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Strategies and mechanisms in musical affect self-regulation: A new model

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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

Music provides people with innumerous possibilities of regulating their affective states (e.g. Groarke & Hogan, 2015; Thoma, Scholz, Ehlert, & Nater, 2012). These states consist of emotions (Tahlier, 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 proprieties 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

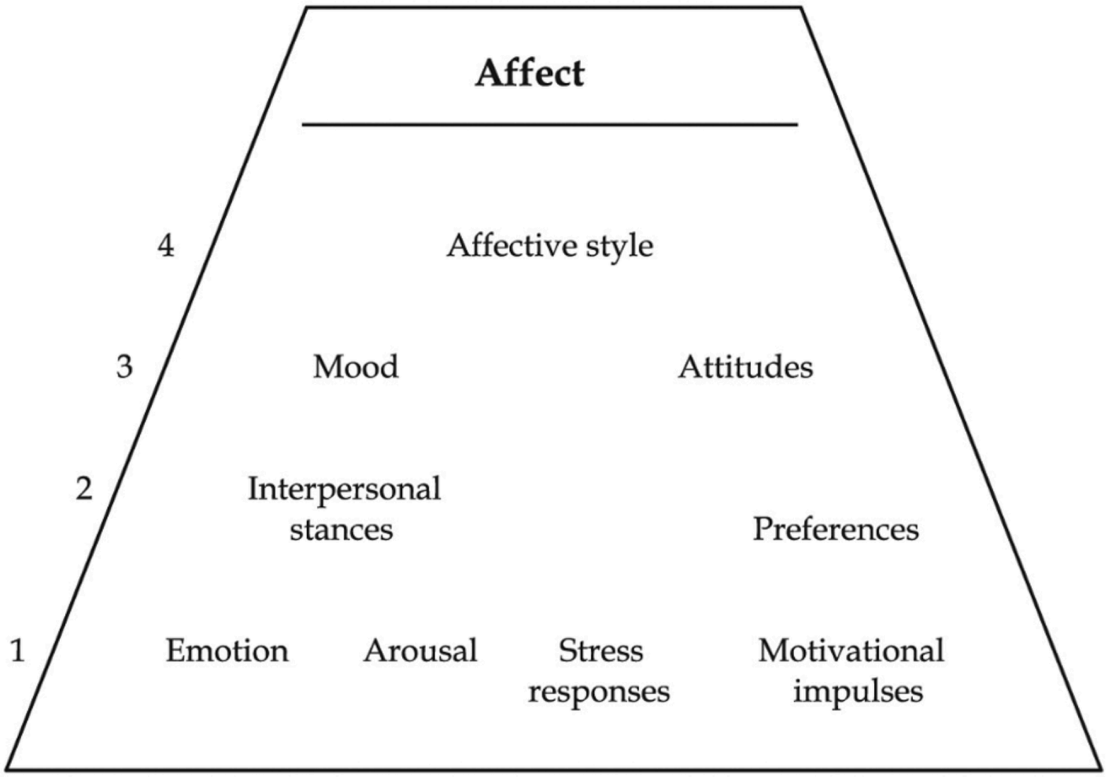

Figure 1. Affect as an umbrella term and the affective terms that are included in it, ranking from short duration (1) to long duration (4). From Baltazar & Saarkikallio (2016). Reprinted by permission of Sage Publications.

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).

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* (Koole, 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 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 unfitness 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).

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 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

		n (%)	*M*	*SD*	Median	Min.	Max.
Age			21	4,72	20	13	30
	13-15	63					
	16-18	(12%)					
	19-21	135					
Gender	Female	249					
	Male	289					

	Other	9
Nationality	Finnish	192
	Portuguese	195
	American	67
	Other (less than 15 counts)	93 (17%)
Occupation	Elementary student	38
	Secondary student	146
	Bachelor student	150
	Master student	57
	Doctoral student	28
	Working	92
	Homemaker	3
	Unemployed	33
Music education	None	146
	Subject at school	310
	Extracurricular	130
	Private tutoring	170
	Self-taught	137
	Music academy	61
	Music conservatory	31
	University	13

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 tecnique is

based on a table of 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.

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
*Musical expectancy **	*Changes in music that confirm or contradict the expected structure of the music (Juslin & Västfjäll, 2008a)*

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).

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/number of rows and 1/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.

Table 4. Contingency table with Mechanisms as row and Strategies as column.

	F	D	C	MF	B	FD	FC	FM	DC	D	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

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		
Strategies (Columns)	1	2	3	1	2	3
Focus	0.051	0.323	0.536	0.1	5.7	**16.3**
Distract	0.438	0.657	0.207	**12.**	**30.5**	3.1
Cognitive work	-0.870	0.157	0.033	**32.**	1.1	0.1
Modify	0.404	-0.151	-0.346	5.7	0.9	4.7
Body	0.617	0.244	-1.041	**8.9**	1.5	**28.4**
FD	-0.260	0.272	-1.029	1.1	1.2	**18.5**
FT	-0.510	-0.363	0.400	5.4	2.9	3.7
FM	0.634	-1.300	-0.324	3.4	**15.4**	1.0
DT	-1.479	0.019	-0.229	**26.**	0.0	0.7
DM	0.413	-1.004	0.156	3.1	**19.7**	0.5
TM	-0.088	-0.281	-1.404	0.1	0.7	**17.2**
+3	-0.034	-0.588	0.289	0.1	**20.3**	5.1
Mechanisms (Rows)						
Genre	0.585	1.030	0.427	**8.6**	**28.9**	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	**20.2**
Identification	-1.804	0.181	0.042	**31.**	0.3	0.0
Lyrics	-0.768	0.125	0.371	**22.**	0.7	6.0
Acoustics	-0.302	0.647	0.145	2.3	**11.4**	0.6
Rhythm	0.497	0.269	-0.342	**14.**	4.6	7.7
Memories	-0.094	-0.527	0.001	0.3	**11.1**	0.0
Association	-0.536	0.006	-0.245	5.0	0.0	1.2
Aesthetics	0.388	-0.904	0.423	6.0	**35.5**	8.1
Contagion	0.091	-0.088	-1.129	0.3	0.3	**46.4**
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.

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.

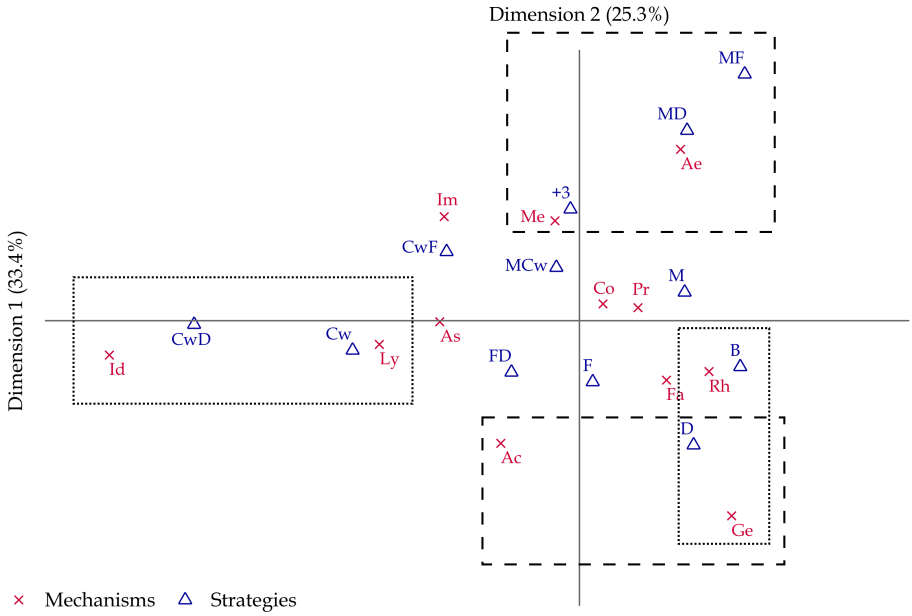

Figure 2(a). Biplot with visual representation of dimensions 1 and 2. The categories with significant contributions to dimension 1 are inside the dotted line and to dimension 2 are inside the dashed line.

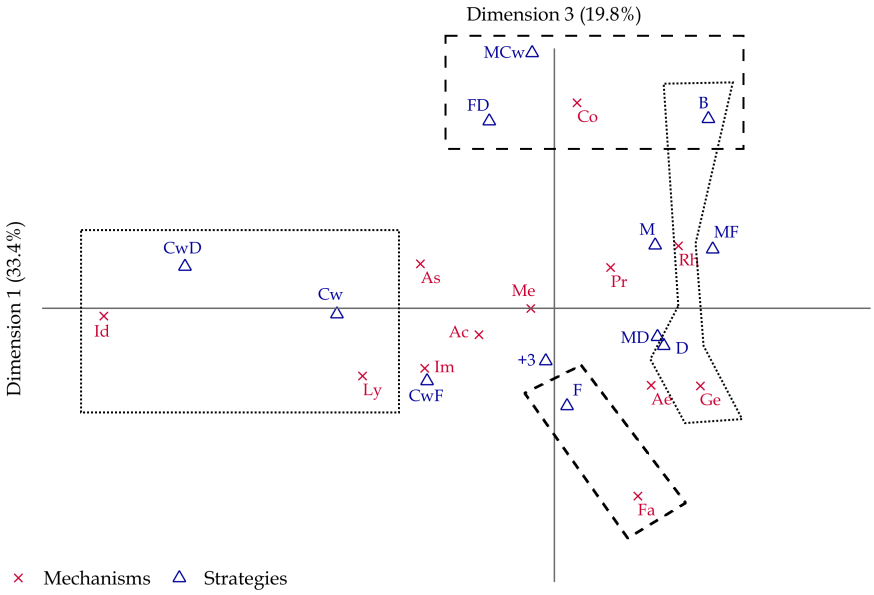

Figure 2(b). Biplot with visual representation of dimension 1 and 3. The categories with significative contributions to dimension 1 are inside the dotted line and to dimension 3 are inside the dashed line.

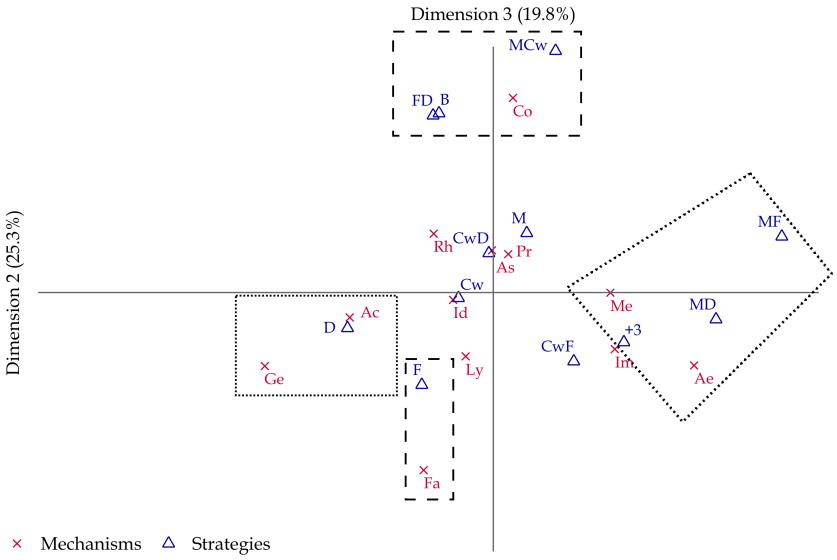

Figure 2(c). Biplot with visual representation of dimension 2 and 3. The categories with significative contributions to dimension 2 are inside the dotted line and to dimension 3 are inside the dashed line.

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.

Table 7. The three dimensions extracted, their contributions, and labelling.

D	Explained inertia	Strategies and *mechanisms*	Poles' labelling	Underlying component
1	33.4%	Cognitive work Cognitive work and distract *Identification* *Lyrics*	Cognitive work	Cognition
		Distract Body *Rhythm* *Genre*	Entertainment	
2	25.3%	Three or more Modify and distract Modify and focus *Aesthetics* *Memories*	Affective work	Feelings
		Distract *Genre* *Acoustics*	Distraction	
3	19.8%	Body Focus and distract Modify and think *Contagion*	Revival	Body
		Focus *Familiarity*	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 lowers focus on a component of affect regulation: cognition, feelings, bodily reactions. The visual representation of these three dimensions can be seen in Figure 3.

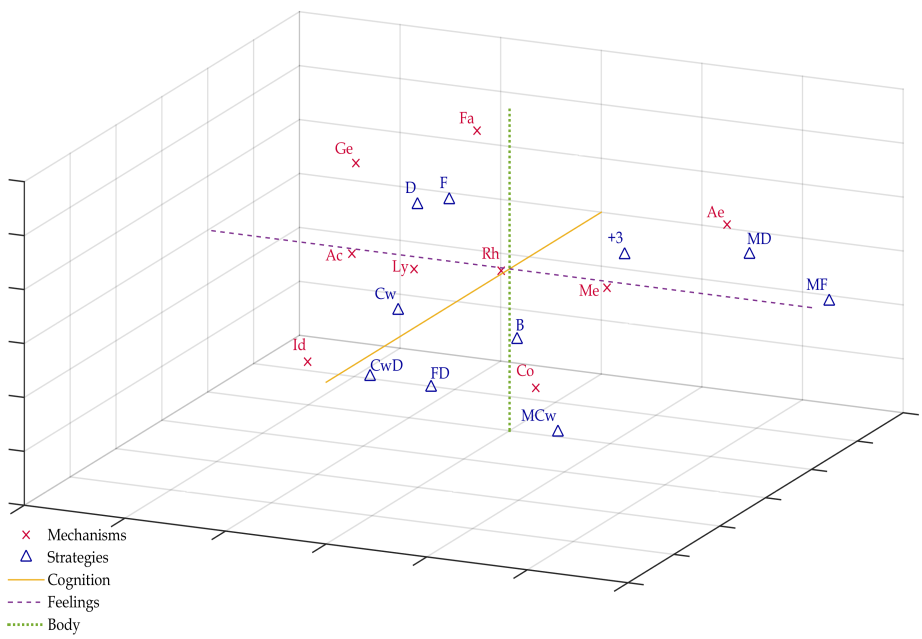

Figure 3. Three-dimensional projection of the associations between strategies and mechanisms that had relevant contributions to the axes (dimensions Cognition, Feelings, and Body).

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

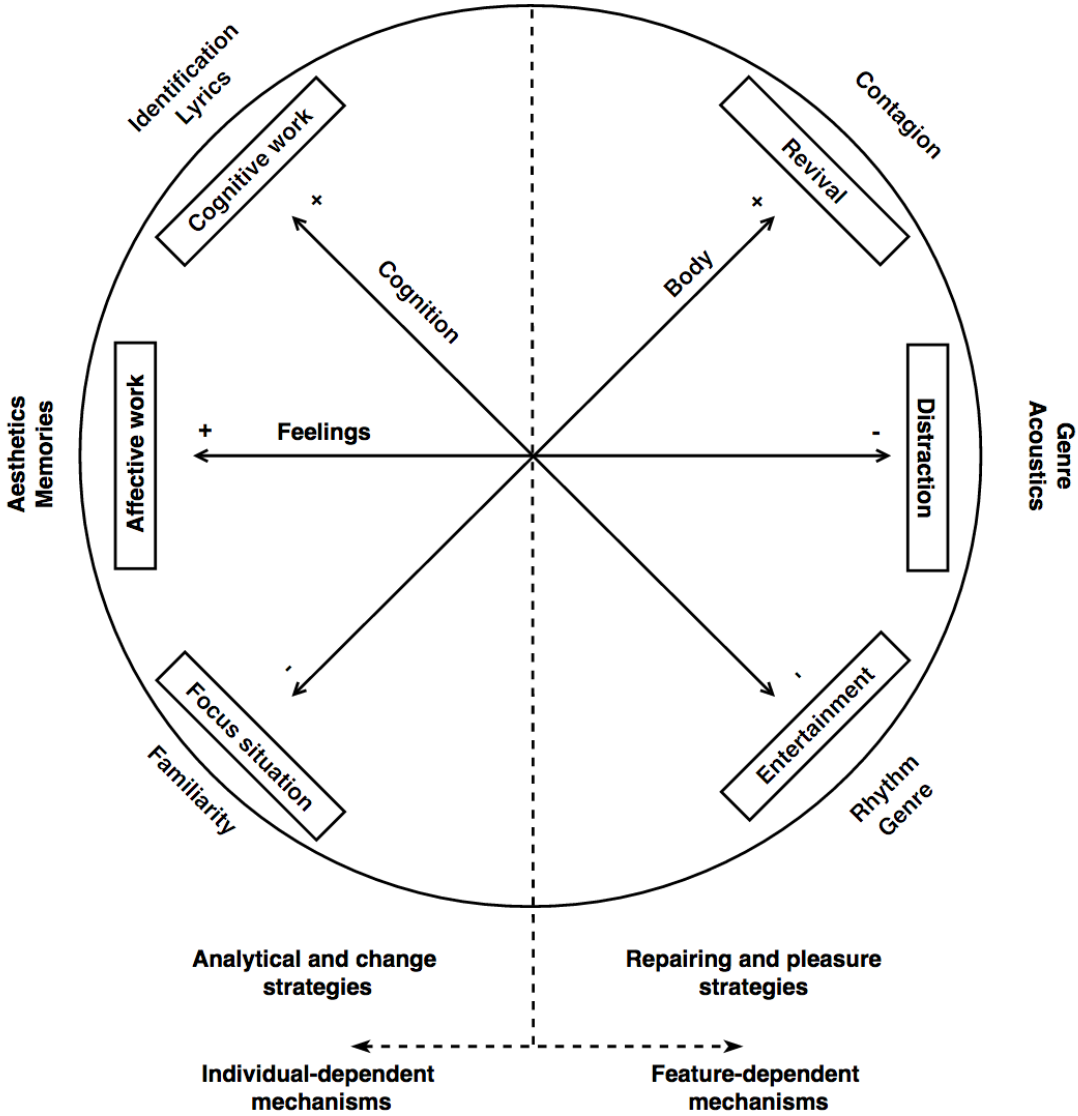

Figure 4. Model of strategic use of music for affect self-regulation.

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 '-'.

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 congrutiy 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).

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 elicite strong affective responses. Moreover, aesthetic fruition may be used to mood enhacement (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 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 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
 memories
Please 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
 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 suprressing 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