learned how short-term learning processes are connected to long-term goals (see Kylo & Landers, 1995; Locke & Latham, 2002). The motivational effect of goal setting was recognized in the participants' eagerness and self-efficacy in instrumental practice. Furthermore, goal setting had an immense impact on the participants' attentional focus and metacognition, as well as on their ability to cope in the face of failure. These findings were also consistent with Zimmerman's cyclical model of self-regulated learning (Zimmerman, 1989). SRL advocates the importance of initial task analysis on subsequent learning processes (e.g., Zimmerman, 2008).

A major finding in Paper 4 was that perfectionistic participants who were anxious and nervous in performance situations became more self-efficacious and resilient and less worried during performances during and after the intervention. Hoffman and Hanrahan's (2012) study mainly focused on reducing performance anxiety (i.e., state and trait) based on three workshops delivered to a group of musicians. Among other techniques (e.g., self-awareness, imagery, cognitive restructuring), the study applied thought stopping through which the participants learnt to block out unwanted thoughts. In contrast, the present research applied acceptance-based methods deriving from *acceptance and commitment therapy* (ACT) (Hayes & Strosahl, 2004). Research has found that thought suppression might lead to increased cognitive disequilibrium and negative experiences (Levin, Hildebrandt, Lillis &

Hayes, 2012). Accordingly, studies taking a mindfulness/acceptance-based approach to PST have proven that such non-traditional approaches are particularly effective for performance enhancement in sports (Bernier et al., 2009; Moore & Gardner, 2011). The less we choose to struggle with blocking out unwanted feelings and thoughts (i.e., acknowledging and accepting them), the less we are negatively disturbed and affected by them (see Hayes & Strosahl, 2004). Moreover, mindfulness/acceptance-based approaches are believed to have played a central role in coping with perfectionistic concerns and worry. ACT seems to have potential for performance enhancement in musicians.

In addition to teaching psychological skills, the PST intervention (Paper 4) taught students healthy practice habits (i.e., taking enough breaks, creating an accepting, non-judgmental focus during practice, self-evaluation routines). These practice habits were found to have a positive effect on participants who complained about physical pain. In addition, by evaluating their goals, the participants received feedback, which enabled them to adjust their goals. This motivated the participants, since they frequently recognized that they had improved.

On a theoretical level, the intervention (Paper 4) also contributed by demonstrating the relevance of applying SRL as a framework of PST. Moreover, the adapted cyclical model of self-regulated learning (see Figure 2) in many ways aided both interpretative and practical aspects of the program. To my knowledge, no previous PST interventions (regardless of field) have applied Zimmerman's (1989) cyclical model of SRL systematically as a theoretical and practical framework for PST.

5.3 Implications

Embedded in the handcraft of effective music acquisition and performance, the present research has major implications for music learning, teaching and motivation therein.

By identifying adaptive and maladaptive processes of learning among music students, we can replace potentially destructive learning habits with more constructive ways of learning. The present research vigorously investigated and verified constructive and less constructive ways of approaching instrumental practice and performance (e.g., use of goal setting and psychological

skills, perfectionistic concerns vs. perfectionistic striving, outcome oriented practice vs. task oriented practice). Paper 2 generated generalizable findings regarding patterns within cyclical phases of music acquisition. The findings in Paper 2 were supported by findings from Papers 3 and 4, which demonstrated the impact of implementing principles from SRL (Zimmerman, 2002) along with psychological skills. Thus, generalizable findings (Paper 2) were corroborated with in-depth findings (Papers 3 and 4) enabling connecting relationships. Combined, these findings are believed to provide both music students and music educators with information that might have a positive impact on their work methods. In sum, the present research can in many ways be applied as a user-manual for motivating effective practice strategies enabling mastery and joy in music acquisition and performance.

The use of theory in the present research is believed to have a substantial impact on how we understand motivational processes in music acquisition, and the practical execution thereof.

Theorization presented in Paper 1 was preliminarily verified in the empirical studies (Papers 2, 3 and 4). The first major implication relates to the motivational impact of defining concrete direction in what we do. All three studies presented in this thesis suggest the motivational potential of goal setting. This knowledge is transferable to teacher–student relationships (Papers 1 and 3). For example, the present research (Papers 3 and 4) constituted a learning environment that encouraged basic psychological needs (i.e., autonomy, relatedness, and competence). We found that these elements led to continued motivation in the participants. For instance, letting the participants identify their strengths and weakness motivated them for subsequent action because it enabled them to connect the evaluation to their sense of self (Deci & Ryan, 2000). A feeling of relatedness and competency was highlighted through communication and experienced mastery during the PST (Papers 3 and 4). I believe that awareness of these factors is imperative in facilitating teacher–student relationships.

The present study's use of principles from acceptance and commitment therapy most likely have practical implications for future intervention studies concerning performance anxiety and performance enhancement. In line with Bernier et al., 2009, and Levin et al. 2012, Paper 4 revealed that accepting and using the extra energy generated in a performance situation (instead of suppressing and reducing it) was highly effective in enhancing the efficacy of both instrumental practice and performance.

Finally, I hope that the present research will have didactical implications in higher music education. More specifically, workshops and classes aiming to help music students to become self-regulated motivated learners should be offered from an early stage in higher music education. The present research is an example of how such programs might be implemented in higher music education.

5.4 Strengths and limitations

The present research incorporated a wide variety of theory reflecting two main directions:

- a Motivational processes before, during and after learning (Zimmerman, 1989; 2002).
- b Basic psychological needs in human beings (Deci & Ryan, 2000).

The use of motivational constructs strongly benefitted our overall understanding of motivational determinants, both practically and theoretically. In implementing the psychological skills, SDT provided a framework that triggered a need-satisfying work environment and inter-individual communication based on autonomous motivation (see Deci & Ryan, 2000). Such a perspective turned out to positively initiate motivation for on-going work (Papers 1, 3 and 4). Moreover, as discussed in the theoretical article (Paper 1) it is believed that SDT contains qualities that directly advance motivational factors in music acquisition and teaching. In essence, SDT's emphasis on personal well-being and the importance of identifying and internalizing learning in relation to one's sense of self makes it a powerful construct in instrumental practice. SRL theory facilitated the interpretation of research findings through its pragmatic emphasis on explaining cycles of learning. Because of its practice-related approach, SRL not only explained learning outcomes on a theoretical level, but supported the overall structuring of the PST interventions as well. Moreover, the present research findings demonstrate the manifold advantages of applying SRL in performance enhancement interventions.

The present research project was theory-driven. This implies that the overall project took an a priori approach. From a social-constructionist point of view, theory driven studies that are mainly interested in testing theory might be subject to certain limitations (e.g., Burr, 1995). Research that is

too theory-driven has a tendency to overlook latent socially produced and reproduced meaning (Charmaz, 2008). This stands in contrast to essentialist/realist approaches where a more unidirectional relationship is accounted for between language, experience and meaning (Braun & Clark, 2006). From a pragmatic perspective, the epistemological relevance is embedded in the nature of the research questions (Onwuegbuzie & Leech, 2005). In the present project, the research questions were, in essence, embedded in psychological theory. Consequently a more theory-driven approach was preferred (Braun & Clark, 2006).

Paper 2 was based on a quantitative approach. In retrospect, I realize that this was not unproblematic. The process of validation and reliability testing was complicated by mixing validated and reliability tested questionnaires with items that were generated for contextual purposes. As a result, a thorough process of validation and internal reliability testing was needed. The literature suggested that during piloting of questionnaires exploratory factor analysis would demand a minimum of 100 participants (Cox, Holden & Sagovsky, 1987). However, others recommend a minimum of 300 (Tabachnick & Fidell, 2013), five per item (Bryman & Cramer, 2009). In the present study, 157 respondents formed the basis for the factor analysis of a total of 34 items (Paper 2) and 39 items (Paper 4) (approx. 4.6 per item). Even though this was on the weaker side, it corresponded to some of the recommendations (Cox et al., 1987). The analysis in Paper 2 had several advantages applying structural equation modeling (SEM). SEM was developed to include a set of other analysis techniques including regression, factor and other correlational analysis in one package. In SEM analysis, two models are applied, a *measurement model* and a *structural model*. The measurement model is basically a confirmatory factor analysis (CFA) model including the latent variables and its indicators. Before further analysis can be conducted on the structural model, acceptable factor loadings among the indicator variables (i.e., manifest variables), and among the latent and the indicator (manifest) variables are necessary (Schumacker & Lomax, 2004). Moreover, a strong statistical foundation is built into the measurement model, securing reliable test results and work conditions for the structural model. The quantitative analysis in Paper 4 was far more limited. Because quantitative measures were supplementary to the qualitative data (quan+ QUAL), the sample size was kept small. This negatively affected the possibility of generalizing data to the population from which it was sampled. However, this permitted

in-depth qualitative investigation. In essence, the case study design led to results addressing not only *what* worked or didn't, but also *why* and *how* the intervention worked or didn't as well (Yin, 2009).

Although generalizability to a larger population is unheard of in case study research, theoretical generalizability is not uncommon (Marczyk et al., 2005). In this thesis, Paper 4 generated results that were in line with the theoretical hypotheses.

The present research applied a questionnaire in both a medium large survey study (N=204) and a case study (N=6) sampled from the same population. Although the findings from the case study are not generalizable, they appear empirically strong when compared to the larger survey study. Finally, the case study (Paper 4) would have been statistically strengthened by incorporating randomization procedures and a control group. Accordingly, this should be considered in future intervention research in music.

6 Conclusion

The present research provides evidence regarding motivation in and enhancement of instrumental practice and performance. The overall aim of the present research was manifold. The first aim was to identify and investigate the relationship between three phases of learning (e.g., Zimmerman, 2002) in relation to motivation for continuity and adaptive self-regulation. Based on this aim, the first study in the present research generated new knowledge regarding cyclical learning processes. In essence, the study uncovered a motivational potential in forethought phase processes for subsequent learning. Music students who were considered proactive in their approach to instrumental practice were found to apply a rich repertoire of psychological skills. In addition, they were self-efficacious and able to cope adaptively in the face of failure. However, the research also found evidence of a need for helping and supporting music students in learning adaptive instrumental practice skills.

The second aim, thus, was to construct a PST program for music students. Accordingly, a PST intervention was evaluated with the aim of adapting PST to the field of higher music education. General recommendations from sport psychology were taken in consideration (Andersen, 2000; Hays, 2009, Weinberg & Gould, 2011). Thus, the pilot intervention prioritized an individually based approach, which highlighted self-assessment and self-determination. In addition, intervention tools such as performance profiling, electronic

practice journals and iPads were evaluated along with the intervention. Results revealed that an individual approach based on self-determination triggered autonomous forms of motivation in the participants (Deci & Ryan, 2000). The results also revealed that a combination of individual and group sessions enabled better integration and more opportunities to try out the psychological skills. However, the intervention also provided feed forward regarding how to optimize psychological skills training among music students. For instance, the pilot study revealed that the participants perceived having individual and group meetings every other week to be insufficient and expressed a need for weekly individual meetings. Moreover, having two weeks between the individual sessions seemed to decrease the continuity of the intervention. The group sessions were revealed to be highly efficient and advantageous for learning and rehearsing the various psychological skills. These sessions provided an opportunity to gain performance experience in a medium-pressure performance context. In sum, the participants became increasingly prepared and robust in challenging performance situations.

Paper 4 is the first PST intervention study to use an individual-based long-term approach based on sport psychological recommendations (e.g., Weinberg & Gould, 2011; Andersen, 2000). Generally, the initial thematic analysis revealed that music students had little experience with planning and setting specific goals for their instrumental practice sessions. This lack of goal setting skills was further related to themes such as lack of concentration and volition, and physical pain. Most of the participants were preoccupied with mastering the music as soon as possible. To this end they set general goals that were mainly outcome-oriented. This, in turn, affected several of the participants' deliberateness, self-efficacy and progress. Results generated during and after the intervention revealed that the participants became increasingly motivated for deliberate practice and implementation of psychological skills. Key findings revealed that planning (i.e., use of practice journals) and hierarchical goal setting (i.e., short- medium- and long-term goals) based on theoretical principles (i.e., Locke & Latham, 2002) in cyclical SRL had a strong contribution to the participants' concentration, self-observation, self-evaluation and coping. In essence, this laid a foundation for further implementation of psychological skills (imagery, centering, acceptance training/self-talk, arousal regulation). Participants who were considered to be perfectionists (i.e., worried about not living up to personal or normative standards), whose performances deteriorated as a result of

task-irrelevant focus, learned adaptive perfectionistic striving. In sum, the participants became increasingly self-efficacious, resilient and confident through learning and implementing a non-judgmental focus highlighting openness and acceptance of mistakes. The accumulation of such adaptive mental practice habits over time, combined with multiple opportunities to implement these skills in front of others, facilitated performance enhancement. The combination of a timely intervention with multiple simulations, implementation and practical application of the psychological skills were key sources to the positive results of the PST intervention. Weinberg and Gould's (2011) statement regarding self-regulation as the ultimate goal of PST turned out to be true for the present research. Eight-month follow up interviews revealed that the students were generally involved in self-regulated learning and application of PST.

The overall research also revealed the appropriateness of integrating motivation theories of learning (SRL) and human needs (SDT) on both a practical and theoretical level. In essence, the use of theory (Figure 2) had a positive impact on the interpersonal, communicative and structural components of the intervention, as well as on conceptual and theoretical interpretations of learning and human motivation.

6.1 Future research and directions

Future research should replicate the survey study applying a longitudinal design. This would facilitate a more profound understanding of the long-term development of motivational patterns and use of practice strategies (e.g., during an academic year). Additionally, such a longitudinal design would benefit from including grades and performance achievement as outcome variables, along with basic psychological needs (e.g., quality of motivation).

SDT has been integrated in studies on burnout and motivational climate in sports, and performance enhancement in sports (e.g., Bentzen, 2015; Lemyre, 2006) which found that the degree of perceived autonomous motivation has explicit and implicit effects on level of performance and burnout in top athletes and coaches. Little research on the motivational climate in higher music education has been conducted in the field of music. Most of the research on motivation in music acquisition is based on individuals'

goal-orientation (e.g., Miksza, 2009; Smith, 2005) and has found that mastery goals (i.e., goals focusing on the task at hand) are positively related to use of practice strategies, reported time of practice, and performance achievement. However, no studies have investigated perceived motivational climate in relation to fulfillment of basic psychological needs, deliberate practice, symptoms of burnout and performance achievement. Future research should implement SDT to investigate relations among these variables. The relevance of such a study would increase with a longitudinal investigation of these variables in relation to performance grades and level of success after graduation.

In addition/relation to conducting survey studies, more action research is needed in the field of music education. In particular, studies aiming to enhance music students'/musicians' instrumental practice and performance are needed. Moreover, studies that implement mindfulness-based practices (e.g., Hayes & Strosahl, 2004; Levin et al., 2012), instead of focusing on eliminating/reducing worry (e.g., music performance anxiety), would be particularly useful. Future studies should emphasize symptoms caused by performance anxiety and maladaptive perfectionism as both normal and human. Accepting the symptoms of perfectionism and letting them appear without suppressing or avoiding them is believed to create better results than more traditional methods (e.g., thought stopping, cognitive restructuring) (Levin et al., 2012). Such types of interventions fused with techniques deriving from PST have the potential to contribute to future research. Future interventions can benefit from combining individual and group sessions, providing multiple opportunities for group interaction, performances and fulfillment of basic psychological needs (Andersen, 2000; Deci & Ryan, 2000).

Regarding possible directions for future research, music educators and performers would greatly benefit from learning more about the mechanisms behind human motivation. The present research has provided rich material related to motivational concepts and how these concepts work in real life situations. In sum, greater emphasis should be given to these concepts in regard to the practice, performance and teaching of music.

References

- Andersen, M. B. (2000). *Doing sport psychology*. Champaign, IL: Human Kinetics.
- Andersen, M. B. (2005). *Sport psychology in practice*. Champaign, IL: Human Kinetics.
- Araújo, M. V. (2015). Measuring self-regulated practice behaviors in highly skilled musicians. *Psychology of Music*, 44(2), doi: 10.1177/0305735614567554
- Atkins, L. (2009). Health and wellbeing education in British conservatories. In A. Williamon, S. Pretty & R. Buck (eds), *Proceedings of the International Symposium on Performance Science* (Utrecht), 219–223.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122–147.
- Bandura, A. (1994). Self-efficacy. In V. S. Ramachandran (Ed.) (Vol. 4, pp. 71–81). New York: Academic Press.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

- Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. New York: W. H. Freeman and Company
- Bandura, A., & Cervone, D. (1983). Differential engagement of self-reactive influences in cognitive motivation. *Organizational Behavior and Human Decision Processes*, *38*, 91–113.
- Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, *88*(1), 87–99. doi: 10.1037/0021-9010.88.1.87
- Barry, N. H. (1992). The effects of practice strategies, individual differences in cognitive style, and gender upon technical accuracy and musicality of student instrumental performance. *Psychology of Music*, *20*, 112–123.
- Beauchamp, M. K., Harvey, R. H., & Beauchamp, P. H. (2012). An integrated biofeedback and psychological skills training program for Canada's Olympic short-track speedskating team. *Journal of Clinical Sport Psychology*, *6*, 67–84.
- Beauchamp, P. H., Halliwell, W. R., & Fournier, J. F. (1996). Effects of cognitive-behavioral psychological skills training on the motivation, preparation, and putting performance of novice golfers. *The Sport Psychologist*, *10*, 157–170.
- Befring, E. (2002). *Forskingsmetode, etikk og statistikk*. Oslo: Det Norske Samlaget.
- Bentzen, M. (2015). *The Process of burnout among high-performance sport coaches*. Oslo, Norway: Norges Idrettshøgskole.
- Bernier, M., Thienot, E., Codron, R., & Fournier, J. F. (2009). Mindfulness and acceptance approaches in sport performance. *Journal of Clinical Sports Psychology*, *4*, 320–333.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.
- Bruser, M. (1997). *The art of practicing: A guide to making music from the heart* (1st ed.). New York: Bell Tower.
- Bryman, A., & Cramer, D. (2009). *Quantitative data analysis with SPSS 14, 15 and 16: a guide for social scientists*. London: Routledge.
- Burr, V. (1995). *An introduction to social constructionism*. London: Routledge

- Burton, D. (1989). Winning is not everything: Examining the impact of performance goals on collegiate swimmers' cognitions and performance. *The Sport Psychologist*, 3, 105–132.
- Burton, D., Naylor, S., & Holliday, B. (2001). Goal setting in sport: Investigating the goal effectiveness paradox. In R. Singer, H. Hausenblas & C. Janelle, (Eds.), *Handbook of research on sport psychology* (2nd ed., pp. 497–528). New York: Wiley.
- Burton, D., Pickering, M., Weinberg, R., Yukelson, D., & Weigland, D. (2010). The competitive goal effectiveness paradox revisited: Examining the goal practices of prospective Olympic athletes. *Journal of Applied Sport Psychology*, 22, 72–86.
- Burton, D., & Weiss, C. (2008). The fundamental goal concept: The path to process and performance success. In T. Horn (Ed.), *Advances in sport psychology* (3rd ed., pp. 339–375). Champaign, IL: Human Kinetics.
- Burwell, K., & Shipton, M. (2013). Strategic approaches to practice: an action research project. *British Journal of Music Education*, 30(3), 329–345.
- Butler, R. J., & Hardy, L. (1992). The performance profile: Theory and application. *The Sport Psychologist*, 6, 253–264.
- Carter, C. (2013). Why the progress you make seem to disappear overnight. *The Bulletproof Musician*, 6–11.
- Chaffin, R., Imreh, G., & Crawford, M. (2002). Practicing perfection: Memory and piano performance. Mahawah, NJ: Erlbaum.
- Charmaz, K. (2008). Constructivism and grounded theory. In J. A. Hollstein & J. F. Gubrium (Eds.), *Handbook of Constructionist Research* (pp. 397–412). New York: Guilford Press.
- Clark, T., & Williamon, A. (2011). Evaluation of a mental skills training program for musicians. *Journal of Applied Sport Psychology*, 23, 342–359.
- Cleary, T. J., & Zimmerman, B. J. (2001). Self-regulation differences during athletic practice by experts, non-experts, and novices. *Journal of Applied Sport Psychology*, 13, 185–206.
- Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detecting of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, 150, 782–786.

- Creswell, J. W. (2009). *Research design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Islands, CA: SAGE Publications Inc.
- deCharms, R. (1977). Pawn or origin? Enhancing motivation in disaffected Youth. *Educational Leadership*, 34(6), 444–448.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experimnts examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 125, 627–668.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268.
- Denzin, N. K. (2009). *The research act: A theoretical introduction to sociological methods*. New Brunswick, NJ: Aldine Transaction.
- Dosil, J. (Ed.) (2006). *The sport psychologist's handbook: a guide for sport-specific performance enhancement*. Chichester, West Sussex, England.
- Dweck, C. S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology*, 31, 674–685.
- Elliot, A. J., & McGregor, H. A. (2001). A 2 x 2 achievement goal framework. *Journal of Personality and Social Psychology*, 80(3), 501–519.
- Elliot, A. J., & Dweck, C. S. (Eds.) (2005). *Handbook of competence and motivation*. New York: Guilford Press.
- Erez, M., & Kanfer, F. H. (1983). The role of goal acceptance in goal setting and task performance. *The Academy of Management Review*, 3(3), 454–463.
- Ericsson, K. A. (2006). *The influence of experience and deliberate practice on the development of superior expert performance*. In K. A. Ericsson, N. Charness, P. J. Feltovich & R. R. Hoffman (Eds., pp. 683–703), *The Cambridge Handbook of Expertise and Expert Performance*. Cambridge: Cambridge University Press.
- Ericsson, K. A., & Charness, N. (1994). Expert performance – its structure and acquisition. *American Psychologist*, 49(8), 725–747.

- Ericsson, K. A., Krampe, R. T., & Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, *100*(3), 363–406.
- Filby, W. C., Maynard, I. W., & Graydon, J. K. (1999). The effect of multiple-goal strategies on performance outcomes in training and competition. *Journal of Applied Sport Psychology*, *2*, 230–246.
- Fournier, J. F., Calmels, C., Durand-Bush, N., & Salmela, J. H. (2005). Effects of a season-long PST program on gymnastic performance and on psychological skill development. *International Journal of Sport and Exercise Psychology*, *3*(1), 59–78.
- Galamian, I. (1999). *Principles of violin playing & teaching* (3rd ed.). Ann Arbor, Mich.: Shar Products Co.
- Gallwey, W. T. (1997). *The inner game of tennis* (Rev. ed.). New York: Random House.
- Gaunt, H. (2009). One-to-one tuition in a conservatoire: the perceptions of instrumental and vocal students. *Psychology of Music*, *38*, 178–208.
- Gerring, J. (2007). *Case study research: principles and practices*. New York: Cambridge University Press.
- Giacobbi, P. R., Poczwadowski, A., & Hager, P. F. (2005). A pragmatic research philosophy for applied sport psychology. *The Sport Psychologist*, *19*, 18–31.
- Gould, D., Petlichkoff, L., Hodge, K., & Simons, J. (1990). Evaluating the effectiveness of a psychological skills educational workshop. *The Sport Psychologist*, *4*, 249–260.
- Graham, J. (1993). The role of performance profiling in cognitive behavioral interventions in sport. *The Sport Psychologist*, *7*, 160–172.
- Green, B., & Gallwey, W. T. (1986). *The inner game of music* (1st ed.). Garden City, NY: Anchor Press/Doubleday.
- Greenleaf, C., Gould, D., & Dieffenbach, K. (2001). Factors influencing Olympic performance: Interviews with Atlanta and Nagano US Olympians. *Journal of Applied Sport Psychology*, *13*, 154–184. doi:10.1080/104132001753149874
- Gruson, L. M. (1998). Rehearsal skill and musical competence: Does practice make perfect? In J. A. Sloboda (Ed.) *Generative processes in music: The psychology of performance, improvisation, and composition* (pp. 91–112). Oxford: Clarendon Press.

- Guest, G., MacQueen, K. M., & Namey, E. E. (2012). *Applied thematic analysis*. Los Angeles: Sage Publications.
- Hallam, S. (1997a). Approaches to instrumental music practice of experts and novices: Implications for education. In H. Jørgensen & A. C. Lehman (Eds.), *Does practice make perfect? Current theory and research on instrumental music practice* (pp. 89–108). Oslo, Norway: Norges musikkhøgskole
- Hanrahan, S. J., & Andersen, M. B. (2010). *Routledge handbook of applied sport psychology: A comprehensive guide for students and practitioners*. New York: Routledge.
- Hayes, S. C., & Strosahl, K. (2004). *A practical guide to acceptance and commitment therapy*. New York, NY: Springer.
- Hays, K. F. (2009). *Performance psychology in action: A casebook for working with athletes, performing artists, business leaders, and professionals in high-risk occupations* (1st ed.). Washington, DC: American Psychological Association.
- Heimberg, T. (2007). *Making a musical life*. San Anselmo, Calif.: String Letter Pub.
- Hoffman, S. L., & Hanrahan, S. J. (2012). Mental skills for musicians: Managing music performance anxiety and enhancing performance. *Sport, Exercise, and Performance Psychology*, 1(1), 17–28.
- Howard, V. A. (1982). *Artistry: The work of artists*. Indianapolis, Indiana: Hackett Publishing Company.
- Hu, L. T., & Bentler, P. M. (1999), "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives," *Structural Equation Modeling*, 6 (1), 1–55.
- Johnson, R. B., Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Research*, 33(7), 14–26
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, I. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112–133.

- Jørgensen, H. (2000). Student learning in higher instrumental education: Who is responsible? *British Journal of Music Education*, 17(1), 67–77.
- Jørgensen, H. (1996). *Tid for øving? Studentenes Bruk for Tid for Øving*. Oslo: NMH Publikasjoner.
- Jørgensen, H. (2011). *Undervisning i øving*. Oslo: Norsk Musikkforlag A/S, Oslo.
- Jörskog, K. G., & Sörbom, D. (2006). Lisrel for Windows. Lincolnwood, IL: Scientific Software International, Inc.
- Kageyama, N. J. (2007). *Attentional focus as a mediator in the anxiety–performance relationship: The enhancement of music performance quality under stress*. (Ph.D.), Indiana University, Ann Arbor.
- Kendrick, M. J., Craig, K. D., Lawson, D. M., & Davidson, P. O. (1982). Cognitive and behavioral therapy for musical-performance anxiety. *Journal of Consulting and Clinical Psychology*, 50(3), 353–362.
- Kyllo, L. B., & Landers, D. M. (1995). Goal setting in sport and exercise: A Research synthesis to Resolve the Controversy. *Journal of Sports & Exercise Psychology*, 17, 117–137.
- Leimer, K., & Giesecking, W. (1972). *Piano technique consisting of the two complete books: The shortest way to pianistic perfection and rhythmic, dynamics, pedal and other problems of piano playing*. New York, NY: Dover Publications.
- Lehmann, A. C., & Ericsson, K. A. (1997). Research on Expert Performance and Deliberate Practice: Implications for The Education of Amateur Musicians and Music Students. *Psychomusicology*, 16, 40–58.
- Lemyre, P. N. (2005). *Determinants of Burnout in Elite Athletes*. Oslo, Norway: Norges Idrettshøgskole.
- Leon-Guerrero, A. (2008). Self-regulation strategies used by student musicians during music practice. *Music Education Research*, 10(1), 91–106.
- Levin, M. E., Hildebrandt, M. J., Lillis, J., & Hayes, S. C. (2012). The impact of treatment components suggested by the psychological flexibility model: A meta-analysis of laboratory-based component studies. *Behavior Therapy*, 4, 741–456.

- Locke, E. A. (1968). Toward a theory of task motivation and incentives. *Organizational Behavior and Human Performance*, 3, 157–189.
- Locke, E. A., Frederick, E., Lee, C., & Bobko, P. (1984). Effects of self-efficacy, goals, and task strategies on task performance. *Journal of Applied Psychology*, 69, 241–251.
- Locke, E. A., & Latham, G. P. (2002). Building a practical useful theory of goal setting and task motivation. *American Psychologist*, 57(9), 705–717.
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting & task performance*. Englewood Cliffs, NJ: Prentice-Hall.
- Locke, E. A., Latham, G. P., & Erez, M. (1988). The determinants of goal commitment. *Academy of Management Review*, 13(1), 23–39.
- Locke, E. A., Saari, L. M., Shae, K. N., & Latham, G. P. (1981). Goal setting and task performance. *Psychological Bulletin*, 90(1), 125–152.
- Marczyk, G. R., DeMatteo, D., & Festinger, D. (2005). *Essentials of research design and methodology*. Hoboken, N.J.: John Wiley & Sons.
- Marsh, H. W. (1995). Δ^2 and χ^2 I2 fit indices for structural equation models: A brief note of clarification. *Structural Equation Modeling*, 2, 246–254.
- Martens, F. H. (1919). *Violin mastery; talks with master violinists and teachers, comprising interviews with Ysaye, Kreisler, Elman, Auer, Thibaud, Heifetz, Hartmann, Maud Powell and others*. New York, NY: Frederick A. Stokes Company.
- McCormick, J., & McPherson, G. E. (2003). The role of self-efficacy in a musical performance. *Psychology of Music*, 31, 37–51.
- McPherson, G. E., & McCormick, J. (2006). Self-efficacy and music performance. *Psychology of Music*, 34, 332–336.
- McPherson, G. E., Nielsen, S. G., & Renwick, J. M. (2013). Self-regulation interventions and the development of music expertise. In H. Bembenutti, T. J. Cleary & A. Kitsantas (Eds.), *Applications of self-regulated learning across diverse disciplines* (pp. 355–382). Charlotte, NC: Information Age Publishing.
- Miklaszewski, K. (1989). A case study of pianist preparing a musical performance. *Psychology of Music*, 17, 95–109.

- Miksza, P. (2006). Relationships among impulsiveness, locus of control, sex, and music practice. *Journal of Research in Music Education*, 54(4), 308–323.
- Miksza, P. (2009). Relationships among impulsivity, achievement goal motivation, and the music practice of high school wind players. *Bulletin of the Council for Research in Music Education*, 180, 9–27.
- Miksza, P., & Tan, L. (2015). Predicting collegiate wind players, flow, and self-efficacy for self-regulation: An exploratory study of relationships between teachers, instruction and students' practicing. *Journal of Research in Music Education*, 63(2), 162–179. doi: 10.1177/0022429415583474
- Moore, D.G., Burland, K., & Davidson, J.W. (2003). The social context of musical success: a developmental account. *British Journal of Psychology*, 94(4), 529–549
- Moore, Z. E., & Gardner, F. L. (2011). Understanding models of performance enhancement from the perspective of emotion regulation. *Athletic Insight: The Online Journal of Sport Psychology*, 13(3).
- Moreno, J. A., Cervello, E. & Gonzalez-Cutre, D. (2010). The achievement goal and self-determination theories as predictors of dispositional flow in young athletes. *Anales de Psicología*, 26(2), 390–399.
- Neuhaus, G. G. (1993). *The art of piano playing*. London: Kahn & Averill.
- Nicholls, A. R., & Jones, L. (2013). *Psychology in sports coaching: Theory and practice*. Milton Park, Abingdon, Oxon: Routledge.
- Nicholls, J. (1984). Conceptions of ability and achievement motivation. R. Ames & C. Arnes (Eds.). *Research on motivation in education*. NY: Academic Press, 1, 39–73.
- Nielsen, S. G. (1999). Learning strategies in instrumental music practice. *British Journal of Music Education*, 16(3), 275 - 291
- Nielsen, S. G. (2001). Self-regulating learning strategies in the conservatories. *Music Education Research*, 3, 155–167.
- Nielsen, S. G. (2004). Strategies and self-efficacy beliefs in instrumental and vocal individual practice. *Psychology of Music*, 32(4), 418–431.

- Nielsen, G. S. (2008). Achievement goals, learning strategies and instrumental performance. *Music Education Research, 10*(2), 234–247.
- Nielsen, S. G. (2015). Learning pre-played solos: Self-regulated learning strategies in jazz/improvised music. *Research Studies in Music Education, 37*(2), 233–246. doi: 10.1177/1321103X15615661
- Onwuegbuzie, A. J., & Leech, N. L. (2005). On becoming a pragmatic researcher: The importance of combining quantitative and qualitative research methodologies. *International Journal of Social Research Methodology, 8*(5), 375–387.
- Orlick, T., & Partington, J. (1988). Mental links to excellence. *The Sport Psychologist, 2*, 105–130.
- Osborne, M. S., Greene, D. J., & Immel, D. T. (2014). Managing performance anxiety and improving mental skills in conservatoire students through performance psychology training: a pilot study. *Psychology of Well-Being: Theory, Research and Practice, 4*(18), 1–17.
- Pekrun, R., A., Maier, M., & Elliot, A. J. (2009). Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology, 101*(1), 115–135.
- Pintrich, P. R. (2000): The Role of Goal Orientation In Self-regulated Learning. In Monique Boekaerts, Paul R. Pintrich og Moshe Zeidner (red.): *Handbook of Self-Regulation*, Academic Press.
- Platz, F., Kopiez, R., Lehmann, A. C., & Wolf, A. (2014). The influence of deliberate practice on musical achievement: A meta-analysis. *Frontiers in Psychology, 5*, 1–13. doi: 10.3389/psyg.2014.00646
- Reeve, J., & Jang, H. (2006). What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology, 98*(1), 209–218. doi: 10.1037/0022-0663.98.1.209
- Reeve, J., Ryan, R. M., Deci, E. L., & Jang, H. (2008). Understanding and promoting autonomous self-regulation: A self-determination perspective. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research and applications*. New York: Lawrence Erlbaum Associates.

- Renwick, J. M., & McPherson, G. E. (2009). Multiple motives: Profiles of young Australians' reasons for musical engagement. *International Symposium on Performance Science*, 469–474.
- Robson, C. (2002). *Real world research: A resource for social scientists and practitioner-researchers* (2nd ed.). Oxford, UK: Blackwell Publishers.
- Russel, H. (2006). Embracing your demons: An overview of acceptance and commitment therapy. *Psychotherapy In Australia*, 12(4), 1–8.
- Schmidt, C. (2005). Relationships among motivation, performance achievement, and music practice. *Psychology of Music, Journal of Research in Music Education*, 53, 134–147.
- Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*. Mahwah, N.J.: Lawrence Erlbaum Associates.
- Schunk, D. H. (2008). Attributions as motivators of self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and application*. New York: Lawrence Erlbaum Associates.
- Schunk, D. H., & Rice, J. M. (1989). Learning goals and children's reading comprehension. *Journal of Reading Behavior*, 21(3), 279–293.
- Sheard, M. & Golby, J. (2006). Effects of a psychological skills training program on swimming performance and positive psychological development. *IJSEP, West Virginia University*, 2, 7–24.
- Skinner, B. F. (1974). *About behaviorism* ([1st ed.]). New York: Knopf.
- Sloboda, J. A., Davidson, J. W., Howe, M. J. A., & Moore, D. (1996). The role of practice in the development of performing musicians. *British Journal of Psychology*, 87, 287–309.
- Smith, B. P. (2005). Goal orientation, implicit theory of ability, and collegiate instrumental music practice. *Psychology of Music*, 33(1), 36–57.
- Smith, R. E., Schutz, R. W., Smoll, F. L., & Ptacek, J. T. (1995). Development and validation of a multidimensional measure of sport-specific psychological skills: The Athletic Coping Skills Inventory-28. *Journal of Sport and Exercise Psychology*, 17, 379–398.
- Snowman, D. (1981). *The Amadeus Quartet: the men and the music*. London: Robson Books.

- Stake, R. E. (1995). *The art of case study research*. Thousand Oaks: Sage Publications.
- Stambulova, N. B., Wrisberg, C. A., & Ryba, T. V. (2006). A tale of two traditions in applied sport psychology: The heyday of Soviet sport and wake-up calls for North America. *Journal of Applied Sport Psychology, 18*(3), 173–84. doi: 10.1080/10413200600830182
- Starker, J. (1975). An organized method of string playing. *Bloomington: Indiana University Press*, 133–155.
- Starkes, J. L., & Ericsson, K. A. (2003). *Expert performance in sports: Advances in research on sport expertise*. Champaign, Ill.: Human Kinetics.
- Stoeber, J., & Eismann, U. (2007). Perfectionism in young musicians: Relations with motivation, effort, achievement, and distress. *Personality and Individual Differences, 43*(8), 2182–2192.
- Tabachnick, B. G., & Fidell, G. R. (2013). *Using multivariate statistics* (Vol. 6). Boston: Pearson Education.
- Talbot-Honeck, C. A., & Orlick, T. (1998). The essence of excellence: Mental skills of top classical musicians. *Journal of Excellence, 1*, 61–75.
- Thelwell, R. C., & Greenlees, L. A. (2001). The effects of a mental skills training package on gymnasium triathlon performance. *The Sports Psychologist, 15*, 127–141.
- Thelwell, R. C., Greenlees, L. A., & Weston, N. J. V. (2010). Examining the use of psychological skills throughout soccer performance. *Journal of Sport Behavior, 33*(1), 109–127.
- Thomas, P. R., Murphy, S. M., & Hardy, L. . (1999). Test of performance strategies: Development and preliminary validation of a comprehensive measure of athletes' psychological skills. *Journal of Sport Science, 17*, 697–711.
- Toering, T. T., Elferink, M. T., Jonker, L., Van Heuvelen, M. J. G., & Vissdher, C. (2012). Measuring self-regulation in a learning context: Reliability and validity of the Self-Regulation of Learning Self-Support Scale (SRL-SRS). *International Journal of Sport and Exercise Psychology, 10*, 21–41.

- Treasure, D. C., & Roberts G. C. (1995). Application of achievement goal theory to physical education: Implications for enhancing motivation. *National Association for Physical Education in Higher Education*, 47, 475-489.
- Weinberg, R. S., & Gould, D. (2011). *Foundations of sport and exercise psychology* (5th ed.). Champaign, IL: Human Kinetics.
- Weiner, B. (2014). The attribution approach to emotion and motivation: History, hypotheses, home runs, headaches/heartaches. *Emotion Review*, 6(4), 353-361. doi: 10.1177/1754073914534502
- Weiner, B. (1985). An Attribution Theory of Achievement motivation and Emotion. *Psychological Review*, 94(4), 548-573.
- Weston, N. J. V. (2005). *The impact of Butler and Hardy's (1992) performance profiling technique in sport*. (Doctoral dissertation) Retrieved from <http://eprints.chi.ac.uk/841/> (EThOS).
- Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Los Angeles: Sage Publications.
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated learning. *Journal of Educational Psychology*, 81, 329-339.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, 41(2), 64-70.
- Zimmerman, B. J. (2008). *Goal setting: A key proactive source of self-regulation*. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice*. New York: Lawrence Erlbaum Associates.
- Zimmerman, B. J., & Bandura, A. (1994). Impact of self-regulatory influences on writing course attainment. *American Education Research Journal*, 31, 845-862.
- Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Education Research Journal*, 29, 663-676.
- Zimmerman, B. J., & Kitsantas, A. (2005). The hidden dimension of personal competence: Self-regulated learning and practice. In A. J. Elliot & C. S.

- Dweck (Eds.), *Handbook of competence and motivation* (pp. 509–526). New York: Guilford Press.
- Zimmerman, B. J., & Kitsantas, A. (1997). Developmental phases in self-regulation: Shifting from process goals to outcome goals. *Journal of Educational Psychology, 89*(1), 29–36.
- Zimmerman, B. J., & Kitsantas, A. (1999). Acquiring writing revision skill: Shifting from process to outcome self-regulatory goals. *Journal of Educational Psychology, 91*, 1–10.
- Zimmerman, B. J., & Kitsantas, A. (2013). *The hidden dimensions of personal competence*. Charlotte, NC: Information Age Publishing.
- Zimmerman, B. J., & Risemberg, R. (1997). Becoming a self-regulated writer: A social cognitive perspective. *Contemporary Educational Psychology, 22*, 73–101.
- Zimmerman, B. J., & Schunk, D. H. (Eds.). (1989). *Self-regulated learning and academic achievement: Theory, research, and practice*. New York: Springer-Verlag.

List of papers

Paper 1

Hatfield, J. L. (accepted). Goal Setting and Self-Determination in Music Making: Tenets of Becoming an Organized and Motivated Music Practitioner. *Nordic Research in Music Education Yearbook, Vol. 18* (The yearbook will publish a revised version of the article.)

Paper 2

Hatfield, J. L., Halvari, H., & Lemyre, P.-N. (2016). Instrumental Practice in the Contemporary Music Academy: A Three-Phase Cycle of Self-Regulated Learning in Music Students. *Musicae Scientiae*. doi: 10.1177/1029864916658342

Paper 3

Hatfield, J. L., & Lemyre, P.-N. (2016). Foundations of Intervention Research in Instrumental Practice: Constructing a Psychological Skills Intervention for Musicians. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2015.02014

Paper 4

Hatfield, J. L. (2016). Performing at the Top of One's Musical Game: The Mental Edge of Musicianship. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2016.01356

Paper 1

Johannes L. Hatfield

Goal Setting and Self-Determination in Music Making:
Tenets of Becoming an Organized
and Motivated Music Practitioner

To be published in a revised version in
Nordic Research in Music Education Yearbook, Vol. 18

Goal Setting and Self-Determination in Music Making:

Tenets of Becoming an Organized and Motivated Music Practitioner

Johannes L. Hatfield

Norwegian Academy of Music

Abstract

The fields of sports, business, education and other organizational fields have for many decades invested considerable time and resources in research investigating quality of motivation, use of goal setting in relation to performance efficacy and social and personal well-being. Paradoxically, this research has hardly been considered in relation to music education and performance sciences. The present theoretical article will present and elaborate goal-setting and self-determination theories in relation to music practice and performance highlighting potential benefits and pitfalls. In so doing, the connection between goals, social contexts, motivational quality, and instrumental practice/performance will be presented, discussed, and elaborated from theoretical and practical perspectives. Besides trying to actualize motivational perspectives in the field of research in music education, the present article was especially written with the goal of enlightening the field of music (i.e., music students, educators/professors) introducing ways of facilitating motivation and meaningful working habits.

Keywords

Goal setting, self-determination, motivation, instrumental practice, music acquisition

Background

The present article was motivated by the discovery of opposing trends in experienced based literature (i.e., literature written by experienced pedagogues and musicians reflecting years of accumulated experience of teaching and performing) and findings in instrumental practice research (Starker, 1975; Neuhaus, 1993; Galamian, 1999; Heimberg, 2007; Leimer & Giesecking, 1972; Bruser, 1997; Jørgensen, 2011; Jørgensen & Lehmann, 1997; Jørgensen, 1996; Nielsen, 2008). The experience-based practice literature emphasizes the importance of planning and setting realistic goals for practice as the foundation for progress and mastery of performance. However, the scientific literature on music practice reveals that only a minority of music students are accordingly proactive in their approach to instrumental practice (Jørgensen, 1996, Jørgensen & Lehmann, 1997, Nielsen, 2004, Miksza & tan, 2015). Furthermore, several studies reveal that music students perceive that they are not taught how to practice, but rather how to play and perform music (Jørgensen, 1996, Atkins, 2009, Lehmann & Jørgensen, 2012, Jørgensen & Lehmann, 1997, Gaunt 2009, Burwell & Shipton, 2013). Paradoxically, principles of planning and goal setting have for centuries been considered salient within experience-based literature on the art of music practice and performance (Martens 1919; Galamian, 1999; Starker, 1975; Leimer & Giesecking, 1972; Bruser, 1997; Heimberg, 2007; Neuhaus, 1993). The famous American violist Tom Heimberg explains the planning of music practice as follows: “We need to set our intentions clearly as we begin to practice, and shape each practice session like a work of art. At the same time, we need to let go of our expectation of an immediate result” (Heimberg 2007, p. 5). Madeline Bruser, pianist and author of *The Art of Practicing*, also emphasizes and encourages students to practice calmly and thoroughly with detailed planning away from the instrument accompanied by constant reflection during practice (Bruser, 1997). Similarly, legendary Indiana University professor and cellist Janos Starker explains that:

Discipline must be the basis of one of the classic disciplines, music, and once attained, freedom of expression may spring forth. The order of learning is significant. Beautiful artistic ideas running rampant without disciplined instrumental control remind one of a ride in a magnificent automobile over unpaved roads. Written poetry in a language yet unlearned seldom succeeds (Starker 1975, p. 8).

One of the most important teachers in classical music during the last century was the Russian pedagogue and pianist Heinrich Gustavovich Neuhaus, who had the following to say about music practice and performance:

The clearer the goal (the content, music, perfection of performance), the clearer the means of attaining it. This is an axiom and does not require proof. The 'what' determines the 'how', although in the long run the 'how' determines the 'what' this is a dialectic law (Neuhaus, 1993, p. 2).

These quotes all underline the importance of planning and organization of instrumental practice.

Within the field of sports science and psychology, considerable resources have been invested in research focusing on how athletes set goals, achieve expertise, and prepare for competitions (Orlick & Partington, 1988; Burton et al., 2010; Burton, 1989; Beauchamp, Halliwell & Fournier, 1996; Cleary & Zimmerman, 2001; Filby, Maynard & Graydon, 1999; Starkes & Ericsson, 2003). Over the last five decades, this research has made goal setting the most applied and investigated technique among aspiring athletes (Locke, Saari, Shae & Latham, 1981; Burton, 1989; Burton et al., 2010; Kylo & Landers, 1995; Nicholls, 1984; Cleary & Zimmerman, 2001).

An additional topical issue closely connected to goal setting is motivation. The field of sport psychology (in contrast to music) has been greatly involved in investigating athletes' and coaches' quality of motivation for continued achievement (Lemyre, Roberts & Howard, 2005; Treasure & Roberts, 1995; Bentzen, Lemyre & Kenttä, 2015). When we work toward new heights, the motivational purposes for setting goals determine our long-term effort and joy of involvement in whatever we aspire to (Deci & Ryan, 2000). Based on the above-presented topics, I believe there is a need for actualizing goal setting in relation to motivation in music education research. I believe these two powerful concepts will facilitate new practical and theoretical knowledge in the field of music education. Moreover, the present article will examine two well-documented motivational constructs in depth, namely, goal setting theory and self-determination theory.

Theoretical questions of interest

- 1 The art of planning instrumental practice is closely related to learning how to set adequate goals (Neuhaus, 1993; Heimberg, 2007; Martens, 1919; Galamian, 1999; Bruser, 1997). This might

sound both trivial and obvious. However, the essential question remains: How do we set goals, and what kind of goal setting might have the potential to motivate individuals to achieve continuity, persistence and joyfulness in music making and performance?

- 2 The efficiency and continuity of ongoing work is affected by the context in which goals are set (Deci & Ryan, 1985; 2000): What characterizes a milieu that might stimulate music students to set goals that facilitate long-term motivation?

Goal setting

For more than five decades, goal setting has been highlighted in relation to sports, education, and organizational work contexts as a key source of motivation, efficiency, and self-regulation (Zimmerman & Kitsantas, 1997; Cleary & Zimmerman, 2001; Zimmerman, 2008; Zimmerman & Bandura, 1994; Locke, Frederick, Lee & Bobko, 1984; Locke et al., 1981). Locke (1968) was the first researcher to initiate a goal setting construct. Since then, hundreds of empirical studies have been published on the topic.

Principles of goal setting

The first iteration of goal setting theory (GST) simply defined goals as “what an individual is trying to accomplish; which is the object or aim of an action. The concept is similar in meaning to the concept of purpose and intent” (Locke & Latham, 1990, p. 7). Thus, the theory emphasizes conscious goals and the levels of performance associated with them. Locke and Latham (1990) further developed their theory with two main elements, the content and the requisite of goals. “The content refers to the nature of the goals, and the requisite reflects the intensity and the perceived resources and requirements to attain the level of performance demanded by the content” (Locke & Latham, 1990, p. 25).

The theory has found that *specific difficult goals* are associated with higher performances than so-called *do-your-best goals*. In addition, the highest effort of performance is linearly connected to setting difficult goals as long as they are congruent with the goal achiever’s performance capacity (Locke & Latham, 1990, Bandura & Cervone, 1983). Furthermore, the theory presents

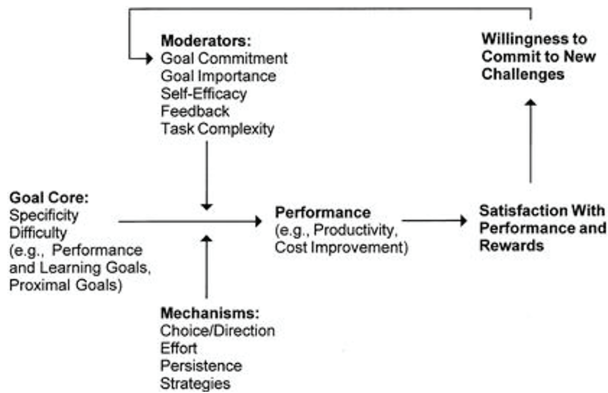


Figure 1: Main components of Locke and Latham’s goal-setting theory, printed with permission from Edward Locke (Locke & Latham, 2002)

both *mechanisms* and *moderators*. Numerous studies have found that *mechanisms* such as *effort*, *persistence*, *choice*, and the repertoire of *strategies* in use are all factors that are positively affected by specific and adequately challenging goals. Important *moderators* of the theory are *goal commitment*, *goal importance*, *self-efficacy*, *feedback*, and *task complexity* (Locke & Latham, 2002). *Goal commitment* and *goal importance* are related to the extent that goals are self-set, and to the extent that purposes for involvement in goal-directed activities are provided. Albert Bandura’s (1977; 1986) social cognitive concept of self-efficacy is central in GST. GST maintains that challenging assigned goals with a rationale automatically increases self-efficacy (Locke & Latham, 1991). Furthermore, the use of feedback (a Bandurian socio-cognitive phenomenon) is fundamental in GST. According to GST, when feedback is adequately provided, students are able to evaluate and adjust their level of direction towards goal requirements. Moreover, the right types of feedback lead to feed-forward and vice versa. Lastly, task complexity is found to stimulate a broader use of task strategies. Related research has found that proximal goals in combination with distal goals raise self-efficacy and task efficiency (Locke & Latham, 2002).

Goal setting in music and sport acquisition

Music performance students are frequently involved in goal-directed actions through daily practice on their instruments. *Goal content*, accordingly, might be to learn to play a concerto or sonata within a certain time frame, or to

practice five hours daily for the rest of the semester. Such types of goals (because of their general nature) are, according to Locke and Latham's framework, considered as general goals and typically lead to what is referred to as "do your best" activity (Locke & Latham, 1990). A recent study on instrumental practice found that music performance students wanted specificity, a day-to-day plan including how and what to practice (Bratlie & Jørgensen, 2015). In relation to this notion, a meta-analysis revealed that: "Individuals setting specific and hard or challenging goals outperform individuals with specific easy goals, do-best goals, or no assigned goals. People with specific moderate goals show performance levels between those of people with easy and hard goals but may not perform better than people with do-best goals" (Locke, Saari, Shae & Latham, 1981, p. 145).

Music students in higher music education are commonly highly passionate about reaching their general goals (Jørgensen, 1996; Bonneville-Roussy, Genevieve, & Vallerand, 2011). However, it seems likely that students of music performance lack the ability to properly acknowledge their innate resources and the pre-requisites necessary for attaining general long-term goals (Jørgensen, 1996, Lehmann & Jørgensen, 2012; Nielsen, 2004). The more specific the goals, the more predictable and efficient they become. Furthermore, if goals are set hierarchically (i.e., short-, medium-, and long-term goals), the goal setter is more likely to perceive more meaning, continuity, and motivation than if their goals are non-hierarchical (Locke & Latham, 2002). These claims were supported by a meta-analysis that included 36 studies on goal setting in the realm of sports and showed that absolute goals and precise goals were more efficient than vague and general goals. Athletes who combined short- and long-term goals showed significantly better results than athletes who only had long-term goals. Finally, cooperative and participant-set goals had significantly greater effect on performance than assigned goals. Moreover, individual, personal and specific goals in combination with short- and long-term goals predicted the most effective goal setting procedures (Kyllo & Landers, 1995). A mixed method intervention study trying out goal-setting techniques among six music students revealed that participants were largely involved in general goal setting prior to intervention. Semi-structured interviews and surveys revealed that general goals tended to make participants inadequately random and inexact in their daily practice. As a result, they were uncertain about how to solve problems and plan concrete practice tasks and thus dissatisfied with their progress. The

study's general findings revealed that students became increasingly more motivated and efficient when they set specific challenging daily goals in combination with long-term goals in their instrumental practice (Hatfield, 2016). Finally, a study assessing the effects of multiple-goal strategies on performance outcomes in swimming training and competition confirmed the predicted hypothesis. The two groups using multiple goal perspectives significantly outperformed both the control group and single-perspective groups. Interviews revealed that the single-outcome goal group explicitly expressed that they found goal setting to be inefficient and anxiety provoking. In contrast, participants applying process goals (i.e. goals that refer to specificity about the behavior needed for successful performance) qualitatively expressed that routines had a positive effect and increased their level of confidence (Filby, Maynard & Graydon, 1999).

When we set goals for ourselves, we are obviously moved by some kind of motivation toward achieving the goal. Thus, it is reasonable to assume that the quality of motivation influences how goals are perceived and carried out. However, even if one is effectively energized through well-documented goal principles, this does not necessarily mean that the energy behind one's motivation is dialectic with need-satisfying ways of developing motivationally. Accordingly, different aspects of motivation will be further discussed in relation to what is referred to as the very core of human motivation (Deci & Ryan, 2000). The next section is based on my belief that principles from GST (which has been proven to energize effort and persistence) need to be further deepened in relation to motivation to work optimally in applied settings.

Self-determination

One of the most topical and most cited theories on motivation today is self-determination theory (SDT) (Deci & Ryan, 1985, 2000). SDT emphasizes motivation as a qualitative phenomenon rather than a quantitative one. In other words, instead of viewing motivation as incremental, or more vs. less of motivation and behavior, SDT explains human motivation in terms of inborn psychological needs.

Key elements of self-determination

Elements from goal setting theory are believed to have a potential beneficial effect on music practice and performance. However, is careful goal setting enough to trigger long term inspiration, enthusiasm, motivation, and persistence in music practice and performance? It is difficult to provide a definite answer to such a question given its general nature. However, five decades of research on human motivation including nearly a thousand studies conducted in both experimental and naturalistic settings, have provided us with knowledge vital to understanding the complexities of motivation (Deci & Ryan, 2000). Thus, a simplified answer to the above question would include the following components:

- 1 Self-determination
- 2 Learning climate (Emphasizing *basic psychological needs*, or BSN)
- 3 Perceived feeling of *competence, autonomy* and *relatedness* (i.e., BSN)

According to SDT, these three components are the main constituents needed to establish conditions in which intrinsic and autonomous motivation might spring forth.

Controlled and *Autonomous* motivation

SDT distinguishes between two qualitative different forms of motivation: *controlled motivation* and *autonomous motivation*. Controlled motivation is based on external pressure (e.g., incentives, deadlines, high expectations, threats and demands, social comparison). Controlled motivation is thus related to external control where humans lack identification and attachment to the executed action. SDT research has found broad evidence that controlled forms of motivation have debilitating and destructive effects on human behavior (Deci, Kostner & Ryan, 1999; Deci et al., 1991). Contrastingly, autonomous motivation is viewed as harmonious with humans' volition, interests and inner values and needs. Autonomous motivation has been found to relate to ongoing effort, creativity, psychological and physical well-being and conceptual learning (Deci & Ryan, 2000, Deci & Ryan, 1985). Based on years of experimental and naturalistic research, SDT has come to the conclusion that humans (in addition to physiological needs) have psychological needs as well. Three *basic psychological needs* (BPN) were

discovered, namely *competence*, *autonomy* and *relatedness* (Deci & Ryan, 1985; 2000). SDT claims that if one or more of the BPN are thwarted, individuals are likely to feel unmotivated and helpless. Common consequences of *need-thwarting* are defensive mechanisms such as giving up, procrastination, isolation, mechanistic learning and other defensive reactions. On the other hand, when the BPN are fulfilled, individuals experience well-being and satisfaction based on identification and autonomously driven activities. Moreover, humans feel energetic, volitional, satisfied and highly motivated under need-satisfying conditions (Deci & Ryan, 1985; 2000). The earliest research within SDT focused on incentives' effect on intrinsic motivation.¹⁷ This research has been summed up in a meta-study including 128 studies showing that incentives have a significant negative effect on intrinsic motivation (Deci, Koestner, & Ryan, 1999). Moreover, contingent incentives become an external stimulus that overshadows intrinsic behavior. Further research on self-determination in education has found that students become more involved in conceptual learning, intrinsically motivated, and goal-oriented when the BPN are fulfilled. Furthermore, conditions such as stringent deadlines, high social expectations, grade orientation, and social evaluation resulted in similar defensive outcomes as did monetary incentives (Deci et al., 1991). Individuals controlled by external incentives are likely to choose the shortest path to achievement, hence, the easiest way out (Ryan & Deci, 2000). Moreover, SDT explains that external stimulus controls/dominates internal regulation making the individual externally controlled rather than self-determined.

Human agency, according to SDT, is not interpreted as a dichotomy of either external, or internal regulation. Extrinsic and intrinsic motivation are viewed on a continuum from *amotivation* to *intrinsic motivation*. Furthermore, this continuum highlights how human beings perceive external stimulus as either more, or less internalized, as illustrated in Figure 2.

The organismic model of integration distinguishes between four types of extrinsic motivation (Fig. 2). *External* and *introjected* regulation are related to controlled forms of motivation such as being forced, coerced, pressured or manipulated into action. These forms of extrinsic motivation lead to

¹⁷ This research was done in opposition to the dominating paradigm of behaviorism that generally saw incentives as behavioral reinforcers predicting amount of behavior.

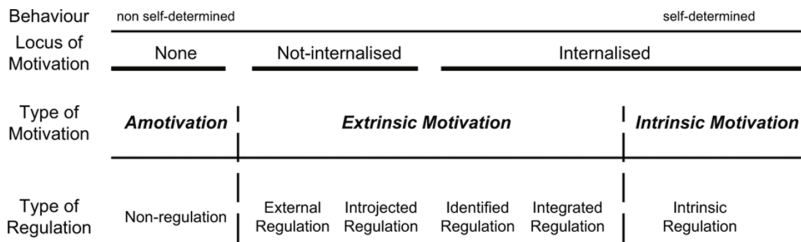


Figure 2: The organismic integration model of SDT illustrated with permission from Edward Deci (Deci & Ryan, 2000)

anxiety, procrastination, *ego-involvement*¹⁸ and lack of interest as a result of no, or poor, integration of external regulation (Deci, Koestner, & Ryan, 1999). On the other hand, *identified* and *integrated* forms of regulation constitute an integral part of autonomous motivation through which humans can personally relate to the regulation. Identified and integrated regulation bring about endorsement, interest and qualitative action in achievement contexts because individuals are able to identify personal value in the external regulation (Deci, Koestner, & Ryan, 1999).

Many musicians were forced to play an instrument during childhood, typically by over-ambitious parents who also controlled the music practice context. It is not uncommon in such controlled environments for parents to sanction their children when the right quality and amount of practice is not carried out. According to SDT, such an environment is likely to either make the practitioner want to quit playing altogether, or to make the practitioner feel detached and alien to music practice throughout their professional life. Under such controlled circumstances, external stimulus remains external and thus not internalized. SDT simply stresses *autonomy support* as acting in accordance with the integrated needs and values of human beings (Deci & Ryan, 2000). Paradoxically, an authoritarian teacher might be more autonomy supportive than a non-authoritarian teacher. For example, a student who identifies with, and feels personally related to authoritarian teaching methods could still be an autonomous practitioner since the underlying purpose of action relates to the students' sense of self. This implies that we

¹⁸ Ego-involvement is a condition in which individuals are mainly concerned about external reactions, or external means for task involvement (e.g., others' expectations, outperforming others, avoiding failure or making a bad impression etc.)

may be dependent on significant others and simultaneously autonomously motivated, fulfilling our basic psychological needs. Moreover, motivation and conceptual learning are likely to spring forth when realistic feedback, supporting language, rationales, belief and autonomy are provided in relation to music activities. Such environments create room for potential identification with and integration of the activity itself (Renwick & McPherson, 2009; Rostval & West, 2001; Reeve et al., 2004; Hallam, 2002). However, more research is needed to confirm these notions.

Self-determination in goal setting and vice versa

Impact of conceptual similarities and differences among the theories

According to GST, goals that are self-set, specific, hierarchical, difficult yet not unrealistic, time-bound and congruent with one's values are the most effective and motivating goals (Locke & Latham, 2002). SDT emphasizes qualitative aspects of motivation such as autonomous motivation and its effects on ongoing behavior (Deci & Ryan, 1985, 2000). GST principally focuses on "conscious performance goals and the level of task performance rather than on discrete intentions to take specific actions" (Locke & Latham, 2002, p. 12). This suggests that GST mainly focuses on the "how" and the "what" of goal setting rather than the "why." SDT, on the other hand, mainly focuses on the impact of underlying values, need-satisfaction, and intentions of goal-directed behavior. Thus it refers, to a greater extent, to purposes of action or the "whys" (Deci et al., 1991). Moreover, when we discuss intrinsic motivation in relation to GST, we have to recall that these two concepts are fundamentally different, since intrinsically motivated activities are "those that individuals find interesting and would do in the absence of operationally separable consequences" (Deci & Ryan, 2000, p. 233). Motivation deriving from activities based on hierarchical goal setting might be seen in relation to extrinsically motivated activities in which "people behave to attain a desired consequence such as tangible rewards or to avoid a threatened punishment" (Deci & Ryan, 2000, p. 236). Goal setting tends to entail an instrumental

element, which is external to and separate from the activity itself.¹⁹ For instance, while preparing for orchestral auditions, it would be appropriate to apply long-term goals accompanied by specific goals scaffolding the practice process. Evidently, there is a certain underlying instrumental aspect, which motivates the practice activity. SDT proclaims that the intention behind an action ought to harmonize with a person's inner values. Moreover, if students practicing orchestral excerpts realized the greater value of practicing such excerpts, they would be motivated to accomplish the task at hand (regardless of whether they perceived the task as dull and draining) (Ryan & Deci, 2000). Viewing the same example from a GST perspective, students would be motivated by completing a target audition accompanied by the satisfaction of having attained realistic, specific, and challenging goals. Hierarchical goals provide us with a rationale and plausible reason for investing effort in a given activity. Accordingly, SDT advocates that providing rationales concerning why a certain external regulation might have personal value to a given individual, stimulates the process of identification and internalization (see Figure 2). However, the two concepts have different underpinnings: GST is mainly concerned with efficiency and results, while SDT is fundamentally concerned with psychological need-satisfaction, intrinsic motivation and mental well-being. Accordingly, Deci and Ryan (2000) point out that one major limitation of Bandura's (1977, 1986) social cognitive theory (and thereby implicitly Locke and Latham's GST) is that it does not distinguish between external and internal perceptions of *locus of causality*²⁰ in relation to motivation (deCharms, 1977). Another main difference between the theories is that GST focuses on activity, learning and motivation as somewhat quantitative (either more motivation or less motivation for attaining the required action). GST's general underpinning is related to effective and desired behaviors and outcomes. Whether the outcome is

19 Naturally, execution of actions that are extrinsically motivated can also be enjoyable and motivating; however, intrinsic motivation is often aimless and based on the pure joy of the activity in itself, like when one enters a flow state in which one becomes inextricable with the activity.

20 *Locus of causality* refers to whether the action is perceived as externally or internally driven. Perceptions of internal locus of causality foster need-satisfaction, conceptual learning, and genuine personal involvement in a task (Deci & Ryan, 2000). This should not be confused with Bandura's distinction between personal and vicarious experience (Bandura, 1977). Bandura does not go further into differentiating intrinsically vs. extrinsically driven goals in relation to personal well-being and psychological need-satisfaction, only the amount, efficacy, and type of behavior in general.

based on external demands and coercion, or genuine interest and eagerness, is not explicitly mentioned as an important moderator as long as the activity works efficiently and leads to the desired results (Locke & Latham, 1990; Bandura, 1977; Bandura, 1986). In order to illustrate and perceive this difference, let us imagine a music student practicing a difficult etude following specific guidelines and daily goals. As a result of this pertinent method of practicing, the student might master the piece. However, despite having mastered the etude, the student might still feel controlled and unsatisfied if he or she has not identified and internalized the personal value of practicing and mastering the etude. Moreover, the student's reaction to learning is a result of an external locus of causality. Although this way of learning might be objectively efficient and goal achieving, it still might be perceived as time draining and mechanistic due to a lack of proper identification and integration (see Neuhaus, 1993). The environment and the communication of purpose or intent are thus relevant to ongoing motivation. Moreover, due to the theories' different ways of operationalizing and explaining human behavior (i.e., GST explains human motivation in terms of goal types and perceptions of efficiency, while SDT explains human motivation in terms of need-satisfaction), I propose, therefore, that a synthesis of these two theories entails qualities (theoretical, practical, and applicable) that complement and enhance human action and motivation (including instrumental practice and performance of music). The next sections preliminarily hypothesize and discuss potential implications of a GST/SDT synthesis.

Synthesizing the two theories

Synthesizing key elements from both theories (i.e., basic psychological needs and specific and optimally challenging goals) might be particularly effective despite the discrepancy between theoretical underpinnings. First, according to SDT, autonomy, relatedness and competence provide the essential nutrients for basic psychological need satisfaction. Need-satisfaction, furthermore, would enable the student to motivate him or herself and at the same time stimulate high effort for the relevant task at hand. At the same time, according to GST, continuous aspiration based on challenging and specific yet attainable goals would foster direction, effort, persistence, and use of the most adequate strategies in instrumental practice. As a result, one is satisfied with the results of effort and thus willing to commit to new challenges (see Fig. 1). Interestingly, both theories stress self-reference/

goal importance. However, GST does so in relation to explaining effort, persistence and strategies. Self-reference according to SDT, however, is related to inner values, volition, intrinsic interest and self-satisfaction. GST research has found that assigned challenging goals accompanied by a rationale generated the same amount of effort as self-set goals (Locke & Latham, 2002). Although, the efficacy of goal-achievement is identical, no information concerning quality of motivation is considered. Even though GST does not explicitly explain this in terms of autonomous motivation, as SDT does, procedures deriving from GST seem to generate volition, eagerness, and continuing effort on the task at hand. Moreover, the two theories' distinctive emphasis on self-reference and rationales seems to nurture complimentary needs of identification and ownership.

With a theoretical synthesis in mind, I have not been able to find any studies explicitly viewing goal setting in relation to SDT within the domain of higher music education. The nearest study found to the present topic of interest was a study investigating the relationship between *passion*²¹ and attainment of elite level performance among musicians. The study found that "harmonious passion was positively associated with the use of learning goals, that was in turn positively associated with deliberate practice. In turn deliberate practice predicted higher levels of performance" (Bonneville-Roussy, Genevieve & Vallerand, 2011, p. 128). Hatfield (2016) tried out a psychological skills training program for music students in which goal setting was one of the core techniques. The study found that general goal setters tended to focus on task irrelevant aspects emphasizing the final result or outcome. Post-test results in the same study revealed that changing from general outcome goals to the application of specific goals helped extrinsically motivated students (i.e., oriented toward the final result and others' expectations) become absorbed in the task at hand, which, in turn, enhanced their self-efficacy, concentration, and motivation for instrumental practice and performance (Hatfield, 2016). A longitudinal study investigating motivation in instrumental practice found that students who were supported by their

21 Passion: "a strong inclination towards a self-defining activity that people love, that they consider important, and in which devote significant amounts of time and energy" (Bonneville-Roussy, Genevieve, and Vallerand 2011:124). Harmonious passion is based on a flexible, persisting internalization of activity, free of external or internal pressure. Obsessive passion derives from controlled internalization grounded in external expectations or internal pressures leading to maladaptive behavior such as uncontrollable excitement and activity-contingent self-esteem (Bonneville-Roussy, Genevieve, and Vallerand 2011).

parents (though not controlled), and who were driven by personal interest, continued to play their instruments. On the other hand, students who avoided practicing challenging pieces, and who were not supported by the environment (i.e., parents, significant others), quit playing (Pitts, Davidson, & McPherson, 2000). Hatfield, Halvari & Lemyre (2016) surveyed music students' motivation and practice habits in higher music education. The findings revealed that students who were involved in planning and goal setting strongly correlated with self-efficacy. These students were additionally found to be more self-observant, volitional, and motivated toward continuous efforts to learn.

In synthesizing such different theories, one might question whether they are simply too different for comparison. My answer to such a question would be that the theories' different underpinnings probably make them even more synthesizable. Related research tends to be biased because it compares and mixes constructs (mainly in survey studies) that are *too* similar in nature (e.g., specific goals and mastery goals, perfectionistic striving and mastery orientation, obsessive passion and controlled motivation/perfectionistic concerns etc.). When theories are inherently different, the interactional benefits are both more promising and applicable than in the contrary case. Moreover, GST and SDT are both viewed as generally reliable theories since they have been tested and refined through hundreds of empirical studies over almost half a century. Furthermore, both theories have a strong inclination toward applicability providing guidelines on how, what and why their conceptual principles work in applied settings. Consequently, I believe there is a pragmatic value in actualizing core elements from both theories. With the research discussed above in mind, it is reasonable to believe that GST and SDT resemble the very core of helping music students and teachers to enhance their motivation and efficiency in teaching, organizing, and carrying out instrumental practice and performance. A preliminary model was developed (Figure 3) to illustrate the potential contributions to understanding motivation from synthesizing key elements of GST and SDT,

GST and SDT provide concrete directions for how to apply the theories to a wide range of contexts. Hence, we can only hypothesize tentative assumptions as a result (Fig. 3). However, it seems clear that the fields of music education and music performance science could benefit from the concepts presented on both a theoretical and practical level. Moreover, not only might a synthesis of the two theories contribute to new perspectives on motivation

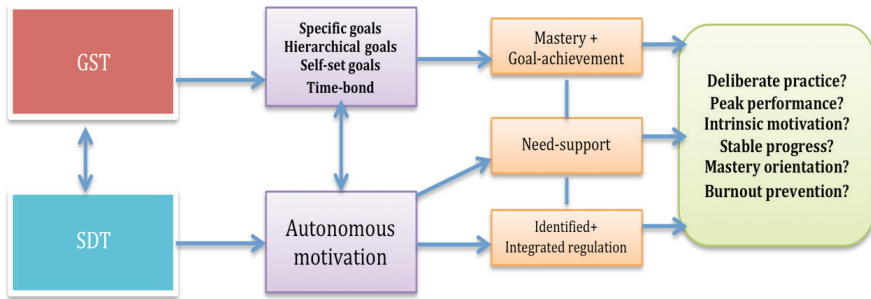


Figure 3: Model synthesizing goal-setting and self-determination theories.

in instrumental practice and performance, but it also might actualize new directions in the teaching and acquisition of music.

GST and SDT in the applied context of music acquisition

Rather than discussing key elements from the topics elaborated above, the present article concludes with hypothetical examples of how principles from GST and SDT are applied to teaching and instrumental practice in the conservatory context. The first case example illustrates how a music student might develop in a context where principles from GST and SDT are insufficiently applied or absent. The second case example, on the contrary, illustrates how a music student might blossom and develop when exposed to key elements from both theories. The case examples are meant to corroborate the synthesis of GST and SDT illustrated in Figure 3.

Case examples

Case 1: Marcus, an eager second-year music student is practicing the expressive first movement of the Brahms violin concerto. Marcus has become familiar with the concerto by listening to numerous recordings he has obtained over the years. Consequently, he has gained a clear yet elusive idea of interpretation, personal taste, and detail concerning the final result. His teacher, Nathaniel, who is greatly respected as one of the best violinists in the country, has assigned a task, and expects to hear his student play through the whole first movement of the Brahms concerto at his next lesson. As a result, Marcus practices intensively with great expression, repeating the

difficult expressive sections over and over, just as he had heard his favorite violinist Isaac Stern perform them. After two weeks of practicing, Marcus is ready to perform the piece for his teacher. However, during the lesson, he notices that things really are not working out as expected. He excuses himself and tells his teacher that he has in fact managed to play the difficult sections at home and in the practice room. Marcus cannot not grasp why it is still not working after all the taxing hours of practice and repetition he has put in during the past two weeks. Nevertheless, Marcus keeps on trying to make it sound right with great intensity during the lesson. Nathaniel responds, without paying particular attention to Marcus' comments, and gives additional suggestions on fingerings, focusing on the phrasing and expression in the development section of the work. In addition, they work on bowing technique for ten minutes, with Nathaniel explaining and showing multiple ways he ought to use his right arm and fingers. The lesson ends with Nathaniel explaining to Marcus that he can accomplish a lot during the next week and that he expects to hear the Brahms first movement played rather flawlessly in tempo and in tune at the next lesson the following week.

Case 2: Like Marcus, Daniela, an Italian cellist working on the expressive and difficult Dvóřak cello concerto, also has strong ideas on how to perform the work. Unlike in Marcus' case, however, her teacher, Leonard, has exposed Daniela to techniques emphasizing the whole learning process. Before even starting to play the concerto, Daniela had sat down with Leonard and had a conversation about the various parts of the concerto. Leonard had made Daniela identify key challenges and propose ways to overcome these challenges. During this initial lesson, Leonard had asked her open-ended questions about how she perceived the work. Moreover, he had asked her how she would overcome technical and musical difficulties, thereby involving Daniela as the active party. Leonard would typically ask questions related to problem solving: where to start working, and why she found particular ways of practicing important in relation to learning the concerto. Daniela noticed that Leonard's questions generated new ideas and knowledge about how to approach the work. In addition, Leonard had made her aware of how the best performers tended to keep a calm, somewhat distanced mode of observation while practicing difficult passages. He demonstrated this approach to practice by showing the right way accompanied by an explanation of why this was important and what she could expect from this type of instrumental practice. Subsequently, Leonard asked Daniela if she could explore this

uncontrolled calm mode, as he called it, when practicing the five most difficult passages in the concertos' first movement. The lessons with Leonard always ended with Daniela writing goals for the upcoming week. The general goals consisted of playing the five passages calmly, letting go of the feeling of controlling the passages. Through self-observation and experimentation, Daniela discovered that it would be a good idea to practice the whole first movement slowly and rhythmically. In addition to the general goals, Daniela wrote down specific daily goals giving concrete information on *how* to practice the five passages. For instance, she had noticed that she learnt complex parts unexpectedly quickly when keeping the tempo manageable. This enabled proximate success. She had learnt from Leonard that this was due to the simple fact that "if we practice quickly and in a fast tempo, we forget things quickly, if we practice slowly and thoroughly, we forget things slowly." Knowing this simple law of cognition led her to adjust her instrumental practice accordingly. Daniela also paid attention to how she managed her time, preventing injuries and unnecessary strain by taking small breaks while practicing and never practicing more than 45 minutes in a row.

Case 1: As the week of practice went on, Marcus became increasingly frustrated the closer it got to his lesson with Nathaniel, who expected him to play the first movement of the Brahms flawlessly in tune. He had practiced through the movement many times and repeated the difficult parts over and over frenetically. Despite having practiced more than seven hours the day before his violin lesson, he had still not mastered the difficult sections. As a result, Marcus started to doubt whether he was ever going to be able to play the piece as his teacher expected him to. In addition, he began to feel increasing pain in both hands and shoulders resulting in additional concern. Marcus was now seriously concerned about how his teacher would react and if he ever would be able to master the Brahms concerto, which, in turn, had started to annoy him.

Case 2: Daniela, on the other hand, stuck to her specific goals and noticed a huge difference already on the second day of practice. On the third day of practice, she was able to play the five passages almost flawlessly in half tempo consistently. Daniela noticed how her muscle memory had absorbed and accommodated the correct way of execution. She became excited and wanted to try to play it in tempo with full expression. She did so once with success, but then she remembered the goal of not letting this eagerness and temptation take control over the practice process that she was just in middle

of. The day before her cello lesson, she noticed how, like a carpenter, she had built up the piece in layers with the correct execution and accordingly felt genuine satisfaction. She was looking forward to showing the newly internalized results to Leonard.

Case discussion and reflections

Marcus, an enthusiastic, talented and motivated learner, lost track of his developmental process due to both lack of specific guidelines and Nathaniel's general and external expectations. The only thing that mattered to Marcus was to play the Brahms concerto as his teacher expected and as expressively as Isaac Stern (his favorite violinist) had done several years before him. His professor Nathaniel, like many other music professors, intuitively emphasized the music, phrasing and technical execution of the work during lesson, giving loads of directions and information. Furthermore, Nathaniel, would typically be the only person speaking during the lessons giving well-meant suggestions culminating in a general long-term goal, namely playing the first movement in tempo, in tune and as flawlessly as possible. Because he was trying to reach these general external goals, Marcus kept on practicing in an intuitive way, "doing his best" during the execution of practice. This dynamic recalls West and Rostval's (2001) doctoral thesis on autonomy in music acquisition, which identified an asymmetrical pattern between music educators and music students. Music teachers were found to dominate and define the learning situation leaving "little room for students and teachers to discuss and reflect on the teaching process" (Rostval & West, 2001, p. 3). Furthermore, Marcus, had never been taught how to set adequate goals for himself. As a result, after repeated experiences of failure, he had increasingly started to attribute failure to a lack of ability and talent.

In Marcus' case, we see an evident lack of goal setting and a dominant concern about not living up to his teachers' general expectations and satisfying his teachers' demands (i.e., introjected regulation). This external locus of causality increasingly thwarted Marcus' intrinsic motives for working on the Brahms concerto and for playing the violin altogether. Introjected regulation typically generates ego-involvement and avoidance behavior due to externally rooted general expectations. In accordance with Locke and Latham (2002), this debilitating goal orientation probably would have decreased if

Nathaniel had provided Marcus with a few very specific learning goals to guide the whole practice process on a daily basis. Autonomous motivation might also have emerged had Nathaniel stimulated Marcus' need for exploration, his curiosity and his creative expression. A different teaching style might, in turn, have created a context in which Marcus could have felt, competent, engaged, and autonomous in his acquisition. Even though Leonard was a cellist, Marcus could have benefited from taking lessons with him for a while. Leonard would have awoken his need for self-exploration, awareness and intrinsic motivation for playing the violin. Leonard's approach is comparable to that of a medical doctor's, wherein mutual collaboration results in a common understanding of a diagnosis which is treated with appropriate prescriptions, making the patient healthy and vital. Moreover, because of Leonard's concern with satisfying the basic psychological needs of autonomy, competence and relatedness accompanied by specific challenging goals, he created a condition in Case 2 in which Daniela could develop freely, fully focusing on the process of learning (i.e., each task at hand). And because of Daniela's orientation towards concreteness and awareness in the practice process, neither the final result nor external expectations appeared to be a salient factor in her developmental process. She had constituted her own complete recipe for what, when, and how to approach her practice. In addition, she was even aware of potential pitfalls and thus able to cope adequately when destructive habits and desires sneaked into her cello practice..

Music students' learning climates and tentative consequences

The two learning environments presented in the case examples resulted in two distinctively different outcomes: Successfully reaching specific goals over time encompassing competence, autonomy and relatedness had made Daniela a secure and self-efficacious music student who actively performed in master classes and competitions. Although she never practiced more than four hours per day, she was considered to be one of the top music students in the academy. Marcus, on the other hand, after having repeatedly experienced total failure in front of his peers during interpretation class, had seriously considered taking a break from music studies and proceeding with medical studies, following in his sisters' footsteps. To Marcus' surprise, however, his violin teacher decided to move to another part of the country. A young teacher who was keenly interested in motivation in relation to instrumental practice replaced Nathaniel. A few months later, Marcus had

blossomed into a mature and enthusiastic promising musician and steadily worked his way towards a professional career as a chamber musician.

Concluding remarks

The present theoretical article is meant to illuminate motivational constructs successfully applied and developed in sports, education and organizational settings and actualize them in the context of music. My goal was to suggest a new approach, not only to music researchers, but to the applied field of music practice and performance as well (including music professors and music students). Future research in the field of instrumental practice will benefit from taking a “hands-on” approach, implementing the presented material in teaching and guidance of music students. However, more exploratory research is needed (i.e., survey studies investigating need-satisfaction in relation to deliberate practice habits and mental well-being) on motivation in instrumental practice and teaching of music. Such research should assess the motivational climate not only of music students, but of music educators/professors as well. Music educators/professors are more prone to motivate others if they are themselves autonomously motivated. Indeed, this is an proposition that deserves greater attention in future research.

References

- Atkins, L. (2009). Health and wellbeing education in British conservatoires. *International Symposium on Performance Science*, 219–223.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ, US: Prentice-Hall.
- Bandura, A., & Cervone, D. (1983). Differential engagement of self-reactive influences in cognitive motivation. *Organizational Behavior and Human Decision Processes*, 38, 91–113.
- Beauchamp, P. H., Halliwell, W. R. & Fournier, J. F. (1996). Effects of cognitive behavioral psychological skills training on the motivation, preparation,

- and putting performance of novice golfers. *The Sport Psychologist*, 10, 157–170.
- Bentzen, M., Lemyre, P. N., & Kenttä, G. (2015). The process of burnout among professional high-performance coaches through the lens of self-determination theory: a qualitative approach. *Sports Coaching Review*, 1–16. doi: 10.1080/21640629.2015.1035050.
- Bonneville-Roussy, A., Genevieve, L. L., & Vallerand, R. J. (2011). When passion leads to excellence: The case of musicians. *Psychology of Music*, 19(1), 123–138.
- Bratlie, J. M., & Jørgensen, H. (2015). Når du sitter og ser ut av vinduet er du ikke konsentrert nok. *NMH Publikasjoner 2015* no. 3:7–13.
- Bruser, M. (1997). *The art of practicing: A guide to making music from the heart* (1st ed.). New York: Bell Tower.
- Burton, D. (1989). Winning is not everything: Examining the impact of performance goals on collegiate swimmers' cognitions and performance. *The Sport Psychologist*, 3, 105–132.
- Burton, D., Pickering, M., Weinberg, R., Yukelson, D., & Weigland, D. (2010). The competitive goal effectiveness paradox revisited: Examining the goal practices of prospective Olympic athletes. *Journal of Applied Sport Psychology*, 22, 72–86.
- Burwell, K., & Shipton, M. (2013). Strategic approaches to practice: An action research project. *British Journal of Music Education*, 30(3), 329–345.
- Cleary, J. C., & Zimmerman, B. J. (2001). Self-regulation differences during athletic practice by experts, non-experts, and novices. *Journal of Applied Sport Psychology*, 13(185–206).
- deCharms, R. (1977). Pawn or origin? Enhancing motivation in disaffected youth. *Educational Leadership*, 34(6), 444–448.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 125, 627–668.
- Deci, E. L., Vallerand, R. J., Pelletier, L., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *The Educational Psychologist*, 26(3), 325–346.

- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268.
- Filby, W. C. D., Maynard, J. W., & Graydon J. K. (1999). The effect of multiple-goal strategies on performance outcomes in training and competition. *Journal of Applied Sport Psychology*, 11, 230–246.
- Galamian, I. (1999). *Principles of violin playing & teaching* (3rd ed.). Ann Arbor, Mich.: Shar Products Co.
- Gaunt, H. (2009). One-to-one tuition in a conservatoire: The perceptions of instrumental and vocal students. *Psychology of Music*, 38, 178–208.
- Hallam, S. (2002). Musical motivation: Towards a model synthesizing the research. *Music Education Research*, 4(2), 225–244.
- Hatfield, J. L. (2016). Performing at the Top of One's Music Game: The Mental Edge of Musicianship. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2016.01356
- Hatfield, J. L., Halvari, H., & Lemyre, N. (2016). Instrumental Practice in the Contemporary Music Academy: A Three-Phase Cycle of Self-Regulated Learning in Music Students. *Musicae Scientiae*. doi: 10.1177/1029864916658342
- Heimberg, T. (2007). *Making a musical life*. San Anselmo, Calif.: String Letter Pub.
- Jørgensen, H. (1996). *Tid For Øving? Studentenes Bruk for Tid for Øving*. Oslo: NMH Publikasjoner.
- Jørgensen, H. (2011). *Undervisning i Øving*. Oslo: Norsk Musikkforlag A/S, Oslo.
- Jørgensen, H. & Lehmann, A. C. (1997). Does practice make perfect? *NMH Publikasjoner 1997*, 1, 71–88.
- Kyllo, L. B., & Landers, D. M. (1995). Goal setting in sport and exercise: A research synthesis to resolve the controversy. *Journal of Sports & Exercise Psychology*, 17, 117–137.

- Lehmann, A. C., & Jørgensen, H. (2012). Practice. *The Oxford Handbook of Music Education*, 1, 677–693.
- Leimer, K., & Giesecking, W. (1972). *Piano technique consisting of the two complete books: The shortest way to pianistic perfection and rhythmic, dynamics, pedal and other problems of piano playing*. New York,: Dover Publications.
- Lemyre, P.-N. Roberts, G. C., & Howard. K. H., (2005). Social cognitive approach to burnout in elite athletes. *Dissertation: Determinants of Burnout in elite Athletes*:127156.
- Locke, E. A. (1968). Toward a theory of task motivation and incentives. *Organizational Behavior and Human Performance*, 3, 157–189.
- Locke, E. A., Frederick, E., Lee, C., & Bobko, P. (1984). Effects of self-efficacy, goals, and task strategies on task performance. *Journal of Applied Psychology*, 69, 241–251.
- Locke, E. A., & Latham, G. P. (2002). Building a practical useful theory of goal setting and task motivation. *American Psychologist*, 57(9), 705–717.
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting & task performance*. Englewood Cliffs ; London: Prentice-Hall.
- Locke, E. A., & Latham, G. P. (1991). The motivation sequence, the motivation hub and the motivation core. *Organizational Behavior and Human Decision Processes*, 50, 288–299.
- Locke, E. A., Saari, L. M., Shae, K. N. & Latham, G. P. (1981). Goal setting and task performance. *Psychological Bulletin*, 90(1), 125–152.
- Martens, F. H. (1919). *Violin mastery: Talks with master violinists and teachers, comprising interviews with Ysaye, Kreisler, Elman, Auer, Thibaud, Heifetz, Hartmann, Maud Powell and others*. New York,: Frederick A. Stokes Company.
- Miksza, P., & Tan, L. (2015). Predicting collegiate wind players' flow and self-efficacy for self-regulation: An exploratory study of relationships between teachers, instruction and students' practicing. *Journal of Research in Music Education*, 162–179. doi: 10.1177/0022429415583474
- Neuhaus, G. G. (1993). *The art of piano playing*. London: Kahn & Averill.

- Nicholls, J. (1984). Conceptions of ability and achievement motivation. R. Ames & C. Arnes (Eds.). *Research on motivation in education*. NY: Academic Press, 1, 39–73.
- Nielsen, S. G. (2004). Strategies and self-efficacy beliefs in instrumental and vocal individual practice. *Psychology of Music*, 32(4), 418–431.
- Nielsen, G. S. (2008). Achievement goals, learning strategies and instrumental performance. *Music Education Research*, 10(2), 234–247.
- Orlick, T., & Partington, J. (1988). Mental skills to Excellence. *The Sport Psychologist*, 2, 105–130.
- Pitts, S., Davidson, A., & McPherson, G. E. (2000). "Models of success and failure in instrumental learning: Case studies of young players in the first 20 months of learning." *Bulletin of the Council for Research in Music Education*, 146, 51–69.
- Reeve, J., Jang, H., Carrell, D., Jeon, S., & Barch, J. (2004). Enhancing Students' Engagement by Increasing Teachers' Autonomy Support. *Motivation and Emotion*, 28(2), 147–169.
- Renwick, J. M., & McPherson, G. E. (2009). Multiple motives: Profiles of young Australians' reasons for musical engagement. *International Symposium on Performance Science*, 469–474.
- Rostval, A., & West, T. (2001). *Interaktion och kunskapsutveckling: En studie av frivillig musikundervisning*. (Doctoral), Royal Academy of Music, Stockholm, Stockholm. (ISSN 1403-400X)
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25, 56–67.
- Starker, J. (1975). *An organized method of string playing*. Bloomington: Indiana University Press, 133–155.
- Starkes, J. L., & Ericsson, K. A. (2003). *Expert performance in sports: Advances in research on sport expertise*. Champaign, Ill. ; Leeds: Human Kinetics.
- Treasure, D. C., & Roberts, G. C. 1995. Application of achievement goal theory to physical education: Implications for enhancing motivation. *National Association for Physical Education in Higher Education*, 47, 475–489.

- Zimmerman, B. J., & Kitsantas, A. (1997). Developmental phases in self-regulation: Shifting from process goals to outcome goals. *Journal of Educational Psychology, 89*(1), 29–36.
- Zimmerman, B. J., & Bandura, A. (1994). Impact of self-regulatory influences on writing course attainment. *American Education Research Journal, 31*, 845–862.
- Zimmerman, B. J. (2008). *Goal setting: A key proactive source of self-regulation*. New York: Dale H. Schunk & Bary J. Zimmerman.

Paper 2

Johannes L. Hatfield, Hallgeir Halvari & Pierre-Nicolas Lemyre

Instrumental practice in the contemporary music academy:

A three-phase cycle of Self-Regulated Learning
in music students

Musicae Scientiae. doi: 10.1177/1029864916658342

Instrumental practice in the contemporary music academy: A three-phase cycle of Self-Regulated Learning in music students

Musicae Scientiae

1–22

© The Author(s) 2016

Reprints and permissions:

sagepub.co.uk/journalsPermissions.nav

DOI: 10.1177/1029864916658342

msx.sagepub.com



Johannes L. Hatfield

Norwegian Academy of Music, Norway

Hallgeir Halvari

Norwegian School of Sport Sciences, Norway

Pierre-Nicolas Lemyre

Norwegian School of Sport Sciences, Norway

Abstract

The purpose of the present study was to test an adapted model of self-regulated learning (Zimmerman, 1989) in the context of higher music education ($n = 204$). The following four hypotheses were tested: 1) Forethought phase constructs such as goal setting, self-efficacy, and time management were hypothesized to positively predict the use of psychological skills (i.e., self-observation, arousal-regulation, imagery, concentration, and self-control); 2) The use of psychological skills was expected to predict self-reflection phase constructs such as coping and perception of progress; 3) The links from the forethought phase to the reflection phase of the model were predicted to be indirect through psychological skills; 4) Self-reflection phase constructs were expected to positively predict forethought phase constructs. Applying Structural Equation Modeling, hypotheses 1 and 2 were partly supported. Regarding hypothesis 3, goal setting was indirectly positively linked to coping and perception of progress through self-observation and self-control. Self-efficacy was indirectly positively linked to coping through arousal-regulation. A follow-up multiple regression analysis was conducted in regard to hypothesis 4. The self-reflection phase constructs positively predicted forethought phase activities. Moreover, the study verified adaptive cyclical learning in the music students who were self-regulated learners.

Keywords

goal setting, instrumental practice, motivation, psychological skills, self-regulated learning

Corresponding author:

Johannes L. Hatfield, Department of Music Education, Norwegian Academy of Music, Slemdalsveien 11, 0363 Oslo, Norway.

Email: Johannes.l.hatfield@nmh.no

At the beginning of the 20th century, the legendary pianist and pedagogue Heinrich Neuhaus stated:

The clearer the goal, the content, music, perfection of performance, the clearer the means of attaining it. This is an axiom and does not require proof. The “what” determines the “how”, although in the long run the “how” determines the “what”, this is a dialectic law. (Neuhaus, 1993, p. 2)

Neuhaus accentuated instrumental practice as an ongoing reciprocal relationship between the process of instrumental practice planning and constant self-reflection. In 1989, Zimmerman published a theoretical model of self-regulated learning (SRL) founded on social-cognitive concepts of human agency. Zimmermann’s model offers a scientific conceptualization of similar ideas as Neuhaus’ view on music acquisition and learning during the early 1900s (Zimmerman, 1989).

Self-regulated learning

The SRL framework (Zimmerman, 1989) has been successfully applied to gain insight into important factors influencing learning in different performance settings such as music, education, and sports. SRL is viewed as an ongoing cycle alternating between the following three phases (see Figure 1):

- 1) Forethought processes precede efforts to learn and are designed to enhance those efforts.
- 2) Performance phase processes occur during learning efforts and are designed to improve action and self-monitoring.
- 3) Self-reflection processes occur after learning efforts and are designed to optimize a person’s reactions to his or her outcomes. (Zimmerman, 2008, p. 287)

McPherson, Nielsen, and Renwick (2013) suggested various dimensions of SRL in music based on reciprocal interrelations between social, cognitive and behavioral mechanisms.

The present article aims to develop this work further, investigating associated factors through the lens of Zimmerman’s cyclical model of SRL (Figure 1) (Zimmerman, 2002a).

A less complex adapted model of SRL was applied in the present study (Figure 2). Due to the complexity of Zimmerman’s model (Figure 1), fewer constructs were included in the adapted model (Figure 2). Nonetheless, the adapted model presents key self-regulatory techniques assessing the relationships among the three cyclical phases (Zimmerman & Kitsantas, 2005). Accordingly, it is hypothesized that specific goal setting, strategic planning, and self-efficacy represent key self-regulatory components optimizing music students’ instrumental practice, progress, and self-regulatory continuity.

Background

Psychological skills training

The present study incorporates strategies deriving from sports psychology to the context of learning in music. Psychological Skills Training (PST) refers to “a systematic and consistent practice of mental or psychological skills for the purpose of enhancing performance, increasing enjoyment, or achieving greater sport and physical self-satisfaction” (Weinberg & Gould, 2011, p. 248). PST is an umbrella of enhancement strategies used in training and competition. Psychological skills such as *goal setting*, *imagery*, *concentration*, and *arousal-regulation* are the

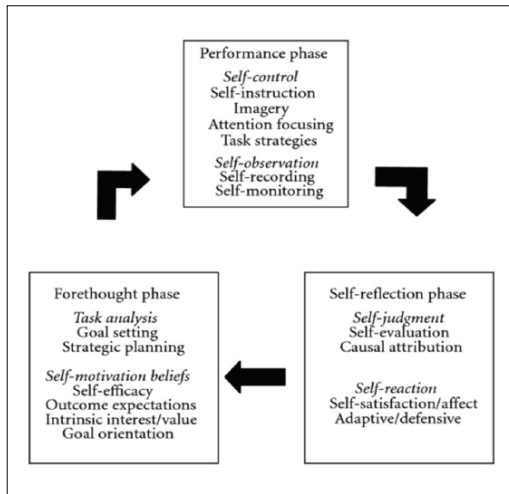


Figure 1. Zimmerman's cyclical model of self-regulated learning (Zimmerman, 2002a).

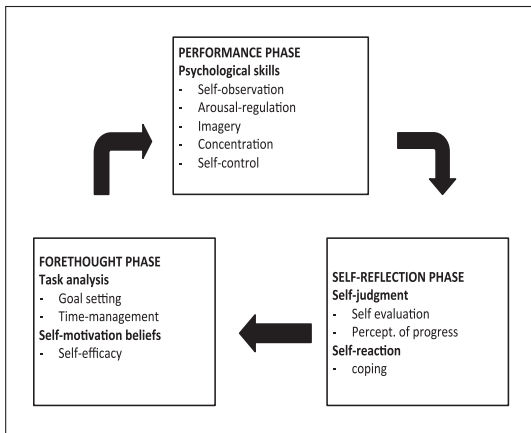


Figure 2. The adapted model of self-regulated learning based on the Self-regulated Learning in Music Questionnaire (SLMQ).

most common tools used in the realm of sport training and competition (Andersen, 2000, 2005; Hanrahan & Andersen, 2010; Hays, 2009; Weinberg & Gould, 2011). The adapted model incorporates these elements of SRL in music to assess music students' use of such performance-enhancing strategies (Figure 2). Goal setting, as an integral component of SRL, has

been integrated into the forethought phase. The remaining psychological skills are integrated as part of the performance phase. Moreover, the integrated elements in the model are all central elements to SRL in performance contexts (Goudas, Kolovelonis, & Dermitzaki, 2013).

Goal setting and planning in non-musical contexts

The concepts of planning and goal setting are central elements of the cyclical model of SRL. According to Zimmerman and Kitsantas (2005), goal setting, self-efficacy, and time management are key self-regulatory components influencing and defining further effort. In essence, the goals originally applied by performers in the first place will largely determine the use of self-observation, self-control, self-evaluation, and further effort (Zimmerman, 2008). Zimmerman has gained inspiration from Locke and Latham's (1990) work on goal setting. Goal setting research has investigated the efficiency of various types of goals in relation to goal achievement and self-efficacy (Bandura, 1977; Locke, 1968; Locke & Latham, 1990, 2002). Four decades of research has revealed specific, challenging, attainable, self-referenced, and hierarchical goals to be most efficient and motivating in achievement tasks (Locke & Latham, 1990, 2002; Locke, Saari, Shae, & Latham, 1981). However, studies on goal setting have been frequently implemented in the fields of health science, education, sports, and organizational settings; more so than in the area of music (Burton, Pickering, Weinberg, Yukelson, & Weigland, 2010; Cleary & Zimmerman, 2001; Filby, Maynard, & Graydon, 1999; Kylo & Landers, 1995; Locke & Latham, 1990). Research in education and sports have found *reactive learners* to be less efficient than *proactive learners*. Reactive learners typically neglect to develop explicit learning strategies and thus tend to rely on intuitive plans and performance outcomes in the learning process. In contrast, proactive learners stick to premeditated goals set during the forethought phase and thus exert greater effort on tasks (Cleary & Zimmerman, 2001; Papaioannou, Ballon, Theodorakis, & Auwelle, 2004; Zimmerman, 2008). Consequently, proactive learners are more likely to exert superior concentration, self-control, and self-observation than less self-efficacious reactive learners (Cleary & Zimmerman, 2001; Frayne & Latham, 1987; Seijts & Latham, 2001). Furthermore, self-regulated learners are self-efficacious individuals. They are also motivated to initiate and sustain self-regulatory efforts. Moreover, self-regulated learners are motivated, satisfied, and optimistic concerning their future when they experience increased effectiveness as a result of goal-directed behavior (Zimmerman, 2002a, p. 66). Accordingly, individuals setting specific goals tend to be highly self-efficacious, focusing on task-relevant aspects in their learning environment. According to Zimmerman (1989, 2008), self-efficacious learners, setting specific process goals for their learning activities, are more likely to cope adaptively when experiencing failure. Expert basketball players setting specific goals for themselves in a free-throw shooting task attributed failure to inappropriate strategy use rather than a lack of ability. On the other hand, intermediate and novice players applying "doing their best" goals turned out to be less self-efficacious, attributing failure to lack of ability (Cleary & Zimmerman, 2001). A study providing deliberate practice techniques such as strategic planning, goal setting, monitoring, and self-evaluation for school children led to an increase in time management, task interest, motivation, and self-efficacy (Stoeger & Ziegler, 2008). Accordingly, Frayne and Latham (1987) found that individuals who were taught self-regulatory techniques, such as specific high goals and self-monitoring, became better at coping with social and personal issues encountered in their work environment. Thus, being able to regulate behavior increased self-efficacy significantly (Frayne & Latham, 1987). Moreover, self-regulated learners persistently adapt to their environment finding

appropriate strategies for overcoming difficulties and challenges (Frayne & Latham, 1987; Locke et al., 1981; Olander et al., 2013; Zimmerman, 2008; Zimmerman & Bandura, 1994; Zimmerman, Bandura, & Martinez-Pons, 1992). Henceforth, proactivity in combination with self-motivational belief (e.g., self-efficacy) is believed to have a strong influence on long-term quality, persistence, and effort during the performance phase (Zimmerman, 2008). Such performance phase activity increases mastery experiences, thus facilitating adaptive coping and self-evaluation during the self-reflection phase (Zimmerman, 2008).

Self-regulated learning cycles in music acquisition

Planning one's instrumental practice sessions in detail and focusing on task-relevant aspects during instrumental practice appears to be of paramount importance on the journey towards music excellence. The famous American violist and teacher Tom Heimberg stated: "We need to set our intentions clearly as we begin to practice, and shape each practice session like a work of art. At the same time, we need to let go of our expectation of an immediate result" (2007, p. 219).

In this process, time management plays an important role in estimating and budgeting use of time (Zimmerman & Kitsantas, 2005). The violinist Isaac Perlman, among others, stresses that practicing 45 minutes should be followed by a recovery break. Considering that additional practice time is likely to be harmful, 4 to 5 hours of daily accumulated instrumental practice is the absolute maximum (Bruser, 1997; Heimberg, 2007; Martens, 1919). Moreover, time management is considered both paramount in injury prevention and in maintaining attentional focus (Bruser, 1997; Lehmann & Jørgensen, 2012; Lehmann, Sloboda & Woody, 2007).

Past research findings suggest that only a minority of music students in higher music education systematically engage in deliberate instrumental practice planning (Jørgensen, 1996; Nielsen, 2004). Moreover, Jørgensen (1996) found that only 21% of performing music students were involved in such proactive learning. The role of impulsive and intuitive practice habits was examined among school wind players (Miksza, 2009). Results revealed that students who were reactive, venturesome, and impulsive in their approach to practice had lower performance scores and were more likely to give up and drop out. Proactive mastery-oriented students showed greater achievement and were more persistent concerning their task. Nielsen (2004), and Miksza and Tan (2015) found that students who were metacognitively active tended to use a greater variety of practice strategies than less metacognitive individuals. Furthermore, students with greater practice strategies were more self-efficacious than students with a smaller repertoire of strategies. Likewise, Hewitt (2015) investigated relationships between performance, self-efficacy, and self-evaluation finding a strong positive relation among all variables. Moreover, study findings revealed that self-motivational beliefs were positively associated with self-reflection and performance.

Bonneville-Roussy and Bouffard (2015) linked constructs such as deliberate practice, self-regulation, goal-direction, and time management as formal practice strategies to musical achievement. They found a negative relationship between time of practice and music achievement. Correspondingly, previous research (e.g., Chaffin & Imreh, 2001; Ericsson, Krampe, & Tesch-Romer, 1993; Hatfield & Lemyre, 2016; Jørgensen, 2008; Miksza & Tan, 2015; Nielsen, 2001, 2004, 2008) has pointed out that the quantity as well as the quality of instrumental practice is inextricably intertwined. In a review of 25 studies of self-regulation in music acquisition and teaching, Valera, Abrami, and Uptis (2016) discovered meaningful relationships

between variables influencing the learning process. First, when looking at musical self-regulated instruction they found that an emphasis towards SRL in the learning environment influenced music learners' use of SRL. Second, self-efficacy played a key role in the learning process reinforcing the importance of self-motivational belief in SRL. Surprisingly, the amount of practice was very weakly associated with SRL, possibly due to a lack of data deriving from higher music education (Valera et al., 2016).

Zimmerman (2002a) emphasizes that SRL might evolve within different time frames (i.e., within the learning situation at micro level, or throughout longer periods of learning). SRL research in music has focused on practice activities such as strategies and goals applied *during* physical execution of instrumental practice (i.e., within the learning situation at micro level) (Chaffin, Imreh, Lemieux, & Chen, 2003; Chaffin, Lisboa, Logan, & Begosh, 2010; Hallam, 2001; Leon-Guerrero, 2008; Miklaszewski, 1989; Nielsen, 2001). Moreover, this line of research has uncovered that music learners are involved in ongoing self-regulatory cognition/metacognition. However, once musicians find themselves in the right setting with the instrument in hand, many may get carried away, starting their practice sessions reactively (i.e., whatever springs to mind) (Hatfield & Lemyre, 2016; Jørgensen, 1996, 2011). Reflections and strategies based on reactive learning may affect skill development positively. However, it might not cover the clarity and focus that careful planning of instrumental practice seems to require. Moreover, the benefits of forethought phase activity carried out prior to physical practice have received surprisingly little attention in music education research (Green & Gallwey, 1986; Hatfield & Lemyre, 2016; Jørgensen, 2011; Renwick & McPherson, 2009; Sloboda, Davidson, Howe, & Moore, 1996; Zimmerman, 2002a). Ergo, the present research investigates relationships among the cyclical phases in SRL, applying forethought constructs as exogenous variables.

Hypotheses

Four hypotheses were developed based on previous findings (e.g., Cleary & Zimmerman, 2001), indicating that self-regulated learners integrate adaptive cyclical learning patterns:

- 1) The forethought phase constructs (i.e., goal setting, self-efficacy, and time management) positively predict the use of psychological skills (i.e., self-observation, arousal-regulation, imagery, concentration, and self-control) in higher education music students.
- 2) The use of psychological skills positively predicts self-reflection phase constructs such as coping and perception of progress.
- 3) Forethought phase constructs are indirectly related to self-reflection phase constructs through psychological skills.
- 4) Forethought phase constructs are positively predicted and accounted for by self-reflection phase constructs looping the self-regulation cycle.

Method

Participants

Music students ($N = 204$) from The Norwegian Academy of Music (men = 52.9% and women = 47.1%) were voluntarily recruited from the performance of music program (52.5%), music education (15.8%), music therapy (6.3%), composition program (1.3%), and other programs

(24.1%). All participants were studying at undergraduate level (67.9%), master level (29.6%), and post-master level (2.5%). The participants were involved in classical music (75%), jazz (12.5%), folk music (1.3%), and other genres (11.3%). The majority of the students were pianists (26.8%), string players (26.1%), and woodwind players (19.7%). The remaining sample consisted of winds, percussion, vocal, and guitar. The participants' amount of daily practice varied significantly. A majority (68%) of the students practiced between 1 and 7 hours per day ($M = 3.3$, $SD = 1.9$). Performance students ($M = 3.4$, $SD = 1.6$) reported practicing marginally more than music education, music therapy, and composition students ($M = 3.2$, $SD = 2.3$). Almost 75% of the participants began playing their instruments between the ages of 3 and 8. The sample represented a broad spectrum of programs in order to cover the overall population of students from the Academy of Music.¹

Procedure

An electronic questionnaire was sent to 754 students at The Norwegian Academy of Music during the first half of the spring term. Participants received an email of request ensuring voluntary participation and full anonymity excluding any information connected to names and email addresses. The questionnaire was available to tentative participants for two months. A friendly follow-up email was sent every other week throughout the period of recruitment. The total response rate was 27%.² The Norwegian Social Science Data Service (NSD) approved the study protocol prior to research operationalization. Statistical analyses were carried out using IBM SPSS version 22 and 23 and LISREL 8.80. Little's Missing Completely At Random Test (MCAR) was initially conducted, revealing that the data were missing completely at random ($X^2 = 39.30$, $df = 50$, $p = .86$).

Measures

Data were collected through an electronic online questionnaire (i.e., Self-regulated Learning in Music Questionnaire [SLMQ]), which was developed purposely for the current study (see Table 5). The questionnaire consists of sub-scales representing theoretical constructs within Zimmerman's cyclical model of self-regulated learning, namely goal setting, self-efficacy, time management, psychological skills (*self-observation*, *arousal-regulation*, *imagery*, *concentration*, and *self-control*), self-evaluation, coping, and perception of progress (see Figure 2). All the sub-scales were scored using a 5-point Likert scale. Each item was scored from "1 = Never" to "5 = Always" or "1 = Strongly disagree" to "5 = Strongly agree" with the exception of the nominal background variables.

Forethought phase. The goal-setting scale ($\alpha = .80$, 6 items) measured students' use of specific, hierarchical goal setting, and strategic planning (e.g., "In relation to my long-term goals, I set specific short-term goals for my practice"). Two items were sampled from Self-regulation Scale (SRS) (Toering, Elferink, Jonker, van Heuvelen, & Vissdher, 2012), and one item from Athletic Coping Skills Inventory (ACSI) (Smith, Schutz, Smoll, & Ptacek, 1995). The remaining three items were created by the first author targeting instrumental practice and performance specifically. Self-efficacy ($\alpha = .77$, 4 items) assessed music students' self-efficacy of instrumental practice (e.g., "I strongly believe that I have what it takes to accomplish what I start working on"). Two items were from SRS (Toering et al., 2012), which in turn was based on the Generalized Self-efficacy Scale (Schwarzer & Jerusalem, 1995). Two additional items were created: the time management scale ($\alpha = .73$, 3 items) was fully developed by the first author measuring the

organization of overall practice time and timing of practice sessions (e.g. "I have a specific plan for how long each practice session should last").

Performance phase. The self-observation scale ($\alpha = .76$, 3 items) measured students' metacognitive abilities (e.g., "I check my accuracy while progressing through a practice task"). Two items were from SRS (Toering et al., 2012), and one additional item was created by the first author. Furthermore, the psychological skills variables consisted of 3 items for arousal-regulation ($\alpha = .58$; e.g., "I often get overly tense during concerts and I am severely influenced by this"), 2 items for imagery ($\alpha = .87$; e.g., "I often use imagery in relationship to concerts and performances"), and 3 items for concentration ($\alpha = .64$; e.g., "it is easy for me to keep distracting thoughts from interfering with my instrumental practice") based on original items from the Athletic Coping Skills Inventory (Smith et al., 1995). The self-control scale ($\alpha = .63$, 3 items) was fully created by the first author assessing tenets of deliberate practice (e.g., "I am tempted to hastily practice new pieces in the original tempo").

Self-reflection phase. Zimmerman's self-reflection phase was tested using two additional scales; coping ($\alpha = .69$, 3 items) and self-evaluation ($\alpha = .75$, 3 items). The questions consisted of items extracted from SRS (Toering et al., 2012) and one specific contextual question created by the first author (e.g., "When I'm not achieving the desired results, I carefully search for plausible reasons that lead to new adequate goals"). Perception of progress was measured by a single item (i.e., "I believe that my current progress reflects the amount of hours spent on practicing"). The internal consistency of measures was satisfactory, except for coping ($\alpha = .69$), self-control ($\alpha = .63$), concentration ($\alpha = .64$), and arousal-regulation ($\alpha = .58$) which were, however, acceptable according to conservative criteria (Kerlinger, 1974). While arousal-regulation was the weakest scale, the factor loadings (see Table 5) were adequate ($> .6$) (Costello & Osborne, 2005). Consequently, all items were retained, allowing to keep at least 3 items/indicators for each latent variable necessary for Structural Equation Modeling (SEM) analyses.

Results

Descriptive statistics for all sub-scales are illustrated in Table 1. All variables were relatively normally distributed as skew values varied from 0 to -0.76 .

Pearson correlations were conducted to examine relationships among the variables (see Table 2). Analyses revealed significant correlations between the three phases in the cyclical model. Goal setting significantly correlated with psychological skills ($r = .58^{***}$), self-efficacy ($r = .45^{***}$), time management ($r = .30^{***}$), self-evaluation ($r = .61^{***}$), and coping ($r = .49^{***}$). The analyses also yielded significant relationships between self-efficacy and psychological skills ($r = .41^{***}$), self-efficacy and self-evaluation ($r = .41^{***}$), self-efficacy and coping ($r = .39^{***}$), and expectedly between self-efficacy and perception of progress ($r = .28^{***}$). Psychological skills, in turn, significantly correlated with coping ($r = .48^{***}$), self-evaluation ($r = .58^{***}$), and perception of progress ($r = .23^{***}$). No other significant relationships were found between the cyclical phases of SRL.

Table 3 illustrates correlations among all variables within psychological skills, the forethought, and self-reflection phases. Analyses revealed that self-observation ($r = .51^{***}$) and self-control ($r = .42^{***}$) had the strongest significant relationship to goal setting, while imagery ($r = .27^{***}$), arousal-regulation ($r = .23^{**}$), and concentration ($r = .34^{**}$) had moderate to weak associations to goal setting. Self-efficacy moderately correlated with all the psychological skills variables, except imagery. The psychological skills variables revealed moderate relationships with coping. Similarly, the psychological skills variables had moderate to strong associations with self-evaluation, except imagery.

Table 1. Descriptive statistics for all quantitative variables.

Variable	Items	α	<i>M</i>	<i>SD</i>	Skew	Kurtosis
Forethought phase						
Goal setting (<i>n</i> = 202)	6	.80	3.20	0.71	-0.22	0.19
Self-efficacy (<i>n</i> = 177)	4	.77	3.98	0.67	-0.76	-0.52
Time management (<i>n</i> = 164)	3	.73	3.06	0.97	0.00	0.37
Performance phase						
Psychological skills:			3.17	0.49	-0.01	-0.15
Arousal-regulation (<i>n</i> = 166)	3	.58	3.39	0.78	-0.29	0.11
Concentration (<i>n</i> = 165)	3	.64	2.99	0.69	-0.21	0.12
Self-control (<i>n</i> = 167)	3	.63	3.15	0.80	-0.21	-0.32
Self-observation (<i>n</i> = 164)	3	.76	3.10	0.84	-0.02	-0.17
Imagery (<i>n</i> = 165)	2	.87	3.17	0.96	-0.26	-0.38
Self-reflection phase						
Coping (<i>n</i> = 163)	3	.69	3.51	0.78	-0.08	-0.49
Perception of progress (<i>n</i> = 162)	1	–	3.54	0.82	-0.23	-0.17
Self-evaluation (<i>n</i> = 164)	3	.75	3.28	0.84	-0.18	-0.37

Note. Possible range from 1 to 5. *N* varies somewhat due to missing item responses.

Table 2. Pearson correlations among sub-scales and mental skills.

Variable	1	2	3	4	5	6	7
1. Goal setting	–						
2. Self-efficacy	.45***	–					
3. Time management	.30***	.20**	–				
4. Psychological skills	.58***	.41***	.16*	–			
5. Coping	.49***	.39***	.08	.48***	–		
6. Perception of progress	.14	.28***	.00	.23***	.14	–	
7. Self-evaluation	.61***	.41***	.12	.58***	.56***	.21**	–

Note. **p* < .05, ***p* < .01, ****p* < .001.

Few significant relationships were found between the background variables and the three self-regulated learning phases (see Table 4). However, program level (i.e., students on bachelor/coded = 1, master/coded = 2, post-master/coded = 3) significantly correlated with use of goal setting ($r = .26^{***}$), and psychological skills ($r = .19^*$). Consequently, an SEM analysis was conducted controlling for program level (see Figure 1). Predictive significant paths were found from program level to goal setting ($r = .30^{***}$), and psychological skills ($r = .21^*$). Moreover, findings show that master/post-master students apply goal setting and psychological skills to a greater extent than bachelor students. No additional correlation was found.

Goodness of fit statistics

Prior to testing structural models, it is necessary to find an acceptable fit in the measurement models (Anderson & Gerbing, 1988). The two measurement models were computed with LISREL 8.80 (Jöreskog & Sörbom, 2006). Confirmatory factor analyses were conducted applying the Maximum Likelihood method. An approximate cutoff of .4 was applied defining significant factor loadings (> .4) (Costello & Osborne, 2005). Several of the SLMQ's original sub-scales (for

Table 3. Pearson correlation among sub-scales and the mental skills' sub-scales.

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Goal setting	.10										
2. Self-efficacy	.45***	.10									
3. Time management	.30***	.20*	.10								
4. Arousal-regulation	.23**	.28***	-.03	.10							
5. Concentration	.34**	.24**	.10	.26***	.10						
6. Self-control	.42***	.34***	.15*	.44***	.38***	.10					
7. Self-observation	.51***	.27***	.16*	.06	.30***	.14	.10				
8. Imagery	.27***	.13	.10	.17	.02	.00	.33***	1.0			
9. Coping	.49***	.39***	.08	.29***	.30***	.24**	.37***	.25**	1.0		
10. Perception of progress	.14	.28***	.00	.08	.12	.21***	.18*	.07	.12	1.0	
11. Self-evaluation	.61***	.41**	.12	.20**	.33***	.42***	.57***	.19*	.56***	.21**	1.0

*p < .05. **p < .01. ***p < .001.

Table 4. Correlations^a between the different phases, background characteristics, and practice habits.

Variable	Goal setting	Self-efficacy	Time management	Psychological skills	Coping	Perception of progress	Self-evaluation
Program level	.26**	-.11	-.00	.19*	.09	.03	.16*
Amount of practice	.08	.07	-.13	.10	.04	.05	.01
Age begin playing	-.03	-.01	-.15	-.05	.04	-.01	-.00
Work besides studies	.05	.03	-.02	.07	.00	.05	.04
Sex	-.02	.05	-.00	.11	.06	.06	.05

^aCorrelations involving program level, work, and sex are Spearman's point-biserial coefficients, whereas all other variables are Pearson *r*s. **p* < .05. ***p* < .01. ****p* < .001.

Table 5. Factor loadings for Self-regulated Learning in Music Questionnaire (SLMQ).

Item	Factor loadings
Goal setting	
1. I always set concrete long-term goals for myself.	.70
2. In relation to my long-term goals, I set specific short-term goals for my practice.	.70
3. On a daily or weekly basis, I set very specific goals for myself that guide what I do.	.47
4. I set very specific goals and know what it takes to reach them.	.74
5. I clearly plan my course of action to solve a problem in my instrumental practice.	.59
6. I develop a specific plan for the solution of a problem in my practice.	.57
Self-efficacy	
7. I strongly believe that I have what it takes to accomplish what I start working on.	.78
8. I can solve most problems if I invest the necessary effort.	.80
9. I always manage to solve difficult problems if I try hard enough.	.61
10. I believe that I am able to become more consistent and goal-directed in my instrumental practice.	.47
Time management	
11. I plan how long I should practice before taking breaks.	.59
12. I am currently not managing my time of practice.	.76
13. I have a specific plan for how long each practice session should last.	.78
Self-observation	
14. I check my accuracy while progressing through a practice task.	.63
15. I observe my practice from an analytical perspective while practicing.	.67
16. I check how well I am doing when I solve instrumental practice tasks.	.77
Arousal-regulation	
17. I often get overly tense during concerts and I am severely influenced by this.	.60
18. I usually communicate negatively with myself while practicing.	.70
19. I think about and imagine what will happen if I fail or screw up before concerts.	.69

(Continued)

Table 5. (Continued)

Item	Factor loadings
Imagery	
20. I often use imagery in relation to instrumental practice.	.79
21. I often use imagery in relation to concerts and performances.	1.0
Concentration	
22. It is easy for me to direct my attention and focus towards what I am practicing	.38
23. It is easy for me to keep distracting thoughts from interfering with my instrumental practice.	.63
24. I easily get distracted while practicing.	.83
Self-control	
25. I tend to lose focus towards task while practicing due to a desire to master the task immediately.	.57
26. I am tempted to hastily practice new pieces in the original tempo.	.43
27. I am unfortunately not consistent enough with my instrumental practice.	.80
Self-evaluation	
28. I keep track of my progress over time.	Omitted item
29. When having practiced something during longer periods, I look back to see if I did the right procedures.	Omitted item
30. I am generally good at evaluating my instrumental practice and finding adequate solutions.	Omitted item
Coping	
31. When things turns out badly during concerts, I try to think about how I can do things better next time.	.60
32. I think through past performance experiences to understand new practice ideas.	.69
33. When I'm not achieving the desired results, I carefully search for plausible reasons – that leads to new adequate goals.	.71
Perception of progress	
34. I believe that my current progress reflects the amount of hours spent on practicing	One item

Note. All factors were extracted based on Kaiser rule of 1 or greater (Kaiser, 1960). Self-evaluation was omitted from the measurement model due to cross loadings with self-observation.

review, see Hatfield & Lemyre, 2016) were diminished (i.e., goal setting, self-efficacy, arousal-regulation, concentration, self-control, and perception of progress) due to factor cross loadings and insufficient loadings ($< .4$). The self-evaluation sub-scale was omitted from the model due to cross loadings between self-observation and self-evaluation measures. However, the scale remained in the initial bivariate statistics as it yielded essential information concerning association between forethought phase and self-reflection phase constructs. The analyses also revealed low factor loadings for items in the perception of progress scale. As a result, the most representative item for the perception of progress scale remained as a single item scale. Goal setting, self-efficacy, and time management became the remaining exogenous variables. Table 5 illustrates the final factor loadings after confirmatory factor analysis.

The confirmatory factor analyses and reliability analyses were carried out on all scales in collaboration with a statistician who ensured a valid measurement instrument for SRL and use

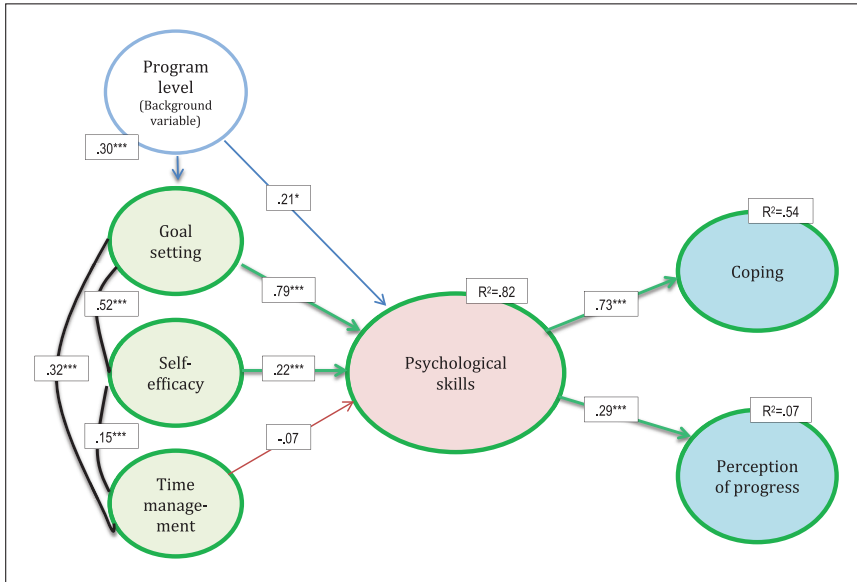


Figure 3. Results from the SEM analysis, controlling for program level. All coefficients are standardized.

of mental strategies among music students. Measurement and structure models revealed acceptable model fit (Marsh, 1995; Hu & Bentler, 1999):

- Measurement model 1, illustrated in Figure 3: *Chi-square* = 319.52 (*df* = 175), $p < .001$, *CFI* = 0.94, *IFI* = 0.94, and *RMSEA* (90% CI) = 0.066 (0.053–0.075). *SRMR* = 0.066
- Measurement model 2, illustrated in Figure 4: *Chi-square* = 554.83 (*df* = 361), $p < .001$, *CFI* = 0.94, *IFI* = 0.94, and *RMSEA* (90% CI) = 0.051 (0.043–0.060). *SRMR* = 0.064
- Structure model 1, illustrated in Figure 3: *Chi-square* = 340.18 (*df* = 182), $p < .001$, *CFI* = 0.93, *IFI* = 0.93, and *RMSEA* (90% CI) = 0.065 (0.055–0.076). *SRMR* = 0.069
- Structure model 2, illustrated in Figure 4: *Chi-square* = 671.88 (*df* = 380), $p < .001$, *CFI* = 0.92, *IFI* = 0.92, and *RMSEA* (90% CI) = 0.062 (0.054–0.069). *SRMR* = 0.077.

Path analysis. Model 1: As illustrated in Figure 3, correlations between goal setting and self-efficacy ($r = .52^{***}$), and goal setting and time management ($r = .32^{***}$) were strong and moderate.³ However, time management and self-efficacy offered a weak correlation ($r = .15^{***}$). As hypothesized, forethought phase constructs partly predicted performance phase components (Hypothesis 1, H1).⁴ In essence, a strong significant path was observed from goal setting to psychological skills (H1). However, a weaker significant path was found between self-efficacy and psychological skills (H1). No significant path was found between time management and psychological skills (H1). Moreover, goal setting, self-efficacy and time management accounted for 82% of the variance in psychological skills (H1). Furthermore, psychological skills accounted for 54% of the variance in coping with a direct standardized regression coefficient of .73 (H2).

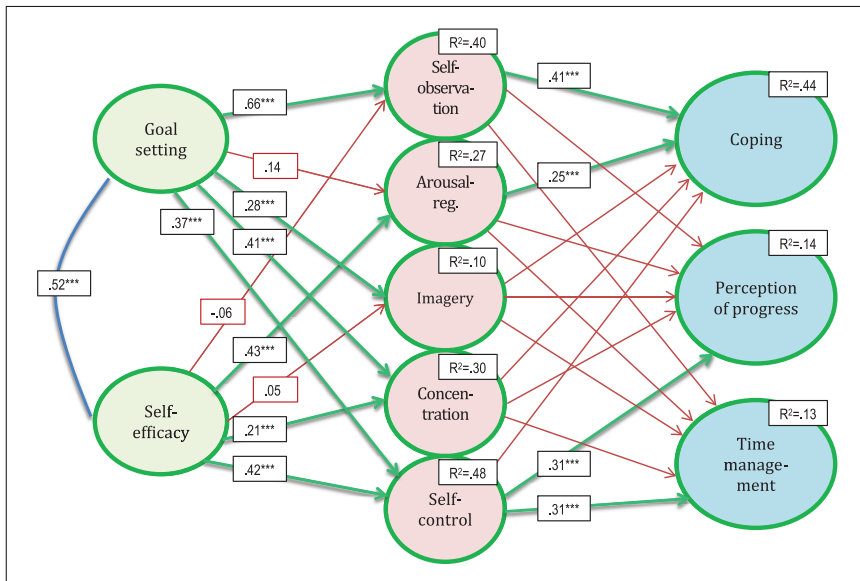


Figure 4. Results from the SEM analysis including psychological skills' latent variables. All coefficients are standardized.

In addition, psychological skills predicted perceptions of progress (just 1 item), accounting for 7% of the variance (H2).

Model 2: In the testing of model 2 (see Figure 4), time management became a dependent variable part of the self-reflection phase (i.e., time management did not significantly correlate with any psychological skills variables in Figure 4). Accordingly, time management was also applied as a predictor variable from the self-reflection phase to the forethought phase in the last regression analysis (H4). Although Zimmerman (2008) argues that time management theoretically makes more sense as a predictor variable, using time management as a dependent variable in the model corresponded with research conducted within deliberate practice finding that pianists' deliberate practice and self-control were associated with time management (Zimmerman, 2002b).

In analyzing the psychological skills' latent variables in Figure 4, we identified multiple significant predictive paths from goal setting to self-observation ($r = .66^{***}$), to imagery ($r = .28^{***}$), to concentration ($r = .41^{***}$), and to self-control ($r = .37^{***}$). Self-efficacy predicted arousal-regulation ($r = .43^{***}$), concentration ($r = .21^{***}$) and self-control ($r = .42^{***}$) (H1). No other significant paths were found. Moreover, goal setting and self-efficacy accounted for 48% of the variance in self-control (H1), 40% of the variance in self-observation, and 30% of the variance in concentration (H1). Self-observation ($r = .41^{***}$) and arousal-regulation ($r = .25^{***}$) were the only significant predictors of coping, accounting for 44% of the variance (H2). Furthermore, self-control predicted perceptions of progress ($r = .31^{***}$) and time management ($r = .31^{***}$) accounting for 14% of the variance in perception of progress and 13% in time

Table 6. Final regression models predicting forethought phase activity (i.e., goal setting and self-efficacy).

Model	Dependent	Independent	<i>b</i>	<i>t</i>	Total adjusted <i>R</i> ²
1.	Goal setting	Coping	.45	6.40***	.24
		Perception of progress	.16	2.27*	
2.	Goal setting	Time management	.25	4.15***	.44
		Coping	.31	4.82***	
		Self-observation	.40	6.22***	
3.	Self-efficacy	Time management	.14	2.12*	.29
		Coping	.36	5.34***	
		Perception of progress	.32	4.78***	

Note. All coefficients are standardized. **p* < .05. ***p* < .01. ****p* < .001.

management (H2). No other significant paths were identified between the endogenous and the outcome variables.

*Tests of indirect links.*⁵ In testing hypothesis 3, LISREL was used to simultaneously test the indirect links in the structural model presented in Figure 4. Of the links involving significant paths (green arrows), the following indirect effects emerged (standardized coefficients): (1) goal setting was significantly and indirectly positively associated with coping (*IE* = .42***) through self-observation; (2) goal setting was significantly and indirectly positively associated with perception of progress (*IE* = .18***) through self-control; (3) goal setting offered a marginal but significant positive indirect association with time management (*IE* = .18, *p* < .10) through self-control; (4) self-efficacy offered a significant positive indirect association with coping (*IE* = .16*) through arousal-regulation; (5) self-efficacy offered a marginal but significant positive indirect association with progress (*IE* = .18, *p* < .10) through self-control; and (6) self-efficacy was not associated with time management (*IE* = .07, *p* > .10) through self-control.

Final regression analysis. Table 6 illustrates the final multiple regression analysis investigating the predictive power of the self-reflection phase on the forethought phase (H4). In relation to the alternative placement of time management in structure model 2 above, time management became an independent variable in the final regression analysis. Self-observation measures were additionally included to address the reciprocity between self-observation and goal setting, that is: "Self-observation, or deliberate attention to aspects of one's behaviors, informs and motivates. Behaviors can be assessed on such dimensions as quality, rate, quantity, and originality. The information gained is used to gauge goal progress" (Schunk, 1990, p. 72).

Final linear multiple regression analyses revealed that coping was the strongest predictor of goal setting and self-efficacy in regression model 1 and 2 (see Table 6). Perception of progress turned out to be nearly as strong as coping in predicting self-efficacy. However, regression model 2 revealed self-observation to be the strongest predictor of goal setting. Time management turned out to weakly predict both goal setting and self-efficacy in model 2 and 3. Variance explained ranged from $R^2 = .24$ to $R^2 = .44$ across the three outcomes.

Discussion

The purpose of the present research was to test the predictive power of an adapted model based on Zimmerman's cyclical model of self-regulation in relation to music students' instrumental practice. The study investigated to what extent the performance phase (i.e., psychological skills) and the self-reflection phase (i.e., coping and perception of progress) varied as a function of music students' reports of involvement in goal setting, perceived self-efficacy for instrumental practice, and time management.

The four hypotheses were partly supported:

- 1) Forethought phase constructs such as goal setting and self-efficacy positively predicted the use of psychological skills. Time management, however, did not correlate with psychological skills.
- 2) The use of psychological skills, in turn partly predicted self-reflection phase constructs such as coping and perception of progress. Self-observation, self-control, and arousal-regulation were the only predictors between the performance phase and the self-reflection phase.
- 3) The links from the forethought phase to the self-reflection phase were indirect through psychological skills. Goal setting was significantly indirectly linked to coping and perception of progress through self-observation and self-control, respectively. Self-efficacy was indirectly linked to coping through arousal-regulation.
- 4) The self-reflection phase constructs significantly predicted forethought phase constructs (i.e., goal setting and self-efficacy).

Finally, the study found that the program level moderately predicted the use of goal setting and psychological skills. This indicated that master and post-master students tended to be more self-regulated in their instrumental practice compared to undergraduates.

Goal setting and self-efficacy in SRL

The present findings revealed a strong correlation between self-efficacy for music practice and use of goal setting. Furthermore, both these variables had a strong predictive association to the use of psychological skills in both models. Previous findings within sports and music have revealed that experts, to a greater extent than non-experts and novices, use specific goals in practice and performance situations (Chaffin et al., 2010; Cleary & Zimmerman, 2001; Miklaszewski, 1989; Miksza, 2009; Nielsen, 2001, 2004; Renwick & McPherson, 2000; Zimmerman, 2008). These studies also found that participants high in self-efficacy applied a wide variety of strategies. A recent study monitoring jazz students' habits of practice (Nielsen, 2015) found that participants engaged in strategic planning tended to monitor and self-evaluate their practice efforts. However, the students did not always adjust strategic activities in relation to self-evaluation during practice. These findings are in line with the present study's findings revealing a strong link between forethought and performance phase processes. Similarly, research within organizational settings and sports have emphasized the importance of specific goal setting prior to further execution of actions. In essence, specific goals contribute to deliberate task-specific involvement and self-efficacy (Kyllo & Landers, 1995; Locke & Latham, 1990). Accordingly, recent research in music performance science revealed that music students' tendencies to display grit (i.e., persistence in achieving short- and long-term goals) in their instrumental practice was related to students' self-reflectiveness, practice efficiency,

flow during practice, and self-efficacy for self-regulation (Miksza & Tan, 2015). Hence, a strong correlation between music students' self-efficacy and goal setting is likely to be influenced by the perception of accomplishment and mastery. According to Bandura (1977), one is likely to experience multiple mastery experiences when a task is based on specific goal setting. Accordingly, students high in self-efficacy are motivated to plan and demonstrate effort in achievement tasks. Moreover, goal setting and self-efficacy seem to reciprocally influence persistence and effort during performance and self-reflection phases (Bandura, 1977; Locke, Frederick, Lee, & Bobko, 1984; Locke & Latham, 1990; Locke et al., 1981; Zimmerman, Bandura & Martinez-Pons, 1994; Zimmerman & Bandura, 1992). Taking previous findings in consideration, it is likely that goal setting and self-efficacy play an important reciprocal role in the use of psychological skills in instrumental practice. Finally, practitioners having a clear prospective idea of how and why to carry out actions before task performance tend to focus on task-relevant activities and steer away from task-irrelevant behaviors during practice (Cleary & Zimmerman, 2001; Locke & Latham, 2002; Zimmerman, 2008).

Time management of instrumental practice

The present study failed to find predictive links between time management and any of the psychological skills. This finding was not surprising as only a few weak correlations were found in the initial bivariate analyses (Table 2). However, at a theoretical level, these findings are consistent with previous research revealing that music students tend to be more concerned about the duration of daily practice, rather than specifically planning how, why, and what to practice in each session (Hatfield & Lemyre, 2016; Jørgensen, 1996). Nevertheless, the accumulated quantity of instrumental practice hours plays an important role in determining how far one might reach as a musician (e.g., Ericsson et al., 1993). However, this stipulates that the hours of practice accumulated need to reflect a certain level of quality (Bonneville-Roussy & Bouffard, 2015; Ericsson et al., 1993; Jørgensen, 2008; Nielsen, 2008; Sloboda et al., 1996). Since the use of psychological skills is predicted by goal setting and self-efficacy (i.e., entailing specific qualitative elements), it is likely that time management (i.e., management of the amount of instrumental practice) lacks the specificity and quality needed in order to predict application to psychological strategies. Moreover, as time management in the present research exclusively involved the management of practice time, future studies would benefit from integrating qualitative elements (e.g., organization of both time and effort within each practice session) to this concept.

Cyclical relations in SRL

In accordance with Zimmerman's cyclical model of self-regulation, the current study found evidence of predictive relationships between the forethought phase, the performance phase, and the reflection phase. Goal setting and self-efficacy for instrumental practice generated strong positive indirect links with coping. Psychological skills explained 54% of the variance in coping. These results are consistent with previous findings concerning planning and goal setting's role on positive outcomes in terms of adaptive coping and use of self-observation (Cleary & Zimmerman, 2001). In this study, experts' use of strategy attributions and self-evaluation positively affected the appliance of attentional focus and process-specific planning during the forethought phase (Cleary & Zimmerman, 2001). In congruence with literature on SRL, the present study revealed that self-efficacious music students applying goal setting are more likely to cope adaptively when facing failure (Locke & Latham, 1990, 2002; Weiner,

1985; Zimmerman, 2008). Moreover, these findings revealed how deliberate planning of aspiring music students' practice sessions might enhance the quality of actions taken during actual practice. Such practice seems not only to enhance students' self-efficacy, but also how they cope when facing failure. This finding supports the cyclical nature of the tested model.

The present study unexpectedly failed to find significant paths from self-control, concentration, and imagery to coping. In turn, self-observation had a very strong link to coping. From a statistical viewpoint, this might indicate that some of the indicators in the three latent variables (i.e., self-control, concentration, and imagery) were slightly weak (see Table 5). Contrastingly, factor loadings indicating arousal-regulation and self-observation were all empirically strong ($> .60$), increasing the likelihood of predictive power (Costello & Osborne, 2005).

From a theoretical standpoint, self-observation (e.g. "I check how well I am doing when I solve instrumental practice tasks") directs the learner's attention to identifying why and how one has arrived at a certain point of accomplishment. Consequently, one can consciously recognize what leads to new attributions and efforts (Bandura, 1986; Zimmerman, 2008). Contrastingly, self-control, concentration, and imagery might additionally have low, or no predictive power due to being more implicit in nature compared to self-observation. Henceforth, although specific goals increase one's concentration on specific tasks, one will not discover why one's concentration is enhanced before metacognitively observing the spring to enhanced concentration. Moreover, this may indicate that goal setting and self-efficacy might enact and predict the use of psychological skills. However, self-observation seems to play a central role in predicting adaptive coping (e.g., providing information about why one's concentration was enhanced, why and how slow practice and imagery might have worked or not worked, etc.). Moreover, self-observation is important in predicting further SRL (Zimmerman, 2002a; Zimmerman, 2008; Zimmerman & Schunk, 1989).

Self-control had a moderate link to perception of progress. The items indicating self-control represented deliberate practice habits in which students keep a certain distance to the task at hand, avoiding hastened practice habits such as over-expression and maladaptive striving for an immediate result (Lehmann & Ericsson, 1997; Lehmann, Sloboda, & Woody, 2007). Obviously, it seems that besides enhancing music students' habits of instrumental practice and performance, self-control seems to offer students' positive feedback facilitating the perception of progress.

The model offered a strong significant path from self-efficacy to arousal-regulation. This indicates that music students with higher levels of self-efficacy were better able to cope with adversity, adapting their arousal and focus to the situational demands. This finding was expected and is similar to Cleary and Zimmerman's (2001) findings linking higher self-efficacy to adequate regulation of arousal during performance in expert performers. Furthermore, in the case of self-inefficacy, heart rate is likely to be affected and stress reactions might spring forth:

Perceived self-efficacy and emotional arousal undoubtedly involve interactive effects, with coping efficacy exercising the much greater sway. That is, perceived inefficaciousness in coping with potential threats leads people to approach such situations anxiously, and experiencing disruptive arousal may further lower their sense of efficacy that they will be able to perform skillfully. (Bandura, 1982, p. 140)

Accordingly, in demanding situations, self-efficacious music students are likely to regulate their arousal as they interpret the arousal as adaptive and energizing (Bandura, 1982). Accordingly, the present study found that adaptive arousal-regulation, predicted adaptive coping when facing failure.

The model's cycle offered predictive associations from the self-reflection phase to the forethought phase. These findings were all expected, and in line with fundamental concepts of self-regulated learning (McPherson et al., 2013; Zimmerman, 2002a; Zimmerman & Schunk, 1989).

The time frame for the current study may have influenced some of the models' parameters. Further studies should consider a longitudinal design to assess whether some of the variables increase the predictive power of the model over time. The generalizability of the study is limited as the sample was not randomized. Participation in the study was voluntary, which may offer a biased population. However, the sample was diversified and represented the breadth of the population from which it was taken.

Conclusion

The present study revealed that psychological skills (i.e., self-observation, imagery, arousal-regulation, concentration, and self-control) were altered by the use of specific goal setting and self-efficacy. Self-efficacy turned out to influence students' use of deliberate practice strategies (i.e., self-control) and appropriate arousal-regulation. Surprisingly, time management did not affect any of the mental strategy variables. These findings indicate that the organization of practice time per se had little impact on the use of deliberate practice strategies. However, appliance of deliberate practice strategies moderately predicted use of time management. Deliberate practice strategies turned out to influence students' perception of progress. This supports research showing that deliberate/formal practice accelerates practitioners' progress compared to informal practice strategies (Lehmann & Ericsson, 1997; Lehmann & Jørgensen, 2012; Nielsen, 2001; Sloboda et al., 1996). In line with previous research on self-regulated learning cycles, the present study revealed that goal setting had a strong predictive effect on self-observation, concentration, and self-control (Cleary & Zimmerman, 2001). Finally, goal setting and psychological skills, and more specifically self-observation, predicted adaptive coping. In turn, self-reflection phase constructs predicted use of goal setting and self-efficacy. Moreover, music students seem to benefit from specific planning of their course of action prior to instrumental practice. This seems to strongly facilitate music students' concentration, their use of appropriate practice strategies and their level of self-awareness while practicing. In turn, this seems to enable adaptive coping in the face of failure. The present study found that master/post-master students were moderately more involved in SRL than bachelor students. Consequently, providing first year/pre-conservatoire students with SRL would probably facilitate progress and motivation. The implications are clear, forethought processes preceding learning influence students' motivational potential. This process deserves more attention in future music and education research.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Notes

1. Even though music therapists play musical instruments, music therapy is not considered as part of the official study programs of performance. Hence, music therapy students should have been omitted from the study. However, the results remained the same after having controlled for both music therapy students and other programs. For instance, the results remained the same even when controlling for performing music students.
2. Since the questionnaire was sent based on an email list including part-time, inactive students, and students taking only one subject, the response rate would have been significantly higher if based on active full-time students.
3. Correlations between exogenous variables are measured through bivariate methods (Pearson's r).

4. Predictive paths from exogenous to endogenous variables are measured through standardized regression coefficients.
5. Indirect effects, in contrast to direct effects (r), are termed IE in LISREL, indicating the indirect product.

References

- Andersen, M. B. (2000). *Doing sport psychology*. Champaign, IL: Human Kinetics.
- Andersen, M. B. (2005). *Sport psychology in practice*. Champaign, IL: Human Kinetics.
- Anderson, J.C., & Gerbing D.W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two - Step Approach. *Psychological Bulletin*, 103, 411–423.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122–147.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bonneville-Roussy, A., & Bouffard, T. (2015). When quantity is not enough: Disentangling the roles of practice time, self-regulation and deliberate practice in musical achievement. *Psychology of Music*, 43(5), 686–704.
- Bruser, M. (1997). *The art of practicing: A guide to making music from the heart*. New York: Bell Tower.
- Burton, D., Pickering, M., Weinberg, R., Yukelson, D., & Weigand, D. (2010). The competitive goal effectiveness paradox revisited: Examining the goal practices of prospective Olympic athletes. *Journal of Applied Sport Psychology*, 22, 72–86.
- Chaffin, R., & Imreh, G. (2001). A comparison of practice and self-report as sources of information: About the goals of expert practice. *Psychology of Music*, 29(1), 39–69.
- Chaffin, R., Imreh, G., Lemieux, F. A., & Chen, C. (2003). "Seeing the big picture": Piano practice as expert problem solving. *Music Perception*, 20(4), 465–490.
- Chaffin, R., Lisboa, T., Logan, T., & Begosh, K. T. (2010). Preparing for memorized cello performance: The role of performance cues. *Psychology of Music*, 38(1), 3–30.
- Cleary, T. J. & Zimmerman, B. J. (2001). Self-regulation differences during athletic practice by experts, non-experts, and novices. *Journal of Applied Sport Psychology*, 13, 185–206.
- Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, 10, 1–9.
- Ericsson, K. A., Krampe, R. T., & Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363–406.
- Filby, W. C. D., Maynard, I. W., & Graydon, J. K. (1999). The effect of multiple-goal strategies on performance outcomes in training and competition. *Journal of Applied Sport Psychology*, 11(2), 230–246.
- Frayne, C. A., & Latham, G. P. (1987). The application of social learning theory to employee self-management of attendance. *Journal of Applied Psychology*, 72, 387–392.
- Goudas, M., Kolovelonis, A., & Dermizaki, I. (2013). Implementation of self-regulation interventions in physical education and sports contexts. In H. Bembvenuti, T. J. Cleary, & A. Kitsantas (Eds.), *Applications of self-regulated learning across disciplines* (pp. 383–415). Charlotte, NC: Information Age.
- Green, B., & Gallwey, W. T. (1986). *The inner game of music*. Garden City, NY: Anchor Press/Doubleday.
- Hallam, S. (2001). The development of metacognition in musicians: Implications for education. *British Journal of Music Education*, 18(1), 27–39.
- Hanrahan, S. J., & Andersen, M. B. (2010). *Routledge handbook of applied sport psychology: A comprehensive guide for students and practitioners*. Abingdon, UK: Routledge.
- Hatfield, J. L., & Lemyre, N. (2016). Foundations of intervention research in instrumental practice. *Frontiers in Psychology*, 6, 1–11.
- Hays, K. F. (2009). *Performance psychology in action: A casebook for working with athletes, performing artists, business leaders, and professionals in high-risk occupations*. Washington, DC: American Psychological Association.
- Heimberg, T. (2007). *Making a musical life*. San Anselmo, CA: String Letter.

- Hewitt, M. P. (2015). Self-Efficacy, Self-Evaluation, and Music Performance. *Journal of Research in Music Education*, 63(6), 298–313.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55.
- Jørgensen, H. (1996). *Tid For Øving?* (Vol. 2). Oslo: NMH-Publikasjoner.
- Jørgensen, H. (2008). Instrumental practice: Quality and quantity. *The Finnish Journal of Music Education*, 11(1–2), 8–18.
- Jørgensen, H. (2011). *Undervisning i Øving*. Oslo: Norsk Musikkforlag A/S, Oslo.
- Jöreskog, K. G., & Sörbom, D. (2006). LISREL for Windows. Lincolnwood, IL: Scientific Software International.
- Kaiser, H.F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement*, 20, 141–151.
- Kerlinger, F. N. (1974). *Foundations of behavioral research* (2nd ed.). New York: Holt, Rinehart and Winston.
- Kylo, L. B., & Landers, D. M. (1995). Goal setting in sport and exercise: A research synthesis to resolve the controversy. *Journal of Sports & Exercise Psychology*, 17, 117–137.
- Lehmann, A. C., & Ericsson, K. A. (1997). Research on expert performance and deliberate practice: Implications for the education of amateur musicians and music students. *Psychomusicology*, 16, 40–58.
- Lehmann, A. C., & Jørgensen, H. (2012). Practice. In G. E. McPherson & G. F. Welch (Eds.), *The Oxford handbook of music education* (Vol. 1, pp. 677–693). Oxford, UK: Oxford University Press.
- Lehmann, A. C., Sloboda, J. A., & Woody, R. H. (2007). *Psychology for musicians: Understanding and acquiring the skills*. Oxford, UK: Oxford University Press.
- Leon-Guerrero, A. (2008). Self-regulation strategies used by student musicians during music practice. *Music Education Research*, 10(1), 91–106.
- Locke, E. A. (1968). Toward a theory of task motivation and incentives. *Organizational Behavior and Human Performance*, 3, 157–189.
- Locke, E. A., Frederick, E., Lee, C., & Bobko, P. (1984). Effects of self-efficacy, goals, and task strategies on task performance. *Journal of Applied Psychology*, 69, 241–251.
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting & task performance*. Englewood Cliffs, NJ: Prentice-Hall.
- Locke, E. A., & Latham, G. P. (2002). Building a practical useful theory of goal setting and task motivation. *American Psychologist*, 57(9), 705–717.
- Locke, E. A., Saari, L. M., Shae, K. N., & Latham, G. P. (1981). Goal setting and task performance. *Psychological Bulletin*, 90(1), 125–152.
- Marsh, H. W. (1995). $\Delta 2$ and χ^2 I2 fit indices for structural equation models: A brief note of clarification. *Structural Equation Modeling*, 2, 246–254.
- Martens, F. H. (1919). *Violin mastery; talks with master violinists and teachers, comprising interviews with Ysaye, Kreisler, Elman, Auer, Thibaud, Heifetz, Hartmann, Maud Powell and others*. New York: Frederick A. Stokes.
- McPherson, G. E., Nielsen, S. G., & Renwick, J. M. (2013). Self-regulation interventions and the development of music expertise. In H. Bembenucci, T. J. Cleary, & A. Kitsantas (Eds.), *Applications of self-regulated learning across diverse disciplines* (pp. 355–382). Charlotte, NC: Information Age.
- Miklaszewski, K. (1989). A case study of pianist preparing a musical performance. *Psychology of Music*, 17, 95–109.
- Miksza, P. (2009). Relationships among impulsivity, achievement, goal motivation, and the music practice of high school wind players. *Bulletin of the Council for Research in Music Education*, 180, 9–27.
- Miksza, P., & Tan, L. (2015). Predicting collegiate wind players' practice efficiency, flow, and self-efficacy for self-regulation: An exploratory study of relationships between teachers' instruction and students' practicing. *Journal of Research in Music Education*, 63(2), 162–179.
- Neuhaus, G. G. (1993). *The art of piano playing*. London, UK: Kahn & Averill.
- Nielsen, S. G. (2001). Self-regulating learning strategies in the conservatories. *Music Education Research*, 3, 155–167.
- Nielsen, S. G. (2004). Strategies and self-efficacy beliefs in instrumental and vocal individual practice. *Psychology of Music*, 32(4), 418–431.

- Nielsen, S. G. (2008). Achievement goals, learning strategies and instrumental performance. *Music Education Research*, 10(2), 235–247.
- Nielsen, S. G. (2015). Learning pre-played solos: Self-regulated learning strategies in jazz/improvised music. *Research Studies in Music Education*, 37(2), 233–246.
- Olander, E. K., Fletcher, H., Williams, S., Atkinson, L., Turner, A., & French, D. P. (2013). What are the most effective techniques in changing obese individuals, physical activity self-efficacy and behaviour: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 1–15.
- Papaioannou, A., Ballon, F., Theodorakis, Y., & Auwelle, Y. W. (2004). Combined effect of goal setting and self-talk in performance of a soccer-shooting task. *Perceptual & Motor Skills*, 98, 89–99.
- Renwick, J. M., & McPherson, G. E. (2000). Self-regulation and musical practice: A longitudinal study. *Proceedings of the ICMPC 2000*, 1–10.
- Renwick, J. M., & McPherson, G. E. (2009). Multiple motives: Profiles of young Australians' reasons for musical engagement. *Proceedings of the International Symposium on Performance Science*, 469–474.
- Schunk, D. H. (1990). Goal setting and self-efficacy during self-regulated learning. *Educational Psychologist*, 21, 75–85.
- Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In S. W. J. Weinman & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35–37). Windsor, UK: NFER-NELSON.
- Seijts, B. W., & Latham, G. P. (2001). *Can goal orientation be induced? Further exploration of the state versus trait debate*. Paper presented at the Canadian Psychological Association, St. Foy, Quebec, Canada.
- Sloboda, J. A., Davidson, J. W., Howe, M. J. A., & Moore, D. (1996). The role of practice in the development of performing musicians. *British Journal of Psychology*, 87, 287–309.
- Smith, R. E., Schutz, R. W., Smoll, F. L., & Ptacek, J. T. (1995). Development and validation of a multi-dimensional measure of sport-specific psychological skills: The Athletic Coping Skills Inventory-28. *Journal of Sport and Exercise Psychology*, 17, 379–398.
- Stoeger, H. Z. A., & Ziegler, A. (2008). Evaluation of classroom based training to improve self-regulation in time management tasks during homework activities with fourth graders. *Metacognition and Learning*, 3(3), 207–230.
- Toering, T. T., Elferink, M. T., Jonker, L., van Heuvelen, M. J. G., & Visscher, C. (2012). Measuring self-regulation in a learning context: Reliability and validity of the Self-Regulation of Learning Self-Report Scale (SRL-SRS). *International Journal of Sport and Exercise Psychology*, 10(1), 21–41.
- Valera, W., Abrami, P. C., & Uptis, R. (2016). Self-regulation and music learning: A systematic review. *Psychology of Music*, 44(1), 55–74.
- Weinberg, R. S., & Gould, D. (2011). *Foundations of sport and exercise psychology* (5th ed.). Champaign, IL: Human Kinetics.
- Weiner, B. (1985). An attribution theory of achievement motivation and emotion. *Psychological Review*, 94(4), 548–573.
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, 81(3), 329–339.
- Zimmerman, B. J. (2002a). Becoming a self-regulated learner: An overview. *Theory Into Practice*, 41(2), 64–70.
- Zimmerman, B. J. (2002b). Achieving academic excellence: A self-regulatory perspective. In M. Ferrari (Ed.), *The pursuit of excellence through education* (pp. 85–110). Mahwah, NJ: Lawrence Erlbaum Associates.
- Zimmerman, B. J. (2008). *Goal setting: A key proactive source of self-regulation*. New York: D. H. Schunk.
- Zimmerman, B. J., & Bandura, A. (1994). Impact of self-regulatory influences on writing course attainment. *American Education Research Journal*, 31, 845–862.
- Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Education Research Journal*, 29, 663–676.
- Zimmerman, B. J., & Kitsantas, A. (2005). The hidden dimension of personal competence: Self-regulated learning and practice. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 509–526). New York: Guilford Press.
- Zimmerman, B. J., & Schunk, D. H. (1989). *Self-regulated learning and academic achievement: Theory, research, and practice*. New York: Springer Verlag.

Paper 3

Johannes L. Hatfield and Pierre-Nicolas Lemyre

Foundations of Intervention Research in Instrumental Practice:

Constructing a Psychological Skills Intervention for Musicians

Frontiers in Psychology. doi: 10.3389/psyg.2015.02014

Foundations of Intervention Research in Instrumental Practice

Johannes L. Hatfield¹ and Pierre-Nicolas Lemyre²

The goals of the present study are to evaluate, implement, and adapt psychological skills used in the realm of sports into music performance. This research project also aims to build foundations on how to implement future interventions to guide music students on how to optimize practice toward performance. A 2-month psychological skills intervention was provided to two students from the national music academy's bachelor program in music performance to better understand how to adapt and construct psychological skills training programs for performing music students. The program evaluated multiple intervention tools including the use of questionnaires, performance profiling, iPads, electronic practice logs, recording the perceived value of individual and combined work, as well as the effectiveness of different communication forms. Perceived effects of the intervention were collected through semi-structured interviews, observations, and logs.

Keywords: Intervention, mental practice, performance profile, practice journal, self-determination

¹ Department of Music Education, Norwegian Academy of Music, Oslo, Norway

² Department of Coaching and Psychology, Norwegian School of Sport Sciences, Oslo, Norway

Introduction

In music, the quality of practice and the level of performance are intricately linked to one another. The famous pianist and pedagogue, Walter Gieseking, pointed out a central aspect of teaching music: *“one of the most important duties of a pedagogue, if not the most important, is to teach the pupil how to practice correctly”* (Leimer and Gieseking, 1972, p. 46). However, during the last four decades, several studies revealed that music students are recurrently not provided with information about how to practice, but how to play and perform the music (Jørgensen, 1996; Jørgensen and Lehmann, 1997; Atkins, 2009; Gaunt, 2009; Lehmann and Jørgensen, 2012; Burwell and Shipton, 2013). Consequently, guiding the learning of the art of instrument practice appears to be both underestimated and neglected in higher music education. Important issues such as how to plan and organize instrument practice, what sort of goals enhance progress and motivation to practice, how to solve specific tasks, or even how to evaluate instrument practice are rarely addressed within the context of higher music education. Findings from different research studies imply that performing music students tend to lack proactivity toward the planning of physical and mental practice (Jørgensen, 1996; Gaunt, 2009; Lehmann and Jørgensen, 2012; Burwell and Shipton, 2013). Several studies have indicated a potential for individual development during higher music education (Ericsson et al., 1993; Jørgensen, 1996, 2000; Nielsen, 2004; Ericsson, 2006). These studies have all noted that there is a need to help music students to utilize their time and effort in ways that motivate and enable stable progress toward successful professional music careers. In a study investigating health and wellbeing related issues in seven British conservatories revealed that most students expressed a general need for one-to-one teaching in relation to performance and practice issues, injury prevention, and the development of professional skills (Atkins, 2009). These findings all support an imperative need in music students to be formally guided on how practice.

Contrastingly, the field of sports has for many years been concerned about developing and sustaining the best possible training environments to facilitate optimal performance in athletes (Starkes and Ericsson, 2003). Setting goals, applying visualization skills in training and competition, developing self-regulation skills and monitoring training with the help of training logs, implementing injury and dropout prevention protocols in combination with other mental techniques have become an important part of the

developmental routine used by aspiring and established athletes (Kyllo and Landers, 1995; Lemyre, 2005; Dosil, 2006; Gjerset, 2008; Hanrahan and Andersen, 2010; Weinberg and Gould, 2011). Among other things, mental training for sports typically emphasizes psychological factors such as personal mastery of tasks, intrinsic motivation, and competing with oneself through goal-directed activities (Andersen, 2005; Dosil, 2006; Hanrahan and Andersen, 2010; Weinberg and Gould, 2011).

Within the music performance context, the phenomenon of mental practice is related to mental rehearsal, which indicates the action of visualizing the music score and creating various sensory images of how to perform a piece of music without muscular movements (Coffman, 1990). However, in the present study, mental practice is conceptualized in accordance with the definition of psychological skills training (PST) within the field of sports psychology; that is, a *“systematic and consistent practice of mental or psychological skills for the purpose of enhancing performance, increasing enjoyment, or achieving greater sport and physical self-satisfaction”* (Weinberg and Gould, 2011, p. 248).

PST-techniques have been considered through almost five decades of research within sport psychology. Techniques such as goal setting, arousal regulation, visualization, concentration, and internal dialog in relation to peak performance have been highlighted (Locke, 1968; Locke et al., 1981; Orlick and Partington, 1988; Beauchamp et al., 1996; Andersen, 2000; Papaioannou et al., 2004; Pavlidou and Doganis, 2008; Burton et al., 2010). When introducing PST to the context of music performance and practice, assessing intervention tools and adapting them to the music context is vital to ensure their relevance and effectiveness (Hays, 2002). This study explicitly focuses on the process of tailoring a PST-program evaluating intervention tools in collaboration with two performing music students. The intervention tools evaluated were: Use of questionnaires, performance profiling, iPads/ practice application, combined individual and group PST-sessions and communication emphasizing self-reference and choice.

The study was based on the following hypotheses:

- 1 Self-assessment through questionnaires and performance profiling motivates students for further work through identification of individual key-issues.

- 2 Music students utilizing iPads with a practice application keeping track of accumulated practice with a diary and video-recording possibility, experience improvement in concentration and self-reflection toward music practice.
- 3 PST-intervention is best implemented through a combination of individual and single-group sessions.
- 4 Implementation of PST feels intrinsically motivating, emphasizing self-referenced learning through non-controlling communication as each participant's personal development and experience of the program is highlighted throughout the intervention.

Background

Few studies have investigated music performance and practice acquisition from an intervention standpoint. Clark and Williamon (2011) found that a 9-week musician-specific mental training program increased students' self-efficacy, practice behavior, imagery vividness, self-awareness, and self-confidence, and incited healthier perspectives toward making music. Issues concerning the content and delivery of the program revealed that participants felt that the program could have been strengthened through more examples of practical application, case studies, and a greater use of class discussion to increase experience sharing and knowledge transfer (Clark and Williamon, 2011). Several other studies introducing mental training to music students revealed similar findings. In a study by Hoffman and Hanrahan (2012), music students were provided three 1-h psycho-educational workshops. In a 1-month follow up assessment, a significant increase in students' performance quality and a significant decrease in performance anxiety in the intervention group were revealed. Another study by Osborne et al. (2014) introducing performance psychology techniques to music students over a 3-week period revealed similar results. After a 3-weeks intervention, students reported a significant reduction of self-reported music performance anxiety. The intervention also enhanced student's performance, preparation, confidence, courage, focus, concentration, and performance resilience (Osborne et al., 2014). Other types of interventions such as yoga (Khalsa and Cope, 2006) cognitive behavioral therapy (Kendrick et al., 1982) and Alexander technique (Valentine et al., 1995) have also revealed positive effects on reducing performance anxiety in music students and performers.

These studies targeted music performance enhancement and music performance anxiety reduction. Burwell and Shipton (2013) recently conducted an action research project regarding strategic approaches to practice, which applied an individual intervention approach. Eight performing music students undertook a 2-week practice clinic for practice seminars, group discussions, practicing, and self-reflection. Their participation in the practice clinic generated interesting insights regarding individual practice, planning, structure, time-management, and metacognitive thinking. Moreover, findings revealed that music students, to their own surprise, had comparatively little knowledge about instrument practice and practice strategies before entering the clinic. The authors found that the students had little insight as to what motivated them to pursue their music training and what factors influenced the quality outcome of their practice.

Motivation research has clearly established the importance of autonomy support and self-reference in learning (Zimmerman et al., 1992; Deci and Ryan, 2000; Locke and Latham, 2002; Elliot and Dweck, 2005; Zimmerman, 2008). Moreover, when behavior or communication forms used by teachers, coaches or instructors is intended to exert control over their pupil it is likely to lead to a significant loss and lack of interest in the associates task (Deci and Ryan, 2000). Using words such as must, ought to, have to, or explaining the assumed right way deductively may be perceived as controlling. However, when the learning context is characterized by an emphasis on explicit rationales, the learner's voice, and a high degree of self-determination, it is likely to foster a high quality in motivation (Deci and Ryan, 1985; Locke and Latham, 1990). Accordingly, both inductive and deductive forms of communication might positively affect the quality of motivation as long as individuals perceive the learning context as congruent with one's intrinsic values (Deci and Ryan, 2000). The present intervention deliberately applied autonomy-supportive and non-controlling forms of communication emphasizing explicit purpose for implementing PST, using open-ended questions, supporting autonomy and encouraging self-reference.

Theory

The present study was conceptually based on two theories, Self-regulation theory (SRT), Zimmerman (2002), and Deci and Ryan's (1985, 2000) Self-determination theory (SDT).

Experienced-based literature on music practice yields similarities with psychological skills used in sports and within the literature on deliberate practice (Ericsson et al., 1993; Ericsson, 2006; Weinberg and Gould, 2011). The famous Russian pianist and pedagogue Genrikh Gustavovich Neuhaus introduced his work on music practice in the following fashion: *"Mastery of the art of working, of learning composition- which is one of the reliable criteria of a pianists 'maturity'- is characterized by an unwavering determination and an ability not to waste time. The greater the part played in this process but willpower (going straight to the goal) and concentration, the better result. The greater the passivity and inertia- the greater the time for learning a composition, while interest in it inevitably flag. All this is well known, but to repeat it is not useless"* (Neuhaus, 1993, p. 4). Self-regulation is viewed in relation to what we know as deliberate practice, which is basically the study of how experts become experts. Self-regulation theory emphasizes deliberate work strategies such as planning and goal setting, meta-analytic practice, evaluation, and self-reflection (Zimmerman and Schunk, 1989; Zimmerman and Risemberg, 1997; Zimmerman, 2002). Furthermore, the context in which music students find themselves might have a huge impact on the actual quality of motivation, and thus, how instrument practice and performance is executed. Consequently, establishing an environment that nourishes autonomous motivation is an essential goal of the current evaluation study. The present study is conceptually based on Self-Determination Theory (SDT; Deci and Ryan, 1985, 2000). SDT is based on three *basic psychological needs*, relatedness, autonomy, and competence. When these three needs are fulfilled, *need-satisfaction* takes place. Moreover, SDT claims that the degree to which these needs are satisfied will impact one's well-being, life satisfaction, volition, and quality of motivation (Ryan and Deci, 2000; Deci and Ryan, 2008). Furthermore, when the learning context is dominated by external regulations such as demands, deadlines, incentives, and other contingencies, students are more likely to be less intrinsically motivated and self-driven. When the learning context is characterized by satisfaction of the three basic psychological needs, motivation is most likely to reach the most integrated level, *identified regulation*. Thus, the more a task is controlled by

external factors, the less identification, integration, and intrinsic motivation is experienced on the task (Deci et al., 1999; Deci and Ryan, 2000). Examples of contrasting types of external regulations are illustrated in the following scenarios:

- 1 Scenario 1: If a music student is forced to play a piece of music, which he dislikes, the student is most likely to feel unmotivated and bored while practicing it. This is by SDT referred to as *controlled regulation* as the student may still perform the task to pass a course.
- 2 Scenario 2: The same student is introduced to the same piece of music but additionally provided with a rationale for why this piece might be especially beneficial to personal artistic development and at the same time given the autonomy to choose another piece to practice. The student would likely start to identify with the new pieces, *identified regulation*, and at the same time feel autonomous, respected and supported by the context in which learning takes place. Moreover, this indicates that music students who have a basic intrinsic motivation to play a musical instrument might be receptive to external regulation of instrument practice if the regulation resonates with their sense of self. Consequently, when students identify the usefulness of an exercise such as goal setting, the exercise becomes internalized through “*transforming the regulation into their own so that it will emanate from their sense of self*” (Ryan and Deci, 2000, p. 60).

The present study will seek to generate explorative empirical data on how to tailor a functional PST program for performing music students through the conceptual lens of SDT (Deci and Ryan, 2000). It will aim to offer insight as to *what are the key elements to include in a functional psychological skills program (PST) for musicians to promote lasting motivation, progress, and deliberate practice?*

Material and Methods

A 2-month PST intervention was provided to two students attending the last year of their Bachelor degree in music performance during the second half of the fall semester.

The main components evaluated in this study were the use of questionnaire in combination with performance profiling, use of iPads and electronic practice journal, the use of individual and group settings, and use of non-controlling communication enabling participants' self-determined activities.

Participants and Procedures

Two fourth-year bachelor students (using pseudonyms), Marcus 22, violinist, and Rita 21, pianist, were voluntarily recruited from the music performance program at the music academy. A letter of recruitment was sent electronically to 34 bachelor level performance students at the academy. Due to broad interest, recruitment was finally based on a combination of participants' interest, availability and time. Their teachers described the participants as average achievers when compared to fellow students.

The intervention was organized into weekly 60-min sessions, two group meetings and two individual meetings per month. Altogether, the two participants attended four individual sessions and four group sessions. The rationale for varying the sessions was to stimulate both individual progress and group reflection throughout the program. In addition, the group sessions were intended to serve as an arena in which the students could display their progress every other week, while gaining feedback and reflecting on further progress and goals.

The first week of intervention comprised of individual assessment based on questionnaires sent by mail 1 week prior to the first individual meeting. After completion, questionnaire scores were transcribed into performance profiles providing the participants with an individual and visual impression of current performance and practice level. During the first meeting, an individualized semi-structured interview was conducted recording participants' opinions of current level of performance and personal impression of the completed questionnaires. Perceived focus points, individual short and long-term goals were identified. Goal setting informed the choice of strategies and tools implemented by the students throughout the program. Meetings generated information on the perceived usefulness of intervention tools as well as providing participants with PST. Consequently, the participant's awareness increased in relationship to their own practice and the intervention process. Main interactions from each session were recorded and transcribed shortly after every session. The research log documented the

participants' views, discussions, and experiences from 1 week to the next throughout the intervention. Meetings consisted of questions about the participants' progress, perceived goal achievement, and accumulated practice specific to intervention tools. The other half of the sessions consisted of discussions pertaining to concrete strategies, goal setting, and trying out new mental skills that could be added to participants' practice routines and performances. Researchers' reflections based on observations concerning use of intervention tools were also integrated to the research log.

Two main focus areas were present throughout the intervention, namely the intervention tools and the implementation of mental skills. The present study aims to investigate and evaluate the usefulness of intervention tools, and solely results pertaining to this point will be presented in the current article.

Semi-Structured Interviews and Data Analysis

Semi-structured interviews were the main source of data for the present study (Kvale, 1997). Two different semi-structured interviews were conducted at the pre-testing and post-testing time-points. The semi-structured interviews had multiple aims. The first aim was to evaluate the intervention tools, while the second aim concerned assessment of participants' need for psychological skills, and the usefulness of these skills. Subsequently, in order to investigate the usefulness of the intervention tools, questions concerning the use of communication, performance profiles, group/individual meetings, iPads and electronic practice journals were assessed on four occasions throughout the intervention process in addition to the interviews.

Thematic analysis was applied analyzing the data (Guest et al., 2012). Thematic analysis identifies, analyze, and report themes in the data (Braun and Clarke, 2006; Guest et al., 2012). Data analysis was conducted using NVivo for mac version 10.2.1.

Intervention Tools

Questionnaire

In order to assess the participants' strengths and weaknesses toward their awareness in relationship to instrument practice, performance preparation,

and mental aspects of music creation, three previously validated questionnaires were translated into Norwegian and adapted to the context of the instrument practice. The original scales had been constructed for performance contexts such as education and sports. The questionnaire operated as a foundation for performance profiling throughout the intervention to help participants gain a multidimensional view of their current situation. The adapted questionnaire was based on the Self-Regulation Scale (Toering et al., 2012), Chronbachs' alpha between 0.73 and 0.85, Achievement Goal Questionnaire (Elliot and McGregor, 2001), Chronbachs' alpha between 0.83 and 0.92, and Athletic Coping Skills Inventory (Smith et al., 1995), Chronbachs' alpha of 0.87. The adapted questionnaire consisted of 86 items intended to measure students' self-regulatory skills, psychological skills, and goal orientations. The questionnaire had eight subscales assessing planning and goal setting, motivation, self-efficacy, achievement motivation, use of mental skills, time-management, self-reflection, and background information. All the subscales were scored using a five-point Likert scale. Each item was scored from "1=Never" to "5 = Always" or "1 = Strongly disagree" to "5 = Strongly agree" with the exception of background variables.

Performance Profiling

When constructing a PST program, multiple components are to be considered such as length of time, frequency of meetings, communication, work constellations, and focus areas among others. However, perhaps the most important aspect of planning PST interventions is to always keep in mind the uniqueness of each individual attending the program (Andersen, 2000; Hays, 2009). In the present study, the uniqueness of each individual was considered through performance profiling (Figures 1, 2). The profile consisted of categories derived from the questionnaires' sub-scales; goal setting, pre-performance, motivation, self-efficacy, self-control, imagery, arousal-regulation, concentration, internal dialog, time-management, self-observation, self-evaluation, and adaptive/maladaptive coping. The performance profile gave both the student and the tutor valuable information for further collaborative evaluation on where to start working (Mellalieu and Hanton, 2009; Weinberg and Gould, 2011). In this study, the performance profile was used to identify important individual PST goals. The profile was computed before and after the intervention providing information on participants' individual progress.

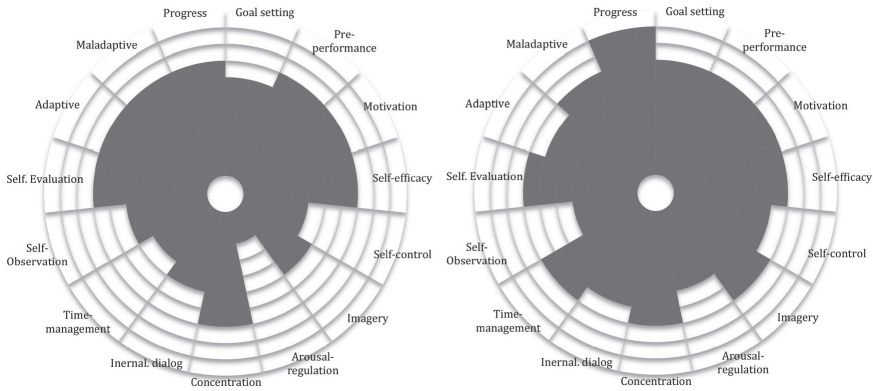


Figure 1: Marcus' performance profiles (left, before; right, after). The shaded areas in the performance profiles indicate the participants' desired outcome scored from 1 to 10. E.g. Marcus has scored 6 out of 10 points in the first assessment on goal setting on the left figure.

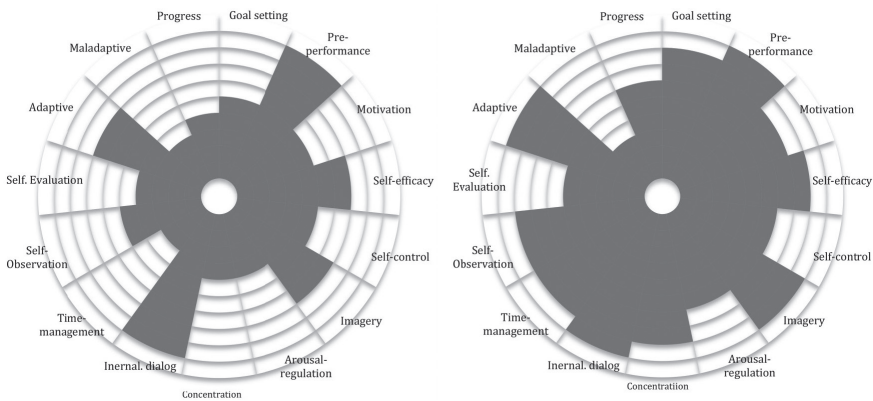


Figure 2: Rita's performance profiles (left, before; right, after).

iPads and Electronic Practice Applications

The present study used the iTunes-based application Music Journal during the intervention. The application was installed on iPad Minis, which were handed out to the participants at the first meeting. The electronic practice journal recorded the total instrument practice time, along with the students' goals, practice time spent on various pieces, and goal achievement (Figure 3). In addition, the students wrote notes about their general experiences of the intervention program.

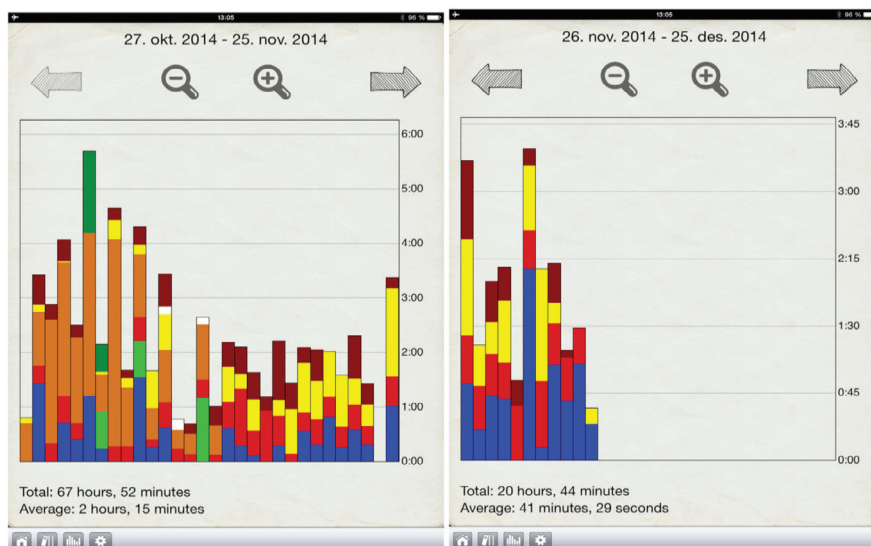


Figure 3: Examples of the applications set up for time spent on multiple pieces/tasks throughout the intervention.

Results

The present case study aimed to gain greater insight on how to develop PST-interventions for music students. The program evaluated multiple intervention tools including the use of questionnaires, performance profiling, iPads, electronic practice journals, the usefulness of individual and group work and different ways of communication, such as non-controlling use of language enabling autonomy and self-reference.

Questionnaire and Performance Profiling

The use of the questionnaire in combination with follow-up semi-structured interviews provided the participants and the researchers with rich information about the students' instrument practice routines and level of performance. Interviews clarified contrasting answers to similar questions, and yielded specific and in-depth knowledge about key practice issues.

The first participant, Marcus, a violinist in his fourth year honor program at the academy, expressed his eagerness to begin the PST program. The first questionnaire suggested that he lacked structure and took an intuitive approach to instrument practice. Further in-depth interviews provided

additional information about his experiences of performance profiling. Semi-structured interview confirmed most of the answers recorded by the questionnaire.

The performance profile provided the researcher and the participants with useful visual information concerning strengths and weaknesses in their instrument practice, as well as feed-forward regarding ongoing work. After having seen the performance profile during the first interview, Marcus was enthusiastic about the specific information offered by the profile, increasing his self-awareness and motivation to set specific goals.

Marcus: Wow, I am really inspired about starting to work on what I just have discovered as my main weaknesses. Yes, I find this profile truly helpful for understanding what I need to focus on. Nobody has given me this kind of information before.

The second case, Rita, also lacked structure and took a similar intuitive approach to her piano practice. In addition, the performance profile suggested that she was unspecific, impatient, and unconscious of time management during practice sessions. The first semi-structured interview confirmed what Rita had revealed in the questionnaire.

Rita: Basically, I tend to plan my practice while being in the practice room with the instrument in hand. I basically play through and give attention to problem spots that appear. I always start with technique exercises, so I tend to go through a formal plan while warming up. I do not reflect upon the completed work after finishing my practice.

During the first week Rita received her performance profile, she was interested, yet not surprised about, her weaknesses and strengths.

Rita: I am actually not surprised about the results of this profile, but it even makes me more aware that this has to be taken seriously, which I have not managed in the past. I look forward to starting to work deliberately with goal setting and some planning.

Both cases left the first session with a noticeable sense of optimism and ease after having set self-referenced goals for themselves. Both participants expressed motivation and optimism toward the continuation of the program. During the following individual session the week after, Marcus had already organized his practice differently.

Marcus: I find it remarkable that one might use such a small amount of time on the various parts practicing the chunks slowly and thoroughly.

In the Schumann, which was his main focus piece, Marcus had scanned through the work finding various focus points he had set working goals for and that he had started to give attention.

Marcus: It is wonderful to know that it is only those parts I need to practice in the movement, and that I did not need to waste time starting from the beginning and randomly correcting some occurring mistakes.

Both cases found this way of practicing much more time-efficient. The participants' performance profile had revealed that they lacked self-control, planning skills, and time management. These were the first aspects that both wanted to address. The performance profile helped both participants with planning and goal-setting, as well as increasing their motivation with the help of self-assessment strategies offering them a sense of ownership over the whole working process (Deci and Ryan, 2000).

Performance profiles are listed and illustrated in the Supplementary Material.

iPads and Electronic Practice Applications

During the first meeting, the participants were given a demonstration and instructions on how to use iPads and the Music Journal application. Participants expressed enthusiasm about the application, and immediately started to write down short and long-term goals.

Throughout the intervention, the application turned out to be a valuable tool for planning, keeping track of individual practice and repertoire, and time management. Participants explored how to use the video camera in order to record their practice sessions. Rita used the application rather consistently and said that she was amazed to discover how little time she spent on her individual practice. Subsequently, she noticed how much time she spent on pieces other than those from her solo repertoire. These points were clearly expressed in the post-interventions interviews.

Rita: I have the same experience, I have never managed to maintain consistency, and I believe that the application was very helpful in showing how much I actually practice.

Marcus: To me it has been very helpful, especially using the application, I felt that I had something concrete to follow, knowing exactly what I was going to do on a daily basis was really inspiring and helpful.

Furthermore, the music practice application also had a diary function that the participants used throughout the intervention. They reported that using the diary had made them reflect and evaluate themselves in a new way that made it much easier to attribute sources of success and failure. They also reported that they had found it challenging to use the diary on a daily basis, but when applied they felt that it enabled them to gain a greater insight on their overall development. However, both students struggled to maintain consistency in using the diaries. Both students reported that it took a great deal of volition after having finished a full day of practice to sit down to reflect and evaluate their day. However, they expressed that the extra time spent on after-practice reflection and evaluation was useful and necessary.

From a research perspective, the application allowed to gain precise information on how, what, and why the students practiced. In addition, the application stored all information in both quantitative and qualitative forms with the help of the journal and the statistical registration of practice. The iPads were convenient for recording and filming interviews as well.

Group and Individual Meetings

Both participants were enthusiastic about the combination of group and individual meetings. Participants reported that they found these meetings necessary to allow them to focus individually and collectively on specific issues and solutions concerning the organization and execution of instrument practice.

Rita: I very much enjoyed it; I feel that it is great to have something besides the interpretation classes with all the other students. In this small group I can actually discuss and play in a slightly more friendly, less frightening atmosphere than playing directly for all the professors and the other students, so yes, it was a good exercise in performing and applying the mental techniques.

Marcus: I believe that it was great having this small group, and not so frightening. I thought that in a group I might be a little more nervous about where to start. But it was great to experience that other students also have their problems and issues with practice. This makes it more human and transparent than a formal interpretation class setting. In the more formal setting one might believe that all the others are perfect, without any problems similar to your own. Through these sessions, I clearly learnt that this is not the case. Working in this type of group, where one openly discusses one's practice habits and strategies, has certainly given me a new dimension to my understanding of practice and performance.

Both participants expressed a need for weekly individual meetings.

Marcus: I believe that it has worked well up to now, but it would have been useful to have an individual lesson shortly after the group session, because one does not always feel like talking about all sorts of personal issues in front of other people.

Rita: For me it was great to work individually, since we managed to focus more specifically on personal goals and discuss precisely how to work. In the group sessions, others were present and this affected me being open about my practice issues. The individual meetings were of great help since somebody helped me understand explicitly why, how, and what to practice. Since I have had issues concerning being self-disciplined for years, having the opportunity to reflect on specific techniques has made me both more aware and more motivated toward my practice. I need to become acclimatized with this way of working.

I wish I could have had more than two individual meetings per month. I believe that the best idea would be to have an individual follow-up meeting after the group sessions. I missed having the opportunity to discuss and plan my practice under your "[the researcher's]" guidance in the weeks we had group lessons.

Viewing the students' progress over time, having 2 weeks between the individual sessions seemed to have affected the students' continuity. Especially, at the beginning of the program, it turned out that two individual meetings per month were insufficient. The individual work was found to be rather time consuming, but useful in relation to the participants' acquisition of mental techniques. In sum, the individual sessions laid a foundation for the participants' directedness and volition, and consequently made them more proactive in their practice approach.

Finally, the group sessions also turned out to be a highly useful setting for exercising and mocking various mental skills in addition to interpretation classes and other performance settings. Moreover, the participants were able to use this small group setting as an opportunity to gain performance experience within a medium pressured performance context making them more robust and prepared for more demanding performance settings.

Forms of Communication

In relation to SDT' claim that non-controlling language enables psychological need satisfaction and autonomy, post-interview revealed the following:

Rita: I need to be told explicitly how to plan my sessions. When I managed the entrance audition, I was inspired and satisfied with my performance, but I have never been told this before. During my lessons with the professor, we mostly discuss the music, technique, fingering, and phrasing, but never how to plan my practice sessions and set goals. Before, I tended to practice without my head turned on. I really liked receiving concrete messages and instructions that revealed I should actually engage in a more efficient method of practice. So, I needed somebody to tell me things like: go ahead and just do it, this week you will really go ahead and accomplish your tasks, be determined and enjoy it!

Marcus: Well, I do believe that both approaches are good. I believe that answering the open-ended questions has made me more independent and aware, including after completing the intervention. But at the same time I find it very inspiring to receive clear directions and advice.

The students' motivation for playing and becoming musicians influenced their receptiveness toward the intervention. Constantly alternating between inductive and deductive means of communication seemed to influence students' implementation of the program positively. Students were able to set their own goals by asking open-ended questions, giving them a sense of ownership and autonomy toward their practice and development (Deci and Ryan, 2000). When using direct communication forms, the main investigator always provided the student with a clear rationale for why a certain action was important. On a few occasions, the main investigator challenged the student on finding out the best course of action. Participants were clearly most active during the intervention, enabling personal identification with activities of focus.

When asked about the overall experience of the program, Marcus responded:

I enjoyed learning how to be more structured in my instrument practice, not approaching my instrument practice by doing what I use to call "panic-practice," and not practicing last minute before my lessons or interpretation classes.

During the whole intervention, Rita had a heavy workload in addition to her studies, which resulted in her generally playing one or two concerts per week.

Rita: I have discovered that I have made myself too busy in recent years by accepting a lot of jobs outside the conservatory. I would like to try to give myself a little more space and spend more time on my solo repertoire. I am not sure if I would have come to this conclusion without participating in this

project. I am very inspired to continue and get more time to dedicate myself, in order to implement what I have learnt during the intervention.

I would like to continue working on, planning and goal setting. I need to try to find a certain balance between the various activities I engage in. I realize that I need to prioritize my individual practice more than before.

Marcus seemed to have benefited from learning how to set multiple types of goals and expressed enthusiasm about continuing to set both general and specific goals for himself.

Marcus: I would love to continue using goal setting the way I have learnt, I felt that it was very useful in preparing my practice sessions. I felt that I had much better control over what I was supposed to practice. Especially when I had a lot to do, I felt that it was a great tool to make my practice more efficient by focusing on things that I needed to practice, instead of just playing through.

Even though the main interest in this study was the effectiveness of the intervention tools, the psychological skills training program seemed to initiate positive progress in the students' practice routines. Finally, the intervention seemed to have stimulated the students' interest in continuing to explore and implement psychological skills. Both Rita and Marcus exhibited strong motivation toward the end of the intervention. Marcus was especially pleased to be selected as a substitute for the local philharmonic orchestra after having implemented psychological skills including audition simulation, imagery, and arousal regulation as part of the audition preparation.

The study also highlighted the importance of students' availability in terms of time. For instance, Rita turned out to be highly active as a concert performer, and engaged in a wide variety of jobs in addition to her music studies. As a result, she expressed frustration about not having enough time to fully focus her attention on her music studies and the intervention. Thus, students' availability is also an important consideration in order to gain the best possible results in future interventions. After finishing the intervention, Rita decided to reconsider her overall workload in relation to her values and music studies.

Discussion

Intervention programs focusing on the enhancement of mental skills needs to be individually tailored (Andersen, 2000, 2005; Hays, 2009; Weinberg and Gould, 2011). A unique finding from the current study was the importance

of the participants' understanding of their own capabilities, which could potentially influence their commitment to the program. After completing the performance profile, both participants expressed a desire to promptly start setting goals for their practice and investing resources to reach them. This correspond to the process of gaining a rational understanding of why one ought to engage in an activity (Deci and Ryan, 2000). Within SDT, this type of motivation is termed identified regulation. The participants set goals that resonate with their personal beliefs. The investigator's conscious support of the participants' need for autonomy has likely and positively influenced the students' motivation throughout the intervention. A less personalized approach would have likely produced poorer forms of motivation in participants requiring greater external forms of motivation to achieve similar levels of commitment but leading lower levels of integration of practice behaviors over time (Deci and Ryan, 1985, 2000). These findings need to be replicated with larger populations. However, it is clear that adapting a motivational approach based on SDT provides useful framework to insure an adaptive climate to implement PST for music students.

Previous studies have suggested that the solitude experienced by performance music students can be detrimental (Jørgensen, 1996; Atkins, 2009). SDT claims that the fulfillment of the basic psychological need for relatedness is important to nurture intrinsic forms of motivation. Socialization through group sessions in which the participants could identify with and relate to one another was important for meeting their psychological need for relatedness. Marcus revealed that, some years ago, he had collaborated with other violinists by meeting at school early in the morning, taking agreed breaks, and pushing each other to practice. Marcus experienced this as highly effective and pleasurable because he could identify with his peers and at the same time manage his time schedule and maintain his personal need for instrument practice. The current intervention produced similar feelings. Consequently, combining the use of group and individual work is important when designing PST-interventions for music students.

Working on deliberate practice techniques such as planning and goal setting had an impact on Rita and Marcus' focus toward task-relevant aspects in their practice. Goal setting seemed to influence the participants' level of concentration. This indicates that setting specific working goals promotes commitment and involvement in the task at hand (Locke and Latham, 2002). Furthermore, this work on goal setting was greatly facilitated by the use

of the iTunes-based application Music Journal. Findings revealed that the application not only worked as a practice journal for goal setting and reflection, but also provided both the researcher and the participants with precise information concerning the amount of accumulated practice, as well as the amount of time spent on diverse pieces of music and techniques. The iPad turned out to be a practical tool for self-assessment and keeping track of progress, as it allowed the students to film their performance, with sufficient sound quality.

During the intervention it became evident that the students had some prior knowledge of planning instrument practice. However, this appeared to be limited to theoretical knowledge, which students had not actively integrated into planning their individual work on their instruments. The students seemed pleased to finally be in a context in which the main goal was to prepare their practice. Earlier studies on practice have revealed that professors tend to believe that their students have an independent understanding of how to organize their practice (Jørgensen, 2000; Burwell and Shipton, 2013). However, current study findings clearly confirm music students' need for support toward planning, goal setting, and maintenance of their instrument practice routines. In this process, both participants found clear instructions and expectations helpful. In addition, communication through which the participants tailored their own solutions and plans generated higher levels of motivation and commitment. Participants' general motivation for being involved in the various elements of the intervention seemed to correspond with what SDT terms *integrated regulation*. The distinction between controlled and autonomous regulation is closely associated to what extent an external form of motivation is integrated into the person's sense of self. Moreover, the style of communication, deductive or inductive, is believed to be useful as long as the participant intrinsically identifies with the subject being communicated. These findings ought to be replicated and tested in future research with music students.

The research method is subject to important limitations. First, the evaluation of the intervention tools might have been made more consistent by using an inventory approach assessing participants' experiences of the tools evaluated. This might have given more systematic quantitative measures of how the participants perceived the intervention tools evaluated. However, it was disregarded, a questionnaire approach with only two participants probably would have produced similar results to semi-structured interviews,

but less specific. Secondly, the study was primarily designed to generate information about the construction of a larger inter-disciplinary study on psychological skills training for musicians. It highlighted the difficult task of combining evaluative and interventional aspects simultaneously. Hence, the usefulness of the implementation of PST techniques may have been negatively affected by the focus on assessing the intervention tools and vice versa. Consequently, future research might exclude, or downplay the role of implementation of PST in order to fully assess intervention tools effectiveness. Interventions solely focusing on PST implementation are most likely to yield more complete descriptions of the effects of PST interventions.

Conclusion

The goal of the present research was to gain knowledge about components that are beneficial to interventional research within the instrument practice field of music. The case study found evidence to support the importance of participants' personal interest and engagement for the intervention. Clearly, personal interest is a variable that needs to be considered when selecting participants for future psychological skills interventions in the music context. This study provided students with performance profile information based on questionnaire self-assessment, a substantial source of motivation and commitment toward continuing work (Weinberg and Gould, 2011). Consequently, a second central implication is that participants who used self-referenced goals, which included a clear rationale for engaging in self-enhancing techniques, are more likely to show interest in initiating such work. Combining group and single PST-sessions turned out to strengthen the overall delivery of the program enabling participants' needs. It also leads to open communication and performance training with the other participant. Using iPads and electronic practice journals enabled valuable feedback and feed-forward for both the participants and the implementer. The journal provided participants with a valuable tool to set specific goals and evaluate themselves on a daily basis. This way of working positively affected participants' motivation and perception of instrumental progress.

Finally, the participants reported that they best received the psychological skills intervention when the researcher altered between a deductive determined way of communication comprising rationales for involvement and

development, and an inductive open-ended communication approach generating free associations. Moreover, procedures deriving from SDT were a noteworthy source of motivation and enthusiasm due to the theory's explicit emphasis on inherent psychological needs. However, future theoretically based research is needed in order to provide more substantial indications of SDT-based framework's potential to explain motivation in the teaching, learning, and practice of music.

Supplementary Material

The Supplementary Material for this article can be found online at: <http://journal.frontiersin.org/article/10.3389/fpsyg.2015.02014>

References

- Andersen, M. B. (2000). *Doing Sport Psychology*. Champaign, IL: Human Kinetics.
- Andersen, M. B. (2005). *Sport Psychology in Practice*. Champaign, IL: Human Kinetics.
- Atkins, L. (2009). "Health and wellbeing education in British conservatories," in *Proceedings of the International Symposium on Performance Science*, eds A. Williamon, S. Pretty, and R. Buck (Utrecht: European Association of Conservatoires), 219–223.
- Beauchamp, P. H., Halliwell, W. R., and Fournier, J. F. (1996). Effects of cognitive-behavioral psychological skills training on the motivation, preparation, and putting performance of novice golfers. *Sport Psychol.* 10, 157–170.
- Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. *Qual. Res. Psychol.* 3, 77–101. doi: 10.1191/1478088706qp0630a
- Burton, D., Pickering, M., Weinberg, R., Yukelson, D., and Weigand, D. (2010). The competitive goal effectiveness paradox revisited: examining the goal practices of prospective olympic athletes. *J. Appl. Sport Psychol.* 22, 72–86. doi: 10.1080/10413200903403232

- Burwell, K., and Shipton, M. (2013). Strategic approaches to practice: an action research project. *Br. J. Music Educ.* 03, 329–345. doi:10.1017/S0265051713000132
- Clark, T. A., and Williamon, A. (2011). Evaluating a mental skills training program for musicians. *J. Appl. Sport Psychol.* 23, 342–359. doi:10.1080/10413200.2011.574676
- Coffman, D. D. (1990). Effects of mental practice, physical practice, and knowledge of results on piano performance. *JRME* 3, 187–196. doi:10.2307/3345182
- Deci, E. L., Koestner, R., and Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychol. Bull.* 125, 627–668. doi:10.1037/0033-2909.125.6.627
- Deci, E. L., and Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. New York, NY: Plenum.
- Deci, E. L., and Ryan, R. M. (2000). The “What” and “Why” of goal Pursuits: Human Needs and the Self-determination of behavior. *Psychol. Inquiry* 4, 227–268. doi: 10.1207/S15327965PLI1104_01
- Deci, E. L., and Ryan, R. M. (2008). Self-determination theory: a macro theory of human motivation, development, and health. *Can. Psychol.* 49, 182–185. doi: 10.1037/a0012801
- Dosil, J. (2006). *The Sport Psychologist's Handbook: A Guide for Sport-Specific Performance Enhancement*. Chichester; Hoboken, NJ: John Wiley.
- Elliot, A. J., and Dweck, C. S. (2005). *Handbook of Competence and Motivation*. New York, NY: Guilford Press.
- Elliot, A. J., and McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *J. Person. Soc. Psychol.* 80, 501–519. doi: 10.1037/0022-3514.80.3.501
- Ericsson, K. A. (2006). *The Cambridge handbook of Expertise and Expert Performance*. Cambridge, MA; New York, NY: Cambridge University Press.
- Ericsson, K. A., Krampe, R. T., and Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychol. Rev.* 3, 363–406. doi: 10.1037/0033-295X.100.3.363

- Gaunt, H. (2009). One-to-one tuition in a conservatoire: the perceptions of instrumental and vocal students. *Psychol. Music* 38, 178–208. doi: 10.1177/0305735609339467
- Gjerset, A. (2008). *Idrettens Treningslære*. Oslo: Universitetsforlaget.
- Guest, G., MacQueen, K. M., and Namey, E. E. (2012). *Applied Thematic Analysis*. Los Angeles, CA: Sage Publications.
- Hanrahan, S. J., and Andersen, M. B. (2010). *Routledge Handbook of Applied Sport Psychology: A Comprehensive Guide for Students and Practitioners*. Abingdon; New York, NY: Routledge.
- Hays, K. F. (2002). The enhancement of performance excellence among performing artists. *J. Appl. Sport Psychol.* 14, 299–312. doi: 10.1080/10413200290103572
- Hays, K. F. (2009). *Performance Psychology in Action: A Casebook for Working with Athletes, Performing Artists, Business Leaders, and Professionals in High-Risk Occupations*. Washington, DC: American Psychological Association.
- Hoffman, S. L., and Hanrahan, S. J. (2012). Mental skills for musicians: managing music performance anxiety and enhancing performance. *Sport Exer. Perform. Psychol.* 1, 17–28. doi: 10.1037/a0025409
- Jørgensen, H. (1996). *Tid For Øving?: studentenes bruk for tid for øving*. Oslo: NMH Publikasjoner.
- Jørgensen, H. (2000). Student learning in higher instrumental education: who is responsible? *Br. J. Music Educ.* 1, 67–77. doi: 10.1017/S0265051700000164
- Jørgensen, H., and Lehmann, A. C. (1997). Does practice make perfect? *NMH Publikasjoner* 1, 71–88.
- Kendrick, M. J., Craig, K. D., Lawson, D. M., and Davidson, P.O. (1982). Cognitive and behavioral therapy for musical-performance anxiety. *J. Consult. Clin. Psychol.* 3, 353–362. doi:10.1037/0022-006X.50.3.353
- Khalsa, S. B. S., and Cope, S. (2006). Effects of a yoga lifestyle intervention on performance-related characteristics of musicians: a preliminary study. *Med. Sci. Monit.* 8, 325–331

- Kvale, S. (1997). *Det Kvalitative Forskningsintervju*. Oslo: Ad Notam Gyldendal AS.
- Kyllo, L. B., and Landers, D. M. (1995). Goal setting in sport and exercise: are search synthesis to resolve the controversy. *J. Sports Exerc. Psychol.* 17, 117–137.
- Lehmann, A. C., and Jørgensen, H. (2012). "Practice," in *The Oxford Handbook of Music Education*, eds G. E. McPherson and G. F. Welch (New York, NY: Oxford University Press), 677–693.
- Leimer, K., and Giesecking, W. (1972). *Piano Technique Consisting of the Two Complete Books The Shortest Way to Pianistic Perfection and Rhythmics, Dynamics, Pedal and Other Problems of Piano Playing*. New York, NY: Dover Publications.
- Lemyre, P. N. (2005). *Determinants of Burnout in Elite Athletes*. Oslo: Norges Idrettshøgskole.
- Locke, E. A. (1968). Toward a theory of Task motivation and incentives. *Organ. Behav. Hum. Perfrom.* 3, 157–189. doi: 10.1016/0030-5073(68)90004-4
- Locke, E. A., and G. P. Latham (1990). *A Theory of Goal Setting & Task Performance*. Englewood Cliffs, NJ; London: Prentice-Hall.
- Locke, E. A., and Latham, G. P. (2002). Building a practical useful theory of goal setting and task motivation. *Am. Psychol.* 57, 705–717. doi: 10.1037/0003-066X.57.9.705
- Locke, E. A., Saari, L. M., Shae, K. N., and Latham, G. P. (1981). Goal setting and task performance. *Psychol. Bull.* 1, 125–152. doi: 10.1037/0033-2909.90.1.125
- Mellalieu, S. D., and Hanton, S. (2009). *Advances in Applied Sport Psychology: A Review*. London; New York, NY: Routledge.
- Neuhaus, G. G. (1993). *The Art of Piano Playing*. London: Kahn & Averill.
- Nielsen, S. G. (2004). Strategies and self-efficacy beliefs in instrumental and vocal individual practice. *Psychol. Music* 4, 418–431. doi: 10.1177/0305735604046099
- Orlick, T., and Partington, J. (1988). Mental skills to excellence. *Sport Psychol.* 2, 105–130.

- Osborne, M. S., Greene, D. J., and Immel, D. T. (2014). Managing performance anxiety and improving mental skills in conservatoire students through performance psychology training: a pilot study. *Psychol. Well Being Theory Res. Pract.* 18, 1–17. doi:10.1186/s13612-014-0018-3
- Papaioannou, A., Ballon, F., Theodorakis, Y., and Auwelle, Y. W. (2004). Combined effect of goal setting and self-talk in performance of a soccer-Shooting task. *Percept. Motor Skills* 98, 89–99. doi: 10.2466/pms.98.1.89-99
- Pavlidou, M., and Doganis, G. (2008). The effects of a psychological intervention program in swimming. *J. Excell.* 2, 71–77.
- Ryan, R. M., and Deci, E. L. (2000). Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemp. Educ. Psychol.* 25, 56–67. doi: 10.1006/ceps.1999.1020
- Smith, R. E., Schutz, R. W., Smoll, F. L., and Ptacek, J. T. (1995). Development and validation of a multidimensional measure of sport-specific psychological skills: the Athletic Coping Skills Inventory-28. *J. Sport Exerc. Psychol.* 17, 379–398.
- Starkes, J. L., and Ericsson, K. A. (2003). *Expert Performance in Sports: Advances in Research on Sport Expertise*. Champaign, IL; Leeds: Human Kinetics.
- Toering, T. T., Elferink, M. T., Jonker, L., Van Heuvelen, M. J. G., and Visscher, C. (2012). Measuring self-regulation in a learning context: reliability and validity of the self-regulation scale. *Int. J. Sport Exerc. Psychol.* 10, 21–41. doi: 10.1080/1612197X.2012.645132
- Valentine, E., Fitzgerald, D., Gorton, T., Hudson, J., and Symonds, E. (1995). The effects of lessons in the Alexander technique in music performance in high and low stress situations. *Psychol. Music* 23, 129–141. doi:10.1177/0305735695232002
- Weinberg, R. S., and Gould, D. (2011). *Foundations of Sport and Exercise Psychology*. Champaign, IL: Human Kinetics.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: an overview. *Theory Into Practice* 2, 64–70. doi:10.1207/s15430421tip4102_2

- Zimmerman, B. J. (2008). "Goal setting: A Key Proactive Source of Self-regulation," in *The Motivation and Self-Regulated Learning*, eds D. H. Schunk and B. J. Zimmerman (New York, NY: Taylor & Francis Group), 267–296.
- Zimmerman, B. J., Bandura, A., and Martinez-Pons, M. (1992). Self-motivation for academic attainment: the role of self-efficacy beliefs and personal goal setting. *Am. Educ. Res. J.* 29, 663–676. doi: 10.3102/00028312029003663
- Zimmerman, B. J., and Risemberg, R. (1997). Becoming a self-regulated writer: A Social cognitive perspective. *Contemp. Educ. Psychol.* 22, 73–101. doi: 10.1006/ceps.1997.0919
- Zimmerman, B. J., and Schunk, D. H. (1989). *Self-Regulated Learning and Academic Achievement: Theory, Research, and Practice*. New York, NY: Springer-Verlag.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer Terry Clark and handling Editor declared their shared affiliation, and the handling Editor states that the process nevertheless met the standards of a fair and objective review.

Copyright © 2016 Hatfield and Lemyre. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) or licensor are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms

Paper 4

Johannes L. Hatfield

Performing at the Top of One's Musical Game:
The Mental Edge of Musicianship

Frontiers in Psychology. doi: 10.3389/fpsyg.2016.01356

Performing at the Top of One's Musical Game

Johannes L. Hatfield

The purpose of the present mixed method study was to investigate personal benefits, perceptions, and the effect of a 15-week sport psychological skills training program adapted for musicians. The program was individually tailored for six music performance students with the objective of facilitating the participants' instrumental practice and performance. The participants learnt techniques such as goal setting, attentional focus, arousal regulation, imagery, and acceptance training/self-talk. Zimmerman's (1989) cyclical model of self-regulated learning was applied as a theoretical frame for the intervention. The present study's mixed-method approach (i.e., quan+QUAL) included effect size, semi-structured interviews, a research log, and practice diaries of the participants (Creswell, 2009). Thematic analysis revealed that participants had little or no experience concerning planning and goal setting in regard to instrumental practice. Concentration, volition, and physical pain were additional issues that the participants struggled with at the time of pre-intervention. The study found that psychological skills training (with special emphasis on planning and goal setting) facilitated cyclical self-regulated learning patterns in the participants. In essence, the intervention was found to facilitate the participants' concentration, self-observation, self-efficacy, and coping in the face of failure. The appliance of practice journals facilitated the participants' self-observation, self-evaluation, and awareness of instrumental practice. Finally, the psychological skills intervention reduced participants' worry and anxiety in performance situations. An 8-month follow up interview revealed that the participants were still actively applying psychological skills.

Keywords: instrumental practice, psychological skills, self-regulation, goal setting, motivation, perfectionism, self-efficacy

INTRODUCTION

What does the number one tennis player Roger Federer have in common with the world famous pianist Leif Ove Andsnes? Intuitively, one may believe they represent two completely different phenomena. However, digging more profoundly into this matter, we realize they are both performers expected to achieve at the highest level. Both performers have achieved their level of success through winning competitions, thus overcoming tremendous external and internal pressure. Moreover, their attainment of expertise is based on thousands of hours of deliberate practice ensuing tremendous motor control. In comparison to aspiring musicians, aspiring athletes are to a greater extent supported by a huge apparatus of coaches, doctors and physical therapists. This enables the best possible training and performance conditions for each individual athlete (Hays, 2002). Talented musicians, however, are to a great extent left to their own devices. They spend most of their time practicing their instrument individually in a practice room (Lehmann and Jørgensen, 2012; Burwell and Shipton, 2013). Although music students are involved in playing chamber music as well as symphonic music in higher music education, ensemble playing constitutes just a minor part of a total amount of practice. Accumulating 7800 individual practice hours throughout 5 years of music studies is not uncommon (Jørgensen, 1996). Studying music on the highest level is all about becoming as skilled as possible (Lehmann and Ericsson, 1997). Such one-dimensional striving for perfection and excellence makes music college students more disposed to maladaptive perfectionism than non-music college majors (Wang and Zhao, 2009)¹. Stoeber and Eismann (2007) found that young musicians striving for perfectionism (i.e., *perfectionistic strivers*) were associated with intrinsic motivation, high performance standards, and deliberate effort. Musicians who were concerned with perfectionism (i.e., *perfectionistic concerners*) were associated with controlled motivation, performance anxiety, somatic complaints, and emotional fatigue. Research also reveals that music students have a perception of being taught *what* to practice rather than *how* to practice (Jørgensen, 2000; Atkins, 2009; Gaunt, 2009; Burwell and Shipton, 2013). The violinist, Norbert Brainin of the Amadeus String Quartet describes his

1 *Perfectionistic striving* is characterized by a focus toward high standards, tolerance for imperfection and mistakes. *Perfectionistic concerners*, concern about mistakes, negative feedback, and approval/non-approval from others. *Perfectionistic concerners* are worried about potential discrepancy between personal expectations and performance (Stoeber, 2012).

relationship with his teacher, Carl Flesch like *“that of a doctor and patient. Flesch would listen, diagnose whatever your problems were, and suggest a remedy which would have the merit of helping you to help yourself to improve”* (Snowman, 1981, p. 16). Evidently, Flesch saw the importance of teaching his students *how* to practice giving prescriptions of further exploration and improvement. Providing athletes with the best possible path to athletic excellence is not solely based on deliberate physical training, but psychological training as well (Starkes and Ericsson, 2003; Weinberg and Gould, 2011). In essence, physical and psychological training is viewed as inextricable entities (Hanrahan and Andersen, 2010; Weinberg and Gould, 2011). Both Federer and Andsnes have spent considerable hours on mental/psychological training as part of their training and practice. However, Federer was introduced to psychological skills training due to his training program (Stauffer, 2006). Andsnes reports that he explored new ways of working mentally as a result of foregoing struggle in his instrumental practice during his early twenties (based on my conversation with Andsnes). Moreover, it is believed that young aspiring musicians, similarly to aspiring athletes, would benefit from having the possibility of learning psychological skills. Psychological skills training is believed to advance the quality of motivation, self-awareness and self-regulation in musicians, preventing burnout, procrastination and injuries along the way (Fournier et al., 2005; Lemyre et al., 2005). However, surprisingly few studies have tried out psychological skills training in the context of music acquisition and performance (Clark and Williamon, 2011; Hoffman and Hanrahan, 2012; Osborne et al., 2014).

The primary aim of the present study was to investigate personal benefits, perceptions, and the effects of an individually tailored psychological skills training intervention for performing music students. Zimmerman’s cyclical model of self-regulation was applied as both the theoretical and practical frame of the intervention (Zimmerman and Schunk, 1989; Zimmerman, 2002).

Psychological Skills Training and Self-Regulated Learning

Psychological skills training (PST) is a “systematic and consistent practice of mental or psychological skills for the purpose of enhancing performance, increasing enjoyment, or achieving greater sport and physical

self-satisfaction" (Weinberg and Gould, 2011, p. 248). Principles deriving from PST have been developed and applied successfully in the realm of sports during the last five decades (Orlick and Partington, 1988; Sheard and Golby, 2006; Hays, 2009; Thelwell et al., 2010; Weinberg and Gould, 2011; Beauchamp et al., 2012; Papnikolaou et al., 2012). PST includes *goal setting, attentional focus, arousal regulation, imagery, and acceptance training/self-talk*.² Foundationally, goal setting is considered the core psychological technique within PST (Mellalieu and Hanton, 2009; Weinberg and Gould, 2011). Research on goal setting in sports has found personal, specific, and short-term goals the most effective in training and competition (Burton, 1989). In comparison to long-term goals, specific short-term goals contain the quality of specifically defining what, how and why to carry out one's training on micro level (Burton, 1989). In their meta analysis, Kylo and Landers found that specific short-term goals are more effective when hierarchically combined with long-term goals (Kylo and Landers, 1995). In essence, hierarchical goal setting provides information and rationales gauging the learning process (i.e., long-term goals nourish medium, and short-term goals) (Locke and Latham, 2002; Zimmerman, 2008). Locke et al. (1981) found that *specific* and *difficult* goals were more effective than very *easy*, very *hard*, and "*do you best*" goals. Easy goals are commonly attributed as boring and thus unsatisfying, while very difficult goals seem to be interpreted as unrealistic and thus demoralizing (Locke et al., 1981). Moreover, providing aspiring athletes with challenging goals based on realistic achievement levels facilitates athletes' (tentatively musicians') effort and motivation (Burton, 1989; Weinberg and Gould, 2011).

Self-Regulated Learning (SRL) refers to "*self-generated thought, feelings, and actions that are oriented to attaining goals. These learners are proactive in their efforts to learn because they are aware of their strength and limitations and because they are guided by personally set goals and task related*

2 *Attentional focus (AT)* contains the following: (a) Selective attention (i.e. identifying the relevant cues for each task) (b) maintenance of AT over time, (c) being aware of the situation and performance errors, and (d) Shifting focus when necessary.

Arousal-regulation refers to the capacity of regulating physical and mental arousal in accordance with situational demands. Applying *imagery*, one can recreate and memorize previous positive experiences, and/or one can picture and imagine new situations to mentally prepare for performances. *Acceptance training/self-talk* aims to building self-confidence. Athletes who are insecure tend to avoid doing mistakes, while self-confident athletes are willing to take chances during competition (for further review see Weinberg and Gould, 2011).

strategies” (Zimmerman, 2002, p. 66). Similarly to SRL, strengths and limitations are the first aspects assessed in the initial phase of PST (Andersen, 2000, 2005; Hays, 2009). In supporting initial assessment, *performance profiling* (i.e., through which both coaches and athletes assess and rank strengths and limitations in athletes) aids subsequent goal setting and strategic planning (Figure 1; Weinberg and Gould, 2011; Hatfield and Lemyre, 2016). In strategic planning, athletes apply training journals for systemizing and defining how, when, and why training is being exerted. Notes concerning potential goal-adjustments are written down based on continuous self-evaluation

(Andersen, 2000, 2005; Hays, 2009). Zimmerman’s (1989) theory of self-regulation explicates processes of learning cyclically (Locke, 1968; Bandura, 1977; Nicholls, 1984; Weiner, 1985; Zimmerman and Schunk, 1989; Zimmerman et al., 1992). Zimmerman’s cyclical model (Figure 2) entails three reciprocal phases: forethought, performance and self-reflection phases. *Forethought processes precede efforts to learn and are designed to enhance those efforts. Performance phase processes occur during learning efforts and are designed to improve action and self-monitoring. Self-reflection processes occur after learning efforts and are designed to optimize a person’s reactions to his or hers outcomes”* (Zimmerman, 2008, p.287).



Figure 1: Performance profile illustrating strengths in gray and limitations in white

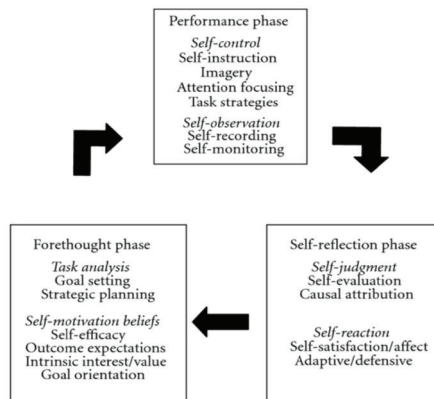


Figure 2: Zimmerman’s cyclical model of self-regulated learning (Zimmerman,2002).

Studies regarding self-regulation in instrumental practice have found that self-regulated music students were metacognitive, self-efficacious, gritty, and proactive in regard to instrumental practice. Furthermore, these studies have found that self-regulated music students have a larger repertoire of practice strategies than less self-regulated music students (Nielsen, 2004; Leon-Guerrero, 2008; McPherson et al., 2013; Miksza and Tan, 2015; Hatfield et al., 2016). Applying structural equation modeling, Hatfield et al. (2016) tested Zimmerman's (1989) cyclical model of self-regulated learning among 204 music students. The study found that self-regulated music students approached their instrumental practice cyclically. The present study applied Zimmerman's cyclical model (Figure 2) as the theoretical lens for both the implementation and interpretation of PST. Forethought phase processes emphasized deliberate individual assessment and self-referenced goals as a foundation for continuity and progress. The performance phase included psychological skills such as attentional focus, arousal-regulation, imagery, and acceptance training/internal dialogue, as well as self-observation. In relation to the self-reflection phase of Zimmerman's cyclical model, participants were encouraged to apply music practice journals for ongoing reflection and evaluation of the individual work carried out (for review see Figure 2).

Intervention Research in the Music Field

Research in performance sciences is growing. The field has investigated instrumental practice quality, self-regulation, and deliberate practice for decades (Ericsson et al., 1993; Jørgensen and Lehmann, 1997; Lehmann and Ericsson, 1997; McPherson and Renwick, 2001; Hallam, 2001; Nielsen, 2001, 2004, 2008; Jørgensen, 2008; Miksza, 2009; Lehmann and Jørgensen, 2012; McPherson et al., 2013; Miksza and Tan, 2015). However, few studies have investigated practice quality, self-regulation, and deliberate practice from an interventional standpoint (Clark and Williamon, 2011; Osborne et al., 2014; Hatfield and Lemyre, 2016). Clark and Williamon (2011) tried out a 9-week mental skills intervention for music students at The Royal College of Music in London. Quantitative findings revealed a significant increase in self-efficacy, imagery vividness, and enhancement of instrumental practice behaviors. Significant changes in cognitive, somatic anxiety, and self-confidence were not found. The qualitative findings revealed an increase in self-confidence, motivation, goal setting and self-awareness. Retrospective feedback

regarding the overall program revealed that participants requested a greater use of group interaction and discussions, thus learning from one another. Better and more frequent application of skills in the performance situation was also requested (Clark and Williamon, 2011). Hatfield and Lemyre (2016) piloted a 2-month PST-intervention assessing the efficacy of various intervention tools. Findings revealed that the PST-program benefited from taking an individual person-based approach. Supporting each participant's psychological needs enhanced self-awareness and intrinsic motivation for PST. The appliance of electronic practice journals affected the participants' self-observation, goal setting and self-evaluation in a positive way. The study also found that socializing through group sessions benefited participants' need for relatedness. The group sessions turned out to provide the participants with a quasi-concert situation in which they had the opportunity to apply the psychological skills (Hatfield and Lemyre, 2016). A 3-week performance psychology program among advanced music students revealed a significant increase in participants' confidence, courage, focus, concentration, resilience and preparation from pre- to post-testing. However, the program failed to show significant increase in mental toughness, energy regulation and optimal energy (Osborne et al., 2014). Accordingly, two short-term intervention studies implementing techniques deriving from cognitive behavioral therapy (CBT) showed a decrease in perceived performance anxiety and an increase in performance quality (Kendrick et al., 1982; Hoffman and Hanrahan, 2012). All the above studies (except Clark and Williamon, 2011; Hatfield and Lemyre, 2016) were short-term studies providing mental/psychological training to participants in groups. According to applied sport psychology literature, short-term interventions with a non-individual focus might be subject to some limitation (Hays, 2009). Similarly to learning any complex skill, PST requires both time and effort (Andersen, 2000, 2005; Hays, 2009). Other types of interventions such as yoga (Khalsa and Cope, 2006), Alexander technique (Valentine et al., 1995), have revealed positive effects in reducing performance anxiety in musicians. Khalsa and Cope (2006) found that yoga had some positive significant impact on reducing high levels of stress, performance-related musculoskeletal conditions, and performance anxiety. Valentine et al. (1995) found that Alexander technique enhanced musical and technical quality of performance to some extent. Some reduction in anxiety and less variation in heart rate was also observed in the experimental group. These findings underscore the importance of body awareness and arousal regulation in regard to practicing and performing

music. Lastly, *mental rehearsal* in the field of music is a widely evaluated mental skill that aims at enhancing music performance (Bird, 1984; Ross, 1985; Coffman, 1990; Driskell et al., 1994; Gregg and Clark, 2007; Haddon, 2007; McHugh-Grifa, 2011). Generally, most of this research has found that the combination of mental and physical practice leads to the best result (Ross, 1985; Driskell et al., 1994; McHugh-Grifa, 2011). This line of research has mainly covered mental rehearsal in terms of mental rehearsal of a music score. Through reviewing mental rehearsal in sports and music, Gregg and Clark (2007) call for a broader, and more structured approach to mental rehearsal in music. Accordingly, the present study aims to apply imagery in terms of both memorizing positive outcomes and preparing emotionally for performance (for review see Smith et al., 2007).

Research individually tailoring PST to musicians is underrepresented in the field of performance sciences. Thus, in contrast to previous studies (e.g., Hoffman and Hanrahan, 2012), the present study took a long-term individually based approach to PST. The overall educational aims of the PST were to: Automate and overlearn the skills, systematically integrate PST in performance situations, and simulate the skills in various performance-related contexts (Weinberg and Gould, 2011).

RESEARCH QUESTIONS

The present study was based on the following research questions:

- 1 How can PST facilitate music students' instrumental practice and performance?
- 2 Might the use of psychological skills have a positive impact on music students' perceived *self-efficacy*, *motivation*, and satisfaction with progress and performance?
- 3 Might the use of psychological skills decrease music student's *anxiety* and *worry* in instrumental practice and performance?

Since the program constituted an *individual* approach, the participants were expected to develop differently throughout the intervention according to individual needs and the personal work.

METHODS AND MATERIALS

The present study was based on a pilot study that aimed to “*build foundations on how to implement future interventions to guide music students on how to optimize practice toward performance*” (Hatfield and Lemyre, 2016, p. 1). The pilot study found individualized approaches to work sufficiently as a foundation for PST. Furthermore, the pilot study found intervention tools such as questionnaires, performance profiling, practice journals, combined group and individual sessions, as well as self-referenced goals to benefit the efficacy of PST-interventions for musicians (Hatfield and Lemyre, 2016). Expanding on the pilot study, the present study included refined versions of the intervention tools assessed in the pilot study (i.e., performance profiling, self-reference, iPads/electronic practice journals, and use of a combination of group and individual meetings)³.

Participants and Procedures

During the second half of the fall semester 2014, six music performance majors were voluntarily recruited from the music academy’s performance program. Due to a high interest rate, an electronic questionnaire was developed for screening the most suitable cases. The questionnaire was sent to all the 26 potential recruits assessing their availability, previous experience with PST, and degree of interest in PST.⁴ Following the selection process, six participants were selected for the study. For anonymity purposes, all six participants were given the abbreviation S1–S6 (S = Student). The final case sample included two jazz performance students (winds, S1 and S6) and four classical performance students (3 strings, 1 woodwind, S2, S3, S4, and S5). All the participants attended the Academy’s bachelor program. After completing the recruitment process, a consent form approving full anonymity and volunteering was provided. One week prior to the intervention, the participants were sent the Self-regulated Learning in Music Questionnaire (SLMQ). The participants were interviewed during the first individual session. The

3 Building on the pilot study (Hatfield and Lemyre, 2016), an emphasis toward satisfying participants basic psychological needs (see Deci and Ryan, 2000) was prioritized throughout the present study. However, this was not reported explicitly as this would have been beyond the scope of the present study.

4 The recruitment questionnaire applied “time for individual practice,” “availability and interest in PST” as inclusion criteria. “Work besides studies” (unavailability) “previous experience with PST” were the exclusion criteria.

assessment routine was repeated at post-intervention assessing individual progress throughout the program. Eight months after completing the intervention, participants were sent a written based follow-up interview assessing their current use of PST. The Norwegian Social Science Data Service approved the study and its procedures.

The Psychological Skills Training Program

The PST-intervention lasted for 15 weeks, from 12th of January until 27th of April 2015. The PST-intervention included 15 individual sessions and 7 group sessions (i.e., the group sessions took place every other week followed up by a 30 min individual session. The group sessions lasted for 60–90 min, while the remaining 8 individual sessions lasted for about 60 min). All participants were asked to pick at least two works of music they wanted to study throughout the intervention (i.e., from scratch to the concert podium). The participants were told to perform their selected works both in concert and in two dress rehearsals. An individual approach laid the basis for the overall implementation and development of the PST-intervention. In essence, self-assessment (i.e., including SLMQ and pre-intervention interviews) laid the foundation for individual tailoring of PST. The individual sessions worked as an arena for elaborating individual needs and training procedures. The group sessions encouraged the participants to apply the techniques they were working on in front of their colleagues. The group sessions also encouraged participants to exchange ideas and experiences. Hence, the participants learnt and applied PST both individually and together with other participants. Internalizing and frequently trying out the psychological skills was highlighted throughout the intervention. In coherence with sport psychological conventions, goal setting constituted a foundation for ongoing PST and individual progress. Based on individual needs, the students worked on techniques including attentional focus/concentration (e.g., centering), imagery, arousal-regulation, and acceptance training (e.g., self-talk) (Andersen, 2000, 2005; Hayes and Strosahl, 2004; Haysand Brown, 2004; Russel, 2006; Harris, 2009; Hays, 2009; Weinberg and Gould, 2011; Hatfield and Lemyre, 2016). The main objective was to give the participants a “hands on experience” throughout the program (i.e., working with the instrument in hand giving the participants as much practical experience as possible).

The first author delivered all group and individual PST sessions. In addition to having studied sport science/psychology and educational science, the first author had years of training and experience as a professional cellist. Moreover, the combination of extensive knowledge of PST and instrumental practice/ performance enabled the application of appropriate integration and adaption of PST-techniques (Andersen, 2000, 2005; Hays, 2002,2009).

Quantitative Measures

Self-regulated Learning in Music Questionnaire (SLMQ), Hatfield et al. (2016) was applied assessing the participants' strengths and limitations in self-regulated learning. For a detailed measurement review see (Hatfield et al., 2016). All scores were recorded on a five-point Likert scale ranging from (1) "strongly disagree" to (5) "strongly agree." The questionnaire was structured in accordance with the three phases in Zimmerman's cyclical model of self-regulated learning (see Figure 2; Zimmerman,2002).

The Forethought Phase

The goal setting scale (6 items, $\alpha=0.80$) measured students' use of goal setting, emphasizing specific and hierarchical goals (e.g., "in relation to my long term goals, I set specific short term goals for my practice"). The *Self-efficacy scale* (4 items, $\alpha=0.77$) measured self-efficacy for instrumental practice (e.g., "I strongly believe that I have what it takes to accomplish what I start working on"). *The time-management scale* (3 items, $\alpha = 0.73$) measured to what extent the music students managed the time of their overall practice and time of each practice session (e.g., "I follow a well developed plan for how long I should practice"). *The worry scale* (4 items, $\alpha = 0.74$) measured the students' internal and external worry of failure while performing (e.g., "I often think to myself, "what if I am not prepared enough for this performance").

Performance Phase

The self-observation scale (3 items, $\alpha = 0.74$) measured to what degree the students were involved in self-monitoring. Moreover, checking one's quality, precision, and use of metacognition while practicing (e.g., "I observe my practice from an analytical perspective").

The self-control scale (3 items, $\alpha = 0.63$) measured to what extent the music students stick to deliberate ways of practicing (e.g., “I tend to lose focus toward tasks while practicing due to a desire to master the task immediately”). *The concentration scale* (3 items, $\alpha = 0.64$) measured to what extent the music students manage to direct their focus toward task relevant activities while practicing (e.g., “It is easy for me to direct my focus toward what I am practicing”). *The imagery scale* (2 items, $\alpha = 0.87$) measured to what extent the music students apply imagery in relation to instrumental practice and music performances (e.g., “I use imagery in relation to instrumental practice”). *The arousal regulation scale* (3 items, $\alpha = 0.58$) measured mental and physical arousal (reversed items) (e.g., “I often get overly tense during concerts and badly influenced by this”).

Self-Reflection Phase

The self-evaluation scale (3 items, $\alpha = 0.73$) measured the students’ involvement in the evaluation of their instrumental practice (e.g., “When having practiced something during longer periods, I look back to see if I did the right procedures”). *The coping scale* (3 items, $\alpha = 0.69$) measured to what extent the music students find new ways and strategies in the face of failure (e.g., “When I’m not achieving the desired results, I carefully search for plausible reasons leading to new more adequate goals”). *Perception of progress* was measured with one single item (i.e., “I believe that my current progress reflects the amount of hours spent on practicing”).

Generally, the internal consistency was very good, except arousal-regulation ($\alpha = 0.58$), self-control ($\alpha = 0.63$), concentration ($\alpha = 0.64$), and coping ($\alpha = 0.69$), which according to conservative criteria (Kerlinger, 1974) were acceptable. The four items were deemed acceptable and kept accordingly (for review see Hatfield et al., 2016).

Qualitative Measures

- 1 *Semi-structured interviews* were carried out in relation to pre- and post-testing. Due to the present study’s individual focus, the interviews were divided into two sections, a general (i.e., consisting of the same questions) and an individualized section (i.e., based on individual answers from the questionnaire).

- 2 A *research log*, assessing individual and group meetings, was applied reporting each participant's progress throughout the intervention. Information including the participants' and the researcher's perceptions of individual work, development, and progress was documented on a weekly basis in the log.
- 3 The participants' *practice journals* documenting personal goals, self-reflection, self-evaluation, and pre- to post-test development triangulated the data collection.
- 4 Based on Hatfield and Lemyre (2016), *Mini-iPads* were handed out to each participant. The iTunes-based application MusicJournal was pre-installed in all the iPads. Besides writing their practice journals, the participants applied the iPads for recording and assessing individual progress.

ANALYSIS

The present study applied mixed methods (i.e., concurrent nested design), "*mixed methods research is research design (or methodology) in which the researcher collects, analyzes, and mixes (integrates or connects) both quantitative and qualitative data in a single study or multiphase program of inquiry*" (Creswell and Plano Clark, 2007, p. 119). The quantitative method supplemented the qualitative methods. Within methods triangulation, which "*serves to clarify meaning by identifying different ways the phenomenon is being seen*" (Stake, 1995, p. 214), was applied in relation to the qualitative data (i.e., semi-structured interviews, research log, and participants practice journals).

Quantitative Analysis

Kolmogorov-Smirnov criteria for normal distribution (K-S) found that 9 of the 13 sub-scales met the test criteria for normal distribution ($p > 0.5$). Consequently, a paired sample *T*-test was applied measuring the 9 sub-scales meeting the K-S criteria, ($p > 0.5$). Wilcoxon signed ranks test (i.e., a non-parametric equivalent to paired sample *T*-test) measured the remaining

4 scales. Hedges G illustrated standardized effect size measures⁵ (Hedges and Olkin, 1985).

Qualitative Analysis

Qualitative data was analyzed based on principles deriving from thematic analysis (Braun and Clarke, 2006; Guest et al., 2012). In accordance with the thematic analysis, all qualitative data was carefully analyzed in the following stages (Braun and Clarke, 2006):

- 1 Familiarization with data supported by transcription and repeated reading of the raw data making initial ideas and impressions.
- 2 Initial coding based on both theory (i.e., self-regulation theory) and identified relevant features systematically identified throughout the dataset.
- 3 Generating potential themes based on initial codes linking all relevant data.
- 4 Reviewing to what extent the themes generated fit the coded extracts and the overall dataset.
- 5 Defining and naming of themes in relation to the overall story deriving from the analysis.
- 6 Producing the report selecting vivid extract examples and final analysis related to the research question and the literature creating the report.

Data from all three sources (i.e., semi-structured interviews, research log, practice journals) were in the end integrated into comprised case reports including key themes representing each participant's development throughout the program. Key themes were subsequently compared across cases, reported, and illustrated through thematic mapping (Braun and Clarke, 2006).

⁵ Hedges' G test of standardized effect size is especially recommended for small samples as it adds a correction factor for small samples.

RESULTS

Quantitative Findings

The quantitative component in the present study was meant to supply and clarify the qualitative aspects, which served as the main empiric body of the present research (i.e., concurrent nested design) (Creswell, 2009).

Effects of the Program

As illustrated in **Tables 1, 2**, the quantitative measures revealed a significant increase in the use of psychological skills such as goal setting, imagery, arousal-regulation, concentration, and self-observation. Wilcoxon signed rank test revealed that self-reflection processes such as self-evaluation and coping increased significantly from time 1 to time 2. The participants' worry decreased significantly from pre- to post-testing. **Figure 3** illustrates a general increase in all the variables (i.e., except worry) from pre- to post-intervention. Individual mean measures are illustrated in **Table 3** showing each participant's quantitative development. The measures generally reveal (with some exceptions) increase in pre- to post-test mean measures.

SLMQ subscales	Time 1 Mean (SD)	Time 2 Mean (SD)	t	p	g
Goal-setting	2.85 (0.59)	3.68 (0.65)	4.90**	0.00	1.2
Self-efficacy	4.13 (0.60)	4.47 (0.35)	1.58	0.17	0.63
Time-management	3.43 (1.0)	3.80 (0.94)	1.21	0.28	0.35
Psych. skills:	2.54 (0.27)	3.31 (0.25)	8.45***	0.00	2.7
Imagery	2.50 (1.0)	3.41 (0.97)	3.05*	0.02	0.85
Arousal-regulation	2.55 (0.77)	3.33 (0.63)	2.76*	0.04	1.0
Concentration	2.38 (0.68)	3.38 (0.57)	4.74***	0.00	1.4
Self-control	2.75 (0.63)	3.12 (0.34)	1.32	0.24	0.67
Self-observation	2.94(0.38)	3.88(0.54)	9.22***	0.00	1.8

$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Degrees of freedom for all *t*-tests are 5. *g*=Hedges' *g* standardized effect size measures.

The bold values indicate statistically significant effect size measures.

Table 1: SLMQ-subscale means (and SD) pre- and post-program with paired sample *T*-test.

SLMQ subscales	Time 1 Mean (SD)	Time 2 Mean (SD)	Z	Wilc. sig.	g
Worry	3.80 (0.70)	2.76 (0.62)	-2.20	0.028	-1.4
Self-evaluation	2.83 (1.0)	3.38 (0.87)	1.84	0.066	0.054
Perception of prog.	3.05 (1.1)	3.44 (0.40)	0.730	0.456	0.43
Coping	2.66 (0.66)	3.61 (0.40)	2.33	0.020	1.6

The significance level, < 0.05 was increased to < 0.10, adjusting for insufficient power (Pallant, 2013). The bold values indicate statistically significant effect size measures.

Table 2: SLMQ-subscale means (and SD) pre- and post-program with Wilcoxon signed-rank test.

SLMQ subscales	1*	2*	3*	4*	5*	6*	7*	8*	9*	10*	11*	12*	13*
Student 1 pre	2.50	4.17	2.00	4.00	2.29	2.50	2.67	2.00	2.00	3.33	2.00	3.67	2.67
Student 1 post	3.00	4.00	2.20	2.80	3.19	4.00	3.33	2.67	2.75	4.00	3.67	3.67	3.67
Student 2 pre	4.00	4.17	2.80	3.80	2.92	3.50	2.00	2.67	3.50	3.33	4.67	2.33	4.00
Student 2 post	4.50	5.00	4.20	2.40	3.71	4.50	4.00	3.33	3.00	4.67	4.67	3.67	5.00
Student 3 pre	2.50	3.83	4.20	2.60	2.63	1.00	3.33	2.67	3.50	2.67	2.33	3.00	2.33
Student 3 post	3.00	4.50	4.00	2.00	3.29	2.50	4.00	3.67	3.00	3.67	2.33	3.67	3.33
Student 4 pre	2.38	4.83	5.00	3.80	2.44	2.00	2.67	2.33	2.75	2.33	2.00	3.33	2.33
Student 4 post	3.50	4.67	4.40	3.60	2.94	2.00	3.00	3.00	3.75	3.00	3.00	3.33	3.00
Student 5 pre	2.88	3.33	3.80	4.80	2.23	2.00	1.33	3.33	2.22	3.00	3.67	1.33	2.33
Student 5 post	4.38	4.50	4.80	2.40	3.35	3.50	2.33	4.33	3.25	4.00	4.00	3.67	3.33
Student 6 pre	2.88	3.83	2.80	3.80	2.79	4.00	3.33	1.33	2.50	3.00	2.33	4.67	2.33
Student 6 post	3.75	4.17	3.20	3.40	3.42	4.00	3.33	3.33	3.00	4.00	2.67	2.67	3.33

All-time1, and time 2 measures in the table above are given in accordance with the following sub-scales number-indicators: 1, Goal-setting; 2, Self-efficacy*; 3, Time-management*; 4, Worry*; 5, Psych.skills*; 6, Imagery*; 7, Arousal-regulation*; 8, Concentration*; 9, Self-control*; 10, Self-observation*; 11, Self-evaluation*; 12, Perception of prog*; and 13, Coping*.*

Table 3: SLMQ—individual subscale means for pre- and post-testing

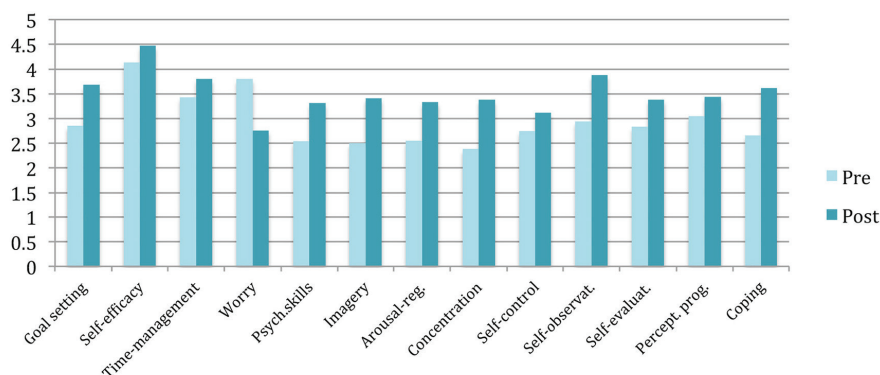


Figure 3: Diagram illustrating group means from pre- to post-intervention.

Qualitative Findings

The qualitative findings based on individual thematic case analysis were ultimately cross-case analyzed searching for diverging and converging trends in the overall data. Findings revealed both collective trends, as well as individual differences between the participants.

Starting Point

At the beginning of the program, all participants were assessed filling out questionnaires that were followed up by semi-structured interviewing. Moreover, six key themes were found across the data set. The first theme identified was *general goal setting*: All the participants stated that they set either general or no goals for themselves.

S3: "I sometimes set a general goal for myself that within a month time I need to be able to do this and this ... I then just pick up my instrument and see in the moment what to practice, I do not have any other plan ..."

S4: "I have never been consistent in goal setting. I have never set concrete goals, but I have tried to be consistent, but without success previously. I struggle to set concrete goals gaining feedback about how I am approaching and developing."

S2 (string student) and S3 (woodwind student) were organized and structured in their approach to instrumental practice. However, they still expressed a need of becoming more explicit and concrete in their instrumental practice. S1 (jazz student) stated that he was never involved in goal

setting whatsoever. S1's practice activity was generally reactive and affective resulting in frustration and procrastination. However, when approaching important concerts, gigs etc., S1 managed to somehow pull himself together.

S1: "Sometimes it might be a vague idea that I want to manage something in the music... I would like to manage this ... and that is it ... This is usually when I struggle and give up ... On other occasions, especially when there is a project that expects me to be prepared and manage so and so ... I just do it ..."

The second theme found across the data set was *goal insufficiency*: Initial findings revealed that the students did not have any previous experience or knowledge of how to set goals for themselves. This sort of reactive planning seemed to have negative effect on the students' *concentration, satisfaction, self-efficacy, and coping* in the face of failure (see **Model 2**). Several of the students reported that they tended to give up when not succeeding immediately.

S4: "When I come to lessons, I often get the impression that I have wasted time and my teacher tells me to do it differently. I feel that my level varies a lot and that I am never able to predict whether my playing will be successful or not."

The third theme identified across the cases was *physical pain*: All the participants reported that they had experienced (S1, S2, and S3), or currently experienced (S4, S5, and S6) physical pain due to practicing. Consequently, participants had started to manage their sessions in terms of time.

S1: "it has never been a routine for me to chunk up my practice sessions, it is always all in like ... Smash ... I might be very inspired, or it becomes a habit ... no, it becomes a black hole that just takes a lot of energy and motivation. When I finish, I almost do not know what I have actually done, and it seems meaningless. This is what I want to detach from. Previously I used to practice many hours in a row. I stopped when I realized that I needed to eat. This kind of excessive practice made me feel physically unwell."

S4: "I have unfortunately developed some kind of elbow inflammation. This was due to tense practice, but this has improved ... However, 20 minutes might sometimes feel too much. I often tend to practice regardless of pain in my elbow ... This also depends on how much I have to practice of course ..."

It turned out that this issue was linked to both lack of goal specificity, task relevant focus, and *outcome-orientation*. Several of the participants had an excessive desire to play the music flawlessly straightaway. The discrepancy between the desired level and the actual level of performance caused unnecessary physical and mental tension (see **Model 2**).

The fourth main theme identified was *lack of concentration*: All the participants complained about lack of concentration (e.g., negative thoughts, thought wandering, use of smart phones, tiredness etc.). This turned out to be a general issue. The analysis showed that there was a link between general goals and lack of concentration (see **Model 2**).

S3: "I notice that my head starts to wonder a lot when I practice. It might be what I want to have for dinner, what party to go to etc. It is rather mixed. Some sessions are really consistent and others tends to be worthless ... This annoys me a lot ... especially that my concentration just wanders away ..."

S5: "The main issue for my low practice efficacy is mind wondering. I tend to think about all the stuff I need to do on that particular day ..."

Finally, some of the participants (S1, S4, S5, and S6) expressed that they felt particularly non-volitional (i.e., *volition* was the fifth main theme identified). S1 and S6 expressed that they tended to give up difficult practice tasks due to experiencing failure and lack of volition.

S4: "I am often tempted, having an urge to practice everything in a fast tempo... But sometimes I manage to avoid this by setting the metronome on a slow pace ... On the other hand I am often tempted to practice the musical expressions before I actually master the technical foundation of the piece."

S5: "I have never liked to practice difficult parts. I tend to be impatient, wanting to master difficult stuff immediately, but this is not possible (laughing), thus I feel insecure about these difficult parts because some times it works and others not."

It turned out that the non-volitional participants were all very eager to achieve a satisfactory outcome as soon as possible. This caused a type of "hastened" practice style based on an overwhelming desire to master the work immediately (see **Model 2**).

In contrast, both S2 and S3 showed inclination toward volitional practice habits.

S2: "Especially if you know the pieces that you are playing very well, I notice that one easily becomes impatient and one starts to rush the process prematurely. However, all in all, I would say that I am rather conscious about that potential danger and seldom fall into that trap... Sometimes I actually do play pieces prematurely because it amuses me..."

S3: "I really hate to be technically sluggish... Then I prefer to play things way to slow rather than too fast."

Moreover, the participants turned out to have both shared and individual needs according to the initial assessment. The thematic map (**Model 2**)

below illustrates the relationships between the themes identified in regard to the participants' pre-intervention practice routines. The model demonstrates how the themes were intertwined. Forethought processes (i.e., strategic planning, personal beliefs) were linked to the other phases in Zimmerman's cyclical model (i.e., concentration, outcome-orientation, coping, volition) (see **Figure 1**).

Introducing Psychological Skills

During the first week of implementation, all the participants started to work on hierarchical goal setting. Long-term goals were chunked down to outcome goals, which in turn were chunked down to medium and short-term goals (i.e., weekly and daily goals). Thematic analysis revealed that goal setting was inextricably connected to concentration (see **Model 3**). Participants expressed that goal setting had made things more predictable. Goal setting helped them to become more focused on the task at hand. They discovered the larger "picture" of their instrumental practice. This facilitated a rationale for *why*, *how* and *what* to practice within each practice session.

S2' diary: "I have now made a strategy with very specific practice today. I have noted various passages that I wish to work on with additional comments on how to pursue. This actually became a tremendously fine day of practice. I managed to be focused for 4 hours and a half... I am very satisfied."

S3' diary: "feels like I have a lot to do, and I feel stressed out, no motivation to practice. After having written down and planned everything, I feel motivated again 😊."

S4: "I find setting goals to be very helpful, both in the long run and especially in the short run. Goals positively affect my focus a lot. I notice that my focus decreases a lot when not setting goals. I also manage to keep my focus on one task, instead of being in a chaos of multiple tasks that have to be accomplished."

Metacognition and *self-observation* were themes identified in relation to planning and goal setting (see **Model 3**). The below quotes exemplifies how the students became increasingly metacognitive and self-observant in regard to their instrumental practice.

S3' diary: "Techniques that really work: When one has too much at the time: Get it written down on paper. Practice repertoire you manage, rather than giving up due to stress. Plan what and how you are going to practice, giving yourself space in order to fulfill it. Always plan for yourself before you practice."

This works much better than trying to plan while actually playing. This enables greater overview of how much time you should spend on each piece."

S5' diary: "I am not as concentrated as yesterday. This does not mean that my practice was poor. This is the feeling I have now. I believe that my low concentration is due to old habits of poor self-discipline, and lack of concrete goals. Today I set vague goals. As a result, my practice suffered from too little variation., my brain got fed up. In other words, I need to be better at stopping unwanted thoughts while practicing, and better at practicing in a varied way."

Some of the participants (two jazz and one string player, S1, S5, and S6) found it arduous to apply the practice journal continuously. However, they found it more motivating and developing to apply the journals, rather than not applying them. E.g., S1 was very persistent writing down goals for himself during the first weeks of the intervention. However, he found it increasingly difficult to keep up with the detailed goal setting. As a result, he preferred to organize his goals mentally. This changed throughout the program as the participant took the initiative to write down his goals once again.

As mentioned, lack of concentration was identified as a main theme among all the participants. In dealing with concentration issues, *centering* was one of the concentration techniques that the participants applied. S3 (woodwind player) did the *centering* every day and expressed that this made him enter the right physical and mental mode when practicing:

S3' diary: "I had a very good practice session! I kind of lost a little concentration in the middle of it. However, then I sat down and decided for myself, "you shall manage this today!). Thus, I did a new centering. This made me perfectly concentrated throughout the whole session."

As the program progressed, it turned out that three string players (S2, S4, and S5) and one jazz player (S1) were generally preoccupied with not living up to their own and other's expectations (i.e., perfectionistic concerns). This was further unfolded through tense and aroused styles of performing. In dealing with this, the participants spent time on building a non-judgmental sort of focus. This increased the participants' resilience when facing failure. The following sample illustrates how this work was carried out:

Research journal: "S4 played the beginning of difficult romantic concerto complaining that she always felt stiff and uncertain from the outset. We talked about sensations and how she felt physically while playing. Afterwards I asked her how tense she felt on a scale from 1 to 10, (i.e., 10 being the most aroused state). She felt that she was an 8 when she first played through. We realized that she was very preoccupied with controlling her playing, her sound,

technique and perfection. I then asked her if she could try something unusual, abandon all sense of control and accept all mistakes while performing the difficult passage. When she approached the most difficult part of the passage, she made a mistake. The mistake was automatically corrected in a tense manner. She was clearly dissatisfied. As an exercise, we did this once again. The second time I told her to accept all the mistakes and instead pay attention to feeling physically comfortable. This turned out to be difficult, especially when playing in front of the others. However, after a while she mastered this type of non-judgmental focus, thus managing to free herself."

This kind of acceptance training became a key-factor influencing all the participants (i.e., especially the four participants who turned out to have perfectionistic concerns). Moreover, the participants actively started to apply new mindsets to their performances (for review see **Model 1**):

S4' diary: "Audition today, I am really nervous. My goal today was to actually apply the good feeling that I have been working on and to maintain a non-judgmental focus while performing. It really worked!!! That is cool! Afterwards I noticed that there were a few places that were a little out of tune. However, the technique felt fine and I had a comfortable feeling in my body. My technique did not suffer as it usually does while being nervous. In addition, I felt that I managed to maintain a good focus throughout the whole performance. If I could play a few more concerts with this mind-set, I am sure that I will manage concerts much better in the future. To experience this, was much more important than winning or loosing. I see this as a positive part of my development. I practiced a little afterwards, but only one hour, which also made me more focused."

S2' diary: "I feel a little nervous about the performance on Thursday. However, when I start thinking rationally, things are just fine 😊. However, when the nervous feeling arrives, it kind of tickles ... I now accept this feeling and take it for what it is 😊."

S5' diary: "I am very satisfied today as well. I feel that things are fun and not heavy. The reason is because I have finally understood that I should not control my fingers and arms, but let them do the job. My focus is not always top notch. However, the fact that I notice progress makes it much easier to play, which is a good thing."

Moreover, *excessive control* was identified as a key issue that debilitated the participants' approach to instrumental practice and performance. Acceptance training (i.e., non-judgmental focus, letting go of control, accepting mistakes without freezing up) facilitated the participants' confidence and understanding of healthy practice. In fact, all six participants reported that they were very satisfied and felt a lot more confident both during dress rehearsal and at the final concert performance. Approaching the dress rehearsal, the participants learnt to change goal focuses from task related

practice goals (i.e., focusing on solving concrete practice-related issues) to performance-related goals (i.e., focusing on musical expression, acceptance, letting go in the face of failure etc.). Thus, once automation was attained, the participants learnt to set performance-related goals. In relation to mock performances, the participants integrated pre-performance routines. These psychological preparations turned out to make the participants more resilient, self-efficacious and satisfied with their performance (see **Model 1**).

S2 diary: "I played through at the concert and I felt that the pianist was still too slow. This made me a little unfocused in the beginning. In any case, things worked much better further out in the piece while playing, I actually felt for the first time ever, that I really managed to solely focus on the music and the expression. I won't even say that I focused on the music. The playing just happened without any thoughts, that was a great feeling."

S5, who performed a virtuoso piece for violin had increasingly become more confident during the last 4 weeks of the intervention. She finally dared to express the music freely, letting go of unnecessary control. In general, each participant was amazed by the progress of other participants. Having multiple opportunities to apply PST in various settings seemed to have facilitated this progress. Although the participants worked on different issues, they all benefited from discussing and observing how others were working during group sessions.

Ups and Downs

Throughout the intervention, the participants experienced both ups and downs including optimistic days, as well as days filled with struggle and agony.

S3 diary: "I overestimated my shape. I am not ready for that amount of practice, step by step. Be aware of the fact that you cannot play that much in a row!!"

S5 diary: "Today was a heavy day of practice. I focused too much on technique, did it wrongly and felt that I did not manage to accomplish my task. This resulted in my shoulder aching. I believe that most of the things that did not work out could have been avoided by having another focus/attitude. Some days are just like this. I have played a lot lately, chamber music, lesson and practice. I should probably have taken a break to day. I will use this drawback as an opportunity to work better tomorrow."

In general, writing down experiences (i.e., positive and negative ones) tended to foster self-awareness in the participants. This enabled them to

self-regulate their subsequent actions. In the face of failure, the participants seemed to attribute their struggles to inappropriate use strategies. Moreover, adaptive coping was identified as a key-theme based on proactivity and metacognition (see **Model 3**).

Experiencing the Program

Interviews regarding participants' experience of the PST revealed that all participants gained more knowledge about themselves as music performers and practitioners.

S1: "Generally, I am now focused toward fundamental basics in my playing and how to develop further. Instead of wasting time on thoughtless practice, I have become better at identifying exactly what is needed to accomplish specific tasks in each practice sessions ... It's like killing darlings."

S2: "Now I recognize what I really need in order to accomplish what I am aiming at. In essence, to realize when I function the best, and when I have time and energy. It also entails preparing my head in order to accomplish what I am searching for. I now find instrumental practice attractive and energizing, rather than a nightmare ... (laughing)."

S4: "The PST has been more rewarding than I could initially imagine. I have become much better at both practicing and performing. Now I have more confidence in myself and in what I am doing compared to before ... In addition, my process of practice has changed a lot, even though I really did not believe it would at the beginning of the programme ... I really did not know that there was an alternative. One really does not speak about these issues at the academy."

Questions assessing participants' perceptions of electronic practice journals revealed that some of the participants liked them more than others. However, all participants expressed that the journals had made them more aware and reflective in regard to instrumental practice. S6 stated that she was not interested in using gadgets. She preferred writing comments on paper, which she did accordingly. S3 had similar experiences using the practice journal. However, he had recognized the usefulness of continuing this practice.

S3: "One thing that has been very helpful is to write diary about my practice making some notes from day to day, what I shall do the day after. In the beginning, I wrote down more details than I do now because it has become automatized. However, now I would like to restart to be more detailed once again, because I notice that the exercises tend to become thoughtless without writing down goals."

Although it only took an extra 10 min a day, the actual deed of getting oneself to write in the diary seemed to require extra effort and volition.

S4: "...it is not exhausting while one is actually doing it. It is to motivate oneself to actually write down goals and reflections. All in all, it was worth the extra effort, because this was the only way that I could actually understand the depth of my practice!!"

The four participants involved in perfectionistic concerns (S1, S2, S4, S5), turned out to have become more task-oriented, resilient, adaptively coping, and self-efficacious in their practice and performance (see **Model 1**).

S2: "Well, I would say that the main difference consists of not being too ego-centric before concerts. This is not about me, and how great I want others to believe that I am to play the instrument. It is all about being satisfied and accepting that one is in the middle of a process that takes time, and that every outcome is just fine. It's manual work, it's all about making things work... I feel that I have become much more harmonic about both my practice and performance. It is actually not that deadly serious anymore, it is not Armageddon or earthquake when one performs... On the other hand, I emphasize the fact that I am grateful to be able to express something musically that others might appreciate, I have become more aware of this fact."

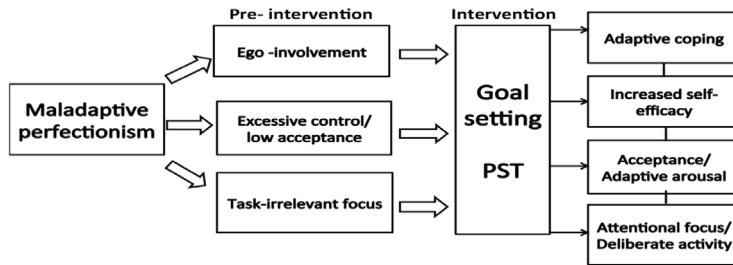
Furthermore, post-interviews demonstrated that goal setting enhanced the participants' motivation, concentration and self-efficacy (see **Model 2**).

S6: "I notice that I become motivated by perceiving that I am more structured and disciplined... The more detailed my practice goals, the better practice and concentration."

S4: "The main difference is that I believe in what I am doing to a greater extent. I feel that I make better progress, which also makes me more happy in general."

In general, all participants perceived the program as personally developing. Thus, the PST facilitated their motivation and joy in making music. The results from the thematic analysis were mapped down in thematic charts (next page):

Model 1 illustrates themes based on work with perfectionistic concerning participants (S1, S2, S4, and S5). **Model 2** illustrates interrelations among themes generated from the data regarding pre-interventional practice habits. **Model 3** illustrates interrelations among themes based on program efficacy.



Model 1: Overview of themes deriving from the thematic analysis (maladaptive perfectionism).



Model 2: Themes associated with practice habits prior to intervention.



Model 3: Themes associated with practice habits during and after intervention.

Follow-up Interviews

Follow-up interviews were conducted 8 months after finishing the intervention. Generally, the interviews revealed that the participants were still actively applying psychological skills acquired during the program. Firstly, all the participants expressed they had become generally more aware and self- reflected in their daily practice.

S1: "My practice is better than it has been in many years ... I now chunk up my practice. My practice is to a much greater extent related to concrete, practical goals and sub-goals that I grasp easily. This makes my mind more balanced during practice. In other words, I do not come out from a black hole every time I put down the instrument. My practice is less victim of trying to make mind-blowing music every time I approach the instrument."

S2 (string player) stated that she still struggling with some self- criticism prior to concerts. However, being aware of how to deal with it helped significantly. S2 had continued to use imagery and acceptance training in her pre-performance routines. However, she expressed a need of be coming even better at applying PST more frequently. Finally, she could not imagine herself practicing without the knowledge and use of the techniques.

S3 (woodwind player) continued to be specific in his planning and expressed that he managed to maintain his concentration applying centering. He had become much more resistant due to being patient and volitional. Additionally, S3 had become more involved in self-evaluation and self-observation through recording himself during practice sessions. Finally, S3 uttered a continued need for individual PST sessions.

S3: "I have to say that I really miss having a coach with whom to discuss problems and challenges, a coach who is not my instrument teacher. I would have loved to continue this work throughout the rest of my time here at the Academy."

S4 (string player) was still applying psychological skills. S4 expressed a need of continuity.

S4: "I am not applying the practice journal as frequently as before. I notice that this affects my focus negatively. My concentration was better during the PST-intervention."

However, S4 also stated that she had become more volitional and deliberate as a result of the PST intervention. Moreover, she had become more self-confident and resilient in the face of failure.

S4: "I have progressed a lot lately. I feel more secure and I play more in tune with a bigger, more sonorous relaxed sound. I am much more successful playing more difficult pieces. I have started to find a serenity and a proudness in what I am doing."

S6 (Jazz player) was actively applying a practice journal writing down specific goals.

S6: "to work in a structured way makes me motivated. In the past, I believed that structured practice was monotonous and dull. However, I now experience that my practice is much more releasing! I have a clear perspective of what I want to practice every day. This has made me less preoccupied with what sort of musician I am becoming. I now know this will suddenly appear as a result of what I love doing at the moment."

Compared to before, S6 recognized that she now noticed daily progress. In general, all the participants completing the followup interview were eager to continue applying psychological skills in their practice and performances.⁶

DISCUSSION

The aim of the present article was to investigate the impact of a PST-intervention for musicians from a self-regulated learning theory perspective. A mixed method approach including qualitative measures corroborated by quantitative measures operationalized the study. The present study found that the participants were reactive practitioners to various degrees. Themes identified included general goal setting, concentration, volition, physical pain, and perfectionism (see **Models 1, 2**). Furthermore, the study found that PST (with special emphasis on planning and goal setting) facilitated cyclical self-regulated learning patterns (For review of SRL see **Figure 2**). In essence, the PST was found to be associated within creased concentration, self-observation, self-efficacy, and adaptive coping in the face of failure (see **Model 3**). Finally, the PST-intervention reduced the participants' level of worry and anxiety in performance situations (see **Model 1**). An 8-months follow up interview revealed that the participants were still actively using psychological skills. The qualitative results were generally supported by the quantitative results (see **Tables 1–3**, and **Figure3**).

⁶ S5 had quit music studies. Consequently, the follow up-interview was not completed.

Planning and Goal Setting

In accordance with previous studies, the present study found that the participants were uninvolved with deliberate planning of instrumental practice (Jørgensen, 1996; Hatfield et al., 2016). The participants had little experience setting specific goals for their instrumental practice. Thus, they applied either general goals, or no goals at all in relation to instrumental practice. This seemed to make the participants self-inefficacious and worried about performing in front of others. Zimmerman (2008) addresses how lack of specific planning and goal setting negatively affects self-efficacy, motivation, and ability to cope due to task-irrelevant focus. This seemed true for the present study. All participants complained about difficulties in maintaining attentional focus. Quantitative findings indicated a general increase in goal setting from time 1 to time 2. Accordingly, qualitative findings revealed that specific and hierarchical goals enhanced the participants' concentration, self-observation, and self-efficacy for instrumental practice and performance. Research investigating the role of specificity and hierarchical goal setting has found that people become more self-observant, self-efficacious, volitional, and concentrated during learning when applying such goals (Schunk and Rice, 1989; Schunk, 1990; Locke and Latham, 2002). As the participants approached the final concert, pre-performance routines (i.e., targeting the outlook of the performances) were applied. During this stage, the participants worked on personal performance cues that emphasized the musical messages they wanted to convey to the audience. Locke and Latham (2002) distinguish between learning tasks and performance tasks in skill acquisition (i.e., the former is related to process goals, and the latter to performance goals). Zimmerman and Risemberg (1997) and Zimmerman and Kitsantas (1999) found that shifting from process goals to performance goals enhanced performance. In essence, as deliberate task oriented practice is carried out, layers of correct motor-control are accumulated. The result is automatized skills (Zimmerman and Kitsantas, 1999). Moreover, becoming conscious of this process seemed to facilitate effortless performance and joy in the participants. Opposite patterns were found in relation to pre-interventional practice habits. Motivated participants lacking proper involvement in forethought phase activity (see Figure 2) tended to seek immediate mastery. This outcome-oriented practice had a negative impact on the participants' self-efficacy, worry, and coping. In essence, some students responded to mistakes by altering their effort. This sort of maladaptive reaction seems to

be particularly unfortunate in regard to over practice and injuries (Lemyre, 2005).

The Role of Perfectionism

The quantitative findings revealed that all participants decreased in worry after implementation of PST. Additionally, quantitative findings revealed that the participants' ability of regulating their arousal increased from pre- to post-test. These measures fit the participants' perception of becoming increasingly more resilient, self-efficacious and confident in performance situations. Having multiple opportunities to apply psychological skills in front of others generated a learning environment that enabled *vicarious learning, social persuasion, mastery-experiences, and physical/psychological certainty* (i.e., the four key sources of self-efficacy) (Bandura, 1977). This instigated self-efficacy for performance and practice in the participants. The effect size measures indicated that self-efficacy was non-significant. However, further investigation demonstrated that this was due to insufficient statistical power. Two of the participants turned out to have high and almost similar scores on both time points. This biased the effect sizes due to a small sample size. The remaining four participants had a significant quantitative increase in self-efficacy between the two time points.

Perfectionistic concerning participants became perfectionistic strivers as they progressed throughout the program. In line with Stoeber (2012), they learnt to tolerate imperfection and mistakes, thus worrying less about social approval. Instead of avoiding negative thoughts, the participants recognized and accepted them. The participants started to view performance situations as unique possibilities to try out the psychological skills they were working on. This made the participants increasingly more resilient (Hayes and Strosahl, 2004; Stoeber and Eismann, 2007). Within Acceptance and Commitment Therapy (ACT), this approach of acceptance and non-judgmental focus has revealed to be highly effective (Hayes and Strosahl, 2004; Russel, 2006). Correspondingly, *The Inner Game of Tennis* advocates that a non-judgmental focus is needed in deliberate practice and performance, accepting whatever outcome (Gallwey, 1997).

Sources of Volition, Awareness, and Self-Reflection

The use of practice journals greatly facilitated the participants' self-awareness, metacognition, and self-observation. Furthermore, the students suddenly had the means to plan and reflect on their practice without being "tempted" and affected by their instrument and spontaneous desires. In fact, the temptation to start out practicing in a random intuitive way turned out to be a source of distraction in several of the participants prior to intervention. In essence, the participants turned out to be more volitional and satisfied with their practice due to ending and starting every practice session writing down reflections and goals. Paradoxically, a striving toward peak performance seems to make music students particularly prone to reactive instrumental practice. Instead of deliberately analyzing what is needed on the path to perfection, reactive learners attempt the final outcome in an overenthusiastic way (Weinberg and Gould, 2011). In line with previous research, the present study revealed that the participants' coped adaptively when facing failure due to having become more aware and metacognitive (Zimmerman, 2008). In essence, when the participants met obstacles, they reflected on how to solve them in the future. Consequently, when they identified precisely *what*, *how*, and *why* they succeeded or failed, they became more certain about how to continue the activity. Attributions are more likely to emphasize use of strategies, rather than lack of personal ability when recognizing the real cause of success and failure (Weiner, 1985). Accordingly, recent research, has found that self-regulated music students were more likely to be self-efficacious and proactive in their planning of instrumental practice. In essence, the study confirmed cyclical self-regulated learning in self-regulated music students (Hatfield et al., 2016).

Drawing on a previous pilot-intervention study (Hatfield and Lemyre, 2016), the present intervention study constituted an individual focus. Thus, each participant's personal needs were closely followed up. In contrast to previous psychological skills interventions for musicians (e.g., Hoffman and Hanrahan, 2012; Osborne et al., 2014), the present study's long-term individual focus is believed to have accelerated personal growth and progress throughout the program. It is limited to which extent one is able to learn, apply and implement psychological skills when depending on a few weeks of training (Andersen, 2000; Hays, 2009). The length of the present PST program enabled internalization and active appliance of the skills. Accordingly, follow up interviews demonstrated that the present study

enabled long-term self-regulatory development. Clark and Williamon (2011) found that participants requested more precise application of the mental skills that were applied in their study. In addition, the participants requested both better integration of the mental skills in various performance situations, and greater use of group discussions (Clark and Williamon, 2011). These findings became valuable for the present study, and were, accordingly, considered during the making of the present PST-intervention.

The study was subject to some limitation. Firstly, the number of participants was very small. This had implications for generalization of the results and the quantitative methods applied. A greater amount of cases (>30) would have enabled external validity. Second, the present study did not include a control group. Having a control group might have strengthened the overall understanding of the effects comparing results of the experimental group and the control group. Accordingly, this would be recommended for future interventions.

CONCLUSION

The present study presented a vast variety of empirical data targeting benefits, challenges, and implications of a PST-intervention for musicians. The main body of findings derived from qualitative sources including participants' practice journals, semi-structured interviews, and research logs. Qualitative findings were supplied by quantitative measures indicating the effects of the intervention. Moreover, the overall design attempted to cover both the breadth and depth of the intervention.

In line with self-regulated learning theory, the present study found that forethought phase activity (i.e., strategic planning, self-assessment and goal setting) facilitated performance phase and self-reflection phase activity (Zimmerman, 1989, 2002; Hatfield et al., 2016). Initial self-assessment (i.e., identifying personal strengths and limitations) enabled the participants to set goals that corresponded to personal needs. The application of practice journals enabled self-regulated learning and the organization of psychological skills. Although some of the participants found consistent use of practice journals challenging, extra effort invested clearly paid off. Implicationally, the appliance of PST is highly recommended as it enables resilience, confidence and self-regulated learning in musicians. Accordingly, providing music

students with the opportunity to discuss personal practice-related issues and frequently perform in front of other students is believed to enrich the curricula in higher music education. Moreover, it is beyond doubt that PST has the potential of facilitating music students' personal development, satisfaction and motivation.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and approved it for publication.

REFERENCES

- Andersen, M. B. (2000). *Doing Sport Psychology*. Champaign, IL: Human Kinetics. Andersen, M. B. (2005). *Sport Psychology in Practice*. Champaign, IL: Human Kinetics.
- Atkins, L. (2009). "Health and wellbeing education in British conservatories," in *Proceedings of the International Symposium on Performance Science*, eds A. Williamon, S. Pretty, and R. Buck (Utrecht), 219–223.
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychol. Rev.* 84, 191–215. doi: 10.1037/0033-295X.84.2.191
- Beauchamp, M. K., Harvey, R. H., and Beauchamp, P. H. (2012). An integrated biofeedback and psychological skills training program for Canada's olympic short-track speed skating team. *J. Clin. Sport Psychol.* 6, 67–84. doi: 10.1123/jcsp.6.1.67
- Bird, E. (1984). Mental rehearsal for musicians: theory, practice and research. *J. Soc. Shely Tens. Perform.* 1, 21–28.
- Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. *Qual. Res. Psychol.* 3, 77–101. doi: 10.1191/1478088706qp 0630a
- Burton, D. (1989). Winning is not everything: examining the impact of performance goals on collegiate swimmers' cognitions and performance. *Sport Psychol.* 3, 105–132. doi:10.1123/tsp.3.2.105

- Burwell, K., and Shipton, M. (2013). Strategic approaches to practice: an action research project. *Br. J. Music Educ.* 3, 329–345. doi: 10.1017/S026505171300 0132
- Clark, T. A., and Williamon, A. (2011). Evaluating a mental skills training program for musicians. *J. Appl. Sport Psychol.* 23, 342–359. doi:10.1080/10413200.2011.5 74676
- Coffman, D. D. (1990). Effects of mental practice, physical practice, and knowledge of results on piano performance. *J. Res. Music Edu.* 3, 187–196. doi: 10.2307/3345182
- Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, CA: Sage Publications.
- Creswell, J. W., and Plano Clark, V. L. (2007). *Designing and Conducting Mixed Methods Research*. Thousand Oaks, CA: Sage Publications.
- Deci, E. L., and Ryan, R. M. (2000). The “What” and “Why” of goal pursuits: human needs and the self-determination of behavior. *Psychol. Inq.* 4, 227–268. doi:10.1207/S15327965PLI1104_01
- Ericsson, K. A., Krampe, R. T., and Tesch-Romer, C.(1993). The role of deliberate practice in the acquisition of expert performance. *Psychol. Rev.* 3, 363–406. doi: 10.1037/0033-295X.100.3.363
- Fournier, J. F., Calmels, C., Durand-Bush, N., and Salmela, J. H. (2005). Effects of a season-long PST program on gymnastic performance and on psychological skill development. *Int. J. Sport Exerc. Psychol.* 3, 59–78. doi: 10.1080/1612197X.2005.9671758
- Gallwey, W. T. (1997). *The Inner Game of Tennis*. New York, NY: Random House.
- Gaunt, H. (2009). One-to-one tuition in a conservatoire: the perceptions of instrumental and vocal students. *Psychol. Music.* 38, 178–208. doi: 10.1177/0305735609339467
- Gregg, M. J., and Clark, T. A. (2007). “Theoretical and practical applications of mental imagery,” in *International Symposium on Performance Science* (Utrecht), 295–300.
- Guest, G., MacQueen, K. M., and Namey, E. E. (2012). *Applied Thematic Analysis*. Los Angeles, CA: Sage Publications.
- Haddon, E. (2007). “What does mental imagery mean to university music students and their professors,” in *International Symposium on Performance Science* (Utrecht), 301–354.

- Hallam, S. (2001). The development of metacognition in musicians: implications for education. *Br. J. Music Educ.* 18, 27–39. doi:10.1017/S0265051701000122
- Hanrahan, S. J., and Andersen, M. B. (2010). *Routledge Handbook of Applied Sport Psychology: A Comprehensive Guide for Students and Practitioners*. Abingdon; New York, NY: Routledge.
- Harris, R. (2009). *ACT Made Simple: An Easy-to-Read Primer on Acceptance and Commitment Therapy*. Oakland, CA: New Harbinger Publications.
- Hatfield, J. L., Halvari, H., and Lemyre, N. (2016). Instrumental practice in the contemporary music academy: a three-phase cycle of self-regulated learning in music students. *Music. Sci.* doi: 10.1177/1029864916658342. [Epub ahead of print].
- Hatfield, J. L., and Lemyre, P. N. (2016). Foundations of intervention research in instrumental practice. *Front. Psychol.* 6:2014. doi: 10.3389/psyg.2015.02014
- Hays, K. F. (2009). *Performance Psychology in Action: A Casebook for Working with Athletes, Performing Artists, Business Leaders, and Professionals in High-Risk Occupations, 1st Edn.* Washington, DC: American Psychological Association.
- Hayes, S. C., and Strosahl, K. (2004). *A Practical Guide to Acceptance and Commitment Therapy*. New York, NY: Springer.
- Hays, K. F. (2002). The enhancement of performance excellence among performing artists. *J. Appl. Sport Psychol.* 14, 299–312. doi: 10.1080/10413200290103572
- Hays, K. F. (2009). *Performance Psychology in Action: A Casebook for Working with Athletes, Performing Artists, Business Leaders, and Professionals in High-Risk Occupations.* Washington, DC: American Psychological Association.
- Hays, K. F., and C. H., Brown(2004). *You're on!: Consulting for Peak Performance*. Washington, DC: American Psychological Association.
- Hedges, L. V., and Olkin, I. (1985). *Statistical Methods for Meta-Analysis*. Orlando, FL: Academic Press.

- Hoffman, S. L., and Hanrahan, S. J. (2012). Mental skills for musicians: managing music performance anxiety and enhancing performance. *Sport Exerc. Perform. Psychol.* 1, 17–28. doi: 10.1037/a0025409
- Driskell, J. E., Copper, C., and Moran, A. (1994). Does mental practice enhance performance. *J. Appl. Psychol.* 79, 481–492.
- Jørgensen, H. (1996). *Tid for Øving? Studentenes Bruk for Tid for Øving*. Oslo: NMH Publikasjoner.
- Jørgensen, H. (2000). Student learning in higher instrumental education: who is responsible? *Br. J. Music Educ.* 1, 67–77. doi: 10.1017/S0265051700000164
- Jørgensen, H. (2008). Instrumental practice: quality and quantity. *Finn. J. Music Educ.* 11, 8–18.
- Jørgensen, H., and Lehmann, A. C. (1997). Does practice make perfect? *NMH Publikasjoner.* 1, 71–88.
- Kendrick, M. J., Craig, K. D., Lawson, D. M., and Davidson, P. O. (1982). Cognitive and behavioral therapy for musical-performance anxiety. *J. Consult. Clin. Psychol.* 3, 353–362. doi:10.1037/0022-006X.50.3.353
- Kerlinger, F. N. (1974). *Foundations of Behavioral Research* (2nd ed.). New York: Holt, Rinehart and Winston, Inc., 1973. *Educ. Psychol. Meas.* 34, 721–724.
- Khalsa, S. B. S., and Cope, S. (2006). Effects of a yoga lifestyle intervention on performance-related characteristics of musicians: a preliminary study. *Med. Sci. Monit.* 8, 325–331.
- Kyllo, L. B., and Landers, D. M. (1995). Goal setting in sport and exercise: a research synthesis to resolve the controversy. *J. Sports Exerc. Psychol.* 17, 117–137. doi: 10.1123/jsep.17.2.117
- Lehmann, A. C., and Jørgensen, H. (2012). “Practice,” in *The Oxford Handbook of Music Education*, eds G. E. McPherson and G. F. Welch (New York, NY: Oxford University Press), 677–693.
- Lehmann, A. C., and Ericsson, K. A. (1997). Research on expert performance and deliberate practice: implications for the education of amateur musicians and music students. *Psychomusicology* 16, 40–58. doi: 10.1037/h0094068

- Lemyre, P. N. (2005). *Determinants of Burnout in Elite Athletes*. Oslo: Norges Idrettshøgskole.
- Lemyre, P.-N., Hall, H. K., and Roberts, G. C. (2005). A social cognitive approach to burnout in elite athletes. *Scand. J. Med. Sci. Sports* 18, 221–234. doi: 10.1111/j.1600-0838.2007.00671.x
- Leon-Guerrero, A. (2008). Self-regulation strategies used by student musicians during music practice. *Music Educ. Res.* 10, 91–106. doi: 10.1080/146138007 01871439
- Locke, E. A. (1968). Toward a theory of task motivation and incentives. *Org. Behav. Hum. Perform.* 3, 157–189. doi: 10.1016/0030-5073(68)90004-4
- Locke, E. A., Saari, L. M., Shae, K. N., and Latham, G. P. (1981). Goal setting and task performance. *Psychol. Bull.* 90, 125–152. doi: 10.1037/0033-2909.90.1.125
- Locke, E. A., and Latham, G. P. (2002). Building a practical useful theory of goal setting and task motivation. *Am. Psychol.* 57, 705–717. doi: 10.1037/0003-066X.57.9.705
- McHugh-Grifa, A. (2011). A comparative investigation of mental practice strategies used by collegiate-level cello students. *Contrib. Music Educ.* 38, 65–79. Available on line at: <http://www.jstor.org/stable/24127177>
- McPherson, G. E., and Renwick, J. M. (2001). A Longitudinal Study of Self-regulation in Children's Musical Practice. *Music Educ. Res.* 3, 169–186. doi: 10.1080/14613800120089232
- McPherson, G. E., Renwick, J., and Nielsen, S. G. (2013). "Self-regulation interventions and the development of music expertise," in *Applications of Self-Regulated Learning across Diverse Disciplines*, eds H. Bembenucci, T. J. Cleary, and A. Kitsantas (Charlotte, NC: Information Age Publishing), 355–382.
- Mellalieu, S. D., and Hanton, S. (2009). *Advances in Applied Sport Psychology: A Review*. London; New York, NY: Routledge.
- Miksza, P. (2009). Relationships among impulsivity, achievement goal motivation, and the music practice of high school wind players. *Bull. Counc. Res. Music Educ.* 180, 9–27.
- Miksza, P., and Tan, L. (2015). Predicting collegiate wind players, flow, and self-efficacy for self-regulation: an exploratory study of relationships

- between teachers, instruction and students, practicing. *J. Res. Music Edu.* 63, 162–179. doi: 10.1177/0022429415583474
- Nicholls, J. (1984). "Conceptions of ability and achievement motivation," in *Research on Motivation in Education*, eds R. Ames and C. Arnes (New York, NY: Academic Press), 39–73.
- Nielsen, G. S. (2008). Achievement goals, learning strategies and instrumental performance. *Music Educ. Res.* 10, 235–247. doi: 10.1080/14613800802079106
- Nielsen, S. G. (2001). Self-regulating learning strategies in the conservatories. *Music Educ. Res.* 3, 155–167. doi: 10.1080/14613800120089223
- Nielsen, S. G. (2004). Strategies and self-efficacy beliefs in instrumental and vocal individual practice. *Psychol. Music.* 4, 418–431. doi: 10.1177/0305735604046099
- Orlick, T., and Partington, J. (1988). Mental skills to excellence. *Sport Psychol.* 2, 105–130. doi: 10.1123/tsp.2.2.105
- Osborne, M. S., Greene, D. J., and Immel, D. T. (2014). Managing performance anxiety and improving mental skills in conservatoire students through performance psychology training: a pilot study. *Psychol. Well-Being Theory Res. Pract.* 18, 1–17. doi:10.1186/s13612-014-0018-3
- Pallant, J. (2013). *SPSS Survival Manual: A Step by Step Guide to Data Analysis using IBM SPSS*. Maidenhead: McGraw Hill.
- Papnikolaou, Z., Voutselas, V., Mantis, K., and Laparidis, K. (2012). The effects of a psychological skills training program on the cohesion of men's soccer team. *J. Educ. Pract.* 3, 8–21.
- Ross, S. L. (1985). The effectiveness of mental practice in improving the performance of college trombonists. *J. Res. Music Educ.* 36, 221–230.
- Russel, H. (2006). Embracing your demons: an overview of acceptance and commitment therapy. *Psych other. Aust.* 12, 1–8.
- Schunk, D. H. (1990). Goal setting and self-efficacy during self-regulated learning. *Educ. Psychol.* 21, 75–85. doi: 10.1207/s15326985ep2501_6
- Schunk, D. H., and Rice, J. M. (1989). Learning goals and children's reading comprehension. *J. Read. Behav.* 21, 279–293. doi: 10.1080/10862968909547677

- Sheard, M., and Golby, J. (2006). Effects of a psychological skills training program on swimming performance and positive psychological development. *IJSEP West Virginia Univ.* 2, 7–24. doi: 10.1080/1612197x.2006.9671790
- Smith, D., Wright, C. J., Allsopp, A., and Westhead, H. (2007). It's all in the mind: PETTLEP-based imagery and sports performance. *J. Appl. Sport Psychol.* 19, 80–92. doi: 10.1080/10413200600944132
- Snowman, D. (1981). *The Amadeus Quartet: The Men and the Music*. London: Robson Books.
- Stake, R. E. (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage Publications.
- Starkes, J. L., and Ericsson, K. A. (2003). *Expert Performance in Sports: Advances IN Research on Sport Expertise*. Champaign, IL; Leeds: Human Kinetics.
- Stauffer, R. (2006). *The Roger Federer Story: Quest for Perfection*. Munich: New Chapter Press.
- Stoeber, J. (2012). "Perfectionism and performance," in *The Oxford Handbook of Sports and Performance Psychology*, ed S. M. Murphy (New York, NY: Oxford University Press), 294–306.
- Stoeber, J., and Eismann, U. (2007). Perfectionism in young musicians: relations with motivation, effort, achievement, and distress. *Pers. Individ. Dif.* 43, 2182–2192. doi: 10.1016/j.paid.2007.06.036
- Thelwell, R. C., Greenlees, L. A., and Weston, N. J. V. (2010). Examining the use of psychological skills throughout soccer performance. *J. Sport Behavior.* 33, 109–127.
- Valentine, E., Fitzgerald, D., Gorton, T., Hudson, J., and Symonds, E. (1995). The effects of lessons in the Alexander technique in music performance in high and low stress situations. *Psychol. Music* 23, 129–141. doi:10.1177/0305735695232002
- Wang, J., and Zhao, P. (2009). A Comparative study of perfectionism, coping style and interpersonal relationship between music major and non-music major college students. *Asian Soc. Sci.* 5, 128–132. doi: 10.5539/ass.v5n9p128

- Weinberg, R. S., and Gould, D. (2011). *Foundations of Sport and Exercise Psychology*. Champaign, IL: Human Kinetics.
- Weiner, B. (1985). An attribution theory of achievement motivation and emotion. *Psychol. Rev.* 94, 548–573. doi: 10.1037/0033-295X.92.4.548
- Zimmerman, B. J. (1989). A social cognitive view of self-regulated learning. *J. Educ. Psychol.* 81, 329–339. doi:10.1037/0022-0663.81.3.329
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: an overview. *Theory Pract.* 2, 64–70. doi: 10.1207/s15430421tip4102_2
- Zimmerman, B. J. (2008). “Goal setting: a key proactive source of self-regulation,” in *The Motivation and Self-Regulated Learning*, eds D. H. Schunk and B. J. Zimmerman (New York, NY: Taylor and Francis Group), 267–296.
- Zimmerman, B. J., Bandura, A., and Martinez-Pons, M. (1992). Self-motivation for academic attainment: the role of self-efficacy beliefs and personal goal setting. *Am. Educ. Res. J.* 29, 663–676. doi:10.3102/00028312029003663
- Zimmerman, B. J., and Kitsantas, A. (1999). Acquiring writing revision skill: shifting from process to outcome self-regulatory goals. *J. Educ. Psychol.* 92, 241–225. doi: 10.1037/0022-0663.91.2.241
- Zimmerman, B. J., and Risemberg, R. (1997). Becoming a self-regulated writer: a social cognitive perspective. *Contemp. Educ. Psychol.* 22, 73–101. doi: 10.1006/ceps.1997.0919
- Zimmerman, B. J., and Schunk, D. H. (1989). *Self-Regulated Learning and Academic Achievement: Theory, Research, and Practice*. New York, NY: Springer-Verlag.

Conflict of Interest Statement: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2016 Hatfield. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) or licensor are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Appendices

**Appendix I:
Declarations of the candidate's contributions
and co-authorship**

Paper 1

Hatfield, J. L. (accepted). Goal Setting and Self-Determination in Music Making: Tenets of Becoming an Organized and Motivated Music Practitioner. *Nordic Research in Music Education Yearbook, Vol. 18.*

(The yearbook will publish a revised version of the article.)

The candidate carried out the article solely.

Paper 2

Hatfield, J. L., Halvari, H., & Lemyre, P.-N. (2016). Instrumental Practice in the Contemporary Music Academy: A Three-Phase Cycle of Self-Regulated Learning in Music Students. *Musicae Scientiae*. doi: 10.1177/1029864916658342

The candidate had the main role in designing the study, preparing the methodological procedures (questionnaire), writing up of the article. The candidate was solely responsible for data collection. Halvari's co-authorship mainly consisted of supervision of, and involvement in the statistical analysis carried out. Through numerous meetings with Halvari, the candidate was actively taking part in the statistical analysis of the data. In addition to supervising and recommending statistical methods, Professor, Nicolas Lemyre did the final approval for publication of Paper 2. This included typographical revision and recommendations during the review process.

Paper 3

Hatfield, J. L., & Lemyre, P.-N. (2016). Foundations of Intervention Research in Instrumental Practice. *Frontiers in Psychology*. doi: 10.3389/psyg.2015.02014

The candidate was solely responsible for designing the study, preparing the methodological procedures (interviews), writing up of the article and carrying out the intervention. The candidate was also solely responsible for data collection. The co-authorship carried out by Lemyre consisted of sport psychological supervision in regard to the intervention process and considerable revision and supervision in regard to the review process. In addition, Lemyre did the final approval for publication.

Paper 4

Hatfield, J. L. (2016). Performing at the Top of One's Music Game: The Mental Edge of Musicianship. *Frontiers in Psychology*. doi: 10.3389/fpsyg.2016.01356

The candidate carried out the article solely.

**Appendix II:
Consent from the Norwegian Social Science Data Services
(NSD) (including response letter and change form)**

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES



Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr. 985 321 884

Johannes Hatfield
Senter for musikk og helse Norges musikkhøgskole
Slemdalsveien 11
0369 OSLO

Vår dato: 26.03.2014

Vår ref: 37873 / 3 / LB

Deres dato:

Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 26.02.2014. Meldingen gjelder prosjektet:

37873 *Mental øving - kime til konstruktivitet blant musikkstudenter?*
Behandlingsansvarlig *Norges musikkhøgskole, ved institusjonens overste leder*
Daglig ansvarlig *Johannes Hatfield*

Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstiller kravene i personopplysningsloven.

Personvernombudets vurdering forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, <http://www.nsd.uib.no/personvern/meldeplikt/skjema.html>. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://pvo.nsd.no/prosjekt>.

Personvernombudet vil ved prosjektets avslutning, 31.08.2016, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Katrine Utaaker Segadal

Lene Christine M. Brandt

Kontaktperson: Lene Christine M. Brandt tlf: 55 58 89 26

Vedlegg: Prosjektvurdering

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

Avdelingskontorer / District Offices

OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. nsd@uio.no
TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. kyrre.svarva@svt.ntnu.no
TROMSØ: NSD, SVF, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 43 36. rsdmaa@svt.uio.no

Personvernombudet for forskning



Prosjektvurdering - Kommentar

Prosjektnr: 37873

Utvalget informeres skriftlig og muntlig om prosjektet og samtykker til deltakelse. Informasjonsskrivet er godt utformet, forutsatt at følgende endringer foretas, jf. telefonsamtale med Johannes Hatfield 25.03.2014:

- I avsnittet "Hva innebærer deltakelse i studien?" tilføyes det at den individuelle veiledningstimen i mental øving vil filmes, og at det kvalitative dybdeintervjuet vil tas opp på lydbånd. Videre vil det i siste setning presiseres at notater/refleksjoner lagres aidentifisert.
- I avsnittet "Hva skjer med informasjonen om deg?" omformuleres setningen "Det er kun forskeren selv som vil ha tilgang til informasjon som kan kobles opp mot navn" til "Kun forsker vil ha tilgang til personopplysninger". Videre presiseres det i neste setning at "Den skriftlige informasjonen vil også bli lagret aidentifisert der navnet til hver deltaker blir erstattet med et nummer". Endelig må det presiseres at datamaterialet anonymiseres, og lyd- og videooptak slettes, ved prosjektslutt.

Personvernombudet legger til grunn at forsker etterfølger Norges musikkhøgskole sine interne rutiner for datasikkerhet. Dersom personopplysninger skal lagres på mobile enheter, bør opplysningene krypteres tilstrekkelig.

Det er oppgitt i meldeskjema at det kan bli aktuelt å benytte en "statistiker" til organisering av empiri/data. Dersom en ekstern (ikke tilknyttet Norges musikkhøgskole) assistent benyttes, forutsetter personvernombudet at det foreligger en databehandleravtale mellom assistenten og Norges musikkhøgskole, jf. personopplysningsloven § 15. For råd om hva databehandleravtalen bør inneholde, se Datatilsynets veileder på denne siden: <http://datatilsynet.no/verktøy-skjema/Skjema-maler/Databehandleravtale---mal/>

Forventet prosjektslutt er 31.08.2016. Ifølge prosjektmeldingen skal innsamlede opplysninger da anonymiseres. Anonymisering innebærer å bearbeide datamaterialet slik at ingen enkeltpersoner kan gjenkjennes. Det gjøres ved:

- å slette direkte personopplysninger (som navn/koblingsnøkkel)
- og slette/omskrive indirekte personopplysninger (identifiserende sammenstilling av bakgrunnsopplysninger som f.eks. skole, alder og kjønn)
- samt slette lyd- og videooptak

**MELDESKJEMA**

Meldeskjema (versjon 1.4) for forsknings- og studentprosjekt som medfører meldeplikt eller konsesjonsplikt (jf. personopplysningsloven og helseregisterloven med forskrifter).

1. Prosjektittel		
Tittel	Mental øving - kime til konstruktivitet blant musikkstudenter?	
2. Behandlingsansvarlig institusjon		
Institusjon	Norges musikkhøgskole	Velg den institusjonen du er tilknyttet. Alle nivå må oppgis. Ved studentprosjekt er det studentens tilknytning som er avgjørende. Dersom institusjonen ikke finnes på listen, vennligst ta kontakt med personvernombudet.
Avdeling/Fakultet	Senter for musikk og helse	
Institutt		
3. Daglig ansvarlig (forsker, veileder, stipendiat)		
Fornavn	Johannes	Før opp navnet på den som har det daglige ansvaret for prosjektet. Veileder er vanligvis daglig ansvarlig ved studentprosjekt.
Etternavn	Hatfield	
Akademisk grad	Doktorgrad	Veileder og student må være tilknyttet samme institusjon. Dersom studenten har ekstern veileder, kan biveileder eller fagansvarlig ved studiestedet stå som daglig ansvarlig. Arbeidssted må være tilknyttet behandlingsansvarlig institusjon, f.eks. underavdeling, institutt etc.
Stilling	Stipendiat	
Arbeidssted	Norges Musikkhøgskole	NB! Det er viktig at du oppgir en e-postadresse som brukes aktivt. Vennligst gi oss beskjed dersom den endres.
Adresse (arb.sted)	Slemdalsveien 11	
Postnr/sted (arb.sted)	0363 Oslo	
Telefon/mobil (arb.sted)	41086561 /	
E-post	cellomania@hotmail.com	
4. Student (master, bachelor)		
Studentprosjekt	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
5. Formålet med prosjektet		
Formål	<p>Prosjektets problemstilling: Min problemstilling lyder som følgende: Hvordan vil musikkstudenter oppleve individuell inkorporering av ulike mentale øvingsteknikker som bruk av øvingsdagbok, målsetting, spenningsregulering, visualisering, konsentrasjon og andre dialog over tid?</p> <p>1) På hvilken måte vil MØ kunne bidra studenter med planlegging og forberedelser av konserter?</p> <p>2) Kan MØ kunne gi gode resultater knyttet til de emosjonelle sidene med å spille et instrument?</p> <p>3) Hva vil mentale øvingsteknikker kunne gjøre med progresjon, motivasjon og glede i ulike utøvende settinger? Formål: Prosjektets formål er å få en dypere forståelse av hvordan utøvende klassiske musikkstudenter opplever egen utvikling ved bruk av et mental trening.</p>	<p>Redegjør kort for prosjektets formål, problemstilling, forskningsspørsmål e.l.</p> <p>Maks 750 tegn.</p>
6. Prosjektomfang		
Velg omfang	<ul style="list-style-type: none"> • Enkel institusjon <ul style="list-style-type: none"> ○ Nasjonalt samarbeidsprosjekt ○ Internasjonalt samarbeidsprosjekt 	Med samarbeidsprosjekt menes prosjekt som gjennomføres av flere institusjoner samtidig, som har samme formål og hvor personopplysninger utveksles.
Oppgi øvrige institusjoner		
Oppgi hvordan samarbeidet foregår		
7. Utvalgsbeskrivelse		

Utvalget	Studenter fra høyskolen	Med utvalg menes dem som deltar i undersøkelsen eller dem det innhentes opplysninger om. F.eks. et representativt utvalg av befolkningen, skoleelever med lese- og skrivevansker, pasienter, innsatte.
Rekruttering og trekking	Utvalget rekrutteres gjennom Norges Musikkhøgskole	Beskriv hvordan utvalget trekkes eller rekrutteres og oppgi hvem som foretar den. Et utvalg kan trekkes fra registre som f.eks. Folkeregisteret, SSB-registre, pasientregistre, eller det kan rekrutteres gjennom f.eks. en bedrift, skole, idrettsmiljø, eget nettverk.
Førstegangskontakt	Opprettes gjennom presentasjon av prosjektet og tilbud til studenter om å delta. denne informasjonen sendes ut til studentene per mail.	Beskriv hvordan førstegangskontakten opprettes og oppgi hvem som foretar den. Les mer om dette på våre temasider.
Alder på utvalget	<input type="checkbox"/> Barn (0-15 år) <input type="checkbox"/> Ungdom (16-17 år) <input checked="" type="checkbox"/> Voksne (over 18 år)	
Antall personer som inngår i utvalget	6	
Inkluderes det myndige personer med redusert eller manglende samtykkekompetanse?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Begrunn hvorfor det er nødvendig å inkludere myndige personer med redusert eller manglende samtykkekompetanse.
Hvis ja, begrunn		Les mer om Pasienter, brukere og personer med redusert eller manglende samtykkekompetanse
8. Metode for innsamling av personopplysninger		
Kryss av for hvilke datainnsamlingsmetoder og datakilder som vil benyttes	<input checked="" type="checkbox"/> Spørreskjema <input checked="" type="checkbox"/> Personlig intervju <input checked="" type="checkbox"/> Gruppeintervju <input checked="" type="checkbox"/> Observasjon <input checked="" type="checkbox"/> Psykologiske/pedagogiske tester <input type="checkbox"/> Medisinske undersøkelser/tester <input type="checkbox"/> Journaldata <input type="checkbox"/> Registerdata <input checked="" type="checkbox"/> Annen innsamlingsmetode	Personopplysninger kan innhentes direkte fra den registrerte f.eks. gjennom spørreskjema, intervju, tester, og/eller ulike journaler (f.eks. elevmapper, NAV, PPT, sykehus) og/eller registre (f.eks. Statistisk sentralbyrå, sentrale helseregistre).
Annen innsamlingsmetode, oppgi hvilken	Video-opptak, lydopptak	
Kommentar	Det vil bli gjennomført en spørreundersøkelse i forkant av en instrumentell kasus-studie bestående av 4 til 6 studenter.	
9. Datamaterialets innhold		
Redegjør for hvilke opplysninger som samles inn	Generell og individuell bruk av mentale øvingsteknikker over en 5 måneders tidsperiode.	Spørreskjema, intervju-temaguide, observasjonsbeskrivelse m.m. sendes inn sammen med meldeskjemaet. NB! Vedleggene lastes opp til sist i meldeskjema, se punkt 16 Vedlegg.
Samles det inn direkte personidentifiserende opplysninger?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Dersom det krysses av for ja her, se nærmere under punkt 11 Informasjonssikkerhet.
Hvis ja, hvilke?	<input type="checkbox"/> 11-sifret fødselsnummer <input type="checkbox"/> Navn, fødselsdato, adresse, e-postadresse og/eller telefonnummer	Les mer om hva personopplysninger er
Spesifiser hvilke		NB! Selv om opplysningene er anonymiserte i oppgave/rapport, må det krysses av dersom direkte og/eller indirekte personidentifiserende opplysninger innhentes/registreres i forbindelse med prosjektet.
Samles det inn indirekte personidentifiserende opplysninger?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	En person vil være indirekte identifiserbar dersom det er mulig å identifisere vedkommende gjennom

Appendices

Hvis ja, hvilke?		bakgrunnsopplysninger som for eksempel bostedskommune eller arbeidsplass/skole kombinert med opplysninger som alder, kjønn, yrke, diagnose, etc.
Samles det inn sensitive personopplysninger?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Hvis ja, hvilke?	<input type="checkbox"/> Rasemessig eller etnisk bakgrunn, eller politisk, filosofisk eller religiøs oppfatning <input type="checkbox"/> At en person har vært mistenkt, siktet, tiltalt eller dømt for en straffbar handling <input type="checkbox"/> Helseforhold <input type="checkbox"/> Seksuelle forhold <input type="checkbox"/> Medlemskap i fagforeninger	
Samles det inn opplysninger om tredjeperson?	Ja <input checked="" type="radio"/> Nei <input type="radio"/>	Med opplysninger om tredjeperson menes opplysninger som kan spores tilbake til personer som ikke inngår i utvalget. Eksempler på tredjeperson er kollega, elev, klient, familiemedlem.
Hvis ja, hvem er tredjeperson og hvilke opplysninger registreres?	Spillelærer, informasjon om i hvilken grad øving er tema under spilletimer.	
Hvordan informeres tredjeperson om behandlingen?	<input type="checkbox"/> Skriftlig <input checked="" type="checkbox"/> Muntlig <input type="checkbox"/> Informeres ikke	
Informeres ikke, begrunn		
10. Informasjon og samtykke		
Oppgi hvordan utvalget informeres	<input checked="" type="checkbox"/> Skriftlig <input checked="" type="checkbox"/> Muntlig <input type="checkbox"/> Informeres ikke	Vennligst send inn informasjonsskrivet eller mal for muntlig informasjon sammen med meldeskjema.
Begrunn		NB! Vedlegg lastes opp til sist i meldeskjemaet, se punkt 16 Vedlegg. Dersom utvalget ikke skal informeres om behandlingen av personopplysninger må det begrunnes. Last ned vår veiledende mal til informasjonsskriv
Oppgi hvordan samtykke fra utvalget innhentes	<input checked="" type="checkbox"/> Skriftlig <input checked="" type="checkbox"/> Muntlig <input type="checkbox"/> Innhentes ikke	Dersom det innhentes skriftlig samtykke anbefales det at samtykkeerklæringen utformes som en svarslipp eller på eget ark. Dersom det ikke skal innhentes samtykke, må det begrunnes.
Innhentes ikke, begrunn		
11. Informasjonssikkerhet		
Direkte personidentifiserende opplysninger erstattes med et referansenummer som viser til en atskilt navnliste (koblingsnøkkel)	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Har du kryssset av for ja under punkt 9 Datamaterialets innhold må det merkes av for hvordan direkte personidentifiserende opplysninger registreres.
Hvordan oppbevares navnlisten/ koblingsnøkkel og hvem har tilgang til den?		NB! Som hovedregel bør ikke direkte personidentifiserende opplysninger registreres sammen med det øvrige datamaterialet.
Direkte personidentifiserende opplysninger oppbevares sammen med det øvrige materialet	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Hvorfor oppbevares direkte personidentifiserende opplysninger sammen med det øvrige datamaterialet?		
Oppbevares direkte personidentifiserbare opplysninger på andre måter?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Spesifiser		

Hvordan registreres og oppbevares datamaterialet?	<ul style="list-style-type: none"> ■ Fysisk isolert datamaskin tilhørende virksomheten ■ Datamaskin i nettverkssystem tilhørende virksomheten ■ Datamaskin i nettverkssystem tilknyttet Internett tilhørende virksomheten □ Fysisk isolert privat datamaskin □ Privat datamaskin tilknyttet Internett ■ Videoopptak/fotografi ■ Lydopptak ■ Notater/papir □ Annen registreringsmetode 	<p>Merk av for hvilke hjelpemidler som benyttes for registrering og analyse av opplysninger.</p> <p>Sett flere kryss dersom opplysningene registreres på flere måter.</p>
Annen registreringsmetode beskriv		
Behandles lyd-/videoopptak og/eller fotografi ved hjelp av datamaskinbasert utstyr?	Ja ● Nei ○	<p>Kryss av for ja dersom opptak eller foto behandles som lyd-/bildefil.</p> <p>Les mer om behandling av lyd og bilde.</p>
Hvordan er datamaterialet beskyttet mot at uvedkommende får innsyn?	Brukernavn og passord samt i låsbar rom	Er f.eks. datamaskintilgangen beskyttet med brukernavn og passord, står datamaskinen i et låsbar rom, og hvordan sikres bærbare enheter, utskrifter og opptak?
Dersom det benyttes mobile lagringsenheter (bærbar datamaskin, minnepenn, minnekort, cd, ekstern harddisk, mobiltelefon), oppgi hvilke	Minnepenn, kryptert	NB! Mobile lagringsenheter bør ha mulighet for kryptering.
Vil medarbeidere ha tilgang til datamaterialet på lik linje med daglig ansvarlig/student?	Ja ○ Nei ●	
Hvis ja, hvem?		
Overføres personopplysninger ved hjelp av e-post/Internett?	Ja ● Nei ○	F.eks. ved bruk av elektronisk spørreskjema, overføring av data til samarbeidspartner/databehandler mm.
Hvis ja, hvilke?	Spørreskjema blir sent til studentenes mailadresser.	
Vil personopplysninger bli utlevert til andre enn prosjektgruppen?	Ja ○ Nei ●	
Hvis ja, til hvem?		
Samles opplysningene inn/behandles av en databehandler?	Ja ● Nei ○	Dersom det benyttes eksterne til helt eller delvis å behandle personopplysninger, f.eks. Questback, Synovate MMI, Norfakta eller transkriberingsassistent eller tolk, er dette å betrakte som en databehandler. Slike oppdrag må kontraksreguleres
Hvis ja, hvilken?	det kan bli aktuelt å benytte seg av en statistiker organisering av empiri/data	Les mer om databehandleravtaler her
12. Vurdering/godkjenning fra andre instanser		
Søkes det om dispensasjon fra taushetsplikten for å få tilgang til data?	Ja ○ Nei ●	For å få tilgang til taushetsbelagte opplysninger fra f.eks. NAV, PPT, sykehus, må det søkes om dispensasjon fra taushetsplikten. Dispensasjon søkes vanligvis fra aktuelt departement. Dispensasjon fra taushetsplikten for helseopplysninger skal for alle typer forskning søkes
Kommentar		Regional komité for medisinsk og helsefaglig forskningsetikk
Søkes det godkjenning fra andre instanser?	Ja ○ Nei ●	F.eks. søke registreier om tilgang til data, en ledelse om tilgang til forskning i virksomhet, skole, etc.
Hvis ja, hvilke?		
13. Prosjektperiode		

Appendices

Prosjektperiode	Prosjektstart:01.09.2013	<p>Prosjektstart</p> <p>Vennligst oppgi tidspunktet for når førstegangskontakten med utvalget opprettes og/eller datainnsamlingen starter.</p> <p>Prosjektslutt</p> <p>Vennligst oppgi tidspunktet for når datamaterialet enten skal anonymiseres/slettes, eller arkiveres i påvente av oppfølgingsstudier eller annet. Prosjektet anses vanligvis som avsluttet når de oppgitte analyser er ferdigstilt og resultatene publisert, eller oppgave/avhandling er innlevert og sensurert.</p>
	Prosjektslutt:31.08.2016	
Hva skal skje med datamaterialet ved prosjektslutt?	<input checked="" type="checkbox"/> Datamaterialet anonymiseres <input type="checkbox"/> Datamaterialet oppbevares med personidentifikasjon	<p>Med anonymisering menes at datamaterialet bearbejdes slik at det ikke lenger er mulig å føre opplysningene tilbake til enkeltpersoner. NB! Merk at dette omfatter både oppgave/publikasjon og rådata.</p> <p>Les mer om anonymisering</p>
Hvordan skal datamaterialet anonymiseres?	Datamaterialet vil anonymiseres gjennom avhandling og artikler der kasusene det vises til forblir totalt anonyme.	Hovedregelen for videre oppbevaring av data med personidentifikasjon er samtykke fra den registrerte.
Hvorfor skal datamaterialet oppbevares med personidentifikasjon?		Arsaker til oppbevaring kan være planlagte oppfølgingsstudier, undervisningsformål eller annet.
Hvor skal datamaterialet oppbevares, og hvor lenge?		<p>Datamaterialet kan oppbevares ved egen institusjon, offentlig arkiv eller annet.</p> <p>Les om arkivering hos NSD</p>
14. Finansiering		
Hvordan finansieres prosjektet?	Musikkhøgskolens stipendiatorning i regi av Staten	
15. Tilleggsopplysninger		
Tilleggsopplysninger		
16. Vedlegg		
Antall vedlegg	3	

Endrings skjema

for endringer i forsknings- og studentprosjekt som medfører meldeplikt eller konsesjonsplikt

(jf. personopplysningsloven og helseregisterloven med forskrifter)

Endrings skjema sendes per e-post til: personvernombudet@nsd.uib.no

1. PROSJEKT	
Navn på daglig ansvarlig: Johannes Lunde Hatfield	Prosjektnummer: 37873
Evt. navn på student:	
2. BESKRIV ENDRING(ENE)	
Endring av daglig ansvarlig/veileder:	<i>Ved bytte av daglig ansvarlig må bekreftelse fra tidligere og ny daglig ansvarlig vedlegges. Dersom vedkommende har sluttet ved institusjonen, må bekreftelse fra representant på minimum instituttnivå vedlegges.</i>
Endring av dato for anonymisering av datamaterialet:	<i>Ved forlengelse på mer enn ett år utover det deltakerne er informert om, skal det fortrinnsvis gis ny informasjon til deltakerne.</i>
Gis det ny informasjon til utvalget? Ja: <input type="checkbox"/> Nei: <input type="checkbox"/> Hvis nei, begrunn:	
Endring av metode(r): I tillegg til den opprinnelige metoden vil det bli benyttet et semi-strukturert intervju i forbindelse med Pkt 1. Under	<i>Angi hvilke nye metoder som skal benyttes, f.eks. intervju, spørreskjema, observasjon, registerdata, osv.</i>
Endring av utvalg: Pkt. 1 Musikere og solister utenfor Norges Musikkhøgskole (semi-strukturert intervju) Pkt. 2 surveyundersøkelse av musikkstudenter ved Norges Musikkhøgskole (sendes til ca. 700 studenter, men regner med en svarprosent på rundt 30 %)	<i>Dersom det er snakk om små endringer i antall deltakere er endringsmelding som regel ikke nødvendig. Ta kontakt på telefon før du sender inn skjema dersom du er i tvil.</i>
Annet:	
3. TILLEGGSOPPLYSNINGER	
4. ANTALL VEDLEGG	
<ol style="list-style-type: none"> Intervjuguide Survey Informasjonsskriv 	<i>Legg ved eventuelle nye vedlegg (informasjonsskriv, intervjuguide, spørreskjema, tillatelser, og liknende.)</i>

Har du spørsmål i forbindelse med utfylling av skjemaet, ta gjerne kontakt med Personvernombudet hos NSD, telefon 55 58 81 80

**Appendix III:
Information letters and consent forms**

Forespørsel om deltakelse i forskningsprosjektet

”Mental øving, kime til konstruktivitet i utøvende musikkvirksomhet?”

Bakgrunn og formål

Det vil i tidsrommet 22.10 til den 10.12 høsten 2014 bli gjennomført en pilot intervensjonsstudie på doktorgradsnivå ved Norges Musikkhøgskole som retter seg mot bruk av mentale øvingsteknikker som; målsetting, spenningsregulering, konsentrasjon, visualisering og indre dialog. Prosjektets formål er å få en dypere forståelse av hvordan utøvende klassiske musikkstudenter ved Norges Musikkhøgskole opplever egen utvikling ved bruk av et mentalt øvingsverktøy hentet inn fra idrett og prestasjonspsykologien. Et overordnet formål er å observere og analysere hensiktsmessigheten av mentale basisteknikker i daglig øving blant utøvende studenter og knytte det opp mot erfart individuell utvikling. Det mentale øvingsverktøyet har som hensikt å øke studentenes bevissthet rundt strukturering av egenøving, god progresjon samt fasilitere de emosjonelle sidene ved det å spille et instrument.

Studiens problemstilling lyder som følgende: *Hvordan vil musikkstudenters praksis kunne påvirkes ved opplæring av individuelle selvregulerende mentale øvingsteknikker som bruk av øvingsdagbok, målsetting, spenningsregulering, visualisering, konsentrasjon og indre dialog over tid?*

Det søkes etter utøvende musikkstudenter ved Bachelor og master-programmet i musikk som føler seg truffet og interessert i temaet. Det vil være en forutsetning at du har lyst og interesse for å delta i denne undersøkelsen.

Hva innebærer deltakelse i studien?

Studentene som deltar vil i løpet av en 3 måneders periode jobbe i en refleksjonsgruppe hvor man spiller og utveksler tanker og ideer om øving. I tillegg vil hver student gjennomgå et individuellt mentalt øvingsprogram som retter seg mot planlegging, prestasjonsforberedelser og gjennomføring av øving og konserter. Deltakelse i studien krever at man er villig til å sette seg praktisk inn i temaet mental øving samt legge av 10 til 20 minutter til mental øving daglig uten instrument. Deltakerne vil annenhver uke motta en individuell veiledning i mental øving av 60 minutter i 3 måneder samt jobbe i gruppe. Hvilket som innebærer at det blir ukentlige møter med til sammen to individuelle timer per måned og to gruppetimer. Det vil i studien bli benyttet spørreskjema som måler svakheter og styrker knyttet til prestasjonsforberedelser/øving og prestasjonsevner. Skjemaet vil bli benyttet ved prosjektets start, midtvel og slutt. I tillegg til spørreskjema vil det bli gjennomført kvalitative dybdeintervju i forbindelse med utfylling av spørreskjema og øvings/refleksjonslogg/app. Deltakerne må belage seg på å aktivt kommentere egen fremgang i form av øvingsjournal under og/eller etter den daglige øvingen. De Kvalitative dybdeintervjuene ved veiledningen vil bli tatt opp på lydbånd. Deltakerne vil få i oppgave å plukke ut 2 stykker/verk som vil bli jobbet med under hele intervensjonsperioden. Stykkene vil så jobbes med fra et mentalt øvingsperspektiv og fremføres ved intervensjonens slutt. Informasjonen som innhentes vil bli lagret konfidensielt i NMHs database. I tillegg til lagring i databasen vil det bli tatt løpende notater/refleksjoner som lagres aidentifisert i egen forskerjournal.

Hva skjer med informasjonen om deg?

Alle personopplysninger vil bli behandlet konfidensielt. Kun forsker vil ha tilgang til personopplysninger. Den skriftlige informasjonen vil også bli lagret aidentifisert der navnet til hver deltaker blir erstattet med nummer. Ved prosjektets presentasjon utad vil informasjonen bli behandlet anonymt. Altså vil det ikke nevnes noen navn som vil kunne kobles til deltakeres person. Det vil kun være informasjon rundt utviklingen av prosjektet.

Prosjektet skal etter planen avsluttes 01.09.2016. Etter endt prosjekt vil empirimaterialet anonymiseres og lagres konfidensielt og anonymt i database ved NMH. Lyd – og videoopptak slettes ved prosjektslutt.

Frivillig deltakelse

Det er frivillig å delta i studien, og du kan når som helst trekke ditt samtykke uten å oppgi noen grunn. Dersom du trekker deg, vil alle opplysninger forbli anonymisert.

Dersom du ønsker å delta eller har spørsmål til studien, ta kontakt med prosjektleder, Johannes Lunde Hatfield, på telefon: 41086561, eller på mail: johannes.l.hatfield@nmh.no

Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS.

Samtykke til deltakelse i studien

Jeg har mottatt informasjon om studien, og er villig til å delta

(Signert av prosjektdeltaker, dato)

Forespørsel om deltakelse i forskningsprosjektet

”Mental øving, kime til konstruktivitet i utøvende musikkvirksomhet?”

Bakgrunn og formål

Det vil i tidsrommet 19.01 til den 20.04 våren 2015 bli gjennomført en intervensjonsstudie på doktorgradsnivå ved Norges Musikkhøgskole som retter seg mot bruk av mentale øvingsteknikker som; målsetting, spenningsregulering, konsentrasjon, visualisering og indre dialog. Prosjektets formål er å få en dypere forståelse av hvordan utøvende klassiske musikkstudenter ved Norges Musikkhøgskole opplever egen utvikling ved bruk av et mentalt øvingsverktøy hentet inn fra idrett og prestasjonspsykologien. Et overordnet formål er å observere og analysere hensiktsmessigheten av mentale basisteknikker i daglig øving blant utøvende studenter og knytte det opp mot erfart individuell utvikling. Det mentale øvingsverktøyet har som hensikt å øke studentenes bevissthet rundt strukturering av egenøving, god progresjon samt fasilitere de emosjonelle sidene ved det å spille et instrument.

Studiens problemstilling lyder som følgende: *Hvordan vil musikkstudenters praksis kunne påvirkes ved opplæring av individuelle selvregulerende mentale øvingsteknikker som bruk av øvingsdagbok, målsetting, spenningsregulering, visualisering, konsentrasjon og indre dialog over tid?*

Det søkes etter utøvende musikkstudenter ved Bachelor og master-programmet i musikk som føler seg truffet og interessert i temaet. Det vil være en forutsetning at du har lyst og interesse for å delta i denne undersøkelsen.

Hva innebærer deltakelse i studien?

Studentene som deltar vil i løpet av en 4 måneders periode jobbe i en refleksjonsgruppe hvor man spiller og utveksler tanker og ideer om øving. I tillegg vil hver student gjennomgå et individuellt mentalt øvingsprogram som retter seg mot planlegging, prestasjonsforberedelser og gjennomføring av øving og konserter. Deltakelse i studien krever at man er villig til å sette seg praktisk inn i temaet mental øving samt legge av 10 til 20 minutter til mental øving daglig uten instrument. Deltakerne vil annenhver uke motta en individuell veiledning i mental øving av 60 minutter i 4 måneder samt jobbing i gruppe. Dette innebærer at det blir ukentlige møter med til sammen to individuelle timer per måned og to gruppetimer. Det vil i studien bli benyttet spørreskjema som måler svakheter og styrker knyttet til prestasjonsforberedelser/øving og prestasjonsevner. Skjemaet vil bli benyttet ved prosjektets start, midtveis og slutt. I tillegg til spørreskjema vil det bli gjennomført kvalitative dybdeintervju i forbindelse med utfylling av spørreskjema og øvings/refleksjonslogg/app. Deltakerne må belage seg på å aktivt kommentere egen fremgang i form av øvingsjournal under og/eller etter den daglige øvingen. De Kvalitative dybdeintervjuene ved veiledningen vil bli tatt opp på lydbånd. Deltakerne vil få i oppgave å plukke ut 2 stykker/verk som vil bli jobbet med under hele intervensjonsperioden. Stykkene vil så jobbes med fra et mentalt øvingsperspektiv og fremføres ved intervensjonens slutt. Informasjonen som innhentes vil bli lagret konfidensielt i NMHS database. I tillegg til lagring i databasen vil det bli tatt løpende notater/refleksjoner som lagres avidentifisert i egen forskerjournal.

Hva skjer med informasjonen om deg?

Alle personopplysninger vil bli behandlet konfidensielt. Kun forsker vil ha tilgang til personopplysninger. Den skriftlige informasjonen vil også bli lagret aidentifisert der navnet til hver deltaker blir erstattet med nummer. Ved prosjektets presentasjon utad vil informasjonen bli behandlet anonymt. Altså vil det ikke nevnes noen navn som vil kunne kobles til deltakeres person. Det vil kun være informasjon rundt utviklingen av prosjektet.

Prosjektet skal etter planen avsluttes 01.09.2016. Etter endt prosjekt vil empirimaterialet anonymiseres og lagres konfidensielt og anonymt i database ved NMH. Lyd – og videoopptak slettes ved prosjektslutt.

Frivillig deltakelse

Det er frivillig å delta i studien, og du kan når som helst trekke ditt samtykke uten å oppgi noen grunn. Dersom du trekker deg, vil alle opplysninger forbli anonymisert.

Dersom du ønsker å delta eller har spørsmål til studien, ta kontakt med prosjektleder, Johannes Lunde Hatfield, på telefon: 41086561, eller på mail: johannes.l.hatfield@nmh.no

Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste AS.

Samtykke til deltakelse i studien

Jeg har mottatt informasjon om studien, og er villig til å delta

(Signert av prosjektdeltaker, dato)

**Appendix IV:
Self-regulated Learning in Music Questionnaire (SLMQ)**

Self-regulated Learning in Music Questionnaire

Goal setting

1. I always set concrete long-term goals for myself.
2. In relation to my long-term goals, I set specific short-term goals for my practice.
3. On a daily or weekly basis, I set very specific goals for myself that guide what I do.
4. I set very specific goals and know what it takes to reach them.
5. I clearly plan my course of action to solve a problem in my instrumental practice.
6. I develop a specific plan for the solution of a problem in my practice.

Self-efficacy

7. I strongly believe that I have what it takes to accomplish what I start working on.
8. I can solve most problems if I invest the necessary effort.
9. I always manage to solve difficult problems if I try hard enough.
10. I believe that I am able to become more consistent and goal-directed in my instrumental practice.

Time-management

11. I plan how long I should practice before taking breaks.
12. I am currently not managing my time of practice.
13. I have a specific plan for how long each practice session should last.

Worry

14. I am afraid of performing below the other students' standard.
15. I usually worry about difficult parts of a piece while performing.
16. I compare myself to other students and tend to avoid performing below their standard.
17. I often think to myself "what if I am not prepared enough for this performance".

Self-observation

18. I check my accuracy while progressing through a practice task.
19. I observe my practice from an analytical perspective while practicing.
20. I check how well I am doing when I solve instrumental practice tasks.

Arousal-regulation

21. I often get overly tense during concerts and I am severely influenced by this.
22. I usually communicate negatively with myself while practicing.
23. I think about and imagine what will happen if I fail or screw up before concerts.

Imagery

24. I often use imagery in relation to instrumental practice.
25. I often use imagery in relation to concerts and performances.

Concentration

26. It is easy for me to direct my attention and focus towards what I am practicing
27. It is easy for me to keep distracting thoughts from interfering with my instrumental practice.
28. I easily get distracted while practicing.

Self-control

29. I tend to loose focus towards task while practicing due to a desire to master the task immediately.
30. I am tempted to hastily practice new pieces in the original tempo.
31. I am unfortunately not consistent enough with my instrumental practice.

Self-evaluation

32. I keep track of my progress over time.
33. When having practiced something during longer periods, I look back to see if I did the right procedures.
34. I am generally good at evaluating my instrumental practice and finding adequate solutions.

Coping

35. When things turns out badly during concerts, I try to think about how I can do things better next time.
36. I think through past performance experiences to understand new practice ideas.
37. When I'm not achieving the desired results, I carefully search for plausible reasons - that leads to new adequate goals.

Perception of progress

38. I believe that my current progress reflects the amount of hours spent on practicing

Are you in the Master or Bachelor program?

- 1 Bachelor program
- 2 Master program
- 3 Other program

Do you attend the music performance, music education, music therapy, composition program, or other program?

- 1 Music performance program
- 2 Music education program
- 3 Music therapy
- 4 Composition
- 5 Other program

Do you attend the program of jazz, folk music, or classic music?

- 1 Jazz
- 2 Folk music
- 3 Classical music
- 4 Other

Which category of instruments do you belong to?

- 1 Stringed instruments
- 2 Key-instruments
- 3 Brass
- 4 Woodwinds
- 5 Percussion
- 6 Singing
- 7 Guitar/stringed instruments

Approximately how many hours do you currently practice a day?

- Less than one hour
- 1) 1 to 2 hours a day
 - 2) 2 to 3 hours a day
 - 3) 3 to 4 hours a day
 - 4) 4 to 5 hours a day
 - 5) 5 to 6 hours a day
 - 6) 6 hours or more a day

I started playing my instrument aged.

- 1 3-4 years old
- 2 5-6 years old
- 3 7-8 years old
- 4 9-10 years old
- 5 11-12 years old
- 6 13-14 years old
- 7 15 years old or older

Select your gender.

- 1 Female
- 2 Mail

Du you work beside your music studies?

- 1) I do not work
- 2) I work beside

How much time do you have for instrumental practice?

- 1 Little time
- 2 Some time
- 3 Enough time
- 4 Plenty of time

Do you use your time efficiently?

- 1 Very Inefficiently
- 2 Inefficiently
- 3 Partly efficiently
- 4 Very efficiently

Which part of the world do you come from?

- 1 Norway
- 2 Northern Europe
- 3 Eastern Europe
- 4 Southern Europe
- 5 Africa
- 6 Asia
- 7 The USA or Canada
- 8 Latin America

**Appendix V:
Interview guides for semi-structured interviews applied in
the pilot intervention and the intervention studies**

Semi-structured interview: Interview guide, 27th of October 2014

The aim of this interview is to gain knowledge about the participants' needs and current practice behaviour prior to implementing psychological skills training. The Interviews were individually tailored in order to address questions from the completed questionnaire, which was found to be of particular significance to each interviewee.

General background questions:

- 1) First of all, what expectations do you have prior to starting the program?
- Is there something in particular that you are hoping to achieve during this program?
- 2) Do you have any personal wishes or requests that you would like to work on?
- How do you expect to achieve the wish?

Personal follow-up questions based on completed questionnaire:

Pilot 1:

- 1) The questionnaire shows that you seldom plan or manage your practice sessions before you start practicing, have you ever tried to do so for shorter periods before?
- 2) The questionnaire shows that you apply various strategies dealing with how to solve practice tasks, could you give me some examples of this?
- 3) How exactly do you plan your practice sessions?
- 4) You have received a high score on questions concerning planning of concerts and performances; would you say that your planning correspond with your performance achievements?
- 5) Questions 16, 17 and 18 from the questionnaire reveal that your actual performance achievements do not resonate with your expected performance achievements. Could you please try to imagine a situation in which this is the case and give an example/examples of this?
- 6) What is your foundation for achieving positive progress and success?
- 7) To what extent do you manage to pay attention towards one task at the time?
- 8) Could you tell me about how you organize your practice when starting on a new piece of music?
- 9) Do you feel motivated about the pieces that you are planning to play during the intervention?

- 10) Do you ever pay attention to physical arousal while practicing your instrument?
- 11) Could you please imagine yourself practicing, how do you solve difficult tasks?
- How do you communicate with yourself while solving difficult tasks?
- 12) Could you tell me how you manage your time of practice?
- 13) Do you ever experience that it might be difficult to take brakes while practicing?
- 14) Do you have any kinds of physical pain, injuries due to instrumental practice?
- 15) How do you keep track of your progress?
- 16) What motivates you in your individual practice?
- 17) Do you have any specific goals for the future that motivates you?
- 18) Have you ever experienced that your short-term motivation might damage your long-term achievements and motivation, or vice versa?

Personal follow-up questions based on completed questionnaire:

Pilot 2:

- 1) The questionnaire shows that you seldom plan or manage your practice sessions before you start practicing, have you ever tried to do so for shorter periods before?
- 2) The questionnaire shows that you apply various strategies dealing with how to solve practice tasks, could you give me some examples of this?
- 3) Have you ever tried to use a practice journal or practice application previously?
- 4) What exactly determines what you find important in your instrumental practice?
- 5) How exactly do you plan your practice sessions?
- 6) You have received a high score on questions concerning planning of concerts and performances; would you say that your planning correspond with your performance achievements?
- 7) Could you explain what that demotivates you in the goals you or others set for your instrumental practice?

-What types of goals do you believe might increase your motivation?

- 8) Have you ever felt motivated before due to planning and maintaining good structure in your practice?
- What did you do differently then compared to now?
- 9) What is your foundation for achieving positive progress and success?
- 10) What make you enjoy your practicing, how does this happen?
- 11) Could you tell me about how you organize you practice when starting on a new piece of music
- 12) Do you feel motivated about the pieces that you are planning to play during the intervention?
- 13) Do you ever pay attention to physical arousal while practicing your instrument?
- 14) Could you please imagine yourself practicing, how do you solve difficult tasks?
- How do you communicate with yourself while solving difficult tasks?
- 15) Tell me about how you manage your time when practicing?
- 16) Do you experience that it might be difficult to take brakes while practicing?
- 17) Do you have any kinds of physical pain, injuries due to instrumental practice?
- 18) How do you keep track of your progress?
- 19) What motivates you in your individual practice?
- 20) Do you have any specific goals for the future that motivates you?
- 21) Have you ever experienced that your short-term motivation might damage your long-term achievements and motivation, or vice versa?

Interview guide for Semi-structured interview (pre-intervention)

The present interview guide was meant to elaborate on the answers the participants had given in the questionnaire. The questions seek to uncover an in-depth understanding of the participants' current instrumental practice habits.

- 1) I now want you to imagine a typical day of practice, could you please tell me how you proceed in your daily practice?
 - Do you plan your instrumental practice?
 - How do you plan your practice sessions?
 - Do you set any goals for your practice?
 - What type of goals do you set?
 - Could you tell me about how you organize your practice when starting on a new piece of music?

- 2) Do you apply any particular practice strategy/ies in your instrumental practice?
 - What kind of strategies do you use?
 - Do you use this strategy systematically?
 - Could you please imagine yourself practicing, how do you solve difficult tasks?
 - How do you communicate with yourself while solving difficult tasks?

- 3) How would you describe yourself as a practitioner?
 - Structured?
 - Intuitive?
 - Volitional?
 - How does this behavior affect your instrumental practice?
 - Do you feel it is possible to become more consistent with your practice?
 - Do you often think about your peers while practicing?

- 4) Could you please imagine yourself before a typical concert or performance:
 - What do you usually do before the performance?
 - How do you feel/think before performances?
 - How does this affect your performance?

- 5) Do you have any pre-performance routines?
 - Could you tell me about it, what do you emphasize?
 - Does it help? How?

- 6) Do you feel confident that you will do well before performing?
 - How and why/ why not?
 - Do you hesitate about the amount of preparation before concerts?
 - Do you believe that you are actually not prepared enough?

7) Do you feel that you manage to accomplish your performance goals as a result of practicing?

- How and why/ why not?

8) Could you please imagine yourself performing for other music students at the academy, what goes through your mind?

- Does this focus help you?
- When do you manage to focus fully on the music?
- Do you fear the difficult parts of the pieces you are performing?
- Does this happen frequently/infrequently?

8) Do you ever lose the belief of being capable of accomplishing your practice tasks?

- Does this happen frequently/infrequently?

9) When practicing, are you centered toward the task at hand, or do your mind tend to wander?

- When are you concentrated?
- When are you mind-wandering?
- What do you think about in this situation?

10) Do you have any experience of something that might help you to become more focused?

- If so, what?

11) Try to imagine yourself practicing, what level of arousal do you usually have?

- Does this make you more/less concentrated?

12) Try to imagine yourself before and during concerts, what kind of arousal do you usually have?

- Does this help you/debilitate your focus
- How and why?

10) Could you tell me how you manage your time of practice?

- For how long do you practice in a row, does it function?

11) Do you ever experience that it might be difficult to take breaks while practicing?

- When does this happen
- Is it good/bad for your practice?

12) Do you have any kinds of physical pain, injuries due to instrumental practice?

- Could you describe the type of physical pain you experience?

13) Do you observe your actions while practicing?

- In what way?
- Does it help your practice?

14) Do you keep track of your progress?

- How? - Give me a few examples...

14) What motivates you in your individual practice?

15) When things do not turn out as planned, do you feel that this actually affect your practice?

- In what way?
- Do you ever give up due to not succeeding?
- Does this happen frequently?

15) Do you have any specific goals for the future that motivates you?

- What kind of goals do you have?

16) Do you feel that you spend enough time practicing in order to grow as a musician?

- Could you please elaborate on that, why, how?

17) Are you happy satisfied with your current progress?

- Would you describe yourself as patient or impatient?
- How does this affect your instrumental practice?

General background questions:

1) What expectations do you have prior to starting the program?

- Is there something in particular that you are hoping to achieve during this program?

2) Do you have any personal wishes or requests that you would like to work on?

- How do you expect to achieve the wish?

Interview guide for semi-structured interview (post-intervention)

The first part of the interview asks questions regarding the music students current practice habits. The second part asks questions regarding the participants' perception of the PST-program.

- 1) I now want you to imagine a typical day of practice, could you please tell me how you proceed in your daily practice?
 - Do you plan your instrumental practice?
 - How do you plan your practice sessions?
 - Do you set any goals for your practice
 - What type of goals do you set?
 - Could you tell me about how you organize your practice when starting on a new piece of music?
- 2) Does this type of planning help your progress?
- 3) Which strategies do you currently use in your instrumental practice?
 - How does it affect your instrumental practice?
- 4) What type of practitioner would you say you are at the current?
 - Structured?
 - Intuitive?
 - Volitional?
 - How does this behavior affect your instrumental practice?
- 5) What do you think about while instrumentally practicing?
 - How does this affect your instrumental practice?
- 6) Could you please imagine yourself before a typical concert or performance:
 - What do you usually do before the performance?
 - How do you feel/think before performances?
 - How does this affect your performance?
- 7) Could you please imagine yourself performing for other music students at the academy, what goes through your mind?
 - Does this focus help you?
 - When do you manage to focus fully on the music?
 - Do you fear the difficult parts of the pieces you are performing?
 - Does this happen frequently/infrequently?
- 10) Try to imagine yourself practicing, what level of arousal do you usually have?
 - Does this make you more/less concentrated?
- 11) Do you observe your actions while practicing?
 - In what way?
 - Does it help your practice?

- 12) Do you keep track of your progress?
- How? - Give me a few examples...
- 11) Try to imagine yourself before and during concerts, what kind of arousal do you usually have?
- Does this help/debilitate your focus
- How and why?
- 12) Are you happy satisfied with you current progress?
- Would you describe yourself as patient or impatient?
- How does this affect you instrumental practice?

Perceptions of the PST-intervention

1. How did you experience the initial phase of the program in PST?
- Was there anything you liked/disliked in the beginning?
2. Could you please try to recollect memories about the whole PST from the beginning to the end, could you please say something about how you experienced your own development during the past months?
- What was particularly good with the PST (various elements)
- Thinking in retrospect, is there anything you would take away from the PST?
3. Do you feel that the PST has given you something to continue working on?
- Is there anything you would like to continue to use in your future practice?
- Is there anything that you would not continue working on after the course?
4. How did you experience working in group/performing for others?
- In what way?
- Have you learnt anything form discussing and reflecting music practice and performance with others within the group?
5. How did you experience the ambient in the group?
- Is this something to continue with in higher music education?
7. Have you gained more knowledge about yourself and music practice?
- What in particular have you learnt from this?
8. How are you approaching with the themes that you wanted to enhance?
- Do you have any strategies for developing them? How?
9. How did you experience the use of iPad as a practice tool?
- Have you continued to use the iPad throughout the whole program?
- How did you experience working on concrete goals on the iPad
- Is this something you would like to continue doing?
- Have you used the video-option on the iPad?

10. How has it been to work on goal setting?

- Which types of goals did you particularly enjoy to work on?
- Do you have any new goals for the future?
 - o What goals? How will you apply them?

11. Would you say that you have experienced any progress due to the program?

- What kind of progress?

12. How do you experience your general level of motivation now compared with before the initiation of the program?

- Please elaborate on that?

Follow up interview _____ **Name:**

1) How is your current practicing going?

Respond here:

2) Do you do anything differently before or/and during performances after having finished the psychological skills training, if so, what?

Respond here:

3) Do you do anything differently before or/and during instrumental practice after having finished the psychological skills training program, if so, what?

Respond here:

4) Do you still apply any of the techniques that you learned during the psychological skills training program?

Respond here:

a) If so, which psychological techniques do you still apply? (

Respond here:

b) May you describe how this affects your instrumental practice?

Respond here:

c) Do you want to continue applying these techniques?

Respond here:

5) How do you perceive your current progress? (Describe with a few sentences)

Respond here:

a) What make you progress during instrumental practice?

Respond here:

6) How would you describe your current motivation?

Respond here:

a) What make you currently motivated/unmotivated?

Respond here:

b) Does psychological skills affect your current motivation?

Respond here:

What motivates music students to persistently practice alone in a practice room, and what determines effective instrumental practice? Might methods from *applied sport psychology* facilitate excellence in music students' practice and performance? These are essential questions in Johannes Hatfield's doctoral thesis.

Hatfield sought answers to these questions through a *survey study*, a *pilot intervention study*, and an *intervention study*. The latter study tried out *psychological skills training* from sport psychology in music students' instrumental practice.

The survey study revealed that many music students are unsatisfied with their progress and uninformed about how instrumental practice can be organized effectively. Students who carefully plan and set goals for their instrumental practice seem to be confident self-regulated learners who apply a wide repertoire of psychological skills.

The intervention study revealed that use of practice journals and specific practice planning enhances students' deliberateness and self-regulated learning. Students who were concerned with perfectionism became mentally tougher, more resilient, and less anxious applying psychological skills.

In general, music students became more aware and deliberate in their music aspirations. In essence, learning how to focus one's attention towards the most relevant tasks in multiple situations was probably the most essential learning outcome. Follow up interviews revealed that the participants continued to use psychological skills eight months after completing the intervention.

Hatfield's PhD project verifies that students' motivation and ability to self-regulate is closely related to how instrumental practice is organized. Moreover, the project generated empirical knowledge that is both innovative and applicable.

Johannes Hatfield completed his master in music (cello) at The Malmö Academy of Music, Prague Academy of Music and Verona Conservatory. Later, Hatfield studied educational science at Østfold University College and sports sciences at Lillehammer University College.