Universidade de Aveiro Departamento de Comunicação e Arte
2015

MARCOS VINÍCIUS ARAÚJO

COMPORTAMENTOS AUTORREGULADORES E EXPERIÊNCIAS DE FLUXO NA PRÁTICA MUSICAL: UM INQUÉRITO COM PERFORMERS DE NÍVEL AVANÇADO

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Tese apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Doutor em Música – Estudos em Performance, realizada sob a orientação científica da Doutora Helena Paula Marinho Silva de Carvalho, Professora Auxiliar do Departamento de Comunicação e Arte da Universidade de Aveiro, e coorientação científica da Doutora Susan Hallam, Professora Catedrática do Instituto de Educação da University College London.

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À minha mãe Manoela Araújo (in memoriam)

To my mother Manoela Araújo (in memoriam)

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o júri

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keywords flow experience, self-regulation, musical practice, advanced performers

abstract

Flow experience, a holistic sensation of total involvement in an activity, seems to have positive influences on musical performance activities. Although its main requirements (balance between challenges and skills, clear goals and unequivocal feedback) are inherent elements of musical practice, there is a lack of research about flow occurrences in the context of musical practice and on how specific practice behaviours affect the experience of flow and its particular dimensions. The aims of this thesis were to investigate advanced performers' dispositions to flow in musical practice, and to investigate whether the frequency of these experiences of holistic engagement with practice are associated with self-regulatory practice behaviours. 168 advanced classically-trained performers (male = 50.0%; female = 50.0%), ranging in age from 18 to 74 years (m = 34.41, SD = 12.39), answered a survey that included two measures: the Dispositional Short Flow Scale, assessing performers' flow dispositions, and the Self-Regulated Practice Behaviours Questionnaire, developed specifically for the present research. The overall results of the survey suggested that advanced musicians have high dispositions to flow in musical practice, but not associated with the participants' demographic characteristics. Three of the individual flow indicators were less experienced, suggesting that the most intense flow experiences are rare in musical practice. However, the results point to the existence of another relevant experience, named *optimal practice experience*. Practice engagement levels were positively associated with knowledge of one's own personal resources and a capacity for practice organization, but not with inclusion/use of external resources. A capacity for setting optimal practice goals was related to self-regulation and to immersion aspects of flow. Current findings offer new clues about the assessment of flow dispositions in performers, helping to clarify how daily practice can heighten positive affective responses in musicians who are vulnerable to the requirements and difficulties of deliberate practice, as well as to other negative practice outcomes. The current research questions issues pertaining to the optimization and sustaining of flow in daily practice, suggesting future directions in the study of the affective subjective functioning of engagement with deliberate practice.

palavras-chave experiência de fluxo, autorregulação, prática musical, performers avançados

resumo

A experiência de fluxo, uma sensação holística de total envolvimento com uma atividade, parece exercer influências positivas sobre as atividades de performance musical. Apesar de seus principais requisitos (equilíbrio entre desafios e competências, metas claras e feedback inequívoco) serem elementos inerentes à atividade de prática musical, ainda pouco se sabe sobre ocorrências de experiências de fluxo no contexto da prática musical, e em que medida determinados comportamentos de prática afetam a experiência de fluxo e das suas dimensões particulares. Os objetivos desta tese foram investigar as disposições à experiência de fluxo na prática musical em performers avançados, e investigar se a frequência dessas experiências de engajamento holístico estão associadas a comportamentos autorreguladores da prática musical. 168 performers de formação clássica e nível avançado (masculino = 50,0%; feminino = 50,0%), com idades compreendidas entre 18 e 74 anos (m = 34,41; DP = 12,39) responderam a um inquérito que incluiu dois questionários: a Escala Curta de Disposição ao Fluxo, uma medida válida de avaliação da experiência de fluxo em músicos, e o Questionário de Comportamentos Autorreguladores da Prática Musical, desenvolvido exclusivamente para a presente pesquisa. Os resultados globais do inquérito sugeriram altas disposições para a experiência de fluxo na prática musical, mas essas não estiveram associadas às características demográficas dos participantes. Três dos indicadores individuais da experiência de fluxo foram muito menos experienciados, sugerindo que experiências mais intensas de fluxo na prática musical sejam raras. Entretanto, os resultados apontam para a existência de uma outra experiência relevante, chamada de *experiência óptima de prática*. Os níveis de engajamento na prática estiveram positivamente relacionados com o conhecimento dos próprios recursos pessoais e da capacidade de organização da prática, mas não com a inclusão de recursos externos. A capacidade de estabelecer metas ideias de prática foi associada à autorregulação e aos aspectos de imersão do estado de fluxo. Os resultados atuais oferecem novas pistas sobre a avaliação das disposições ao fluxo em performers, ajudando a esclarecer como a prática diária pode proporcionar respostas afetivas positivas em músicos vulneráveis às exigências e dificuldades da prática deliberada, bem como a outros resultados negativos de prática. A pesquisa atual leva a perguntas sobre a otimização e sustentação da experiência de fluxo na prática musical diária, oferecendo direções futuras no estudo do funcionamento afetivo subjetivo de envolvimento com a prática deliberada.

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General Introduction

When someone studies the piano for the sake of an extrinsic benefit alone, the result can be a lack of enjoyment and, perhaps, even more important, the expectation of no enjoyment.
Thomas Parente

Stressing the importance of intrinsically motivated behaviour in the development of learning activities, in this case, musical practice, the words of Parente in his recently published book *The Positive Pianist* (2015) reflect two general and relevant aspects of human learning engagement. Firstly, individuals learn better when motivated for intrinsic purposes, and not by external rewards. Secondly, the engagement in intrinsically enjoyable activities can be impaired by the introduction of extrinsic rewards (Deci & Ryan, 1985).

The present research investigates musicians' dispositions to optimal experiences in musical practice. Optimal experiences are at the core of an emergent body of research in the field of positive psychology (Seligman & Csikszentmihalyi, 2000). The absence of investigations regarding positive experiences related to the activity of musical practice is a result of the etymological and epistemological understanding of practice as a means to an end, and not an end in itself. As a consequence, practice is commonly understood as an extrinsically motivated activity. This paradigm has influenced the huge amount of research about musical practice, neglecting the nature of optimal experiences in musical practice and its determinants in musicians.

Negative considerations regarding the experience of practice are not rare even among expert performers (Chaffin, Imreh, & Crawford, 2002; Mach, 1991). The pianist John Browning, for example, stated that practice is 'like dish-washing' (Chaffin et al., 2002, p. 44). Several musicians admit having undertaken huge amounts of forced practice in their childhood mainly to avoid teachers' criticisms or to please them. On the other hand, there are positive relationships with practice. Yehudi Menuhin defined music

practice as 'the search for ever greater joy in movement and expression' (Kurtz 2007, p. 7), and pianists Claudio Arrau and Mark Westcott stated that it is beautiful to practice, and that they love to do it (Chaffin et al. 2002; Mach 1991). In addition, there is a growing number of publications about positive experiences and on how to develop a healthy and pleasurable practice (Bruser, 1997; Kurtz, 2007; Parente, 2015).

The research on subjective positive states and traits related to human strengths and virtues (Seligman & Csikszentmihalyi, 2000) differs from the traditional focus of most of the 20th-century psychology on psychopathologies (Ryan & Deci, 2001). Thus, the field of positive psychology has dedicated much attention to states such as wellbeing, happiness, optimism, and optimal experiences such as flow (Snyder & Lopez, 2002).

These optimal performing states are being studied in many domains such as sports, leisure and work. In music, however, studies investigating positive subjective states are still few when compared with studies investigating the negative side of musical performance[1] activity, with a prominent focus on performance anxiety (Hays, 2002; Kenny, 2011). Empirical research about positive performance states and their effect on musical performance have received minor attention in musical performance studies, contrasting with findings from other fields (e.g. sports, work, leisure) that have presented several strategies for performance improvement (Csikszentmihalyi & LeFevre, 1989; Jackson, 1995; Jackson, Thomas, Marsh, & Smethurst, 2001; Swann, Keegan, Piggott, & Crust, 2012).

The state of flow is one main example of these optimal performance states and it is often described as an optimal experience for the musician, being a highly desirable state to achieve, and one that can improve performance quality. Flow is generally referred to as 'an experience that stands out as being better than average in some way, where the individual is totally absorbed in what she or he is doing, and where the experience is very rewarding in and of itself' (Jackson, Eklund, & Martin, 2010, p. 5). Since flow is associated with high levels of performance in activities requiring great investments of

[1] In this thesis, the term *musical performance* refers to the act of playing a musical instrument or singing, regardless of environmental circumstances. Thus, the term does not refer exclusively to public performances or concerts.

[2] The terms *optimal experience* and *flow* are used interchangeably in the original formulation of the flow

attention, its construct offers a relevant conceptual and methodological framework to study optimal experiences in musical practice.

Although research on flow has been conducted for more than 40 years, most of the empirical research about flow in music (e.g. music education, performance, composition) only started after 2000, notwithstanding the fact that the first interviews conducted by Csikszentmihalyi by the late 1960 included musicians and other artists (Csikszentmihalyi, 2004). Little research has been published about flow experience in musical performance, although music is frequently cited as one of the activities that provoke flow most often in the flow literature (Csikszentmihalyi, 1990, 1996; Csikszentmihalyi & Csikszentmihalyi, 1988). However, there has been an increase in literature on flow and its connections with creativity in music (Byrne, MacDonald, & Carlton, 2002; MacDonald, 2006; Sheridan & Byrne, 2002); with subjective wellbeing in music students (Fritz & Avsec, 2007); with music performance anxiety (Fullagar et al., 2012; Kirchner, Bloom, & Skutnick-Henley, 2008); with motivation (Araújo & Andrade, 2013; Araújo & Andrade, 2011) and correlations between flow and some of its dimensions (Fullagar et al., 2012). Flow has been investigated in different contexts of musical performance, including conservatoire students' examinations, vocal and choral musical performance (Freer, 2009), wind ensemble rehearsals (Kraus, 2003), and jazz performance (Hart & Di Blasi, 2015). Flow has also been researched in the context of musical listening activities (Diaz, 2011), and psychophysiological measurement of flow in musical performance is an emergent topic (de Manzano, Theorell, Harmat, & Ullén, 2010; Thomson & Jaque, 2011). The influence of flow in general music education is also increasingly acknowledged (Bakker, 2005; Custodero, 2002; O'Neill, 1999).

To study flow in musical activities is of a great importance. Elliott (1995) has suggested that musical experiences are unique because music and performing involve challenges and thought processes that are entirely different from those required by other endeavours:

> a musical experience results from a matching relationship between a specific kind of musicianship and a specific kind of musical challenge; the fundamental values of musical experiences are self-growth, self-knowledge, and enjoyment; during the musical experiences, performers and listeners often experience focused concentration and deep absorption; in the process of performing and/or listening, no other motivation is needed to sustain attention and effort apart from the experiences of enjoyment and integration that arise from one's goal-directed musical actions (overt and covert). (Elliott, 1995, p. 126)

The fundamental values highlighted by Elliott (1995) in his comment (i.e. self-growth, self-knowledge, enjoyment) on musical performance experiences are key elements in the original formulation of flow theory: 'Following a flow experience, the organization of the self is more complex than it had been before. It is by becoming increasingly complex that the self might be said to grow' (Csikszentmihalyi, 1990, p. 41). According to this idea, the experience of flow can be a catalyst for the achievement of the fundamental values of the activity of performing music, as highlighted by Elliot.

In addition, music has been widely recognised as an ideal activity for the experience of flow. Performing music is an inherently challenging activity. From a physiological perspective, music challenges the performer to be completely attentive with mind and body, and music is one of the most demanding tasks for the human central nervous system (Altenmüller & Schneider, 2008). From a communicative perspective, music challenges the performer to express and be responsive to personal and cultural meanings (Lehmann, Sloboda, & Woody, 2007). From a cognitive perspective, music challenges the performer perceptually, to organize sound in time, and to explore possible interpretations (meanings) for particular music sounds (StGeorge, Holbrook, & Cantwell, 2012). According to Custodero (2002), all these challenges make musical performance a flow platform for musicians.

Applying the principles of flow to the context of musical practice is the focus of the present thesis, which is divided into two main parts. The first part (*Literature Review*) comprises two chapters. Chapter 1 discusses the construct of flow, presenting origins and

developments of the concept of flow, as well as an explanation of all of its experiential indicators. Chapter 2 presents an exhaustive literature review about flow in music. The systematic review illustrates the multifaceted nature of research about flow in music, with theoretical and operational definitions of flow varying according to research questions, methods and contexts. The research about flow in music provides information about: i) the experience of flow, including musicians' descriptions of the experience or correlations between flow and other attributes; ii) the occurrence of flow, including contexts and activities in which it is more likely to occur; and iii) how flow can be measured in the context of musical performance, including studies that have attempted to develop questionnaires and to test the applicability of measures from other fields. All these studies are discussed on the chapter 2 of the present thesis.

The second part of the present thesis (*Empirical Studies*) presents the research process in itself. Chapter 3 introduces the research problem and justification of the study of flow in musical practice, research questions, aims and hypotheses derived from the critical literature review. Chapter 4 presents the general methodology, with a detailed description of the quantitative methods adopted to answer the proposed research questions. Chapters 5 and 6 include the developed empirical studies about the measurement of efficient practice behaviours and dispositions to flow in expert musicians. Chapter 7 is a summary of the research findings and main implications for teaching and learning processes.

Part 1: Literature Review

Chapter 1. Flow: A theory of optimal experience

1.1 Introduction

The concept of flow has its origins in Aristotelian philosophy (Aristóteles, 1991), humanist psychology (Maslow, n.d.), and is a main concept in positive psychology (Seligman, 2002). Its study arises in a context of a paradigm shift in psychology, from a focus on the individuals' problems and pathologies to a focus on research into why some individuals seem to have a happy and fulfilled life independently of culture, money, political and social context, race, age or sex. After many years of investigation, flow has become one of the most prominent concepts in psychology, spreading its significance to many other disciplines, including music.

In order to analyse the concept of flow we need to identify its origin, its characteristics, and its major implications for musical learning and performing. Thus, this chapter is divided into two parts: firstly, the description of the flow concept, and secondly, the description of the nine indicators of the subjective experience of flow.

1.2 Background

The research underlying flow and other optimal experiences has its roots in classical philosophy, psychology and contemporary positive psychology. According to Forsgård (2013), the interest in positive emotions and in the ideal functioning of human psyche started with authorities in philosophy and pre-psychological psychology. For instance, in *Nichomachean Ethics*, Aristotle (1991) set out a viewpoint on human virtue, saying that it should be understood as a disposition to act naturally in a manner that promotes the flourishing of the human spirit (Aristóteles, 1991). Moreover, Aristotle positioned a good life as one that presents happiness through *eudaimonia*. The eudaimonic route of ideal human functioning reaches beyond the notion of pleasure held by the hedonist view of living and behaving in ways that mean you get as much pleasure out of life as possible (see entry 'Hedonic' in the *Cambridge Advanced Learner's Dictionary*). As Forsgård has pointed out,

> Distinct from simply happiness, joy or pleasure, the goals that human beings try and should try to achieve according to many past and more recent thinkers (…) eudaimonia is experiencing a virtuous life as a whole distinct from simply emotions that are felt in a moment. (Forsgård, 2013, p. 4)

Hence, the eudaimonic perspective on happiness has opened a window for contemporary psychologists to explore the features of ideal human functioning. The notion of transcendence through an activity was firstly explored by the American psychologist Abraham Maslow, who coined the term 'peak experience' to describe a sense of 'intense joy, a moment of highest happiness that stands out perceptually and cognitively among other experiences' (Privette & Bundrick, 1983, p. 171). In this research, several characteristics of peak experiences were outlined, including loss of ego; transcendence of self, including integration with the external environment; altered sense of time and space; awareness or revelation of a formerly hidden truth; and a feeling of bliss, ecstasy, rapture, and exaltation (Maslow, 1994). According to this theory, in this state one could fall into a state of intense concentration, free of self-consciousness and ego, with a different perception of time, no negativity, fearlessness and controllability. Maslow also added that one could motivate oneself to reach self-actualization by participating in activities that induce these peak experiences, simply for pure intrinsic reward and enjoyment of the experience (Maslow, 1994). Along with sex, music was cited as one of the easiest ways of achieving peak experiences in the writings of Maslow (Gabrielsson & Wik, 2003).

Influenced by the distinction between both approaches to the study of wellbeing and optimal human functioning (i.e. *eudaimonic* and *hedonic*), Mihaly Csikszentmihalyi began studying optimal experiences. His motivation for the study of optimal experiences aroused in the post 2nd World War context. In an interview, he explained:

> I grew up in Europe, and World War II caught me when I was between seven and 10 years old. And I realized how few of the grown-ups that I knew were able to withstand the tragedies that the war visited on them - how few of them could even resemble a normal, contented, satisfied, happy life once their job, their home, their

> security was destroyed by the war. So I became interested in understanding what contributed to a life that was worth living. (Csikszentmihalyi, 2004, p. 1)

Since then, Csikszentmihalyi and his team have carried out research trying to understand the phenomenology of enjoyment. He reported that it was a surprise 'how similarly very different activities were described when they were going especially well' (Csikszentmihalyi, 1990, p. 65). He coined the term flow for this kind of feelings, since this term encompasses all elements of enjoyment. One of his interviewees described his optimal experience during climbing: 'the act of writing justifies the poetry. Climbing is the same: recognizing that you are a flow. The purpose of the flow is to keep on flowing…' (Engeser & Shiepe-Tiska, 2012, p. 3). Csikszentmihalyi labelled these characteristics as flow because, according to him, 'the short and simple word describes well the sense of seemingly effortless movement' (1990, p. 54).

Thus, the concept of flow derives from a eudaimonic perspective for peak experiences. In this context, the distinction between the terms *pleasure* and *enjoyment* is of paramount importance for the understanding of the concept of flow. While Csikszentmihalyi defined pleasure as 'a feeling of contentment that one achieves whenever information in consciousness says that expectations set by biological programs or by social conditioning have been met' (1990, p. 45), enjoyable events, he suggests, occur when 'a person has not only met some prior expectation or satisfied a need or a desire but has also gone beyond what he or she has been programmed to do and achieved something unexpected, perhaps something even unimagined before' (1990, p. 46). In other words, although prior expectations and satisfaction of needs or desires also have their role, enjoyable events often comprise a sense of going beyond what one was expecting, resulting in a sense of accomplishment and improvement. Thus, a sense of novelty and accomplishment is implicit in this definition of enjoyment.

Following the same line of reasoning, peak experiences are also differently explained. For Csikszentmihalyi, although one can derive pleasure, ecstasy or wellbeing from a non-ostensible motive (e.g. just listening to a beautiful melody), the majority of

optimal experiences[2] occur in a sequence of activities geared toward meaningful goals under specific rules: 'What makes these activities conducive to flow is that they were designed to make optimal experience easier to achieve. They have rules that require the learning of skills, they set up goals, they provide feedback, they make control possible' (Csikszentmihalyi, 1990, p. 72).

When engaged in activities with these characteristics, one's attention or 'psychic energy' is needed, and it is impossible to achieve this without the necessary skills. In other words, during a given activity, the individual must feel that s/he has the right amount of skills needed to master the challenging demands of the activity. Csikszentmihalyi (1990) also points out that every activity contains a set of subjective 'challenges' (i.e. opportunities for action, demands) that will be mastered by people that possess the necessary competences. For individuals who do not have adequate skills, the activity will not be of much interest – it will simply be meaningless.

The popularity of the flow concept has given rise to a vast number of studies in distinct domains including sports (Jackson, Kimiecik, Ford, & Marsh, 1998; Jackson & Eklund, 2002), dance (Hefferon & Ollis, 2006), work (Fullagar & Kelloway, 2009), education (Beard & Hoy, 2010; Schernoff & Csiksczentmihalyi, 2009; Seitz, 2007), leisure (Csikszentmihalyi & LeFevre, 1989) and also art, shopping, medical surgery, and electronic games (Novak, Hoffman, & Yung, 1998). Participants' descriptions in Csikszentmihalyi's studies indicate that, when they are performing their activities well, their concentration is complete, and that they feel relaxed, comfortable and energetic; their minds do not wander and they do not see themselves as separate from what they are doing (Csikszentmihalyi, 1990).

Because flow is a state that encompasses different constructs (e.g. goals, concentration, intrinsic motivation), it is necessary to clarify each construct that forms the flow concept.

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[2] The terms *optimal experience* and *flow* are used interchangeably in the original formulation of the flow theory, so as in the present research.

1.3 The indicators of flow

In 1990, Csikszentmihalyi published the book *Flow: The Psychology of Optimal Experience* (1990), in which he provided a summary of decades of investigations about flow. His research proposed that the phenomenology of enjoyment had 9 main elements, which are currently used and measured in research. The following sections will provide a detailed account of these flow elements according to the original formulation.

1.3.1 Challenge-skills balance

The experience of flow occurs in tasks that one feels generally able to accomplish. For people reporting flow, enjoyment is felt at a point when the opportunities for action (i.e. challenges) are perceived as equal to, or slightly above, the individual's capabilities (Figure 1). In Csikszentmihalyi's words, 'enjoyment appears at the boundary between boredom and anxiety, when the challenges are just balanced with the person's capacity to act' (1990, p. 52).

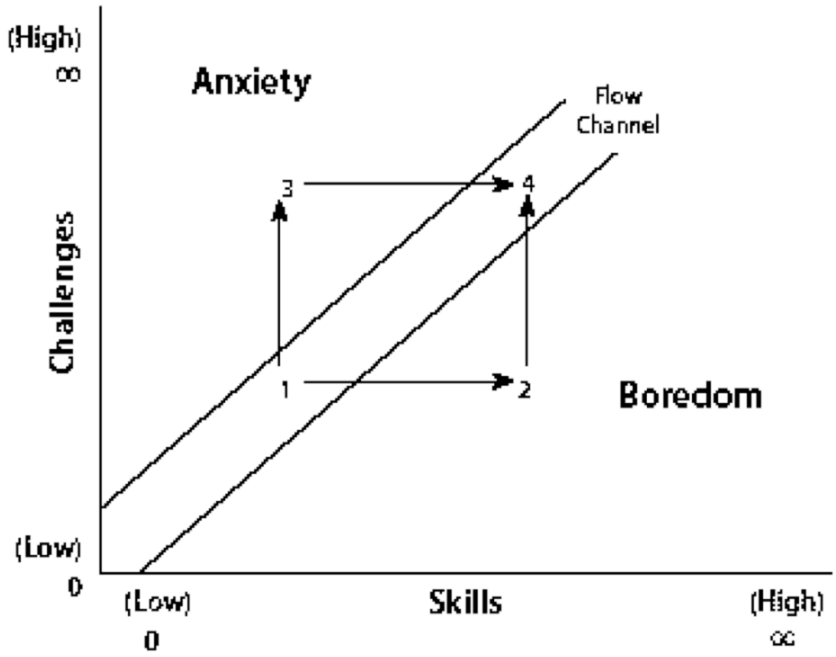

Figure 1. The flow channel. Adapted from Csikszentmihalyi (1990)

According to Figure 1, flow can be experienced by individuals when perceived challenges match their perceived skills. Current interpretations for this dimension of flow tend to propose that 'if an activity is too easy and skill levels are high, boredom will develop; if an activity is too difficult and skill levels are low, anxiety will result; if both challenge and skill levels are low, students feel apathy' (O'Neill & McPherson, 2002, p. 35). Through this model, Csikszentmihalyi and colleagues have concluded that optimal experiences tend to occur when a person is facing a high environmental challenge with the complete use of personal skills.

Another important aspect of the balance between challenge and skills is that it is the individual who is doing the activity who subjectively perceives this balance (Engeser & Shiepe-Tiska, 2012). In this subjective state of balance, people feel both confident and challenged and that everything is under control. One must cognitively appreciate the demands of an activity as challenging and feel that one is able to face those challenges.

From this perspective, although simple activities can be enjoyable, how enjoyable the activity is will depend on its perceived complexity. In other words, to add more to the positive quality of experience, 'one needs to face more demanding challenges and use higher-level skills' (Csikszentmihalyi, 1990, p. 52). This can generate a developmental loop in which 'skills must improve to meet new challenges, and in turn, challenges must improve to continue attracting enhanced skills, thus creating an ideal learning situation' (Custodero, 2002, p. 3).

1.3.2 Action-awareness merging

The merging of action and awareness represents an aspect of the total immersion in an activity (Engeser & Shiepe-Tiska, 2012). According to flow theory, when an individual is using all of the relevant skills when facing the challenges of an activity, the individual's attention is completely absorbed by the activity, and no energy is left over to process any irrelevant information that does not contribute to the performance of the activity (Csikszentmihalyi, 1990). One result of this is that 'people become so involved in what they are doing that the activity becomes spontaneous, almost automatic'

(Csikszentmihalyi, 1990, p. 53). People reporting the merging of action and awareness feel that they are completely aware of their movements, but unaware of the awareness itself. The sense of effortlessness and spontaneity associated with the flow dimension of action-awareness merging often results in automaticity. According to Jackson et al. (2010), 'feelings of automaticity are described by performers, whose well-learnt routines enable them to process subconsciously and pay full attention to their actions' (Jackson et al., 2010, p. 7).

Regarding effort, however, the theory evidences that flow experiences are not effortless. Csikszentmihalyi (1990), for instance, stated that

> Although the flow experience appears to be effortless, it is far from being so. It often requires strenuous physical exertion, or highly disciplined mental activity. It does not happen without the application of skilled performance. Any lapse in concentration will erase it. (Csikszentmihalyi, 1990, p. 54)

Some authors have also suggested that the effortless component of flow does not imply an absence of actual effort; rather, it indicates that an individual does not feel the effort during the activity (Bruya, 2010; Peifer, 2012).

Conversely, this dimension puts great emphasis in performing activities such as sports. To execute movements in a spontaneous and automatic way is considered as a main goal in these types of activities.

1.3.3 Clear goals

According to flow theory, one relevant predictor and component of the intense involvement in an activity is that the goals for the activity are usually clear. Csikszentmihalyi explained that goals 'focus psychic energy, establish priorities, and thus create order in consciousness' (Csikszentmihalyi, 1997, p. 53). Such clarity of purpose occurs moment-by-moment, keeping the individual fully connected to the task and responsive to appropriate cues (Jackson et al., 2010). Concentration is, in turn, enhanced by the order created in consciousness provided by clear goals.

Flow theory highlights three goal features. Firstly, constant success in the achievement of clear goals results in the predominance of enjoyment during a flow experience (Csikszentmihalyi, 1990). Secondly, the goals may not always be very clear in every activity. In arts, for example, the artist may not have a clear picture of what the final product is going to be. For instance, a composer wishing to write a musical piece may not know what notes are right or wrong. In cases like these, Csikszentmihalyi (1990) has stated that the artist must develop 'a strong personal sense of what she intends to do' (Csikszentmihalyi, 1990, p. 55), as a way to have a clear idea if s/he is doing well or not. Finally, depending on the feedback, goals can also be invented or negotiated during the activity (Wyer, Carver, & Scheier, 1999).

1.3.4 Unambiguous feedback

Regarding the goals that an individual may set, the feedback arising from the actions toward the achievement of goals is also important. According to flow theory, the clearer the goal, the more immediate is the feedback about the progress of the performance of a task in relation to the goal. While in flow, an individual can perceive immediately if his/her actions are contributing to the achievement of that goal or not (Csikszentmihalyi, 1990). In other words, the feedback that the individual is gaining through the activity is immediate, unambiguous and sometimes effortless, leaving no doubt whether s/he is doing well or not.

1.3.5 Full concentration

Concentration is an element present in the majority of the descriptions of the concept of flow, confirming that total concentration on a task is one of the clearest indications of being in flow (Jackson et al., 2010). According to flow theory, concentration is generally possible because the task has clear goals and immediate feedback. While in flow, the individual has no extraneous thoughts (Csikszentmihalyi, 1990). In other words, distractions that frequently accompany involvement in any activity are totally absent.

It is important to note that the total connection with the activity puts an emphasis on the individual's capacity to be in the moment. Instead of thinking about the past or future, the individual is focused on what is going on during the activity. As with other flow indicators, the concentration is effortless while an individual is in flow, contrasting with other more usual experiences that require effort in order to keep the mind concentrated in a task, e.g. performance anxiety (see Kenny, 2011).

1.3.6 Loss of self-consciousness

Loss of self-consciousness is another important aspect of absorption in an activity, and it represents a sense of union with the environment and the activity itself. An individual experiencing loss of self-consciousness during an activity is not worrying about the past, the future and his/her own self: the attention is fully concentrated in the activity itself. A key aspect in this experience is the kind of interaction of an individual (agent) with an activity:

> When a person invests all her psychic energy into an interaction—whether it is with another person, a boat, a mountain, or a piece of music—she in effect becomes part of a system of action greater than what the individual self had been before. This system takes its form from the rules of the activity; its energy comes from the person's attention. But it is a real system—subjectively as real as being part of a family, a corporation, or a team—and the self that is part of it expands its boundaries and becomes more complex than what it had been. (Csikszentmihalyi, 1990, p. 65)

According to Csikszentmihalyi (1990), the growth of the self occurs when the activity is an enjoyable one, i.e., 'offers nontrivial opportunities for action and requires a constant perfection of skills' (Csikszentmihalyi, 1990, p. 65).

For a better understanding of this flow indicator, it is important to understand that the loss of self-consciousness does not indicate a loss of the self nor loss of consciousness, but only a loss of awareness of the self during an activity. No less important, the theory also postulates that experiencing loss of self-consciousness does not

mean that one is acting passively. The actual role of the self is important. As Csikszentmihalyi (1990) exemplifies,

> A violinist must be extremely aware of every movement of her fingers, as well as of the sound entering her ears, and of the total form of the piece she is playing, both analytically, note by note, and holistically, in terms of its overall design. (Csikszentmihalyi, 1990, p. 64)

1.3.7 Sense of control

Flow is also reported as a feeling of total control over the activity, or as a lack of 'sense of worry about losing control that is typical in many situations of normal life' (Csikszentmihalyi, 1990, p. 59). While experiencing flow through the sense of control, people enjoy the sense of exercising control in difficult situations. When performing in flow, individuals have also reported a sense of infallibility (Jackson et al., 2010). In this state, performers report feeling free of the frequent fear of failure that is associated with poor task execution.

One important aspect about the sense of control in flow is that absolute control does not exist while a person is experiencing flow. Taking account of the challenge-skills balance dimension, we can see that absolute control is a context in which an individual is undertaking an activity in which the challenge is not as high as his/her skills (see Figure 1). According to Jackson et al. (2010, p. 9), 'it is the possibility of keeping things under control that keeps flow active'. Consequently, if the experience of control increases unfavourably during the activity, it means that the activity is favouring skills over challenges, and flow is not going to happen.

1.3.8 Transformation of time

According to flow theory, when experiencing flow one can feel that time seems not to pass as usual. For some, time seems to pass quickly. For others, time seems to slow down or to stop. While in flow, concerns about chronological time become irrelevant when compared with the rhythm dictated by the activity (Csikszentmihalyi, 1990).

With the mind totally concentrated on the activity with no space for irrelevant thoughts, loss of awareness of time may be reported. Jackson et al. (2010) suggested the existence of a close link between intensity of concentration and transformation of time. However, time transformation is the least frequently experienced dimension of flow, with few connections with the other flow indicators. This is understandable, because time transformation was not part of the original formulation of the flow concept until the 1990s, and was added a posteriori (Engeser & Shiepe-Tiska, 2012).

1.3.9 Autotelic experience

The word *autotelic* is derived from the Greek root words 'auto', which means self, and '*telos',* meaning 'goal'. Csikszentmihalyi (1990) adopted the term autotelic experience to describe the intrinsically rewarding experience that flow brings after the completion of the activity.

In addition, Csikszentmihalyi and colleagues also characterized autotelic activities and personalities. According to them, an autotelic activity 'is one we do for its own sake because to experience it is the main goal' (Csikszentmihalyi, 1997, p. 117). This is an important component of flow, because it may indicate that the experience may be more likely to occur when an individual is engaged in an autotelic activity. Considering personality, an autotelic personality is one who seeks flow experiences as a matter of habit. While gaining skills, the autotelic individual seeks higher challenges that require an increase in skills. People having autotelic personal qualities stand out because they have the 'capacity to structure interactions with the environment in an experientially rewarding way' (Csikszentmihalyi & Nakamura, 1999, p. 114) and 'the ability to manage a rewarding balance between the "play" of a challenge finding and the "work" of skill building' (Csikszentmihalyi, Rathunde, & Whalen, 1997, p. 80).

Finally, autotelic experience is referred to as the end result of the other eight flow dimensions (Csikszentmihalyi, 1990), and it is also frequently described as a happy moment. However, Csikszentmihalyi mentioned that 'when we are in flow, we are not happy, because to experience happiness we must focus on our inner states, and that would

take away attention from the task at hand' (Csikszentmihalyi, 1997, p. 82). Thus, the feelings of happiness and wish to experience flow again are also main indicators that flow **was** experienced during the activity.

1.4 Discussion

The growth of the field of positive psychology has highlighted the need for studies focusing on the positive side of human existence, and demonstrated considerable support for the importance of understanding positive human experiences. As described in this chapter, flow is a complex concept, and its experience resides in the interplay of its 9 dimensions (Table 1).

Table 1

Flow indicators: Definitions

Flow indicator	**Definition***
Challenge-skills balance	A perceived balance between challenge involved and ability to respond to it appropriately
Clear goals	Clarity about the goal to be achieved
Unambiguous feedback	The activity itself provides clear and immediate feedback concerning progress towards goals
Full concentration	Attention is fully focused on the task and there is an absence of distraction
Action-awareness merging	Actions seem to run almost automatically, in a completely natural and spontaneous manner
Loss of self-consciousness	All concern for self disappears and the individual becomes one with the activity
Sense of control	Sensation of total control over the activity and its outcomes

Transformation of time	Temporal disorientation or loss of sense of time
Autotelic experience	Intrinsic motivation for the task, with no attempt at attaining external rewards

Note. * Definitions based on the original description of flow indicators (Csikszentmihalyi, 1990).

Although there is conceptual and empirical evidence showing that the components of flow are highly correlated (see Engeser & Shiepe-Tiska, 2012 for a review), it is premature to conclude that flow can be considered as a one-dimensional concept (Engeser & Shiepe-Tiska, 2012), and more research is needed to specify under which conditions components are associated or dissociated. Csikszentmihalyi has conjectured that the Action-Awareness Merging dimension may be the clearest sign of the experience, which has led some authors to conclude that 'immersion might, in fact, represent a more central aspect than the other components' (Engeser & Shiepe-Tiska, 2012, p. 12). Because of the uncertainty about flow as a one-dimensional concept, this research follows, a priori, the current consideration of flow as an experience with different components, which, in their interplay, represent the experience of flow. Although research may pay special attention to only one component of flow or to consider flow as represented by specified dimensions (e.g. Fullagar, Knight, & Sovern, 2012), one should keep in mind that it is still not clear if a particular set of components can fully represent the flow experience (Engeser & Shiepe-Tiska, 2012).

What seems to be important is to understand that flow has a positive impact on performing activities, and that the implications of this experience for music practitioners deserve a more comprehensive attention. As a way to better understand the importance of flow to musical practice, the following chapter will explore flow research in the context of musical performance activities.

Chapter 2. Flow experience in music making

2.1 Introduction

Flow research in music is multifaceted, and theoretical and operational definitions of flow vary according to research questions, methods and contexts. Generally, flow research in music provides information about: i) the experience of flow, including musicians' descriptions of the experience or correlations between flow and other attributes; ii) how flow can be measured in the context of musical performance, including studies that have attempted to develop questionnaires and to test the applicability of measures from other fields; and iii) the occurrence of flow, including contexts and activities in which it is more likely to occur.

The following sections of the present chapter are organized according to these categories, presenting flow research in musical performance, with special focus on music students, musicians preparing for a career as instrumentalists (or singers), and professionals.

2.2 Flow experience

The present section focuses on musicians' descriptions of their flow experiences in music making. Studies in this category include data related to flow experience collected through semi-structured interviews and questionnaires aimed at understanding how flow is reported or defined by musicians (Bellon, 2006; Bloom & Skutnick-Henley, 2005; Kirchner et al., 2008), how flow characteristics are manifested (Bloom & Skutnick-Henley, 2005; Brown, 2011; Freer, 2009), and the compatibility of particular behaviours with specific flow dimensions (Araújo & Andrade, 2011).

2.2.1 How flow is reported or defined by musicians

The qualitative section of a survey developed by Bloom and Skutnick-Henley (2005) presents descriptions of specific musical flow experiences by the participants. Unfortunately, the authors did not provide information on the expertise level of the

sample. However, because participants practiced only 7 hours a week on average, they were possibly amateurs at the time of the study. Five categories were identified in the participants' descriptions of their specific flow experiences. An ‘Absorption, heightened awareness, clear-mindedness’ category included reports around time transformation (e.g. ‘the two-hour concert seems to be only minutes long'), absence of or low music performance anxiety (i.e. 'the nervousness of the minutes before the performance disappears with the lifting of the curtain’), and full concentration (i.e. 'I was able to lose myself in the work and concentrate on feeling the dynamics and balance with the other instruments'). The other categories were ‘emotional involvement’ (e.g. 'got caught up in the youthful driving emotion of this piece to the point where I was swept up in the passion and flow'); ‘sense of connection with others’ (i.e. 'I was playing a very majestic piece with my teacher. I attempted to perform with the same gusto that he showed'); ‘sense of everything clicking into place’ (e.g. 'I don't have to think about fingerings, bowings, dynamics, etc. I just play it and enjoy it'); and ‘sense of transcendence’ (e.g. 'In the second movement of a string quintet I found that after a mysterious plucking of strings, the cello bursts forth, in unison with the violins, in a soaring melody that is almost shattering and lifts one out of his seat. The feeling is one of floating on air').

The second part of the study carried out by Kirchner et al. (2008) investigated free descriptions of flow experiences by a sample of 80 undergraduate music majors. In order for the experience to be considered as flow, researchers listed the following characteristics of flow: ‘It stood out as a special musical experience; it involved total absorption, the goals were clear, there was confidence in task accomplishment, and attention was focused on the music and not on task-irrelevant thoughts’ (Kirchner et al., 2008, p. 61).

One major drawback of this approach is that the researchers’ explanation of flow did not encompass all flow dimensions. Time transformation, feedback and merging of action and awareness, the late referred to as one of the most salient aspect of immersion in an activity (Engeser & Shiepe-Tiska, 2012), were not included in their approach. Moreover, there is not enough support for the operationalization of the concept, as it was

based on only one previous study (Bloom & Skutnick-Henley, 2005). Thus, we cannot confirm what these items exactly measured. Despite these limitations, seven distinct themes arose from the participants' free descriptions: 'relaxed/feel-good/enjoyment', 'emotional expression', 'loss of awareness of time/pain/sound', 'reaching goals/getting the right feel effortlessly', 'being absorbed/immersed/focused', 'transcendence/dissociation' and 'not having to think' (Kirchner et al., 2008).

It is interesting to note that, although the concept of flow is complex and difficult to define clearly for the interviewees (which is why researchers normally give descriptions of flow indicators as a way to clarify the concept for their participants), the categories found in the participants' descriptions of flow in Bloom & Skutnick-Henley's (2005) study have much in common with the original formulation of flow, as the descriptions tend to include descriptions around time transformation, full concentration, and challenge-skills balance.

Using a different operationalization of the flow concept, Bernard (2009) explored relationships between flow and 'transcendent' music experiences in the autobiographical accounts of students while making, teaching and learning music. One section of the article is particularly interesting, as it was dedicated to the analysis of students' narratives of music-making experiences and flow. The concept of flow was operationalized through indicators previously identified in research about transcendent religious experiences. Thus, flow experience was only considered if (a) the experience was special and infrequent rather than part of everyday life; (b) the experience overtook a person; (c) the individual had the sensation of being outside himself; (d) there was a sensation that the self was superfluous to the experience; and (e) the experience was extremely difficult to describe with words. One of the narratives is presented below:

> The summer before my senior year of college I decided I wanted to play the Brahms Clarinet Quintet. This piece is every clarinettist's dream. Every movement is completely deep and passionate. It demands a huge amount of depth, expression and technique from the clarinettist. Asking around for players I managed to get four of my best friends to play it with me. We began rehearsing

> vigorously four hours a week with coaching. We worked through a million small details and played for master classes throughout the year and in the end played it for my senior recital.
>
> There was a master class that we played in that was magical. That day the light was hitting the concert hall in just the right way, giving the room a soft glow and a warm silence. It was one of those moments where it is as if the music picked me up and took me to another world for just a little while. I forgot that I was playing for people. I forgot what the notes were and where I was. It was just the music and nothing else. This moment made everyday playing that was hard, painful, stressful and frustrating worth it. Sitting in a practice room for hours in a day and staring at yourself in the mirror makes one forget the music that originally brought us there. Music sometimes becomes a love and hate relationship. The expectations, instructions, details weigh heavy upon voices that should be freely alive. I remember looking out the window as we were playing thinking that I will always need to play because it is who I am. It was at that moment that I realized I wanted to be a clarinet chamber musician. (Bernard, 2009, p. 12)

What is interesting in this data is that, although the flow characteristics elucidated by the author's operationalization of flow can be identified in passages that suggest a 'magical' moment or that the music took the individual to 'another world', other flow elements can be recognized. The clarinettist's goals are clearly stated when she says that she 'decided to play the Brahms clarinet quintet (…) every movement is completely deep and passionate'. When commenting that the musical piece 'demands a huge amount of depth, expression and technique', the participant is expressing the perceived high challenges of the piece. In addition, the loss of self-consciousness is represented by the quote 'I forgot that I was playing for people (…) I forgot what the notes were and where I was (…) it was just the music and nothing else'. Finally, the moment can be identified as an autotelic experience because that particular moment 'made everyday playing that was hard, painful, stressful and frustrating worth it'.

Descriptions of flow cannot always ensure that experiences are connected with optimal or high-level performances. Nevertheless, as researchers started to study the characteristics of an optimal performance for musicians, they found many of the flow indicators in that context. For instance, optimal performance was one of the themes investigated by Bellon (2006). Her thesis described how professional musicians apply what she claimed as the main principles of sport psychology in their performance preparation processes. The author interviewed 6 professional musicians about 6 categories, namely: 'structure of the preparation', with questions focused on goal setting, whole versus part practice, and pre-event routines; 'Aids and tools', which included imagery and visualization strategies (i.e. practising away from the musical instrument and imagining an ideal performance); the 'Interference' category included questions regarding how to solve problems of mind interference; 'Psychological skills', with questions about concentration and energy level control; and 'Other aspects' category, which included optimal performance, self-fulfilling prophecy, fear of failure and teaching.

Regarding optimal performance, Bellon asked the participants whether they had ever experienced what sport athletes describe as being in the zone, how they would describe being in the zone, and if they had the ability to recreate this state (Bellon, 2006). In her research, the concept of zone was operationalized as a state that can be achieved when performers ‘are physically and mentally ready for the performance’ (Bellon, 2006, p. 79).

Participants’ statements about what was like to be in the zone included: ‘when you know that everything will go well’; ‘hypnotic state or blank, empty’; ‘you’ve lost all track of time, you’ve completely lost a sense of self, and generally, at the end of this experience, you’re very happy - you feel very rewarded intrinsically’. A sense of union with the music and loss of self-consciousness were also salient in some of the comments:

> As musicians, when we are the music, in a sense, and the music is us and there isn’t any whom-we-are there, that’s a sign that you’re in the zone. So that’s what it feels like: There isn’t (critical) verbal thought and internal dialogues, or at least not very much. It’s all musical thought. (Bellon, 2006, p. 115)

Although we cannot assume that the participants were reporting a state of flow, it is significant that these indicators of optimized performance were very similar to flow indicators. For instance, challenge-skill balance was reported as a feeling of competence (‘everything will go well’), and loss of self-consciousness could be identified in ‘there isn’t any whom-we-are there’. The autotelic nature of the experience was also expressed in ‘you feel very rewarded intrinsically’.

Another two examples of this kind of research include Guster's (2013) thesis about 'intangible' aspects of music making and Clark, Lisboa, & Williamon's (2014) investigation on musicians’ thoughts and perceptions during performances. Guster’s (2013) study devotes a chapter to optimal experiences in the lives of ten professional pianists. In this study, intangible in music was referred to as ‘those aspects of music making that cannot be measured or objectively described’ (Guster, 2013, p. 4). The pianists' reports about ‘their most memorable or powerful experiences while performing’ (Guster, 2013, p. 186) are particularly interesting. Although the pianists reported these moments as rare in performances, they considered them as definitive and significant moments that motivated them to keep going with their careers. As in Bellon’s (2006) study, flow indicators were found in their descriptions. Altered sense of awareness and self were the most reported characteristics related to flow. Loss of self-consciousness was reported as forgetting their own self and connecting with others (i.e. feeling of being one with the music or the audience).

Clark, Lisboa, & Williamon (2014) identified a number of characteristics associated with the flow experience in the musicians' own perceptions during successful performances:

> There are moments […] on stage when I feel as if I have a safety net underneath me and that nothing can possibly happen, nothing can go wrong… I can trust my instinct, I can trust my physical capabilities, and at the same time I can allow control to be put to the side and to let myself run without control, but at the same time knowing that I’m safe and that no matter what I do it’s going to sound good… [In one performance] I distinctly remember the whole time having this big

> grin on my face … because I felt like there was absolutely nothing wrong with the world, and the music that I was creating had no boundaries, I was in touch with what I'd always wanted to get in touch with. So I can only describe it as one of the happiest experiences. (Clark et al., 2014, p. 9)

Sense of total control, sense of trust (i.e. confidence), and heightened sense of awareness (i.e. full concentration) are flow elements identified as factors associated with a successful performance. Accordingly, some musicians defined 'focus' as 'being in the moment, communicating with the audience, and focusing on their own sound and that of other performers on stage with them' (Clark et al., 2014, p. 9). According to this perspective, the experience of flow through full concentration (i.e. focus) on performance could be represented by a narrow focus on the sound or on what the musician is conveying or trying to convey to his/her audience. Additionally, these successful performances were characterized as 'one of enjoyment, in which they felt relaxed, confident and in control' (Clark et al., 2014, p. 9).

2.2.1.1 Comments

What is clear is that the participants' comments in these studies rely on memories of previous musical performances. One major trend that arises from the descriptions above is that flow is associated with 'good' performances (i.e. optimal, successful) and sensations acknowledged as imperative for an optimal performance. Flow was also reported as the absence of performance anxiety, which is one of the most commonly mentioned disruptors of good performance quality (Kenny, 2011; Kenny & Ackermann, 2011). All the descriptions of flow and optimal performances by musicians pointed to the same direction: flow is a desirable state for musical performance activities.

However, this research methodology has limitations. The major problem is that flow experience is not unanimously defined to participants. Bearing in mind that flow is currently understood as an experience characterized by an interplay of other indicators (Engeser & Shiepe-Tiska, 2012), papers in this category lack a precise description of all flow dimensions as a way to verify if participants' experiences are somewhat related to

flow dimensions. Another possible approach is the investigation of positive experiences in a broad sense without previous definitions of flow experiences. The investigation of Freer (2009) is an example of this kind of approach. Analysing boys' descriptions of their experiences in a choral group, the author found allusions to flow indicators in that context. The identification of distant general musical goals (i.e. sing higher notes) in young and/or inexperienced musicians' narratives suggested that they relied on their teachers to set goals. Types of feedback were also highlighted in the singers' choral experiences. For example, teachers' task-related feedback helped students to modify their efforts in order to achieve better results. Feedback about the processing of tasks also contributed to improve the students' understanding of the construction of meanings for their tasks. Thus, the author concluded that successful completion of challenges was positively correlated with the students' enjoyment of their musical activities.

Another example was Lamont's (2012) study on strong experiences of musical performance. Lamont (2012) asked a sample of 35 university students (mean age = 20 years old) to give free reports of their strongest and most intense experiences in musical performance. While positive emotions were found in more than 80% of the reports, negative emotions accounted for 62.9%. Flow characteristics were identified in most of the positive experiences, with connections with personal engagement and meaning in musical performance. Conclusively, the author stressed the importance of 'flow and peak experiences in generating and sustaining motivation for future engagement with music' (Lamont, 2012, p. 588). This perspective suggests that there is a need for more studies investigating positive emotions related to musical engagement and how these might be affected by musical training. Moreover, Lamont (2012) has argued for a more integrated approach to happiness and wellbeing in musical performance. Together, these studies suggest that flow indicators are present in descriptions of positive musical performance experiences.

2.2.2 How flow characteristics are manifested in musical activities

Brown's (2011) auto-ethnographic study, which also relies on previous memories, has examined how flow experiences were manifested in the researcher's collaborative performances and activities as a piano accompanist. The memories included writings in personal diaries, audio and video recordings of concerts, and personal scrapbooks of memorabilia including press cuttings, photos, and concert programs. Based on those materials, the author built a narrative on significant experiences related to flow characteristics. Through analysis of narrative data, the author pointed to some emerging concepts related to the dimensions of flow. Challenge-skills balance was found to be related to a set of different particular activities in her trajectory as a piano accompanist, such as the acquisition of motor skill development for a pianist, aural acuity, reading musical notation, sight-reading and quick learning. Other identified related factors were attention and the autotelic nature of the activity.

Concerning the focus of attention, Brown highlighted the importance of attention directed to the external and internal aspects of the collaborative performance. External aspects included the physical environment (e.g. quality of piano, acoustics, temperature of the place) and the spatial relationship with partners, the individual differences of performers and their roles (e.g. differences between accompanying singers, dancers and instrumentalists), and events occurring during a musical performance (e.g. communication with collaborative performers, listening to the other, balancing the sound). Moreover, influential aspects related to internal attention were responses to the performance experience (e.g. strategies used to modulate and control music performance anxiety), ability to draw upon long-term memory (e.g. to recognize styles of musical compositions) and the ability to use working memory during the performance (e.g. to control thoughts and to stay focused). The ability to constantly shift attention in musical performance activities is a characteristic of expert performers (Chaffin, Imreh, & Crawford, 2002; Williamon, 2004), and this may be an example of a relationship between an efficient behaviour and flow through focused attention (i.e. full concentration).

The autotelic nature of flow was also a relevant theme in Brown's (2011) thesis. The author identified behaviours that she reported having an effect on the Autotelic Experience flow indicator, such as the identification of clear goals and attention to feedback from collaborative performers in the performance process; being in control of actions and experiencing a sense of immersion in the performance (Brown, 2011). These accounts present the Autotelic Experience (i.e. a sense that one is doing an activity for its own sake) as a product of other flow indicators (e.g. clear goals and feedback cause the autotelic experience) rather than a main component of the flow experience. The same was found for Time Transformation, which was also not cited as an element of flow experience, but rather as a result of the flow experience itself.

Brown's reflection on how flow indicators were manifested in her collaborative performance experiences provides an interesting account of the possible contexts and factors that might have influenced her experience of the different flow indicators. This study also presents an important discussion on the use of auto-ethnographic methodology in investigations of subjective internal states and implications from the findings.

In an interview with two professional musicians, Araújo & Andrade (2011) have discussed and identified the presence of flow indicators in the musical activities (i.e. practice and performances) of two musicians with distinct musical backgrounds: a flautist specializing in Western Classical music, and a drummer specializing in Brazilian popular music with groups. What was clear in the musicians' reports in this study is that flow tended to emerge from a combination of a continuous sense of challenge and repertoire preference. It seemed that as the repertoire was seen as less preferable, more effort needed to be made. Setting specific goals in the organization of practice seemed to contribute to better goal achievement, which in turn provided a sense of personal accomplishment. Relating to concentration during practice and performance, loss of sense of time was mostly emphasized during group activities (chamber music). In addition, emotion was also considered as a relevant factor in the musicians' discourses. In the practice process, this component was represented by expressions such as 'a marvellous experience', 'much happiness', or a sense that they could play the pieces.

2.2.2.1 Comments

Musicians' reports in these studies convey the idea that flow is more likely to occur when there is a combination of a continuous sense of challenge and repertoire preference, suggesting that repertoire preference leads to less effort. Setting specific goals in the organization of practice seems to contribute to a better goal achievement, which in turn provides a sense of personal accomplishment. Regarding concentration during practice and performance, loss of sense of time was emphasized during group activities (chamber music). In addition, emotion was also considered as a relevant factor in the musicians' discourses.

While conclusions about the participants' flow experiences were again based on retrospective reports, results of both studies suggest that self-regulatory processes, which are an essential component in the development of musical expertise (McPherson & Zimmerman, 2011), might contribute to the experience of flow. Research in this category is important because it reveals how flow is experienced in different musical activities, also revealing commonalities and divergences among different contexts. The challenge-skills balance was found to be related to the development and application of particular musical skills (Brown, 2011), but was also combined with repertoire preference (Araújo & Andrade, 2011). In these studies, flow was also associated with the ability to control the focus of attention and to set specific goals. Lastly, Autotelic Experience was found as a result of the experience of other flow indicators (Brown, 2011), and expressed as a highly positive feeling of accomplishment in the context of practice (Araújo & Andrade, 2011).

2.2.3 Summary

Identifying flow elements in musicians' activities is relevant because a common and encompassing understanding of flow in musical learning activities is still lacking. However, researchers need to be careful with conclusions such as 'these components generated very often during their musical practices, the flow experience' (Araújo &

Andrade, 2011, p. 561). Affirmations such as these are difficult to sustain, since they are based mainly on analysis of discourse and retrospective reports.

Musicians' free descriptions may better illustrate the meaning of flow dimensions for music. Professional musicians and students reported the Action-Awareness Merging indicator in terms of the absence of self-talk during performances (Bellon, 2006; Kirchner et al., 2008). Another example is transformation of time, which was reported as 'everything in slow motion' (Bellon, 2006, p. 85) during performances, and as if time passed quickly during practice (Bellon, 2006, p. 84), suggesting that flow dimensions can be experienced during different types of musical activity with different perceptions. Hypnotic state, loss of awareness of pain and of sound, and physical relaxation were reported characteristics that are not listed in current descriptions of flow (Bellon, 2006; Kirchner et al., 2008). Musicians also referred to being significantly emotionally involved when in flow (Araújo & Andrade, 2011; Bloom & Skutnick-Henley, 2005; Kirchner et al., 2008), reporting feelings of joy, satisfaction, pure delight and happiness. Although many different terms occur in the free flow reports, most of them are related to the current definition of the nine flow indicators.

The results of these studies also indicate that, even though flow elements are reported, there is no agreement about the intensity of the flow state experience during practice processes. Studies using quantitative measures of flow in music shed some light about the aspect of intensity of the experience of flow and its dimensions. These studies are reviewed in the following section.

2.3 Flow measurements

Although flow theory has mostly maintained its original formulation, there is a certain level of disagreement about how flow should be measured. Moneta (2012) proposes that this is a consequence of the modelling approach through which researchers 'typically simplify the theory and condense it into a simpler and more precise model' (Moneta, 2012, p. 24). Although modelling can be useful for testing abstract relationships expressed in natural language through statistics, theory simplification is generally

somewhat arbitrary. Consequently, researchers risk adopting different models and hence disagreeing on how certain constructs should be measured.

The following section will review the main methods used for the measurement of flow, how flow has been measured in research in music performance and the main implications of the findings.

2.3.1 Main methods for the measurement of flow

In general, three main methods have been used to measure flow in research: the flow questionnaire, the experience sampling method and standardized scales (Moneta, 2012). The Flow Questionnaire (FQ) was the first measurement tool created. Developed by Csikszentmihalyi & Csikszentmihalyi (1988), it proposes definitions of flow and asks respondents to recognize them, describe the situations and activities in which they experience flow, and rate their subjective experience when they are engaged in flow-conducive activities. Definitions are based on the interviews that Csikszentmihalyi (1990) undertook with participants from several domains of human endeavour.

According to Moneta (2012), four advantages of using this questionnaire are salient. Firstly, the quotes presented in the Flow questionnaire seem to capture the essence of the construct. Another advantage is that the instrument 'does not impose flow on respondents' (Moneta, 2012, p. 45), which can be considered as a major drawback in the componential approach for measuring flow (next subsection). Thirdly, data related to freely listed activities in which participants have experienced flow can be used to analyse the prevalence of flow in specific activities. Finally, participants' reports on their main flow activities help to verify 'whether flow occurs when challenges and skills are in relative balance with each other and whether subjective experience is more positive in the flow state than in the anxiety and boredom states' (Moneta, 2012, p. 45).

Weaknesses of the instrument are related to the fact that one cannot be sure if the quotes presented in the questionnaire really constitute a single description of the flow state. For instance, dividing the flow quotes into two separate sections measuring shallower flow and deeper flow, Moneta (2010) found significant differences in a sample

of 393 workers in the UK, which led the author to conclude that ‘mixing shallow flow quotes with deep flow quotes creates uncertainty as to exactly what a respondent's yes/no answer refers to’ (Moneta, 2012, p. 46). Other cited disadvantages include the impossibility of measuring the intensity or level of flow in specific endeavours, and the fact that it does not allow for the assessment of how the balance between the perceived challenges and perceived skills in the activity influence the occurrence of the flow state. Overall, the scale seems to be a reliable measure for studying the kind of activities and contexts in which flow is more prevalent.

The second approach to the measurement of flow is the Experiencing Sampling Method - ESM (Csikszentmihalyi & Larson, 1987), a measure of flow designed to capture flow in daily experience. In this method, participants are equipped with beep emitting electronic signals randomly during a day (normally eight times as day). When the beep sounds, participants need to stop what they are doing and fill out a questionnaire containing qualitative items asking about the activity (i.e. main activity and thoughts during its realization), the context (i.e. time, date, place, if alone or together with someone else, etc.) and aspects related to motivation and interest (e.g. why one is undertaking the activity, sources of physical discomfort, etc.), and also quantitative items, designed to measure the intensity of a set of subjective feelings. While Moneta (2012) has concluded that ESM is good for the purpose of ‘measuring the flow state in daily life and for testing hypothesis concerning the effects that challenge, skill, and their balance have on flow’ (Moneta, 2012, p. 56), it is also important to say, however, that data about construct validity is unknown, and researchers need to take this into consideration before using this method.

Seeking for solutions for reliability and validity, researchers have developed scales consistent with Csikszentmihalyi’s (1990) concept of flow. The most frequently used scales in the field of music were developed by Jackson & Eklund (2002), considering flow both as a state (Flow State Questionnaire-2, FSS-2), and as a trait (Dispositional Flow Scale-2, DFS-2). From this perspective, flow is captured as a multidimensional state-trait variable.

Both scales include items measuring the nine indicators of flow: concentration, control, action-awareness merging, autotelic experience, loss of self-consciousness, time, goals, feedback and balance. There are no differences in the items construction between the trait and state versions, but only in the initial instructions given to the participants. While the state questionnaire (FSS-2) is meant to be applied right after an activity and asks participants to answer the questions thinking of the specific activity that they have just performed, the trait scale (DFS-2) asks participants to think of their general experience about the dimensions when engaged in an activity. The two questionnaires have good psychometric properties (Jackson & Eklund, 2002).

2.3.1.1 Comments

Comparing the three main measurement methods of flow, clear differences among the perspectives that lie behind the concept of flow can be perceived. In the first two measures (FQ and ESM), flow tends to be envisaged as a single construct. In contrast, the standardized scales (FSS-2 and DFS-2) present a multidimensional perspective of flow, understanding flow as a constellation of inter-related constructs. Moneta (2012) argued that no one method is overall superior to another, as they all have strengths and weaknesses. Thus, the right choice of methods for measuring flow will depend on the nature of the research questions involved in the research, and on the researcher's perspective on the flow concept and beliefs on how knowledge is better constructed. For example, if the researcher believes that validity is of paramount relevance for research, the componential approach (i.e. scales) is more likely to be used.

2.3.2 How flow has been measured in music performance

A total of 11 studies have used quantitative measures to assess flow experience in specific activities (de Manzano et al., 2010; Diaz & Silveira, 2012; Marin & Bhattacharya, 2013; Steckel, 2006; Thomson & Jaque, 2011; Wrigley & Emmerson, 2013) and general experience across situations and times or average experience when individuals are engaged in a context of activity (Araújo & Andrade, 2013; Sinnamon,

Moran, & O'Connell, 2012; Thomson & Jaque, 2011). While some studies have attempted to adapt and validate flow scales from other domains (Sinnamon et al., 2012; Steckel, 2006; Wrigley & Emmerson, 2013), others have developed their own questionnaires (Araújo & Andrade, 2013; Bloom & Skutnick-Henley, 2005; Marin & Bhattacharya, 2013). The experience sampling method (ESM) technique has only been applied once in the study of flow in musical performance (O'Neill, 1999).

2.3.2.1 Adaptation/use of scales from other domains

Wrigley & Emmerson (2013) attempted to test the psychometric adequacy of the Flow State Scale (Jackson et al., 2010) with a sample of students enrolled in under- and postgraduate courses in a university, and to verify the incidence of flow state in students playing in a solo audition. Their research provided the first empirical validity and reliability study of the Flow State Scale (FSS-2) in live music performance, although time transformation provided weak prediction and little variance explanation. Studies in other domains have reported similar problems with this specific dimension of flow, and this may be related to the challenge in capturing this characteristic of flow. In addition, other demographic and performance variables did not have a significant effect on flow experience, although pianists obtained the lowest scores when compared with their counterparts (i.e. brass, strings).

Along with Transformation of Time (M=3.28), Wrigley & Emmerson (2013) found low means for Loss of Self-Consciousness (M=3.12) and Sense of Control (M=3.28), and moderate to high scores for the other dimensions. Clear Goals was highly reported (M=4.12), followed by Feedback (M=3.78) and Balance (M=3.61) (Table 2). Although the conditions for flow obtained the highest means, their results suggested that the students did not experience immersion and enjoyment in the audition. The authors mentioned that

> most students struggled with becoming absorbed in their performance. Almost 60% of students experienced low amounts of enjoyment (Autotelic Experience), and just over half of the students (58%) did not experience a strong balance

> between their perceived skills and challenge of the examination. (Wrigley & Emmerson, 2013, p. 301)

Because the majority of participants did not score high in flow in the performance examination, the authors concluded that the judgmental and intimidating experience of a musical examination in a university may inhibits students' flow experiences, a conclusion that was also present in other studies about flow. O'Neill (1999), for instance, concluded that evaluative contexts contributed to the reduction of flow experience, especially in students considered less skilled in their musical instruments. In a different context, however, Steckel (2006) found that Autotelic Experience and Challenge-Skills Balance were the most highly scored indicators among marching band musicians with difference levels of expertise attending a musical convention. This result may confirm Wrigley & Emmerson's (2013) conclusions, because the context of marching band performances, in which there is the distribution of responsibility among the individual members may be likely to produce stress and pressure as in the context of an individual audition. Thus, these results suggest that the environment may play an important role in the emergence of flow experiences, and that teachers must be able to ensure the intrinsic quality of their students' musical experiences by devising strategies to motivate them. Recent research has also found that music performance anxiety is negatively related to flow experience (Fullagar et al., 2012; Kirchner et al., 2008), suggesting that it may be another important inhibitor of flow in a performance examination. However, more research is needed to confirm these findings; also, researchers should control other variables that may influence flow state occurrence in a live audition (e.g. repertoire preference), opening up new research avenues.

Sinnamon et al. (2012) tested the adequacy of the Dispositional Flow Scale-2 (DFS-2), a standardized questionnaire designed to measure general dispositions to the experience of flow in an activity (Jackson et al., 2010; Jackson & Eklund, 2002). The questionnaire was applied to a large sample of 205 music students – 125 'amateurs' (not claiming to be professionals) and 80 'elite' students from two conservatoires. The results indicated that DFS-2 was generally a psychometrically sound measure of flow, and that

the participants (music students) experienced flow quite frequently when they are playing their instruments. Autotelic Experience (M=4.18), Clear Goals (M=4.01), and Unambiguous Feedback (M=3.89) were the highest scored dimensions among the students, contradicting low scores on the Autotelic Experience indicator in Wrigley & Emmerson's (2013) study. However, Sinnamon et al. (2012) questioned the validity and low means of certain subscales of this test, highlighting that this raises doubts about the importance of some indicators of flow in music (e.g., merging of action and awareness, loss of self-consciousness). While participants scored higher in the global flow measure (summative score), scores in indicators like Loss of Self-Consciousness and Action-Awareness Merging were significantly lower when compared with other flow dimensions.

There may be two possible explanations for these problems. Firstly, the wording of the items designed to measure these dimensions might be more appropriate in the sports domain than music, because, as the author highlighted, in music 'there is the expression of emotion, presentation, communication and rapport with an audience, evocation of emotion in others, duty to a composer's wishes through communication of music to an audience, and the production of sound' (Sinnamon et al., 2012, p. 9), characteristics that might not be adequately expressed in the original formulation of items. Secondly, another explanation for these divergences between both studies (Sinnamon et al., 2012; Wrigley & Emmerson, 2013) may be that, while one study relies on the participants' previous memories, the other is based on flow rates measured immediately after a performance in the context of an examination. Moreover, when comparing the flow experiences of amateurs with the elite music students, no significant differences were found in Sinnamon's et al. (2012) study, a pattern also found in Wrigley & Emmerson's (2013) study.

As in Sinnamon et al.'s (2012) study using the DFS-2 scale, Marin & Bhattacharya (2013) also found low means for the 'loss of self-consciousness' indicator (M=2.78) (Table 2). The study investigated relationships between dispositions to flow, practice routines, repertoire preference and emotional intelligence in professional

pianists. Ranking the subscales, results of this study indicated that Clear Goals (3.74), Autotelic Experience (3.66), Challenge-Skill Balance (3.53) and Transformation of Time (3.50) were the dimensions with the highest means (Table 2). Furthermore, a correlational analysis between all subscales and global flow indicated that, while all subscales correlated with the global measure, some of them (i.e. loss of self-consciousness, transformation of time and unambiguous feedback) showed only moderate correlations, suggesting that the contributions of all dimensions to the overall flow are not equally important, a conclusion similar to the findings of Sinnamon et al. (2012).

Steckel (2006) used a 'Flow Facilitator measure' to identify to what extent each item of a set of questions contributed to obtaining flow. The scale was developed in the field of sports and comprises 35 items describing possible facilitators of flow based on the author's previous in-depth interviews with athletes about the factors that they thought helped them to achieve flow. In this measure, participants are asked to mark from 1 (‘does not help at all’) to 5 (‘helps a great deal’) to what extent each factor contributed to the achievement of flow. ‘Being prepared physically’, ‘Having a consistent pre-performance routine’, ‘Feeling confident in my ability to perform’, or ‘Having a good awareness of the environment’ are examples of items used in that scale. Although the scale proved to be reliable (Cronbach's Alpha = 0.82), no validity evidence was presented. Mean scores were found between 3.21 and 4.43 (Table 2). Findings from this study will be commented on the section devoted to influential factors of flow experience (Section 2.4.1.2). Steckel (2006) also used the Flow State Scale-2 to measure flow state in the research participants. Again, low loadings were found for Loss of Self-Consciousness (M = 3.21), and Autotelic Experience dimension achieved the highest scores (M = 4.43).

The results of de Manzano et al.’s study (2010) did not follow the same pattern for Loss of Self-Consciousness. Loss of Self-Consciousness was highly reported in their study (M=4.38). Using the Short Flow Scale, the authors investigated psychophysiological correlates of flow state in the performance of rehearsed pieces by professional pianists in an experimental study environment. This study differs from all

other approaches reviewed so far, since they measured flow five times in order to analyse fluctuations on flow, trying to embrace the assumption that flow can be varied in time and long-lasting. High ratings were obtained for most of the dimensions, with an exception for Transformation of Time (M=3.39).

Findings of the articles mentioned in this section are presented in Table 2.

Table 2

Flow indicators: Ratings in quantitative studies

	Wrigley & Emmerson (2013)		**Steckel (2006)**		**Sinnamon et al. (2012)**		**De Manzano et al.* (2010)**		**Marin & Bhattacha-rya (2013)**		**Avera-ge**
Flow indicator	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**
Clear Goals	4.12	.57	4.22	1.0	4.01	.74	4.1	.78	3.74	.79	4.04
Unambiguous Feedback	3.78	.71	4.12	.56	3.89	.81	4.39	.65	3.50	.65	3.94
Challenge-Skill Balance	3.61	.70	4.08	.72	3.71	.66	4.51	.18	3.53	.60	3.89
Autotelic Experience	3.51	.94	4.43	.68	4.18	.83	3.77	1.18	3.66	.80	3.91
Action-awareness merging	3.37	.74	3.87	.75	3.45	.72	4.04	1.01	3.21	.60	3.59
Full Concentration	3.53	.86	3.70	.83	3.61	.77	3.87	1.22	3.24	.58	3.59
Sense of Control	3.28	.75	3.92	.68	3.50	.80	3.97	1.01	3.14	.52	3.56
Transformation of Time	3.28	.94	3.76	.81	3.70	.95	3.39	1.13	3.50	.78	3.53
Loss of Self-Consciousness	3.12	.95	3.21	1.03	2.84	1.03	4.38	.72	2.78	.84	3.27

Notes. *The loadings were proportional converted in a 5-point scale as a way to compare it with other studies.

Average = Average loadings per indicator

2.3.2.1.1 Comments

The adaptation and validation of flow questionnaires to music has emerged as another important research area. Validating scales from other fields may represent an important step to assess flow as a multidimensional construct, exploring the occurrences of isolated flow indicators and associations of these with other constructs. Also, through these studies one may inspect quantitative variations in the experience related to the distinct investigated contexts. However, studies in this category have presented some shortcomings with determined flow indicators.

In the adaptation of the Flow State Scale, Transformation of Time provided weak prediction and variance explanation in the Wrigley & Emmerson's (2013) study, a problem also found in sports (Jackson et al., 1998). In contrast, Transformation of Time was present in the majority of the musicians' reports (section 3.1.1). This contradiction may reinforce the conclusion that the importance of flow indicators in music may vary depending on the musical activity. A similar result was found for Loss of Self-Consciousness. Low loadings for the Loss of Self-Consciousness indicator reported in these quantitative studies raise uncertainty about the equal importance of all dimensions of flow for music or about the relevance of items in capturing this dimension of flow. Together, the low scores for loss of self-consciousness dimension of flow are problematic, as this was previously referred to as 'the most telling aspect of the flow experience' (Sinnamon et al., 2012, p. 17). It seems that the high ratings for Loss of Self-Consciousness in the study of de Manzano et al. (2010) is influenced by the study design. A musician playing a rehearsed piece for the fifth time may be more able to concentrate and to forget him/herself in a fifth execution than the first one.

Other studies have reported similar problems. Steckel (2006) also found that, while the mean for the global flow measure was relatively high ($M = 3.92$, $SD = .48$), only 14 participants (of the 155) experienced all flow dimensions, providing further evidence that some of the flow indicators may be less important or less experienced in the musical performance domain. Nevertheless, high standard deviations found in these indicators (Table 2) confirm that there was much disagreement about this experience in

the context of musical performance, also supporting the ephemeral essence of the experience.

2.3.2.2 Researchers developing their own questionnaires

Some researchers in the domains of musical performance and musical education developed their own questionnaires for measuring flow facilitators and contexts in musical activities (Araújo & Andrade, 2011; Araújo & Andrade, 2013; Bloom & Skutnick-Henley, 2005; Diaz & Silveira, 2012; Marin & Bhattacharya, 2013). Studies in this category have designed their flow items based on findings from previous qualitative research. The following section will explore and discuss the available questionnaires.

2.3.2.2.1 Questionnaires assessing conditions for flow

Based on findings from their case study with two musicians (Araújo & Andrade, 2011), Araújo & Andrade (2013) developed a questionnaire for measuring conditions for flow, represented by components of musical practice associated with flow experience (Araújo & Andrade, 2011). The items were organized within categories defined as facilitators of the flow experience in musical practice, namely motivation and repertoire contribution (e.g. 'repertoire is a crucial factor for my personal motivation'), concentration while practising, self-confidence and self-competence, (e.g. 'I play my instrument well'), goals and use of strategies, and emotions (i.e. 'pleasure/joy in playing the instrument'). The results of this study showed that the students achieved high scores in the measured behaviours. Despite the fact that the developed scale does not measure flow per se, the study of Araújo & Andrade (2013) highlights the importance of the establishment of conditions for the experience of flow. However, one limitation in this study is the small sample (only 33 students), which did not allow for the use of inferential statistical techniques. Therefore, the correlations between practice behaviours and flow experience are explained qualitatively. A larger and randomly selected sample could have contributed to the reliability and validity of the questionnaire, and would have allowed

for the exploration of associations, differences and predictions of the components that might contribute to understanding the flow experience in relation to demographic factors.

Similarly, Bloom & Skutnick-Henley (2005) developed a questionnaire with the purpose of measuring 'flow proneness' or 'the ability of musicians to get into flow when they play their instruments' (Bloom & Skutnick-Henley, 2005, p. 24). The questionnaire is divided into two parts, one qualitative and the other quantitative. In the qualitative part, a write-in section asked the musicians to describe a recent flow experience in music making. In order to be considered as an optimal experience, five elements were required in the write-in descriptions: it stood out as a special musical experience; it involved total absorption; the goals were clear; there was confidence in task accomplishment; and attention was focused on the music and not on task-irrelevant thoughts. There was no description about the construction of the items for the quantitative part of the questionnaire, and the authors did not clearly explain how flow proneness was measured. Nonetheless, the results of this study indicated five predictors of flow in musical activities: (1) self-confidence and self-trust while playing or singing, (2) the desire to experience and express feelings through music, (3) having musical experience goals, (4) the ability to maintain focus on the music while playing/singing, and (5) the ability to play/sing without destructive self-criticism.

The same questionnaire was applied in a later study about flow and music performance anxiety (Kirchner et al., 2008). In this study, it was possible to find a reference relating to the quantitative items measuring flow proneness in the original Bloom & Skutnick-Henley's (2005) study. This construct was assessed by a scale comprised of four items: '(1) 'I have often had similar 'flow-oriented' musical experiences in the past year'; (2) 'While singing or playing my instrument, I can usually get into similar 'flow' states easily'; (3) 'I rarely or never get into 'flow' states while singing/playing music' (to be reverse-scored); and (4) 'When possible, I choose to sing/play music that is likely to get me into flow' (Kirchner et al., 2008, p. 61).

Investigating flow in relation to emotional intelligence in highly skilled pianists, Marin & Bhattacharya (2013) also developed their own questionnaire on flow. The

instrument involved three scales: flow and performance, flow and musical styles/composers, and flow and musical emotions.

The flow and performance scale includes six questions assessing features related to the experience of flow during performances, as follows:

> The number of flow states during piano performance and music listening (e.g., Would you agree that flow states in piano performance can only be reached when the piece is nearly ready for a public performance?), the relationship between flow, motivation (Would you agree that the experience of flow keeps you motivated to practice the piano and to become better?) and life-satisfaction (Do you experience a high degree of life satisfaction after the experience of flow in piano performance?) as well as the occurrence of flow by defining flow according to Csikszentmihalyi's concept (1990) prior to these questions. (Marin & Bhattacharya, 2013, p. 7)

The flow and musical styles/composers questionnaire included five questions regarding whether flow is experienced more according to musical genre (i.e. 'Do you feel that you experience flow states more often when playing certain musical styles?'), and what musical style and composers have most frequently induced flow. Finally, several questions regarding flow and a diverse set of emotions were administrated. For example, the items 'Do you experience intense happiness and enjoyment WHILE being in a flow state in piano performance?' and 'Do you experience intense happiness and enjoyment shortly AFTER the experience of flow in piano performance?' were designed to measure the relationship between flow and happiness in the context of piano performance.

The questionnaire also included questions assessing the role of musical emotions in the induction of flow (e.g. 'From your own experience, do you feel that flow states are more easily induced by certain types of emotions expressed by a piece?'), changes in the emotional content of a piece (e.g. 'Would you agree that flow states appear less frequently when the emotional content of a piece is varying a lot over the course of a piece?'), and effect of certain emotions on flow (e.g. 'Do you feel that flow states are

more easily reached when the piece induces emotions in you that you particularly like in general?').

2.3.2.2.2 Questionnaires assessing contexts and activities of flow

Assessing what contexts and activities produced flow in a summer music festival, Diaz & Silveira (2012) developed a questionnaire partially based on the original flow concept. The instrument asks participants to think if they remember being 'so absorbed or focused on an activity that nothing else seemed to matter' (Diaz & Silveira, 2012, p. 4) at some point during the festival. When answering yes, the participants were asked to highlight one or more activities in which they experienced flow. The list included academic and social activities. Among the academic ones, some of them were rehearsals (band and orchestra), master and elective classes, individual practice time, theory class, and performing in a concert, amongst others. Examples of social activities included talking with friends, mealtime, watching TV, and computer time, amongst others. Finally, the participants were asked to describe how attentive and how much they enjoyed their top-three flow activities, completing a 10-point Likert-scale.

2.3.3 Summary

The topics outlined above suggest that there is a need for new measures of flow specific for the domain of music. Little research has been conducted aiming to develop new instruments for the measurement of flow. Findings from the studies reviewed also suggest that the nature of the flow experience in music performance may be influenced by situational and personal factors that might contribute to its achievement (see next section). Studies that have developed measures of flow facilitators (Araújo & Andrade, 2013; Bloom & Skutnick-Henley, 2005; Kirchner et al., 2008) have highlighted factors that may contribute to the achievement of flow in musical activities. Nevertheless, studies in this category do not provide validity indicators for these measures, and more research is necessary as a way to test the measures' construction in other individuals and contexts.

Equally important is the development of new possibilities for measuring flow in musical performance. Although researchers have shown reliability and validity of measures in other domains such as sports (e.g. Wrigley & Emmerson, 2013; Sinnamon et al., 2012), there is no agreement about the importance of all dimensions of flow in the domain of music. As a result, findings based on overall flow scores and on participants' reported flow states measured by these questionnaires might have been biased.

2.4 Flow occurrence

The following section provides an overview of research on flow occurrence in musical performance. This part is divided into two main sections. Firstly, situational and personal factors affecting the flow experience in musicians are presented. These were gathered from musicians' reports and interviews, and from questionnaires. The studies in this category have attempted to investigate the effect of particular musical activities (e.g. musical festivals, practice, performance) and behaviours in flow occurrences. The second part discusses the associations between flow and other constructs.

2.4.1 Influential factors: Facilitators and inhibitors of the flow experience

Seven studies suggested situational and personal factors that influenced flow occurrences in musicians (Araújo & Andrade, 2011; Bloom & Skutnick-Henley, 2005; Diaz & Silveira, 2012; Fritz & Avsec, 2007; Guster, 2013; Kirchner et al., 2008; Steckel, 2006).

2.4.1.1 Situational factors: Contexts and activities

While two studies suggested that evaluative environments might reduce the possibility of flow experiences in musicians (O'Neill, 1999; Wrigley & Emmerson, 2013), other studies have attempted to establish in what contexts and activities flow may occur more frequently. Diaz & Silveira (2012) explored the occurrence of flow in high school music students attending a summer musical festival. Although the ages of the participants were not provided, one may infer that these were between 14 and 18 years

old (i.e. between 9th and 12th grade, high school in the USA). To ensure that the participants had experienced flow at some point during the summer camp, Diaz & Silveira (2012) employed part of the original flow concept (i.e. being so absorbed or focused on an activity that nothing else seemed to matter). However, while one can recognise the Concentration and Loss of Self-Consciousness flow indicators in the description, it seems that this definition of flow fails to fully acknowledge all of the dimensions of flow. In other words, absorption or focus on an activity can be experienced within other states such as anxiety (Kenny, 2011), preoccupation or worry, amongst others.

Despite that, the results of this study are worthy of consideration in relation to the aspect of concentration and absorption in an activity, both included in the Loss of Self-Consciousness flow dimension, referred to as problematic in flow measurement studies in music (Section 2.2). The results indicated that all participants experienced concentration and absorption (i.e. 'when they were so absorbed or focused on an activity that nothing else seemed to matter') at least once during the festival. After checking for agreement among the participants regarding flow-inducing activities, the authors suggested that ‘a large variety of both academic and social activities were considered sufficient for inducing flow’ (Diaz & Silveira, 2012, p. 4). Moreover, Diaz & Silveira (2012) found that ‘large ensemble rehearsals', 'hanging out with friends' and 'elective classes' were the most reported activities. On the other hand, the least elected activities included 'watching TV' and 'using a computer'. The authors also found that academic activities represented the majority of the students' choices, with social activities representing only 18% of the answers. Among the academic activities, ‘large rehearsals’, ‘classes’ and ‘live concerts’ gave the highest scores. ‘Musical practice’ and ‘lessons’ obtained the lowest scores. Therefore, the authors suggested that ‘future studies should examine what strategies might be beneficial in helping to create and sustain flow experiences during individual practice sessions, and in other musical activities that require student-directed self-organization and evaluation’ (Diaz & Silveira, 2012, p. 8).

Following the suggestions of the previous study, which highlighted a need for the study of flow in the context of musical practice, Waite & Diaz's (2012) study was the first and only investigation attempting to examine flow experience during individual musical practice. For this purpose, 20 volunteer ensemble musicians made video recordings of three 30-minute practice sessions and answered a questionnaire at the end of each session. Based on literature not pertaining to the music domain, flow in their study was defined as (a) total concentration on an activity and the enjoyment which one derives from an activity; (b), a balance between the challenges perceived in a given situation and the skills a person brings to it; and (c) a sense of control over one's environment (Waite & Diaz, 2012). The questionnaire comprised perceived aspects of skill, challenges, playfulness, concentration, control and enjoyment. Other flow aspects such as clear goals, feedback and time transformation were not included. For the analysis, practising behaviours were coded as 'on-task' (i.e. playing the instrument, marking or studying the music, listening or playing along with a recording, adjusting the instrument, singing, and purposeful breathing) and 'off-task' (i.e. checking a cell phone, staring into space, drinking water, leaving the practice room, talking to friends, and stretching).

Results of this study indicated that there were no differences in each flow-related construct according to the participants' ability level, a similar finding to other studies (Sinnamon et al., 2012; Wrigley & Emmerson, 2013), but 'on-task' practice time was positively associated with flow. Although the authors mentioned that their participants attained high ratings for all flow constructs, the article did not present any numerical data. The authors considered that flow was experienced during musical practice because 'ratings for skills and challenges were relatively balanced, and perceptions of playfulness and enjoyment were notably high' (Waite & Diaz, p. 15). The authors concluded that practice sessions could be structured to promote flow by providing and articulating musical challenges with attainable goals for students, developing self-assessment as a form of feedback, and allowing students to have partial control over goals and feedback as a way to foster personal autonomy. Moreover, since this is the only study about flow in the context of musical practice, the value of this investigation is confirmed by the

reliability of the method for examining flow in practice, presenting a new possibility for studying flow state in musical activities.

Under- and postgraduate students also reported experiencing flow during several musical activities in Fritz & Avsec's (2007) investigation. The participants were asked to describe what musical activity 'provoked the strongest, the most pleasant, or the most special feelings' (Fritz & Avsec, 2007, p. 10). 'Public performance', 'singing in a choir', and 'playing in an orchestra' were the most prominent situational factors related to flow. These findings suggest that group performance activities are especially conducive to flow. Bloom & Skutnick-Henley (2005), in contrast, found that the majority of flow experiences occurred in non-performance situations for their participants. Unfortunately, the authors did not provide examples of these non-performance activities. They also found that many flow experiences also occurred while playing in ensembles, and music from the Romantic and Classical period was more frequently related to flow (Bloom & Skutnick-Henley, 2005).

2.4.1.2 Personal factors

Findings from 4 studies (Araújo & Andrade, 2011; Bloom & Skutnick-Henley, 2005; Kirchner et al., 2008; Steckel, 2006) have suggested personal factors that could be identified as 'facilitators' or 'predictors' and 'inhibitors' of flow occurrence. Bloom & Skutnick-Henley (2005) referred to 'self-reliance' as the most significant predictor, followed by the 'ability to focus on the music', 'to have experience goals' and 'the ability to play without self-criticism'. When asked about what led them to a flow experience, participants reported on six dominant categories: 'love of music' or the emotional engagement with the music to be played; 'familiarity with the music', identifying previous knowledge and practice as important factors; 'emotionality' (this term is not clearly defined in the paper), which is related to the ability of control emotions; 'letting go' or a mix of relaxed mood and a sense of being in control; 'connection/rapport' or the ability to connect with others; and 'concentration/focus'.

Steckel (2006) also found facilitators that participants perceived as important for the flow experience. These included ‘being mentally prepared, having fun performing, and having a positive attitude’ (Steckel, 2006, p. 40). Other potential facilitators included ‘being alone before a performance, not being concerned about others around me and receiving a pep talk prior to a performance’ (Steckel, 2006, p. 40). Guster (2013) found other influential factors of flow experience in musicians, namely aspects of the environment (i.e. audience, quality of the instrument), the musical structure as narrative, the musicians' relationship to the music and prior preparation, and the musician's approach and state of mind during performance.

Deriving data from interviews with two professional musicians, Araújo & Andrade (2011) discussed and identified the presence of some flow characteristics in two musicians from distinctive musical genres. Musicians' goals in practice organization and challenge management, concentration during practice and performance and emotion as positive feedback after concerts were suggested as relevant personal factors for flow occurrence.

2.4.1.3 Comments

Findings from these studies suggest that flow can be experienced in a wide range of musical activities and is influenced by distinct behavioural factors. Regarding contexts and activities, and despite the ever-present divergence in the conceptualization of flow for participants, studies suggest that flow is more frequently experienced in ensemble activities and performance, when compared with other individual activities such as practice or lessons. Interestingly, reports on performance-related flow tend to include aspects associated with total immersion in an activity (e.g. absorption, concentration), whereas aspects related to challenges, skills, goals and feedback are clearly more present in contexts such as practice and other individual activities (Araújo & Andrade, 2011; Waite & Diaz, 2012). Accordingly, this may suggest that the experience of the different flow indicators might be dependent on the nature of the musical activity.

Equally important, results from studies about personal factors suggest that flow experience in music is facilitated by factors that may transcend the balance between the perceived levels of skill and difficulty of the task. Musicians' reported facilitators of flow tend to flag factors related to repertoire (e.g. familiarity with the music, to like the music, to consider the musical structure as a narrative, relationship with the music), and positive attitudes toward the musical activity (e.g. ability to play without self-criticism, 'letting go', having fun performing). Positive emotions, concentration and goals were also suggested as main contributors to the flow experience, according to musicians' reports.

These studies, however, did not explore whether these factors are facilitators of the flow occurrence or components of the experience *per se*. For instance, not having a sense of being controlled by something else is similar to descriptions of loss of self-consciousness dimension. In addition, concentration (i.e. Concentration on the task at hand) was originally defined as a clear component of the flow experience, and not a condition as reported by these participants.

2.4.2 Associations with other factors

Six studies have explored correlations between flow and wellbeing (Fritz & Avsec, 2007), flow and performance achievement (O'Neill, 1999), flow and music performance anxiety (Fullagar et al., 2012; Kirchner et al., 2008), flow and psychophysiological measures (de Manzano et al., 2010; Thomson & Jaque, 2011), and flow and emotional intelligence (Marin & Bhattacharya, 2013).

2.4.2.1 Flow and performance achievement

Peak performance is conceptually similar to flow. Whilst these constructs share similarities (Privette & Bundrick, 1983), connections between flow and peak performances and high achievements have been demonstrated across many different disciplines. However, only one study about the impact of flow in musical performance could be located. Using the Experience Sampling Method approach, O'Neill (1999) examined to what extent flow experiences accounted for differences in the amount of

time young musicians with different levels of competence (N=60; ages between 12 and 16) spent practising and their levels of performance achievement. The results showed that moderate achievers from a specialist music school reported fewer flow experiences when practicing than their high-achieving peers at the same school and musically active young people attending a non-specialist state school. These results suggest that there is an association between context and flow, and that 'it is possible that the evaluative context of a specialist music school contributes to the reduced flow experiences of students who are considered less musically able by the school's standard' (O'Neill, 1999, p. 133). Moreover, a positive relationship between high achievement in music performance and the number of experienced flow states was also found, suggesting that flow may have an impact on musical performance achievement in young students.

Surprisingly, a positive relationship between flow and high performance achievement was not found in Marin & Bhattacharya's (2013) investigation, contradicting the findings of O'Neill (1999). A possible explanation for this might be the age or expertise difference between the samples. While O'Neill's (1999) study was undertaken with young music students, Marin & Bhattacharya's (2013) sample comprised professional pianists. Moreover, the same study found a positive association between practice time and flow (a result also found in Waite & Diaz's study), which may explain the notion that practice quantity alone may not predict performance improvement and expertise acquisition (Gaunt & Hallam, 2011; Hallam & Barry, 2002; Jørgensen & Hallam, 2011).

2.4.2.2 Flow and wellbeing

Fritz & Avsec (2007) found associations between flow dispositions and wellbeing. Three questionnaires were applied to a sample of 84 students from a national music academy: Dispositional Flow Scale 2 (DFS-2), the Satisfaction with Life Scale and the Positive Affect Negative Affect Scale. The students (mainly piano players) were enrolled in music pedagogy (n=44), and performance and composition courses (n=40). Unfortunately, the study lacks details regarding demographical information (e.g. age,

performance experience), so we cannot infer about participants' levels of musical expertise.

Firstly, the authors investigated which musical activities provoked the experience of flow most frequently, asking the participants which activities provoked 'the strongest, the most pleasant or the most special feelings' (Fritz & Avsec, 2007, p.10). The most cited musical events were 'performance/concert', 'playing an instrument or singing' and 'performance preparation' (see Section 2.3.1.1). However, the lack of a clear flow operationalization/definition means that there is uncertainty about the strong feelings of the participant being regarded as flow. Recent research has demonstrated that there are many other strong experiences related to music making (see Gabrielsson, 2011 for a comprehensive review). Among the specific flow dimensions, challenge skill balance, clear goals and autotelic experience were the most significant predictors of the measured aspects of subjective wellbeing. Interestingly, time transformation and loss of self-consciousness were not related to any aspect of wellbeing.

2.4.2.3 Flow and anxiety

Flow and musical performance anxiety seem to be negatively related to one another. Two empirical studies and one theoretical study have tried to clarify the relationship between both states in musical performance.

Kirchner et al. (2008) surveyed 90 music students enrolled in musical performance courses in an American university. The Music in Flow Survey (Bloom & Skutnick-Henley, 2005) comprises items regarding the musicians' flow experience while playing a musical instrument or singing. Flow proneness, a key measure in this survey, included five predictors of flow found in their previous research: self-confidence and self-trust while playing or singing, the desire to experience and express feelings through music, having musical experience goals, having the ability to maintain focus on the music while playing/singing, and the ability to play/sing without destructive self-criticism.

The results of Kirchner et al.'s study (2008) indicate that, with the exception of 'having musical experience goals', all flow elements (i.e. self-confidence and self-trust

while playing or singing, desire to experience and express feelings through music, ability to maintain focus on the music while playing/singing, and ability to play/sing without destructive self-criticism) were found to be significantly and negatively related to musical performance anxiety. Because the correlations were weak, the authors suggested that flow and anxiety could occur simultaneously.

The study of Fullagar et al. (2012) investigated the relationships between flow, the challenge-skill balance dimension and performance anxiety in a specific musical task. The study considered Clear Goals, Unambiguous Feedback and Challenge-Skills Balance dimensions as flow conditions. Thus, the variable flow in this study was measured by the sum of scores of the other six dimensions. 27 university music students (mean age = 21.7) voluntarily participated in the study, and were asked to practice sections of a piece of music to be played at a musical exam. After each practice session, they responded to a survey assessing 'perceived challenge' (of the section practiced), 'perceived skill' (or perceived capability to play the section), 'momentary performance anxiety' while playing each passage of music, and flow. For the measurement of flow, the author utilized the six items of the flow state scale (enjoyment, concentration, action-awareness merging, loss of self-consciousness, time transformation and sense of control). The results indicated that the participants' level of perceived skills has influenced all of the relationships among the variables. Confirming flow theory, flow was more likely to occur when there was a balance between challenges and skills. The authors also observed that flow and anxiety were antithetical experiences; thus, when flow was highest, performance anxiety was lowest, and vice versa. Performance anxiety was significantly related to mismatches between perceived high challenge and skills.

Considered together, studies on this facet of flow research suggest that flow and anxiety may be negatively related. Based on this, Kirchner (2011) also suggested practical applications of flow theory in an attempt to counterbalance musical performance anxiety. Based on the writings of Csikszentmihalyi (1990), the author suggests the following strategies to minimize prejudicial anxiety:

> Being certain that the repertoire does not exceed an individual's skill level prevents boredom and anxiety and allows the individual to be confident in their undertaking. Being immersed in the music helps the performer to remain in the present moment and wards off any task-irrelevant thoughts. Establishing goals promotes focus and diminishes distractions. Providing feedback supplies the information to assess progress towards established goals. A feeling of being in control, without necessarily consciously controlling the situation, counterbalances the sense of losing control present in performance anxiety. Forgetting about the self allows the focus to shift from the performer to the music. (Kirchner, 2011, p. 295)

However, there are no studies that have empirically tested the referred flow strategies as a means to overcome musical performance anxiety, and this could become a pertinent subject for future research.

2.4.2.4 Flow and physiological factors

Using psychophysiological measures to study flow experience is an emergent area (Bruya, 2010; Peifer, 2012). In researching the physiological aspects of flow in professional pianists, de Manzano et al. (2010) found significant relationships between flow and heart rate, blood pressure, activity of the zygomaticus major muscle and respiratory depth. The authors concluded that flow is a 'state of effortless attention, which arises through an interaction between positive affect and high attention' (de Manzano et al., 2010, p. 301). A decrease in cardiac autonomic balance (CAB) and regulatory capacity (CAR) was also found by Thomson & Jaque (2011), who conducted the first empirical study investigating correlations between psychophysiological states of flow in live musical performance. Although invasive in nature, these interventional studies have suggested that flow may not only be psychological, but also a physiological state.

2.4.2.5 Flow and emotional intelligence

To date, Marin & Bhattacharya's (2013) study is the only one to explore the connections between flow in music and emotional intelligence, a more general aspect of personality. 76 highly skilled pianists were asked to fill in a questionnaire comprising the Dispositional Flow Scale-2 (DFS-2), a standardized questionnaire to measure trait emotional intelligence, and a researcher-developed questionnaire on the context of musical emotions and musical style (its structure is explained in the Section 2.3.2.2).

The results of this study showed that both the amount of daily practice and emotional intelligence were significantly related to flow. The findings stated that, 'the higher the trait emotional intelligence of a piano performance student, the more prone is s/he to experience flow' (Marin & Bhattacharya, 2013, p. 19). In addition, the total amount of daily practice was directly associated with flow and this result was not dependent on emotional intelligence. On the other hand, demographical variables like gender, age, and musical training did not predict flow, a finding present in other studies reviewed in the previous sections. Overall, the results of Marin & Bhattacharya's (2013) study highlight the role of musical emotions and musical styles in the induction of flow, supporting the idea that emotion can play an important role in flow dispositions in musical practice and performance.

2.4.2.6 Comments

Research in this category explored associations between flow and other factors in musical performance. The number of flow experiences was positively associated with performance achievement in young students (O'Neill, 1999), but this relationship was not found in a study with professional pianists (Marin & Bhattacharya, 2013). Because flow is not affected by age and other demographical factors in the majority of the studies reviewed so far, it is difficult to assume that this divergence is due to differences in levels of musical expertise in the samples. A possible explanation for this lies in the different contexts investigated. While frequency of flow in the students' different activities (i.e. productive, leisure and maintenance activities) was taken into consideration in O'Neill's

(1999) study, flow was taken into consideration only in relationship to performance events in the research conducted by Marin & Bhattacharya (2013). This is further evidence that flow in musical activities is very dependent on the context of the activity.

There is a surprising lack of empirical research testing the relationships between flow and performance quality in music, particularly as flow has been found to be related to performance optimization in domains outside music such as sports. Wrigley & Emmerson (2013) found that low scores on specific flow indicators, including Autotelic Experience, Full Concentration and Sense of Control, were associated to students' poor performance in a college audition. Other studies have found that flow indicators were present in descriptions of 'good' (i.e. optimal, successful) musical performances (e.g. Bellon, 2006; Clark et al., 2014), although the sample comprised professionals in these studies. Together, these results suggest that the relationship between flow and performance in novice and students that are developing expertise in music tends to be more affected by the context, whereas relationships between flow and performance in professionals is usually reported in the context of a live performance and moderated by personal and strong feelings (e.g. 'I can trust my instinct, I can trust my physical capabilities, and at the same time I can allow control to be put to the side and to let myself run without control'). Although several authors suggest strategies for the promotion of flow in performance (e.g. Bloom & Skutnick-Henley, 2005) and relationships between flow indicators and essential components of performance optimization (e.g. Araújo & Andrade, 2011), more research is needed to clarify the nature of the relationship between flow experience both as trait or state and the quality of outcomes in musical activities (e.g. public performances, rehearsals, practice, etc.).

The relationship between flow and performance anxiety requires further research, mainly because the enhancement of flow in musicians may work to prevent musical performance anxiety. Performance anxiety is difficult to treat and reductions of anxiety levels after treatment are a challenge (Kenny, 2011). Studies in this category provide early evidence that flow may be negatively related to anxiety. Some flow indicators (i.e. Challenge-Skills Balance, Clear Goals and Autotelic Experience) have been found to be

positively related to wellbeing, although Loss of Self-Consciousness and Transformation of Time were not found to be related to any aspect of wellbeing. This reinforces the hypothesis of non-adequate item formulation for these indicators in the context of music.

The relationships between flow and emotional intelligence in professional musicians provide evidence that personality may be an important contributor of flow in musicians. Physiological measures can also contribute to verifying psychological effects while a musician is reporting flow, as interpretation of musicians' reports can constitute a challenge to flow research in musical performance.

2.4.3 Summary

The present section reviewed studies presenting data related to the occurrence of flow in musical performance. Identification of commonalities and divergences related to flow occurrences may help the promotion of flow in musicians, providing teachers, researchers and advanced[3] musicians with information about the common contributors and disruptors of the experience. A summary of facilitators and inhibitors of flow experience in musical activities is presented in Table 3.

Studies reviewed in this section suggest that flow can be experienced in many different musical performance activities, although it was more cited in ensemble and live performance activities. The concept of 'shared' or 'combined' group flow, in which 'all those involved [in the group] are experiencing the nine characteristics of individual flow while concurrently engaging in a shared goal-oriented activity' (Hart & Di Blasi, 2015, p. 4) opens a research window for a more specific exploration of flow in group musical activities. Regarding young musicians, flow was experienced in solo and ensemble

[3] In this thesis, *advanced musicians* are defined as those adult musicians who have more than 10 years of practice experience with their main instruments (Ericsson et al., 1993), but also those engaged in higher education music performance courses. Even though they may have less than 10 years of experience, these *advanced musicians* are learning musical skills and strategies for professional engagement (i.e., pre-professionals). From the perspective of skill acquisition, advanced musicians are autonomous, highly skilled individuals when engaged with musical activities, including practising (Papageorgi et al., 2010). Accordingly, *expert musicians* are only those with more than 10 years of practice experience in the field of music performance.

performances, ensemble rehearsals, master classes, and individual practice. On the other hand, flow in expert and professional musicians was mostly explored in the context of solo performances. Further studies would be needed in order to verify the occurrence of flow in more experienced musicians in other contexts, such as ensemble performance and individual practice. Recently, theoretical and empirical studies have started to investigate flow in musicians in other genres such as jazz (Hart & Di Blasi, 2015; Mazzola, 2008).

Repertoire, positive attitudes towards the musical activity, positive emotions, concentration, goals and preparation for performance were all found as possible contributors to the emergence of flow in musicians. It is interesting to note that some factors affecting musical performance have much in common with factors that contribute to the emergence of flow in elite athletes, such as focus, physical and mental preparation, and confidence, amongst others (Jackson, 1995). Regarding repertoire, the emergence of clear goals for the learning process of new repertoire was associated with the capacity of having or developing a 'big picture' or a personal artistic image of the piece in professional musicians (Chaffin et al., 2002), and this may contribute to foster flow through the clarification or refinement of goals in relation to the repertoire, also resulting in a more focused and narrowed concentration in relation to particular challenges of the musical pieces.

Table 3

Factors identified as influencing flow in research on music performance

Construct	**Examples from the studies**	**Studies**	**Facilitate (F) Inhibit (I)**
Goals	Having process, experiential goals; clear goals.	1, 4, 7, 11	F
Preparation	Being mentally prepared, preparation for performances	2, 3, 6, 7	F
Emotions and	Desire to experience and express feelings	2, 6, 7	F

thoughts	through music; fun performing; positive attitude		
Arousal	Combination of adrenaline rush; relaxed mood	1	F
Repertoire	Appropriate repertoire; to love the music; previous knowledge of the music	1, 4, 6, 7	F
Focus, attention	Focus on the present and total absorption; focus on the music	1, 4, 11	F
Feedback	Having immediate feedback; self-assessment	4, 10	F
Personal autonomy	Control over goals and assessment	10	F
Confidence	Self-confidence and self-trust while playing	1	F
Environment and situational conditions	Ensemble rehearsals, elective classes, public performances, performance with chamber groups, choir, orchestra, quality of the musical instrument	3, 5, 6	F
Environment and situational conditions	Audition, Evaluative environment	8, 9	I
Criticism	Playing with self-criticism	1	I
Self-talk	Inner monologues during performances	4	I
Anxiety	Being anxious	4	I

Notes. 1 = Bloom & Skutnick-Henley (2005); 2 = Steckel (2006); 3 = Fritz & Avsec (2007); 4 = Kirchner et al. (2008); 5 = Diaz & Silveira (2012); 6 = Guster (2013); 7 = Araújo & Andrade (2011); 8 = O'Neill (1999); 9 = Wrigley & Emmerson (2013); 10 = Waite & Diaz (2012); 11 = Brown (2011)

2.5 Flow in the context of musical practice

The studies reviewed so far suggest that, although flow is a beneficial psychological state for performing musicians, research aiming to investigate the phenomenon in musical practice is, in fact, scarce, in contrast to the number of studies relating to performance. Relatively few published studies have attempted to explore the nature of flow in musical practice, and how flow can benefit musical practice. Thus, to be able to better understand the importance of flow for musical practice, it is necessary to explore first how the musical practice of expert musicians is currently conceptualized, what are the common behavioural patterns in effective practice, and how practice relates to flow experiences.

2.5.1 Research problem

Musical practice is possibly the activity that takes up most of a musician's time. In the context of musical expertise, it is currently accepted that the quality of practice plays an important role in the improvement of performance, and, once a high level of proficiency is achieved, that practice needs to be continued in order to sustain the necessary skills (Krampe & Ericsson, 1996).

Traditionally, empirical studies about musical practice have mainly been concerned with how much practice is needed to achieve high levels of expertise in music, and how practice can be undertaken in such a way as to be more effective. The studies conducted by Ericsson and colleagues evidenced the role of the quantity of practice, and this was a step beyond the belief that musical expertise could be inherited genetically. Ericsson concluded that to achieve musical expertise ten years of deliberate practice in average is necessary (Ericsson, Krampe, & Tesch-Romer, 1993). The main evidence for this ten-year rule comes from biographical studies with professional musicians.

Beyond the quantity of practice, the nature of the effective practice conducted by expert musicians became a relevant research topic in the last decades. Several studies have highlighted the characteristics of effective practice among musicians. Music practice is deliberate when musicians set specific goals that lie somewhat beyond their

current level of performance, and try to attain those goals during bouts of intense concentration (Ericsson et al., 1993). In this kind of practice, there are explicit goals and the possibility of feedback (Lehmann et al., 2007). In other words, the approach to practice is deliberate when musicians: 1) have a well-defined task representing a personal challenge to overcome; 2) are concentrating as much as possible during the undertaking of the task to be accomplished; 3) have the persistence to repeat sections and correct errors; and 4) find alternative strategies to try to accomplish difficult elements within the task. Another perspective is to consider effective practice as an activity that achieves a desired end product in as short a time as possible without interfering with long-term goals (Hallam, 1997), with a prominent role for metacognition (i.e. knowledge about strategies and personal resources), a crucial element in musical practice processes (Hallam, 2001). Indeed, advanced musicians often adopt reflexive/metacognitive strategies during practice asking questions such as 'in what way should I play this passage?' or 'what strategy should I use to tackle this musical task?' (Nielsen, 2001), and evaluate executed tasks. Practice strategies are used flexibly, and expert musicians also have their own artistic conceptualizations of pieces to be studied (Chaffin & Lemieux, 2004).

The self-regulated learning paradigm also relates to the effectiveness of music practice (Miksza, 2011a). Research suggests that self-regulation is a key component of effective musical skills acquisition, having an impact on performance quality (Hallam, 2001; Hallam & Barry, 2002; Lisboa, Chaffin, Logan, & Begosh, 2007; McPherson & Zimmerman, 2011; Nielsen, 2004). From this perspective, music learning occurs through the interaction of social, cognitive, affective and motivational processes (McPherson & Zimmerman, 2011). Musicians self-regulate to improve their performance through managing and planning their own practising, choosing, modifying and adapting their own strategies. Phases of self-regulation include planning, performance and evaluation. Common self-regulated behaviours of advanced musicians include: self-setting goals, including goals' properties, orientations and goal efficacy; metacognitive thinking; planning and time management; environment control; self-evaluation; active search for resources; help-seeking; and internal causal attributions.

As seen, practice is a term often used to designate actions that have their conclusions in an end product. The outcomes or desired end products of practice are frequently referred to as *goals* in the music psychology literature. In fact, goals are present in every current notion of practice related to expert musicians, including the previously mentioned perspectives for efficient practice (i.e. deliberate practice, self-regulation). For instance, deliberate practice is defined as 'a structured activity often designed by teachers or coaches with the explicit goal of increasing an individual's current level of performance' (Ericsson & Lehmann, 1996, p. 695). Efficient practice is the practice that achieves a desired end product in as short at time as possible (Hallam, 1997), and formal practice is defined as 'a goal-directed and focused period of practice that includes both self-regulation and deliberate practice strategies' (Bonneville-Roussy & Bouffard, 2014, p. 686).

Thus, the main concepts of music practice (i.e. deliberate, formal, efficient) emphasize the purposes of practice, and not its process and experiential dimensions. There is a large body of research discussing how one should practice efficiently and correctly. Musical achievement, performance improvement, and even perfectionism, as described in *Does practice make perfect* (Jørgensen & Lehmann, 1997), are examples of concepts that express the perhaps unique outcome of interest in these approaches. This reflects a research context where being more productive in less time is the most important thing. Thus, aspects such as joy, happiness, self-realization, fun, delight and blissful absorption in a productive activity are largely neglected. Many people pursuing the development of musical expertise practice their instruments persistently for many years. During the long period required to make improvements through daily practice, musicians often are faced with boredom, frustration, and anxiety, and there can also be a sense of unfinished business (Chaffin et al., 2002; Mach, 1980; Parente, 2015).

On the one hand, the investigation of practice and its outcomes of interest (i.e. achievement, improvement, transfer of learning, expertise development) is interesting for developing scientific meaning, but a consequence of this is the inevitable reductionism of its understanding, which may hide or even omit other important elements in the lives of

musicians, like personal feelings and positive experiences that also contribute to performance achievement and self-realization. The lack of empirical investigation regarding optimal experiences in the context of musical learning may contribute to this problem.

Concomitantly, another side of the problem is that investigations in the field of expertise (Ericsson, Charness, Feltovich, & Hoffman, 2006) point to several problems and constraints related to the development of musical expertise. The achievement and maintenance of musical performance expertise, a process that, as commented earlier, occurs mainly through daily practice, is dependent on high levels of physical, psychological and general musical skills acquired through years of intense practice (Table 4). This high level of physical and psychological need for performance excellence in the field of music results in disconcerting health-related problems across professional musicians, which are well documented by research, including music performance anxiety, pain, and other physical and mental disorders (Ginsborg, Kreutz, Thomas, & Williamon, 2009; Kenny, 2011; Kreutz, Ginsborg, & Williamon, 2009; Parry, 2004). According to Altenmüller, Wiesendanger, & Kesselring (2006), musical expertise is a complex concept, because it involves not only tempo-space precision, but also the ability to memorize music, to be reliable, to retrieve the right neuron-motor programs in the right space, the ability to play emotionally, communicating with people, and the ability to behave as a professional musician. All these musical expertise features require movements that are, by definition, at the upper limit of bodily human capacity, and require the reproduction of the right tempo-spatial coordination, which will result in the error-culture of classical music (Altenmüller & Schneider, 2008; Goehr, 1992). The error-culture tradition results in perfectionist traits (Clark et al., 2014). To be an expert musician, it is also imperative to develop the ability to deal with strong emotional experiences (Gabrielsson, 2011) and experiences of joy, chills, anxiety and many others. Another, and no less important constraint of musical expertise, is the social environment and the presumed expectations about musical performance (Goehr, 1992; Rink, 2004).

Table 4

Prerequisites for 'excellence' in musical performance domain.

<table>
<tr>
<td>(a) Physical skills

General physical fitness, health
Relaxation; tension reduction
Musculoskeletal function
Cardiovascular function
Respiratory function
Movement generation; coordination</td>
<td rowspan="2">(c) General musical skills

General practice efficacy
Goal setting
Time management
Problem identification
Self-evaluation of skill
Evaluation of others' skill
Memorizing music
Sight-reading
Improvisation
Analytical music skills
Expressive range
Expression of emotions
Communication within the ensemble
Communication with the audience</td>
</tr>
<tr>
<td>(b) Psychological skills

General psychological well-being
General stress reduction
Management of stage fright
Concentration; attention
Memory
Sensory awareness; perception
Motivation; attribution</td>
</tr>
</table>

Note. Adapted from Williamon (2004).

Another issue of concern is that there are studies showing that 'the traditional educational routes through which a majority of professional musicians pass (at least those within the classical tradition) often put little or no emphasis on care of the body, prevention of injury and psychological well-being' (Williamon & Thompson, 2006, p.

413). These authors agree that it is important to provide musicians with skills for maintaining a fruitful and healthy career in music. Applied research has begun to offer advice for musicians so that they become aware of their psychological and physical problems (Williamon, 2004; Williamon & Thompson, 2006). That research perspective has provided institutions and musicians with knowledge about methods for preventing medical problems, awareness of physical and mental resources available, and the establishment of health-related support services for musicians (Williamon & Thompson, 2006).

2.5.2 Investigations about flow and musical practice

Although research on the music practice of experts does not usually include motivation as a dependent variable, studies have started to shown an association between flow experience and musical practice. Butkovic, Ullén & Mosing (2015) found that musical flow proneness[4] was the most significant predictor of total hours of music practice throughout the lifetime of a sample of adult musicians. Marin & Bhattacharya (2013) also found that dispositions to flow in student pianists were significantly related to practice time in hours, but not related to the experience of the number of years of piano playing. The same result was found in the study by Waite & Diaz (2012) with undergraduate music majors. Positive experiences related to practice can also be found in professional musicians' accounts. For instance, Yehudi Menuhin defined music practice as 'the search for ever greater joy in movement and expression' (Kurtz, 2007, p. 7), and pianists Claudio Arrau and Mark Westcott stated that it is beautiful to practice, and that they love to do it (Chaffin et al., 2002; Mach, 1980). In addition, a study conducted by Hallam (1995) found several distinct motivations for practice among professional musicians, with some of them presenting intrinsic motivation for practice. If those musicians positively engaged with practice are prone to flow experiences, and adult musicians' personality traits are already developed, a question that remains to be

[4] Both 'flow proneness' and 'flow dispositions' refer to the tendency or how frequently an individual experiences flow in an activity.

answered is what do musicians need to do in order to have optimal experiences of flow in practice, or what characteristics of their practice might be related to flow?

Few studies have focused on the relationships between musicians' efficient practice behaviours and flow. Waite & Diaz (2012) found evidence of flow experience in the practice sessions of twenty undergraduate music majors. Using video-recordings of three practice sessions and questionnaires, Waite & Diaz (2012) found that ratings for skills and challenges were relatively balanced, and perceptions of playfulness and enjoyment were notably high, leading the authors to suggest that the participants experienced flow during their practice sessions. Kirchner (2011) suggested strategies for the incorporation of flow conditions into music practice. The strategies included the selection of repertoire within a musician's capacities; focus on the present moment while practicing; a set of clear and specific goals; and avoidance of inner monologue (Kirchner, 2011). However, no evidence of the effectiveness of those strategies in the attainment of flow in music practice was provided. Similarly, Araújo & Andrade (2011) discussed and identified the presence of flow indicators in the musical activities of two professional musicians. When related to practice, the authors found that flow tended to emerge from a combination of a continuous sense of challenge and repertoire preference (i.e. the less preferred the repertoire, the more effort was needed). While the set of specific and clear goals were related to a sense of personal accomplishment in practice, both musicians frequently used expressions such as 'a marvellous experience' and 'much happiness' to describe their feelings when they achieved their goals. In conclusion, the authors acknowledged self-regulatory processes as 'essential components of optimal performance, directing attention and generating the concentration, favouring the flow experience' (Araújo & Andrade, 2011, p. 553). Yet, more studies are needed to determine whether these conclusions could be generalized to a more comprehensive sample of expert musicians.

2.5.2 Summary

The evidence outlined above suggests that musicians' experience of flow in practice may be affected by specific practice behaviours, especially self-regulated practice behaviours. In fact, several studies have demonstrated that self-regulation plays a crucial role in the efficiency of practice of musicians from different ages and the general psychology literature also suggests that high levels of self-regulation are related to a sense of psychological stability, personal control and wellbeing in the general population (Hoyle, 2010). People who exert self-regulation typically have well-defined goals and adopt appropriate standards of behaviour (Hoyle, 2010). However, little is known about which specific self-regulated practice behaviours are most effective in eliciting flow in the context of music practice. Previous research has not included a comprehensive set of efficient practice behaviours. In addition, as commented earlier, a general goal of research on music practice is to find out which specific practice behaviours and strategies are most effective to improve performance, tending to focus on performance achievements rather than optimal experiences. Thus, although individual approaches to practice may result in difficulties regarding the measurement of practice behaviours, there is a need for research that incorporates multiple self-regulated practice behaviours, indicators of optimal experiences (i.e. flow) and demographical variables.

The multi-faceted nature of practice results in wide individual differences in musicians' approaches to practice. Specific behaviours such as marking parts, using a metronome, repeating sections, etc. are highly dependent on factors such as the musicians' characteristics (i.e. level of expertise, learning styles, approaches to practice, motivation, personality) and task requirements (i.e. nature of the task, repertoire of the instrument and its characteristics) (Hallam, 1997). Because of that, a more general set of self-regulated practice behaviours need to be considered by research investigating relationships with optimal experiences.

2.6 Discussion

Resulting from a recent shift in the paradigm of psychological research, studies considered in this systematic literature review investigated musicians' attributes and strengths in the development of their musical activities. The research reviewed has adopted a varied range of methodologies, and has contributed towards a better understanding of flow, the positive side of musical engagement, and its applications.

This chapter has reviewed the three key aspects of flow research in musical performance, namely flow experience, flow measurement and flow occurrence.

To experience flow is important because, in addition to the evident importance of flow indicators for musical performance, the musicians' descriptions included in these studies also suggest that flow is a desirable state for musical practice. The complex interplay of cognitive, affective and motivational components in flow can result in efficiency and enjoyment in a musical activity. In addition, positive associations between flow and wellbeing, practice time and performance achievement and negative associations with performance anxiety also justify the study of flow in the context of musical practice. However, most of the current reported positive associations between flow and other desirable states are to be found in domains outside music, and this may explain why advances relating to flow in the musical practice are still in their first steps.

As explained before, flow experience is currently represented by the interplay of nine indicators. However, there is a great inconsistency in the research results about what might be the most significant dimensions of flow experience for musical performance. Clear Goals, Unambiguous Feedback, Challenge-Skills Balance and Autotelic Experience were mostly reported in responses in questionnaires, and this led researchers to conclude that the other dimensions may not be so important for flow experience in music. Since these studies used questionnaires that were developed for the domain of sports (FSS-2 and DFS-2), a lack of a better formulation of items related to the less reported flow indicators of Loss of Self-Consciousness, Action-Awareness Merging and Transformation of Time for music may explain these results. As a result, conclusions pointing to Loss of Self-Consciousness as a dimension of flow that may not be so

relevant for flow in musical performance (Marin & Bhattacharya, 2013; Sinnamon et al., 2012) may be premature. In contrast, these 'less significant' dimensions could be clearly identified in several reports of musicians in studies that investigate flow through qualitative methodologies such as interviews, phenomenological analysis, and auto-ethnography (see Section 2.1). Two main conclusions arise from that. In quantitative studies, a new formulation of items is needed in order to adapt the questions for the reality of musical practice. On the other hand, researchers using qualitative methodologies need to provide a more reliable description of flow, including all of its indicators and not place too much emphasis on one aspect of the experience to the detriment of others.

Overall, the studies outlined in this chapter suggest that flow in music is a complex and subjective experience that is influenced by contextual and personal factors. It is manifested through combinations of affective, cognitive, motivational and somatic indicators that may occur in a wide range of contexts and musical activities, but it is usually more intense in performance settings, when the performer can forget her/his ego and any kind of evaluation that can deviate her/his attention from the music itself or from the main goals. Flow can apparently affect musicians of all ages and is not dependent on other characteristics such as nationality, musical instruments and years of training, although positive associations were found between flow and daily practice time. This confirms the original formulation of the theory, which suggests that flow is not dependent on demographical factors. No less importantly, flow affects musicians' motivation, because after experiencing it musicians become more willing to try reaching that state again.

Regarding flow measurement, it seems that there is a need for: i) new self-report questionnaires about flow, including items that better reflect the reality of musical performance; and ii) new approaches to the assessment of flow in musical performance activities, including multi-methodological approaches. A good example of the latter is the emergence of studies using physiological measures in combination with self-report. Through this approach, researchers can compare self-reports with psycho-physiological

measures, a methodology that has been used in other domains (Bruya, 2010; but see also Dietrich, 2004).

Factors that may influence flow in musicians are similar to the factors reported in sports research, which reinforces the theory and its importance for musical performance. Evaluative environments in music seem not to contribute to flow. A focus on evaluation seems to not contribute to the emergence of flow, fostering excessive self-concerns and feelings of incapacity or low self-efficacy. Music teachers may be placing too much emphasis on *how* their students perform, and not enough on *what* they experience. This, in turn, can result in students seeking for *control* rather than *flow* as a way to prevent negative evaluation.

Moreover, although some researchers have started to identify how flow is beneficial for musical learning processes, the recent developments concerning the concept of flow in music have heightened the need for systematic investigations of flow in musical practice, mainly because the concept embraces the possibility of improvement and increase in skills, wellbeing and sustained motivation. Thus, it is possible that research about flow in musical practice can offer ways of promoting positive experiences in this context, fostering intrinsic motivation for the development of practice.

Finally, aspects of flow in musical performance that probably require more research include:

- The effects of the nature of the musical task on flow experience;
- The effects of individual differences (i.e. learning styles, particular skills, motivation to practice, self-regulation, metacognition) on flow experience;
- Measurement methods of flow in music;
- The relationship between flow and performance quality;
- The relationship between flow and the quality of specific learning activities (e.g. individual practice, master-classes, classes, rehearsals);
- Interventions for the enhancement of flow, application of flow-inducing strategies;

- Personality traits and flow;
- Physiological and neurological indicators of flow in musicians;
- The role of the body in the flow experience in musicians.

These themes suggest that there is much to research about the nature of flow in musical performance. Such research is likely to increase our understanding of the complex phenomenon of flow and contribute towards enhancing happiness and performance achievement in musicians.

Part 2: Empirical Studies

Chapter 3. Flow experience in musical practice

3.1 Introduction

Based on the principles of positive psychology (Seligman & Csikszentmihalyi, 2000), the present research argues that the study of optimal experiences in music practice and its related practice behaviours can contribute to make musicians, teachers and institutions aware of their positive experiences with music making, enhancing the understanding of the mechanisms that make efficient practice a more enjoyable activity. This research considers that the evidenced problems (section 2.5.1, p. 63) could be counterbalanced through a better understanding of flow in the context of practice. Because there are few studies investigating flow in the practice of expert performers, this research also expects to complement studies that have sought to guide musicians on the prevention of health problems related to a performance career, offering the potential for musicians to recognize and seek the beneficial state of flow.

The present investigation also intends to build upon research on music practice. While notions of skills, improvement and learning are at the core of the outcomes of research on music practice, the present research also aims to foster self-knowledge and wellbeing for musicians as they develop and maintain expertise through considering flow as an outcome variable in music practice. All these ideas are embedded in and influenced by the following research assumptions:

- Musicians are mainly motivated to make music by hedonic motives i.e. they use their musical activities as a means to generate positive emotional experiences aimed at personal satisfaction (Gabrielsson, 2011; Persson, 2001);
- Just as for any human activity, optimal flow experience or state is a pleasant and desirable experience in music practice;
- Flow in deliberate music practice improves the quality of the situational experience;
- Flow provides improved performance and motivation for practice and wellbeing.

3.2 Flow and/in musical practice

Recent theoretical evidence suggests that music practice can be a platform for flow occurrences. The structure of the activity of practising is theoretically conducive to a flow state. Practising music is an inherently challenging activity. From a physiological perspective, music practice challenges the performer to be completely attentive with mind and body in the learning process (Williamon, 2004). From a cognitive perspective, music practice challenges the performer perceptually, to organize sound in time, and to explore possible interpretations and artistic conceptualizations for particular music sounds (Chaffin et al., 2002; StGeorge et al., 2012). According to Custodero (2002), all these challenges make the act of performing music a flow like activity.

Csikszentmihalyi (1990) named 'flow activities' as those activities designed to make the occurrence of optimal experiences more likely:

> What makes these activities conducive to flow is that they were designed to make optimal experience easier to achieve. They have rules that require the learning of skills, they set up goals, they provide feedback, they make control possible. They facilitate concentration and involvement by making the activity as distinct as possible from the so-called 'paramount reality' of everyday existence. (Csikszentmihalyi, 1990, p. 72)

Considering this citation, music practice fits perfectly the requirements for being considered as a flow-inducing activity. It has several 'rules' that require skills. For instance, a musician must know how to accurately produce the necessary sounds with his or her musical instrument, having a secure technique with a range of available tools for creating the intended sound quality. Beyond this, music in the Western classical music tradition is usually written on a score, which is an abstract representation of the music to be performed. This rule requires a set of cognitive and neuron-motor skills to decipher the signs and to interpret the notation. In addition, musicians need to target their attention to many different musical problems in a progressive way. They need to locate and solve musical problems while artistically listening to what they are doing during the practice

process. This results in an attentional loop that comprises both goals and feedback, which pushes the musician' capacity to improve through practice.

It is also noticeable from the same citation that there is an emphasis on how a flow activity is constructed or organized. That is, flow seems to be not very dependent on 'what' the activity is, but more on 'how' it is designed: 'Such flow activities have as their primary function the provision of enjoyable experiences (…) Because of the way they are constructed, they help participants and spectators achieve an ordered state of mind that is highly enjoyable' (Csikszentmihalyi, 1990, p. 72). Accordingly, it seems that how practice is organized is a key factor for its occurrence in that context.

As proposed, flow as described by Csikszentmihalyi (1990) is likely to occur in the context of practice. Thinking of each of its nine indicators, flow may occur during practice when:

1. A musician is engaged in a challenging musical activity that requires his/her musical skills, and the level of skills required precisely matches or is slightly above the perceived level of musical challenge.
2. All of the musician's attention is engaged in the activity at hand.
3. The musician's awareness and actions merge together during the prosecution of task accomplishment.
4. The practice session has clear goals and swift feedback, indicating to the musician whether he/she is achieving the goals.
5. Due to the extreme concentration involved, irrelevant thoughts are pushed out of mind.
6. There is a feeling of control over the practice. Worries about failure are not present.
7. The musician loses self-consciousness during practice, with a feeling of union with the task.
8. The musician experiences transformation of time, where time seems to pass faster or more slowly.

9. The musician feels that the practice session was a rewarding one, feeling motivated to seek the experience again in another practice session.

The benefits of flow for music practice seem self-evident. When related to practice, flow may encourage musicians to attend to their practice, so that they might achieve more such optimal experiences. Flow could also motivate musicians to seek or develop the effective mechanisms underlying efficient practice. Theoretically, it is likely that a flow experience in practice can recharge musicians' drive to master challenging musical pieces. Consequently, flow may work as a clear motivational resource for musicians to sustain efficient practice over long periods of time.

3.3 Research questions

Because flow can occur through a combination of all of its indicators or through at least one indicator (Csikszentmihalyi, 1990; Engeser, 2012), it is important to understand how flow is experienced in the context of advanced music practice, which of its indicators may be more relevant for this context, and what are its effective practice correlates. Taking into consideration the previous evidence for the occurrence of flow in the musical practice of experts and the possible relationships with self-regulation, the following research question is proposed:

To what extent do dispositions to flow in the practice of experienced musicians relate to the self-regulatory processes employed in their musical activities? This question is divided into the following sub-questions:

- How can the self-regulatory behaviours of expert musicians be measured?
- How regularly is flow experienced in situations of music practice? Which aspects are more or less relevant to music practice?
- What factors may determine the emergence of the flow experience and its individual elements (influence of age, gender, experience, level of performance, musical instrument, practice routines, self-regulatory behaviours) in music practice?

3.4. Aims

The general aims and sub-aims of this research were:

- To develop, apply and provide valid evidence through a questionnaire measuring self-regulated practice behaviours in skilled musicians.

  - To elaborate a questionnaire according to the literature regarding musical expertise, identifying and characterizing the self-regulated practice behaviours used by expert musicians;

  - To apply the developed questionnaire to a sample of expert musicians;

  - To explore and to test the questionnaire's psychometric structure, reliability and preliminary validity;

  - To characterize the participants according to the expert practice behaviours measured by the questionnaire, studying the relationships between their self-regulated behaviours and their demographical characteristics (age, gender, musical instruments, practice routines, etc.).

- To study the incidence of flow experience in the context of expert music practice.

  - To assess expert musicians' dispositions to flow in music practice through the application of a validated questionnaire, examining frequency and intensity of the experience of each flow indicator during practice;

  - To characterize the participants according to their flow experience in music practice, studying relationships between the intensity of flow and their demographical factors.

- To investigate whether self-regulated practice behaviours affect flow experience in music practice.

  - To examine the relationships between self-regulated practice behaviours and dispositions to flow in the participants;

  - To investigate self-regulated practice behaviours that may help in the achievement of flow in music practice.

3.5 Hypotheses

After the identification of the research problem and the aims of the present research, the generated research hypotheses are presented. These hypotheses are exploratory in nature, based on the literature about flow, self-regulation and efficient practice behaviours.

3.5.1 General hypothesis

Expert musicians are prone to flow experience musical practice, and their capacity for self-regulating their music practice can facilitate both the autonomous establishment of conditions for flow in practice and its occurrence in the context of practice.

3.5.2 Operational hypotheses

As described earlier, investigations in many distinct domains, including music, usually do not find flow related to demographical factors (Marin & Bhattacharya, 2013; Wrigley & Emmerson, 2013), supporting the original formulation of the theory. Indeed, factors such as age, gender or nationality have not being found related to flow (Csikszentmihalyi, 1990). Nevertheless, the present research considered reasonable to test the influence of expert musicians' demographical factors on their dispositions to flow. No formal studies have tested the influence of demographical factors on flow among a wide sample of experts playing a wide range of different musical instruments.

The same applies to the relationship between dispositions to flow and practice time. Although some studies have provided support for this relationship, there is a need for a study testing the referred relationship in a wider sample of expert performers. Thus, the two first operational hypotheses of the present study are:

H1: There are no differences in the participants' dispositions to flow according to demographical factors (theory confirmation in the context of musical practice).

H2: Flow experience is positively related to practice time. Participants with frequent flow experiences in practice will be more likely to experience loss of the sense of time in

practice and to be intrinsically motivated to undertake it, thus, reporting more time spent practising.

3.5.2.1 Hypothesis regarding the relationships between self-regulation and flow

Due to the relationship between self-regulation and psychological stability in the general population (Hoyle, 2010), and the evidence of this relationship in results of previously described studies about flow and musical practice (Araújo & Andrade, 2011; Kirchner, 2011; Waite & Diaz, 2012), it is possible that expert musicians' dispositions to flow in musical practice may be influenced by this attribute of an effective practice (i.e. self-regulation). Thus, the following hypothesis was tested:

H3: Musicians' dispositions to flow in practice may be affected by specific self-regulated practice behaviours

3.5.2.2 Hypotheses regarding specific flow dimensions

Challenge-skills balance. The balance between challenges and skills is of great importance for the concept of flow, as the term optimal experience is operationalized as a 'subjective event that a person describes as being simultaneously high on environmental opportunities or challenges, and high on personal abilities, or skills' (Csikszentmihalyi & Nakamura, 1999, p. 112). From this, one can assume that if a musician is not facing challenging musical tasks that invite his/her best capabilities during practice, optimal experience might not occur. However, the same task, whatever the musical task is (e.g. learning a musical piece or a musical phrase, sight-reading, memorization, etc.), will present different challenges for each musician. Thus, it would be hard to consider what is a 'difficult' or an 'easy' musical piece or any other task in general, because this is dependent on the musicians' subjective understanding of its demands. As a result, it is reasonable to assume that the musicians' subjective understanding of a musical task is a key aspect for the occurrence of the necessary balance between challenges and skills.

The aspect of subjective understanding of a musical task touches the topic of mental representation, which is roughly defined as an 'individual's ability to reconstruct

the outside world in order to act effectively on that information' (Lehmann et al., 2007, p. 23). This cognitivist perspective considers mental representations as mechanisms that mediate the execution of skills. In the field of musical performance, it has been mostly associated with artistic imagery of musical pieces (Chaffin, Imreh, Lemieux, & Chen, 2003; Gabrielsson, 2003), serving as a plan to guide performance preparation. There is research evidence showing that the more experienced the musician, the more refined their mental representations are, and the better the performance is (Lehman et al., 2007). Consequently, a refined mental representation may facilitate a better cognitive appreciation of the task at hand.

Along with cognitive appreciation of the task, challenges will also depend on the physical and cognitive demands of the instrument. For example, for a guitarist, playing slow movements with much sustained sound between notes is a challenging physical demand of the instrument, while a section with chord sequences may be challenging for a violinist. This means that the challenge-skills balance can foster optimal experience in musical practice if musicians perceive the demands of a chosen practice activity (e.g. Learning a musical piece) as highly challenging and, at the same time, have the necessary high capabilities to overcome them. The adjective 'highly' is used because the theory states that in people reporting flow 'both challenges and skills are high or at least above the average, baseline level' (Csikszentmihalyi & Nakamura, 1999, p. 112).

One study has tested whether immersion indicators of flow are related to the balance between challenge and skills in musicians. Fullagar et al. (2012) found that the immersion aspects of flow were positively related to the balance between the perceived skills necessary to play a musical passage and the perceived challenges inherent in the task and negatively related to musical performance anxiety. As shown, the balance between perceived skills and inherently musical tasks may be a condition for flow in musical practice. Thus, it would be of great benefit if one could find ways to provide opportunities for this experience of balance in practice to occur. For this, knowledge about their own characteristics as performers and about the nature of tasks is certainly relevant for the achievement of this flow dimension.

Another implication of this flow dimension concerns the nature of musical skills in the practice process and the importance of self-assessment (i.e. Self-evaluation). In the case of musical performance, little research has been undertaken about how advanced musicians evaluate their own skills and the possible relationships between these and practice efficiency. Although researchers agree that professional musicians can be differentiated from novices because they are aware of their personal resources, skills and strategies (Hallam, 1995, 2001), there has been no attempt at investigating such relationships in specific contexts of practice. More experienced musicians may have more flow experiences because they know how to self-evaluate their skills and, as a result, they know what kinds of challenges may foster engagement in practice.

In the case of students developing musical expertise, knowledge of teachers about their students' skills (skills assessment) may also be of great importance for fostering enjoyment in musical practice. Despite the existence of many musical aptitude tests, a better knowledge about musical skills assessment would provide teachers with clear guidance about repertoire and tasks to assign to their students. Related to this, Duke & Simmons (2006) found that expert music teachers give appropriate challenges for their students, knowing how to recommend repertoire 'well within' (Duke & Simmons, 2006, p. 11) their students' technical and musical capabilities: 'The challenge for the students, then, is to execute the technical and musical demands of repertoire with the utmost skill every time they engage in performance' (Duke & Simmons, 2006, p. 11).

Perhaps accomplished teachers intuitively know what flow theory acknowledges, that an optimal experience can occur because of this high-level balance between challenges and skills. However, because this was not the focus of their study, the authors did not provide any information regarding 'technical' and 'musical' capabilities. Studies have suggested that one main difference between experts and novices is the high development of metacognitive thinking in experts. For instance, Hallam (2001) found that what each individual musician felt as necessary to maintain high standards of performance (i.e. individual needs) in relation to practice differed between professional musicians. This included elements such as the regularity of practice, its content, use of

warm ups, technical work. This suggests that expert musicians have acute self-awareness of their strengths and weaknesses.

Gabrielsson (2003) commented on the importance of students' self-assessment of their musical performances, concluding that this may help students 'to develop skills in thinking independently and reflecting on their practice and performance; in other words, to learn appropriate strategies for practice and performance' (Gabrielsson, 2003, p. 256). There are no in-depth studies on the role of self-assessment of musical skills or, in other words, personal knowledge about skills, despite the fact that research has raised the issue that the choice of specific challenges for musical practice is related to the knowledge of musical strengths and weaknesses, and may enhance the possibility of fostering optimal experiences in that context.

The balance between challenges and skills seems to be an important element for musical learning, as it can relate to self-efficacy or to the conviction that one can successfully execute the behaviour required to produce the outcome (Bandura, 1995). The importance of self-efficacy for musical training and performance has recently received much attention by researchers (Ritchie & Williamon, 2010), mainly because this psychological characteristic has been found to be positively related to performance outcomes.

Reflecting on the importance of the balance between perceived skills and inherent musical challenges for music practice, what is clear is that the achievement of a balance between challenges and skills may be dependent on the musicians' capacity to recognize the nature of these challenges and to self-evaluate. As a result, the following two hypotheses could be derived:

H4. Metacognitive knowledge (knowledge of cognition) is related to the challenge-skills balance (the first may contribute to achieve the second).

H5. The challenge-skills balance is related to the level of a musician's expertise (the more experienced the musician is the more he/she can achieve this balance), because of evidence showing that the more experienced the musician, the more refined their mental representations are.

Clear Goals. Music practice provides an excellent setting for actions relating to clear goals and rules. The structure of the music allows attention to be focused on immediate tasks. According to flow theory, the deep involvement that is characteristic of a flow experience occurs because, first of all, the activity has a goal or goals, and, secondly, because the goal is clear. Csikszentmihalyi (1990) stated that, 'unless a person learns to set goals and to recognize and gauge feedback in activities, s/he will not enjoy them' (Csikszentmihalyi, 1990, p. 55). The examples provided by Csikszentmihalyi reflect goals that are obviously clear in nature. For instance, in sports, the goals are generally more immediate than in music:

> A tennis player always knows what s/he has to do: return the ball into the opponent's court (…) The chess player's goals are equally obvious: to mate the opponent's king before his own is matted. (…) The climber inching up a vertical wall of rock has a very simple goal in mind: to complete the climb without falling (Csikszentmihalyi, 1990, p. 54).

While the context of sports seems to offer these obvious goals for the player, this may not be the same in other contexts. In the arts, for example, the goals are generally not as clear. Csikszentmihalyi (1990) recognizes that

> A composer of music, for instance, may know that he wishes to write a song, or a flute concerto, but other than that, his goals are usually quite vague. And how does he know whether the notes he is writing down are "right" or "wrong"? The same situation holds true for the artist painting a picture, and for all activities that are creative or open-ended in nature (Csikszentmihalyi, 1990, p. 55).

Interestingly, Csikszentmihalyi (1990) suggests that because the goals are not clearly set in advance in artistic creative activities, an individual needs to develop a "strong personal sense of what she intends to do" (Ibid, 1990, p. 55). He exemplifies:

> The artist might not have a visual image of what the finished painting should look like, but when the picture has progressed to a certain point, she should know whether this is what she wanted to achieve or not. And a painter who enjoys painting must have internalized criteria for "good" or "bad" so that after each

> brush stroke she can say: "Yes, this works; no, this doesn't." Without such internal guidelines, it is impossible to experience flow (Csikszentmihalyi, 1990, p. 56).

In the context of music practice, several studies carried out by Chaffin and colleagues (Chaffin & Imreh, 2001; Chaffin, Demos, & Crawford, 2009; Chaffin et al., 2002; Lisboa et al., 2007) have shown that, when starting the practice process of a new musical piece for performance, classical musicians seem to begin by seeing the 'big picture' or a capacity for forming an artistic image of the new piece. This is a key characteristic of experts in different domains (see also Ericsson et al., 2006). To perform a musical piece 'well' can also be understood as an artistic goal with a high level of abstraction. While experts usually have or form a global image (i.e. higher level goal) of a problem before starting to work on details (i.e. lower level goals), novices frequently 'tend to focus on superficial characteristics, plunging into the details without developing a clear idea of the big picture' (Chaffin et al., 2002, p. 467). The internal guidelines provided by the big picture would seem to be a necessary feature for experiencing this flow dimension in musical practice, in which more specific (i.e. less abstract) goals are generated that in turn will guide effective and concentrated practice.

H6. If clear goals are associated with the 'big picture', and because the more expert the performer is the more he is able to rely on this 'big picture', then the clear goals flow dimension is positively related to the level of expertise (age, experience).

Unambiguous Feedback. Feedback is a necessary element of effective practice, and progress may be constrained in its absence. The message contained in the feedback is important, because it helps in determining whether practice goals are being achieved.

Feedback can come from many sources in the context of musical practice. Primarily, 'performers get immediate feedback from the sound of the music they are playing' (Kirchner et al., 2008, p. 64). In simple behavioural terms, if the sound is in accordance with the immediate practice goals, it is reinforcing and the tendency is to continue practising/playing. In the context of musical practice, other sources of feedback

can be kinaesthetic awareness, or knowing the spatial location of the body (Jackson et al., 2010). Different instruments will result in divergent kinaesthetic awareness. While a clarinettist may be paying attention to feedback related to breathing in the right places in a musical phrase, a violinist might be receiving feedback from appropriate fingering.

The flow state itself is pleasurable and therefore theoretically self-reinforcing. Not only is it important for the teacher to provide immediate feedback for a student, offering ways in which the student can improve, but it is also important that the student learns how to supply his or her own feedback.

As practice research has shown, practising deliberately or efficiently means to start and stop as many times as necessary in order to solve problems during the process, and to reflect on other possibilities to overcome the challenges of the activity. A musician who is trying to learn and resolve problems in a difficult passage may think about what fingering to use, interpretation possibilities, and many other dimensions of music interpretation. When practising in flow, the feedback after each try or attempt is unambiguous, and the musician will know, through engagement in metacognitive thinking, exactly what to do to move further towards his end product.

H7. Metacognitive engagement with practice is positively related to unambiguous feedback flow indicator.

3.6 Summary

The musical activities of elite musicians comprise self-regulated practice behaviours and positive psychological experiences, such as the state of flow. Although the studies referred in this proposal have contemplated elements of musical practice related to self-regulation, few researchers of musical performance have considered specific theories of optimal experiences to frame their questions and research methods. Also, despite the existence of a substantial literature about flow states for performing activities, there is an absence of systematic studies that seek to deepen the understanding of the characteristics of the states of flow in the practice of expert musicians.

By studying the associations between expert musicians' attributes (demographical factors and self-regulated behaviours) and their dispositions to flow in the context of practice, this research aims to contribute to a better understanding of dispositions to flow in practice, providing clues for improving the quality of the subjective experience during musical practice in terms of increase in the intrinsic motivation for this important musical activity and wellbeing. By tracing these relationships, and relating them to the wider context of practice within the domain of musical performance, one can then reflect upon and draw conclusions about the importance of these behaviours in the achievement of flow. Are the efficient practice behaviours used by advanced players influential, and if so, how? And are dispositions to flow in musical practice also affected by musicians' attributes such as age, gender, experience, musical instrument and daily practice time?

The present research considered these points, firstly by studying in depth the concepts of efficient practice and flow individually, and then by measuring each of them in expert performers. The relationships between theory and results and the practical implications are explored. New ideas for the field of music are considered and substantiated with empirical evidence provided by the analysis of the data collected, which will be detailed in the following chapter.

Chapter 4. General Methodology

4.1 Introduction

The investigation of internal human processes presents several methodological challenges for researchers, since they are generally not outwardly observable. Thus, the second part of the present thesis is devoted to presenting the general methodological approach, including the nature and design of the investigation, sampling procedures, instruments for data collection and analytical procedures. The methodology consists of a description of the structure of an empirical study or the explanation of the necessary procedures, methods and techniques for the development of the present study. All these elements are, by definition, under 'a philosophical stance of worldview that underlies and informs a style of research' (Jupp, 2006, p. 175). The following section presents all of the details involved in the methodological design.

4.2 Nature and design of the investigation

This is an empirical correlational investigation that aimed to gain a better understanding of flow in the music practice of experienced musicians. In correlational or non-experimental studies, the researcher observes the variables and does not exert control or any kind of intervention over the studied variables (Marôco, 2011). In this research approach, information about the population is inferred based on a sample of the population (Cohen, Manion, & Morrison, 2007; Marôco, 2011). This investigation is an attempt to expand the work of flow researchers in the field of music, examining systematically the well-known theory of flow and testing hypotheses generated by a critical exam of the literature about musical practice.

The present research is based on an explanatory cross sectional correlational survey (Cohen et al., 2007; Coutinho, 2011; Hill & Hill, 2009; Marôco, 2011). Survey is a technique frequently used in descriptive studies, or studies that set out to describe and to interpret reality. According to Cohen et al. (2007), the data in surveys are collected at a particular point in time, with the 'intention of describing the nature of existing conditions,

or identifying standards against which existing conditions can be compared, or determining the relationships that exist between specific events' (p. 205). In this research, the relationships between the attributes of expert performers and flow are tested by exploration and confirmation. The survey is exploratory because there are no studies investigating the relationships between those variables and no specific models have been developed. It is also deemed confirmatory because it tests some of the hypotheses derived from the literature review.

The survey was developed through two main quantitative questionnaire studies. A questionnaire can be defined as 'a rigorously standardized instrument, both in the questions' wording and in its order' (Ghiglione & Matalon, 2001, p. 110). It consists of a series of questions for the purpose of gathering information from respondents about their feelings, motivations, attitudes, realizations and personal and social experiences (Hill & Hill, 2009). It is an often-used technique in health and social-psychological research. Among its advantages, it provides economic conditions to gain access to a large number of cases in less time (Coutinho, 2011). The completion of questionnaires can save the researcher's time, as he/she does not need to travel to contact participants personally. In addition, a standardized questionnaire can minimize the effect of divergent ways of asking a particular question, because 'without this check any differences which are found between people's responses could be due to the way the question was asked rather than any inherent differences between the respondents' (Clark-Carter, 2010, p. 8). A final advantage is that responses gathered from self-report questionnaires are immediately quantifiable, providing statistical treatment and analyses as a way to test the generated hypotheses. As a questioning method, it involves measurement in the absence of manipulation.

Among its disadvantages, although questionnaires may include the same kind of questions as an interview, there is no personal contact with the participants, resulting in a more impersonal method (Coutinho, 2011). While interviews normally get a hundred per cent of return rate, quantitative researchers are accustomed to have about thirty per cent of non-response rates or poorly answered questionnaires (Coutinho, 2011).

Despite these disadvantages, several reasons support the adoption of a quantitative methodology paradigm for the development of the present study. Firstly, flow is currently understood as an observable phenomenon traditionally measured through self-report questionnaires (see Chapter 2, Section 2.3). Thus, in the absence of validated questionnaires developed in the domain of musical performance and because flow is the main dependent variable, this research considered it appropriate to use well-developed and validated instruments in order to add more reliability to the investigation of flow in this context.

Secondly, the investigation of internal subjective states and behavioural patterns has a long tradition in psychological research (Clark-Carter, 2010). The psychometric tradition has established consistent methodological approaches regarding the development and use of questionnaires, which is an important issue regarding research validity. Since one of the main aims of the present research is to establish patterns relating to the internal and positive subjective states of musicians during practice, the use of questionnaires was deemed appropriate.

Thirdly, the literature review chapter suggests that, when related to practice, there is no agreement about the relevance of each flow indicator during practice, despite the fact that aspects related to challenges, skills, goals and feedback are clearly more present in contexts such as practice and other individual activities (Araújo & Andrade, 2011; Waite & Diaz, 2012). Because this evidence issues from studies with students and from studies with small samples, the present study considered using questionnaires to get a more encompassing understanding of flow in the practice of expert performers, which in turn may provide the conditions for deeper and more precise explorations of flow through qualitative methods in the future.

4.3 Instrumentation

The research design was built on the proposed questions regarding expert musicians' dispositions to flow and connections with their self-regulated practice behaviours. In correlational research, a clear definition of research variables is

imperative, as these comprise attributes that reflect or express a concept or construct and may assume different values (Coutinho, 2011). In this research, self-regulated practice behaviours and flow are either abstract or latent concepts or variables that cannot be directly observed (Saris & Galhoffer, 2007) or measured. For this kind of variable, the concepts only assume a variable format when they can embrace individual attributes (Coutinho, 2011; Saris & Galhoffer, 2007).

Two questionnaires were used in the present research as measurement instruments of both independent (i.e. self-regulated practice behaviour) and dependent variables (flow dispositions). Definition of the variables for study and the instrumentation procedures are explained in the following sub-sections.

4.3.1 Self-regulated practice behaviour variables

Self-regulation in the context of music practice is a construct that comprises thoughts, behaviours, and self-generated feelings aimed at the achievement of learning goals in music practice. The indicators gathered in the literature (Chapter 2, Section 2.5) about music practice included: 1 regulator (goals and attributes), 6 regulatory mechanisms (planning, monitoring, knowledge and regulation of study strategies, time control, environmental structuring, use of help and resources), and 3 regulatory assessments (self-evaluation, attributions, and self-efficacy).

For the definition of music practice goals, this study relies on goal-setting theory (Locke & Latham, 2013), which defines a goal as ‘the object or purpose of an action, and may be, in the context of work, a level of performance to be achieved’ (Locke & Latham, 2013, p. 28). One of the main attributes of a goal is its content, which refers to the outcome to be achieved (e.g., being able to play a quick musical section without changing the tempo), having, as its main attributes, specificity and difficulty. According to Locke & Latham (2013), goals incorporating more specific outcome standards are more likely to improve self-regulation and to trigger self-evaluations than general goals such as ‘do my best’ or ‘try hard’. According to these authors, specific goals improve performance because they specify the amount of effort required for success and boost self-efficacy by

providing a clear standard to achieve. Regarding difficulty, the perceived level of difficulty of learning goals affects motivation for learning in novice students and, according to Locke & Latham (2013), moderately difficult goals seem to have impact on motivation. Goals are also distinguished by how far they go into the future, and this relates to proximity, another relevant attribute for goal-setting theory (Locke & Latham, 2013). Short-term or proximal goals are achieved in less time, resulting in enhanced motivation and a better self-regulation than more distant goals. This prediction is supported by studies in several domains outside music performance and in music education (Miksza, 2007; Ritchie & Williamon, 2013, among others), but few or none in the context of expert music practice.

In sum, in the context of music practice, a goal can be regarded as a level of proficiency to be achieved in any aspect of music learning. Advanced musicians, like anyone involved in music practice, can set goals for different levels of abstraction in the learning process, ranging from a simple and immediate completion of goals (e.g., sight-reading a musical phrase) to more complex goals (e.g., to be able to play a particular piece of music from memory).

Considering the six regulatory mechanisms, planning is represented by the extent to which the individual sets plans and strategies for efficient practice (Gabrielsson, 2003). Monitoring is related to a metacognitive engagement with music practice, which is represented by declarative knowledge or knowledge about oneself and about chosen strategies (Schraw & Moshman, 1995), procedural knowledge or knowledge about how to implement practice strategies, and conditional knowledge or knowledge on the circumstances of the application of practice strategies (knowledge of when to apply the strategies) (Schraw & Moshman, 1995).

Time control is related to the extent to which musicians plan and organize their practice time (Jørgensen, 2004). Environmental structuring is represented by the attention that musicians devote to the organization of the physical environment of their practice sessions (Jørgensen, 2004; Provost, 1992), and use of help and resources refers to the frequency with which musicians seek help from social peers (teachers, students,

musicologists, friends, peers) and from other various resources (CDs, videos, biographies, several books of theoretical musical subjects, etc.).

Lastly, the regulatory assessments included in the present concept of self-regulated practice behaviours were self-evaluation, causal attributions and self-efficacy. Self-evaluation is defined in the context of expert music practice as the evaluation of progress towards the practice goals by comparing the current level of knowledge or performance with the desired practice goal (Jørgensen, 2004). Causal attributions are divided into: 1) internal causal attributions of practice goal achievement, or the degree to which the achievement of the practice goals is attributed to internal factors (e.g. persistence, effort, knowledge, strategic approach, competence, etc.), and 2) external causal attributions, represented by the degree to which reaching practice goals is attributed to external factors (e.g. context, peers, teachers, environment, etc.). Self-efficacy when related to music practice refers to the belief that the musician has in his/her own action capabilities to reach practice goals (Bandura, 1995; Ritchie & Williamon, 2010).

As seen, it is clear that self-regulation cannot be measured only through a direct question. Asking a musician how much s/he engages in self-regulation during practice would not provide valid information as to whether s/he really behaves in this manner, since self-regulation, in the context of the present investigation, consists of the sum of the described interrelated behaviours.

4.3.2 Self-regulated practice behaviour: Instrumentation

Few studies have attempted to measure self-regulated practice behaviours in expert musicians through questionnaires. Most of the studies that have incorporated quantitative measures of practice behaviours have adapted and/or supplemented measures by authors from other fields. For example, the most widely used questionnaire for this purpose is the Motivated Strategies for Learning Questionnaire (MSLQ), developed by Pintrich and colleagues (Pintrich & de Groot, 1990) which is frequently adapted and used for measuring music learning strategies in students (see Nielsen, 2011). One exception is

the study conducted by Miksza (2011b), who developed a measure for self-regulated musical behaviours based on specific literature about students' approaches to practice.

As previously stated, in the light of this theoretical gap, one of the aims of this investigation was also to explore the self-regulated practice behaviours of expert musicians through the development of a self-report measure. The analysis of the participants' attributes in relation to the self-regulated behaviours adopted in a process of practice will contribute for a better understanding of their relationship with flow dispositions. The developed self-regulated practice questionnaire and all of the information regarding its development, application and validation is discussed in the first empirical study conducted for this research, presented in Chapter 5.

4.3.3 Flow variables

Variables involved in the latent concept of dispositions to flow in music practice, or the frequency with which a musician enters into flow during music practice, are the nine flow indicators described in previous sections of the present thesis (see Chapter 1, Section 1.3, p. 13). The operational concepts are:

- Challenge-skills balance: how frequently a musician feels competent enough to meet high demands during practice;
- Clear goals: how frequently a musician has a strong sense of what he/she wants to do during practice;
- Unambiguous feedback: how frequently a musician has a good idea of how well he/she is doing during practice;
- Full concentration: how frequently a musician is completely focused on the ongoing activity during practice;
- Sense of control: how frequently a musician has a feeling of total control during practice;
- Action-awareness merging: how frequently a musician acts spontaneously and automatically, without having to think, during practice;

- Loss of self-consciousness: how frequently a musician is not worried about what others may be thinking about him/herself during practice;
- Time transformation: how frequently a musician feels that time passes differently than normal during practice;
- Autotelic experience: how frequently a musician feels that the experience of practising is extremely rewarding.

4.3.4 Musicians' dispositions to flow in practice: instrumentation

Dispositional Short Flow Scale-2. The Dispositional Short Flow Scale-2 (Martin & Jackson, 2008) is a brief and valid measure of flow for the music performance domain. Its external and internal validity is detailed in Jackson et al. (2010) and in Martin & Jackson (2008). The number 2 beside the scale name indicates that it is an improved and more robust version of the scale.

This short flow scale provides an assessment of flow as a holistic concept, envisaging flow as a coherent experience that is drawn from the nine flow indicators (Jackson et al., 2010). The dispositional version of the short flow scale assesses the general tendency to experience flow instead of a particular incidence (i.e. state scale). The dispositional version of the scale is based on evidence that 'people differ in their propensity to experience flow on a regular basis' (Jackson et al., 2010, p. 12; see also Engeser, 2012).

The scale presents nine items, each reflecting one of the nine flow indicators, e.g. Challenge-Skill Balance ('I feel I am competent enough to meet the high demands of the situation'), Clear Goals ('I have a strong sense of what I want to do'), Full Concentration ('I am completely focused on the task at hand'), Sense of Control ('I have a feeling of total control'), Autotelic Experience ('The experience is extremely rewarding'). All items were rated from 1 (strongly disagree) to 5 (strongly agree). All scoring procedures are explained in Jackson et al. (2010). For instance, scores ranging between 1 and 2 indicate that the specific flow indicator being measured is never or rarely experienced in the context of music practice. The moderate score of 3 indicates that the specific flow

indicator is experienced some of the time, experiencing it during practice more than rarely, but not frequently. Finally, scores of 4 and 5 indicate that the musician frequently or always experiences the flow indicator when practising.

Several explanations for the use of this scale in the present study can be offered. Firstly, this scale achieved good psychometric properties in a sample of musicians (Martin & Jackson, 2008). Secondly, it seemed adequate for the exploration of flow both as a uni- (i.e. global) and multi-dimensional concept. Thirdly, according to the scale developers, the 'items were selected that appeared to best measure the intended construct' (Martin & Jackson 2008, p. 143), and this also allows for individual analysis per item, which in turn allows for the assessment of individual flow indicators and their relation with musical practice behaviours. Lastly, because the questionnaire is practical and quick to complete, bias in responses to time-consuming questionnaires are minimized.

In addition, although there is conceptual and empirical evidence showing that the components of flow are highly correlated (Engeser & Shiepe-Tiska, 2012), it is premature to conclude that flow can be considered as a one-dimensional concept (Engeser & Shiepe-Tiska, 2012), and more research is needed in order to specify under which conditions components are associated or dissociated. Csikszentmihalyi has conjectured that the action-awareness merging dimension may be the clearest sign of the experience, which has led some authors to conclude, 'immersion might, in fact, represent a more central aspect than the other components' (Engeser & Shiepe-Tiska, 2012, p. 12). Because of the uncertainty of flow as a one-dimensional concept, this research follows, *a priori*, the current consideration of flow as an experience with different components, which, in their interplay, represent the experience of flow as a whole.

4.4 Preliminary studies

Two preliminary studies were conducted for the present research. The first one was part of the development of the new measure of self-regulated practice behaviour in expert musicians. This pilot study is detailed in Chapter 5. The second preliminary study was conducted in order to translate the Dispositional Short Flow Scale-2 (Martin &

Jackson, 2008) into Portuguese, and to test its adequacy for Portuguese speakers. Issues related to meaning and polysemy were focused on (Hill & Hill, 2009).

4.4.1 Method for translation

The questionnaire was translated into Portuguese following similar steps as in the technique of 'Translate - Translate back' (Hill & Hill, 2002, p. 81). Firstly, one Portuguese native-speaker (the author of the present research) did a translation of the document to Portuguese (1st translation). The translation was then examined by an English native speaker who also understands Portuguese (a doctoral student working at the same department as the first author), because 'an English person is more familiar with the English language' (Hill & Hill, 2002, p. 81) than a non-native English speaker.

The second step was a verification of the translation by a third person (supervisor). The third person is a Portuguese native speaker who lived for many years in the USA having experience with English both as spoken and written language. The 1st translation was translated back into English (Back-translation). The final step was the comparison of the original version of the questionnaire with the translated version for harmonization.

The Portuguese translated version was also applied to 6 participants (experienced performers and music educators) in order to verify any problems with the wording and other elements. Among the 6 participants, one had English as mother tongue, and was also a fluent Portuguese speaker, living in Portugal. The other 5 participants were all Portuguese speakers. The participants were required to read carefully the items, to answer the items and to provide relevant comments after completion.

As a result, no changes in the translated questionnaire were deemed necessary. Participants reported that the questionnaire was generally clear, but some of its items were difficult to imagine in the context of practice for some of the participants. The item 'I do things spontaneously and automatically without having to think' was a clear example. In the words of one participant,

> ‘When I am practising, I do not usually do things spontaneously and automatically and without having to think. It may occur in the middle of the practice session, when for example I feel that I lose focus, when I want just to play or improvise, to play spontaneously… but in this case I think I am not studying, although I think it is necessary and it is good for everything’ (pilot participant 2).

Cases like these were not considered as translation-related problems. Thus, all items in the questionnaire were maintained, and no further adaptations were necessary.

4.4.2 Survey: Final version

The improved version of the self-regulated practice questionnaire (Chapter 5) and the translated flow questionnaire were included in a survey entitled ‘Attitudes and Sensations in Music Practice’ (Appendix 1 and Appendix 2), which will be referred to as ‘ASMP questionnaire’ henceforth. The ASMP questionnaire comprised a demographic section in which participants recorded information regarding their age, gender, nationality, education (i.e. academic qualification), musical instrument, practice time and performance experience; the latter was measured by years of playing from their first public concert onwards. After the demographic section, the first part was named ‘attitudes towards music practice’, and included the self-regulated practice behaviour questionnaire. The second part was entitled ‘sensations during practice’, and presented the flow questionnaire.

4.5 Sample

The target sample for this study was part of a population of expert performers of the Western art music tradition having more than ten years of experience. This choice was based on the work of Ericsson et al. (1993), who suggested that musical expertise can be achieved in ten years of deliberate practice. Although research indicates that the amount of hours of practice gradually decreases from the thirties on, the same does not occur with the displayed musical skills (Ericsson et al., 1993).

From the perspective of musical activities, expert performers are normally engaged with practice, performance and also teaching (Beeching, 2005; Chaffin et al., 2002; Mach, 1980; Manturzewska, 1990; Williamon, 2004). Professionals from the Western art music tradition usually have earlier starts in music learning, and individuals starting at the age 3 are not uncommon in this field (Lehmann et al., 2007). From the perspective of professional activities, expert musicians usually play in orchestras, ensembles and as soloists. Expert musicians may also work as recording musicians for particular labels within the music industry. The teaching activity usually occurs through invitations for giving master classes or having a teaching position in a musical institution.

Due to the large number of individuals in this population, this study adopted a non-probability sample, being a convenience and intentional sample (Hill & Hill, 2009; Coutinho, 2011; Cohen et al., 2007). The main reason for that choice was economy of time, as the initial version of the present research proposal included a second qualitative element, in order to complement the quantitative correlational study. In addition, there has been no reliable evidence of differences in practice habits being affected by cultural variables (e.g. nationality): studies investigating efficient practice behaviours in the context of the Western art music tradition have found consistent results across different countries (Hallam, 1997; Miksza, 2011a), suggesting that efficient music practice is not significantly affected by cultural differences.

Although expert musicians were the focus of this study, the sample also included participants engaged in higher education music performance courses as part of this investigation, namely the development of a new measure of self-regulated practice behaviours (Chapter 5). These individuals seemed appropriate to include in the study, as they are learning musical skills and strategies for professional engagement (i.e., pre-professionals). From the perspective of skill acquisition, these *advanced* musicians are autonomous, highly skilled individuals engaged with musical activities, including practising (Papageorgi et al., 2009). Through this inclusion, the study maximized the possibility of testing the variability of flow and self-regulated behaviours according to

experience. The following sub-sections describe the sampling procedures, sample selection criteria, and the attributes of the selected sample.

4.5.1 Selection of the target sample

An invitation for participation in the survey was distributed via email to several music institutions and released in online social networks and digital forums about music research (e.g. *Performance Studies Network*). These institutions were deemed appropriate because they often include professional musicians and adult students training for professional engagement with music. The invitation included the hyperlinks for access to the web platform designed for the survey response and information regarding the aims of the research. The resulted and analysed samples will be detailed in the following chapters 5 and 6. Table 9 presents the global sample included in this research, which is detailed in the presentation of each study in this thesis.

A total of 335 questionnaires were returned, but only questionnaires that had responses for all items in the main section were considered. The resulting convenience sample included 212 higher education performance students and professional performers (singers and instrumentalists) who made their living by performing and/or teaching music in higher education institutions (male = 52.4%; female = 47.6%). Participants were nationals from several different countries (Table 5). The high number of Brazilian and Portuguese participants in the survey was due to the fact that the author had more contacts with participants and institutions from both countries at the time of the study. Participants and institutions from these countries were particularly efficient in the distribution of the questionnaire to their students and colleagues. As previously stated, the present research assumed that cultural differences do not affect eventual differences in practice habits.

Table 5

Participants' nationalities

Country	**Frequency**	**Percentage**
Brazil	91	42.9
Portugal	36	17.0
UK	25	11.8
USA	11	5.2
Canada	10	4.7
Italy	6	2.8
Greece	5	2.4
Germany	5	2.4
Australia	7	3.3
Other countries	16	7.5
Total	212	100.0

Participants' ages ranged from 18 to 58 years (M = 25.36, SD = 7.87), but most participants were between 21 and 40 years old (Table 6). Musicians engaged in higher education music performance study courses accounted for 50.5% of the sample (n = 107), while the remainder were professional musicians. The majority of the higher education students who answered the questionnaire were engaged in undergraduate (n = 32), masters (n = 23) and doctoral (n = 25) musical performance courses. The category 'other' (n = 9) comprised specific higher education musical performance short courses.

Table 6

Number of participants per age group

Age group	**Frequency**	**Percentage**	**Mean**	**SD**
≤20	22	10.4		
21-30	79	37.3	25.36	7.87
31-40	58	27.3		
41-50	29	13.8		
>50	24	11.2		
Total	212	100.0		

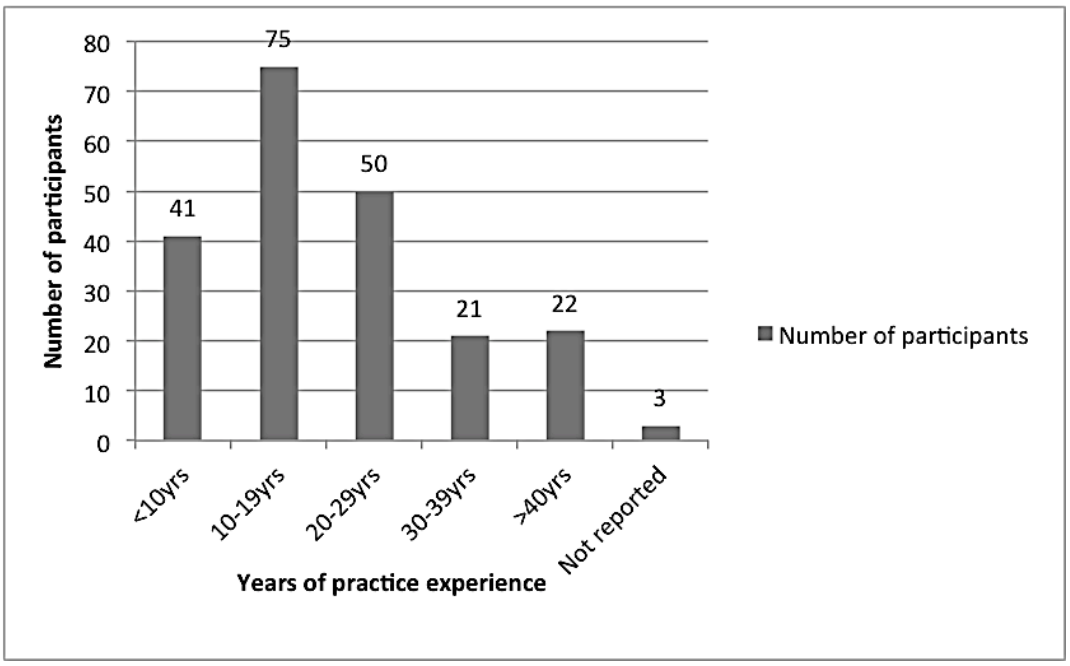

Figure 2. Number of participants by years of practice experience from the first public concert

Calculating from the date of each participant's first public concert, their practice experience ranged from 3 to 56 years (M = 19.96, SD = 11.92), with the majority having more than 10 years of experience (82.8%) (Figure 2). All participants having less than 10 years of experience were enrolled in higher education courses (n = 41). A performance course in the context of higher education is usually focused on educating and training musicians to the highest professional standards. Because of that, this research included participants with less than 10 years of experience who were studying performance in higher education. This group was also included in order to examine whether practice experience may also affect self-regulated practice behaviours.

When participants were asked what instrument they played, the most frequent response was keyboard instruments (25.9%, n = 55), followed by plucked strings (24.5%, n = 52), bowed strings (14.6%, n = 31), woodwind (16.0%, n = 34), voice (10.4%, n = 21), brass (4.2%, n = 9) and percussion (3.8%, = 8). Two participants did not register their musical instruments or gender (0.6%, n = 2).

Table 7 presents the daily practice durations reported by participants. The table shows that, although the distribution of practice time is varied, most respondents reported between 1 and 3 hours of practice per day. This is consistent with literature suggesting that significant variations in duration of daily practice among musicians with equivalent levels of expertise can be explained by the capacity for practicing effectively (Chaffin et al., 2002).

Table 7

Duration of daily practice in hours

Hours	**Frequency**	**Percentage**
< 1h	49	22.6
1h – 2h	65	30.7
2h – 3h	43	20.3
3h – 4h	35	16.5
> 4h	20	9.4
Total	212	100.0

Table 8 shows the reported practice days per week. It is possible to verify that the majority of the musicians reported practising at least 3 to 6 days a week, confirming their active engagement with routine practice.

Table 8

Days of practice per week

Hours	**Frequency**	**Percentage**
1 – 2 days	36	17.0
3 – 4 days	53	25.0
5 – 6 days	79	37.3
Everyday	38	17.9
Not-reported	6	2.8
Total	212	100.0

4.6 Data processing: Online survey

The present survey was conducted online. The participants completed the questionnaire online accessing the hyperlinks sent by email. The web platform was created by the *Serviços de Tecnologia de Informação e Comunicação*, based at the University of Aveiro (Portugal).

Although there is some debate regarding the use of surveys online, the option to conduct an online survey seemed appropriate because: i) the population size of classical expert musicians is fairly large and widely geographically distributed; ii) it was deemed appropriate for the time constraints of the present research, because postal mail must be physically delivered, taking more time; iii) the University offered technical and operational help, hosting the survey online; iv) there was an estimation that around 40% of the world population has access to the Internet, from which around 40% are users from

America (South and North) and Europe. Thus, the present research assumed that the sampling frame had access to the Internet; v) was a non-probability sample; and vi) the items were questions regarding human idiosyncrasies and habits. More advanced musicians are less inclined to share their learning processes with others. Indeed, compared to younger students, there are less observational studies of concert performers, which seems to suggest that these musicians may not be so open to sharing the 'mystique' of their artistry. For instance, in the analysis of the learning process of a piece of music by a professional pianist, the pianist expressed feelings of vulnerability in revealing her demanding practising process to others (Chaffin et al., 2002). Participants asked to complete a questionnaire and to send it by email lose their anonymity. All of those criteria are based on Sue (2007).

The survey remained open for five months, from October 15th, 2013, to February 28th, 2014. Because the participants were volunteers, they did not need to provide their names or any other data related to their identity. Thus, ethical considerations were only related to assuring the participants of the confidentiality of their responses.

4.7 Data analysis: Statistical methods and procedures

In this thesis, a number of statistical methods were employed in order to ensure reliability and accuracy of the analyses of the associations between flow and self-regulated practice behaviours. The statistical tests were run with the software IBM SPSS 20 statistics and Stata 13. The following sub-sections describe the statistical techniques used in the present research and their theoretical need.

4.7.1 Statistical techniques used to characterize the sample

Descriptive statistics. Measures of central tendency are adequate to provide a summary of the participants' characteristics and to provide an impression of the results (Clark-Carter, 2010). Among these, *mean*, *median* and *mode* were used to describe the sample characteristics according to their scores. The mean is a common measure of central tendency that is represented by the sum of scores divided by the number of scores.

Median is the value that is encountered in the middle of all values in the result; and mode is the most frequently occurring value. The three measures were analysed as a way of having a more comprehensive and reliable analysis. The use of means alone may result in problems with the interpretation of the data. For example, means can be affected by extreme scores in data (Clark-Carter, 2010; Howell, 2013). Further information regarding means is found in Clark-Carter (2010) and Howell (2013).

Standard Deviation (SD) was used to measure dispersion, along with maxima and minima, to get an impression of the spread of the sample in relation to the measured variables. Being calculated by the square root of the variance, a high standard-deviation indicates that data is widely spread. In contrast, a low standard-deviation indicates that data tends to be close to the mean (Marôco, 2011).

In order to quantify intensity and direction of association between two variables, the Pearson coefficient *r* was used as the association measure in the development of the questionnaire for the assessment of self-regulated practice behaviour. This coefficient varies between −1 and +1. If $r > 0$, the variables vary in the same direction. If $r < 0$, the variables vary in the opposite direction. Its absolute value indicates how strong the association is. Humanities and social sciences tend to consider correlations as weak ($r < 0.25$), moderate ($0.25 < r < 0.5$), strong ($0.5 < r < 0.75$) or very strong ($r > 0.75$) (Marôco, 2011).

4.7.2 Statistical methods used in the development of the Self-Regulated Practice Behaviour Questionnaire

Reliability. The Cronbach (1951) alpha score was used to demonstrate the internal reliability of the questionnaire. Its score represents the integrity of the items in the questionnaire, represented by the correlation levels between the items within a questionnaire (Hill & Hill, 2009; Coutinho, 2011). It is the most appropriate indicator of internal consistency for questionnaires using Likert-type scales. Evaluations of individual

items were made through the inspection of a correlational matrix designed to assess each item of the measure with the total correlation score.

Validity. Factor Analysis comprises a series of methods that were first developed by Spearman (1904) to investigate the structure of an underlying set of observed variables (Byrne, 2010; Fabrigar, Wegener, MacCallum, & Strahan, 1999; Marôco, 2011; Thompson, 2004). One method of factor analysis, Exploratory Factor Analysis (EFA) is a well-known statistical procedure 'used when a researcher wishes to identify a set of latent constructs underlying a battery of measured variables' (Fabrigar et al., 1999). It is widely used for the exploration of how and to what extent the observed variables (i.e. items in the questionnaire) are linked together (Byrne, 2010).

The internal validity of the self-regulated behaviours questionnaire was tested through the application of EFA to the whole set of items. This statistical method was considered the most appropriate to establish the latent constructs underlying the observed practice behaviours referred to in the literature about musical practice. At this point, it is important to mention that this procedure only provides an understanding of the possible latent practice behaviours explored to improve its analytical and explanatory power in the analyses of their relationships with flow dispositions.

4.7.3 Inferential statistics

Differences according to the participants' attributions. To allow for the investigation of differences between the means of two or more distinct groups in the sample, independent samples T-tests and Analysis of Variance (ANOVA) were adopted. The T-test is adequate to compare the means of two distinct groups (e.g., compare if the means of self-regulation differ by gender); the ANOVA was adopted to compare means between more than two groups. The null hypothesis tested through both statistical procedures is: there are no differences between the means in each group. If the result is statistically significant, there is a chance that the result is probably true for that population (Clark-Carter, 2010; Howell, 2013; Marôco, 2011; Laureano, 2013).

Associations between self-regulated practice and flow. The association of self-regulated practice behaviours and flow dispositions was explored using regression analyses (instead of correlations). While the main purpose of a correlation is to quantify the intensity and direction of associations between a pair of variables, regressions allow specific predictions between an independent variable (IV) and a dependent variable (DV)[5]. Clark-Carter (2010) explained that

> Regression analysis can be described as a form of modelling, for a mathematical model of the relationship between variables is created. Regression allows specific predictions to be made from the IV(s) about the DV for individual participants. Simple regression involves a single IV. Multiple regression allows more than one IV to be used to predict the DV and so improves the accuracy of the prediction. (Clark-Carter, 2010, p. 314)

As a means to investigate whether flow dispositions are predicted by self-regulated practice behaviours, associations between both variables were explored through multivariate regression. Multivariate regression is appropriate for 'situations where there is a set of dependent (or outcome) variables and a set of predictor variables' (Clark-Carter, 2010, p. 370). Thus, the flow variables were regressed on ten different dependent variables. The first model[6] used factor scores estimated from a Confirmatory Factor Analysis (CFA) using all nine items (named here as Global Flow), the other nine dependent variables were the nine individual indicators of the Dispositional Short Flow Scale. These nine items, as dependent variables, each on a 5-point Likert scale, were treated as continuous variables. Although the treatment of Likert-type items as continuous variables can be problematic because of the absence of corrections for non-normality (DiStefano, 2002; Flora & Curran, 2004), this procedure is frequently adopted in research in several domains (Eastin & LaRose, 2006; Perry, 1996). Even being subject

[5] According to Clark-Carter (2010), the terms *criterion* and *predictor* are more appropriate than *dependent* and *independent* for variables in non-experimental research. However, the latter terms will be used throughout this thesis to avoid entropy with another terminology.

[6] The term *model* is used in regressions because the tested interactions between IV's and DV's are represented by equation models.

to biases of this nature, it was decided, in the present research, to disregard this assumption because the main interest was the overall picture of the relationships between self-regulated practice behaviours and flow, and not establishing causal relationships between both. Thus, this research treats the dependent variables as continuous in order to simplify the comparison between the corresponding estimates with those of the Flow factor scores, which are on a continuous scale.

In order to account for self-regulated behaviours varying systematically by country, gender, years of experience, musical instrument, higher-education studies, participation in prize competitions, and hours spent practising per week, control variables[7] were included in the model. Including these control variables also aided inference, as the variance of the error term may not be constant, and instead may be a function of these individual characteristics. This assumption was further relaxed and heteroskedasticity-robust standard errors were estimated based on White (1980).

Standardised[8] 'beta' coefficients were reported to ease comparability of the estimates with those from other samples. Standardized coefficients refer to the variation in the number of standard deviations in a dependent variable per standard deviation increase in the independent variable (Howell, 2013). The coefficient is usually standardised to answer the question of which of the independent variables has a greater effect on the dependent variable in multiple regressions. The reported estimates, thus, indicate the change of the dependent variable in standard deviations with a one standard deviation change in the independent variables.

4.8 Summary

The general methodological procedure explained in this chapter set out the itinerary for this research (Table 9). The experience of flow by expert musicians and its associations with self-regulated practice behaviours were analysed based on the

[7] Control variable is a variable that is constantly maintained in order to assess or clarify the relationship between other two variables. In the present study, the control variables are introduced in order to avoid self-regulated practice behaviours varying according to demographic factors.

[8] Standardising data is a procedure through which 'data is transformed so as to have a mean of zero and a standard deviation of one in each variable' (Howell, 2013, p. 265).

quantitative assessments of the performer's experience and their demographic attributes. The theoretical model of dispositions to flow relating to self-regulation provided the opportunity for using a validated scale, whereas the absence of a model of self-regulation in experts required the construction of a questionnaire specifically for this research. As the samples included both Portuguese and English speakers, the present investigation conducted preliminary studies in order to minimize research bias resulting from the use of translated versions. It should be noted that the translated version of the Dispositional Flow Scale-2 was approved by the company that holds and regulates the dissemination of the flow questionnaires (Appendix 5).

Table 9

Samples and studies

Study	Sample	Instrument	Period
Development of a measure of self-regulated practice behaviours	49 advanced [9]musicians	First developed version	Nov 2012 – Feb 2013
	212 advanced musicians	Adapted version	Oct 2013 – Feb 2014
Dispositions to Flow in musical practice	168 expert musicians	Dispositional Flow Scale-2 (DFS-2)	Mar 2014 – Jul 2014
Self-regulated practice behaviours and flow dispositions	168 expert musicians	SRPB + DFS-2	Set 2014 – Apr 2015

This chapter described the general methodological procedures that underpinned the following studies. Other specific methodological aspects are detailed in the description of each study included in this thesis.

[9] The distinction between 'advanced' and 'expert' performers is described in the section 4 (p. 92).

Chapter 5. Development of a measure of self-regulated practice behaviours

5.1 Introduction

A successful career in music performance requires high levels of physical and psychological skills (Williamon, 2004), developed through extensive periods of deliberate and effective practice (Ericsson et al., 1993; Hallam, 1997). Recently, the characteristics of effective music practice have been studied from the perspective of self-regulation theory (McPherson & Zimmerman, 2011; Miksza, 2011a).

Self-regulation is a broad psychological concept, commonly understood as the ability to transform thoughts, feelings and behaviours through the deliberate or automated use of specific mechanisms and meta-skills in the pursuit of the achievement of personal goals (Karoly, 1993). In music, the theory of self-regulation is used to understand the learning processes and strategies of music students as they develop their musical expertise (McPherson & Zimmerman, 2011). The adoption of self-regulated strategies by music students is positively correlated with improved musical performance, management of technical and interpretative problems of musical pieces, management of practice time, formal practice, self-efficacy beliefs and the use of cognitive and metacognitive strategies (see McPherson & Zimmerman, 2011).

As explained in Chapter 2 (Section 2.5, p. 64), self-regulation also relates to the effectiveness of music practice (Miksza, 2011a). After many years of deliberate practice, expert musicians develop their practice in an efficient way (Hallam, 1997), adopting self-regulated behaviours that are in the basis of expert performers' autonomy and control over their practice. However, although some studies have tried to measure these behaviours through questionnaires, studies that incorporate quantitative measures of practice behaviours usually adapt or complement questionnaires developed in other areas than music. For example, the most widely used questionnaire to measure self-regulation in music students is the Motivational Strategies for Learning Questionnaire (MSLQ), which focuses on the behaviour of students in the school environment (Pintrich & De Groot, 1990). A notable exception to this is the study conducted by Miksza (2011b), who

developed a measure of self-regulatory behaviours based on the literature about students' music practice.

The investigation of self-regulated behaviours in advanced musicians may be appropriate to inform the development of the younger students. As experienced musicians, it is likely that they already have the psychological skills that young students are still developing (Lehman & Davidson, 2006). As regards to behaviour, more experienced musicians' approach to their practice is likely to be more reliable and constant (Chaffin et al., 2002; Hallam, 1997), and adult musicians are more able to reflect upon and verbalize their practice behaviours.

This chapter describes the investigation of self-regulated practice behaviours in adult musicians. The general aim of the present study was to explore the self-regulated practice behaviours of advanced musicians through the development of a self-report measure. The absence of a measure of self-regulated practice behaviours adopted by expert performers and those who are preparing for a musical career justifies the present study. The specific aims of the present chapter were as follows:

- To develop a questionnaire to assess self-regulated practice behaviours used by adult musicians;

- To apply the questionnaire to a sample of adult musicians with a relatively high level of musical expertise, expressed by a minimum of ten years of deliberate practice in a context of formal musical learning;

- To analyse the psychometric characteristics of the instrument through reliability tests and exploratory factorial analyses;

- To analyse the advanced musicians' self-regulated behaviours and their interactions with sample attributes (e.g. age, gender, experience, musical instrument, practice routines, among others).

5.2 The development of the self-regulated practice behaviour questionnaire (SRPBQ)

The development of the questionnaire followed the 5 key steps proposed by Spector (1992, p. 8) for the development of a new measure: (i) clear and precise definition of the construct, (ii) planning of the questionnaire, (iii) pilot study, (iv) management and analyses of items, and (v) validation.

5.2.1 Definition of the construct

The first step in the development of the SRPBQ was the clear and precise definition of the construct. Self-regulation in the context of musical practice is a construct that comprises thoughts, behaviours, and feelings self-generated with the purpose of the achievement of learning goals (McPherson & Zimmerman, 2011). Although this definition follows the original formulation of the theory about self-regulation in academic learning (Zimmerman, 1998), the indicators adopted for the development of the questionnaire were the ones listed in the earlier literature review about expert musicians (Chapter 2, Section 2.5, p. 64). As mentioned above in Chapter 4 (Section 4.3.1, p. 96), the indicators were tentatively classified for better organization, visualization and management of an expected large number of items: 1 regulator (goals and their attributes); 6 regulatory mechanisms (planning, monitoring, knowledge and regulation of study strategies, time control, environmental structuring, use of help and resources); and 3 regulatory assessments (self-evaluation, attribution of success and failure in the achievement of practice goals, and self-efficacy).

It is necessary to explain that self-regulation cannot be measured through a direct question only. This type of construct is referred to as a *latent variable*, that is, a variable that cannot be directly observed (Saris & Galhoffer, 2007), because it comprises several components or indicators. For instance, by asking a musician how much self-regulation he or she adopts in his/her practice or how frequently he or she self-regulates, one will not be able to know exactly how much self-regulation the musician adopts, since self-regulation comprises a sum of interrelated behaviours.

5.2.2 Survey plan

The questionnaire planning phase included three related processes, as follows: (i) decision on the type of response to items, (ii) generation of items and (iii) instructions to participants.

As regards to the decision on the type of response to the items, Spector (1992) suggested that the three most used forms of response are agreement, assessment and frequency. Taking into account the concept of self-regulation and its selected indicators, it was considered appropriate to choose frequency and agreement as response forms. For instance, goal setting was investigated using frequency as form of response (e.g. how frequently one sets goals for practice), whereas knowledge of personal strategies was investigated using levels of agreement (e.g. how much one agrees about awareness of one's available practice strategies).

For the measurement of attitudes, Likert-type scales are commonly used in psychological research using self-report questionnaires (Bandura, 2006; Likert, 1932). Studies using questionnaires for the measurement of musicians' attitudes and behaviours also usually adopt Likert scales (Austin & Berg, 2006; Leon-Guerrero, 2008; McPherson & Renwick, 2000; Miksza, 2011b; Nielsen, 2004, 2011; Ritchie & Williamon, 2010). Thus, this study deemed it appropriate to use the Likert method by establishing specific categories: for items measuring frequency of behaviour, a Likert-type scale from 1 (never) to 5 (always) was used; for items requiring levels of agreement, answers were rated on a Likert scale from 1 (strongly disagree) to 5 (strongly agree).

For the generation of items, the fundamentals of self-regulated learning in the context of research in music practice were adopted as the starting point for the development of the first set of questions. The initial and tentative set of items included 36 items. The set included adaptations of two scales that measure self-efficacy (Schwarzer & Jerusalem, 1995) and metacognitive strategies (Schraw & Dennison, 1994), and other items created by the investigator himself (Table 10).

The self-efficacy scale was adapted to a musical context from Schwarzer and Jerusalem's (1995) General Self-Efficacy Scale, as this scale has demonstrated reliable

psychometric properties (Cronbach's Alpha = 0.80s) and adequate applicability to expert, adult musicians. Participants responded to 10 items regarding their personal beliefs of competence to solve problems during practice.

The goal orientation scale comprised 5 items to assess learning and outcome orientations. Items assessing learning orientation such as 'I practice with the main purpose of learning a great deal' contrasted with outcome orientation items such as 'It is important for me to prove that I am a good musician'. Self-regulated individuals tend to set specific and clear goals for an activity (Hoyle, 2010). A 6-item scale was designed to assess the frequency of these behaviours (e.g. 'I set specific practice goals'), comprising the goal-setting subscale.

Table 10

Development of a self-regulated practice behaviour questionnaire: Initial set of items

Construct	**Number of items**	**Main Sources**
Self-Efficacy	10	Schwarzer & Jerusalem (1995)
Regulation of cognition	10	Schraw & Dennison (1994)
Goals setting	6	Literature review*
Goals orientation	5	Literature review*
Self-evaluation	5	Literature review*

Note. * The author crated the items taking into account literature regarding advanced musicians' efficient practice behaviours.

Metacognition was assessed through an adaptation of regulation of cognition items from Schraw and Dennison's Metacognitive Awareness Inventory (1994). The scale

comprised 10 items assessing sub-processes that affect the control aspect of practice, such as notion of used strategies (e.g. ‘I find myself analysing the usefulness of strategies while I am practising’), time control (e.g. ‘I organize my time to practice to best accomplish my goals’), environment control (e.g. ‘I try to isolate/eliminate or minimize environment distractions for practice’), and social aspects (e.g. ‘I usually ask teachers or colleagues to listen to me playing’). Finally, self-evaluation was measured through 5 items assessing self-evaluation at the end of a practice session (e.g. ‘I ask myself how well I accomplish my goals once I’m finished’).

Following this step, a panel of experts in the field of music evaluated all items. The panel of experts included the two supervisors: the first is a Portuguese pianist and music teacher, specialized in musical performance, with high proficiency in English language; the second is a professor and educational psychologist from the UK, with a relevant experience in the field of music education. Although these experts were chosen by convenience, their complementary profiles and trajectories were deemed appropriate to contribute with a comprehensive analysis of items from two distinct perspectives, i.e., musical performance and music education. Further revisions were made before the first pilot study. Some minor changes were introduced in items of the self-efficacy scale for better adaptation for music. For example, the item 'I can always solve difficult problems if I work hard' became 'During practice, I can solve difficult problems if I work hard'. When measuring frequency of behaviours, adverbs such as ‘always’, ‘often’, amongst others, were discarded.

Besides the generation of items designed to measure the indicators of self-regulation and choice on how to answer the questions, the survey plan also involved the decision on their format, including how the text would be displayed. For practical reasons, as previously explained (Section 3.5), an online platform was used for the implementation of the survey.

5.2.3 Pilot study

The first pilot study consisted in the administration of the questionnaire to a group of musicians to test its adequacy for musical research and its preliminary reliability.

The sample comprised 49 classically-trained instrumentalists (male = 52%, female = 48%) from the home institution, ranging in age from 18 to 58 years (m = 25.36, SD = 7.87). The musicians were engaged in undergraduate (41%) and graduate music performance degrees (masters = 43%, PhD = 16%). Their experience playing their instruments spanned from 5 to 52 years (m = 12.65, SD = 7.48). Among the instrumental categories investigated, strings represented the majority of respondents (45%). Other categories included woodwind (25%), followed by keyboards, brass, and percussion (10% each).

The musicians completed the questionnaire from November 28th, 2012, to February 11th, 2013. Inter-item and item-total analyses were undertaken for each of the five hypothetical self-regulation scales.

5.2.4 Management and analyses of items

The results of the pilot study suggested that the exclusion of items from the self-efficacy subscales (4 items), orientation of goals (1 item), set targets (2 items), and metacognition (2 items) would increase the internal consistency. After removal of these items, analysis showed that all items had significant correlations ($p < 0.01$) and all item-total correlations were $r = 0.30$ or greater. The subscales had internal consistency levels from moderate to high, as determined by Alpha Cronbach reliability coefficients ($\alpha = .74 - .86$) (Table 11)

Table 11

Self-regulated practice behaviour questionnaire: Internal consistency among hypothesized subscales

Sub-scale	**Mean**	**SD**	**α**
Self-efficacy (6 items)	30.42 of 42	6.29	.86
Goal-orientation (4 items)	19.35 of 20	5.41	.80
Goal-setting (4 items)	14.00 of 20	7.17	.74
Metacognition (8 items)	25.76 of 40	5.36	.81
Self-reflection (5 items)	17.69 of 25	2.97	.78

Note. SD = Standard Deviation; α = Cronbach's Alpha

After the statistical analysis of the first pilot study, the resulting scale of 27 items underwent further review by the same panel of experts described above, and another test was undertaken with 5 musicians and researchers in the area of music performance. The items that still raised distinct differences in relation to their meaning were removed. Based on the results of the review and following the criteria of semantic analysis (clarity and ambiguity), 5 items were thus eliminated. The final questionnaire (22 items) was then applied to the target sample for analysis of validity evidence.

5.2.5 Validation

After the development of the questionnaire, the next step was the application of factor analysis for the analysis of validity evidence. For this, a larger number of participants would be necessary. Although there is no total agreement regarding the number of participants for validation procedures, the rule of 10 observations per variable

proposed by Byrne (2010) is widely accepted in quantitative studies (i.e. if the questionnaire has 10 variables, the study must have a minimum of 100 participants). Crocker & Algina (2008) indicate a general rule of using 10 individuals per variable, with a minimum of 100 participants in the total sample. On the other hand, however, Gorsuch (1983) stated that a sample for factor analysis must contain at least 5 participants per variable and a number of at least 200 participants, while Guadagnoli & Velicer (1988) suggest that the desired size of a sample depends on the size of the resulted factor loadings.

In order to avoid methodological shortcomings in the factorial analysis because of an inadequate number of participants, it was decided to apply the measure to the target sample for the study (Chapter 4, Section 4.5.1, p. 105), since it was predicted that the main sample in the study would include more than 100 participants. Thus, the psychometric structure of the questionnaire was tested, testing its reliability and preliminary validity through factorial analysis applied to the main sample, as a way to verify if the self-regulated practice behaviours could be measured by a self-report developed questionnaire based on the literature about expert practice behaviours.

5.2.5.1 Internal reliability

The questionnaire items are displayed in Table 12. Exploratory inter-item and item-total correlational analyses (Pearson product-moment correlations) were conducted in order to verify the internal structure of the questionnaire as a whole. After inspection of the correlational matrix table, the item 'I practice in order to achieve high ratings (e.g. grades) and positive feedback' did not achieve any correlation where $r \geq 0.3$. Cronbach's alpha measure was used to test the measurement reliability. Across the full sample, a Cronbach's alpha score of .843 was achieved, which is above the acceptable level to indicate that the questionnaire was internally reliable (Marôco, 2011).

A reliability test also suggested that removing the same item would increase the internal consistency to $\alpha = .86$. Thus, the item was omitted from further analyses. Internal reliability tests showed that all items contributed to form a whole scale of self-regulated

practice behaviours, with the exception of the item 'I cannot reach my practice goals without the support of some external factors'. Although removing this item would have resulted in an increase of 0.01 in the reliability coefficient, the previous correlational analysis showed that it achieved four significant correlations ($p < .005$), and therefore the item was not excluded.

Table 12

Descriptive statistics of musicians' practice behaviours and reliability tests ordered by mean within each factor

Factor	Practice behaviour	Mean	Mode	Median	SD	α
Self-Regulation Through Practice Organization	I use specific strategies related to my practice goals	4.14	4	4.00	.86	.83
	I understand that my goals are challenging	4.11	4[a]	4.00	.85	.83
	I set goals for my practice sessions	3.95	4	4.00	.93	.83
	I set specific goals for my practice sessions	3.88	4	4.00	1.03	.83
	I evaluate the progress made towards my goals	3.80	4	4.00	1.01	.83
	I set long-term goals (weeks, months, years)	3.75	4	4.00	1.10	.83
	I organize the physical environment of my practice sessions	3.65	5	4.00	1.20	.84
	I set short-term goals (minutes, hours, days)	3.62	4	4.00	1.08	.84
	I plan the order of the activities of my practice sessions	3.61	3	4.00	1.05	.83
	I plan the time of my practice sessions	3.46	3	3.00	1.11	.83
Self-Regulation Through Personal Resources	I understand the nature and demands of my musical activities	4.39	5	4.00	.68	.84
	I understand my strengths and weaknesses	4.31	4	4.00	.61	.84
	I am aware of the strategies that I use during practice	4.25	5	4.00	.83	.83
	I use strategies that have been effective in the past	4.22	5	4.00	.83	.84
	I know what I must do to in order to complete my musical activities satisfactorily	4.20	4	4.00	.77	.84
	I know when and in which contexts my strategies will be most effective	3.99	4	4.00	.81	.83
	I am able to achieve my practice goals satisfactorily	3.95	4	4.00	.72	.84

	I practice in order to improve my musical skills	4.50	5	5.00	.65	.84
Self-Regulation Through External Resources	I seek information from several sources (books, CDs, videos, internet, biographies, arts, etc.) to support my study	3.83	5	4.00	1.07	.84
	I request help from others (teachers, peers, composers, musicologists and specialists)	3.39	3	3.00	1.12	.84
	I cannot reach my practice goals without the support of some external factors (peers, teachers, materials, environment) *	3.09	2	3.00	1.20	.85
	I practice in order to achieve high ratings (e.g. grades) and positive feedback**	2.93	3	3	1.28	.86

Note. SD = Standard Deviation; α = Cronbach's Alpha reliability coefficient if item deleted; [a] = Multiple modes exist. The smallest values shown; * Reversed score; ** Item removed.

5.2.5.2 Preliminary validity

In order to identify the underlying factors among the remaining 21 items, exploratory factor analysis was carried out using the principal factor method and an orthogonal varimax (Kaiser off) rotation solution (Table 13). Factors were retained using the criteria of eigenvalues over 1, and of factor loadings above 0.4 (Guadagnoli & Velicer, 1988; Kaiser, 1960).

Table 13

Rotated factor pattern matrix for final common factor analysis

Item	Factor 1	Factor 2	Factor 3
I set goals for my practice sessions	.83		
I set short-term goals (minutes, hours, days)	.67		
I set long-term goals (weeks, months, years)	.48		
I set specific goals for my practice sessions	.79		
I understand that my goals are challenging	.49		
I use specific strategies related to my practice goals	.59		
I am aware of the strategies that I use during practice		.59	
I use strategies that have been effective in the past		.55	
I know when and in which contexts my strategies will be most effective		.77	
I understand the nature and demands of my musical activities		.79	
I know what I must do to in order to complete my musical activities satisfactorily		.74	
I plan the order of the activities of my practice sessions	.69		
I plan the time of my practice sessions	.63		
I organize the physical environment of my practice sessions	.52		
I evaluate the progress made towards my goals	.46		
I seek information from several sources (books, CDs, videos, internet, biographies, arts, etc.) to support my study			.45
I request help from others (teachers, peers, composers, musicologists and specialists)			.67
I am able to achieve my practice goals satisfactorily		.49	
I cannot reach my practice goals without the support of some external factors (peers, teachers, materials, environment)			.43
I understand my strengths and weaknesses		.52	
I practice in order to improve my musical skills			.48

Note. Eigenvalues: Factor 1 = 6.476 / Factor 2 = 1.975 / Factor 3 = 1.077.

Three different aspects of music practice were derived from analysis of the whole self-regulation scale, which could be interpreted as (1) Practice Organization, (2) Personal Resources, and (3) External Resources.

Factor 1 included ten practice behaviours related to the organization of practice, which were dependent on management/evaluation of distinct goals for practice, as well as planning of time and physical environment. Factor 2 clustered seven items related to different aspects of personal resources, knowledge/regulation of strategies and general self-efficacy for goal achievement in practice. Lastly, factor 3 included four items regarding the influence of external aspects related to practice efficiency (external causal attributions, help seeking and use of resources). All of these behaviours contribute to practice efficiency, which was characteristic of this sample of musicians. The results showed that the questionnaire could be used to explore different individual self-regulatory practice behaviours (i.e. items), and to explore the three distinct aspects of music practice (i.e. self-regulated factors) in advanced musicians. Table 12 displays the items ordered by mean within the three self-regulation factors.

5.3 Analysis of the self-regulated practice behaviours in advanced musicians

Having developed a reliable and valid measure of the self-regulated practice behaviours of advanced musicians, the following sections explore the participants' self-regulated practice behaviours, analysing the scores achieved in each factor and studying the relationships between self-regulated behaviours and their demographical characteristics.

5.3.1 Descriptive statistics

Descriptive statistics were used to describe the sample according to their self-regulated practice behaviours (Table 12). Means for the self-regulated behaviours were moderately high, demonstrating that this sample of advanced musicians adopted the measured behaviours. Within the factor Practice Organization, items related to goals and strategy comprehension (i.e., 'I understand that my goals are challenging' and 'I use specific strategies related to my practice goals') obtained the highest scores. Personal Resources items, expressing metacognitive knowledge (i.e., 'I understand the nature and demands of my musical activities' and 'I understand my strengths and weaknesses')

achieved the highest means. Moreover, the item 'I practice in order to improve my musical skills' obtained the highest score in the External Resources category. Lowest means were found for aspects of music practice related to support from others and organization (i.e., planning). Although novice self-regulated learners rely on knowledgeable others and social resources when facing difficulties (Hallam, 2010; McPherson & Zimmerman, 2011), these behaviours did not score highly in this sample. Planning of Time for Practice did not achieve as high a mean and mode as the other behaviours (mean < 3.50, mode = 3). Support from External Factors (m = 3.09; SD = 1.20) and Help from Others (m = 3.39; SD = 1.12) also had low means when compared with the other measured self-regulated behaviours.

5.3.2 Differences in self-regulation according to the participants' attributions

Inferential statistical tests (ANOVAs, t tests) were performed in order to verify differences in the self-regulated factors by gender, age group, musical instrument groups and time practising. No significant differences in the self-regulation factors by gender and musical instrument groups were found.

5.3.2.1 Age and self-regulation

A one-way ANOVA was conducted to determine if the three self-regulation factor scores were different for groups with different ages. Participants were divided into five age groups: < 20, 21–30, 31–40, 41–50, and > 50 (see Table 6 for number of participants in each age group on p. 96). There were no outliers, as assessed by boxplots; data were normally distributed for each group, as assessed by the Shapiro-Wilk's test ($p > .05$), and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p > .05$).

Data are presented as mean ± standard deviation. Self-Regulation through Personal Resources showed a statistically significant difference between different age groups, $F(4, 207) = 2.730$, $p < .005$. Also, Self-Regulation through External Resources was significantly different between different age groups, $F(4, 207) = 7.192$, $p < .005$.

Tukey's post-hoc analysis revealed that the Self-Regulation through Personal Resources score increased from < 20 years (3.9 ± 0.6) to 31–40 years (4.3 ± 0.7) groups, with the scores being maintained until 50 years of age (Figure 3). The means of Self-Regulation through External Resources, however, decreased significantly after 50 years of age (Figure 4).

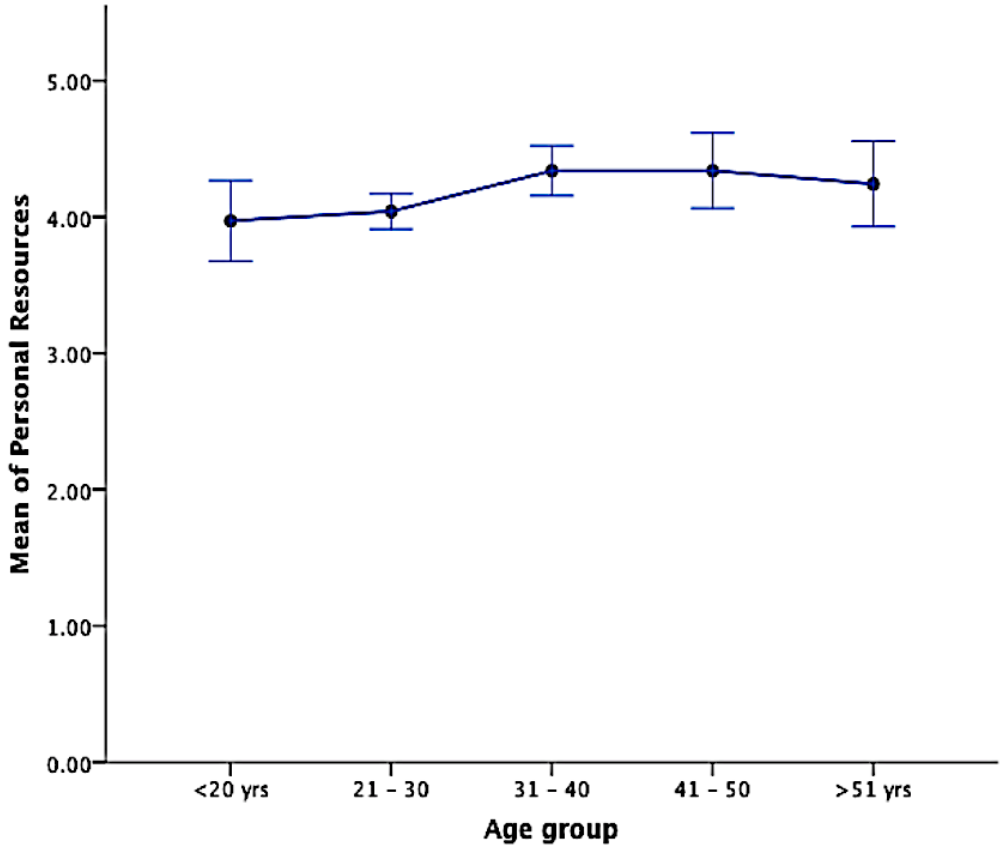

Figure 3. Increase in ANOVA means of the self-regulation through personal resources factor according to age group

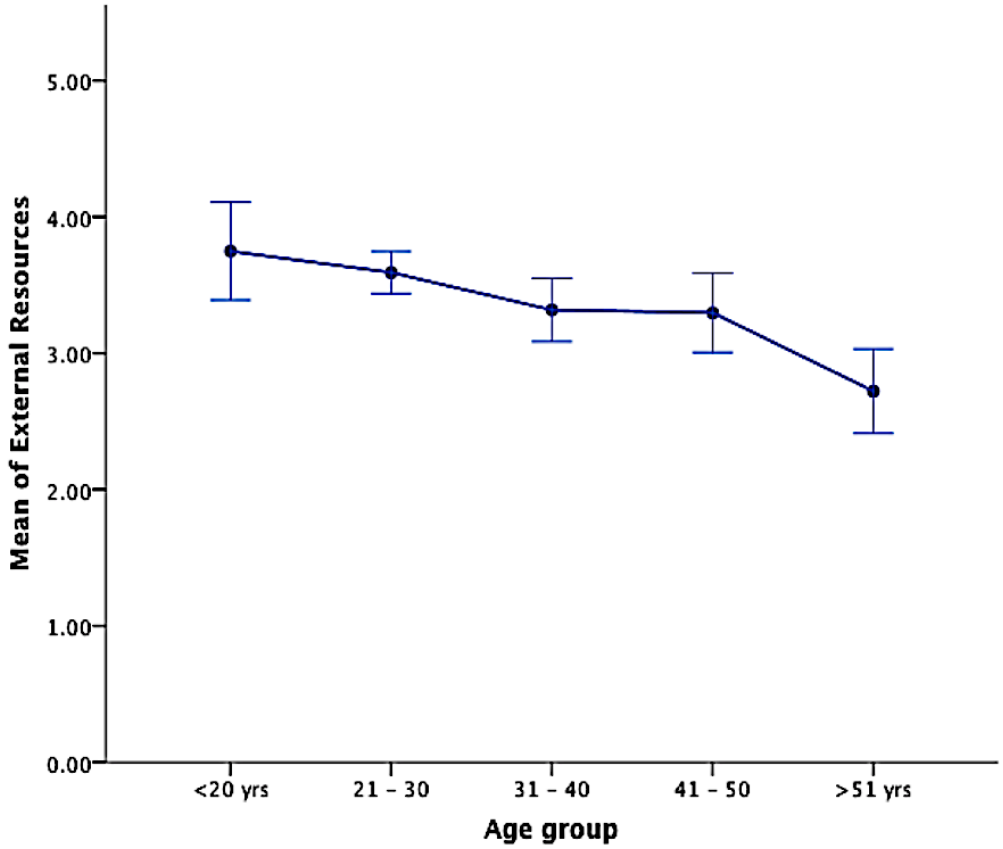

Figure 4. Decrease in ANOVA means for the self-regulation through external resources factor according to age group

The data suggest that Self-Regulation through Personal Resources (knowledge and regulation of cognition, strategies, self-efficacy) increases with age. In contrast, Self-Regulation through External Resources (external causal attributions, help seeking and use of resources) decreased with age, suggesting that advanced musicians are less dependent on external resources.

5.3.2.2 Practice time and self-regulation

A one-way ANOVA was conducted to test whether the three self-regulation factor scores differed for groups reporting different daily practice durations. Participants were classified into five practice duration groups: 'less than 1 hour,' '1h – 2h' '2h – 3h,' '3h –

4h,' and 'more than 4h' (Table 7 presents the number of participants in each practice duration group). There were no outliers, as assessed by boxplots; data were normally distributed for each group, as assessed by Shapiro-Wilk's test ($p > .05$), and there was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p > .05$). Data are presented as mean ± standard deviation.

Self-Regulation through Practice Organization was statistically significantly different between different practice duration groups, $F(4,207) = 4.846$, $p < .005$. There was a significant increase in the means from the 'less than 1h' group (3.4 ± 0.9) to the '3h–4h' group (4.1 ± 0.6) (Figure 5), suggesting that organization in practice affects the daily practice time. Although ANOVA means were still between 3 and 4 and thus cannot be characterized as a large increase, it seems that organization contributes to a more focused practice, which in turn may have contributed to the increase in practice time.

Also, Self-Regulation through External Resources was significantly different between different practice duration groups, $F(4,207) = 4.385$, $p < .005$, since means increased from the 'less than 1h' group (2.9 ± 0.9) to the '3h–4h' group (3.8 ± 0.6) (Figure 6). This suggests that the more musicians tend to use external resources in the process of practice, the more time is devoted to practice. This is understandable since these musicians may spend more time researching and searching for support from materials (e.g. books, recordings) and from knowledgeable others (e.g. peers, composers, teachers). The Tukey's post-hoc analysis revealed that the increases were significant.

A correlational analysis was also applied to verify if time spent practising decreased with age. Practice duration was significantly related to age, $r(212) = -.272$, $p < .01$. It seems that the more experienced the musician, the less time he/she needs to practise efficiently.

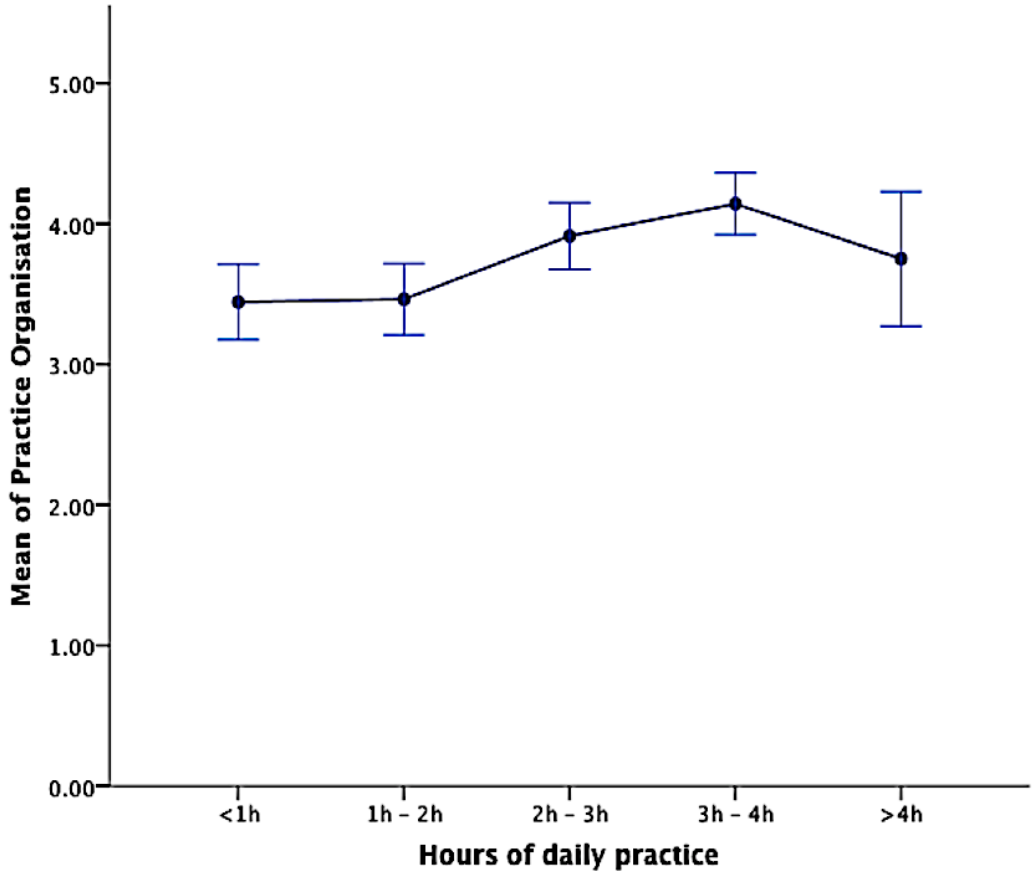

Figure 5. Increase in ANOVA means for the self-regulation through practice organization factor according to duration of daily practice measured in hours

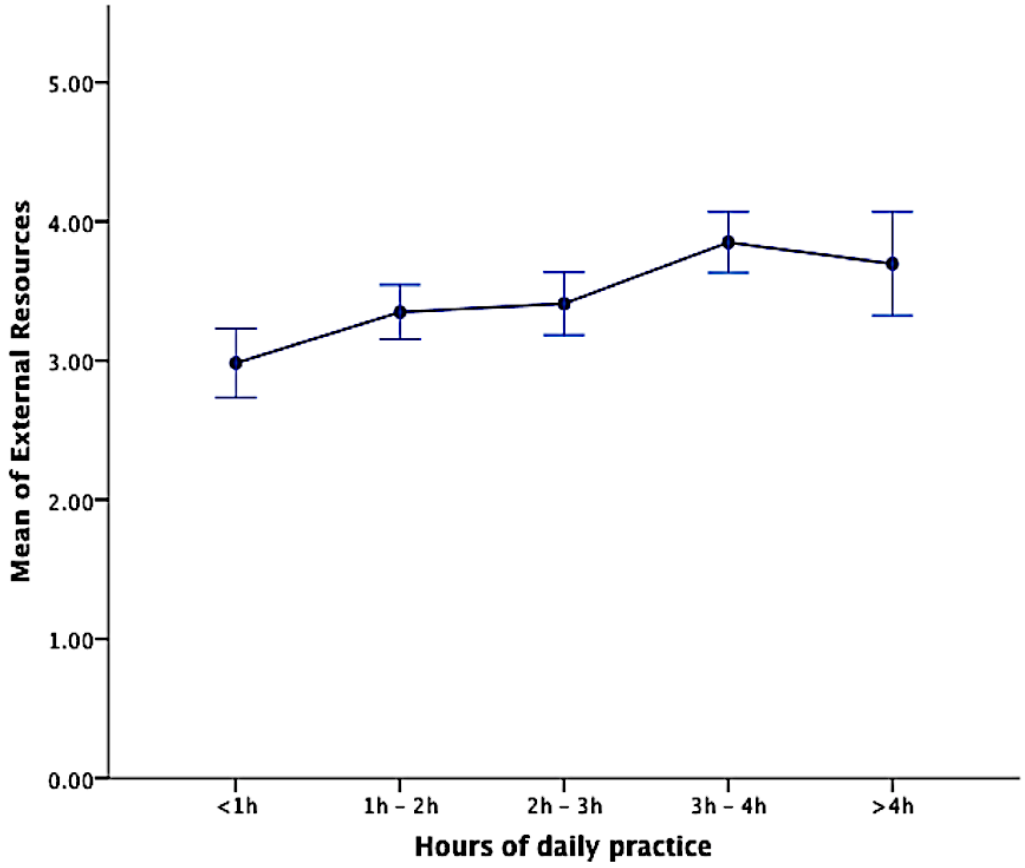

Figure 6. Increase in ANOVA means for the self-regulation through external resources factor according to daily practice measured in hours

5.3.3 Discussion

This study examined self-regulated behaviours in the practice of advanced classical musicians. Drawing on the three previously established self-regulated practice factors frequently adopted by advanced performers, namely Self-Regulation through Practice Organization, Self-Regulation through Personal Resources, and Self-Regulation through External Resources, the present study found high scores for most of the self-regulated practice behaviours (Table 12), suggesting that advanced musicians rely heavily on self-regulation in their practice processes.

However, some of the organizational aspects (i.e., planning of time and order of activities) received lower scores in this category (i.e., Practice Organization),

contradicting findings that have stated that practice is most effective when organized in a sequential manner (see Hallam, 1997). It was expected that advanced musicians would be highly organized or methodical, but the standard deviations and modes found for these items (SD > 1; mode = 3) suggest that organization is not a main aspect of their self-regulation. Notwithstanding, a possible explanation for this may be that experts from several fields normally adopt behavioural patterns (Ericsson et al., 2006) that are constructed through several years of training. In other words, these advanced musicians may not need to focus as much on practice planning because they already know how to organize it efficiently.

The data also seems to suggest that the less experienced the advanced musicians are, measured by their age, the more they rely on practice organization. The data shows that the older the musician, the less time he or she practices. Although no relationship was found between age and Practice Organization, Practice Organization increases with duration of daily practice (Figure 5). As a result, it is possible to deduce that self-regulation through practice organization may be more representative in the practice processes of younger or less experienced advanced musicians. This is in consonance with several studies that have demonstrated high scores for behaviours related to practice organization in young music students (McPherson & McCormick, 1999; McPherson & Zimmerman, 2011; Miksza, 2007; Miksza, 2011b).

Also noteworthy were the low rates for Self-Regulation through External Resources (Table 12). Self-regulated learning is a social learning theory, in which music practice occurs through the interaction of social, cognitive, affective and motivational processes (McPherson & Zimmerman, 2011). What is clear in the results of the current study is that advanced musicians reported relying more on personal resources (e.g., metacognition) rather than external ones (i.e., teachers, peers, composers, specialists, materials). The younger musicians in this sample reported including more external resources in their practice processes (Figure 4), also indicating that, while practice organization and external resources are more relevant in the self-regulation of young advanced performers, they tend to decrease as a result of the increase of knowledge of

personal resources (Figure 3). Musicians become more autonomous with experience, relying less on support from knowledgeable others.

Together, these results suggest that Self-Regulation through Personal Resources contributes to make musicians' music practice processes more efficient and less time-consuming as their expertise increases. Thus, experienced musicians may simply need less time to achieve their practice goals, as expressed by the negative correlation between practice time and age. There are other possible explanations: the nature of the practice task or familiarity with the repertoire can influence the time and the manner in which practice is undertaken. For example, Miklaszewski's study (1995) with professional pianists found that the participants spent less time practising a Romantic piece than a contemporary one. Nevertheless, it is important to note that, although self-regulated skills have predicted efficient use of practice time in studies with young musicians (Austin & Berg, 2006), studies have tended not to address how specific self-regulatory behaviours can contribute to practice efficiency. The findings of this study suggest that Self-Regulation through Personal Resources may be the most relevant aspect of self-regulation for practice efficiency among advanced musicians.

Efficient practice may comprise self-regulated behaviours that expert musicians regularly use during their music practice processes. One advantage of using the self-regulated learning paradigm to assess more advanced musicians is the possibility of reflection on other factors that are normally absent in studies with professionals (e.g., social factors). However, music practice is primarily a solitary activity, and more advanced performers may be less inclined to share their learning processes with others. As suggested earlier in this thesis, the fact that there are few observational studies of concert performers may be a result of professional musicians' difficulties in verbalizing the 'mystique' of their artistry (Chaffin et al., 2002). This can be considered as a limitation in this study, as reports on Self-Regulation through External Resources can be biased by this salient characteristic of professional performers.

Another limitation of this study is related to its validity. Although this questionnaire achieved internal reliability, the validity of a construct cannot be

established with only a single study. Longitudinal data is necessary for assessments of any cause and effect inferences (Pedhazur, 1997). The use of a self-report questionnaire technique and the convenience sample are also limitations of this study. There is evidence that self-reported practice procedures and authentic practice may differ (Chaffin & Imreh, 2001). Because of this, future research using the questionnaire with observational (e.g., video-based research) or experimental (e.g., intervention) methods should be considered, in order to confirm or challenge the present findings.

In furthering our understanding of the practice behaviours of advanced musicians, several practical implications arise, for musicians, music teachers, and researchers alike. The reliability and preliminary validity of the measure suggest that the questionnaire can be used to assess musicians' self-regulated practice behaviours. As the questionnaire does not focus on particular instrumental techniques or methods of practice (e.g., use of metronome, stretching and breathing exercises, etc.), it can be applied to musicians playing any type of instrument. Depending on the score achieved on the questionnaire, teachers and coaches could assess which self-regulated behaviours might be improved in order to make the practice processes of adult students and musicians more efficient, teaching them how to self-regulate their practice. In a longitudinal context, the questionnaire might also be used to assess improvements and changes in musicians' behaviours throughout a music course. Musicians (i.e., instrumentalists and singers) can also use the present questionnaire for self-assessment. There are individual differences in music practice processes, and thus musicians can fill in the questionnaire to assess what strategies could be adopted in order to improve their practice efficiency.

5.4 Conclusion

Due to the absence of a measure of self-regulation that could be used for this study, the Self-Regulated Practice Behaviour Questionnaire (SRPBQ) was created (Appendix 1 and Appendix 2). It was designed specifically for this study, and is based on the previous literature review regarding efficient and deliberate practice behaviours adopted by expert performers. Its final version comprises 21 items, which assess three

different aspects of self-regulation found by the exploratory factorial analysis: practice organization, personal resources and external resources. Along with 12 items for participants' identification (demographic, academic, musical), the measure presents a list of thoughts, feelings and behaviours, and the participants must rate their responses on a Likert-type scale, judging their own perceptions about how often or how intense they have those specific thoughts, feelings and behaviours in the practice process.

After the development of the questionnaire, this study explored the self-regulated practice behaviours used by advanced musicians in their approaches to practice. Practice organization is one important factor of self-regulation in this sample of advanced musicians, but its relevance tends to decrease as musicians gain more experience over time. Experienced and professional musicians apparently know how to organize their practice efficiently. The inclusion of external resources in practice also follows the same pattern, indicating that experienced musicians rely more on their personal resources in order to be efficient in practice.

This study of the self-regulated practice behaviours of advanced musicians also suggests that musicians become more efficient as they gain experience, reflecting an important feature of a professional career in musical performance. Professional musicians usually have busy schedules comprising not only concerts, but also teaching, recording and other activities not strictly related to music such as self-promotion, distribution of music through the internet, business meetings, amongst others (Beeching, 2005). By adopting self-regulated practice behaviours, advanced musicians make their practice processes more efficient. Would self-regulation contribute to making the musicians' practice a more enjoyable and rewarding activity? The next chapter investigates dispositions to flow in the practice of expert musicians and to what extent their reported self-regulated behaviours and other attributes relate to their flow dispositions in musical practice.

Chapter 6. Musicians' Dispositions to Flow in Musical Practice

6.1 Introduction

The present chapter explores expert musicians' dispositions to flow in musical practice. As previously explained in Chapter 3, there has been no detailed investigation about the prevalence of optimal experiences in the context of practice. Research on music practice does not usually address wellbeing and performers' optimal functioning states. The concept of flow was considered for the present research since it encompasses relevant experiential dimensions for performers and learning variables. Building upon research on music practice, the present research claims attention for the importance of wellbeing for musicians as they develop and maintain expertise, considering flow as a relevant outcome variable in music practice.

The study of expert musicians' dispositions to flow in musical practice was guided by the following questions:

- To what extent are expert musicians prone to experience flow during musical practice, and what is the relevance of each flow dimension in the context of practice?
- What demographical factors (age, genre) and music variables (musical instruments, performance experience, level of expertise, practice routines, self-regulated practice behaviours) may relate to the expert musicians' proneness to flow during practice?

By investigating flow dispositions in musicians, the present study intends to offer a contribution to assist musicians, teachers and researchers to make practice a more meaningful experience.

6.2 Method

6.2.1 Materials.

As previously described in the thesis, the two questionnaires used for this study

were the self-regulated practice behaviours questionnaire and the Dispositional Short Flow Scale (Martin & Jackson, 2008). The content of the scale used for assessment of flow dispositions in musicians is described in the section 4.2 of the thesis.

Developed for the present research (Chapter 5), the self-regulated practice behaviours questionnaire (SRPBQ), as previously described, includes 21 items related to three different aspects of self-regulation previously found through the exploratory factor analysis: Practice Organization, Personal Resources and External Resources. The Practice Organization section includes 10 items assessing behaviours related to the organization of practice (e.g. 'I set goals for my practice sessions'; 'I organize the physical environment of my practice sessions'; 'I plan the time of my practice sessions'). Personal Resources includes 7 items related to knowledge/regulation of strategies (e.g. 'I am aware of the strategies that I use during practice') and general self-efficacy for goal achievement in practice (e.g. 'I am able to achieve my practice goals satisfactorily'). Lastly, self-regulation through External Resources is measured through 4 items regarding the use of external aspects in the practice process (e.g. 'I seek information from several sources [books, CDs, videos, internet, biographies, arts, etc.] to support my study'; 'I request help from others [teachers, peers, composers, musicologists and specialists]'). The measure is rated on a 5-point Likert-type scale related to frequency of behaviours (1-never to 5-always) and levels of agreement (1-completely disagree to 5-completely agree). The questionnaire also includes a demographical section asking questions regarding participants' age, gender, nationality, musical instrument, experience in music counting from their first public concert, prizes in competitions, and practice time (hours per day, days per week).

6.2.2 Participants.

168 participants were selected from the target sample (Section 3.4.1, p. 94), since they met the criteria of having at least ten years of experience (Ericsson et al., 1993). Thus, the analysed sample included only expert classically-trained musicians (male = 50.0%; female = 50.0%) ranging in age from 18 to 74 years (m = 34.41, SD = 12.39).

Musical instrument groups included keyboards (27.4%), plucked strings (22.6%), woodwind (17.3%), bowed strings (14.9%), singers (9.5%), brass (4.2%) and percussion (3.6%) players. At the time of the research, the majority of the musicians practiced at least 1-2 hours per day and at least 5-6 days a week (Tables 14 and 15). Counting from their first public concert, their instrumental playing experience was varied (Table 16).

Table 14

Expert musicians: Duration of daily practice

Hours	**Frequency**	**Percentage**
< 1h	37	22.0
1h – 2h	53	31.5
2h – 3h	36	21.4
3h – 4h	27	16.1
> 4h	15	8.9
Total	168	100.0

Table 15

Expert musicians: Duration of weekly practice

Hours	**Frequency**	**Percentage**
1 – 2 days	31	18.5
3 – 4 days	43	25.6
5 – 6 days	66	39.3
Everyday	28	16.6
Total	168	100.0

Table 16

Years of practice experience

Experience	Frequency	Percentage
10 – 19 years	75	44.6
20 – 29 years	50	29.8
30 – 39 years	21	12.5
> 39 years	22	13.1
Total	168	100.0

6.2.3 Procedures

The survey remained open for five months, and the participants answered the online questionnaire from October 15th, 2013, to February 28th, 2014. Because the participants were volunteers, they did not need to provide their names or any other data related to their identity. Thus, ethical considerations were only related to assuring the participants of the confidentiality of their responses. The statistical analysis was run with the software IBM SPSS 20 statistics and Stata 13.

6.2.4 Statistical procedures

Descriptive statistics, correlations and multivariate regressions were used to analyse the dispositions to flow. The associations of self-regulated practice behaviours with flow were investigated using a multivariate regression. The multivariate regression was the chosen method for analysing the relationships between the three aspects of self-regulation (i.e., Practice Organization, Personal Resources and External Resources) and dispositions to flow. The significant associations between Flow indicators were regressed on ten different dependent variables (Global Flow + 9 individual indicators). The first regression model uses factor scores estimated from a Confirmatory Factor Analysis (CFA) (Martin & Jackson, 2008) using all nine items (named here as Global Flow). The other nine dependent variables are the nine individual items of the Dispositional Short

Flow Scale. Using these nine items as dependent variables, each on a 5-point Likert scale, these variables were treated as continuous. As previously commented, this is made in order to facilitate comparisons between the corresponding estimates with those of the Flow factor scores, which are on a continuous scale (see Section 3.6.3, p. 102).

Control variables were also included in the model in order to account for variations in self-regulated behaviours. The variables are dummy[10] (1 = yes, 0 = no) variables for female (variations in gender), musical instruments whereby 'singer' is the reference category, graduation from higher education, participation in prize competitions; the continuous variables include years of experience and the number of hours practised per week. Including these control variables also aided inference, as the variance of the error term may not be constant, and instead may be a function of these individual characteristics. This assumption was further relaxed and heteroskedasticity-robust standard errors were estimated based on White (1980). Standardised 'beta' coefficients are reported to ease comparability of our estimates with those from other samples. Thus, the reported estimates indicate the change of the dependent variable in standard deviations with a one standard deviation change in the independent variables.

6.3 Results

6.3.1 Dispositions to flow in musical practice

Descriptive statistics (means, medians, modes and standard deviations) for Global Flow and for the nine flow indicators are displayed in Table 17 Means for individual flow indicators are ordered from the most experienced indicator. A Global Flow mean of 33.21 suggests that flow is experienced in practice, according to the values of reference. With the exception of Action-Awareness Merging, all other means were above 3, indicating that those specific flow indicators were experienced at least more than rarely.

Among the individual flow indicators, Autotelic Experience or the feeling that

[10] Dummy variables are artificial variables that can take only two values: 0 ('off' or reference category) and 1 ('on' category). These variables are necessary in regression models when the independent variables are nominal with more than two groups (e.g., musical instruments).

practice is a rewarding experience was the most salient flow indicator in practice (M = 4.15), suggesting that it is one of the most relevant indicators of the experience. Other salient indicators of flow experience in practice were Unambiguous Feedback (i.e., the sense of knowing immediately if one's own actions are contributing to the achievement of the practice goal or not; M = 4.11), Time Transformation (i.e. sense the time is not passing as usual; M = 4.05), Clear Goals (i.e. having clear goals for practice; M = 4.02), Full Concentration (i.e. feeling absorbed by the activity; M = 3.83), and Challenge-Skill Balance (feeling competent enough to meet the highly demanding situations; M = 3.72).

Action-Awareness Merging was the least reported indicator (M = 2.90). Dimensions with medians and modes of 3 and high standard deviations were the less experienced flow indictors in the context of practice.

Table 17

Flow dispositions in expert performers, ordered by mean

Flow indicator (N = 168)	**Mean**	**Median**	**Mode**	**SD**
Global Flow	33.21	-	-	4.97
Autotelic Experience	4.15	4	4	.81
Unambiguous Feedback	4.11	4	4	.83
Transformation of Time	4.05	4	4	.96
Clear Goals	4.02	4	4	.83
Full Concentration	3.83	4	4	.87
Challenge-Skill Balance	3.72	4	4	.86
Loss of Self-Consciousness	3.24	3	4	1.17
Sense of Control	3.20	3	3	.90
Action-Awareness Merging	2.90	3	3	1.15

Note. SD = Standard Deviation.

In order to clarify the above analysis, the nine items were compressed to a dichotomous variable of either the presence or absence of that variable. Each flow item was categorized into 'high flow' (4 - frequently and 5 - always) and 'low/no flow' (1 - never, 2 - rarely and 3 - sometimes). Table 18 presents the frequencies and percentages of musicians who experienced high and low/no flow on each flow indicator. The last column presents the differences between percentages on high flow and low/no flow.

Table 18

Expert musicians' High or Low/No flow scores on each flow indicator

Flow Item (N=168)	**High Flow**		**Low Flow**		**Difference**
	N	%	*N*	%	%
Unambiguous Feedback	140	83.3	28	16.7	66.6
Autotelic Experience	135	80.4	33	19.6	60.8
Transformation of Time	131	78.0	37	22.0	56.0
Clear Goals	124	73.8	44	26.2	47.6
Full Concentration	116	69.0	52	31.0	38.0
Challenge-Skill Balance	100	59.5	68	40.5	19.0
Loss of Self-Consciousness	75	44.6	93	55.4	10.8
Sense of Control	63	37.5	105	62.5	25.0
Action Awareness Merging	52	31.0	116	69.0	38.0

The table shows that the majority of the participants are in the High Flow group for six flow indicators (Table 18). Similarly to the previous descriptive results, the High Flow group includes the same six dimensions that had 4 for means and modes (see Table 17). More than 80% of the participants reported Unambiguous Feedback and Autotelic

Experience in practice, indicating that they frequently or always know how well they are performing tasks in practice (i.e. Unambiguous Feedback), and frequently or always feel that practice is an extremely rewarding activity (i.e. Autotelic Experience) after reflecting on it. The consideration of practice as a rewarding activity by more than 80% of the sample suggests that practice is considered as an enjoyable activity.

78% of the participants were also in the high flow group for Transformation of Time, placing this experience as another important indicator of flow in musical practice. Clear Goals, i.e. having a strong sense of what one wants to do in practice, was also highly reported (more than 70% of the musicians in the high flow group).

Regarding the less experienced indicators, the majority of the respondents were in the Low/No Flow group for Loss of Self-Consciousness (55.4%), Sense of Control (62.5%), and Action-Awareness Merging (69%), the least reported flow indicators in the context of practice (Table 18). Although the majority reported that they never, rarely or sometimes had the experience of Loss of Self-Consciousness (55.4%) in practice, the difference between Low/No Flow and High Flow groups was not as indicative, since 44.6% of the participants were in the high flow group for this flow indicator. The same was observed for Full Concentration and Challenge-Skills Balance (Table 18). Non-indicative differences between the percentages of Low/No Flow and High Flow groups suggest that the occurrence of those indicators may vary considerably in the practice of expert musicians, and that their occurrences may depend on the particular attributes of musicians.

6.3.2 Flow dispositions and demographics

The first operational hypothesis outlined for this study was that flow might not be affected by demographic factors (H1, p. 84), as postulated by the original theory (Csikszentmihalyi, 1990). In order to investigate the influence of demographic factors in the variations of flow experience during practice, a multiple regression analysis was run to test whether demographic characteristics significantly explain both the flow score predicted from the confirmatory factor analysis (CFA) previously undertaken (Global

Flow), and for the individual flow items (Tables 19 and 20). Although the Global Flow score is a continuous measure so that linear regression is a justified approximation, applying linear regressions to individual flow items implies the assumption that these Likert items, which are categorically measured elements, are satisfactorily continuous. This assumption is made in order to obtain comparable estimates for all ten dependent variables of interest. All demographic characteristics described in the methodology section (Sample, section 3.4, p. 93) are included in the test.

The first row of results in the two tables corresponds to the CFA predictions as a dependent variable, the other rows to the individual items. The reported estimates are standardised beta coefficients, and reflect the change in standard deviations of the dependent variable when the respective continuous predictor variable increases by one standard deviation. Most of the variables tested below are dummy variables, thus the corresponding estimates indicate the difference in means of the dependent variable when the dummy variable is ‘on’.

Table 19

Association of instrument type with flow dispositions

Dependent Variables	Bowed strings	Brass	Keyboard	Percussion	Plucked strings	Woodwinds	Other
Global Flow	-0.14 *(-1.04)*	-0.16 *(-0.84)*	-0.07 *(-0.57)*	-0.06 *(-0.21)*	0.01 *(0.09)*	-0.04 *(-0.39)*	0.04 *(0.26)*
Challenge-Skill Balance	-0.62 *(-1.74)*	-0.41 *(-0.92)*	-0.32 *(-0.87)*	-0.30 *(-0.48)*	-0.16 *(-0.43)*	-0.06 *(-0.16)*	0.42 *(0.95)*
Action-Awareness Merging	-0.23 *(-0.70)*	-0.45 *(-1.14)*	-0.30 *(-0.96)*	0.60 *(1.13)*	-0.23 *(-0.73)*	-0.12 *(-0.37)*	-1.10** *(-2.69)*
Clear Goals	-0.37 *(-1.07)*	-0.68 *(-1.88)*	-0.54 *(-1.71)*	-0.41 *(-0.86)*	-0.55 *(-1.71)*	-0.38 *(-1.24)*	-1.47*** *(-3.96)*
Unambiguous Feedback	0.04 *(0.10)*	-0.12 *(-0.24)*	0.15 *(0.44)*	-0.02 *(-0.04)*	0.30 *(0.86)*	0.41 *(1.17)*	1.14** *(2.69)*
Full Concentration	-0.10 *(-0.29)*	-0.59 *(-1.46)*	-0.29 *(-1.01)*	-0.58 *(-1.02)*	-0.03 *(-0.11)*	-0.43 *(-1.40)*	0.45 *(1.21)*
Sense of Control	-0.25 *(-0.80)*	-0.22 *(-0.41)*	-0.04 *(-0.16)*	-0.03 *(-0.05)*	0.05 *(0.16)*	-0.05 *(-0.17)*	-1.04** *(-2.79)*
Loss of Self-Consciousness	-0.16 *(-0.48)*	0.14 *(0.28)*	-0.03 *(-0.10)*	-0.04 *(-0.07)*	0.06 *(0.17)*	-0.22 *(-0.64)*	0.75 *(1.83)*
Time Transformation	0.06 *(0.18)*	0.69 *(1.85)*	0.45 *(1.61)*	0.70 *(1.51)*	0.38 *(1.31)*	-0.06 *(-0.16)*	1.63*** *(4.52)*
Autotelic Experience	0.08 *(0.21)*	0.53 *(1.07)*	0.29 *(0.70)*	-0.01 *(-0.02)*	0.48 *(1.17)*	0.35 *(0.89)*	1.29** *(2.78)*

Note. * p<0.05, ** p<0.01, *** p<0.001; Standardised 'beta' coefficients reported; T-statistics in parentheses based on heteroskedasticity-robust standard errors. Sample size is 167 in all 10 regressions.

Table 19 displays the estimates for different instrument types relative to the category “Voice”. The findings suggest that only the category “other” differs significantly from the base category for the six items. As this group only consisted of one observation, it was considered as an outlier and the finding was not further interpreted. The findings suggest that dispositions to flow in musical practice do not vary across musical instrument groups.

Table 20 focuses on musicians’ demographic characteristics. The findings suggest that demographic characteristics rarely explain dispositions to flow experience. Yet, they suggest that, in two cases, more experienced musicians were associated with a reduction in Loss of self-consciousness by 0.19 SD and Challenge-Skill balance by 0.2 SD. In contrast, daily practice time was associated with an increase in Global Flow (0.13 SD), Clear Goals (0.22 SD) and Full Concentration (0.27 SD). Interestingly, the findings suggest that female musicians experience Unambiguous Feedback much less often than their male counterparts, as observed in the difference in means by gender of -0.38 SD. However, this finding will not be further interpreted because of the absence of a significant relationship between gender and Global Flow (Table 20).

Table 20

Association of demographic characteristics with flow dispositions

Dependent Variables	**Experience in years**	**Female**	**Max. daily practice time**
Global Flow	-0.06 *(-1.51)*	-0.08 *(-0.99)*	0.13* *(2.46)*
Challenge-Skill Balance	-0.20* *(-2.41)*	0.06 *(0.35)*	0.21 *(1.93)*
Action-Awareness Merging	-0.05 *(-0.51)*	0.10 *(0.61)*	-0.04 *(-0.38)*
Clear Goals	-0.04 *(-0.51)*	-0.07 *(-0.40)*	0.22* *(2.13)*
Unambiguous Feedback	-0.08 *(-0.84)*	-0.38* *(-2.08)*	0.08 *(0.71)*
Full Concentration	-0.05 *(-0.59)*	0.04 *(0.22)*	0.27* *(2.48)*
Sense of Control	-0.07 *(-0.82)*	-0.14 *(-0.83)*	0.20 *(1.66)*
Loss of Self-Consciousness	-0.19* *(-2.36)*	-0.30 *(-1.82)*	0.19 *(1.85)*
Transformation of Time	0.10 *(1.17)*	0.11 *(0.65)*	0.15 *(1.18)*
Autotelic Experience	-0.02 *(-0.21)*	-0.19 *(-1.15)*	0.10 *(0.89)*

Note. N = 167. * p<0.05, ** p<0.01, *** p<0.001; Standardised 'beta' coefficients reported; T-statistics in parentheses based on heteroskedasticity-robust standard errors. Sample size is 167 in all 10 regressions.

6.3.3 Self-regulated practice behaviours and flow dispositions

The results of the regression analyses can be found in Table 21, in which the rows denote the corresponding dependent variables, and the three self-regulated practice behaviours are located in the columns. The first model (in the first row) uses the flow factor scores obtained from a CFA using all items. It therefore can be seen as a summary score of overall flow experience (Global Flow). The estimates suggest that Global Flow is predominantly a function of Practice Organization and Personal Resources, but not a function of External Resources. Analysis of the individual items shows that Challenge-Skill Balance, Clear Goals and Concentration appear to follow this pattern. In each of these three cases, the estimated correlations are positive for Practice Organization and Personal Resources, whereby the estimated correlation for Personal Resources is twice to three times the size of the corresponding estimate for Practice Organization.

Table 21

The association of self-regulated practice behaviours and flow dispositions

Dependent / Independent variables	**Practice Organization**	**Personal Resources**	**External Resources**
Global Flow	0.11*	0.27***	0.00
	(2.43)	*(2.18)*	*(0.06)*
Challenge-Skill Balance	0.18*	0.65***	-0.07
	(2.18)	*(5.24)*	*(-0.07)*
Action-Awareness Merging	-0.20*	-0.07	0.02
	(-2.08)	*(-0.47)*	*(0.15)*
Clear Goals	0.30***	0.67***	0.04
	(3.54)	*(6.26)*	*(0.40)*
Unambiguous Feedback	0.11	0.28*	0.04
	(1.05)	*(2.07)*	*(0.23)*
Full Concentration	0.21*	0.46**	-0.05
	(2.16)	*(2.97)*	*(-0.40)*
Sense of Control	0.17	0.33*	-0.05
	(1.49)	*(2.19)*	*(-0.37)*
Loss of Self-Consciousness	0.14	0.25	-0.24*
	(1.45)	*(1.81)*	*(-2.05)*
Time Transformation	0.04	0.08	0.02
	(0.31)	*(0.63)*	*(0.12)*
Autotelic Experience	0.114	0.166	0.306*
	(1.04)	*(1.26)*	*(2.14)*

Notes. * p<0.05, ** p<0.01, *** p<0.001; Standardised 'beta' coefficients reported; T-statistics in parentheses based on heteroskedasticity-robust standard errors. Sample size is 167 in all 10 regressions.

Five of the nine flow indicators appear to only be explained by one of the three self-regulated behaviours (i.e. Personal Resources): Challenge-Skills Balance and Clear

Goals were strongly related to Personal Resources. Other significant associations with Personal Resources were found for Full Concentration, Sense of Control and Unambiguous Feedback. Balance, Goals and Concentration were also associated to Practice Organization, but the associations with Personal Resources were stronger. This suggests that Personal Resources is a relevant aspect of self-regulation associated to dispositions to flow in musical practice.

Interestingly, negative associations were found between Action-Awareness Merging and Practice Organization (i.e. decrease by approximately 0.2 standard deviations (SD) with a standard deviation increase in Practice Organization), and between Loss of Self-Consciousness and External Resources (i.e. 0.24 SD decrease). Autotelic Experience appears to be explained by External Resources, since a standard deviation increase in External Resources is associated with a 0.3 SD increase in Autotelic Experience. Although highly reported, Time Transformation does not seem to vary significantly with any of the three self-regulated behaviours.

6.4 Discussion

As for any human activity, to feel positive during practice is important. Musical practice is an activity in which musicians invest much of their times. Although findings from previous studies have highlighted the importance of the quality of the musical practice, investigations in the field of musical practice usually do not include the positive side of music making, resulting in a limited conceptualization of the phenomenon of musical practice. Thus, this study was a first step in the understanding of expert musicians' dispositions to flow in musical practice (i.e. how frequently flow is experienced) and their possible determinants.

Confirming the general hypothesis of the present research, (Section 3.5.1, p. 84), the results of this study have suggested that the investigated sample tended to experience flow to some extent in practice (M = 33.21 out of 45, Table 17). As previously stated, this research follows, a priori, the current consideration of flow as an experience with different components, which, in their interplay, represent the experience of flow.

Consequently, the results seem to confirm that flow can be experienced during practice, as this sample is moderately prone to the experience of flow during musical practice. However, the data also suggests that intense flow experiences are not usually experienced during practice. The following sub-sections present the discussion considering all of the outlined hypotheses of the present research.

6.4.1 Flow during practice: The relevance of specific indicators

As a multidimensional experience, this study suggests that some flow indicators are more relevant for practice than others. More than 80% of the sample considered practice as a rewarding activity (Autotelic Experience). Since demographical factors did not explain flow indicators (Table 20), and experience in years is also included here, it is likely that the experience of other flow indicators may explain the feelings of enjoyment during practice. The nine flow indicators are likely to be correlated as the dependent variables all relate to an overall flow indicator (see Appendix 3 and Appendix 4 for robustness check).

The more enjoyable the activity, the more time an individual will devote to it. This relationship was also confirmed by the means for Transformation of Time, suggesting that it is another relevant indicator of flow during musical practice (Tables 17 and 18). Concomitantly, daily practice time was positively related to flow, indicating that the more prone to flow a musician is, the more time s/he is devoted to practice (Table 20). Thus, hypothesis H2 of the present research (p. 84) is confirmed (i.e. Flow experience will be positively related to practice time).

Other highly reported flow indicators were Clear Goals, Unambiguous Feedback, Challenge Skills Balance and Concentration.

As expressed in the results of the previous chapter, expert musicians tend to rely heavily on their personal resources for achieving goals in practice (Chapter 5). As a result, their awareness of their own personal resources may help in evaluating whether they are achieving their goals in the process of practice. This may explain the high scores for Unambiguous Feedback and Clear Goals (Tables 17 and 18).

The capacity to keep in mind the overall musical structure or an artistic image of a piece during practice (Chaffin et al., 2003) may be another attribute of expert musicians that may explain the high means achieved for Clear Goals. However, a relevant number of participants (n = 44) reported that they rarely or only some of the time experienced Clear Goals during practice (Table 22), suggesting that there may be personal or contextual factors that also influence Clear Goals, such as the perceived level of task complexity.

Table 22

Clear Goals: Number of participants per answer

Answer	**N**	**%**
Never	0	0
Rarely	6	3.6
Some of the time	38	22.6
Frequently	71	44.3
Always	53	31.5
Total	168	100

Another flow indicator that had a significant number of participants in the Low/No Flow group was Challenge-Skill Balance. The term 'optimal experience' is defined as a 'subjective event that a person describes as being simultaneously high on environmental opportunities or challenges, and high on personal abilities, or skills' (Csikszentmihalyi & Nakamura, 1999, p. 340). Consequently, it was assumed that flow in practice could occur for a musician facing challenging musical tasks that invite his/her best capabilities during practice (Chapter 3, Section 3.2). The results for this flow

indicator indicated that 40.5% (rarely = 7.1%) of this sample did not usually feel competent enough to meet high musical demands in practice (Table 18). Experts usually tend to be highly confident about their own expertise and skills (Chi, 2006; Ericsson et al., 2006), and this pattern can also be found in research investigating conceptions and self-assessments of musical skills and expertise in advanced musicians (Papageorgi & Welch, 2014). This finding may suggest that, even among experts, the level of determined challenges faced during practice might affect their perceived level of competence, to a point that they do not feel competent enough to overcome them. This is in line with the idea that the characteristics of the task may determine whether it is possible for experts to behave competently or not (Shanteau, 1992). Thus, the inclusion of tasks that negatively affect performers' subjective perception of competence may prevent flow during practice.

Few or rare experiences of perception of competence may be a consequence of a dominant focus on the pursuit of virtuosic technique and/or on standardization of musical performance, resulting in an imbalance between perceived challenges and skills. Instead of balance, musicians may value the pursuit for mastering pieces perceived as highly challenging. This is one characteristic of the field of Western art music performance, a domain in which musicians are often expected to produce nothing less than perfection (Lehmann et al., 2007; Parncutt & McPherson, 2002; Williamon, 2004). The pursuit of perfection during practice may result in unwanted and unpleasant experiences (e.g. anxiety, worry, stress, reduced perceptions of competence), caused by the imbalance between perceived challenges and skills. Further investigations about the experience of negative emotions during practice and its related factors are needed in order to clarify the nature of negative emotions and their influence on musical learning.

Related to the lack of perception of confidence, the data showed that Loss of Self-Consciousness was not usually experienced by a considerable number of participants. However, other studies reported problems with this indicator, suggesting that it may be not relevant for flow in music (Marin & Bhattacharya, 2013; Sinnamon et al., 2012), or that the item formulation ('I am not worried about what others may be thinking of me')

may probably need a better adaptation for the musical context. Because Loss of Self-Consciousness was reported as a sense of union with the music and forgetfulness by musicians (Section 2.1, p. 18), a better formulation of the item could be 'When I am practising I feel that it is just me and the music' or even 'I usually forget that I am practising'.

Sense of Control and Action-Awareness Merging were the least reported flow indicators. Previous studies have found high ratings for these dimensions in the context of performance. Ratings for these indicators in the present research suggest that there may be few or rare occasions in which expert musicians feel spontaneous or acting on 'automatic pilot' (i.e. Action awareness merging), and in total control, not worrying about failure (i.e. Sense of control) during practice. These indicators may be more likely to be experienced during the execution of tasks rather than learning, and perhaps in the later stages of practice, such as the polishing phase and the performance rehearsal (Chaffin et al., 2002).

6.4.2 Flow during practice: The role of specific self-regulated practice behaviours

With consideration to the hypotheses regarding associations between self-regulated practice behaviours and flow (Chapter 3, Section 3.5, p. 84), this research is the first empirical evidence of self-regulated practice behaviours affecting dispositions to flow in expert musicians, thus, confirming the hypothesis H3 (i.e. Musicians' dispositions to flow in practice may be affected by specific self-regulated practice behaviours, p. 85).

Among the three self-regulated factors, Self-Regulation through Personal Resources was a particularly strong predictor of flow dispositions when the estimates were significant (Table 21). Prior studies have noted that professional musicians usually demonstrate extensive metacognition in their practice processes (Hallam, 2001), and, indeed, advanced musicians rely more on self-regulation through personal resources than external ones (Chapter 5). Thus, this result suggests that Self-Regulation through Personal Resources may affect flow in the music practice of expert musicians. Figure 7 is

a representation of the resulting positive associations between self-regulated behaviours and the musicians' tendency to experience flow during musical practice.

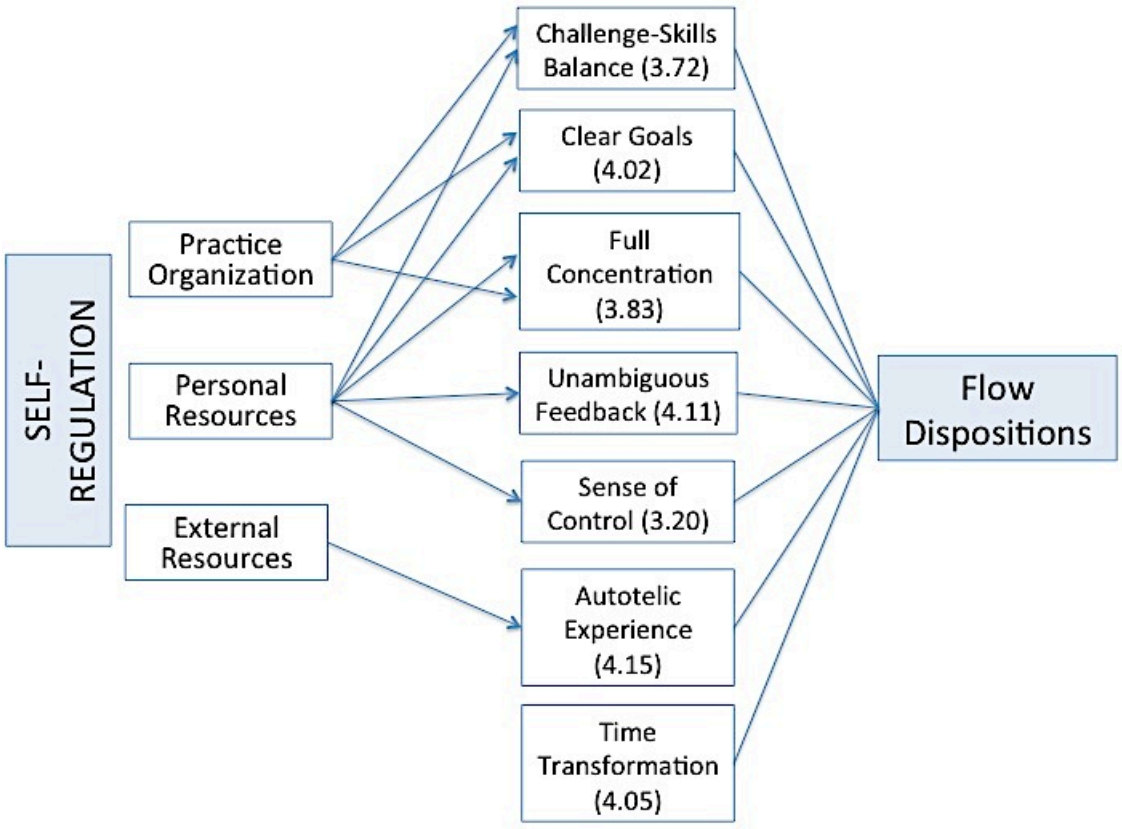

Figure 7. Associations between self-regulated practice behaviours and flow dispositions in expert musicians

However, the analyses of individual items show that Personal Resources did not predict all of the nine flow indicators, but only Challenge-Skill Balance, Clear Goals and Unambiguous Feedback, commonly referred to as conditions for flow (Csikszentmihalyi, 1990; Fullagar et al., 2012), along with Full Concentration and Sense of Control (Table 21). A possible explanation for this connection between Personal Resources and flow conditions (i.e. balance, goals and feedback) is that musicians with a keen awareness of

their personal resources can make sensible and correct choices of what to do in practice (e.g. musical tasks/challenges, goals, repertoire), contributing to the achievement of a balance between task challenges and their own perceptions of competence. Thus, musicians reporting few or rare experiences of Challenge-Skills Balance may be less aware of their own personal resources during practice. This explanation supports hypotheses H4 (i.e., Metacognitive knowledge is related to challenge-skills balance) and H8 (i.e., Metacognitive engagement with practice is positively related to unambiguous feedback flow indicator). However, H5 (i.e., The challenge-skills balance is related to the level of a musician's expertise - the more experienced the musician is the more he/she can achieve this balance) was not confirmed. Surprisingly, the negative association between the variables suggests that the more experienced a musician in this sample is, the less s/he experiences a feeling of enough competence to meet challenging demands during practice (Table 18). It is possible that musicians feel that their skills are deteriorating because of age, contributing to a reduction in perceptions of competence over the years. While Krampe & Ericsson (1996) found that musicians who keep practicing can delay negative effects of aging, Krampe (1994) found declines in the execution of non-musical cognitive-motor tasks related to age in professional pianists, and several studies highlight significant decreases in the amount of practice in later stages of expertise development (Ericsson & Lehmann, 1996; Manturzewska, 1990), which may also contribute to feelings of diminished competence.

Personal Resources also predicted the occurrence of Clear Goals. Positive relationships between performers' experience and clarity of goals have been reported in several studies (Chaffin & Imreh, 2001; Chaffin et al., 2002; Chaffin & Lemieux, 2004). It is accepted that expert musicians have their own artistic conceptualisations of the works to be studied (Chaffin & Lemieux, 2004). These characteristics may, in turn, facilitate musicians' concentration in practice, fostering feelings of capacity for being productive and efficient.

However, it was a surprise that H6 (i.e., If clear goals are associated with the big picture, and because the more expert the performer is the more he is able to rely on this

big picture, then the clear goals flow dimension is positively related to the level of expertise) was not supported, as illustrated by the non-significant association between both variables (Table 18). This non-significant association may suggest that the clarity of goals during practice may depend more on contextual factors (e.g., familiarity with the task).

Albeit with a minor level of statistical significance, Self-Regulation through Practice Organization was also a significant predictor of musicians' dispositions to flow in practice, having a prominent role in the experience of the Challenge-Skills Balance, Clear Goals and Full Concentration (Table 21). These indicators were two to three times more strongly related to Personal Resources, which suggests that expert musicians that usually rely on both self-regulated behaviours (i.e., Personal Resources and Practice Organization) may have more of those experiences during practice. In relation to Challenge-Skills Balance, organized musicians usually set plans and goals for practice (Chaffin & Lemieux, 2004; Jørgensen, 2004), which may also explain the choice of challenging but achievable tasks for practice. Regarding Full Concentration, flow theory suggests that concentration is generally possible because the task has clear goals and immediate feedback (Csikszentmihalyi, 1990). This idea was supported by a study conducted by Hallam (2001), in which practice organization was positively related to the reported concentration of professional musicians during practice.

On the other hand, Practice Organization was negatively related to Action-Awareness Merging. In performance activities, a sense of effortlessness and spontaneity associated with this flow indicator often results in automaticity. According to Jackson et al. (2010), 'feelings of automaticity are described by performers, whose well-learnt routines enable them to process subconsciously and pay full attention to their actions' (Jackson et al. 2010, p. 7). As outlined in the previous section, Action-Awareness Merging may be less likely to occur in practice, and there are two possible explanations for this result. Firstly, if a musician is executing a task on automatic pilot, which is evidence of the experience of Action-Awareness Merging in performing activities (Clark et al., 2014; Jackson et al., 2010), it is possible that s/he needs no more practice

organization, because s/he has probably achieved her/his practice goals. Musicians may need organization in practice only when seeking to achieve goals, a situation in which automaticity may be less likely to occur. Secondly, Practice Organization may be an inhibitor of Action-Awareness Merging. Frequent attempts to organize practice may distract attention from the execution of the task itself. Thus, although organization is a highly encouraged aspect of efficient practice that contributes to achievement of goals in a shorter time, this aspect can inhibit spontaneity and automaticity in practice. This is a relevant aspect of practice that may contribute to foster motivation for deliberate practice.

External Resources is the aspect of self-regulation that advanced musicians rely on less (Chapter 5), and the findings of the present study suggest that it is not a significant predictor of dispositions to flow in expert musicians. However, the analyses of individual items shows that Self-Regulation through External Resources is negatively related to Loss of Self-Consciousness and positively related to Autotelic Experience. It is possible that the inclusion of external resources (i.e. teachers, peers, composers, specialists, materials) in the practice process may have influenced considerations of practice as a rewarding activity, fostering enjoyment and intrinsic motivation for practice. However, further research is needed to confirm if this is the case in expert musicians. On the other hand, a likely explanation for the negative association between External Resources and Loss of Self-Consciousness is the uncertainty about the equal importance of this flow indicator for music or about the relevance of the item in capturing this characteristic of flow.

6.5 Discussion

Flow theory states that, in order to remain in flow, it is necessary to increase the complexity of an activity, to develop new skills and to meet new challenges (Csikszentmihalyi, 1990). Departing from a theoretical match between the concepts of advanced musical practice and flow, the present research hypothesized that flow would be possible and frequently experienced in musical practice.

However, it seems that the study as whole suggests that musical practice may not offer frequent opportunities for intense flow states. According to Csikszentmihalyi's (1990) theory, the profound and rewarding sensation of enjoyment results from the combination of all flow indicators. Relevant indicators of flow were rarely experienced in musical practice according to the musicians' reports (i.e. action-awareness merging, sense of control), and a considerable number of participants reported not usually experiencing other relevant indicators (challenge-skills balance, clear goals and full concentration) during practice. Since flow is an experience with different components, which, in their interplay, represent the experience of flow, it is likely that authentic flow experiences rarely occur during musical practice. As highlighted by the literature review of the present thesis (Chapter 2), the findings suggest that flow is usually more intense in performance settings, when the performer can forget her/his ego and any kind of thought that can deviate his/her attention from the music itself or from the goal during a performance.

Although the results do not suggest a high frequency of deep and genuine flow experiences, which probably arise when the less-reported flow indicators are also present, the same results could be interpreted as indicating another possible positive experience in the musical practice of experts. In fact, six of the nine flow indicators are frequently or always experienced by the vast majority (i.e. autotelic experience, unambiguous feedback, transformation of time) and by approximately half of the sample (clear goals, challenge-skills balance, full concentration). These experiences could be named as *optimal practice* (Figure 8), which may be represented by a gratifying state of concentration during practice that musicians may experience when seeking clear, proximal and challenging goals that are slightly above their perceived skills, in such a manner that the goal does not result in negative self-perceptions of competence. These attributions of a goal may represent what can be called *optimal practice goals* (Figure 9), representing a key element of an optimal practice environment. Clear signals of the experience during practice are the feelings of intense concentration and clear internal

feedback. A sensation that time passes differently from the norm and a feeling that the practice session was a rewarding one may remain after an optimal practice session.

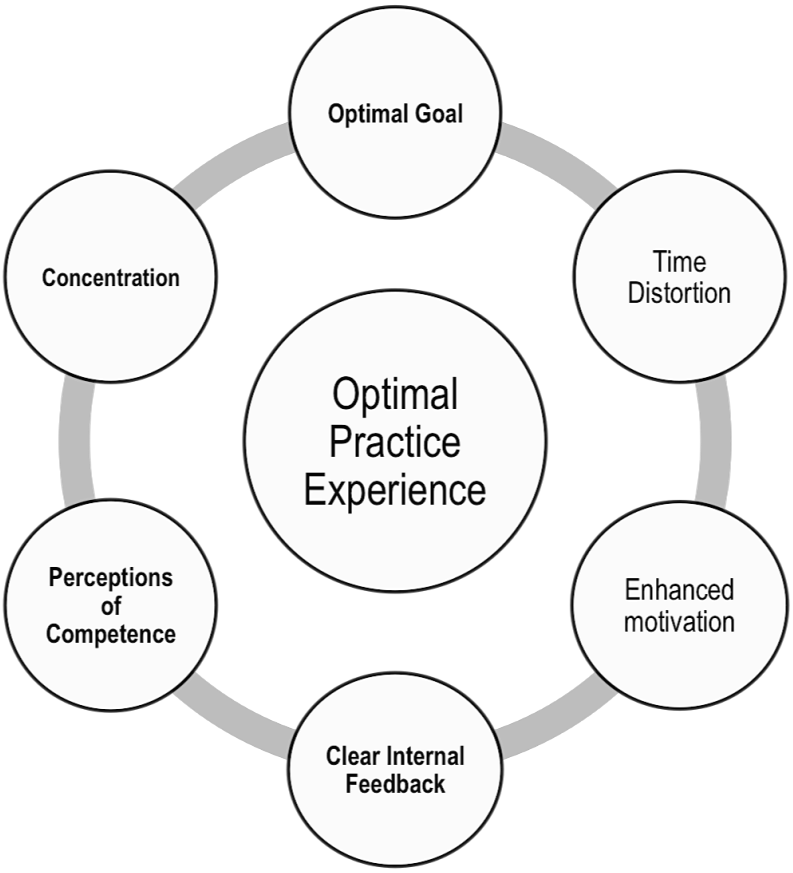

Figure 8. Optimal practice experience

The study of flow in musical practice and its related practice behaviours contributes to a better understanding of the mechanisms that make efficient practice a more enjoyable activity. Concerning the role of specific practice behaviours, self-regulated practice behaviours are associated with the experience of flow indicators related to musical skills, tasks, the clarity of goals and feedback, and also concentration and control over the activities. Self-Regulation through Personal Resources and Practice Organization are common efficient behaviours of experts that are associated with the achievement of conditions for flow, which, in turn, may enhance the possibility of

increased concentration and sense of control in practice. Expert musicians who also include external elements in their practice processes (e.g. peers, composers, students, materials from distinct sources, etc.) tended to consider practice as a more rewarding activity. However, the multi-dimensional nature of the flow construct and the methods used in this study do not allow for the inference of causal relationships between flow and self-regulated practice behaviours. The statistical methods adopted in the current research only reduce the influence of other variables on reports on flow, thereby allowing conclusions in the light of the literature on music practice.

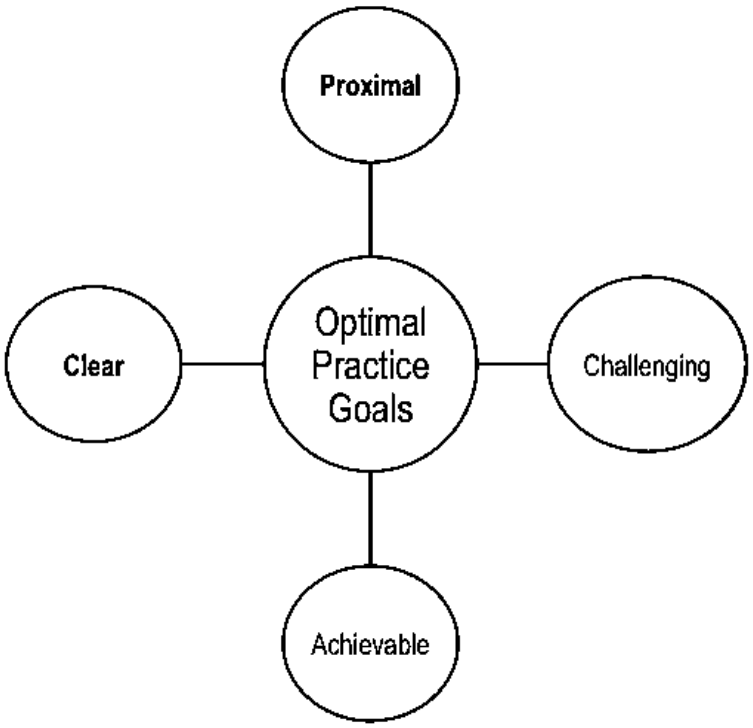

Figure 9. Optimal practice goals

Although findings cannot be considered causal, the resulting positive associations could be further investigated through experimental testing of the effect of self-regulated strategies in the experience of flow in students. Musicians feeling unmotivated to practice may consider including external factors (e.g. teachers, peers, composers, specialists,

materials, recordings, etc.) in their practice processes in order to foster motivation. Teachers could also design specific self-regulatory strategies to help those students who are less motivated to undertake efficient/deliberate practice, contributing to making their practice processes more meaningful and more rewarding. Further research is needed to untangle the possible aspects of musical practice that generate the experience of flow in students. This may contribute to a decrease in dropouts in music tuition, allowing students to have meaningful experiences in their music learning processes.

Moreover, because deliberate practice is an effortful activity that cannot be sustained for long periods of time (Ericsson et al., 1993; Lehmann et al., 2007), it is likely that some proportion of the total amount of a musician's practice time contains moments of non-deliberate practice activities, such as 'play', a self-contained and non-productive activity 'not linked psychologically to purposes which are external to the activity and which would dictate its character' (Giddens, 1964, p. 74). Thus, a balance between deliberate practice and deliberate play may be relevant for musical practice. Future investigations regarding play and other types of intrinsically-motivated activities during the practice process may be also relevant; these activities can certainly contribute to a reduction of self-evaluative thoughts that prevent the experience of the less reported flow indicators, and, consequently, the intense flow experiences in musical practice.

Chapter 7. Summary and conclusion

7.1 Introduction

The investigation of human strengths and virtues and the promotion of wellbeing are at the core of investigations in the domain of positive psychology (Deci & Ryan, 2006; Ryan & Deci, 2001; Seligman & Csikszentmihalyi, 2000). A key contribution of this research perspective is that instead of focusing on the prevention of and overcoming negative emotions, it focuses on the possibility of improvements in the quality of subjective experience and on how positive feelings in an activity may be increased (Seligman & Csikszentmihalyi, 2000).

From this research orientation, the present research is a first step towards the investigation of positive experiences in musical practice. Musical practice is a key activity for the development and maintenance of musical expertise. In the context of the Western art music tradition, musical practice is usually perceived as an effortful and solitary activity. From an experiential point of view, practice is a dynamic situation in which musicians can face a set of different emotions resulting from positive and negative emotional experiences. In investigating how the experience of musical practice can be optimized, flow theory can provide a relevant framework for the investigation of positive experiences. Besides relevant affective and motivational dimensions, the theory also embraces dimensions directly relevant for the learning process itself, such as clear goals, unambiguous feedback, concentration, and control. As outlined in the literature review of the present thesis, flow is considered a desirable experience for performers, including musicians.

The purpose of this chapter is to provide a summary of the findings, outline relationships with existing literature, reflect on the possible implications offered by the findings, highlight limitations, and, finally, make recommendations for future research. The present thesis set out to explore expert musicians' dispositions to flow in musical practice and their relationship to the musicians' attributes and self-regulated practice behaviours. Adopting a quantitative methodological approach, a questionnaire measuring

the self-regulated practice behaviours of expert performers was developed and applied with a validated flow scale for the music performance domain. Both questionnaires were then used to explore possible relationships between specific self-regulated practice behaviours and flow dispositions.

7.2 Main findings

The main research question of the present thesis referred to the extent to which dispositions to flow of experienced musicians could be predicted by the frequency of self-regulated practice behaviours adopted in musical practice. To be able to measure self-regulated practice behaviours, a questionnaire was developed (Chapter 5) following the steps for the development of a measure proposed by Spector (1992): clear and precise definition of the construct, planning of the questionnaire, pilot study, management and analyses of items, and validation. The self-regulated practice behaviours included were gathered from the literature regarding advanced and expert musicians' approaches to practice and the general music psychology literature (Chapter 2, Section 2.5). Adaptations and exclusions of some of the items resulted in a reliable measure with a robust Cronbach alpha coefficient. After two pilot studies, the final version of the questionnaire was applied to the main sample of the study, which comprised 212 advanced musicians. Exploratory Factor Analysis evidenced the preliminary validity of the questionnaire, resulting in three sub-scales measuring different aspects of the self-regulation frequently adopted by advanced musicians, namely Practice Organization, Personal Resources and External Resources. The exploration of self-regulated practice behaviours demonstrated that experts rely heavily on the measured behaviours, adopting sophisticated mechanisms of self-control and high levels of metacognitive engagement with practice, suggesting that self-regulation is a powerful element of efficiency in the practice of advanced musicians.

Expert musicians' dispositions to flow in musical practice were investigated in order to assess how regularly flow is experienced in situations of music practice and which of its aspects are more or less relevant to musical practice (Chapter 6). The

Dispositional Short Flow scale, a validated measure of flow dispositions in music, was completed by 168 expert performers, defined as experts because they reported having more than ten years of practice experience, and a relatively frequent and intense practice routine measured by days of practice per week and hours of practice per day. The assessment of the performers' flow dispositions suggested that some flow indicators were more experienced than others in musical practice. Taking into account that an intense flow experience is represented by the experience of the nine flow indicators in an activity, the findings suggested that intense flow experiences were not usual during instrumental practice.

Although the occurrence of frequent genuine flow experiences in musical practice was not supported, the results were interpreted as suggesting another relevant experience in the lives of expert performers, named optimal practice experience (Figure 8). The second section of chapter 6 investigated whether flow dispositions were associated with demographic variables and self-regulated practice behaviours. The study of the relationships between flow and musicians' demographical factors suggested that flow was not influenced by factors such as age, gender, experience and musical instruments. However, the dependent variables were affected by daily practice time, suggesting that the time expert musicians devote to practice is influenced by their flow dispositions.

Moreover, the examination of the associations of flow dispositions with self-regulated behaviours suggested how measured self-regulated practice behaviours related to the expert musicians' dispositions to flow. The highlighted associations (Figure 7) proposed Self-Regulation through Personal Resources and Practice Organization as common efficient behaviours of experts associated with the achievement of conditions for flow, which, in turn, enhanced the possibility of increased concentration and sense of control in practice.

7.3 Research implications

Considering the frequency with which musicians have flow experiences when engaged with musical practice, several implications arise. Due to connections with

wellbeing and optimal performance in several domains, the present investigation may contribute to the optimization of teaching and learning processes regarding practice, providing tools for teachers, musicians and researchers for recognizing, assessing and promoting flow experience in musicians.

Regarding the validity of the Self-Regulated Practice Behaviour Questionnaire (SRPBQ), further research is needed to establish a stronger evidence of its validation. The process of validation of a new measure includes several steps beyond the analysis of its internal structure through correlations and exploratory factor analysis. Examples of these further steps for validity include: the establishment of criterion-oriented validity, demonstrating that the measure predicts an external criterion; predictive validity, which is used to demonstrate consistency over time through re-application of the measure after a period of time; convergent validity, which demonstrates that the questionnaire is highly correlated with a theoretically related construct; and several others (Pasquali, 2007).

This research only analysed its internal validity because it was deemed appropriate according to the research aims. Its internal structure evidenced its usefulness for the assessment of efficient behaviours in the process of musical practice, providing a useful tool for the evaluation of behaviours and strategies that can be improved. Since the questionnaire was developed based on the effective practice behaviours of expert performers in the literature, music teachers could use the questionnaire to verify whether their students are adopting effective practice behaviours.

From a research point of view, further research with experimental delineation could be appropriate to address the issue of causality and reciprocity among the found self-regulated factors. Examples of relevant research questions regarding the development of these efficient behaviours in students might be how a lesson can be designed to promote the experience of self-regulated practice behaviours, or, from a longitudinal perspective, to what extent these behaviours account for the achievement of musical expertise in less time.

As regards the flow experience in musical practice, this research contributed by generating relevant knowledge towards the recognition and enhancement of positive

experiences during musical practice. From the analysis of the frequently reported dispositions to flow in musical practice, the concept of *optimal practice experience* and its dimensions could be used for the assessment of positive experiences during musical practice.

The concept of optimal practice experience seems to offer a possible explanation for differences regarding motivations for practice among professionals in previous research (Hallam, 1995) and in some expert musicians' reports (Chaffin et al., 2002; Kurtz, 2007; Mach, 1991). Since attitudes toward practicing can vary from more informal to deliberate approaches (Lehmann et al., 2007; Sloboda, Davidson, Howe, & Moore, 1996), future research may investigate the relationships between optimal practice experiences and other variables such as learning, performance, intrinsic motivation for practice, performance anxiety traits, wellbeing, amongst others.

The associations between self-regulated behaviours and musicians' flow dispositions also have other relevant teaching implications. Teachers may use the same ideas resulting from the present research as a way to track whether their students are having optimal practice experiences. Less or predominantly extrinsically-motivated students may be encouraged to organize their practice and to acknowledge their own personal resources when approaching practice tasks. Another implication concerns the importance of a parsimonious choice of tasks for practice, taking into account self-perceptions of competence. Musicians relying more on self-regulated behaviours seem to experience the attributes of *optimal practice experience* more often. Thus, the encouragement of these self-regulated behaviours may be the key for less experienced musicians (e.g., students) in gaining better recognition and generation of perceived challenging and achievable practice goals; teachers also need to take into account their students' perceptions regarding the proposed tasks (e.g. repertoire, technical exercises, etc.), questioning students about how they perceive specific tasks in such a manner that the balance can remain constant. All of these implications, in turn, may inform the development of new interventions for the promotion of *optimal practice experiences*.

Considering the implications regarding performance anxiety, a key factor of performance anxiety usually reported by musicians is inadequate preparation for a performance (Papageorgi, Hallam, & Welch, 2007). In the words of a pianist reflecting about his own music performance anxiety: 'I am not blessed with a natural piano technique and no matter how long or how hard I practiced, I could never attain the secure feeling that my fingers would work well (or even passably) at any given performance' (Kenny, 2011, p. 486). It is clear that the main orientation for what is regarded as good practice is 'how long' (time) and 'how hard' (persistence), i.e. properties of deliberate practice. Since the concept of *optimal practice experiences* includes self-perceptions of confidence resulting from the achievement of *optimal goals* (Figure 9), further research may be carried out to verify if musical performance anxiety may be reduced by the promotion of *optimal practice* habits.

This discussion has shed some light on how attitudes towards musical practice can be shaped to promote positive experiences. Along with the prevention of injury, positive psychological experiences are at the core of research about wellbeing in musicians (Williamon & Thompson, 2006). By including flow dispositions in musicians, outcomes of this research shed light on the promotion of wellbeing in musicians through the recognition and promotion of positive experiences in the context of deliberate and efficient musical practice.

Overall, the present thesis provided relevant ideas and tools for the assessment of efficient practice behaviours and positive experiences in musical practice. Assessments of students' practice effectiveness and motivation usually tend to be subjective, mainly guided by the accumulated experience of a teacher or what s/he has learned during the training period. Because students usually differ in their profiles and intentions with music, the adaptation and development of reliable questionnaires may assist teachers with the difficult work of assessment, facilitating the determination of a more clear and precise profile of students.

As a consequence, the use of questionnaires may work as a teaching strategy. If a student says that s/he is practising hard but the results are below what is expected by both

student and teacher, then the SRPB questionnaire can diagnose how students self-regulate their practice, what organizational strategies are being adopted by the student, how aware the student is about his/her own personal resources, and what external resources are being used. The same questionnaire may be used for making students aware of other efficient practice behaviours that they can try for the expected improvements. Regarding motivation, the *flow* questionnaire may diagnose whether the students are enjoying their leaning experience, how much absorbed s/he is during practice, how the students perceive their goals, and whether they feel confident regarding the demands of practising. Even when a teacher believes that a specific musical piece is necessary for the development of a specific technique, a strategy found in some traditional methods, it is necessary to acknowledge that the experience of the student also plays a crucial role in its musical development.

Another possible idea is to include this kind of assessment at the beginning of a musical course, as part of an entry examination. Thus, teachers will have access to the students' motivational and practice profiles since the beginning of the course, and this information may be valuable for tracking the development of the student through regular assessments during his/her studies.

The use of self-report questionnaires as a main methodology discloses, however, limitations on the present research. The statistical data analyses used in this research provided a general picture of the relationships between self-regulated behaviours and flow dispositions, but it was not possible to consider those relationships in relation to specific individuals. For this, a qualitative approach may be more appropriate, taking into account individual differences and specific contexts of practice. Additionally, although this research provides evidence for the occurrence of an optimal experience that carries similarities with genuine and intense flow states, the methodology does not guarantee that the depicted concept exists in reality, and more investigation is necessary to verify the validity of the hypothetical concept. Finally, although not part of the aims of the present investigation, it is possible that other relevant variables may also contribute to explain flow dispositions in musical practice (e.g., personality traits).

By focusing on optimal experiences during practice and their relationships with specific efficient practice behaviours, the present thesis has provided an initial step towards the investigation of the anatomy of optimal functioning in musical practice. This perspective builds upon current knowledge regarding musical practice but, at the same time, challenges current teaching, learning and research approaches regarding practice that do not consider the subjective world of the musician, inviting reflection on the importance of subjective positive feelings in the development of artistic practices.

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Appendix 1. Survey – English version

ATTITUDES AND SENSATIONS IN MUSICAL PRACTICE

This questionnaire is part of an on-going doctoral research at the University of Aveiro. The main objective of this research is to evaluate attitudes and feelings in performers' practice situations. There are no right or wrong answers to the questions. Please respond openly and honestly. Your responses will be confidential and the analysis will ensure your anonymity.

Demographical information

1. Age: ____

2. Gender:

Male	
Female	

3. Nationality: _____

4. Academic qualifications (Please indicate your most advanced academic qualification):

Academic qualification	Start year	Conclusion year
Primary level		
Secondary level		
Bachelor degree		
Post-graduate certificate or diploma		
Masters degree		
Doctoral qualification		
Other: (please specify) _____		

5. Course in progress
Please indicate the level of any course you are currently taking (if not applicable please go to question 6)

Academic qualification	**Start year**	**Conclusion year**
Primary level		
Secondary level		
Post-graduate certificate or diploma		
Bachelor degree		
Masters degree		
Doctoral qualification		
Other: (please specify) _____		

Musical instrument

6. What is your main musical instrument (singers please answer 'voice'): _____

7. Please indicate how old you were when you started taking instrumental or vocal lessons: _____ years

8. Performance experience

How many years have you been performing in public (from your first public performance)?

Practice frequency and performances

9. Concerts per year:

Please indicate the average number of concerts per year in which you have an important role (consider school auditions, public performances, chamber music performances, solos with an orchestra, among others):

Less than 10		Between 10 – 20		Between 21 – 30		Between 31 – 40		More than 40	

10. Practice: hours

How many hours do you currently practice per day (average)?

No more than 1h		Between 1h – 2h		Between 2h – 3h		Between 3h – 4h		More than 4h	

11. Practice: days

How many days do you currently practice per week (average)?

1 – 2 days		3 – 4 days		5 – 6 days		Every day	

12. Have you ever been awarded a prize in a musical performance competition?

Yes	
No	

12.1 If you answered 'yes', please indicate how many prizes you received: _____

1st PART: ATTITUDES TOWARDS THE PRACTICE PROCESS

Please indicate your response to the following statements:

In my practice:

1=Never 2=Rarely 3=Sometimes 4=Often 5=Always

I set goals for my practice sessions	1	2	3	4	5
I set short-term goals (minutes, hours, days)	1	2	3	4	5
I set long-term goals (weeks, months, years)	1	2	3	4	5
I set specific goals for my practice sessions	1	2	3	4	5
I understand that my goals are challenging	1	2	3	4	5

In my practice:

1=Completely disagree 2=Disagree 3=neither agree nor disagree 4=Agree 5=Completely agree

I use specific strategies related to my practice goals	1	2	3	4	5
I am aware of the strategies that I use during practice.	1	2	3	4	5
I use strategies that have been effective in the past.	1	2	3	4	5
I know when and in which contexts my strategies will be most effective	1	2	3	4	5
I understand the nature and demands of my musical activities	1	2	3	4	5
I know what I must do to in order to complete my musical activities satisfactorily	1	2	3	4	5

In my practice:

1=Never 2=Rarely 3=Sometimes 4=Often 5=Always

I plan the order of the activities of my practice sessions	1	2	3	4	5
I plan the time of my practice sessions	1	2	3	4	5
I organize the physical environment of my practice sessions	1	2	3	4	5
I evaluate the progress made towards my goals	1	2	3	4	5
I seek information from several sources (books, CDs, videos, internet, biographies, arts, etc.) to support my study	1	2	3	4	5
I request help from others (teachers, peers, composers, musicologists and specialists)	1	2	3	4	5

Reflecting about my own characteristics as a performer, I believe that:

1=Completely disagree 2=Disagree 3=neither agree nor disagree 4=Agree 5=Completely agree

I am able to achieve my practice goals satisfactorily	1	2	3	4	5

I cannot reach my practice goals without the support of some external factors (peers, teachers, materials, environment)	1	2	3	4	5
I understand my strengths and weaknesses	1	2	3	4	5
I practice in order to improve my musical skills	1	2	3	4	5
I practice in order to achieve high ratings (e.g. grades) and positive feedback	1	2	3	4	5

2nd PART: SENSATIONS DURING PRACTICE

Please answer the following questions in relation to your experience when you are practising. These questions relate to the thoughts and feelings you may experience during participation in your activity. You may experience these characteristics some of the time, all of the time, or none of the time. There are no right or wrong answers. Think about how often you experience each characteristic during your activity, then circle the number that best matches your experience.

7. When I practice,

1=Never 2=Rarely 3=Sometimes 4=Frequently 5=Always

I feel I am competent enough to meet the high demands of the situation	1	2	3	4	5
I do things spontaneously and automatically without having to think	1	2	3	4	5
I have a strong sense of what I want to do	1	2	3	4	5
I have a good idea, while I am performing, about how well I am doing	1	2	3	4	5
I am completely focused on the task at hand	1	2	3	4	5
I have a feeling of total control	1	2	3	4	5
I am not worried about what others may be thinking of me	1	2	3	4	5
The way time passes seems to be different from normal	1	2	3	4	5
The experience is extremely rewarding	1	2	3	4	5

Thank you very much for your answers!

Appendix 2. Survey – Portuguese version

QUESTIONÁRIO SOBRE ATITUDES E SENSAÇÕES NO PROCESSO DE ESTUDO MUSICAL DE INTÉRPRETES

O presente questionário faz parte de uma pesquisa de doutorado em andamento desenvolvida na Universidade de Aveiro. O objetivo principal dessa pesquisa é avaliar atitudes e sensações em situações de estudo de músicos intérpretes.
Esperamos respostas diferentes e, portanto, queremos destacar a não existência de respostas certas ou erradas. Por favor seja aberto e honesto em suas respostas. Este questionário é de natureza confidencial e o seu tratamento é feito de forma global não havendo análise individualizada, garantindo dessa forma o seu anonimato.

Informações demográficas

1. Idade: ____

2. Gênero:

Masculino	
Feminino	

3. Nacionalidade: _____

4. Habilitação literária (Por favor indique sua habilitação literária mais elevada)

Habilitação literária	Ano de início	Ano de conclusão
9.º ano (3.º ciclo do ensino básico)		
11.º ano		
12.º ano (ensino secundário)		
Curso tecnológico/profissional/outros (nível iii)*		
Bacharelado		
Pós-graduação		
Mestrado		
Doutorado		
Outro: (especificar) _____		

5. Curso em andamento
Por favor indique o nível do curso em andamento (caso não se aplique favor passar a questão 6)

Nível do curso em andamento	Ano de início	Ano de conclusão
Bacharelado		
Licenciatura		
Pós-graduação		
Mestrado		
Doutorado		
Outro: (especificar) _____		

Instrumento musical

6. Instrumento musical: Qual é o seu instrumento musical principal (cantores por favor respondam 'voz'): _____

7. Indique a idade em que iniciou a ter aulas de instrumento ou canto: _____ anos

8. Experiência no instrumento:
Há quantos anos toca ou canta desde a primeira audição pública (em anos)? _____

Frequência no estudo e atuações

9. Concertos por ano:
Indique o número médio de concertos por ano em que teve situação de destaque (incluir audições escolares, performances públicas, música de câmara, solos com orquestra, entre outros):

Menos que 10		Entre 10 – 20		Entre 21 – 30		Entre 31 – 40		Mais que 40	

10. Horas de estudo por dia:
Atualmente, quantas horas em média você estuda por dia?

Não mais que 1h		Entre 1h – 2h		Entre 2h – 3h		Entre 3h – 4h		Mais que 4h	

11. Dias de estudo por semana:
Atualmente, quantos dias em média você estuda por semana?

1 – 2 dias		3 – 4 dias		5 – 6 dias		Todos os dias	

12. Você já obteve algum prêmio em concurso de performance musical?

Sim	
Não	

12.1 Se respondeu ‘sim’ à questão anterior, por favor indique o número de prêmios em concursos de performance musical: _____

1ª PARTE: ATITUDES NO PROCESSO DE ESTUDO

Por favor, leia com atenção os itens abaixo e responda especificamente considerando a sua experiência geral no seu processo de estudo de uma obra musical:

No meu estudo, eu:

1=Nunca 2=Raramente 3=Às vezes 4=Muitas vezes 5=Sempre					
Estabeleço objetivos para as minhas sessões de estudo	1	2	3	4	5
Estabeleço objetivos para serem atingidos a um curto prazo (minutos, horas, dias)	1	2	3	4	5
Estabeleço objetivos para serem atingidos a um prazo mais alargado (semanas, meses, anos)	1	2	3	4	5
Estabeleço objetivos específicos para as minhas sessões de estudo	1	2	3	4	5
Percebo que meus objetivos apresentam desafio	1	2	3	4	5

No meu estudo, eu:

1=Discordo plenamente 2=Discordo 3=Nem concordo nem discordo 4=Concordo 5=Concordo plenamente					
Utilizo estratégias específicas relacionadas aos meus objetivos	1	2	3	4	5
Tenho noção das estratégias de estudo que utilizo	1	2	3	4	5
Utilizo estratégias de estudo que funcionaram no passado	1	2	3	4	5
Sei quando e em que contexto as minhas estratégias de estudo serão mais eficazes	1	2	3	4	5
Reconheço a natureza e as exigências das minhas atividades musicais	1	2	3	4	5
Sei o que devo fazer para completar as atividades musicais de maneira satisfatória	1	2	3	4	5

No meu estudo, eu:

1=Nunca 2=Raramente 3=Às vezes 4=Muitas vezes 5=Sempre					
Planejo a ordem das atividades das minhas sessões de estudo	1	2	3	4	5
Planejo o tempo das minhas sessões de estudo	1	2	3	4	5
Organizo o ambiente das minhas sessões de estudo	1	2	3	4	5
Avalio o progresso em direção aos meus objetivos	1	2	3	4	5
Busco informações de diversos referenciais (livros, cds, vídeos, internet, biografias, artes, etc.) para apoiar meu estudo	1	2	3	4	5
Solicito ajuda de outras pessoas (professores, colegas, compositores, musicólogos ou especialistas).	1	2	3	4	5

Ao refletir sobre minhas características como intérprete, eu acredito que

1=Discordo plenamente 2=Discordo 3=Não concordo nem discordo 4=Concordo 5=Concordo plenamente					
Sou capaz de atingir os meus objetivos de maneira satisfatória	1	2	3	4	5
Não conseguiria alcançar meus objetivos de estudo se não fossem determinados fatores externos (colegas, professores, materiais, ambiente)	1	2	3	4	5
Conheço minhas qualidades e dificuldades	1	2	3	4	5
Estudo para conseguir ampliar as minhas competências musicais	1	2	3	4	5
Estudo para conseguir obter boas avaliações (ex. notas) e críticas	1	2	3	4	5

2ª PARTE: SENSAÇÕES NO PROCESSO DE ESTUDO

Por favor responda às seguintes questões em relação à sua experiência durante a prática musical. Você pode experienciar essas características em alguns momentos, a todo instante, ou em nenhum momento. Não há repostas certas ou erradas. Pense sobre a frequência com que você experiencia cada característica durante a sua atividade e, em seguida, circule o número que melhor corresponda a sua experiência.

7. Geralmente quando eu estudo, eu

1=Nunca 2=Raramente 3=Às vezes 4=Frequentemente 5=Sempre					
Sinto que sou competente o suficiente para atender às altas exigências da situação	1	2	3	4	5
Eu faço as coisas de forma espontânea e automaticamente, sem ter que pensar	1	2	3	4	5
Eu tenho um forte sentido do que eu quero fazer	1	2	3	4	5
Tenho uma boa noção de quão bem eu estou agindo	1	2	3	4	5
Estou completamente focado na atividade em curso	1	2	3	4	5
Tenho uma sensação de controle total	1	2	3	4	5
Não fico preocupado com o que outros podem estar pensando sobre mim	1	2	3	4	5
Sinto que o tempo passa diferente do que o normal	1	2	3	4	5
Sinto que a experiência é extremamente gratificante	1	2	3	4	5

Muito obrigado pela sua participação!

Appendix 3. Robustness check for Flow and demographics

Flow and demographics

	Flow	**nflow_1**	**nflow_2**	**nflow_3**	**nflow_4**
Female	-0.04 *(-0.60)*	0.17 *(1.05)*	0.07 *(0.41)*	-0.08 *(-0.49)*	-0.16 *(-0.90)*
Experience in years	-0.04 *(-1.29)*	-0.16 *(-1.92)*	-0.02 *(-0.19)*	0.02 *(0.23)*	-0.10 *(-1.24)*
Pluck	0.02 *(0.19)*	0.31 *(0.97)*	-0.34 *(-1.15)*	-0.08 *(-0.28)*	0.38 *(1.10)*
Bow	-0.05 *(-0.36)*	0.22 *(0.69)*	-0.18 *(-0.68)*	0.17 *(0.56)*	-0.02 *(-0.05)*
Wood	0.10 *(0.79)*	0.45 *(1.46)*	0.06 *(0.21)*	0.11 *(0.38)*	0.24 *(0.71)*
Brass	-0.22 *(-1.49)*	-0.15 *(-0.37)*	-0.06 *(-0.14)*	-0.57 *(-1.49)*	-0.3 *(-0.88)*
Percussion	-0.07 *(-0.43)*	0.29 *(0.79)*	-0.38 *(-0.95)*	-0.32 *(-0.70)*	-0.58 *(-1.19)*
Keyboard	-0.06 *(-0.49)*	0.02 *(0.06)*	-0.37 *(-1.34)*	-0.04 *(-0.14)*	-0.11 *(-0.35)*
Higher Education	0.00 *(0.04)*	0.17 *(1.01)*	-0.13 *(-0.83)*	-0.03 *(-0.19)*	0.27 *(1.71)*
Prize competition	0.04 *(0.63)*	0.22 *(1.40)*	-0.08 *(-0.52)*	-0.12 *(-0.84)*	0.70 *(0.40)*
Hours practiced per week	0.11** *(2.73)*	0.19* *(2.09)*	-0.13 *(-1.27)*	0.15 *(1.61)*	0.11 *(1.22)*
N	167	167	167	167	167

	nflow_5	nflow_6	nflow_7	nflow_8	nflow_9
Female	-0.10	-0.06	-0.21	-0.04	-0.07
	(-0.60)	*(-0.38)*	*(-1.28)*	*(-0.28)*	*(-0.42)*
Experience in years	-0.11	-0.00	-0.19*	0.03	-0.02
	(-1.42)	*(-0.04)*	*(-2.35)*	*(0.39)*	*(-0.26)*
Pluck	-0.20	0.15	-0.15	-0.15	0.08
	(-0.66)	*(0.47)*	*(-0.49)*	*(-0.55)*	*(0.30)*
Bow	-0.10	-0.10	-0.20	-0.40	-0.30
	(-0.29)	*(-0.31)*	*(-0.68)*	*(-1.49)*	*(-0.98)*
Wood	0.10	0.31	-0.43	0.04	0.06
	(0.33)	*(1.01)*	*(-1.37)*	*(0.17)*	*(0.20)*
Brass	-0.47	0.00	-0.36	-1.02	-0.43
	(-1.26)	*(0.00)*	*(-1.06)*	*(-1.92)*	*(-1.23)*
Percussion	-0.10	-0.20	0.18	0.00	0.45
	(-0.24)	*(-0.47)*	*(0.45)*	*(0.01)*	*(0.98)*
Keyboard	-0.07	0.03	-0.07	-0.26	-0.27
	(-0.25)	*(0.09)*	*(-0.27)*	*(-1.09)*	*(-0.98)*
Higher Education	-0.17	0.03	-0.12	-0.20	0.00
	(-1.14)	*(0.22)*	*(-0.79)*	*(-1.28)*	*(0.01)*
Prize competition	0.09	0.08	0.08	-0.07	0.12
	(0.59)	*(0.50)*	*(0.48)*	*(-0.45)*	*(0.80)*
Hours practiced per week	0.25*	0.16	0.20*	0.15	0.15
	(2.48)	*(1.64)*	*(2.36)*	*(1.65)*	*(1.60)*
N	167	167	167	167	167

Notes. Standardised beta coefficients reported, * p<0.05, ** p<0.01, *** p<0.001

The nine flow indicator models are likely to be correlated as the dependent variables all relate to an overall flow indicator. As a robustness check we estimated these nine models simultaneously, allowing the errors to be correlated across models. We find that the estimated standard errors decrease slightly. Thus the coefficients that are significant in the table above remain significant. In addition, the estimate of brass for item 8 and the estimate of experience for item 1 become statistically significant at the 5 percent level.

Appendix 4. Robustness check for Flow and self-regulation

Flow and self-regulation

	fac21	fac22	fac23	N
Flow	0.10*	0.28***	0.00	167
	(2.56)	*(5.70)*	*(0.01)*	
nflow_1	0.12	0.75***	0.00	167
	(1.82)	*(7.30)*	*(0.02)*	
nflow_2	-0.25**	0.02	-0.05	167
	(-2.94)	*(0.17)*	*(-0.43)*	
nflow_3	0.22**	0.64***	0.00	167
	(3.08)	*(6.48)*	*(0.04)*	
nflow_4	0.06	0.41***	-0.01	167
	(0.7)	*(3.75)*	*(-0.06)*	
nflow_5	0.18*	0.44***	-0.02	167
	(2.04)	*(3.58)*	*(-0.21)*	
nflow_6	0.20	0.37**	-0.04	167
	(1.95)	*(3.06)*	*(-0.29)*	
nflow_7	0.12	0.32*	-0.16	167
	(1.50)	*(2.55)*	*(-1.50)*	
nflow_8	0.07	-0.03	-0.02	167
	(0.79)	*(-0.30)*	*(-0.20)*	
nflow_9	0.19*	0.18	0.25*	167
	(2.04)	*(1.56)*	*(2.14)*	

Notes. Standardised beta coefficients reported, * p<0.05, ** p<0.01, *** p<0.001

The nine flow indicator models are likely to be correlated as the dependent variables all relate to an overall flow indicator. As a robustness check we estimated these nine models simultaneously, allowing the errors to be correlated across models. The significance level of the estimates do not change.

Appendix 5. Authorized translated version of the flow scale

Translation Agreement Number TA-421
FLOW: SHORT Dispositional Scale (S DFS-2) – All 9 items – Portuguese
Requestor/Translator: Marcos Vinícius Araújo

ESCALA CURTA DE DISPOSIÇÃO AO ESTADO DE FLUXO (S DFS-2)

Por favor responda às seguintes questões em relação à sua experiência na sua atividade escolhida. Você pode experienciar essas características em alguns momentos, a todo instante, ou em nenhum momento. Não há repostas certas ou erradas. Pense sobre a frequência com que você experiencia cada característica durante a sua atividade e, em seguida, circule o número que melhor corresponda a sua experiência.

Geralmente, quando eu _____(cite a sua principal atividade)

		Nunca	Raramente	Às vezes	Frequente-mente	Sempre
1	Sinto que sou competente o suficiente para atender às altas exigências da situação	1	2	3	4	5
2	Eu faço as coisas de forma espontânea e automaticamente, sem ter que pensar	1	2	3	4	5
3	Eu tenho um forte sentido do que eu quero fazer	1	2	3	4	5
4	Tenho uma boa noção de quão bem eu estou agindo	1	2	3	4	5
5	Estou completamente focado na atividade em curso	1	2	3	4	5
6	Tenho uma sensação de controle total	1	2	3	4	5
7	Não fico preocupado com o que outros podem estar pensando sobre mim	1	2	3	4	5
8	Sinto que o tempo passa diferente do que o normal	1	2	3	4	5
9	Sinto que a experiência é extremamente gratificante	1	2	3	4	5