

Margarida Baltazar

Where Mind and Music Meet  
Affect Self-Regulation through Music



JYVÄSKYLÄ STUDIES IN HUMANITIES 345

Margarida Baltazar

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Affect Self-Regulation through Music

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UNIVERSITY OF JYVÄSKYLÄ

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## ABSTRACT

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The present dissertation focused on musical affect regulation, i.e. on the use of music to self-regulate affective states such as emotions, moods, and energy levels. In publication I, relevant findings from previous research were extracted and the field's conceptual clarity and precision was assessed. Besides identifying weaknesses in conceptualization and providing recommendations for future studies, publication I found that not all the elements of affect regulation through music have been equally explored by research. Given the gap observed on the study of musical mechanisms underlying affect regulation, publication II placed a special focus on this component and its association with regulation strategies. Publication II unveiled associations between musical mechanisms and regulation strategies in several layers. Drawing from the findings in publications I and II, a conceptual model of affect regulation through music was presented in publication III. According to this model, musical activities, regulation strategies, and musical mechanisms are selected in function of the affective goal and, in deep interaction, determine the affective outcomes and wellbeing. This is a continuous process and takes place in a matrix of individual and contextual factors. To further investigate how the affective outcomes are influenced by regulation strategies and music, an experimental study was conducted. Publication IV demonstrated that the reduction of stress was influenced by the level of efficacy of the music listened to and of the strategy employed. Moreover, it was concluded that the music listened to was more determinant for the decrease of stress than the strategy instructed in the experiment. The findings of this dissertation are relevant for research on both general affect regulation and musical regulation. This dissertation has implications for future studies on everyday uses of music and on the health outcomes of affect-related music behaviour.

Keywords: affect regulation, music, musical mechanisms, regulation strategies, everyday listening, stress responses

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## LIST OF ORIGINAL PUBLICATIONS

This dissertation summarizes four publications (I-IV). In publications I, II, and IV, the author had the main responsibility for designing the study, collecting, analysing and interpreting the data, and writing. The author was the sole contributor for publication III.

- I Baltazar, M., & Saarikallio, S. (2016). Toward a better understanding and conceptualization of affect self-regulation through music: A critical, integrative literature review. *Psychology of Music, 44*(6), 1500-1521.
- II Baltazar, M., & Saarikallio, S. (2017). Strategies and mechanisms in musical affect self-regulation: A new model. *Musicae Scientiae*, advance online publication.
- III Baltazar, M. (in press). Musical affect regulation in adolescents: A conceptual model. In K. McFerran, P. Derrington, & S. Saarikallio (Eds.). *Handbook of music and adolescence*. University of Oxford Press.
- IV Baltazar, M., Västfjäll, D., Asutay, E., Koppel, L., & Saarikallio, S. (2018). Is it in me or in the music? Self-regulation of stress and the role of strategies and music. Manuscript in review.

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# 1 INTRODUCTION

One of the quintessential and most intriguing questions in music psychology is why music is so important for humans, especially when, at first sight, it does not present adaptive or survival value, and does not interfere with everyday life goals. This statement by Charles Darwin (1871, pt. II, p. 333) expresses well such amazement:

As neither the enjoyment nor the capacity of producing musical notes are faculties of the least use to man in reference to his daily habits of life, they must be ranked amongst the most mysterious with which he is endowed.

However, one premise in Darwin's statement is debatable: *music has no use to man*. While no one would argue that music itself is necessary to keep humans alive in a strict sense, we are a social and cultural species that relies on artifacts to, for instance, develop societies, foster social unity, and transmit values. Therefore, one approach to this musical mystery is to examine what kind of functions music might have met throughout our evolution (Cross & Morley, 2009; Schäfer, Sedlmeier, Städtler, & Huron, 2013). Following this perspective, several propositions have been presented, namely: music promotes social cohesion, allows emotional communication, facilitates infant-mother attachment, and induces feelings of transcendence and pleasure (for a review, see Schäfer et al., 2013).

Exploring how humans interact with music and benefit from this interaction in everyday life has been one cornerstone of music psychology (Hallam, Cross, & Thaut, 2009; Sloboda, 2005). As a contrast, the question of whether music is always beneficial for us has also been raised. With the growing ubiquity of music, increasing consumption of media, and the appearance of "deviant" music genres like rock, metal, rap... the doubts emerging in society were picked up by researchers: Can this music be bad for us? Even though fans of some music genres have been described as exhibiting problematic behaviours (e.g. rap fans, Miranda & Claes, 2004), researchers and scholars have been suggesting that no linear connection is possible to be drawn and that other variables explain that relationship (e.g. Baker & Bor, 2008; Mulder et al., 2010).

The understanding of music's effects can, thus, be promoted by shifting attention away from studying the effects of the inherent properties of music on passive music users to seeing music users as active meaning-makers that interact with music, negotiate it with their peers, and adapt it to their needs (DeNora, 2013; McFerran & Saarikallio, 2014). The crafting of the term *musicizing* by Small (1998) symbolizes well this shift. By transforming music into a verb, Christopher Small underlines its interactive and co-creative aspect. In the same year, Gross (1998a, 1998b) presented emotion regulation as the new emerging topic and introduced his own process model. Inspired by Gross and his clear model, psychology research on the topic of emotion regulation bloomed. This parallel development in the field of music and in the field of psychology laid the groundwork for the emergence of musical affect regulation as a research field. Note, however, that the idea that music can be used to regulate affect is not a completely new one (as it can be seen in the historical journey endeavoured by Garrido & Davidson, 2013). The novelty aspect is the emphasis on agency and on music as a resource where culture, musical attributes, and individuals meet (DeNora, 1999; Krueger, 2011, 2018a; Saarikallio, 2017).

The convergence of work conducted in the last 15-20 years in the areas of music and emotions, affect regulation, everyday use of music, and functions of music provides a solid support to the present doctoral research. However, even though the study of affect regulation through music has been growing steadily, it has not reached yet the same level of maturation observed in the general affect regulation research. On one hand, the field starts to understand underlying mechanisms in the induction of emotions through music (Juslin, Liljeström, Västfjäll, & Lundqvist, 2010; Juslin & Västfjäll, 2008b), strategies that are employed while listening to music (Saarikallio & Erkkilä, 2007; Van Goethem & Sloboda, 2011), and the functions that music serves in our daily life (Groarke & Hogan, 2015; Schäfer et al., 2013); yet, on the other hand, a state of conceptual heterogeneity and a lack of studies on the interrelations between components of musical affect regulation can still be observed.

The present dissertation is situated at a crossroad between psychology and music research, borrowing concepts, frameworks, and methods from both fields. This work aims to contribute to the conceptual development of the field by examining previous work and establishing guidelines for future work. The interface between music and the mind will be approached by studying how musical mechanisms support regulation strategies and by experimentally testing the impacts of these components. The cumulative work of this dissertation will result in a comprehensive model of musical affect regulation. The results of this dissertation will, hopefully, contribute to the conceptual state of the field, to the understanding of daily life use of music, and to the general field of affect regulation.

In the next chapters, the doctoral work composed by four publications (three journal articles and one academic handbook chapter) will be summarized and discussed. Chapters 2 (Affect and self-regulation) and 3 (Musical affect regulation) will provide the theoretical background of the work and an over-

view of the relevant empirical literature. Chapter 4 will outline the research aims. Chapter 5 will introduce the motivation and methods behind each publication and present the corresponding results. Chapter 6 will discuss the findings and their implications. Chapter 7 will close the summary component of this dissertation with the conclusions. The original publications are reprinted at the end of this summary and can be consulted for more details.



## 2 AFFECT AND SELF-REGULATION

In this chapter, two central concepts of this dissertation will be presented and defined: affect and affect self-regulation. These two concepts can refer to a myriad of different phenomena, depending on the theoretical approach. Instead of presenting the multiple conceptualizations in the field, this chapter will introduce the theoretical approach adopted in the current dissertation.

### 2.1 Affect

The affective sciences are emerging as a relatively new field, with a confluence of branches from several disciplines, such as cognitive psychology, sociology, and neurosciences (see, as example, the multidisciplinary effort of the Handbook of Affective Sciences, Davidson, Scherer, & Goldsmith, 2003). The field of affective sciences is characterized by a vast number of theoretical approaches to the definition of affect, emotion, or cognition, and to the distinction of their universal and cultural components (for reviews, see Gross & Barrett, 2011; Scherer, 2000; Scherer & Peper, 2001). Each approach has its implications regarding what can be considered *affect* and whether there is a separate vs inherent process of affect regulation. The lack of consensus has arguably stimulated the debate on some of the most integral aspects of human functioning; however, it has also limited the possibilities of dialogue between theoretical approaches.

In this dissertation, affect is used as an overarching term that encompasses diverse affective phenomena. Following the definition of affect by Juslin and Sloboda as “an umbrella term that covers all evaluative – or ‘valenced’ (positive/negative) states” (2010, p. 10), affective states were compiled from the literature until reaching the conceptualization of affect adopted in this dissertation. Figure 1 presents those states and organizes them in terms of duration (long vs short).

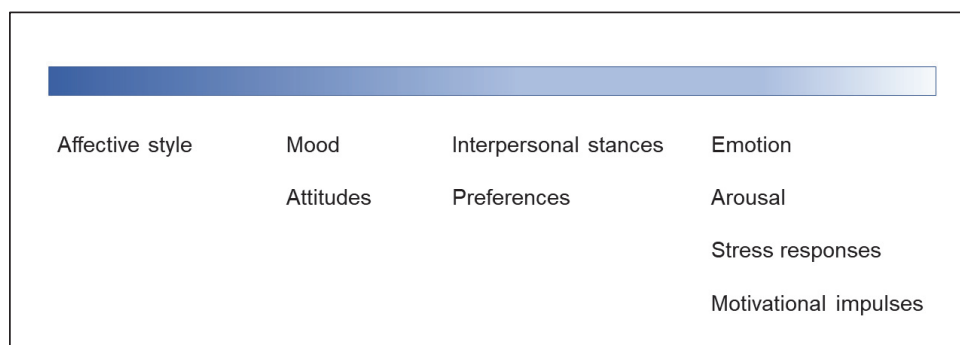


FIGURE 1 Affective states included in the umbrella term *affect*. The terms are ranking from long duration and stable (left) to short duration and unstable (right). Compilation based on Scherer (2000, 2004, 2005) and on additional information from Ferguson, Hassin, and Bargh (2008), Fleckenstein (1991), Gross (2014), Gross and Thompson (2007), Harmon-Jones and Harmon-Jones (2015), and Van Goethem (2010). Figure adapted from Baltazar & Saarikallio (2016), by permission of Sage Publications.

## 2.2 Affect self-regulation

Affect self-regulation is the process responsible for creating, changing, or maintaining any of the affective states, whether positive or negative (Gross, 2015a; Gross & Thompson, 2007). *What* exactly is being regulated and *how* are still questions not fully answered. Due to the multiple theoretical approaches in affective sciences, also the topic of self-regulation has been fragmented. The different branches in this topic either focus on the regulation of emotions (e.g. Aldao & Nolen-Hoeksema, 2013; Gross, 2015b; Tamir, 2016), moods (e.g. Larsen, 2000; Thayer, Newman, & McClain, 1994), action tendencies (e.g. Carver & Scheier, 1990), or attention and motivation (e.g. Boekaerts & Niemivirta, 2005). As with the conceptualization of affect, it comes down to theoretical traditions and approaches and to what one considers to be affect, feelings, motivation, and cognition and what influence the individual can exert on them. Overall, through self-regulation the individual tries to get closer to a certain state or goal, regardless of the domain considered. In this dissertation, affect self-regulation will refer mainly to the states that have been observed to be targets of modulation through music: emotions, moods, arousal, stress responses, focus and motivation. Moreover, only the regulation processes targeted at the self (in contrast to at other people) will be considered in this work. Thus, future mentions of affect regulation refer to affect self-regulation.

As previously implied, affect regulation is driven by affective goals. Affective goals can either be conscious, thus directing an active and explicit affect regulation (e.g. Hoeksma, Oosterlaan, & Schipper, 2004; Thompson, 1994; Troy, Shallcross, Brunner, Friedman, & Jones, 2017) or unconscious, thus directing an

automatic and implicit regulation of affect (e.g. DeWall et al., 2011; Gyurak, Gross, & Etkin, 2011; Koole & Rothermund, 2011). Typically, it is assumed that these goals pull towards more positive or pleasant states (Campos, Walle, Dahl, & Main, 2011; Riediger, 2015). However, an instrumental account on affect regulation suggests that people might also regulate their affect so that they reach other goals beyond the current experience (Tamir, 2009). According to the taxonomy proposed by Tamir (2016), affect regulation goals are informed by the motives for self-regulation, which can be hedonic goals (such as to feel good) or instrumental (such as to be socially valued). Thus, whether the person wants to reduce anger, increase arousal, or hide happiness, for instance, depends greatly on whether their motives are purely hedonic (*I want to relax*) or instrumental (*I must show anger to be taken seriously*). Due to constant feedback loops that inform the individual about the success in attaining the established goal and the ever-changing context, affect regulation guarantees a good adaptation to the environment and, consequently, promotes satisfying levels of wellbeing (Webb, Gallo, Miles, Gollwitzer, & Sheeran, 2012).

Functional affect regulation is fundamental for psychological health. Innumerable accounts on how affect regulation difficulties predict lower wellbeing and psychological symptomatology have been emerging in relation to children (Garnefski, Rieffe, Jellesma, Terwogt, & Kraaij, 2007; Gullone, Hughes, King, & Tonge, 2010), adolescents (Bell & McBride, 2010; Garnefski, Kraaij, & van Etten, 2005; van Rijn et al., 2011), and adults (for a review, see Gross & Munoz, 1995). Given the connection between affect regulation and health, researchers have been trying to identify the underpinnings of maladaptive regulation patterns. One approach has been to measure overall affect dysregulation or difficulties (e.g. Bowie, 2010; Gratz & Roemer, 2004). Another approach has been to investigate one component of affect regulation that seems to mediate the relationship with wellbeing and health: the regulation strategy. Strategies are the cognitive or behavioural tools employed to pursue the affective goals (Koole, 2009). These tools are acquired and developed from childhood to adulthood (Campos, Campos, & Barrett, 1989; Cole, Michel, & Teti, 2004; Rubin, Cheah, & Fox, 2008), and, like any other set of skills, they can build a better or worse repertoire depending on life experiences and individual traits (Diamond & Aspinwall, 2003; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Fox & Calkins, 2003).

The literature offers several frameworks for the study of regulation and their strategies. Amongst those, the process model of emotion regulation (Gross, 1998a, 2015a) has been one of the most influential in the field. Gross proposes that strategies can be differentiated according to the moment of their activation along the emotion generation process: situation selection, situation modification, attention deployment, reappraisal, and response modulation (at the physiological, experiential, or behavioural level). The first four stages take place before and the fifth takes place after the emotional responses have been triggered. Thus, strategies employed during any of the first four stages are antecedent-focused, whereas strategies employed in the fifth stage are response-focused.

According to the process model, the earlier the strategies are activated, the more efficient and health-supporting they will be (Gross, 1998a, 2002). To test this prediction, several studies have been conducted to compare antecedent- and response-focused strategies. Most commonly, the compared strategies have been *reappraisal* and *expressive suppression* (e.g. Dan-Glauser & Gross, 2011; Gross & John, 2003; Moore, Zoellner, & Mollenholt, 2008; Schutte, Manes, & Malouff, 2009).

Despite the extensive body of research supporting some premises of the process model, there is also contradictory evidence that suggests that the efficacy of affect regulation is not as time-dependent as portrayed in the model (Consedine, Magai, & Bonanno, 2002; Philippot, Chapelle, & Blairy, 2002; Randall, Rickard, & Vella-Brodrick, 2014; Urry, 2009; Webb, Miles, & Sheeran, 2012). There are, in fact, alternative ways of understanding affect regulation and categorizing regulation strategies. For instance, Parkinson and Totterdell (1999) classified strategies according to two types (cognitive and behavioural) and two approaches (diversion and engagement), creating a matrix with four cells. Similarly, Larsen (2000) suggested the same types (cognitive and behavioural), but further categorized according to the focus of the strategy (on situation or on mood). Koole (2009), in turn, presented a descriptive framework that separates strategies according to the emotion-generation system targeted: attention, knowledge, and body. Additionally, Koole (2009) considers three psychological functions that can be pursued by these previous categories of strategies: need-oriented, goal-oriented, person-oriented. Koole's framework is, thus, composed by nine total categories. Table 1 offers a review and summary of some of the strategies studied in the literature by using a categorization based on the two approaches suggested by Parkinson and Totterdell (1999), on the targets devised by Koole (2009), and on the responses referred by Gross (1998a).

The referred frameworks are not normative regarding the adaptiveness of each strategy; instead, the success of affect regulation seems to depend more on the needs and goals supported by the strategies. In fact, a shift has been recently observed in the field from the study of particular strategies (e.g. Gross, 1998a; Gross & Levenson, 1997; Moore et al., 2008) toward the study of contextual factors and regulation flexibility as determinants for a successful and health-fostering affect regulation (Aldao & Nolen-Hoeksema, 2012a; Bonanno & Burton, 2013; DeSteno, Gross, & Kubzansky, 2013; Koole & Aldao, 2015).

TABLE 1 Regulation strategies. Typology according to type (attention, cognition, subjective experience, physiology, behaviour) and approach (engagement and diversion).

	Engagement	Diversion
Attention	Focus on aspects of the situation Seek for social/affective/behavioural clues Rumination	Distraction Entertainment Avoidance
Cognition	Reappraisal Perspective thinking Reflection Catastrophizing Blaming	See the situation/reaction through a distanced perspective Engage in cognitive tasks Social comparison Fantasizing Memory recall
Subjective experience	Seek strong sensations Maintain or increase experienced feeling Accept experience	Decrease or inhibit experienced feeling Eat/drink Use drugs
Physiology	Increase body functioning (flow, endurance) Revving up/energize Body screening techniques Biofeedback	Relaxation techniques Eat/drink Use drugs Exercise
Behaviour	Venting Discharge Seek support/ask for advice Talk Initiate or maximize expression of feeling (smile, cry, shout)	Expressive suppression Withdraw Inhibit action tendencies

## 3 MUSICAL AFFECT REGULATION

Now that *affect regulation* was introduced and defined, chapter 3 will explore this concept in relation to music, starting from general functions of music, elaborating the key elements of musical affect regulation, and continuing to specific implications of music use for affect regulation.

### 3.1 Music: More than sounds

#### 3.1.1 Functions of music

Initial studies on daily life engagement in music have brought to light the immense power people attribute to this resource (DeNora, 2000; Small, 1998). Deep explorations of musical behaviours (listening, playing, going to concerts...) have further revealed that there are several functions of music that motivate these behaviours and contribute to wellbeing (Bonde, 2011). Depending on the theoretical approach and on the method utilized, studies have presented different lists of functions, with large variance in content and number (for a review, see Schäfer et al., 2013). In short, music has been linked to functions related to affect regulation, self-awareness and identity, transcendence, aesthetic reflexivity and enjoyment, social bonding, and enhancement of performance (Boer & Fischer, 2012; DeNora, 1999; Groarke & Hogan, 2015; Laukka, 2006; Laukka & Quick, 2013; Schäfer et al., 2013; Ter Bogt, Mulder, Raaijmakers, & Gabhainn, 2011).

Being music a product of culture, its functions are also deeply constructed by the individual in a given sociocultural context (DeNora, 1999, 2000, 2010). Cross-cultural studies have been revealing that there are functions equally important throughout cultures, while others manifest differently. For example, a study conducted by Boer and colleagues (2012) examined the relevance of a list of functions of music for participants from different cultural backgrounds (Germany, Kenya, Mexico, New Zealand, Philippines, and Turkey). The authors

interpreted their findings along the individualism-collectivism and secularism-traditionalism lines: participants from collectivist cultures reported more often the use of music for expressing values and cultural identity; participants from secular and individualistic cultures valued the dance function more; and participants from traditional cultures reported more the use of music for expressing values and cultural identity, and for bonding with their families. Interestingly, the perception of some functions seems to be transversal to several cultures. Boer and Fischer (2012) explored functions of music at the individual, social, and cultural level. They found that, regardless of the cultural background, the most valued functions for the three levels were affect regulation, bonding, and expression of cultural identity, respectively. Some differences were also found; however, they could not be explained by an individualism-collectivism effect, suggesting that there are no clear cuts in cross-cultural studies. As Saarikallio (2012a) summarizes, functions of music related to affective work and mental wellbeing might be shared across cultures, while functions related to cultural expression, social mechanisms, and sociocultural identity might vary.

### 3.1.2 Regulatory function of music

Regardless of the heterogeneity found amongst studies on functions of music, one result in common is that functions related to the regulation of affect are the most valued in music. Emotions, feelings, arousal – these are integral aspects of the experience of music, which, importantly, are often named as the main reason to engage in music (Juslin & Laukka, 2004; Thayer et al., 1994). Besides, music not only evokes affective reactions of various intensities and colours (Juslin & Laukka, 2004; Juslin, Liljeström, Västfjäll, Barradas, & Silva, 2008; Schubert, 2013), it also conveys cultural and social messages, encapsulates memories (Blais-Rochette & Miranda, 2016; Janata, Tomic, & Rakowski, 2007), creates virtual spaces (Clarke, 2014; DeNora, 2013; Krueger, 2011), and engages neurochemical systems related to reward, stress, immunity, and social affiliation (for a review, see Chanda & Levitin, 2013). All these effects elevate music to a privileged position as a resource for affect self-regulation.

Musical affect regulation (i.e. the use of music to alter, maintain or change affective states) borrows concepts from the literature on affect regulation, such as affective goals and strategies. Starting precisely from the grounds of general affect regulation, Van Goethem and Sloboda (2011) presented four levels of analysis of regulation through music – goals, strategies, tactics, and mechanisms (GSTM framework; Van Goethem, 2010). Goals, as previously mentioned, set the direction and, therefore, influence *what* and *how* music is used. Studies based on retrospective reports on the affective goals pursued through music show high percentages of affective use of music (Juslin & Laukka, 2004; Lonsdale & North, 2011; Thayer et al., 1994). Overall, music seems to be used mainly to maintain positive affect, create a positive state, increase energy, or move away from negative states (Bishop, Karageorghis, & Loizou, 2007; Heasley, 1995; Saarikallio, 2011; Sakka & Juslin, 2018; Skånland, 2013; Van Goethem & Sloboda, 2011). Besides, informants tend to claim to be quite successful in attaining these



goals through music (DeNora, 1999; Thayer et al., 1994; Van Goethem & Sloboda, 2011). However, it is possible that the affective salience of musical episodes distorts self-reports. Studies using experience sampling methods registered a less frequent use of music to attain affective goals in daily life (Greasley & Lamont, 2011; Randall & Rickard, 2016; Sloboda, O'Neill, & Ivaldi, 2001).

As for tactics (third level in the GSTM framework), these refer to the several possibilities of action offered by music: listening, playing instruments, singing, performing, dancing, composing... According to the GSTM framework, tactics give the concrete platform for activating the resources needed for the affective goals (Van Goethem, 2010; Van Goethem & Sloboda, 2011). Even though music listening is the most commonly used tactic amongst these for regulating affect (Saarikallio & Erkkilä, 2007; Van Goethem, 2010), other musical activities are also tightly connected with wellbeing (Bonde, 2011; Dingle, Brander, Ballantyne, & Baker, 2013; Ruud, 1997). One might hypothesize that different activities have a stronger affinity with different functions of music.

### 3.1.3 Regulation strategies

To attain the desired affective state, individuals employ regulation strategies while engaging in music. Overall, the same strategies studied in affective sciences can also be observed in musical affect regulation, since the cognitive and behavioural processes involved adapt and benefit from the resource available (i.e. music). Identically to what is observed in the field of general affect regulation, there are multiple strategies studied in the context of musical affect regulation, with no consensual framework to categorize them. One exception is the model for mood regulation by adolescents, suggested by Saarikallio and Erkkilä (2007). The model presents a theoretical conceptualization formed by seven strategies: *entertainment, revival, strong sensation, diversion, discharge, mental work, and solace*. A measurement scale has been developed based on this model (Music in Mood Regulation scale, MMR; Saarikallio, 2008, 2012b), which has since then been used in diverse studies (e.g. Carlson et al., 2015; Saarikallio, Nieminen, & Brattico, 2013; Shifriss, Bodner, & Palgi, 2015; Thomson, Reece, & Di Benedetto, 2014).

Studies with different methods and samples have also successfully identified regulation strategies employed through music. For instance, von Georgi, Gebhardt and colleagues (Gebhardt, Kunkel, & Von Georgi, 2014; Gebhardt & Von Georgi, 2007; von Georgi, Göbel, & Gebhardt, 2009) suggested five basic strategies in their Activation and Arousal Modulation model: *relaxation, cognitive problem solving, reduction of negative activation, fun stimulation, and arousal modulation*. In the context of sad music listening, Van den Tol and Edwards (2013, 2015) presented the following strategies: *getting in touch with feelings, experience, and express sadness; retrieve memories; distraction; cognitive reappraisal; and look for acceptance, comfort and support, imagining that music is a friend*. More succinctly, Van Goethem and Sloboda (2011) condensed their strategies to the most often used: *relaxation, distraction, active coping, venting, introspection, and rational*



*thinking*. Overall, it has been observed a development of parallel approaches to the study of musical strategies, with significant overlap.

The strategic choices for a given moment are a matter of utmost relevance for the understanding of affect regulation (Sheppes, Scheibe, Suri, & Gross, 2011). In the context of musical affect regulation, some patterns of association between strategies, situation, and affective goals start to emerge. Through ESM, Randall and colleagues (Randall & Rickard, 2016; Randall et al., 2014) observed that the initial mood was a determinant factor for engaging in strategic uses of music. In the context of sad music listening, Van den Tol and Edwards (2015) found that when the goal was mood enhancement, participants tended to achieve it through distraction or cognitive reappraisal, coupled with music that was rated as having high aesthetic value. In Sakka and Juslin's study (2018) the participants that tended to use music more often for reducing negative affect reported more the use of distraction, reflection, reappraisal, and physical modulation, while the enhancement of positive emotion correlated with distraction, reflection, and discharge, and, lastly, enhancing negative emotion correlated with rumination.

These findings start to empirically demonstrate and confirm what has been theorized—that strategies are chosen according to the situation and desired affective state. Yet, one must keep in mind that these results come from a set of rather exploratory studies, and these patterns are far from being solidly established.

### 3.1.4 Mechanisms

Previous research leaves no doubt about the fact that music is particularly engaging thanks to the affective impact it has on people. But why does music create this impact? Musical emotions have mainly been studied in two distinguishable categories: perceived (expressed by the music) and felt (experienced by the individual) (Evans & Schubert, 2008; Gabrielsson, 2002; Schubert, 2013). For the same piece of music, the individual can perceive joy as being expressed, but in turn feel nostalgia and calmness. While the expressed feelings can be inspiring and influence the experienced affect, it counts only for one portion of the affective change after engaging with music (Gabrielsson, 2002). As the present dissertation focuses on affect regulation, the second category (i.e. felt emotions) is the most relevant to understand.

In their seminal work, Juslin and Västfjäll (2008b) claimed that to comprehend how emotions are induced through music it would be needed to go beyond the study of acoustic features and composition techniques. According to the authors, emotion induction was based on psychological mechanisms that need to be accounted for. They proposed six mechanisms: brain stem reflexes, evaluative conditioning, emotional contagion, visual imagery, episodic memory, and musical expectancy. In their subsequent work, two more mechanisms were added—rhythmic entrainment and aesthetic judgment—, thus forming what is now known as the BRECVEMA framework (Juslin, 2013a; Juslin & Västfjäll, 2008a). Since then, experimental studies have been conducted, showing the

framework's ability to explain the induction of different emotions in the listeners (Juslin, Barradas, & Eerola, 2015; Juslin, Harmat, & Eerola, 2014; Sakka & Juslin, 2017).

However, affect regulation is not based only on the induction of affective states and, as proposed by Van Goethem and Sloboda (2011), the musical mechanisms underlying affect regulation also deserve further investigation beyond induction processes. Based on interviews, Van Goethem and Sloboda (2011) identified the following mechanisms: emotion of the music, type of music, familiarity, content of the music, feeling of being in other world, memories, music-related activities (e.g. dance or sing along), and non-related activities (e.g. housework). However, these categories were directly extracted from interviews, and their validity has not been put to test through empirical studies. Saarikallio, Baltazar, and Västfjäll (2017) also explored the mechanisms supporting the use of music for relaxation by adolescents. We found that the mechanisms could be categorized into *musical* (acoustic features, expressed emotion) and *mental* (memories, visual images). More recently, Sakka and Juslin (2018) applied the BRECVEMA mechanisms to a survey study on affect regulation by depressed and non-depressed participants. They found that all the mechanisms except brain stem reflexes and musical expectancy were rated as commonly involved in affect regulation, with no differences between the groups of participants.

Besides these studies, mechanisms in musical affect regulation have been approached only indirectly and mostly not identified as such. For example, listening to music to employ the strategy *consolation* can be explained mainly by acoustic features/expressed emotion (non-specified, labelled as *music itself* by the authors), lyrics, and sense of oneness/togetherness (Hanser, ter Bogt, Van den Tol, Mark, & Vingerhoets, 2016; ter Bogt, Vieno, Doornwaard, Pastore, & van den Eijnden, 2017). In the particular case of listening to ironically-enjoyed music, Van den Tol and Giner-Sorolla (2017) found that mechanisms related to musical features (such as rhythm, melody, lyrics, and contagion) and to familiarity seem to be determinant for the function played by this musical activity. Also, in the context of using sad music in adverse situations, Van den Tol and Edwards (2013) identified the following aspects that can be understood as musical mechanisms: connection, memory triggers, high aesthetic value, and message.

Given that individuals interact with musical mechanisms to self-regulate, correlations between mechanisms and strategies would be expected. Recent literature has started to approach this issue, but results are still sparse. Van Goethem and Sloboda (2011) observed that "intrinsic mechanisms of emotion, type and familiarity of the music were most important for the strategy of relaxation, whereas extrinsic mechanisms such as memories and related and unrelated activities were most important for the strategy of active coping". We also found a bi-dimensional relation between mechanisms and strategies, although with different variables (Saarikallio et al., 2017): musical (as in intrinsic to music) mechanisms supported the strategies distraction and induction of emotions, whereas mental (as in extrinsic to music) mechanisms supported the strategy processing. Sakka and Juslin (2018), in turn, reported correlations related to on-

ly two of the BRECVEMA mechanisms—visual imagery correlated with reflection and discharge, and contagion correlated with discharge.

In conclusion, musical mechanisms are a promising level of analysis that can help to better understand how music is used as a medium for self-regulating affect and its outcomes. Nevertheless, it is still a topic in an initial stage of development.

### 3.2 Relevance of musical affect regulation

Music contributes to wellbeing and good mental health through its various functions (DeNora, 2000, 2013; MacDonald, 2013; Saarikallio & Baltazar, *in press*). The function targeted by this dissertation—*affect regulation*—has been extensively studied in relation to wellbeing (MacDonald, 2013). In fact, how music is used for affect regulation has been pointed as a mediator between music use and wellbeing (e.g. Chin & Rickard, 2014). In general, adaptive and flexible affect regulation is connected to health, since it influences the ratio of positive/negative affect, the ability to respond and adapt to the environment, and to build healthy relationships (Aldao & Nolen-Hoeksema, 2012b; Gross & Munoz, 1995). Consequently, when music is used to meet affective needs, it will also contribute to affective outcomes in short- and long-term (Marik & Stegemann, 2016).

As also found in general affect regulation literature, research on music has been emphasizing the importance of the strategies employed while engaging in music. Findings collected so far indicate that using adaptive strategies through music fosters wellbeing and mental health, while the increased use of maladaptive strategies is linked to poorer health. More specifically, strategies such as reappraisal, distraction, and entertainment have been linked to better mental health (Carlson et al., 2015; Chin & Rickard, 2014; Thomson et al., 2014; Van den Tol & Edwards, 2015). Conversely, rumination, discharge, and avoidance/disengagement have been linked to poorer mental health (Carlson et al., 2015; Garrido & Schubert, 2013; Miranda & Claes, 2009; Miranda, Gaudreau, & Morizot, 2010; Thomson et al., 2014). Given that these results emerge from correlational studies, they cannot imply causation. Also, they only consider the average frequency of each strategy, with no contextual factors. As McFerran (2016) argues, the negative outcomes of music might arise from using music when in distress or when depleted of the necessary skills. When, on the contrary, music engagement is conducted in a positive manner, it can be a protective factor. As proposed by Saarikallio (2017), music can be health fostering through beneficial attitudes such as self-reflective awareness of affective responses to music and beneficial behaviours such as using music for inducing positive emotions and aesthetic pleasure.

As a final remark, no explorations regarding affective outcomes, wellbeing, and health impact have yet been made in relation to musical mechanisms. Some relations between musical mechanisms and strategies have been put forward

(Saarikallio et al., 2017; ter Bogt et al., 2017; Van Goethem & Sloboda, 2011), suggesting that strategies resort to certain aspects of music when acting on the affective states. To further understand music's effect on affective outcomes, it will also be necessary to explore the links between strategies and musical mechanisms.

### **3.2.1 Developmental perspective on musical affect regulation: youth**

Youth is one of the periods in life when music affect regulation is more relevant. Even though people engage in music throughout their whole lives in a meaningful way, there are changes in musical behaviours that reflect developmental needs and tasks (Bonneville-Roussy, Rentfrow, Xu, & Potter, 2013). The peak of music engagement is observed in adolescence (North, Hargreaves, & O'Neill, 2000), which is a developmental stage characterized by major changes at the affective, biological, cognitive, social, and identity levels (Gowers, 2005). One explanation for the sudden increase of personal meaning of music during adolescence is that music's functions meet the developmental needs of adolescents (Laiho, 2004; Miranda, 2013; Schwartz & Fouts, 2003). In a review of literature on music and adolescents from a developmental perspective, Miranda (2013, p. 10) claims that "the transaction between music and adolescence opens a critical window in which music can influence at least seven major areas of development: aesthetics; identity; socialisation; emotion regulation and coping; personality and motivation; gender roles; and positive youth development".

This factor makes music especially relevant during this stage, and depending on its use, it can be a protective or risk factor (McFerran & Saarikallio, 2014; Miranda & Claes, 2009). Regulation difficulties experienced during adolescence can manifest in social difficulties, lower psychological and emotional adjustment, and internalization and externalization symptomatology (Garnefski et al., 2005; Silk, Steinberg, & Morris, 2003). Possibly due to the increased intensity of emotions and to the important affective challenges lived during adolescence and youth years, adolescents and young adults value more the affective, identity, and social functions of music, while older adults value more functions related to transcendence and personal growth (Groarke & Hogan, 2015; Laiho, 2004; Laukka, 2006; Leipold & Loepthien, 2015; North et al., 2000; Papinczak, Dingle, Stoyanov, Hides, & Zelenko, 2015; Schwartz & Fouts, 2003).

In sum, given the increased engagement in music and the highlighted affective functions of music during youth, research with this population has been especially informative for psychology of music. Even though this dissertation is not framed in a developmental perspective, one of its publications will have a young sample (publication II) and another publication will apply a conceptual model of affect regulation particularly to youth (publication III).

### **3.2.2 Daily life perspective on musical affect regulation: stress**

Among the various affect-regulatory uses of music, stress regulation is one of the most common behaviours in daily life. Stress responses need to be regulated

daily, as they are triggered by any situation that is perceived as a challenge or threat and the resources to cope with it are assessed as uncertain or insufficient (Lazarus & Folkman, 1984). When the stressor is perceived, several changes take place at the physiological, affective, cognitive, and behavioural levels (Lazarus & Folkman, 1984; Tomaka, Blascovich, Kelsey, & Leitten, 1993). In short, some typical changes are: increased heart rate and perspiration (Mandrick, Peysakhovich, Rémy, Lepron, & Causse, 2016; Peters, Godaert, & Ballieux, 1998; Tsigos & Chrousos, 2002), experience of tension and negative affect (Lazarus, 2000; Smith, Haynes, Lazarus, & Pope, 1993), and limited capacity to make demanding choices (Starcke & Brand, 2012).

Stress responses have the function of increasing the individual's ability to react to the environment and, therefore, are usually adaptive (Lazarus & Folkman, 1984; Selye, 1936). As Lazarus' Transactional Model of Stress implies, stress "is neither in the environmental input nor in the person, but reflects the conjunction of a person with certain motives and beliefs with an environment whose characteristics pose harm, threats, or challenges depending on these person characteristics" (Lazarus, 1990, p. 3). Since the individual's resources and actions are a determinant component of this highly dynamic process, the ability to self-regulate the high arousal and negative valence concomitant to stress responses is crucial. Indeed, affect self-regulation skills have been pointed as one of the moderators between stressful events and health outcomes (e.g. Bonanno & Burton, 2013; Jamieson, Nock, & Mendes, 2012; Lazarus, 1974; Shallcross, Troy, & Mauss, 2015; Wang & Saudino, 2011; Wickramasinghe, 2010).

Music listening has been identified as a common tactic to regulate stress in everyday life (Pelletier, 2004; Thayer et al., 1994) and salutary effects have been observed in relation to this tactic, such as lower cortisol levels (e.g. Khalfa, Dalla Bella, Roy, Peretz, & Lupien, Sonia, 2003; Lindblad, Hogmark, & Theorell, 2007; Linnemann, Ditzen, Strahler, Doerr, & Nater, 2015), higher serotonin levels and activation of brain areas involved in reward (Blood & Zatorre, 2001; Evers & Suhr, 2000; Menon & Levitin, 2005), and faster recovery of the autonomic nervous system after exposure to the stressor (e.g. Chafin, Roy, Gerin, & Christenfeld, 2004; Thoma et al., 2013). These effects seem to be facilitated by features of music such as low tempo, softness, and consonance (see Västfjäll, 2002), especially when it is the participants' preferred music (Jiang, Zhou, Rickson, & Jiang, 2013; Liljeström, Juslin, & Västfjäll, 2012; Moore, 2013).

Stress regulation is an excellent example of a "music-individual" interaction that, for many, happens frequently in their daily life. For that reason, the use of music to reduce stress offers an interesting paradigm for the study of musical affect regulation, and a particular focus on this topic is provided in publication IV. Even though it is already quite established that music can be used to reduce stress, little is still known about how this goal is pursued in terms of employed regulation strategies and their interaction with music.

## 4 RESEARCH AIMS

The present work is motivated by the current situation in the field of affect regulation through music: in the last decade, musical affect regulation has been an emerging topic and many pioneering steps have been taken. However, the field is lacking some unity and there are aspects of the interaction between the individual and the music that haven't been properly explored yet. It is, thus, timely and pertinent to look back at how previous studies have been conducted, identify overlooked aspects, devise ways of studying such aspects, and outline new conceptual and empirical understanding.

Therefore, this work had the following aims:

- critically analyse the conceptual standing of previous research and its findings
- understand how music and regulation strategies relate
- investigate the impact of music and regulation strategies on the pursuit of an affective goal
- elaborate a comprehensive, conceptual model that represents the current theoretical and empirical findings

In essence, the present dissertation was constructed to serve two mutually supporting main goals: to empirically elaborate some of the unstudied elements of the concept of musical affect regulation, and to provide overall theoretical coherence to the field. As depicted in Figure 2, the publications of the present work (I to IV) can be categorized according to their approach: theoretical or empirical. The combination of both approaches was deemed necessary to reach the aims outlined for this dissertation and, indeed, such dialogical approach represents one of the strengths of this work.



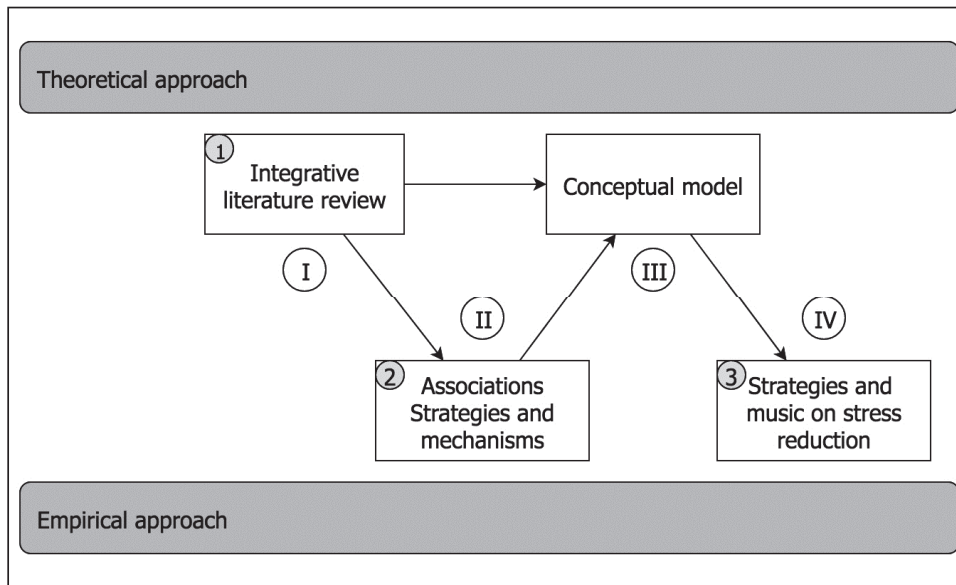


FIGURE 2 Overview of the publications included in this dissertation. The publications are ordered in Roman numerals and the studies in Arabic numerals.

Publication I was an integrative literature review. Its aims were to analyse the conceptual preciseness and clarity of previous studies, categorize and summarize their findings, and lay out recommendations for future research. From this study, it became apparent that there was a major need for unambiguous terminologies and conceptual frameworks and that musical mechanisms were one of the less studied components of the process of affect regulation through music. Consequently, in publication II the musical mechanisms were approached in relation to regulation strategies (study 2). By using a questionnaire on musical regulation episodes, study 2 had the aim of capturing the associations between musical mechanisms and employed regulation strategies, and, thus, better understand how music supports affect regulation. Drawing from studies 1-2 and from recent literature, publication III had the aim of developing a comprehensive conceptual model where the relevant components of affect regulation would be shown in relation to each other. Finally, publication IV had the aim of investigating the relationship between three elements of the model presented in publication III. More specifically, it assessed the effects of regulation strategies and of music on the affective goal of reducing stress responses (study 3).

The methods and results of each publication are described in the next chapter.

## **5 SUMMARIES OF PUBLICATIONS: METHODS AND RESULTS**

The present work results from a merge of diverse research methods with complementary approaches. In this chapter, the rationale and procedure behind each method applied and the results obtained will be presented. This dissertation comprises four publications, which are based on three studies in the following manner: publication I explores the results of a critical integrative literature review (study 1); publication II gives an empirical account of the associations between regulatory strategies and musical mechanisms when engaging in music (study 2); publication III builds on previous literature and on the results from study 1 and study 2 to propose a conceptual model for affect regulation through music; and publication IV reports the observed impact of regulatory strategies and self-selected music on laboratory-induced stress responses (study 3). More detailed descriptions can be found in the original publications.

### **5.1 Publication I: Reviewing and critically analysing the literature**

#### **Background and aims**

The first study of this dissertation was motivated by the observed growth of research on the uses of music for self-regulating affective states. As an emerging and young topic of research, it has not achieved yet a consolidated state and literature reviews with a conceptual perspective were lacking. For this reason, study 1 had two aims: firstly, to collect the results from recent studies in an integrative manner and, secondly, to draw a critical perspective on the conceptual state of the field. Three research questions were formulated:

- 1) Which concepts and theoretical backgrounds have been used to research affect regulation processes through music?



- 2) How well defined and consistent are these concepts throughout the publications?
- 3) What are the major research results, and how do they fit the levels of Van Goethem's (2010) GSTM framework?

## Methods

The literature search, analysis, and interpretation were conducted following an integrative methodology. The techniques of the integrative literature review allow to, on one hand, compile previous literature and summarize it, and to, on the other hand, critically analyse the literature through specific questions defined a priori (Dixon-Woods, Agarwal, Young, Jones, & Sutton, 2004; Torraco, 2005). It is, thus, a valuable tool for developing concepts and discussing implications for future research (Broome, 2000). In order to increase trustworthiness and rigour, literature reviews follow a few systematized steps to collect and analyse the data (Cooper, 1998): problem formulation, data collection, data evaluation, analysis and interpretation, and presentation.

The target of the literature review consisted of empirical studies on affect regulation through music (at least one component such as affective goals or strategies should be contemplated). Both affect and regulation followed the relatively broad definition introduced in Chapter 2, so studies on emotion regulation, coping, and mood repair, for example, were included.

The data was collected by using a comprehensive approach, comprised by search in online databases, ancestry searching, hand searching, networking, and searching research registries (Whittemore & Knafl, 2005). The online databases were searched for journals and doctoral dissertations published in English between 1 January 1994 and 30 June 2014, using the following Boolean expression: music AND (emotion OR mood OR affect) AND (regulation OR strategy OR coping). Several databases were searched: Pro Quest PsycINFO, ProQuest Social Science Journals, ProQuest Psychology Journals, ERIC, Science Direct, Web of Science and Scopus. This first step generated 2,004 results. Duplicated copies and publications that did not meet the inclusion criteria were excluded, while newly found publications were added. After three rounds of screening and reference chaining, the final sample of 34 publications was reached (32 journal articles and 2 dissertations).

The data was extracted from the publications, coded, and organized into subgroups (Whittemore & Knafl, 2005) following a set of pre-defined criteria and categories. The extraction and coding of the data found in each publication was guided by three stances: focus of study, conceptual clarity, and results concerning each dimension of the GSTM framework (Van Goethem, 2010). The first stance characterized the main topics of study and the main concepts involved. The conceptual clarity of each publication (second stance) was assessed in four points: definition of the affective target (e.g. emotion), definition of the regulatory process (e.g. coping), consistent use of affective terms, and proposal of a framework or model for the results. The research results were, lastly, catego-

rized in the four levels of the GSTM framework (goals, strategies, tactics, mechanisms; Van Goethem, 2010). The choice of the GSTM framework was based on the convenience of its four dimensions to organize results.

## Results

The results concerning the first stance (focus of study) revealed that a wide range of terms were used throughout the publications in relation to the studied regulatory processes (e.g. emotion regulation, mood repair, coping) and to the targets of regulation (e.g. emotion, energy, focus). Additionally, it was observed that the common foci of research were the functions of music, the choices underlying the use of music for affect regulation, the particularities of musical self-regulation by specific groups or ages, the individual differences and contextual influences, and the implications of musical self-regulation for mental health and wellbeing. Regarding the second stance, the analysis revealed a prevalent lack of conceptual clarity: 26 (out of 34) publications did not provide a definition for the affective states under study, 21 did not define the regulatory process in question, and 13 used affective terms such as emotions and moods interchangeably. Additionally, only 15 publications presented a model or framework to describe their findings. Lastly, as for the third stance, data was found for all the four dimensions of the GSTM framework, although with imbalanced frequencies. Mechanisms were rarely considered in the analysed studies and often were not identified as such. Amongst tactics, music listening was the focus for most of the studies, whereas other tactics (such as singing or playing) were underrepresented. Additionally, it was observed that most of the studies approached only one of the GSTM dimensions and few examples were found where interrelations between elements were explored.

By reviewing the literature and analysing its conceptual state, this study generated two main outcomes: the identification of relevant components involved in affect self-regulation through music (Figure 3) and a list of recommendations for future research, which, in broad strokes, urged for a clearer use of affect- and regulation-related terms, for a deeper investigation of underrepresented components of musical affect regulation and the interrelations between components, and for the creation of a model that would comprehensively depict affect regulation through music as a multi-layered and dynamic process.

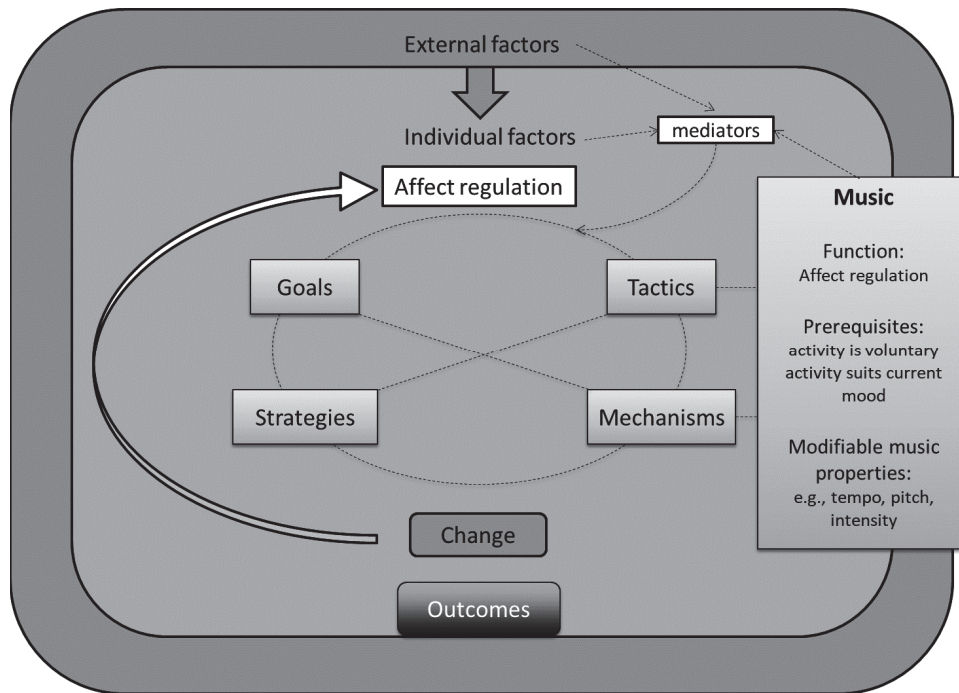


FIGURE 3 Relevant components for a conceptual understanding of affect self-regulation through music.  
From Baltazar and Saarikallio (2016). Reprinted by permission of Sage Publications.

## 5.2 Publication II: Exploring the associations between strategies and mechanisms

### Background and aims

Publication II was driven by the results observed in publication I and part of its conclusions: there is little research on the interrelations between co-occurring components of musical self-regulation and the role of musical mechanisms has not been systematically studied yet. With this as a starting point, publication II focused on two of the components—regulatory strategies and musical mechanisms—and on their underlying associations. Research on the interplay between these components was still slim; however, it pointed at possible patterns in the combination of strategies and music while self-regulating. In a previous study not included in this dissertation (Saarikallio, Baltazar, & Västfjäll, 2017), we observed that, while relaxing through music, adolescents tend to pair the strategies *distraction* and *emotion induction* with

mechanisms such as acoustic features and expressed emotion (labelled as *musical* mechanisms) and the strategy *processing* with mechanisms such as memories and visual images (labelled as *mental* mechanisms). Drawing support from this exploratory study on adolescents' relaxation and from publication I, publication II had the aim of investigating the associations between regulatory strategies and musical mechanisms underlying the use of music for affect regulation.

## Method

The data was collected through a computer-based questionnaire, which was distributed online through personal contacts, social media (Facebook, Reddit), mailing lists of the University of Jyväskylä, webpages for psychology experiments, and recruitment webpages. Additionally, schools were also contacted for recruitment and, in some, the questionnaire was administered offline in the schools' computer rooms.

The final sample was composed by 574 participants (46% female, 53% male, 2% other) and their ages ranged from 13 to 30 years ( $M=21$ ). Besides the demographic questions, the participants were instructed to think of the last time they had engaged in music with a certain affective goal. They were asked to briefly describe in their own words how that situation was. This was used solely to facilitate the recall and the descriptive answers were not analysed. After this step, the questions focused on three aspects: motive for choosing music, employed strategies, and most relevant musical mechanisms. The question regarding the motive for choosing music as a regulatory activity is reported in publication III.

**Regulation strategies.** A list of strategies was assembled by compiling the strategies retrieved in study 1, deleting redundant or uncommonly used strategies, and consulting frameworks from general affect regulation literature (mainly based in the categorization in Table 1, Chapter 2). Special attention was put in providing items that would be easy for the participants to relate to and that would represent different ways of regulating affect. By not using pre-existent typologies of strategies, the adopted method paved way to the emergence of new patterns.

Since each strategy was formulated in a more general way, some sub-options were also provided when the participants clicked in the strategy itself. The participants could choose more than one strategy and sub-option. The strategies and sub-options (inside parentheses) were:

- focus deeply on what was happening or what I was feeling  
(*specify on what*: experienced feelings, situation and/or its meaning and consequences, memories related to the situation or to the feelings, elements of the music that provided support and acceptance);

- distract myself

*(specify from what: thoughts, feelings, elements around me, memories; specify on what you focused: visual and auditory imagery, aspects of music, pleasant thoughts and/or feelings, memories);*

- think about what happened or about what I was feeling

*(specify how: by having a rational view on it, by reflecting on it, by understanding it, by accepting it);*

- change my way of thinking

*(specify how: by finding different meanings for the situation, by finding different meanings for the affective reaction, by seeing the situation/reaction through a distanced perspective, by suppressing my thoughts);*

- modulate my feelings

*(specify how: by seeking strong sensations, by maintaining or increasing what I was feeling, by decreasing or inhibiting what I was feeling);*

- focus on my body and expressions

*(specify how: by increasing flow, endurance or performance, by reviving up/energizing, by meditating, by suppressing bodily reactions, by controlling my breathing and relaxing the muscles, by venting/discharging what I was feeling, by suppressing any expression of feelings).*

**Musical mechanisms.** Regarding the musical mechanisms, they were also identified in study 1, and required no additional categorization. The participants were asked to identify the elements of music that influenced them the most in the recalled episode and to place them in descending order. The mechanisms were:

- genre of the music
- personal preference
- familiarity
- identification with the artist
- lyrics
- acoustic features (e.g. volume, timbre, softness...)
- rhythm/pace of the music
- memories
- associations with other things

- aesthetic value
- contagion
- visual imagery
- musical expectancy.

**Statistical analyses.** The data concerning the employed regulation strategies and accompanying musical mechanisms were analysed through correspondence analysis (CA). CA is a generalized principal component analysis aimed to handle categorical data (Abdi & Béra, 2014). CA is traditionally applied to contingency tables to reduce its multidimensionality while retrieving the largest amount of variance possible (Beh & Lombardo, 2014). Being an exploratory technique, no specific hypotheses need to be formed beforehand (Benzécri, 1973; Greenacre, 1984). CA is, thus, very useful for approaching new research questions, such as the associations between musical mechanisms and regulation strategies. Moreover, a clear advantage of selecting this technique is its visual component: the extracted scores for each item in the table (i.e. each strategy and each mechanism) can be used as coordinates to represent both variables in one single map—a biplot. The analyses were computed with the Matlab package Correspondence Analysis with Rotations (CAR; Lorenzo-Seva, van de Velden, & Kiers, 2009).

## Results

The results of the CA showed a statistically significant relationship between row and column variables. The first three dimensions extracted by the CA, explaining in total 78.5% of the variance, were kept for interpretation.

The following steps were taken to reach an interpretation for each dimension: a) inspection of the contribution of each variable to the dimensions; b) retention of variables with contributions larger than average; c) examination of the groups of strategies and mechanisms at each pole of the dimensions; and d) labelling of each pole according to the strategies and mechanisms that most contribute to them. Resulting from these steps, each dimension was interpreted as being representative of one functioning modality involved in self-regulation—cognition, feelings, and bodily reactions—and each pole was interpreted as being representative of a higher or lower engagement of that level. The contrasting poles were: cognitive work vs entertainment (cognition), affective work vs distraction (feelings), and revival vs focus on situation (bodily feelings).



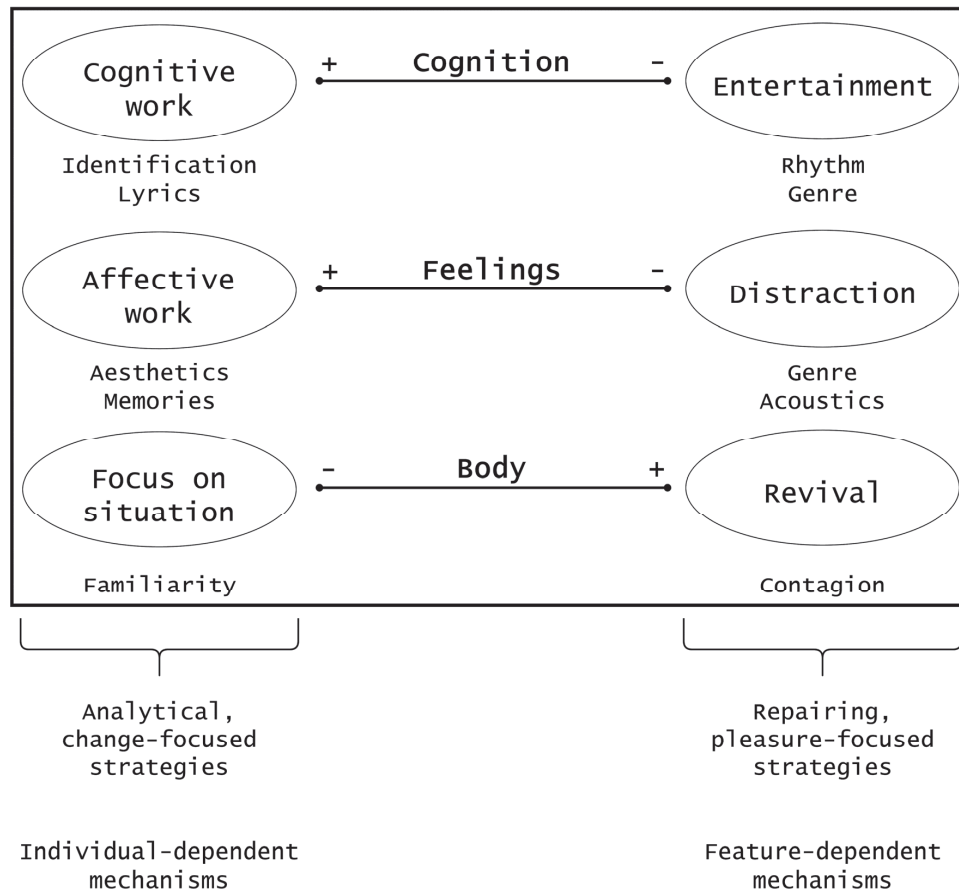


FIGURE 4 Three-dimensional model representing the associations between strategies and musical mechanisms.

Note. A higher / lower use of the level that names the dimension (e.g. cognition) is marked with "+" / "-". Adapted from Baltazar and Saarikallio (2017b), by permission of Sage Publications.

A model for the associations between regulatory strategies and mechanisms emerged from this analysis (Figure 4). Overall, the model is described as three-dimensional, with six contrasting poles where mechanisms and strategies interrelate. Interestingly, one more pattern was found in the associations between strategies and mechanisms: analytical and change-focused strategies—e.g. cognitive work—were mainly supported by individual-dependent mechanisms—e.g. memories (left side of Figure 4), whereas repairing and pleasure-oriented strategies—e.g. revival—related to feature-dependent mechanisms—e.g. rhythm (right side of Figure 4). It seems, thus, that regulation work that requires generally more resources benefits from personally meaningful aspects of

music, while regulation work that disengages from the experienced situation benefits from aspects intrinsic to the music and that, speculatively, are personally less relevant.

In conclusion, publication II presents a novel and relevant model that helps to visualize and conceptualize the deep interrelations established between the individual and music through the matching of regulatory strategies and musical mechanisms.

### **5.3 Publication III: Presenting a conceptual model for musical affect self-regulation**

#### **Background and aims**

Publication III draws mainly from the results and conclusions of studies 1 and 2. As identified in publication I, literature on musical affect regulation was lacking a model that could serve as a reference for future studies and as a solid structure for categorizing and better understanding existing results. The purpose of publication III was, thus, to fill this gap and link the suggested model to previous research. The model is inserted under the framework of adolescence/youth and the reviewed literature in the publication concerns this age group.

The choice of this age group is based on the extensive data that situates the peak of music usage in general and its usage for affective reasons, in particular, during adolescence/young adulthood (North et al., 2000). Furthermore, the affordances of music seem to be highly suitable for several of the developmental tasks typical of this age group (Laiho, 2004; Miranda, Blais-Rochette, Vaugon, Osman, & Arias-Valenzuela, 2015). Even though youth are an interesting population due to its strong connection with music, the scope of the model is not limited to youth.

#### **Methods**

Conceptual modelling is a methodology characterized by the merge of knowledge regarding what concepts are relevant for the phenomenon, the nature of those concepts, and the nature of the relationships amongst those (Soulliere, Britt, & Maines, 2001). Conceptual models build bridges between the empirical and theoretical dialogues and are, furthermore, an important tool for communication inside and outside the discipline (Heemskerk, Wilson, & Pavao-Zuckerman, 2003; Soulliere et al., 2001). The data for building the proposed model were extracted in studies 1 and 2, complemented with a renewed review of the literature on the elements of musical affect regulation.

Publication III compiled the components of musical affect regulation identified in publication I, namely: functions of music, affective goals, musical activity, regulatory strategies, musical mechanism, contextual and individual factors,



and affective outcomes/wellbeing implications (see Figure 3). Deeper searches in the literature were conducted to further characterize the relationships amongst these components in the context of adolescence. Additionally, in order to better understand which level of the GSTM framework (goals, strategies, tactics, mechanisms; Van Goethem, 2010) is more salient to music users, participants were asked in questionnaire (study 2) why they chose music in that situation instead of other activities (such as talking to someone or watching television). Four options were given, each corresponding to one of the GSTM levels: "I wanted to be in a certain affective state" (goal), "I wanted to use music as a 'tool' that could help me" (strategy), "I wanted to engage in music by, for example, listening, playing, or dancing to it" (tactic), and "I wanted to feel music's impact on me" (mechanisms).

## Results

The components of musical affect regulation were organized and interrelated according to previous studies on music and psychology research. As depicted in Figure 5, affect regulation is framed as one of many possible functions of music. The affective goals set the need and the desired direction of the regulation process and thus influence the choice of musical activity (e.g. listening, playing, singing), of regulatory strategies (e.g. distraction), and musical mechanisms (e.g. fast paced rhythm). The musical activity, due to its own affordances, affects what strategies and mechanisms are available and/or suitable. Importantly, the process can happen in the opposite direction: the selection/availability of a particular strategy or mechanism can determine which activity to engage in.

Then, as suggested in publication II, strategies and mechanisms intertwine and act at the level of cognition, feelings, and bodily reactions. These associations represent the interaction point between the tools used by the individual (strategies) and the resources provided by the music (mechanisms) and are considered by this model as the very core of the musical and regulatory experience. The central positioning of these elements was confirmed by analysing the motives behind engaging in music instead of in other activity (collected in study 2). The question regarding the motives for music engagement revealed that the options were unequally distributed,  $X^2(3)=36.98, p < .001$ . The options related to strategies and mechanisms were chosen equally often, and significantly more often than the other two options ( $z=3.38, p < .001$ , both). This suggests that the strategic possibilities offered by music, together with the affective impact created by its mechanisms, are the key motivators for using music to regulate affect.

Lastly, the combination of strategies and mechanisms produce affective changes that determine the success of the episode and, in the long-term, influence the individual's overall wellbeing. Affect regulation is inherently continuous: permanent feedback loops lead to adjustments in affective goals and behaviours. This component is represented in the model by the backwards curved

arrow. The described model acknowledges also the contextual and individual factors as shaping influences throughout the whole process.

In sum, the conceptual model presented in publication III marks a point of theoretical maturation and is fruit of an extensive literature review and its integration with empirical data. Nevertheless, the model is still an initial proposition, most likely to be adapted and updated as new studies and data emerge from future research.

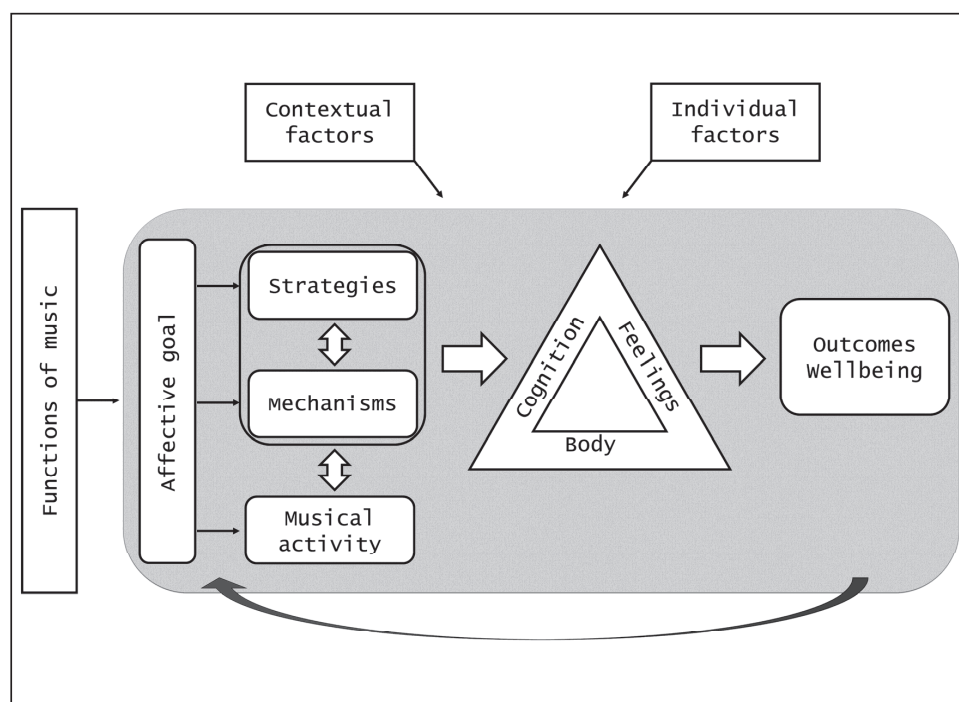


FIGURE 5 Conceptual and integrative model of affect self-regulation through music (Baltazar & Saarikallio, 2017a)

#### 5.4 Publication IV: Investigating the individual and relative impact of music and strategies on affect regulation

##### Background and aims

The model in publication III conceptualized the affective outcomes as being moderated by a matrix of deep associations between employed strategies and musical mechanisms. However, the impact that the strategy or the music themselves have on the affective outcomes is still unclear. Building on the conclusions of publications II and III, the aim of the third study was to examine the

individual and relative effects of strategies and music. Such examination had to be framed by a specific affective goal, which in this case was a rather common one in daily life: reduction of stress levels.

Acute stress responses are activated when a situation is perceived either as a challenge or a threat (Lazarus & Folkman, 1984). Whereas the perception of a challenge can be motivating, threat appraisals trigger several responses that increase the organism's ability to either adapt or react (Lazarus, 1993; Lazarus & Folkman, 1984). For instance, in the physiological domain, heart rate and perspiration increase; in the affective domain, tense and negative affect increases; and in the cognitive domain, executive functions are impaired, and priority is given to intuitive and fast decisions. Efficient self-regulation of everyday life stress is crucial for the long-term physical and mental health (Schneiderman, Ironson, & Siegel, 2005; Shallcross et al., 2015).

### Method

An experiment with a within-subjects 2x2 factorial design was conducted. The two factors were *music* and *strategy*, both with two levels: *efficacious* and *inefficacious*. The strategies and music pieces at both levels were selected beforehand by the participants themselves in an online survey. The survey instructed them to imagine a situation where they were feeling stress and wanted to calm down ("Imagine that you are feeling nervous or anxious and need to calm down to be able to work or study"). Having this as a context, information was collected regarding the two experimental factors: music and regulation strategies. More specifically, the participants gave music examples that would be efficacious to reduce stress in that situation (*adequate* examples) and music examples that would be inefficacious (*inadequate* examples). Furthermore, they identified which strategies would be *efficacious* and *inefficacious* if employed in that situation while listening to music. The *adequate* and *inadequate* music and strategies are, thus, relative to the self-perceived efficacy.

**Experiment.** The final sample of participants in the experiment was composed by 34 individuals, of which 13 were female ( $M_{\text{age}}=23.71$ ,  $SD_{\text{age}}=4.91$ ). Each round of the experiment was composed by two blocks: stress induction and stress regulation, with measurement points after each block. Each participant went through four rounds of the experiment to cover the four conditions, presented in complete counterbalanced order. The materials provided in the stress regulation block varied in function of the condition.

**Stress induction.** Stress responses were manipulated through the administration of heat-based pain while making fast-paced decisions regarding possible gains or losses (i.e. a gambling task; see example in Koppel et al., 2017). Pain is linked to highly negative and aversive valence and activates response mechanisms similar to stress' flight responses (Melzack & Casey, 1968). Based on this, pain has been used before to induce acute stress responses in

participants (e.g. Deuter et al., 2012; Smeets, Otgaar, Candel, & Wolf, 2008). In this study, pain was administered simultaneously to a decision-making task to increase its ecological validity by reproducing daily life stress: physiological activation plus cognitive demands (Lazarus, 1985). Decision-making tasks are known for being demanding and causing the depletion of cognitive resources (Baumeister, Vohs, & Tice, 2007). A strong body of research shows, for example, that affect regulation is simultaneously more needed and difficult after such depletion (Baumeister, Faber, & Wallace, 1999; Vohs et al., 2014).

*Stress regulation.* During the block of self-regulation of stress responses, the participants were instructed to calm down by using a given strategy while listening to music. The strategy given in the instructions depended on the participant's previous answers and on the experimental condition, and so did the music. The experimental conditions were composed by the four combinations resulting from factor  $\times$  level: adequate strategy and adequate music, adequate strategy and inadequate music, inadequate strategy and adequate music, and inadequate strategy and inadequate music. After explaining the instructions, participants had 3 minutes of music listening and self-regulation.

*Stress measurement.* The measurement of stress responses followed the premise that stress is a multidimensional phenomenon and, hence, requires a multidimensional approach (Lazarus, 1990). The changes in affect after stress induction and after musical self-regulation were measured across three modalities: experiential, physiological, and cognitive.

The experiential component was measured through self-report of affect. The three-dimensional model of affect was utilized (Ilie & Thompson, 2006; Schimmack & Grob, 2000), which comprises the scale of energy arousal, tension arousal, and valence. The self-reports were registered through visual analogue scales (VAS) with the opposing adjectives at each pole of the scale (drowsy-alert, relaxed-tense, negative-positive).

The physiological component was measured through skin conductance levels (SCLs) and the startle blink test. Skin conductance refers to "how well the skin conducts electricity when an external direct current of constant voltage is applied" (Figner & Murphy, 2011, p. 165), and SCLs refer to the overall skin conductance during a relatively long period of time (some seconds to some minutes). Being skin conductivity modulated by the sympathetic branch of autonomic nervous system, SCLs are frequently used as a measure of general arousal and, by proxy, of cognitive and/or affective activity. When experiencing strong affective reactions, such as the ones elicited by stress (e.g. Jacobs et al., 1994; Tomaka et al., 1993; Witvliet & Vrana, 1995) and by tense and negative valent music (e.g. Baumgartner, Esslen, & Jäncke, 2006; Khalfa, Isabelle, Jean-Pierre, & Manon, 2002; Labbé, Schmidt, Babin, & Pharr, 2007), SCLs increase.

The startle response is a fast, defensive mechanism. When a sudden and intensive stimulus is perceived, an abrupt contraction of muscles around the eyes (or a blink) can occur; such reaction can be measured through electromy-

ography (EMG) (Blumenthal et al., 2005). Understandably, when the perception of threat is higher (either linked to the situation, experienced affect, or personal traits), the startle is also augmented (Lang, Bradley, & Cuthbert, 1990). As opposed to the SCL, the startle is not determined by general arousal, but by the negative or aversive nature of the stimulus. The amplitude of the startle has been reported to increase when negative stimuli are used (Witvliet & Vrana, 1995), including unpleasant music (Roy, Mailhot, Gosselin, Paquette, & Peretz, 2009). In the present work, the startle amplitude was used as a physiological measure of the modulation of valence (Bradley & Lang, 2000).

Lastly, a decision-making task was used as an indirect measure of cognitive functioning. Indirect measures have the advantage of bypassing issues related to self-reports, such as demand characteristics and limited access to inner processes (Västfjäll, 2010). The activation of the stress system shifts the overall cognitive functioning from a slow, rational process to a fast, intuitive process (Epstein, Pacini, Denes-Raj, & Heier, 1996; Amos Tversky & Kahneman, 1974; Yu, 2016). Therefore, decisions that reveal the involvement of either process can be used as an indirect measure of stress levels (Lempert & Phelps, 2014; Västfjäll, 2010). Tasks with monetary decisions under the risk of either loss or gain (i.e. gambling tasks) are paradigmatic in the study of decision-making (Holyoak & Morrison, 2012; Västfjäll & Slovic, 2013). In study 3, participants took part of a task where they had to choose between a safe and a risky option regarding the gain or the loss of money. Given that people tend to be risk-averse in loss situations and risk-seeking in gain situations (Tversky & Kahneman, 1981), changes in that pattern during the experiment can be seen as reflective of stress levels (Porcelli & Delgado, 2009; Starcke & Brand, 2012).

## Results

Self-regulation of stress responses through music was operationalized as the difference between measurement points (after stress induction and after stress regulation). Both factors (music and strategy) exhibited a main effect on the regulation of self-reported stress levels. The *adequate* music led to a larger reduction of tension levels in comparison to *inadequate* music, and, similarly, the *adequate* strategies led to larger tension reduction as to *inadequate* strategies. Moreover, the effect of the factor *music* on stress reduction was also statistically significant in the physiological and cognitive domains (*adequate* music was related to larger decreases in SCLs and higher risk-taking when making monetary decisions related to potential gains). Two of the measures (startle blink amplitudes and risk-taking when making monetary decisions related to potential losses) did not vary throughout measurement times.

Additionally, pairwise comparisons between conditions revealed that the *adequate-adequate* combination was consistently more beneficial for stress reduction than the *inadequate-inadequate* combination. Nevertheless, the *adequate-adequate* condition was not significantly better than all the other conditions nor was the *inadequate-inadequate* significantly worse than all others. The reason for

it seems to be that, interestingly, in *adequate-inadequate* combinations the effect of music prevailed. In other words, music seemed to have a greater impact on the affective outcomes than the employed strategy, at least in the short-term.

In sum, publication IV brought some evidence on the crucial role of both *strategies* and *music* for successfully attaining an affective goal. Employing an inefficacious strategy or listening to an inadequate music can hinder self-regulation. However, the stronger immediate effect of music observed in the results emphasizes music's inherently regulatory attributes. These results align with the model proposed in publication III, which postulates that the affective outcomes are moderated by the combined strategies-mechanisms, instead of being defined by separate actions from strategies and from mechanisms. It is hypothesized that when listening to a music piece that already belongs to the individual's regulatory repertoire, the beneficial associations between those mechanisms and typically used strategies (regardless of the strategy instructed in the experiment) are activated.

## 6 DISCUSSION

The findings, implications, main contributions and limitations of the four publications summarized in the previous chapter will now be discussed.

### 6.1 Findings and implications

#### 6.1.1 Conceptualization of musical affect regulation

The topic of musical affect regulation is going through constant growth. Indeed, if study 1 would be repeated at the time of writing this dissertation, approximately 30 more publications would be considered for inclusion<sup>1</sup>.

This expanding field is characterized by having various possible angles of observation. As study 1 revealed, the foci of study are abundant, and several components of musical affect regulation have been identified in the literature, and so have the interrelations between some of them. However, these multiple and enriching approaches to the phenomenon come hand in hand with elusive conceptual understandings and a lack of unifying frameworks. This implies that an effort should be made to connect disparate results and theories. The integrative conceptual model presented in publication III is an attempt at meeting this need. Just like publication I benefited from the clear categories of the GSTM framework (Van Goethem, 2010), future studies can benefit from the proposed conceptual model, since it provides a solid ground, a comprehensive look over components of musical regulation, and a structure for exploring further interrelations.

Given the lack of clarity and precision found in the field, definitions for several affective terms were collected and presented in Publication I (consult original publication). Lastly, for the sake of clarity, the use of the umbrella term *affect* was advocated. The purpose is to acknowledge when more than one affect-

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<sup>1</sup> Estimation based on a brief inspection of the same databases with the same keywords, limited to the period 1 July 2014 - 15 March 2018.



tive state is targeted and when it is not possible (or planned) to distinguish between states under study (Juslin & Sloboda, 2010; Van Goethem & Sloboda, 2011). Equally important, is the clear identification of components of affect regulation. Concepts such as strategies, tactics, and functions are fundamental for the understanding of musical affect regulation; yet, publication I unveiled a certain undifferentiated use of these concepts in the field. The proposed model tackles this issue by showing how these elements interact and position in relation to others.

As stated by Scherer (2005, p. 724) concerning the definitions of affect and related terms, definitions “guide research, make research comparable across laboratories and disciplines, and allow some degree of cumulativeness, and they are quite central for the development of instruments and measurement operations – as well as for the communication of results and the discussion between scientists”. With this in mind, one goal of this dissertation was to contribute to a better conceptualization of musical affect regulation—not only through collecting definitions and recommending a suitable terminology, but also through elaborating a comprehensive model that provides a structure and foundations for future work on musical affect regulation. The proposed model is not a finished product; on the contrary, future studies will certainly contribute with new interactions between components, new factors to add, and new stances.

### 6.1.2 Regulation of stress responses through music

Publication IV (study 3) shed some light on the underpinnings of stress regulation and the use of music for that purpose. This section will elaborate on the implications following from study 3 in relation to musical stress reduction. The discussion of the role played by regulation strategies and music and how they interact will take place in subsequent sections of this chapter.

Study 3 sought to experimentally investigate the individual and relative impact of employed strategies and music listened to on the reduction of stress responses. Stress was successfully induced in laboratory context by using heat-based pain coupled with a fast-paced task. The results demonstrated that employing the self-selected *adequate* strategy led to a larger reduction in self-reported tension in comparison to the *inadequate* strategy. Likewise, listening to the *adequate* music led to larger reductions of stress as observed in the self-report scales, SCLs, and risk-taking behaviour when gains were predicted.

The multidimensional assessment of stress responses followed the premise that stress itself is multidimensional (Lazarus, 1985, 1990), thus being insufficient to assess it with only one measure. In study 3, significant changes were registered at the levels of tension, valence, energy, SCLs, and risk-taking behaviour. In line with previous studies (e.g. Gan, Lim, & Haw, 2016; Linnemann et al., 2015), the subjective measure was the most sensitive to stress manipulation and its regulation.

The stress reduction in function of the music listened to was observed in two more measures: SCLs and risk-taking in gain trials. The SCLs are a good



measure of overall arousal (Witvliet & Vrana, 1995) and the observed decreases in SCLs were interpreted as reduction in the stress responses. Despite the statistically significant effect found in SCLs in function of the music's efficacy (*adequate* vs *inadequate*), this measure did not discriminate very powerfully otherwise: the pairwise comparisons between conditions were significant only between the conditions *inadequate-adequate/inadequate-inadequate* and marginally significant between the conditions *adequate-adequate/inadequate-inadequate* and the conditions *adequate-inadequate/inadequate-adequate*. This weaker result of SCLs and lack of significant variance in the startle blink response calls for further investigation of musical self-regulation of stress responses at the physiological level. Other physiological measures can be explored in future studies to better capture the affective changes of the participants, namely cardiac (Thoma et al., 2013) and endocrine (Linnemann, Strahler, & Nater, 2017) measures.

As for risk-taking, this was shown to be an interesting indirect measure of stress levels. When making decisions regarding potential gains, participants took more risks (i.e. were less risk-averse) after regulating with the *adequate* music in comparison with the *inadequate* music. This result suggests that the music self-perceived as relaxing influenced the participants' cognitive functioning. Increased risk-taking when gains are offered with a clear probability (50%) can represent a shift to a processing style characterized as optimistic and gain-focused (George & Dane, 2016) and denote a perception of the situation by the individual as favourable to their self-regulation (Andrade, 2005; Andrade & Cohen, 2007). The increase in risk-taking was, thus, interpreted as a result of the *adequate* music's capacity to support self-regulation.

Unlike a large body of research that studies affect self-regulation through the comparison of only two strategies (e.g. Dan-Glauser & Gross, 2011; Ehring, Tuschen-Caffier, Schnülle, Fischer, & Gross, 2010; Gross, 1998a), the participants were given a total of eight options in study IV. Interestingly, all the options were selected by at least one participant as an efficacious strategy – although with unequal distribution – and only two were not selected by any participant as an inefficacious strategy (*task-focused attention* and *relaxation*). Even though the data does not grant clear justifications for this, one might take the relatively wide spread of preferences as a reflex of personal repertoires of strategies to regulate stress (Aldao & Nolen-Hoeksema, 2013; Dixon-Gordon, Aldao, & De Los Reyes, 2015).

Despite the stronger effect that music showed in the factorial analysis and pairwise comparisons across conditions, an extensive body of research shows that, on the long-term, this might invert, and regulatory strategies might develop a more defining role of the individuals' wellbeing and health (Carlson et al., 2015; Marik & Stegemann, 2016; Randall et al., 2014). This apparent paradox can be explained by the differences between two motives for regulating – hedonic and instrumental: while the hedonic motives are to maximize pleasure and minimize pain, the instrumental motives are to attain states that help achieve other goals (Tamir & Millgram, 2017). Furthermore, the overuse of any strategy (including one that brings immediate relief and pleasure) can lead to the loss of

effect from that same strategy, with the consequence of dysregulation (Marik & Stegemann, 2016). From the short-term results observed in this experiment, it is not possible to foresee the long-term impact on the participants' health nor the role that the two factors (music and strategy) would individually have on it. Further longitudinal investigation will be crucial to ascertain the health implications of the current findings.

To sum up, stress responses experimentally manipulated in the laboratory provided a good framework for the investigation of the roles played by regulatory strategies and by music. Despite the challenges in empirically studying self-regulation while respecting ecological validity, it can be considered that study 3 was successful in its aims. The use of the adequate strategy and the adequate music supported, overall, a larger reduction of stress responses than the use of their inadequate versions. Furthermore, the dominant effect of music over strategies brought up interesting implications (some of which discussed below, others discussed in the original publication). Given the novel character of this study and its experimental design, further investigations are needed, ideally through ecologically more valid methods, such as the experience sampling method (ESM).

### **6.1.3 At the core of affect regulation through music: strategies and mechanisms**

#### **Regulation strategies**

Regulation strategies were defined in Chapter 2 as the tools utilized to reach an affective goal. They are inherently plastic and somehow abstract, thus can be used in varying activities and contexts. In music research, the study of these regulatory tools has taken two approaches: 1 - to transfer what has been observed in psychology research to the context of music engagement (e.g. Chin & Rickard, 2014; Randall et al., 2014) and 2 - to observe behaviours of music engagement, identify strategies, and build music-specific frameworks (e.g. Saarikallio & Erkkilä, 2007; Van den Tol & Edwards, 2013). The methodology and findings of the present work are compatible with both approaches. That is, it draws from research on general affect regulation, and develops music-specific conceptualizations. Even though the tool itself (i.e. the regulation strategy) might be the same regardless of where it is used, its usage is shaped by the material and context in question. For this reason, studying affect regulation strategies in context of music elucidates how they adapt and benefit from music's features and mechanisms.

All in all, the correspondence analysis in publication II led to the identification of six strategies employed while engaging in music for self-regulation: cognitive work, entertainment, affective work, distraction, revival, and focus on situation. These strategies can be paired up in terms of engagement or avoidance of three modalities of psychological functioning: cognition, feelings, and bodily reactions. For instance, the modality "cognition" is engaged by employing cognitive work strategies and avoided by shifting to entertainment. In addi-

tion, the extracted model helped to distinguish two broader types of strategies: “analytical and change-oriented”, and “repairing and pleasure-oriented”. Although the six strategies have some correspondence with previous work (e.g. Saarikallio & Erkkilä, 2007; Van Goethem, 2010), the unveiling of the three functioning modalities and the two types of strategies is quite novel.

Research on emotion regulation has been dominated by the process model (Gross, 1998a, 2015a); however, recent work has reached the conclusion that Gross’ process model does not transpose well to empirical studies on musical affect regulation (Randall et al., 2014; Sakka & Juslin, 2018). Rather, bottom-up approaches have been more fruitful in describing the utilization of music for self-regulation. Those are the cases of Saarikallio and Erkkilä (2007), Van Goethem and Sloboda (2011), Gebhardt, Kunkel, and Von Georgi (2014) and Van den Tol and Edwards (2013). Similarly, the model of regulation strategies presented in this work is not a mere transposition of general models of affect regulation. It reflects the structure of strategies observed in the collected data on musical regulation.

Briefly put, the frameworks generated in the field of psychology have in common the identification of underlying functions or targets of affect regulation (e.g. Larsen, 2000). Conversely, in music research the existent categorizations tried to identify specific strategies or groups of strategies (e.g. Saarikallio & Erkkilä, 2007). This dissertation combines both approaches in study 2: three modalities of psychological functioning (cognition, feelings, bodily reactions) with two levels of focus (avoidance or engagement) and two general types (analytical or repairing) were identified, and so were six groups of strategies distributed across these modalities and levels.

The simultaneous use of two or more strategies (i.e. blended strategies, Gross, 2015a) is rarely considered in research on affect regulation. Nevertheless, there are reasons to believe that in real life affect regulation is not reached by using just one strategy at a time (Aldao, 2013; Aldao & Nolen-Hoeksema, 2013). In publication II, almost half of the participants reported having used two or more strategies during the episode of musical affect regulation. Despite the methodological and interpretation difficulties that the multiple response question created, this approach was proven fruitful. By allowing the participants to describe more closely their regulatory path, research gains new insights on how individuals manage their affective states and interact with the surrounding resources. In publication II, this implied creating clusters of strategies (or major strategies), which, in turn, are reflected in the final CA model. Given that this was a first approach to blended strategies and that self-report has its validity fragilities, further research of this phenomenon is needed.

Publication IV was equally relevant for the investigation of regulation strategies in musical contexts. The study’s contribution was to explore the impact of strategies’ self-perceived efficacy on an affective goal. A positive effect was observed in the self-report VAS: the *adequate* strategy led to larger reductions in tension levels in comparison to the *inadequate* strategy. Taking into consideration previous experimental studies in psychology (review by Aldao &

Nolen-Hoeksema, 2012b) and survey studies in music psychology (Chin & Rickard, 2014; Saarikallio, Gold, & McFerran, 2015), this result was expected. Yet, given that there are no previous experimental studies on the effects of strategies while regulating through music, such a confirmation is valuable. Even more so considering that the strategies used were self-chosen; i.e. the (in)efficacy was assessed by the participants themselves and no prior check of suitability of the strategy was performed by the experimenter. Nevertheless, it should be noted that the effect of strategies was smaller than the effect of music.

In conclusion, the conceptualization of strategies suggested in this dissertation emerges from a combination of theoretical and empirical approaches, as recommended by Koole (2009). The results and related implications add support to the claim of Doré, Silvers, and Ochsner (2016) that affect regulation is an interaction of person, situation, and strategy.

### **Mechanisms**

As publication I pointed out, musical mechanisms are one of the least studied components of affect regulation through music. Van Goethem (2010; Van Goethem & Sloboda, 2011) was the first suggesting the study of musical mechanisms underlying affect regulation, just like it had been done with emotion induction (Juslin & Västfjäll, 2008b). Since then, direct investigations of musical mechanisms in the context of affect self-regulation have been conducted by Saarikallio, Baltazar, and Västfjäll (2017), by the study 2 in this dissertation, and, more recently, by Sakka and Juslin (2018). It is, thus, still an understudied topic.

Publication II added support to its antecedents (Saarikallio et al., 2017; Van Goethem, 2010; Van Goethem & Sloboda, 2011) by confirming that, in similarity with music induction studies, it is also possible to explore the mechanisms underlying self-regulation. In total, nine mechanisms contributed significantly to the correspondence analysis model: identification with the artist/song, lyrics, contagion, genre, acoustic features, rhythm, familiarity, aesthetics, and memories. Furthermore, an interesting pattern was observed in the mechanisms: they are a bi-dimensional construct that can be divided into individual- and feature-dependent. The individual-dependent mechanisms are based on an interaction created between the music user and music through, for instance, memories and attributed meaning. The feature-dependent mechanisms, on the other hand, are somehow more universal and relate to musical aspects such as pace, rhythm, expressed emotions<sup>2</sup>. These findings align with a conceptualization suggested by Sloboda and Juslin (2001) in terms of iconic, intrinsic, and associative coding underlying emotion induction. According to the type of mechanisms included in these frameworks, the feature-dependent mechanisms incorporate the iconic and intrinsic coding categories, while individual-dependent mechanisms incorporate the associative coding category. The bi-dimensional structure has also been empirically observed in Saarikallio et al.

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<sup>2</sup> This does not mean, of course, that feature-dependent mechanisms cannot be influenced by individual, social, and cultural factors.

(2017), where mechanisms underlying the adolescents' relaxation were categorized into *musical* and *mental*. This bi-dimensional structure might have relevant implications for understanding how people use music for their affective goals and how music impacts them, since feature- and individual-dependent mechanisms seem to serve different purposes. Whereas the first was linked to repairing and pleasure-focused strategies, the second was linked to analytic and change-focused strategies. These results suggest, thus, that there are differences between the two categories in terms of resources demanded, affordances for affect regulation, and affective impact.

In study 3 (publication IV), the independent variable was the self-perceived efficacy of music (*adequate-inadequate*) instead of the underlying mechanisms. This was motivated by the fact that most mechanisms are not per se linked to some specific affective outcome. For example, the mechanism *memories* can be used to modulate or create affective contrasting states depending on the contents of those memories and their affective colouring. Instead, the participants were asked to select one adequate and one inadequate music piece, expecting that the underlying mechanisms would be aligned with the target affective state (Juslin et al., 2010). This way, publication IV measured *indirectly* the action of mechanisms. Indeed, the brief analysis of the overall features of the *adequate* and *inadequate* samples through STOMP revealed that they differed significantly: the *adequate* examples were mainly mellow, while the *inadequate* examples were mainly intense. If the underlying mechanisms would be inspected, it would be expected to find, for example, a higher presence of rhythmic entrainment in the *inadequate* sample, expressed emotions would differ, and memories would be linked to situations of contrasting valence and arousal (Västfjäll, Juslin, & Hartig, 2012). It would be relevant in future studies to examine what mechanisms underlie the samples of *adequate* and *inadequate* music in a similar design. Overall, the significant and strong effects of music on participants' self-regulation indicate that they successfully discerned between the efficacious and inefficacious mechanisms.

These results further suggest that the analysis of musical choices offers promising possibilities. Even though the use of self-reports to study musical mechanisms underlying affect regulation is fallible, self-chosen music can be used as a vehicle to explore those mechanisms. In other fields of research, it is common to use a visual object or representation to start meaningful explorations of experiences, memories, and identity linked to that object (e.g. Bagnoli, 2009; Harper, 2002). In a similar line and regarding music, Peltola (2017) conducted focus group interviews with participants who brought their own example of self-defined sad music. Through interpretative phenomenological analysis, the researcher extracted themes related to the description of the emotional experience and to the description of the music. When describing the musical pieces, the participants mentioned several of the musical mechanisms included in publication II and in BRECVEMA framework (Juslin, 2013b; Juslin et al., 2010; Juslin & Västfjäll, 2008b): aesthetic judgment, musical expectancy, lyrics, acoustic features, and visual imagery. This is an emerging topic and adopting a quali-



tative methodology focused on the subjective experience of the participants in future studies could help to discern which mechanisms in music are a support to affect regulation.

#### 6.1.4 Links between regulatory strategies and music

A common thread in this doctoral work is the exploration of how regulatory strategies and musical mechanisms intertwine to foster self-regulation. Despite the sparse research data on mechanisms underlying affect regulation, publication I registered the indication that mechanisms could be used in function of the employed strategies. Then, publication II focused specifically on the associations between these two components. These findings are also reflected on publication III. Lastly, study 3 (publication IV) used an experimental paradigm to explore the impact of music and strategies on an affective goal (stress reduction), which indirectly informs about the possible role of musical mechanisms.

Publication II shows us how strategies and musical mechanisms interrelate across the levels of cognitive, affective, and bodily functioning. The results on which strategies benefit from which mechanisms are still exploratory and should, therefore, be interpreted cautiously. More than pointing at one-to-one relations between strategies and mechanisms (e.g. between revival and contagion), the technique used in publication II (CA) tries to explain the most variance possible by identifying the underlying dimensions. It is, thus, at the structural and conceptual level that the links between strategies and mechanisms are explored in this dissertation. It can be noted that, besides the associations found in publication II (in Figure 4, the mechanisms are placed below the group of strategies with which they associated), other studies have collected anecdotal correlations between strategies and mechanisms (Saarikallio et al., 2017; Sakka & Juslin, 2018; ter Bogt et al., 2017; Van Goethem & Sloboda, 2011).

Even though the fine grain correlations are still not clear due to insufficient empirical data on the topic, it seems unequivocal that musical mechanisms and regulation strategies interrelate. Such interrelations occur across the three modalities previously presented: cognition, feelings, body. Furthermore, both variables exhibit an overlapping bi-dimensional structure (i.e. individual-dependent mechanisms are linked to analytic strategies and feature-dependent mechanisms are linked to repairing strategies). As suggested before in this dissertation, regulatory strategies are not fixed and immutable. On the contrary, they benefit from the resources available. Consequently, the examination of the associations between strategies and music indicates that, at some level, the strategies merge with music and draw on its most essential elements.

Music has been described as a forum (Saarikallio & Baltazar, in press), a resource (Skånland, 2011), a scaffolding of the affective mind (Krueger, 2018a), and a technology of the self (DeNora, 1999). Such status of music in relation to the individual indicates that it provides tools and possibilities that go beyond the specific regulatory strategy controlled in the experiment of publication IV. Especially when considering that the music listened to by each participant was familiar to them and often used for similar affective goals, there are aspects

such as memories and associations with that specific piece, and automatic regulatory effects induced by it that cannot be ignored. Therefore, it is argued in this dissertation that the links between strategies and music are indicative of music's affordances for regulatory purposes.

In a recent study, Suri and colleagues (2017) explored how environmental affordances influence the choice of regulatory strategies. The authors observed that the possibilities offered by a certain situation to reappraise its meaning (i.e. the environmental affordances) influences the likelihood of employing the strategy *reappraisal*. The concept of affordance as the possibility of action belonging to an object or environment in relation to an organism was initially brought forward by Gibson (1977, 1979). Contrary to this original definition and to the one used by Suri and colleagues (2017), musical affordances are understood as dynamic and not belonging exclusively to music itself (DeNora, 1999, 2000, 2010; Krueger, 2014). As argued by DeNora (2000, 2010), they are relational and emerge from the interactions between music, individual, and culture. Music is rarely seen as a passive object; rather, music is something we do things with (Krueger, 2011). The merge between affective needs, past experiences, associations, strategies, and music is patent in the conceptual model of publication III. As seen in Figure 5, the interaction between music and the individual is centred at the crossroad between the cognitive, experiential (feelings), and physiological (body) modalities, which are shaped and defined by affective goals, characteristics of the musical activity itself, individual factors (such as personality or memories) and contextual factors (such as the current surroundings or the cultural background). It is in this interplay that affordances are negotiated and utilized. Likewise, the contrasts observed between the uses of music by analytic strategies and repairing strategies and between the poles of each dimension (i.e. engagement or avoidance) illustrate well how music can be a resource that accommodates our affective needs and extends our possibilities (through offloading and scaffolding, as in Krueger, 2018a). At times, music can be used to access and work affective material, and, at times, music can be used to gain distance, take shelter, and benefit from its own affective expressions, like in a zoom in–zoom out movement (DeNora, 2013; Krueger, 2014, 2018b; Saarikallio, 2018)—or, as Clarke framed it, to be “lost and found in music” (2014).

### 6.1.5 Musico-emotional skills

Even though some strategies seem to be more adaptive and correlate to overall wellbeing and mental health, establishing absolute and generalizable one-to-one relationships raises some doubts. Alternatively, recent work has been emphasizing the importance of contextual factors and regulation flexibility for determining affective outcomes and wellbeing (Aldao, 2013; Aldao, Sheppes, & Gross, 2015; Marik & Stegemann, 2016). Both the choice of the effective strategy and the ability of adapting it to the context are part of what is called emotional skills (Mayer & Salovey, 1997). Other skills are also involved, such as the identification and expression of affective states. Correspondingly, there are skills re-



lated to music usage that carry implications for affect regulation. As defended in this dissertation, short- and long-term affective outcomes arise from the close interaction between the individual, musical affordances, and context; hence, the ability of interacting adequately with musical resources is of utmost importance. As some scholars have been defending, music can represent risk and/or protective factors (McFerran, 2016; McFerran, Garrido, & Saarikallio, 2013; Saarikallio et al., 2015) depending on *how* it is used. More than the specific music used (or its genre), what seems to determine music's (mal)adaptive character is the purpose of its use, the agency practiced by its user, the adequacy to facilitate the desired affective state, and the strategic possibilities offered.

Considering thus the affective and music use-related skills necessary to promote an adaptive and positive musical self-regulation, the term *musico-emotional competence* is proposed in this dissertation. The latter encapsulates different concepts that have already been put forward elsewhere (Mayer & Salovey, 1997; Mayer & Salovey, 1995; McFerran & Saarikallio, 2014; Saarikallio, 2017; Saarikallio & Baltazar, in press; Salovey, Bedell, Detweiler, & Mayer, 1999). By joining the musical and the affective components, this term is a timely invitation for future studies to consider what is different from emotional competence and what is particular to musico-emotional competence; how do these skills serve the dialogue between the person and the context; and how they reflect on their wellbeing and health.

## 6.2 Main contribution of the present work

This section will be illustrated by Figure 6. As one can observe, it reproduces the conceptual model previously presented and marks with numbers the aspects that can be considered the main contributions of this dissertation.

- (1) The integrative conceptual model encapsulates the primary aim and contribution of this dissertation: it draws from the literature reviewed in publication I and throughout the doctoral work and integrates the empirical data of publication II. Publication IV built on connections established in the model and experimentally verified that affective outcomes are indeed dependent on music's suitability for the affective goal. Importantly, this model reflects the merge between empirical and theoretical research.
- (2) Associations between strategies and mechanisms are a novelty in this field and publication II was, at the best of my knowledge, the first study putting forward an extensive exploration of these associations and delivering a model that describes them. Besides presenting new knowledge, it opens grounds for new investigations. Future studies will certainly develop the intrinsic structures underlying the music-individual interactions even further;
- (3) Publication IV was too, at the best of my knowledge, the first attempt of experimentally studying the individual and relative impact of music

and regulation strategies on a given affective goal. Conducting such a study in a laboratory context compensates the loss in ecological validity with higher control of individual differences and confounding variables. Its findings on the positive effects of both music and strategies on attaining the affective goal are, therefore, highly encouraging.

- (4) By placing this structural model of strategies-mechanisms at the core of the model, this dissertation presents music as a plastic and interactive resource. It could hardly be argued that the strategies employed while engaging in music are music specific – they are generally available to the individual –, but by being enacted through music they adapt to the attributes of the resource. Moreover, music brings more resources to the individual beyond the specific strategy used, as observed in Publication IV.

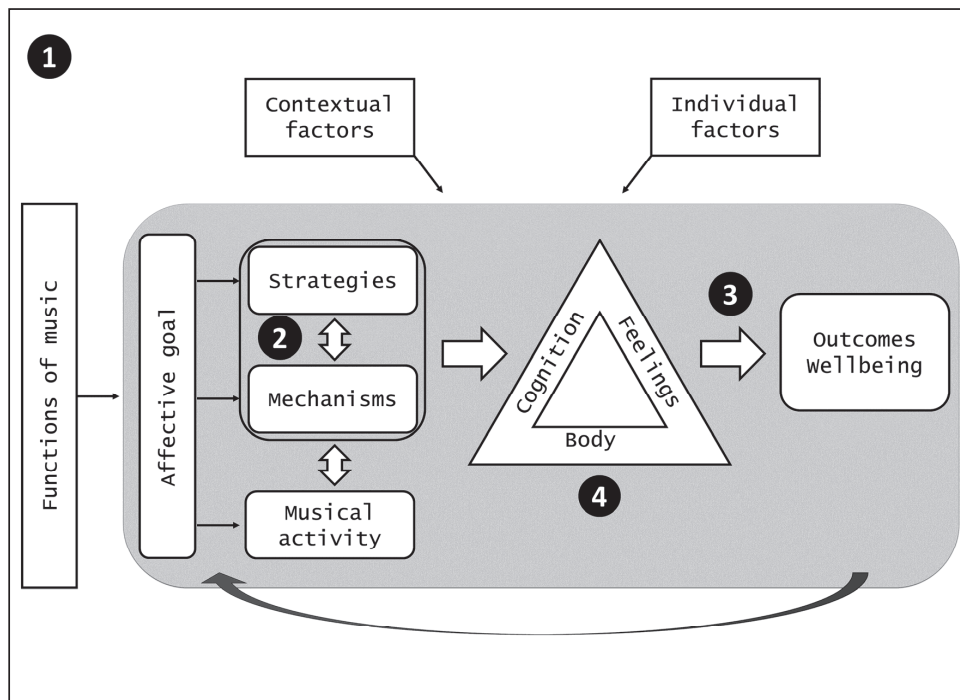


FIGURE 6 Main contributions, marked in the conceptual model.

The description of each number can be found in the text.

### 6.3 Limitations

Despite the comprehensive inclusion of several components in the proposed model (publication III), this dissertation did not collect data nor empirically explored all mentioned components. There are, thus, several limitations related to this fact that must be acknowledged. For instance, even though individual and contextual factors are recognized as being a major shaping force in the process of affect regulation, these factors have not been experimentally explored. Previous research on music listening has been identifying relevant effects of age (Cohrdes, Wrzus, Wald-Fuhrmann, & Riediger, 2018; Leipold & Loepthien, 2015), personality traits (Dunn, de Ruyter, & Bouwhuis, 2011; Liljeström et al., 2012), reactivity to stress (Thoma, Scholz, Ehlert, & Nater, 2012), and profile of music use (Ter Bogt et al., 2011). It might be argued that these factors most likely play a role in the patterns observed in the publications II and IV. Future studies with larger samples and different groups could ascertain how these individual factors influence, for example, the interplay between strategies and mechanisms, the choice of strategies and music for the regulation of stress, and the psychophysiological consequences of regulating stress responses through music.

Likewise, regarding context, the present work took into consideration its role only at the conceptual and theoretical level. On a macro-level, cross-cultural studies have been bringing forward compelling evidence on the differences regarding affective processes, related meaning-making, expression, and regulation (De Leersnyder, Boiger, & Mesquita, 2013; Mesquita, Boiger, & De Leersnyder, 2016; Miranda et al., 2015; Saarikallio, 2012a). On a micro-level, the situation and context surrounding the individual also influence their affective responses and behaviours (Aldao, 2013; Aldao & Nolen-Hoeksema, 2012a; Koehler & Broughton, 2016; Liljeström et al., 2012). In publication II, the survey did not control the type of situation recalled, and, in publication IV, the laboratory context might have altered the expected effects of the selected music and strategies. A better look at contextual factors should be taken in future approaches, either by investigating different cultures, controlling and comparing the situations in self-reports, recreating situations through vignettes, or using methodologies that respect contextual variables, such as ESM.

The use of self-selected strategies was motivated by indications that there is a considerable variability in personal preferences regarding strategies and that contextual and individual factors weigh in the efficacy and adaptiveness of strategies (Doré et al., 2016; Tamir & Ford, 2012; Tamir & Mauss, 2011; Troy, Shallcross, & Mauss, 2013). That said, it is also possible that this approach introduced error variance in the data due to eventual poor choices from participants. Likewise, for some participants the stress induced in the laboratory might not have matched the scenario described in the online survey and, thus, not have matched the predicted efficacy of the strategies. This assumption is based on studies demonstrating how characteristics of the experienced affect (such as its intensity and origin) influence the efficacy of strategies (McRae,

Misra, Prasad, Pereira, & Gross, 2012; Sheppes & Gross, 2011; Sheppes et al., 2011). Also, one methodological concern is whether the instructions regarding the strategies were followed as intended (Aldao, 2013; Demaree, Robinson, Pu, & Allen, 2006). In future studies, these limitations can be minimized by having the participants select their strategies in the lab after introducing the task and the stressor, by including an informative and practice period, and by administering a post-experiment questionnaire on the strategies actually used during the task.

The measurement of affective experiences is a challenging and complex endeavour (Meiselman, 2016). In this thesis, publication II relies on the self-report of past experiences. Even though self-report methods can be a practical way of collecting data and registering how individuals perceive themselves and their experiences (Zentner & Eerola, 2010), the data might be biased by the features of the method itself and by the limitations in the human ability of accessing and recalling inner processes (Västfjäll, 2010). When interpreting the findings of publication II, this issue—paired with the study's exploratory character—should be taken into account.

## 7 CONCLUSION

This dissertation had the aim of contributing for the overall conceptual development of the field of musical affect regulation and for the understanding of how people use music in cooperation with their regulation strategies. Four publications were presented and discussed in chapters 5 and 6, creating a dialogue between previous research and the knowledge emerging from this dissertation.

As this work demonstrated, despite the considerable development of the field in the last two decades, research on affect regulation through music was still lacking a solid conceptual background. Hopefully, the new understandings and recommendations conveyed by this dissertation can contribute for filling this gap.

The present work revealed that the interaction between individual and music can be observed at the level of musical mechanisms and regulation strategies. The symbiotic relationship between these two variables shapes the affective experience, cognition, and bodily reactions. Moreover, the positive effect of the employed strategies and of the music listened to was successfully observed experimentally. The findings collected in this thesis have deep implications for future studies on the efficacy of music as a health fostering resource and for the general research on regulation strategies.

This work is aligned with the growing approach in affect regulation (in general) and musical affect regulation (in particular) that defends an analysis of health and wellbeing outcomes from the perspective of the individual, context, and regulation flexibility, rather than a focus on inherently (mal)adaptive characteristics of specific strategies or music pieces. From this perspective, the consideration of musico-emotional competence becomes even more pertinent.

## TIIVISTELMÄ (FINNISH SUMMARY)

Tämä väitöskirja keskittyi musiikilliseen tunnesäätelyyn eli musiikin käyttöön tunnetilojen kuten tunteiden, mielialojen ja energiatasojen itsesäätelyssä. Julkaisussa I koottiin yhteen aikaisempien tutkimusten olennaiset tulokset ja arvioitiin tutkimusalan käsitteellinen selkeys ja tarkkuus. Sen lisäksi, että käsitteellistämässä löydettiin heikkouksia ja tuleville tutkimuksille tarjottiin suosituksia, julkaisussa I havaittiin, että kaikkia musiikillisen tunnesäätelyn elementtejä ei ole tutkittu tasapuolisesti. Huomioiden, että erityisesti tunnesäätelyyn liittyvien musiikillisten mekanismien kohdalla havaittiin tutkimuksellinen aukko, julkaisu II kiinnitti erityistä huomiota tähän komponenttiin ja sen yhteyteen säätelystrategioihin. Julkaisu II paljasti yhteyden musiikillisten mekanismien ja säätelystrategioiden välillä usealla eri tasolla. Julkaisujen I ja II pohjalta julkaisussa III esiteltiin musiikillisen tunnesäätelyn käsitteellinen malli. Mallin mukaan musiikilliset aktiviteetit, säätelystrategiat ja musiikilliset mekanismit valitaan päämääränä olevan tunteen funktiona, ja tiiviissä vuorovaikutuksessa ne määrittävät tunteisiin ja hyvinvointiin liittyvät seuraukset. Tämä on jatkuva prosessi ja tapahtuu yksilöllisten ja kontekstuaalisten tekijöiden matriisissa. Jatkaen tutkimista edelleen selvittäen, kuinka säätelystrategiat ja musiikki vaikuttavat tunteen muutoksiin, suoritettiin kokeellinen tutkimus. Julkaisu IV osoitti, että stressin vähentymiseen vaikutti kuunneltavan musiikin tehokkuus ja käytetty strategia. Yhteenvetona todettiin, että kuunneltu musiikki oli ratkaisevampi tekijä stressin vähenemiselle kuin kokeessa ohjeistettu strategia. Tämän väitöskirjan havainnot ovat merkityksellisiä paitsi musiikillisen itsesäätelyn tutkimukselle, myös tunnesäätelyn tutkimukselle yleisesti. Lisäksi havainnoilla on vaikutuksia tuleviin tutkimuksiin, jotka koskevat musiikin käyttöä jokapäiväisessä elämässä tai tunteisiin liittyvän musiikin terveysvaikutuksia.

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## **ORIGINAL PAPERS**

### **I**

#### **TOWARD A BETTER UNDERSTANDING AND CONCEPTUALIZATION OF AFFECT SELF-REGULATION THROUGH MUSIC: A CRITICAL, INTEGRATIVE LITERATURE REVIEW**

by

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## **ABSTRACT**

Research on the affective phenomena involved in music has grown exponentially over the last twenty years. One particular topic is the use of music for affect self-regulation (i.e., the process of creating, changing, or maintaining affective states). Being a recent field of research, knowledge remains scattered and heterogeneous. An integrative literature review was conducted to present the results from recent research and critically analyse its overall conceptual state. A systematic search of online databases focusing on publications from January 1994 to June 2014 was completed. An extensive screening resulted in the selection of 34 publications, which were analysed with regard to their focus, conceptual clarity, and the results obtained concerning the following levels: goals (G), strategies (S), tactics (T), and mechanisms (M). The findings show that the GSTM levels have not been studied with equal weight and precision. Moreover, additional relevant dimensions of analysis have also emerged. A considerable degree of inconsistency in the use of terms and conceptual imprecision was found across the publications, and the lack of a model aggravated the situation. The main components of affect regulation through music were identified. A compilation of definitions of affective terms and recommendations for the future research are presented.

## INTRODUCTION

Emotion regulation (i.e., the internal and external processes for monitoring, assessing and modifying emotional reactions, whether positive or negative; Thompson, 1994) is a growing topic in psychology (Koole, 2009). Still, paired with the scientific enthusiasm for this concept, questions and doubts regarding its validity and definition have arisen (e.g., Bridges, Denham, & Ganiban, 2004; Campos, Walle, Dahl, & Main, 2011).

The difficulties regarding this concept start with emotion: the act of defining emotion poses several problems, and the attempt to differentiate it from emotion regulation is not always successful. Some authors have argued that emotions are inherently regulatory (Kappas, 2009; 2011) and our understanding of emotion is limited (e.g., Kagan, 1994), thus making it impossible to distinguish between the concepts of emotion and emotion regulation; that emotion regulation processes involve more than influencing emotions (Hofer & Eisenberg, 2009); and that the general concept of emotion should be discarded for not being useful to psychological theory (Griffiths, 1997).

In the field of music and emotions, the concept of emotion regulation has been used as a starting point to study regulatory processes through music engagement (e.g., Thoma, Ryt, Mohiyeddini, Ehlert, & Nater, 2012). Additionally, perhaps as an attempt to grasp different affective phenomena, mood regulation (Saarikallio & Erkkilä, 2007), mood enhancement (Sleigh & McElroy, 2014), coping (Miranda & Claes, 2009), and affect regulation (Van Goethem & Sloboda, 2011), have also been used.

This variety of approaches has enriched the field; nonetheless, it can have a negative effect when definitions are not precise or concepts are used interchangeably. Affect, mood, and emotion each have different definitions as psychological phenomena. Affect can be considered the umbrella term, but no consensus exists regarding which phenomena to include under it (for a review on different approaches to affect, see Van Goethem, 2010).

In order to provide better insight into the different sub-components of the affect regulation concept, Van Goethem (2010; Van Goethem & Sloboda, 2011) suggested studying affect regulation through music at different levels: goals, strategies, tactics and mechanisms (GSTM framework).

Goals comprise the first level of the GSTM framework and serve as a reference for the entire process; they are the desired future states (Shah &

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Kruglanski, 2000) that provide direction toward fulfilling an individual's needs as well as influencing the strategies, tactics and mechanisms used (Van Goe-them & Sloboda, 2011). The second level of the GSTM framework consists of strategies, which are defined as the specification regarding how a given regula-tory act is implemented (Koole, 2009, p. 10) or how a goal is pursued.

The third level, tactics, corresponds to the practical activity that supports the strategy. Finally, mechanisms refer to the features of the tactic that enable the entire process. The following description provides an example of the entire framework: An individual defines the goal as reducing sadness, and uses the strategy of distraction through the tactic of music listening, via the mechanism of emotional contagion.

The GSTM framework will be used in this study because it is, at the time of writing, the only existing framework that encompasses all the dimensions of affect and allows the study of music as a tactic. Despite being neither descrip-tive nor an explanatory model of the regulative process, it enables the categori-zation and analysis of the data related to this topic. Other models have been suggested, but were not chosen due to their specific scope: emotional uses of music by young tennis players (Bishop, Karageorghis, & Loizou, 2007), mood regulation through music by adolescents (Saarikallio & Erkkilä, 2007), and use of sad music for self-regulation (Van den Tol & Edwards, 2013).

Cole, Martin, and Dennis (2004) identified the lack of definition for emo-tion and emotion regulation as one of the major issues in the study of emotion regulation. This concern is directly transferable to music research, where there has not been a conceptual discussion about self-regulatory processes. This field is emerging; at present, only two publications have reviewed the topic in an integrative and critical manner (McFerran, Garrido, & Saarikallio, 2013; Uhlig, Jäschke, & Scherder, 2013). However, these articles did not address conceptual definitions.

Because of this situation, scattered knowledge and the absence of solid and homogeneous definitions are expected across publications. The concerns regarding conceptual definitions are one of the motivators of the present work.

### Definitions, terminology, and scope of this study

In the present paper, affect will be used “as an umbrella term that covers all evaluative – or ‘valenced’ (positive/negative) states” (Juslin & Sloboda, 2010, p. 10). The affective states included under the term affect can be found in Figure 1. In the figure, the different affective states are distributed according to a scale of duration and stability throughout time based on Scherer (2000, 2004, 2005) and on additional information found in Ferguson, Hassin and Bargh (2008), Fleckenstein (1991), Gross (2014), Gross and Thompson (2007), Harmon-Jones and Harmon-Jones (2015), and Van Goethem (2010). These affective phenomena will not be separately analysed in the current paper, so detailed definitions will be presented later, in the recommendations.

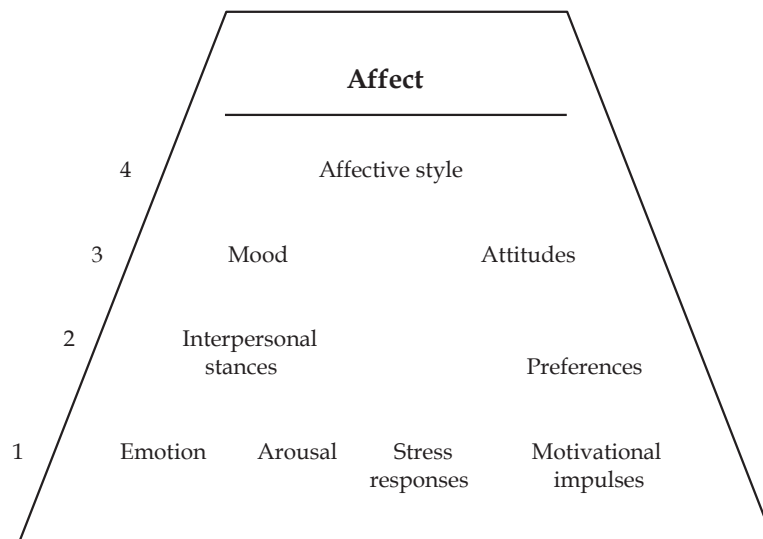


FIGURE 1. Affect as an umbrella term and the affective terms that are included in it, ranking from short duration (1) to long duration (4).



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Affect regulation is considered in this work as all the attempts at creating, changing, or maintaining any of the affective states, positive or negative (e.g., emotion regulation, coping, mood regulation, arousal modulation). As with emotion regulation (Gross & Thompson, 2007), these attempts may be directed to multiple aspects of the affective states: their latency, rise time, magnitude, duration, the offset of behavioural responses, the experience, or the physiological reaction. Furthermore, in this paper, “affect regulation” refers solely to self-regulation processes; attempts to regulate others’ affective states – such as music targeted to consumers, music therapy, or music interventions – are not considered in this review. Moreover, the terms “affective states” and “affect regulation” are used when referring to the research results, even when the authors originally used other terms, in order to maintain conceptual coherence throughout the paper.

### **Aim and research questions**

The purpose of this study is to review the pertinent publications concerning affect self-regulation through music in an integrative manner and to present a critical perspective on the conceptual state of the field. While recognizing that terminologies are plastic and that there will always be variance in their use, it aims at stimulating self-reflective questions and discussion amongst researchers. Consequently, the field can reach higher levels of cohesion, precision, and clarity.

The following research questions guided this study:

- 1) Which concepts and theoretical backgrounds have been used to research affect regulation processes through music?
- 2) How well defined and consistent are these concepts throughout the publications?
- 3) What are the major research results, and how do they fit the levels of Van Goethem’s (2010) GSTM framework?

Recommendations for future research are also discussed.

## **METHODS**

The current literature review was performed following an integrative methodology. An integrative literature review synthesises, analyses and critiques findings from studies across multiple paradigms to address the current knowledge regarding a specific area to generate new frameworks and perspectives (Torraco, 2005). The current study adopted a five-stage model (Whittemore & Knafl, 2005) that includes problem formulation, a literature search, data evaluation, data analysis, and the interpretation and presentation of results.

### **Literature search**

An extensive literature review was conducted using electronic databases. The first step included a broad search of the literature using the following keywords: music AND (emotion OR mood OR affect) AND (regulation OR strategy OR coping); minor changes in the Boolean expression were made to adapt to particular search engines' features. The included databases were Pro Quest PsycINFO, ProQuest Social Science Journals, ProQuest Psychology Journals, ERIC, Science Direct, Web of Science and Scopus. The search was confined to journal articles and dissertations published in English between 1 January 1994 and 30 June 2014.

### **Data evaluation**

Data were evaluated in terms of inclusion and exclusion criteria, in order to keep the selected publications within the scope of this review. When an author had published an article based on a dissertation, the article was preferred and the related dissertation excluded. Table 1 shows the inclusion and exclusion criteria that guided the selection of publications.

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TABLE 1. Inclusion and exclusion criteria for the selection of publications

Inclusion	Exclusion
Empirical study	Theoretical study
At least one component of affect regulation through music (e.g., goals, context)	Not related with affect regulation through music
Self-regulation	Affect regulation controlled by others / regulation of others' affect
English	Non-English
Publication date: 1994–2014	Publication date: before 1994

The steps followed to screen and delete publications from the initial to the final sample are pictured in figure 2.

### Data analyses

To thoroughly interpret the data and provide a critical and innovative synthesis, the data were analysed using the strategies suggested by Whittemore and Knafl's framework (2005). First, the data were extracted, coded and organised into subgroups. The extraction and codification of data were performed based on a priori constructs, creating three stances in this analysis: I) focus of study; II) conceptual clarity; and III) results related to each dimension of the GSTM framework. Every selected publication was analysed under these three stances. The stances and their connections to the research questions are listed in Table 2.

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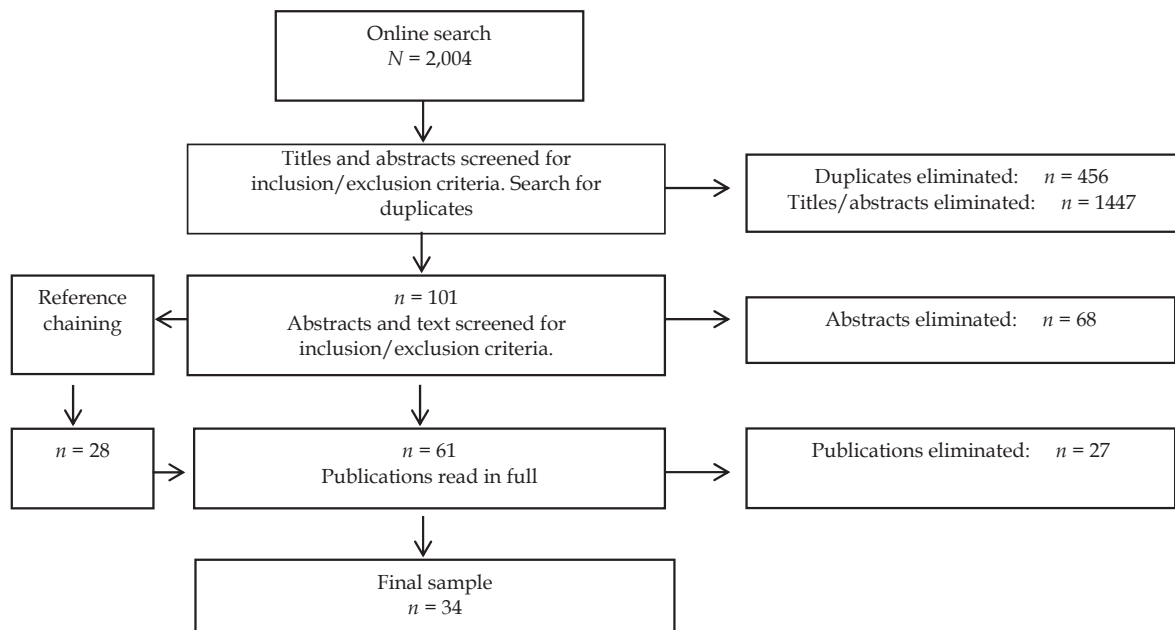


FIGURE 2. Flowchart of the data screening process.

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TABLE 2. The three analysis stances, their object, and their relation with the research questions

Stances	Objects of analysis	Research questions
Focus of study	Studies' topic and adopted concepts regarding affective states and regulatory processes; main results for each topic.	Question 1 The analysis of the studies' topics and used concepts will help to characterize this field of research.
Conceptual clarity	Presence/absence of: definition of the affective phenomena in focus definition of the regulatory process consistent use of affective terms a model or framework for the results	Question 2 Each one of these criteria is a way of assessing the observed state of conceptual clarity.
Main results	Research data in each of GSTM framework's levels – goals, strategies, tactics and mechanisms.	Question 3 GSTM's levels will serve as categories for presenting the results and checking how these concepts have been categorized.

In the first stance (focus of study), the major concepts related to affect and regulatory processes as well as the results of each publication were registered and summarised.

Concerning the second stance (conceptual clarity), the following criteria were chosen to assess the conceptual clarity and precision of the studies: definition of the studied affective phenomenon; definition of the studied regulatory process; consistency in the use of affective terms; and suggestion of a framework or model for the results. These four criteria are operationalized in Table 3.

As for the third stance (main results), the results of the selected publications were categorised based on the GSTM framework (Van Goethem, 2010) to describe the current state of the art and provide a basis for a discussion regarding how this topic has been approached. The differences between the categorisations of the different authors and the GSTM framework were analysed to measure conceptual heterogeneity and precision.

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Finally, the publications were further categorized according to their degree of closeness to the specific topic of affect self-regulation through music. This categorization is based on the publications' content and main topic. Three subgroups were formed. Subgroup 1 was composed of studies focusing directly on some kind of affect regulation through music engagement; subgroup 2 included publications where affect regulation through music is studied in relation to other phenomena; and subgroup 3 concerned different but related phenomena that provided information about affect regulation through music.

TABLE 3. Operationalization of the four criteria of conceptual clarity.

Criteria	Operationalization
Definition of the studied affective phenomenon	Reference to a definition of the affective phenomenon under study (e.g. mood) accepted by the literature. Coded as "Present", "Not present".
Definition of the studied regulatory process	Reference to a definition of the regulatory processes under study (e.g. mood regulation) accepted by the literature or to own definition or diffuse definition. Coded as "Present", "Own/diffuse definition", "Not present"
Consistency in the use of the affective terms	The chosen term to the affective state is used throughout the publication without being replaced with other affective terms interchangeably. When authors stated their own decision for using the terms interchangeably, that was noted down. Coded as "Present", "Justified", "Not present"
Suggestion of a framework or model for the results	The results are presented in a new or existing framework, categorization or model. Coded as "Present", "Not present"

Because the review targeted concepts and definitions in particular, the methodological qualities of the study design, data collection, and analysis were not assessed (for a review on these, see McFerran et al., 2013; Uhlig et al., 2013).

## RESULTS

### Search results

The first step of the screening process, i.e., the database search, resulted in 2,004 hits. At the end of the screening process, the final sample consisted of 34 publications. Of these publications, 2 were dissertations, and 32 were journal articles published in varied fields. The exclusive focus on self-regulation of this research led to the elimination of a considerable part of the empirical literature that measured the regulation initiated, suggested or influenced by others.

### Stance I: Focus of study

Tables 4, 5, and 6 provide an overall view of the examined publications, including their major concept or theory and their focus of study (the main results of each publication can be consulted in Appendix A in Supplementary Materials online<sup>1</sup>). The publications appear categorised by degrees of closeness to the topic. Seventeen publications were categorised as directly related to affect regulatory processes through music – subgroup one (Table 4); seven were identified as addressing this topic via the relations with other phenomena – subgroup two (Table 5); and ten were more indirectly related – subgroup three (Table 6).

Some variability amongst the publications was found with regard to the terms used to identify the regulatory processes: emotion regulation, mood enhancement or repair, mood regulation, coping, emotion modulation, affect regulation, and others. Similarly, there were multiple studied targets of regulation across publications, including emotion, mood, motivation, impulses, energy, and focus.

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<sup>1</sup> <http://journals.sagepub.com/doi/suppl/10.1177/0305735616663313>



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TABLE 4. Underlying concepts of regulation and focus of study of subgroup 1.

Authors (year)	Underlying concepts	Focus of the study	Authors (year)	Underlying concepts	Focus of the study
Barcewicz (2012)	Mood regulation	Adolescents	Skånland (2013)	Affect regulation	Adult MP3 player listeners
Bishop, Karageorghis, & Loizou (2007)	Emotion regulation	Tennis players	Sleigh & McElroy (2014)	Mood management theory	Music listening vs. writing
Gebhardt & Von Georgi (2007)	Emotion modulation Neurophysiological personality model	Psychiatric patients	Tahlier, Miron, & Rauscher (2013)	Emotion regulation	Sadness
Gebhardt, Kunkel, & Von Georgi (2014)	Emotion modulation Neurophysiological personality model	Psychiatric patients	Thoma, Ryf, Mohiyeddini, Ehler, & Nater (2012)	Emotion regulation	Everyday life
Heasley (1995)	Mood regulation	Everyday life	Thomson, Reece, & Benedetto (2014)	Mood regulation	Young people and psychopathology
Knobloch & Zillmann (2002)	Mood management theory	Good, neutral, and bad mood	Van den Tol (2013)	Functions and uses of sad music	Sad music
Saarikallio (2011)	Emotional self-regulation	Adults	Van den Tol & Edwards (2015)	Sad music	Sad music
Saarikallio & Erkkilä (2007)	Mood regulation	Adolescents	Van Goe-them & Sloboda (2011)	Affect regulation	Everyday life
Skånland (2011)	Coping	Stress			

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TABLE 5. Underlying concepts of regulation and focus of study of subgroup 2.

Authors (year)	Underlying concepts	Focus of the study	Authors (year)	Underlying concepts	Focus of the
Chamorro-Premuzic, Gomà-i-Freixanet, Furnham, & Muro (2009)	Emotion regulation Big Five traits of personality	Personality	Miranda, Gaudreau, & Morizot (2010)	Coping	Psychopathology Adolescents
Chen, Zhou, & Bryant (2007)	Mood repair Mood management theory	Personality	Saarikallio, Nieminen, & Brattico (2013)	Mood regulation	Reactivity to music
Greenwood & Long (2009)	Emotion regulation Mood management theory	Emotion regulation difficulties	Thoma, Scholz, Ehler, & Nater (2012)	Emotion regulation Stress reactivity	Emotion regulation style and stress reactivity
Miranda & Claes (2009)	Coping	Psychopathology Adolescents			

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TABLE 6. Underlying concepts of regulation and focus of study of subgroup 3.

Authors (year)	Underlying concepts	Focus of the study	Authors (year)	Underlying concepts	Focus of the study
Boer & Fischer (2012)	Musical behaviour	Functions of music – cultures	Laukka (2006)	Functions of everyday music listening Mood regulation	Wellbeing
DeNora (1999)	Technology of the self Sociology of music/cultural construction of subjectivity	Functions of music	Laukka & Quick (2013)	Functions and uses of music Emotion regulation	Functions of music – athletes
Dingle, Brander, Ballantyne, & Baker (2013)	Health psychology Social identity theory Emotion regulation	Wellbeing	Schäfer & Sedlmeier (2009)	Functions of music Music preferences	Functions of music
Getz, Chamorro-Premuzic, Roy, & Devroop (2012)	Positive and negative affect Uses of music and music preferences	Music preferences, affect	Schäfer, Sedlmeier, Städtler, & Huron (2013)	Functions of music Music preferences	Functions of music
Hakanen (1995)	Music listening habits Mood management theory	Functions of music – African Americans	Ter Bogt, Mulder, Raaijmakers, & Nic Gabhainn (2011)	Uses of music and typology of users Mood enhancement	Engagement levels with music

Considering the scope of the topics, the most common foci concerned the regulatory use of music during daily life or within specific situations (e.g., Thoma, Ryf, et al., 2012), the relationships between the use of music and several individual traits such as personality or music preferences (e.g., Getz et al., 2012), and the relationships between the regulatory use of music and psychopathology or wellbeing (e.g., Miranda et al., 2010). In addition, certain publications focused on specific cultural or age groups and the regulatory use that these groups have for music (e.g., Saarikallio & Erkkilä, 2007). Finally, other publications studied the functions of music (e.g., Schäfer et al., 2013) or with regard to specific populations (e.g., Bishop et al., 2007).

### **The function of music**

Overall, the literature supports the notion of music as a rich resource that has several functions (DeNora, 1999; Schäfer et al., 2013). Affect- and regulation-related functions are amongst the functions that participants value the most (Schäfer et al., 2013), particularly in the case of their favourite music (Schäfer & Sedlmeier, 2009). This function is somewhat universal, given that similar results were found across different groups and populations (Boer & Fischer, 2012; Hakanen, 1995; Laukka & Quick, 2013). Functions other than affect regulation have also been identified; for example, those related to self-awareness achievement, the expression of social relatedness (Schäfer et al., 2013), aesthetic reflexivity, construction of the self (DeNora, 1999), art enjoyment (Schäfer & Sedlmeier, 2009), and even help with sports performance (Laukka & Quick, 2013).

### **The use of music for affect regulation**

The results showed that affect is a determinant factor when selecting music for listening (Heasley, 1995). Furthermore, a tendency exists for selecting music that mirrors the experienced affect (Thoma, Ryf, et al., 2012). Music is used to regulate several components of affect in daily life: emotion, mood, motivation, focus, impulses and arousal levels (DeNora, 1999). The use of music is based on different goals related to the maintenance, maximisation, change or inducement of affect (Thoma, Scholz, et al., 2012; Van Goethem &

Sloboda, 2011). The pursuit of these goals is supported by strategies that fit the individual (e.g., Gebhardt & Von Georgi, 2007; Saarikallio & Erkkilä, 2007).

### **Age group**

Adolescents are a relatively common target population for research regarding affect regulation through music. Saarikallio and Erkkilä (2007) suggested that music is a versatile resource that offers adolescents a way to increase and restore wellbeing as well as improve emotional life through different strategies such as revival and diversion. Adults also use music for their affect regulation. For example, the use of MP3 players might help people cope with internal and external stressors by creating a personal space that increases their sense of control (Skånland, 2011).

Throughout adulthood, certain goals and strategies remain similar; however, others change over time with age, after particular events or retirement (Saarikallio, 2011). Still, music remains a source for positive emotions, and mood regulation through music predicts wellbeing and personal growth amongst the elderly (Laukka, 2006).

### **Specific groups**

Studies of tennis players (Bishop et al., 2007) and other professional athletes (Laukka & Quick, 2013) showed that these groups use music in order to elicit emotional states that foster their desired performance outcomes. Athletes can listen to music during warm-ups, training sessions and pre-events preparations.

### **Individual differences and contextual influences.**

Individual differences influence both the relationship with music and the outcomes of music engagement. Pursued goals (Thoma, Scholz, et al., 2012), emotion regulation difficulties (Chen et al., 2007; Greenwood & Long, 2009), personality traits (Barcewicz, 2012; Chamorro-Premuzic et al., 2009), relationships with music (Ter Bogt et al., 2011), and affective reactivity to music

(Saarikallio et al., 2013) were some of the personal factors related to the regulatory use of music.

Although the contextual features have not been studied deeply, some studies have suggested that context matters. Participants in Saarikallio's study (2011) frequently mentioned the perceived relationships between context and their choices of music. Thoma, Ryf, et al. (2012) found that preferences for certain emotional content within music was correlated with the emotional content of the situation itself. Likewise, Skånland (2013) suggested that whether an individual attempts to maintain, change or enhance their emotions through music depends on contextual features.

#### **Effects on mental health and wellbeing.**

Some studies have focused on the protective characteristics of music, suggesting that engaging with music benefits individuals and fosters wellbeing (Dingle et al., 2013; Laukka, 2006; Skånland, 2011). Both in healthy and clinical samples, the use of music to entertain and induce positive states correlates with higher levels of wellbeing (Gebhardt et al., 2014; Thomson et al., 2004). Nevertheless, certain uses of music for affect regulation are related to symptoms of mental distress, both in adolescents (Miranda & Claes, 2009; Miranda et al., 2010) and adults (Thoma, Scholz, et al., 2012).

Overall, it has been found that the frequent use of music for affect regulation predicts mental disorders (Thomson et al., 2014). Studies with clinical samples have revealed that participants diagnosed with psychopathology, besides engaging more often with music for self-regulation, show different patterns in the underlying strategies and goals depending on the diagnosed pathology (Gebhardt & Von Georgi, 2007; Gebhardt et al., 2014). To date, it has not been possible to ascertain if certain uses of music are maladaptive and increase psychopathology or if higher uses of music reveal the increased need of regulation to cope with mental suffering.

**Stance II: Conceptual clarity**

Table 7 depicts the evaluation of each publication’s conceptual clarity. The first criterion (column 1) is the presence/absence of a definition for the studied affective state (e.g., emotion). The second criterion (column 2) is the presence/absence of a definition for the regulatory process (e.g., mood management).

TABLE 7. Assessment of conceptual clarity based on the presence of definition of affective terms (1), definition of the regulatory process (2), the consistency of their use (3), and proposal of model/framework for the results (4).

Authors, year	Conceptual clarity				Authors, year	Conceptual clarity			
	1	2	3	4		1	2	3	4
Closeness subgroup 1					Closeness subgroup 2				
Barcewicz (2012)	O	O	O	O	Chamorro-Premuzic et al. (2009)	O	/	O	X
Bishop et al. (2007)	O	/	O	X	Chen et al. (2007)	O	X	X	O
Gebhardt & Von Georgi (2007)	O	O	X	O	Greenwood & Long (2009)	O	O	O	O
Gebhardt et al. (2014)	O	/	X	O	Miranda & Claes (2009)	O	X	X	O
Heasley (1995)	X	X	/	X	Miranda et al. (2010)	O	X	X	O
Knobloch & Zillmann (2002)	O	X	X	O	Saarikallio et al. (2013)	O	O	O	O
Saarikallio (2011)	X	X	/	X	Thoma, Scholz, et al. (2012)	O	X	X	X
Saarikallio & Erkkilä (2007)	X	X	O	X	Closeness subgroup 3				
Skånland (2011)	X	X	X	O	Boer & Fischer (2012)	O	/	X	X
Skånland (2013)	X	X	X	O	DeNora (1999)	O	/	X	O
Sleigh & McElroy. (2014)	X	O	O	O	Dingle et al. (2013)	O	O	X	X
Tahlier et al. (2013)	X	O	O	O	Getz et al. (2012)	O	O	X	X
Thoma, Ryf, et al. (2012)	O	X	O	O	Hakanen (1995)	O	O	O	X
Thomson et al. (2014)	O	X	O	O	Laukka (2006)	O	O	X	O
Van den Tol & Edwards (2013)	X	X	X	X	Laukka & Quick (2013)	X	O	X	O
Van den Tol & Edwards (2015)	O	O	X	X	Schäfer & Sedlmeier (2009)	O	O	X	X
Van Goethem & Sloboda (2011)	O	O	X	O	Schäfer et al. (2013)	O	O	X	X
					Ter Bogt et al. (2011)	O	O	X	X

1 - Definition of the affective phenomena in focus: X- present; O- not present; 2 - Definition of the regulatory process in focus: X- based on theory; /- short description of authors’ conception or diffuse definition; O- no definition; 3 - Consistent use of affective terms: X- consistency; /- assumed or explained interchangeability; O- unjustified interchangeability; 4 - Model or framework for the data: X- present; O- not present.



The analysis of column 1 revealed that a significant majority of the publications (26 of 34) did not define the affective concepts under study. This lack of definition was particularly salient in the subgroups that addressed the topic more indirectly (subgroup 2 and 3) but was nevertheless problematic also for the closest subgroup (subgroup 1), in which less than half of the publications presented a clear definition (8 of 17).

Similarly, regarding the definition of the regulatory processes, more articles were published without a definition (16) than those with a definition (13). Five publications defined regulatory processes in a less formal way (e.g., without theoretical support). Definitions were more common amongst publications with a higher degree of closeness to the topic (subgroup 1: 9 of 17, subgroup 2: 4 of 7), whereas none of the subgroup 3 publications provided a theory-based/clear definition.

Column 3 shows the consistency/interchangeability of the use of affective terms and concepts throughout the publication. Nearly half of the publications within the closeness subgroups 1 and 2 used the affective concepts interchangeably, of which two articles assumed or justified this interchangeability. In subgroup 3, most of the publications were consistent in their use of the chosen terms and concepts.

The fourth criterion was the proposal/absence of a model or framework for the results of the paper (column 4). This criterion portrays the capacity of recent research to produce systematised knowledge. Column 4 shows that approximately only one-third of the publications in the first subgroup organised their results based on a model. For subgroup three, the proportion was inverted, with two-thirds proposing a model or framework.

The identified models/frameworks varied in their focus and comprehensiveness. Some concerned specific population (e.g., tennis players; Bishop et al., 2007), specific affect dimensions (e.g., mood regulation; Saarikallio & Erkkilä, 2007) or specific uses of music (e.g., listening to sad music when feeling sad; Van den Tol & Edwards, 2013). Examples coming from publications belonging to the second or third levels of closeness, presented, as expected, frameworks that focus on more distant phenomena (e.g., health benefits of choir singing, Dingle et al., 2013; functions of music, Schäfer & Sedlmeier, 2013; typology of music listeners, Ter Bogt et al., 2011). Regarding the comprehensiveness of these categorizing systems, they ranged from models of a specific process (e.g., Saarikallio & Erkkilä,

2007) to broader frameworks to briefly explain the results obtained (e.g., Boer & Fischer, 2012).

### **Stance III: Research results related to the GSTM framework**

The results based on the four levels of the GSTM framework are summarised in Tables B1, B2, B3 and B4 (Appendix B in Supplementary Materials online).

#### **Goals**

The first level of the GSTM framework concerns the goals of affect regulation. Some studies have created lists of goals based on the existing literature and presented them to participants (e.g., Thoma, Scholz, et al., 2012); others extracted possible goals via grounded theory (e.g., Bishop et al., 2007); still others reduced regulation goals into theory-driven categories such as changing, creating, enhancing and maintaining affective states (e.g., Van Goethem & Sloboda, 2011).

Not all of the goals were equally frequent. For example, Laukka (2006) presented a group of elderly participants with a list of 28 reasons to listen to music, and certain goals were identified more frequently: to be entertained, to evoke memories, to feel pleasure, to have company/background music. Overall, the most common goals were to change from a negative to a positive affective state (Bishop et al., 2007; Heasley, 1995; Saarikallio, 2011; Van Goethem & Sloboda, 2011), or to maintain/strengthen a certain state by listening to affect-congruent music (Heasley, 1995; Saarikallio, 2011; Skånland, 2013).

Certain variables influence the setting of personal goals. For example, when feeling sad, the goal of enhancing one's mood or creating happiness is less likely when individuals believe that nothing can be done about their affective state or when their sadness is already resolved (Tahlier et al., 2013). In general, adolescents believe that it is easier to use music to promote positive affect when they are already in positive states (Barcewicz, 2012).

During the analysis, several concepts were identified that could be categorised as goals, according to the GSTM framework; however, the authors presented them with different labels (Table B1 in Supplementary Materials). For example, Heasley (1995) presented three categories (enhance, change, and enhance-to-change) as “metastrategies”. Because these concepts were described as overarching plans, they fit better in the category of goals than strategies. Boer and Fischer (2012) described seven functions of music, with each one including several goals, which they called “sub-functions”. Other publications recognised goals in their research but did not label or identify them thoroughly (Barcewicz, 2012; DeNora, 1999; Knobloch & Zillmann, 2002; Sleight & McElroy, 2014).

### Strategies

Research on this topic has identified numerous affect regulation strategies using music. A compilation of all of the strategies identified by the current review resulted in the following list (similar strategies with different names are not repeated here): revving up, relaxing, discharging, mental concentrating, focusing on energetic aspects of music, inducing visual and auditory imagery, thinking rationally, reducing negative activation, fun-seeking, modulating arousal, ruminating, introspecting, reflecting, reminiscing about pleasant thoughts and images, seeking diversion, increasing motivation, increasing positive affect, maintaining a happy mood, increasing flow and endurance, actively coping, problem-oriented coping, emotion-oriented coping, avoidance-disengagement coping, reviving, seeking strong sensations, finding solace, and retrieving memories (Table B2 in Supplementary Materials). None of the studies included all of the identified strategies; rather, most studies referred to four to six strategies.

Given the inherent link between goals and strategies with regard to affect regulation, it is possible to find connections between these concepts in music use. Cognitive reappraisal and distraction might be positively related to mood enhancement (Van den Tol & Edwards, 2015). Relaxation, cognitive problem solving and the reduction of negative activation might be related to the modulation of negative emotions, whereas fun seeking might meet the goal of positive stimulation (Gebhardt et al., 2014; Gebhardt & Von Georgi, 2007).

In addition, differences were found between the definition of a strategy based on the GSTM framework and the labels created by the authors (Table B2 in Supplementary Materials). Certain strategies were identified as being outcomes despite the fact that participants referred to them as an action (visual and auditory imagery; Bishop et al., 2007). In other cases, potential strategies (e.g., retrieving memories and distraction) were identified as goals, emphasising the action rather than the desired affective state (Van den Tol & Edwards, 2013, 2015).

### **Tactics**

Regarding the third level of the GSTM framework, all publications showed, to some extent, that music can be viewed as a tactic in the process of affect regulation and that it helps to attain individually defined goals. Multiple activities are related to music, and each one of them can be a potential tactic for affect regulation. Nevertheless, all but three of the analysed publications (Dingle et al., 2013; Saarikallio & Erkkilä, 2007; Van Goethem & Sloboda, 2011) focused solely on the tactic of music listening.

Other tactics can be found in Saarikallio and Erkkilä's (2007) model, which includes music listening, playing, singing, song writing and performing. These actions can serve multiple regulatory goals, and each one has different relationships with specific strategies. Van Goethem and Sloboda (2011) also listed music-related activities, including dancing, singing along, listening intensely, actively choosing songs and sitting and listening. Dingle et al. (2013) focused on the specific tactic of singing in a choir and suggested that this activity can help participants to achieve personal and social changes.

Music use is a rich tactic that is frequently utilized. Van Goethem and Sloboda (2011) found that music was the second most used tactic after talking to friends, followed by watching television. Greenwood and Long (2009) also found that listening to music was more common than watching television; furthermore, these authors found that watching television was the most frequent tactic when the participants were feeling bored but that they turned primarily to music when feeling either positive or negative affect.

The contexts in which musical tactics occur are also diverse. Individuals can use this tactic either alone or with others (Barcewicz, 2012), in public plac-

es while searching for a personal space (Skånland, 2011), and while performing other activities (Bishop et al., 2007; DeNora, 1999).

Additional important information came out of this analysis including the inconsistent labelling of music engagement as a tactic or a strategy amongst researchers. Although most researchers account for the richness of music as a resource and its ability to meet multiple strategies and goals (thereby being a tactic of affect regulation), numerous publications approached music listening as a strategy (see table B3 in Supplementary Materials; Bishop et al., 2007; Chen et al., 2007; Miranda & Claes, 2009; Miranda et al., 2010; Skånland, 2011). Van Goethem (2010; Van Goethem & Sloboda, 2011) identified music listening as a tactic but included several other music activities (e.g., dancing, listening intensely, going to concerts, actively choosing songs) in the mechanism category, labelled as “music-related activities”.

### **Mechanisms**

Finally, the mechanisms through which music supports the goals and tactics of affect regulation have also been included in previous studies; however, these studies are scant and solely related to the tactic of “music listening” (Table B4 in Supplementary Materials). Only one paper (Van Goethem & Sloboda, 2011) directly approached and identified mechanisms as such: the emotion of music, the type of music, familiarity with music, content of music, other world, and memories. Two additional concepts were included in this study by the authors; in the present analysis, however, they were considered as tactics: music-related activities and unrelated activities.

Although not identified as such, some of the selected publications addressed musical mechanisms. Regarding the emotion of music, preferences for higher or lower levels of energy and joy depended on participants’ moods (Knobloch & Zillmann, 2002); furthermore, the choice of music usually followed the principle of affect congruency (Thoma, Ryf, et al., 2012). The genre of music can also make a difference in regard to affect regulation processes, given that certain associations between genres, emotions and goals have been found (Hakanen, 1995). In general, however, the associations that individuals make between genres and emotions depend on their preferences.

In other cases, potential mechanisms were noted only in a secondary manner (DeNora, 1999; Laukka & Quick, 2013), or studied under a different label. Bishop et al. (2007) identified a list of determinants for music listening amongst tennis players, which, according to the GSTM framework, can be categorized as mechanisms, such as extramusical associations, acoustical properties, and identification with the artist or lyrics. Similarly, and with regard to listening to sad music while feeling sad, Van den Tol and Edwards (2013, 2015) identified connection, memory triggers, the message communicated (named as “direction” in Van den Tol & Edwards, 2015), and high aesthetic value as being music-selection strategies.

People might use the mechanisms of music engagement in different ways depending on the situation and their personal characteristics. Participants with different emotion regulation profiles (emotion moderation, hedonistic emotion regulation, and distress-augmented) make disparate music valence and arousal choices for different emotional situations (Thoma, Ryf, et al., 2012). Moreover, specific mechanisms might be preferred for specific strategies and goals, such as “connection” and “intensifying sadness” (Van den Tol & Edwards, 2015).

Most of the information regarding mechanisms was not identified as such. This level of the GSTM framework appeared to be the least recognised by the research field. Yet, the current results show that several mechanisms make music engagement a multifaceted resource.

## DISCUSSION

This integrative literature review resulted in a broad overview of recent research concerning affect regulation through music, and identified a variety of conceptual issues timely for this emergent field. This topic of research is growing, thus it is appropriate to analyse the existing literature and suggest guidelines for the future.

### **Stance I: Focus of study**

The analysis of the subgroups of closeness revealed that only half of the selected publications have directly focused on the phenomenon of affect regulation through music. One possible explanation is that this topic is in its early stages, and there is plenty of space for more research. With such a small number of studies, fully consolidated knowledge remains elusive in this area. Nevertheless, a diverse scope of topics was found across publications, and this variety has surely enriched the field.

One of the topics commonly present in the field was the functions of music. Overall, affect-regulation-related functions seem to be amongst music's most important and frequent functions (Ter Bogt et al., 2011). However, the relationship between the concept of functions (or motivations, reasons) and the concept of affect self-regulation appears to be far from clear.

Self-regulation is a dimension present in virtually every voluntary human behaviour, and can be defined as "self-generated thoughts, feelings, and actions that planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2005, p.14). Our actions and decisions, conscious or unconscious, are attempts on different levels at bringing us closer to our goals (Carver, Johnson, Joormann, & Scheier, 2015). However, the functions of music have typically been differentiated between regulatory functions (usually affect-related) and other functions (social, individual, cognitive, behavioural functions).

Given the underlying self-regulation motivation in every human being and the infinite sources of affective influences, it is possible to raise the ques-



tion of whether there is any use of music that is not self-regulatory and where the border lies between affective and non-affective functions of music. For example, Boer and Fischer (2012) identified seven functions of music, and, although only the first function (“self-regulation through music”) includes self-regulation in this labelling, according to the empirical literature in music psychology almost all the others might also play a role in self-regulation (e.g., “memories through music” as a mechanism, Juslin & Västfjäll, 2008; “music as a diversion” as a strategy, Saarikallio & Erkkilä, 2007; “music in the background” as a tactic, Van Goethem, 2010). This illustrates high levels of discrepancy in conceptual understanding about the different dimensions of human behavior and experience involved in music use.

Despite the lack of studies on the influence of context on music functions, overall the results show that contexts have an impact on the choice of music (Saarikallio, 2011), on the preference for emotional content (Thoma, Ryf, et al., 2012), and on the setting of affective goals. The studies of music uses in defined contexts, such as sports (Bishop et al., 2007; Laukka & Quick, 2013), reflect in their results the specificities of different populations and the malleability of music to adapt to varied needs and goals. Future studies with a context- or population-specific approach would be beneficial for understanding the different functions of music, and their interplay with affect-regulatory goals.

## **Stance II: Conceptual clarity**

The way each study refers to the regulatory function of music (e.g., mood enhancement) and to its target (e.g., emotion) varied substantially. However, given the number of publications that did not define their chosen concepts, it is difficult to know exactly how each phenomenon within a certain study resembles/differs from those in other studies. In addition, unjustified interchangeability was observed in approximately half of the analysed publications. Surprisingly, the lack of definitions for affective terms and consistency with regard to their use was more prevalent amongst publications focusing directly on the study of affect regulation through music (subgroup 1). Despite the differences amongst affective phenomena, the social sciences have commonly used terms such as mood and emotion interchangeably. This use, as

Scherer (2005) stated, leads us to a lack of clarity with regard to the terminology and jeopardises the possibility of creating solid knowledge.

### **Stance III: Research results related to the GSTM framework**

The particular goals, strategies, tactics and mechanisms are likely to have different effects on affect regulation. Thus it is important to explore how the different elements involved in this process work and interact with each other and what is the weight of each one with regard to emotionality and health. However, most studies have focused on only one specific level or component of this process, and this one-dimensional knowledge is not enough to build solid and comprehensive models of the health effects of affective regulation through music.

The GSTM framework was shown to be effective in analysing and presenting the data in a structured way, and all its levels were represented in the collected results. Nevertheless, the overall presence and deepness of study of these levels varied.

The mechanisms level has received the least amount of attention and was rarely identified by researchers. Two of the mechanisms that were more commonly present in recent research (even if not identified as such) included music genre (e.g., Hakanen, 1995) and musical preferences (e.g., Getz et al., 2012). Although the concept of mechanisms is supported by the model of emotion induction through music (Juslin & Västfjäll, 2008), the relationship between these two types of affective processes (induction and regulation) has not been explored empirically.

At the tactics level, the variety of possible music-related tactics is not properly represented, as most of the studies have focused solely on music listening. This leaves us with little information about how tactics differ from each other in terms of regulation uses and results.

Despite the abundant list of strategies identified in this analysis, few studies have included many of them or tested which strategies are actually used, when, and how. This matter is important given the results indicating the presence of a relationship between the strategic use of music and mental health or wellbeing (Thoma, Scholz, et al., 2012).

With regard to the components of affect regulation, a certain conceptual imprecision was found across publications. For example, the identification of music as a strategy rather than a tactic was an issue in certain publications (Bishop et al., 2007; Chen et al., 2007; Skånland, 2011; Sleigh & McElroy, 2014; Tahlier et al., 2013). This perspective can negatively influence research because it does not pave the way for the investigation of the additional levels and dimensions present in music engagement. In general, the discrepancies between the authors' labelling and the one suggested by the GSTM framework reinforce the idea that this field of research is still searching for suitable definitions.

Certain publications presented models for their results; however, most of these studies focused on adjacent topics (i.e., the second and third subgroups of closeness). This finding is a further indication that the specific field of affect regulation through music has experienced more difficulties with regard to producing models than the other fields. At the moment, no complete model of affect regulation through music exists.

Nevertheless, it is of interest to analyse what kind of models better fit the process of affect regulation. The most inclusive and pertinent models for this purpose identified in the literature review are the three models already mentioned in the introduction of this article (Bishop et al., 2007; Saarikallio & Erkkilä, 2007; Van den Tol & Edwards, 2013). Overall, the four levels of the GSTM are present at the core of these three models as well. But, distinctly, the models imply an idea of direction or sequence, which is not present in the GSTM framework. Even though it is not possible to specify exactly on which level the regulative process starts, the setting of individual goals seems to be the first step for these three models. Moreover, under this first step two other factors appear in Saarikallio and Erkkilä's (2007) and Van den Tol and Edwards's (2013) models, situational and individual. These factors help to place the regulatory process in context.

Additionally, some other ideas come from these two models: music prerequisites are necessary for it to be helpful for regulation purposes (Saarikallio & Erkkilä, 2007), mediator factors influence the whole process at different stages (Bishop et al., 2007), and the affective outcomes depend on the success of the regulation process (Van den Tol & Edwards, 2013).

In summary, the combination of empirical and theoretical knowledge collected in this literature review drafts a direction for future models to be built. Figure 3 is an attempt at portraying the main elements in the affect reg-

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ulation process; it gathers the dimensions commonly present in research and its dashed lines represent tentative relationships as suggested by the literature. The inclusion of new components and the representation of the dynamic and fluid aspects of the regulation process through music are some of the challenges that must be faced when building a descriptive and explanatory model. Model development is of the utmost importance for the construction of theory (Shoemaker, Tankard, & Lasorsa, 2004), and would contribute to higher levels of understanding of affect regulation through music and produce more solid results.

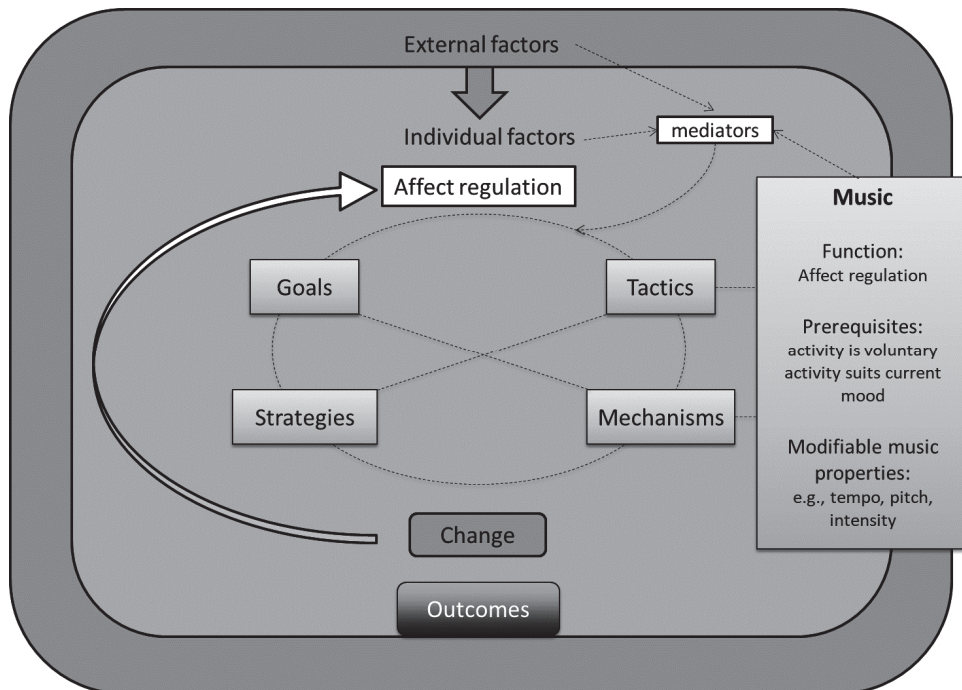


Figure 3. Relevant components for a conceptual understanding of affect self-regulation through music.

## Recommendations for future research

Accounting for the topics reflected in the previous section, the following recommendations for future research are proposed:

- 1) Choosing the appropriate term for the affective phenomena under study. A more specific term might be suitable when the focus is on a particular process (e.g., mood regulation), whereas the umbrella term “affect regulation” might be more suitable when all the affective phenomena are included, or when it is not possible to separate the components involved in music engagement (cf. Figure 1).
- 2) Providing a precise conceptual definition of the affective states approached. A list of definitions retrieved from the literature is presented in Table 9.
- 3) Thoroughly exploring the diverse levels and components of the regulatory processes through music and the interaction between them.
- 4) Clarifying the role of self-regulation across the functions of music.
- 5) Expanding the research to other populations (e.g., writers, musicians), identifying specific and universal aspects of music use.
- 6) Clearly classifying music as a tactic (rather than a strategy) and further elaborating on the type of musical activity in question. A lack of studies exists with regard to musical activities other than music listening.
- 7) Exploring the differences and similarities between emotion-inducing and emotion-regulating mechanisms.
- 8) Aiming for a better understanding of how affect regulation through music is related to, is similar to, or differs from affect regulation in general.
- 9) Creating a model that includes all of the components observed in affect regulation and that reflects its complex and dynamic character. The visual representation of the most important components of affect regulation through music presented in Figure 3 can be used as a starting point.

## Implications and contributions

The first look at past research (Stance I) showed us what kinds of topics have been explored in the field. In addition to summarizing recent results, the review identified which topics have received less attention and pointed at questions in need of study.

TABLE 9. Affective terms and their definitions according to the literature.

Affective term	Definition
Affect	Umbrella term that covers all evaluative –or ‘valenced’ (positive/negative) states. <sup>1</sup>
Affective style	Relatively stable dispositions that bias an individual toward perceiving and responding to people and objects with a particular emotional quality, emotional dimension, or mood. Individual differences in affective style are related to personality traits, temperament and behaviour tendencies. <sup>2,3</sup>
Arousal	Physical activation of the autonomic nervous system. Is one of the components of an emotional response, but could occur in the absence of emotion. Arousal is often reflected in the ‘feeling’ component. <sup>1</sup>
Attitudes	Relatively enduring beliefs and predispositions towards specific objects or persons. <sup>3</sup>
Emotion	Relatively brief episode of coordinated brain, autonomic, and behavioural changes that facilitate a response to an external or internal event of significance for the organism. Emotion focus on specific ‘object’ and last minutes to a few hours. <sup>1,2</sup>
Feelings	Subjective representations of emotions. They can reflect any or all of the components that constitute emotion. <sup>2</sup>
Interpersonal stances	Are characteristic of an affective style that spontaneously develops or is strategically employed in the interaction with a person or a group of persons. <sup>3</sup>
Moods	Diffuse affective states that are often of lower intensity than emotion, but considerably longer in duration. They do not necessarily occur due to a specific cause or lead to a specific reaction. <sup>2</sup>
Motivational impulses	Tendencies of action characterized by approach or avoidance. Approach motivation is the energization of behaviour by, or the direction of behaviour toward, positive stimuli. Avoidance is the energization of behaviour by, or the direction of behaviour away from, negative stimuli (objects, events, possibilities). <sup>4</sup>

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Preferences	Relatively stable evaluative judgments in the sense of liking or disliking a stimulus, or preferring it or not over other objects or stimuli.
Stress responses	Caused by intense and generally negative situations, they refer to whole-body and negative affective states occasioned by an inability to manage situational demands. <sup>5</sup>

<sup>1</sup> Juslin & Sloboda (2010) <sup>2</sup> Davidson, Scherer, & Goldsmith (2003) <sup>3</sup> Scherer (2005)

<sup>4</sup> Elliott (2006) <sup>5</sup> Gross (2014)

More importantly, the results alert us to a situation where the lack of definitions, interchangeability of terms, and labelling of phenomena incongruently with the theory (e.g., label music listening as a strategy) are frequently present. This is the first review work that addresses these issues in the field of affect regulation through music. By showing the fragilities in the state of the art, it promotes a (hopefully productive) discussion in the field.

The analysis of existing models and theories led to the compilation of adequate definitions for several affective terms (Table 9) and to the identification of the most important components of affect regulation through music (Figure 3). This represents a step further and creates the groundwork for future studies.

## CONCLUSION

The debate surrounding the theoretical and empirical frameworks used in this area can only improve the quality of research. This review showed that an interesting body of research already exists concerning the topic of affect regulation and music, drawing influences from a variety of research fields. Despite the growth in interest and the publications dedicated to this topic, the total amount of research with a direct and deep focus on affect regulation through music remains small. Moreover, the theoretical knowledge in this field is not yet consolidated, and complete models have not been presented. We hope that this article will promote more precise and comprehensive research on this rapidly growing area of interest.



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Note: The asterisk (\*) marks the publications included in the literature review

## II

### **STRATEGIES AND MECHANISMS IN MUSICAL AFFECT SELF-REGULATION: A NEW MODEL**

by

Margarida Baltazar & Suvi Saarikallio, 2017

Musicae Scientiae [advance online publication]

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## STRATEGIES AND MECHANISMS IN MUSICAL AFFECT REGULATION

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### **ABSTRACT**

This study aimed at investigating the associations between regulation strategies and musical mechanisms involved in musical affect self-regulation. A sample of 571 participants was collected and the data regarding the reported strategies and mechanisms were analysed using correspondence analysis (CA). Three bipolar dimensions – cognition, feelings, and body – were retained for interpretation, thus revealing six contrasting strategic uses of music: cognitive work, entertainment, affective work, distraction, revival, and focus on situation. Clear associations between strategies and mechanisms emerged from the CA, connecting cognitive, feelings-focused, and situational processing with individual-dependent mechanisms and repairing, pleasure, and body-focused strategies with feature-dependent mechanisms. The novel observations about these associations renew the conceptual understanding of musical affect self-regulation and lay foundations for a new model that integrates regulatory strategies and mechanisms as intrinsic and interrelated components of this behaviour.

Keywords: affect regulation, correspondence analysis, emotion regulation, mechanisms, mood regulation, music, self-regulation, strategies

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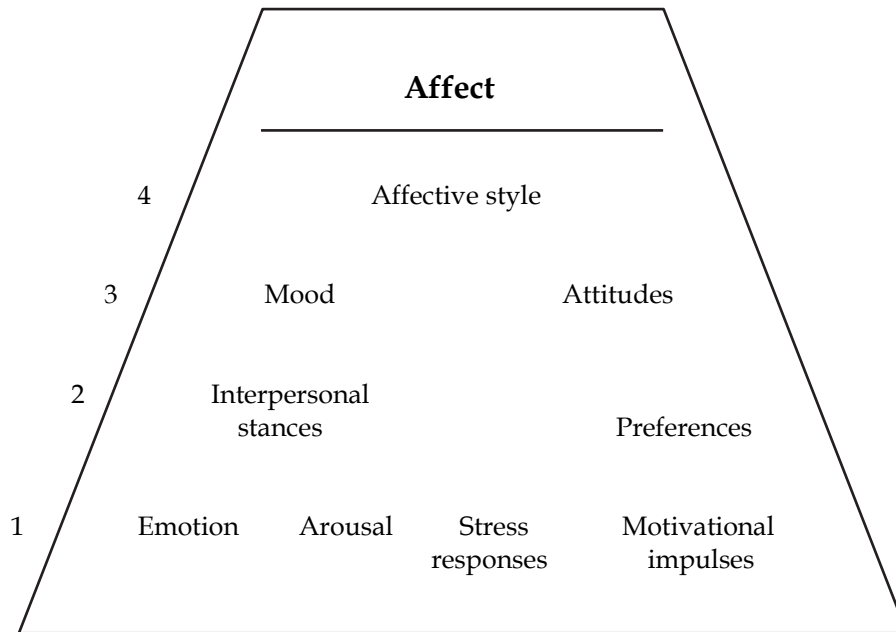
Music provides people with innumerable possibilities of regulating their affective states (e.g. Groarke & Hogan, 2015; Thoma, Scholz, Ehlert, & Nater, 2012). These states consist of emotions (Tahler, Miron, & Rauscher, 2013), moods (Saarikallio & Erkkilä, 2007), energy levels and arousal (DeNora, 1999), and focus and motivation (Bishop, Karageorghis, & Loizou, 2007). The key features of musical self-regulation - affect, cognition, and music - have been recognized to be closely connected (Krumhansl, 2002); yet, how people use music's properties to manage their affective states is still intriguing and fascinating. With this paper, we will approach this topic by tackling two of the main aspects underlying musical affect regulation: the strategies employed through music to attain affective goals and the musical mechanisms that support self-regulation.

### Terminology and definitions

Affect has been used in the literature as an umbrella term to include all the evaluative (positive or negative) states (Juslin & Sloboda, 2010). However, due to the fuzzy borders between cognition, motivation, and emotion - which can be seen as a continuum (Fleckenstein, 1991; Scherer & Peper, 2001) - there is still no consensus on what to include under this umbrella. Baltazar and Saarikallio (2016) reviewed and compiled the affective phenomena that have been identified in the literature (Figure 1). In the present paper, a similar concept of affect is adopted. Affect regulation is defined, thus, as all attempts at creating, changing, or maintaining any of the affective states, positive or negative (e.g. emotion regulation, coping, mood regulation, arousal modulation; Gross, 2015; Gross & Thompson, 2007).

Affect regulation is directed by a goal (conscious or unconscious) and the concrete approach people take to achieve the goal is a *strategy* (Kooze, 2009, p. 10). Strategies take place in a certain context or activity (i.e. *tactics*; Van Goethem, 2010), which can, for instance, be listening to music, singing, or dancing. The underlying processes explaining why music then impacts emotions and allows affective regulation to occur are labelled *mechanisms* (Juslin & Västfjäll, 2008b; Saarikallio, Baltazar, & Västfjäll, 2017; Van Goethem & Sloboda, 2011). For example, the strategy *reappraisal* (finding different interpretations for the situation) can be used while listening to music with empowering lyrics. The lyrics, in turn, are the mechanism facilitating affect

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**FIGURE 1.** Affect as an umbrella term and the affective terms that are included in it, ranking from short duration (1) to long duration (4). From Baltazar & Saarikallio (2016). Reprinted by permission of Sage Publications.

*Note.* The duration ranking is based on Scherer (2000, 2004, 2005), and additional concepts were found in Ferguson, Hassin, & Bargh (2008), Fleckenstein (1991), Gross & Thompson (2007), Harmon-Jones & Harmon-Jones (2015), Juslin & Sloboda (2010), and Van Goethem (2010). The terms that are typically linked to cognitive phenomena refer to their affective component (e.g. motivation vs. motivational impulses).

regulation. Although some mechanisms are music-specific (e.g. rhythm), some mechanisms are general psychological processes, not specific to music (e.g. memories). However, as mechanisms are here studied in the context of music as the means for self-regulation, they will be addressed as *musical* mechanisms.

## **Research on strategies and mechanisms in the context of musical affect regulation**

The study of strategies within musical affect regulation is especially challenging due to the unfittingness of general affect regulation models to the case of music (Randall, Rickard, & Vella-Brodrick, 2014) and the difficulty in defining strategies and differentiating them from other concepts such as musical goals and tactics (Baltazar & Saarikallio, 2016). Studies differ in whether the strategy as a concept refers to processes identified in general affect regulation or processes encountered specifically in music, but overall, music has been reported to facilitate strategies such as *reappraisal* (Chin & Rickard, 2014a; Randall et al., 2014), *entertainment/fun seeking* (Gebhardt, Kunkel, & Von Georgi, 2014; Saarikallio & Erkkilä, 2007), *relaxation* (Van Goethem & Sloboda, 2011), *revving up/energizing* (DeNora, 1999; Saarikallio, 2011), and *finding solace* (Saarikallio & Erkkilä, 2007) (see a complete compilation in Baltazar & Saarikallio, 2016). Recent work has also noted that different strategies have differing impacts on development, wellbeing, and psychological health (Carlson et al., 2015; Chin & Rickard, 2014a; Gebhardt et al., 2014; Marik & Stegemann, 2016; Schäfer & Sedlmeier, 2009; Thoma, Ryf, Mohiyeddini, Ehlert, & Nater, 2012; Thomson, Reece, & Di Benedetto, 2014).

As for the underlying mechanisms in music, the first approach was taken towards musical emotion induction (Juslin, Barradas, & Eerola, 2015; Juslin & Västfjäll, 2008a, 2008b). Juslin and Västfjäll (2008a) identified six mechanisms underlying emotion induction through music: *brain stem reflex*, *evaluative conditioning*, *emotional contagion*, *visual imagery*, *episodic memory*, and *musical expectancy*. Later, *rhythmical entrainment* (2008b) and *aesthetic judgment* (Juslin, 2013) were added to the list.

However, there is more to affect regulation than emotion induction (for example, suppression of affective responses). Within affect regulation, Van Goethem and Sloboda (2011) identified eight underlying mechanisms: *type of music*, *familiarity*, *unrelated activity*, *emotion of music*, *memories*, *content of music*, *related activities*, and *other world* (from higher to lower frequency). Although not named as such, other musical mechanisms have been sparsely present in other studies, such as *connection*, *memory triggers*, *high aesthetic value*, and *message* (Van den Tol & Edwards, 2013) and *extramusical associations*, *acoustical properties*, and *identification with artist/lyrics* (Bishop et al., 2007).

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While conceptually differentiated, strategies and mechanisms occur as interrelated elements of affect regulation. Yet, only preliminary studies of their interlinkage exist. Van Goethem and Sloboda (2011) reported an association between the strategy *active coping* and the mechanisms *memories* and *related/unrelated activities*, and between the strategy *relaxation* and *emotion, type of music* and *familiarity*. Saarikallio, Baltazar & Västfjäll (2017) reported that strategies *distraction* and *emotion induction* were linked to *musical* mechanisms, while strategy *processing* was linked to both *musical* and *mental* mechanisms.

### **Aim of the current study**

Despite the advancements of studying music-related regulation strategies and mechanisms, there still is great conceptual ambivalence in the field (Baltazar & Saarikallio, 2016). In particular, it is far from clear how each mechanism is used in cooperation with a particular regulation strategy. For this reason, the principal aim of the present study was to explore the associations between strategies and mechanisms used while regulating affect through music.

## METHODS

### **Participants**

The sample consisted of 571 participants, of which 24 were excluded due to incomplete answers, leading to a final sample of 547 participants. The sample's characteristics are described in Table 1. The participants were recruited through several means: schools, mailing lists, social media, webpages for recruiting participants, psychology experiments webpages, and the researchers' personal networks (there is no data on how many participants came from each). Except for the participants who were recruited directly from schools, the participation

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was done online. All the participants were voluntary and gave their informed consent. No compensation was offered.

**TABLE 1.** Descriptive statistics of the sample.

N = 547 participants

		<i>n</i> (%)	<i>M</i>	<i>SD</i>	Median	Min.	Max.
Age			21	4,72	20	13	30
	13-15	63 (12%)					
	16-18	135 (25%)					
	19-21	113 (21%)					
	22-24	85 (16%)					
	25-27	73 (13%)					
	28-30	78 (14%)					
Gender	Female	249 (46%)					
	Male	289 (53%)					
	Other	9 (2%)					
Nationality	Finnish	192 (35%)					
	Portuguese	195 (36%)					
	American	67 (12%)					
	Other (less than 15 counts)	93 (17%)					
Occupation	Elementary student	38 (7%)					
	Secondary student	146 (27%)					
	Bachelor student	150 (27%)					
	Master student	57 (10%)					
	Doctoral student	28 (5%)					
	Working	92 (17%)					
	Homemaker	3 (0.5%)					
	Unemployed	33 (6%)					
Music education	None	146 (27%)					
	Subject at school	310 (57%)					

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Extracurricular activity	130 (24%)
Private tutoring	170 (31%)
Self-taught	137 (25%)
Music academy	61 (11%)
Music conservatory	31 (6%)
University	13 (2%)

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*Note.* Totals may not round up to 100% due to rounding. Min. = Minimum value; Max. = Maximum value.

### Measures – Questionnaire

The data were collected through a computer-based questionnaire, designed specifically for this study. The participants were asked to recall the last moment when they engaged with music (by listening, playing, watching concerts, or creating) with some affective intention/outcome. Participants then identified which strategies they put in practice and which mechanisms were the most relevant. The strategies and mechanisms presented as options were retrieved from the literature (Baltazar & Saarikallio, 2016) and consisted of 13 mechanisms and 25 strategies (organized in five categories). While the minimum was to choose one strategy and one mechanism, participants could choose as many options as they wished. The questionnaire is in Appendix.

### Statistical procedures

#### Categorization

As a standard first step for dimensionality reduction methods, a preliminary analysis was conducted to assess the structure of the answers, perform some necessary categorization, and label categories. Categorization, and sometimes recoding, of data might be necessary for correspondence analysis (Greenacre, 1984; Kaciak & Louviere, 1990), given that this technique is based on a table of



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crossed frequencies (i.e. contingency table). For the variable Mechanisms, no further categorization was needed. The participants were allowed to choose more than one mechanism and order them from the most to the least relevant. However, only the first choice is included in this analysis. In the particular case of the mechanism *musical expectancy*, only 8 participants selected this mechanism as a first choice. Given the small frequency, *musical expectancy* was replaced by the participants' second mechanism. See Table 2 for the list of mechanisms and their definitions.

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TABLE 2. Underlying mechanisms for musical affect regulation.

Mechanisms	Conceptualization
Genre	Overall style/kind of music
Preference	Favourite music
Familiarity	Experienced and well-known music
Identification	Personal identification with the artist's experience or identity
Lyrics	Text sang/recited during the music
Acoustics	Loudness, timbre, sonority
Rhythm	Influence from the pace and rhythm of the music on affective states (e.g. arousal).
Memories	Episodic memories that are activated through the music
Associations	Pairing between music and some other stimuli ("evaluative conditioning" in Juslin & Västfjäll, 2008b)
Aesthetics	Perceived aesthetic value by the individual
Contagion	Induction of the expressed affective state by the music
Imagery	Visual imagery that has the power to change or create affective states
<i>Musical expectancy</i> *	<i>Changes in music that confirm or contradict the expected structure of the music (Juslin &amp; Västfjäll, 2008a)</i>

Note. \* not included in the correspondence analysis. Based on Bishop et al (2007), Juslin (2013a, 2013b), Juslin & Västfjäll (2008a, 2008b), Van den Tol & Edwards (2015), Van Goethem and Sloboda (2011).

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As for Strategies, the participants could choose from one up to five categories, thus creating multi-answer data. The five main categories already present in the questionnaire were kept: 1 - Focus on thoughts, affective state and/or situation, 2 - Distraction from thoughts, affective state and/or situation, 3 - Cognitive Work, 4- Modify feelings, 5- Bodily reactions/behaviour. A total of 335 participants chose just one of these options. For the 128 participants who identified two strategies, it was necessary to create new categories based on combinations in order to represent the simultaneous use of strategies. As the combination of Body reactions/behaviour with other strategy was rare (17 occurrences), these participants were categorized on the main category "Body". Eighty-four participants chose three or more strategies, and a specific category reflecting the simultaneous (and possibly low differentiated) strategies was created for them (Three or more). As the count for each possible combination of three strategies was low, it would not be feasible to keep them separately. Table 3 shows the final strategy categories and presents their code names that will be used in the text from now on. The specific strategies included in each category can be seen in the questionnaire (Appendix). Overall, the categorization procedure resulted in a total of 12 mechanisms and 12 strategies to be used in the subsequent analyses.

**TABLE 3.** Strategies and their categorization.

Categories	Code name
Focus on thoughts, feelings, and/or situation	Focus
Distract from thoughts, feelings, and/or situation	Distract
Cognitive work	Cognitive work
Modify feelings/experience	Modify feelings
Bodily reactions and behaviour	Bodily reactions
Focus and distract	FD
Focus and cognitive work	FC
Focus and modify	FM
Distract and cognitive work	DC
Distract and modify	DM
Cognitive work and modify	CM
Three or more	+3

*Note.* The combined categories included all the strategies belonging to the individual categories. The *three or more* category includes all the combinations with three or more strategies.

### **Correspondence analysis**

Correspondence analysis (CA) is a descriptive and exploratory technique developed to deal with contingency tables (Benzécri, 1992). Described as a “variant of principal component analysis (PCA) applicable to categorical data” (Greenacre, 2015, p. 1), this technique is especially useful when the size of the tables does not allow to see appropriately the underlying associations. Complex data is simplified by the extraction of the least number of dimensions that explain the most inertia (i.e. variance). Besides demonstrating the association between variables, CA projects these associations into a biplot, with the distances between the points calculated through the chi-square statistic.

This technique perfectly fits to the current data, as it was categorical, included several levels, its complexity did not allow to directly perceive underlying associations, and there was no model to explain/predict it (Greenacre, 1984). Because our aim was to describe both variables (Strategies and Mechanisms) and explore the associations between them, we computed symmetrical coordinates. The analyses were computed with the Matlab package Correspondence Analysis with Rotations (CAR; Lorenzo-Seva, van de Velden, & Kiers, 2009).

## RESULTS

### Extracting the dimensions and their contributing variables

The first step in CA is the extraction of the dimensions explaining the most of the inertia (i.e. variance) by analyzing the cross-tabulated data. The chi-square test of independence examined the relation between the row and column variables in the contingency table (mechanisms and strategies; see Table 4) and showed that the relation was significant,  $X^2(121, N = 547) = 147.24, p < .05$ . Power-divergence statistic with  $\lambda = 2/3$  (Read and Cressie, 1998) was used as suggested for small tables (Parshall, Kromrey, & Dailey, 1995). The first three dimensions explained 78.5% of the inertia, with each one explaining more than the expected average (33.4%, 25.3%, and 19.8%, respectively). The analysis of the scree plot and eigenvalues (Table 5), and the Hull's parallel analysis (Lorenzo-Seva, 2011) confirmed the extraction of the three dimensions.

One of the outputs of CA is the contribution of each row and column to the dimensions. The rows and columns with higher contributions are the most meaningful for the dimension and relevant for its interpretation. The contributions that are larger than the average (i.e.  $1/\text{number of rows}$  and  $1/\text{number of columns}$ ) are considered salient contributions and retained for interpretation. Table 6 shows the contributions for each row and column, with salient values (i.e. values higher than the average contribution, 0.083) in bold face.

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**TABLE 4.** Contingency table with Mechanisms as row and Strategies as column.

	F	D	CW	MF	B	FD	FC	FM	DC	DM	MB	+3	Total
Ge	8	15	3	4	3	1	2	0	0	0	0	3	39
Pr	6	11	6	7	5	4	1	2	2	4	0	9	57
Fa	7	7	3	2	0	0	1	0	0	2	0	4	26
Id	3	0	5	1	0	1	1	0	2	0	0	2	15
Ly	9	11	10	2	0	4	7	1	5	2	0	9	60
Ac	7	10	7	1	3	1	2	0	2	1	1	4	39
Rh	14	20	6	13	10	5	2	2	1	3	3	11	90
Me	8	6	6	6	3	1	6	2	2	4	3	10	57
As	3	3	6	3	2	1	2	0	1	1	1	4	27
Ae	8	8	4	6	3	1	5	4	1	7	0	15	62
Co	2	8	5	6	7	5	2	2	2	3	3	5	50
Im	3	2	5	3	0	0	1	0	1	1	1	8	25
Total	78	101	66	54	36	24	32	13	19	28	12	84	547

*Note.* Columns (Strategies): F = Focus, D = Distraction, CW = Cognitive work, MF = Modify feelings, B = Bodily reactions, FD = Focus and Distract, FM = Focus and Modify feelings, DC = Distract and cognitive work, DM = Distract and Modify, +3 = More than three strategies.

Rows (Mechanisms): Ge = Genre, Pr = Preference, Fa = Familiarity, Id = Identification, Ly = Lyrics, Ac = Acoustics, Rh = Rhythm, Me = Memories, As = Associations, Ae = Aesthetics, Co = Contagion, Im = Imagery.

**TABLE 5.** Eigenvalues, percentage of inertia explained, and scree plot for the first five dimensions.

Dim.	Eigenvalue	%	Cum%	Scree plot
1	0.0898	33.4	33.4	*****
2	0.0682	25.3	58.7	*****
3	0.0533	19.8	78.5	*****
4	0.0252	9.4	87.9	*****
5	0.0163	6.1	94.0	*****

*Note.* Dim. - Dimensions; % - Percentage of inertia explained by each dimension; Cum% - Cumulative percentage of inertia

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**TABLE 6.** Rotated symmetrical coordinates for each category under Strategies and Mechanisms and their respective contributions for each of the extracted dimensions (in percentage).

	Coordinates			Contributions (in %)		
	Dimension			Dimension		
<i>Strategies (Columns)</i>	1	2	3	1	2	3
Focus	0.051	0.323	0.536	0.1	5.7	<b>16.3</b>
Distract	0.438	0.657	0.207	<b>12.5</b>	<b>30.5</b>	3.1
Cognitive work	-0.870	0.157	0.033	<b>32.3</b>	1.1	0.1
Modify	0.404	-0.151	-0.346	5.7	0.9	4.7
Body	0.617	0.244	-1.041	<b>8.9</b>	1.5	<b>28.4</b>
FD	-0.260	0.272	-1.029	1.1	1.2	<b>18.5</b>
FT	-0.510	-0.363	0.400	5.4	2.9	3.7
FM	0.634	-1.300	-0.324	3.4	<b>15.4</b>	1.0
DT	-1.479	0.019	-0.229	<b>26.8</b>	0.0	0.7
DM	0.413	-1.004	0.156	3.1	<b>19.7</b>	0.5
TM	-0.088	-0.281	-1.404	0.1	0.7	<b>17.2</b>
+3	-0.034	-0.588	0.289	0.1	<b>20.3</b>	5.1

<i>Mechanisms (Rows)</i>						
	1	2	3	1	2	3
Genre	0.585	1.030	0.427	<b>8.6</b>	<b>28.9</b>	5.2
Preference	0.226	-0.068	-0.223	1.9	0.2	2.1
Familiarity	0.334	0.313	1.032	1.9	1.8	<b>20.2</b>
Identification	-1.804	0.181	0.042	<b>31.6</b>	0.3	0.0
Lyrics	-0.768	0.125	0.371	<b>22.8</b>	0.7	6.0
Acoustics	-0.302	0.647	0.145	2.3	<b>11.4</b>	0.6
Rhythm	0.497	0.269	-0.342	<b>14.4</b>	4.6	7.7
Memories	-0.094	-0.527	0.001	0.3	<b>11.1</b>	0.0
Association	-0.536	0.006	-0.245	5.0	0.0	1.2
Aesthetics	0.388	-0.904	0.423	6.0	<b>35.5</b>	8.1
Contagion	0.091	-0.088	-1.129	0.3	0.3	<b>46.4</b>
Imagery	-0.519	-0.548	0.330	4.4	5.2	2.0

*Note.* The values with a contribution higher than average are in bold face.

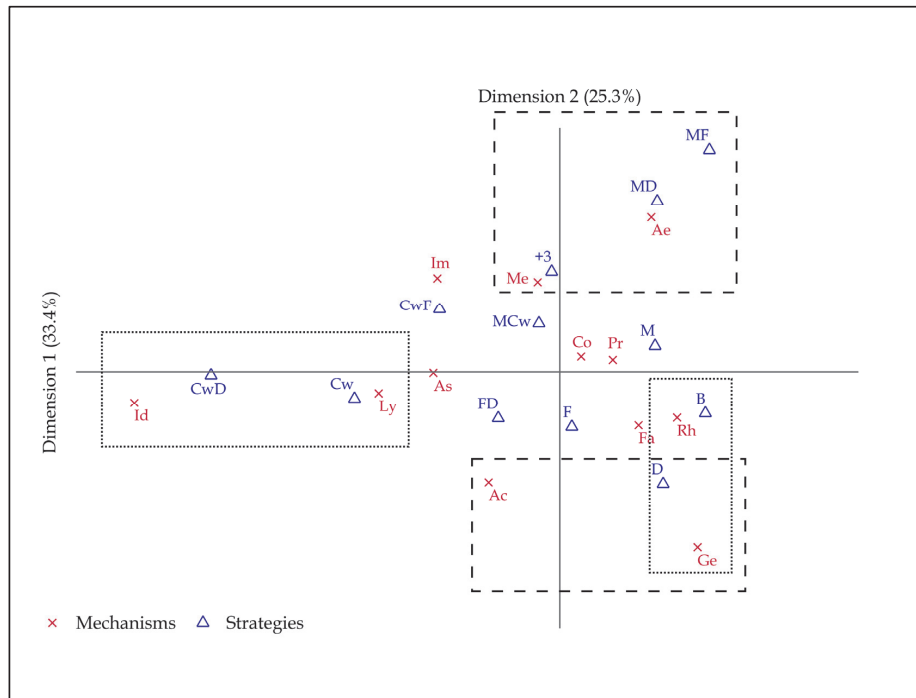


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The values in Table 6 are further represented in a visual translation in Figures 2(a), 2(b), and 2(c). As more than two dimensions were extracted and the dimensions were not correlated, the solution was orthogonally rotated (varimax) to improve its graphical representation (Lorenzo-Seva et al., 2009; Van De Velden & Kiers, 2005). No weighting system was applied, as it yielded the best results in Bentler's simplicity index (1997) (before rotation: .587 and .480, after rotation: .935 and .935, for row and column coordinates respectively).

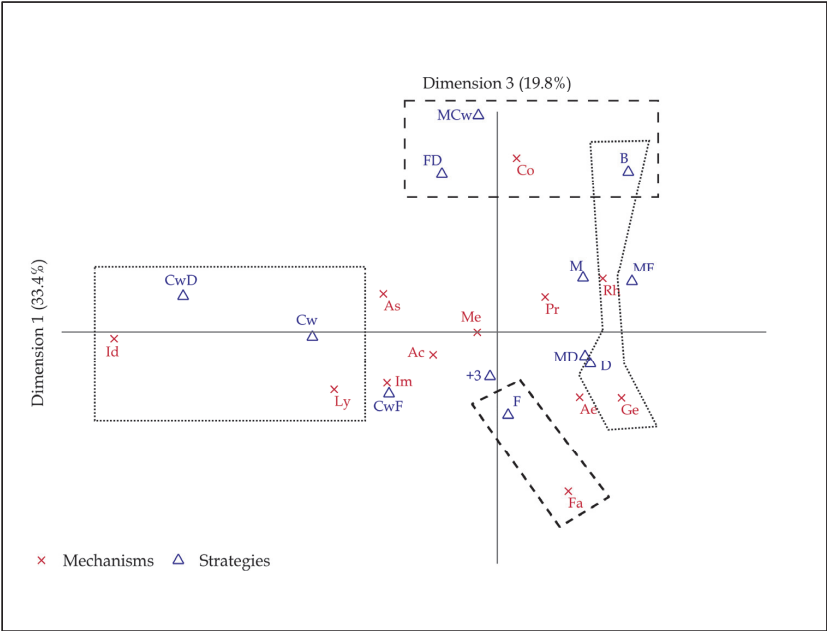
Figure 2(a) depicts all the strategy and mechanism categories projected simultaneously in the space created by the associations between them, in dimensions 1 and 2. Figure 2(b) includes dimension 1 and 3, while Figure 2(c) represents the dimensions 2 and 3. The variables that have a stronger contribution for the dimension are closer to each extreme; the central position shows a contribution close to zero. The categories retained for interpretation, due to their significant contributions, are circled in the biplots. Two strategies (*modify feelings, cognitive work and focus*) and three mechanisms (*preference, association, and imagery*) did not have salient contributions for any of the dimensions.

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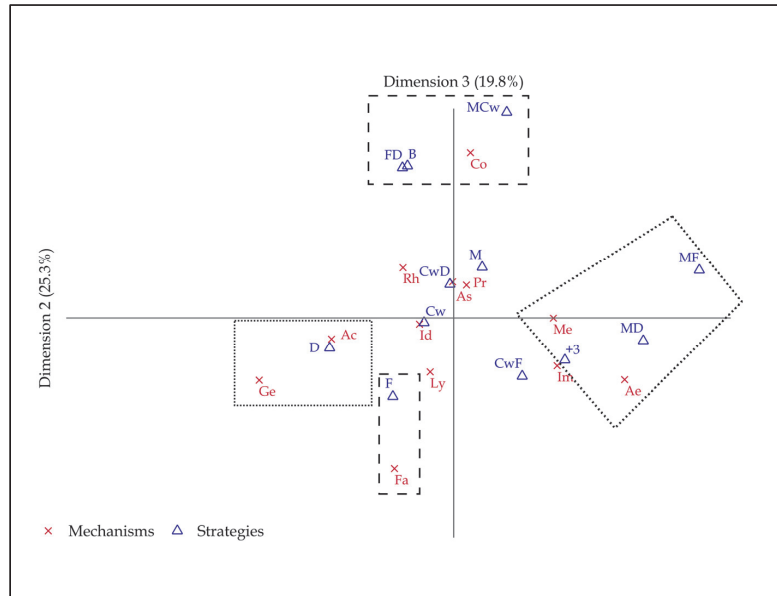
**FIGURE 2(a).** Biplot with visual representation of dimensions 1 and 2. The categories with significant contributions to dimension 1 are inside the dotted line and to dimension 2 are inside the dashed line.

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**FIGURE 2(b).** Biplot with visual representation of dimension 1 and 3. The categories with significant contributions to dimension 1 are inside the dotted line and to dimension 3 are inside the dashed line.

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**FIGURE 2(c).** Biplot with visual representation of dimension 2 and 3. The categories with significant contributions to dimension 2 are inside the dotted line and to dimension 3 are inside the dashed line.

### Describing the extracted dimensions

The analysis resulted in a three-dimensional solution built of both regulatory strategies and mechanisms. The description of the dimensions is based on the analysis of the relevant strategies and their associations with musical mechanisms. Table 7 summarizes the features of each dimension that will be later used for their interpretation.

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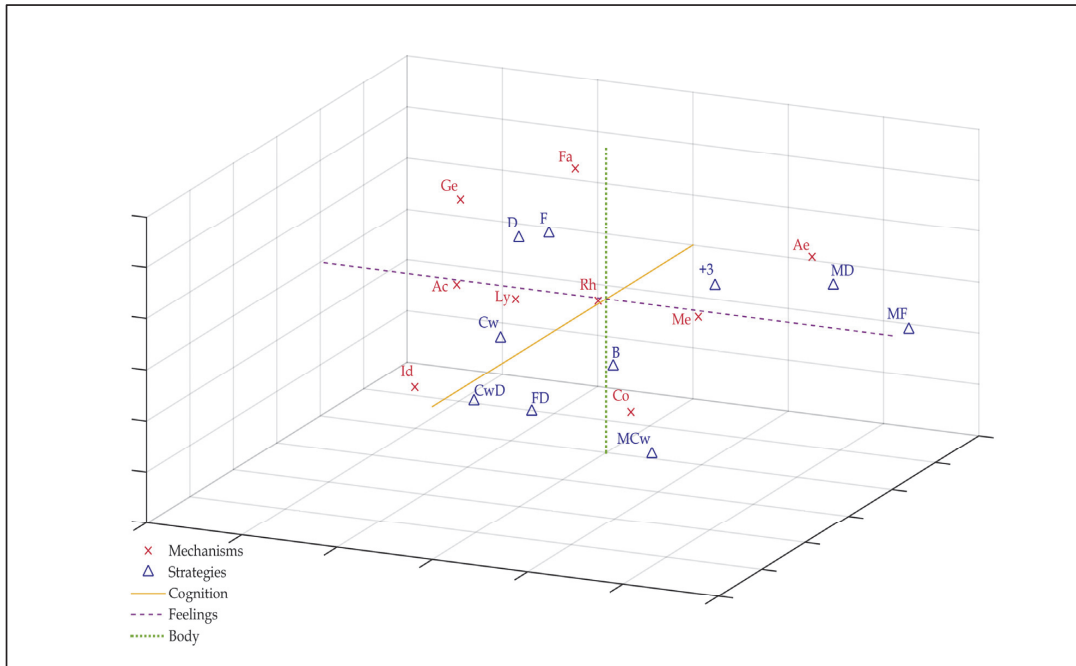
**TABLE 7.** The three dimensions extracted, their contributions, and labelling.

D	Explained inertia	Strategies and <i>mechanisms</i>	Poles' labelling	Underlying component
1	33.4%	Cognitive work Cognitive work and distract <i>Identification</i> <i>Lyrics</i>	Cognitive work	Cognition
		Distract Body <i>Rhythm</i> <i>Genre</i>	Entertainment	
2	25.3%	Three or more Modify and distract Modify and focus <i>Aesthetics</i> <i>Memories</i>	Affective work	Feelings
		Distract <i>Genre</i> <i>Acoustics</i>	Distraction	
3	19.8%	Body Focus and distract Modify and think <i>Contagion</i>	Revival	Body
		Focus <i>Familiarity</i>	Focus situation	

*Notes:* D = Dimensions. The mechanisms were italicized in order to facilitate the reading through the table.

By taking into account both poles of the three dimensional solution (Table 7), the results reveal six major groups of strategy-mechanism combinations, which portray different processes of affect regulation through music. The labelling of the dimensions (columns 4 and 5 in Table 7) was done by analyzing and counterposing the strategies and mechanisms on the poles (column 3). We suggest looking at each dimension as representing a higher or lower focus on a component of affect regulation: cognition, feelings, bodily reactions. The visual representation of these three dimensions can be seen in Figure 3.

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**FIGURE 3.** Three-dimensional projection of the associations between strategies and mechanisms that had relevant contributions to the axes (dimensions Cognition, Feelings, and Body).

## DISCUSSION

The three-dimensional solution emerging from the data describes musical affect self-regulation as a combination of strategies and mechanisms across three affective components: cognition, feelings, and bodily reactions. The solution serves as a base for a model of strategic use of music for affect self-regulation (Figure 4).

### The model of strategic use of music for affect self-regulation

In the following paragraphs, we will discuss this emergent model and its constituent elements by starting with the extracted dimensions (representing the three core affective components) and their respective poles, continuing with the division of strategies and mechanisms into two groups, illustrated by the two halves of Figure 4.

#### Dimension 1: Cognition (cognitive work vs entertainment)

Dimension 1 shows how close or distant the regulation was to cognition. One pole represents cognitive work, which constitutes a separate major group of regulation strategies (Garnefski, Kraaij, & Spinhoven, 2001), and includes, for example, *reappraisal* and *perspective taking*. Reappraisal specifically has been linked to higher effectiveness and better affective outcomes, both in general regulation (Augustine & Hemenover, 2009; Gross & John, 2003) and musical regulation (Chin & Rickard, 2014b). Regulation through cognitive work can be seen as an effort of gaining new meanings before a total response takes place (antecedent-focused; Gross, 1998). The combined use of *cognitive work* and *distraction* might reveal the supporting effect of disengagement from undesired thoughts or feelings in attaining new cognitive perspectives. The mechanisms *identification* and *lyrics* point at a desirable congruity with the artists/emotional content and with the extracted meaning to support cognitive strategies.

As for the other pole of this dimension, *distraction* and *body* signal an attempt at turning to non-cognitive stimuli for influencing mood and arousal. This has been identified by Saarikallio and Erkkilä (2007) as *entertainment*, a strategy of having music in the background for lifting up spirits and maintaining positive mood. Similarly, the model of activation and arousal modulation with music (Gebhardt & Von Georgi, 2007), includes *fun stimulation* as a basic dimension. The regulation of bodily feelings got a less relevant score in this dimension and it possibly assists *entertainment* through *relaxation* or *energizing*. The disengagement from cognitive processing seems to be facilitated by music features like *rhythm* and *genre*. Music's styles and features have already been reported to serve different affective goals (Hakanen, 1995). One particular way of taking advantage of genre and beat is through ironically-enjoyed music, which might be more stimulating than preferred music (van den Tol & Giner-Sorolla, 2016).



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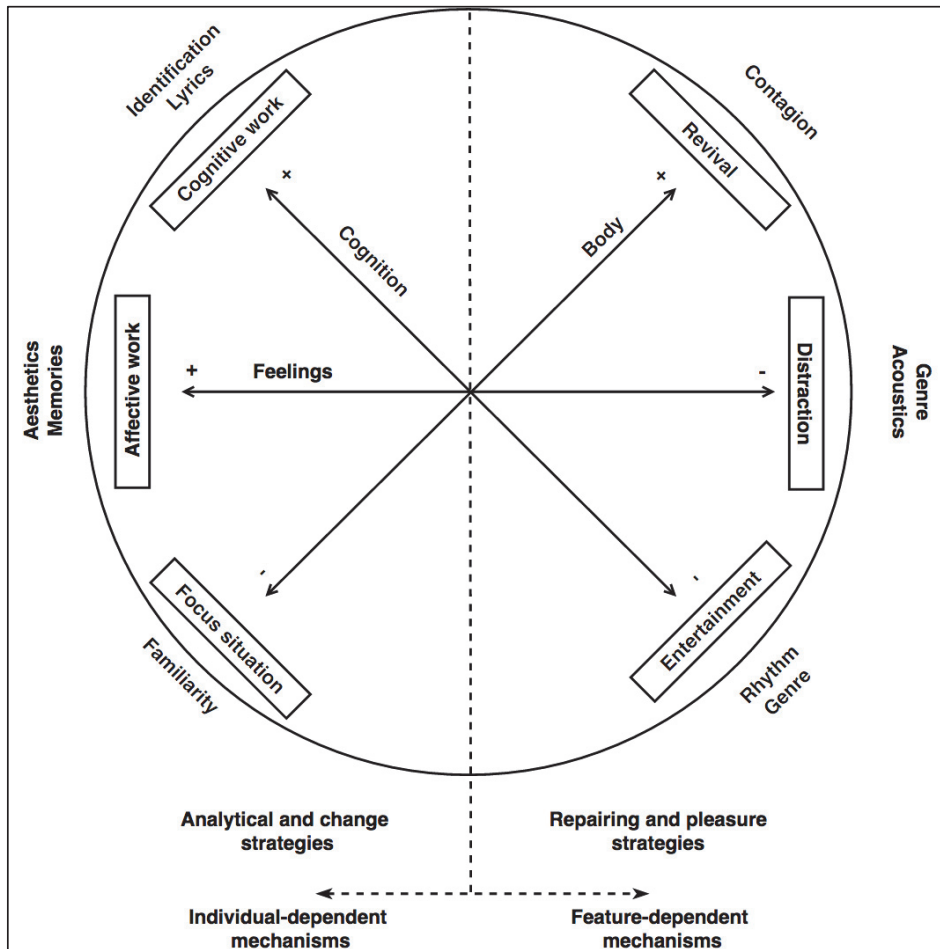


FIGURE 4. Model of strategic use of music for affect self-regulation.

Note. A higher use of the process that names the dimension (e.g. cognition) is marked with '+' and a lower use of that process if marked with '-'.

### **Dimension 2: Feelings (affective work vs distraction)**

The second dimension indicates whether regulation particularly focuses on feelings and affective reactions (labelled *affective work*) or aims to disengage from them (labelled *distraction*). *Affective work* involves a large variety of strategies and is highly complex: the variables *more than 3 strategies, modify and distract, modify and focus*, all contributed significantly to this pole. It encompasses, amongst others, three strategies from Saarikallio and Ekkilä's model (2007): *happy mood maintenance, solace* and *strong sensations*, which have in common the use of affective resources, either by preserving experienced states, changing them, or creating new ones. Regarding mechanisms, this pole was linked to enjoyment of beauty (*aesthetics*). Interestingly, Saarikallio, Nieminen, and Brattico (2013) report that people who relate more to aesthetic components of music tend to use it to elicit strong affective responses. Moreover, aesthetic fruition may be used to mood enhancement (Van den Tol & Edwards, 2015). The second supporting mechanism revealed to be *memories*. In the context of sad music listening, *memories* related to feeling closer to others and intensifying sadness (Van den Tol & Edwards, 2015), which are processes close to affective work.

The opposite pole of this dimension represents distraction, which is one of the most common strategies used while listening to music (Boer & Fischer, 2012; Van Goethem & Sloboda, 2011). *Distraction* provides the possibility of shifting from negative stimuli to positive or neutral music, thus avoiding the undesired affective states (Gross, 2015). Recent literature suggests that *distraction* might be an adaptive strategy due to its low engagement in negative thoughts/feelings (Carlson et al., 2015; Van den Tol & Edwards, 2015). *Distraction* has some similarities with *entertainment* both at strategic and musical level: withdraw from cognitive/affective processing and use of music's features to either distract or have fun.

### **Dimension 3: Body (revival vs focus on situation)**

In the third dimension, we found a differentiation between the focus on arousal states and on the experienced situation or task at hand. The first pole is linked to modifying bodily feelings through relaxing, energizing, and improving flow (here named as *revival*). Music has been often identified as a means of relaxation (DeNora, 1999; Saarikallio et al., 2017) and energizing (Bishop et al., 2007). *Contagion* was the supporting mechanism for revival. This mechanism has the

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ability of inducing the music's expressed valence and arousal, and it has been found to successfully contribute to relaxation (Saarikallio et al., 2017; Van Goethem & Sloboda, 2011).

The opposing pole does not show focus on bodily change. Instead, the attention is set in the situation and focus is tuned on to the experience and related thoughts, feelings, or surroundings (here named as *focus on situation*). It might be an attempt at getting a better feel of what is happening or concentrating on some specific task (e.g. studying). Music can indeed be used to improve mental and physical performance (Bishop et al., 2007; Laukka & Quick, 2013). In terms of mechanisms, focus on situation was related to *familiarity* of music. Interestingly, it has been observed that familiar music has a more positive effect on word memory tasks than unfamiliar music (Chew, Yu, Chua, & Gan, 2016). One might hypothesize that familiar music leaves more cognitive and affective resources available for focusing on the phenomenon while, simultaneously, providing stability to the individual.

### **Regulation strategies: emerging patterns**

On the left side of the model (Figure 4), we have strategies related to a higher mental processing, either by cognitive work, affective work, or deployment of attention to the current situation. Opposed to these, on the right side, we can find strategies concerning the regulation of arousal levels (revival), distraction, and entertainment. There is, thus, a contrast between active, contemplating, affect-processing and cognition-loaded regulation (through what we called *analytical and change strategies*) and more passive, pleasure-oriented, and body-focused regulation (through what we called *repairing and pleasure strategies*)

Furthermore, it was observed that the simultaneous use of strategies is frequent. This study grasped what Gross (2015) calls "blended" forms of regulation, in contrast with "pure" forms of regulation (i.e. involving only one strategy), which constitute the object of the vast majority of the empirical literature. Our results point to the importance of allowing multiple answers in order to explore different layers of regulation and simultaneous processes.

### **Musical mechanisms: emerging patterns**

On the left side of the model (Figure 4), associated with analytical and change-oriented strategies, we find mechanisms that can be labelled individual-dependent. Individual-dependent mechanisms are reflective of the experience emerging from the relationship between the individual and the music. This group included the following categories: *identification, lyrics, aesthetics, memories, and familiarity*.

Meanwhile, on the right side, supporting repairing and pleasure-oriented strategies, situate the feature-dependent mechanisms. The feature-dependent mechanisms are related to more universal characteristics of music regarding sound, style, and valence. This group was composed of the following mechanism categories: *rhythm, genre, acoustics, and contagion*.

We concluded, thus, that mechanisms are a bi-dimensional (individual- and feature-dependent) variable and that these two categories have a particular interplay with the two major categories of regulation strategies (as seen in Figure 4). The categorization is somewhat in line with Sloboda and Juslin's (2001) coding of underlying emotions in music: iconic, intrinsic, and associative, with iconic and intrinsic coding reflecting feature-dependent and associative coding reflecting individual-dependent mechanisms. Likewise, in the context of adolescents' musical relaxation, Saarikallio, Baltazar, and Västfjäll (2017) grouped mechanisms into musical (including melody and music's valence/arousal, comparable to feature-dependancy) and mental (including memories and images, comparable to individual-dependancy).

## **CONCLUSION**

The current study provided grounds for a clarified conceptual understanding of how the affect-regulatory processes structurally interrelate in a musical context. The emergent model portrays the existent links between two of the key elements of musical affect regulation: strategies and mechanisms. Besides the three-dimensional structure that emerged, the conceptual understanding gained from the model concerns the structure of mechanisms (bidimensional: feature- and individual- related) and strategies (bidimensional: analytical, focused on change and repairing, focused on pleasure), and the associations between the two variables (feature-related mechanisms associate with repairing

## STRATEGIES AND MECHANISMS IN MUSICAL AFFECT REGULATION

strategies, and individual-related mechanisms associate with analytical strategies). Future research will be helpful to further explore the eventual relations between the three dimensions, individual factors, and wellbeing variables.

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### APPENDIX

#### Questionnaire [section concerning the reported results]

How was music a 'tool' for you?  
Music helped me to:

- focus deeply on what was happening or what I was feeling.  
Please specify on what:
  - experienced feelings
  - situation and/or its meaning and consequences
  - memories related to the situation or to the feelings
  - elements of the music that provided support and acceptance
- distract myself.  
Please specify from what:
  - thoughts
  - feelings
  - elements around me
  - memoriesPlease specify on what you focused:
  - visual and auditory imagery
  - aspects of music
  - pleasant thoughts and/or feelings
  - memoires
- think about what happened or about what I was feeling.  
Please specify how:
  - by having a rational view on it
  - by reflecting on it
  - by understanding it
  - by accepting it
- change my way of thinking.  
Please specify how:
  - by finding different meanings for the situation
  - by finding different meanings for the affective reaction
  - by seeing the situation/reaction through a distance perspective

## STRATEGIES AND MECHANISMS IN MUSICAL AFFECT REGULATION

- by suppressing my thoughts
- manipulate my feelings.
  - Please specify how:
    - by seeking strong sensations
    - by maintaining or increasing what I was feeling
    - by decreasing or inhibiting what I was feeling
- focus on my body and expressions.
  - Please specify how:
    - by increasing body functioning (flow, endurance, performance)
    - by revving up/energising
    - by meditating
    - by suppressing bodily reactions
    - by controlling my breathing and relaxing the muscles
    - by venting/discharging what I was feeling
    - by suppressing any expression of feelings

Which elements of music influenced you the most?

Select from the list and order them from the most important (on top) to the least important (bottom). The minimum selection is one; there is no maximum.

- the genre of music
- it was my preferred music
- it was some music that I already know quite well
- I could identify myself with the artist(s) during the song
- the lyrics
- acoustic features of the music (e.g. volume, timbre, sounds...)
- rhythm/ pace of the music
- memories linked to that music
- associations with other things outside the music
- I find that music very beautiful/ aesthetically valuable
- I started to feel the same emotions that were expressed by the music
- it provoked visual images in my mind
- it had changes during the song or developments that I could not predict

### **III**

#### **MUSICAL AFFECT REGULATION IN ADOLESCENTS: A CONCEPTUAL MODEL**

by

Margarida Baltazar (in press),

In K. McFerran, P. Derrington, and S. Saarikallio (Eds.), *Handbook of Music  
and Adolescence*

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## MUSICAL AFFECT REGULATION: CONCEPTUAL MODEL

[Preprint of a chapter that has been accepted for publication by Oxford University Press in the forthcoming book “Handbook of Music and Adolescence”, edited by Katrina McFerran, Phillipa Derrington, and Suvi Saarikallio due for publication in 2019]

### **ABSTRACT**

Adolescents actively use music for affect regulation. In this chapter, affect is considered as a broad umbrella term containing moods, emotions, motivational impulses, and energy levels. Theoretical and empirical research has recently been unveiling the components involved in affect self-regulation, such as the psychological functions of music listening, affective goals, regulation strategies, and musical mechanisms. The study of these components and of their interactions has resulted in a better understanding of the dynamics between music engagement, wellbeing, and psychological development amongst adolescents. The purpose of this chapter is to present a conceptual model of musical affect self-regulation. The core components of the model are regulatory strategies and musical mechanisms, which interact across the dimensions of cognition, feelings, and bodily reactions.

Keywords: Adolescent, affect regulation, development, musical mechanism, music, regulation strategy, wellbeing

## INTRODUCTION

The ubiquity of music in adolescents' lives has conferred it an immense responsibility and incomparable power: the one of lifting shattered emotions, blowing the blues away, keeping it low, or changing the key. But what exactly is the role of music and how can we study it? Is there something special about music? This chapter will explore how adolescents use music to self-regulate their affect. A conceptual model of affect regulation through music will be presented, drawing support from both psychology and music research.

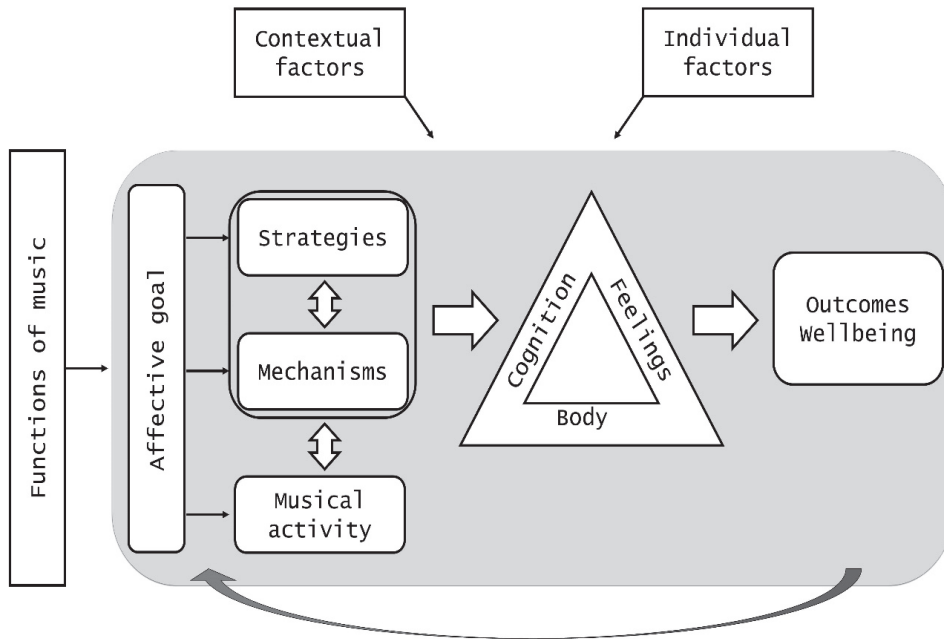
## AFFECT AND AFFECT REGULATION

When talking about their relationship with music, adolescents often report the regulation of different affect dimensions simultaneously (e.g. "I received emotions of joy and happiness and emotional sensations. I got into a good mood and I started feeling ample [sic] and happy. I started to feel like dancing.", Saarikallio et al. 2017). Given this overlap in daily life experience, this chapter follows the suggestion of Baltazar and Saarikallio (2016) and adapts the umbrella term affect in order to include the states related to the positive/negative evaluation of external and internal stimuli. This term allows us to gather together states such as emotions, moods, motivational impulses, stress responses, and arousal (Juslin and Sloboda 2010; Scherer 2005). Affect regulation is then taken to mean all the attempts made by the young person at creating, changing, or maintaining any of these affective states. Only the regulation of one's own affective states (i.e. self-regulation) will be addressed in this chapter.

Affect is highly informative: through our feelings, we get valuable cues about what is happening around us and its meaning (Damasio 2000). However, affect cannot flow freely in a constant stream of strong emotions, moving moods, and varying levels of arousal. It requires regulation and this is a constant process where the person thrives for a better balance between personal goals, emotions, and context (Tamir and Ford 2012; Aldao and Nolen-Hoeksema 2012; Tamir 2016).

Adolescence is a special developmental stage since major changes occur at several levels - affective, biological, cognitive, social, and identity (for a review, see Gowers 2005). During these changes, emotional experiences can be more intense and unstable and social or external regulation may be decreased (Yap et al. 2007). Due to the developmental challenges faced, adolescence and early adulthood are critical points of vulnerability (Steinberg 2005). If the adolescent is lacking self-regulation skills, there is an increased risk of social difficulties, lower psychological and emotional adjustment, and internalization and externalization symptoms (Garnefski et al. 2005).

MUSICAL AFFECT REGULATION: CONCEPTUAL MODEL



**Figure 1.** Integrative model of affect self-regulation through music (Baltazar and Saarikallio 2017b).



## **MODEL OF AFFECT SELF-REGULATION THROUGH MUSIC: PUTTING THE PIECES TOGETHER**

The model depicted in Figure 1 combines several components of musical affect regulation that have been identified in recent literature (Van Goethem and Sloboda 2011; Baltazar and Saarikallio 2016, 2017a). In this model, affect regulation is one amongst many functions of music. The affective goals influence the choice of musical activities, regulatory strategies, and the musical mechanisms. Regulation strategies and musical mechanisms form specific associations represented in the triangle of 'cognition, feelings, body'. The process of regulation results in changes that, in the long-term, are related to the adolescents' wellbeing. Affect regulation is a continuous process, embedded in an intricate pattern of contextual and individual factors.

### **Affective goals**

The act of regulation is considered to be driven by an affective goal, even if unconsciously (Koole and Rothermund 2011; Tamir 2016). In a healthy individual, affect regulation is flexible (Marik and Stegemann 2016) and the behavior, regulation strategies, and interaction with available resources in the environment adjust to better fit the affective goal. Similarly, in the context of music use, the affective goal guides the adolescent's decisions regarding the musical activity to engage in, the strategy to apply, and the musical mechanisms to focus on.

Adolescents might use music to achieve several affective goals, such as decreasing negative affect, increasing or maintaining positive affect, and intensifying negative states (Papinczak et al. 2015; Saarikallio and Erkkilä 2007; Tarrant et al. 2000). In psychology studies, adolescents have been found to be more prone than adults to engage in negative states or to dampen positive affect (Riediger et al. 2009) and this pattern has also been found in music listening (Cohrdes et al. 2017). Nevertheless, the goals pursued and their outcomes are heavily influenced by the adolescents' mental wellbeing and individual factors (Miranda and Gaudreau 2011; Schwartz and Fouts 2003). Of particular interest is that an increased use of music to cope with negative states has been correlated with higher levels of depression symptoms (Miranda and Claes 2009).

## **Musical activities**

Adolescents engage in music through several types of activities – listening attentively or in the background, dancing, singing, watching music videos, composing songs, writing lyrics, amongst others (Saarikallio and Erkkilä 2007; Van Goethem 2010). One way of seeing these musical activities can be the concretization of an affective need and goal (Van Goethem and Sloboda 2011); they give the adolescent the resources for action and puts into practice the desired strategies. An ecological approach to music suggests that musical situations convey affordances – i.e. possibilities of action belonging to an object or environment in relation to an organism (Gibson 1977). It has been argued that each musical activity has different affordances (Krueger 2014; DeNora 2000), thus supporting different regulatory actions.

Empirical results seem to support this claim. Adolescents interact with different musical activities with different purposes and strategies. In Saarikallio and Erkkilä's (2007) study, even though music listening was the most common activity for self-regulation, interesting patterns concerning other musical activities emerged. For example, singing was used for reviving, relaxing, and re-energizing through the strategy revival and forgetting about current negative mood through diversion. Writing songs, in turn, while having in common the support of relaxation and revival, was also associated with achieving new insights and understandings about the situation/feeling through mental work. These associations point to the interdependence between music, its features, and the strategic possibilities offered. For this reason, there is a bidirectional arrow between musical activity and the group strategies and mechanisms in Figure 1.

## **Regulation strategies and musical mechanisms: At the interface between the adolescent and music**

There is something fascinating in studying how the characteristics of music support its affective uses. Micro level examination may deepen our understanding of why music is so efficient and engaging. We recently conducted a study that provides useful insights into the internal organization of strategies and mechanisms and the associations between them. Data was collected through an online questionnaire from adolescents and young adults concerning their most recent episode of affect regulation through music (more details in Baltazar and Saarikallio 2017a). Participants were asked about the reason they chose music over other activities (e.g. talking to a friend, exercising). Four options were provided, each one representing the intention to focus on one of the four levels of musical affect regulation suggested by Van Goethem (2010): goals ("I wanted to be in a certain affective state"), strategies ("I wanted to

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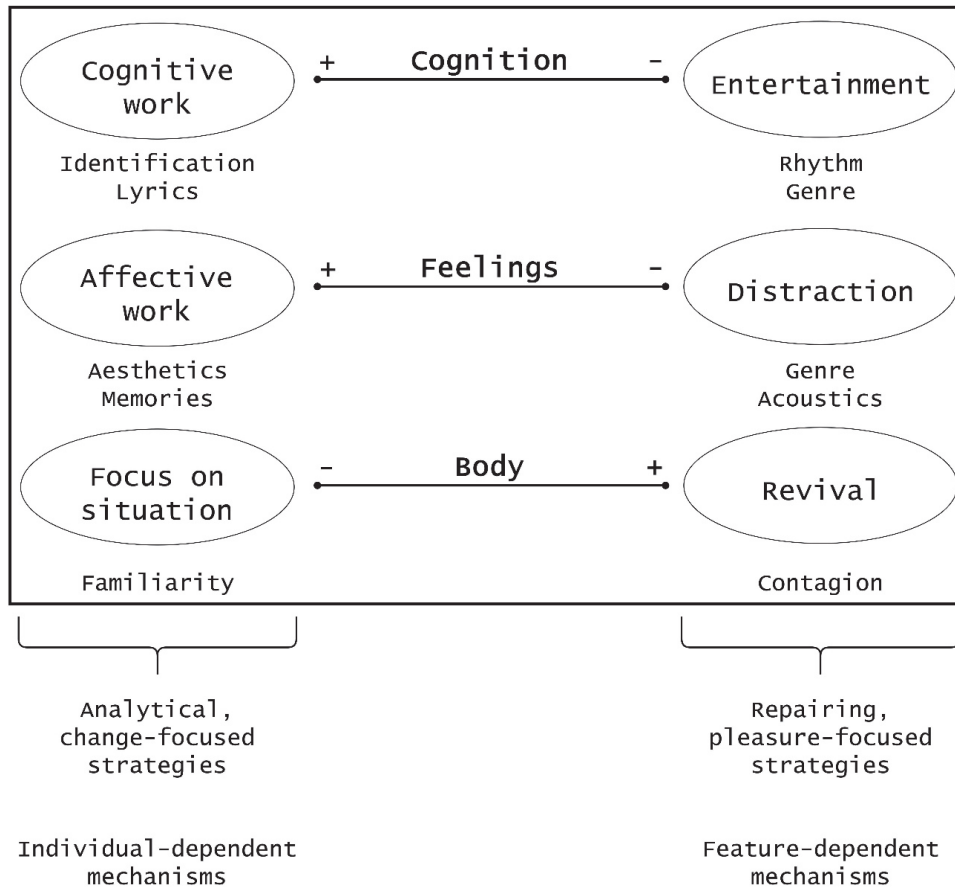
use music as a ‘tool’ that could help me”), musical activities (tactics in Van Goethem, 2010; “I wanted to engage in music by, for example, listening, playing, or dancing to it”), and mechanisms (“I wanted to feel music’s impact on me”). The answers were unequally distributed,  $X^2(3)=36.98$ ,  $p < .001$ . The participants selected the options relative to strategies and mechanisms equally often, both with a proportion significantly higher than the expected mean ( $z = 3.38$ ,  $p < .001$ ). According to these young informants, the strategies that they can use through music and music’s emotional impact on them are the main motivators behind engaging in music. Based on this, we identified regulatory strategies and musical mechanisms as the core elements for the adolescents’ experience (Figure 1) and considered that their associations deserve further exploration.

### Strategies

In a musical context, we consider strategies to be the behavioral and cognitive tools employed while performing a certain musical activity to achieve an affective goal. Regulation strategies are inherent to any human behavior and have been widely studied in psychology (for a review, see Gross 2015). However, general models from psychology do not necessarily transpose directly to the case of musical self-regulation (Randall et al. 2014). Consequently, music researchers have been devoted to the identification and analysis of the strategies involved in musical uses. Saarikallio and Erkkilä (2007) identified the following strategies used by the adolescent participants in their study: entertainment (creating a fun environment and seeking amusement), revival (relaxing, energizing, and revitalizing), strong sensation (seeking powerful feelings of pleasure, enjoyment, and excitement), diversion (detaching from undesired thoughts or feelings), discharge (expressing, releasing, or venting emotions), mental work (reflecting on and reappraising situations and reactions), and solace (seeking comforting, connecting, and meaningful experiences).

In the survey study, we presented a set of strategies based on a compilation from recent research (Baltazar and Saarikallio 2016) for the participants to identify which they had used in the self-reported musical episode. Three dimensions emerged from the analysis, representing distinct components underlying affect regulation: cognition, feelings, and bodily reactions (Figure 2). The poles of each dimension mean a higher or lower involvement of the corresponding component.

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**Figure 2.** Associations between strategies and mechanisms across three dimensions (cognition, feelings, body).

*Note.* The plus/minus signs indicate the higher/lower use of that dimension's component (e.g. cognition). Adapted from Baltazar and Saarikallio (2017a) by permission of SAGE Publications.

As seen in Figure 2, the higher and lower focus on cognition, feelings, and bodily reactions while self-regulating through music creates six major groups of strategies: cognitive work (reappraisal, perspective taking, reflection, acceptance), entertainment (seek pleasurable feelings through fun), affective work (modulation of feelings, induction of strong sensations), distraction (turn the attention away from thoughts, feelings, or surroundings), revival (relaxation, energizing, increasing flow

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and endurance) and focus on situation (direct the attention to the surroundings, to the task in hand or situation).

Interestingly, these groups of strategies can be further categorized in two: analytical and change-oriented strategies versus repairing and pleasure-oriented strategies. The left side of Figure 2 is thus characterized by an active, contemplative, and cognition-loaded regulation, while the right side is characterized by a more passive, pleasure-oriented, and body-focused regulation.

### **Musical mechanisms**

Studies on adolescents' musical regulation often report statements such as "First I am captivated by the lyrics, and then I pay attention to the melody, sonorities, and all that" or "Someone is singing, then the music's rhythm... It reaches inside me and makes me relax" (Baltazar 2009). These testimonies imply that there are qualities in the music itself or in the dyad "individual-music" that facilitate affective change. In this chapter, musical mechanisms refer to the aspects linked to music that can induce affect and support affective change.

Initial explorations of this topic have been supporting the link between musical qualities and self-regulation. Saarikallio et al. (2017) examined the interplay between strategies and mechanisms in adolescents' relaxation through music and observed that two major groups of mechanisms were used: musical (including acoustic features and emotional character of the song) and mental (including imagery and memories). Additionally, studies with adults have overall identified a large list of mechanisms that adolescents might potentially use as well (lyrics, rhythm, memories, genre, acoustic features, identification with the artist or song, aesthetics, preferences, associations, familiarity with the music, contagion, and imagery; see review in Baltazar and Saarikallio 2016).

Based on these findings, the survey study asked the participants to identify the relevant mechanisms for the reported episode. The following mechanisms contributed significantly to the model in Figure 2: identification with the artist or song, lyrics, rhythm, genre, aesthetics, memories, acoustics, contagion, and familiarity with the music. The young participants tended to get support from each mechanism in association with certain groups of strategies; these associations are illustrated in Figure 2 by placing the mechanism under the respective major strategy.

These mechanisms cover a wide range of features one can identify in relation to music. The results suggest that musical mechanisms can be grouped into individual-dependent mechanisms (left side of Figure 2: identification, lyrics, aesthetics, memories, and familiarity with the music in music) and feature-dependent mechanisms

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(right side of Figure 2: contagion<sup>1</sup>, genre, acoustics, and rhythm). The feature-dependent mechanisms are related to more universal characteristics of music regarding sound, style, expressed arousal and valence, while the individual-dependent mechanisms reflect a unique experience between the person and music and are linked to associations, significations, and preferences.

### **Regulation strategies and musical mechanisms: Underlying associations**

There is an interesting pattern visible in Figure 2 that sheds some light on how musical mechanisms support the affective needs of young people. Individual-dependent mechanisms (e.g. memories) are associated with analytical and change-oriented strategies (e.g. affective work). Feature-dependent mechanisms (e.g. rhythm) are, in contrast, associated with repairing and pleasure-oriented strategies (e.g. entertainment). One might conclude that personally meaningful aspects of music have a stronger impact on affect regulation that requires larger efforts in terms of cognitive, affective, and attention processing (left side of the Figure 2), while regulation processes that disengage from the situation and internal processes (such as the ones on the right side of Figure 2) benefit from mechanisms intrinsic to music.

### **Affective outcomes and wellbeing**

One of the driving factors for the growth of research on strategies underlying music use is their strong connection to health and affective outcomes. More and more, research has been showing that regulation strategies are a mediating variable between music uses, genre preferences, and mental health (e.g. Chin and Rickard 2014; Thomson et al. 2014). The development of adaptive and flexible regulation tools during adolescence is crucial for youth's wellbeing and mental health. Depending on the used strategies, music can be a risk or protective factor (Miranda 2013; McFerran 2016). The affective outcomes and wellbeing implications are not explored in this chapter; however, it is worth noting that, according to this model, affective musical regulation impacts—positively or negatively—the adolescent's wellbeing through the cumulative process of affective outcomes.

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<sup>1</sup> Even though the term *contagion* might suggest an individual association, it refers to the expressed emotions of the music, which then are “mimicked” by the individual (Juslin and Västfjäll 2008). Similarly, *rhythm* can induce affect through entrainment. All perception is, at some level, subjective and individual and even the feature-dependent mechanisms are imbued with this subjectivity.

### **Individual and contextual factors**

Self-regulation is deeply influenced by individual and contextual factors. These two factors have reciprocal relationships, as children and adolescents are raised in a socio-cultural environment that undoubtedly shapes their biopsychological development (Raver 2004).

Just as there are several types of music, there are different listeners (Ter Bogt et al. 2011). The relationship with music is rather personal, and individual traits play an important role in how adolescents use music to self-regulate. The number of hours adolescents spend listening to music, their preferred style of affect regulation, the most relevant function of music and, even, the affective outcomes of music engagement have all been traced back to individual factors such as emotional reactivity (e.g. Roberts et al. 1998), symptomatology (e.g. McFerran et al. 2015), developmental stage (e.g. Leipold and Loepthien 2015), and level of engagement with music (e.g. Ter Bogt et al. 2011).

As for contextual factors, one should bear in mind that the sociocultural context is a powerful shaping force that influences musical behavior on several levels. These influences can be observed on, for example, the adolescents' musical preferences or on their use of music to express their cultural identity (for a review, see Miranda et al. 2015). Importantly, given the culture-dependent function and meaning of emotions (Ratner 2000), adolescents need to adhere to sociocultural rules regarding their self-regulation (Eisenberg and Zhou 2000). Lastly, the specific situation surrounding the adolescent at the moment of regulation greatly dictates what are the needs, possible actions, available strategies, and desired outcomes of affect regulation (e.g. Boekaerts 2002).

## CONCLUSION

Adolescents have incorporated music in their lives and entrusted it with an important function: to help them regulate emotions, moods, and energy levels. Affect regulation is one of the many functions played by music, but it is one of the most relevant for youth's wellbeing and development.

According to the conceptual model presented in this chapter, regulatory strategies and musical mechanisms are at the core of musical regulation. Through the interaction between these two components, adolescents pursue their affective goals across the levels of cognitive, affective, and sensorial functioning. This is a dynamic process, constantly influenced by internal and external factors. The aim of this model is to provide researchers with a solid conceptual background for future studies. Prevention and intervention programs might likewise benefit from this conceptual endeavour due to the identification of key elements underlying the adolescents' musical self-regulation and contributing to their wellbeing. However, more research is needed to better understand the interconnections between each of the dimensions identified. The model can, therefore, be seen as eternally 'under construction'.



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## **IV**

### **IS IT IN ME OR IN THE MUSIC: SELF-REGULATION OF STRESS AND THE ROLE OF STRATEGIES AND MUSIC**

by

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