

Factor structure of audiences' physical experience while watching dance

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Abstract

The aim of this study is to explore factor structure of audiences' physical experience and their related bodily sensations when watching dance choreographies. This study also includes the process of developing an instrument for measuring the observers' physical experience of dance choreographies and their related kinesthetic responses to watching dance. In the main study, participants rated their physical experiences and kinesthetic responses when watching 16 different dance choreographies of various dance forms, including contemporary dance, jazz, tango, and hip-hop. Three factors of the observers' physical experiences when watching dance were identified: Action Tendency, Arousal, and Relaxation. Furthermore, the results show that the structure of the observers' kinesthetic responses when watching dance consisted of three factors: Focus, Excitement and Embodied Anticipation. The spectators' physical experiences and bodily sensations in response to an observed dance are the result of their engagement in the dance, the pleasure they draw from the dance, the emotions provoked in them, and their admiration for the performance. These findings are in line with the concept of kinesthetic empathy, which can be understood as the experience of sharing a dancer's movements.

KEYWORDS

body sensations, dance choreographies, kinesthesia, kinesthetic empathy, observer's physical experience

INTRODUCTION

Dance is a complex artistic, cultural, social, psychological, and physical phenomenon that provokes the most diverse reactions and responses in the observer. The aesthetic experience of a dance audience may vary from the admiration for virtuosity to amazement and fascination (Marković, 2017; Vukadinović, 2019). Observing dance provokes different emotions, such as joyfulness, cheerfulness, or even sadness. It also leads to physical experience and bodily sensations, such as holding one's breath or getting goosebumps (Brownlow et al., 1997; Reasons & Reynolds, 2010; Sawada et al., 2003).

In this paper, "aesthetic experience" is defined as an exceptional state of mind that is characterized by a strong focus on a certain object that engages and fascinates the subject, whereas all other objects and actions in the environment are excluded from consciousness (cf. Beardsley, 1982; Csikszentmihalyi, 1990; Cupchik, 1974; Kubovy, 1999; Koestler, 1970; Marković, 2010; Ognjenović, 2003; Polovina & Marković, 2006; Telegan & Atkinson, 1974). Further explorations of Marković (2017) that were related to aesthetic experience have indicated that there

is a motivational, semantic, and affective aspect of aesthetic experience.

Previous studies have mainly focused on the affective aspect and have shown that aesthetic experience is often associated with pleasant feelings and emotions (Leder et al., 2004; Leder & Nadal, 2014; Winkielman & Cacioppo, 2001) but it can also be followed by unpleasant ones (Cooper & Silvia, 2009; Rawlings, 2003; Silvia & Brown, 2007; Wagner et al., 2014). Furthermore, Marković (2010, 2012) points out that aesthetic feeling is characterized by the observer's fascination, amazement, and profound relationship with the object (whether the object of experience is a dance, painting, film, sculpture, music piece, etc.).

However, little is known about the physical experience as the fourth aspect of aesthetic experience. Observed in general and regardless of an artistic discipline, there are few studies dealing with the physical aspect of aesthetic experience (Benedek & Kaernbach, 2011; Cervellin & Lippi, 2011; Cova & Deonna, 2014; Menninghaus et al., 2015; Miceli & Castelfranchi, 2003; Niedenthal, 2007; Schnall et al., 2010; Schubert et al., 2016; Tan & Frijda, 1999; Vingerhoets &

Bylsma, 2016; Wassiliwizky et al., 2017; Wassiliwizky et al., 2015; Zickfeld, 2015). Furthermore, there are even fewer studies in the domain of dance (Brownlow et al., 1997; Foster, 2008; Reasons & Reynolds, 2010; Sawada et al., 2003; Strukus, 2011). Thus, the main focus of the present study is to explore different aspects of audiences' experiences related to the body (including sensory, motor, and emotional experience) when watching dance.

Two key concepts related to observing dance are explored in this paper: physical experience and bodily sensations. The physical experience of observing dance, according to different studies (Foster, 2008; Jola et al., 2011; Martin, 1939; Reasons & Reynolds, 2010; Strukus, 2011), is connected with the effects watching dance has on the observer's body as well as with the description of feelings that result from observing the dance movements of others. Spectators of dance often report that they feel cheerful, touched, amazed, proud and so on (Foster, 2008; Jola et al., 2011; Reasons & Reynolds, 2010; Strukus, 2011).

On the other hand, bodily sensations include a wide range of different somatovisceral and motoric responses as a part of the physical experience, such as, for example, holding one's breath or getting goosebumps (Foster, 2008; Jola et al., 2011; Reasons & Reynolds, 2010; Strukus, 2011). Previous studies have reported that bodily sensations are related to kinesthesia as an integral part of physical experience (Batson, 2008; Foster, 2007, 2008, 2011; Montero, 2006, 2012). Moreover kinesthesia, which refers to the sensitivity of body position and muscle tension, may be defined as the awareness of the position and movement of the parts of one's own body mediated by receptors in the muscles, joints, tendons, ligaments, and skin that are stimulated by body tensions (cf. Batson, 2008; Foster, 2008, 2011; Montero, 2006, 2012; Sherrington, 1907). Furthermore, kinesthesia (or proprioception) is considered to be integral to perception (Berthoz, 2000; Reynolds, 2007), as well as to distinct multicomponent sensory modality (Jola et al., 2011). Thus, bodily sensations (i.e., kinesthetic responses) associated with observing dance could include different somatovisceral and motoric responses, such as tapping the feet, shaking, and clenching the fists. Based on the abovementioned discussion, in this paper the terms "bodily sensations" and "kinesthetic responses" are used as synonyms. Furthermore, concerning the relationship between these two key concepts, bodily sensations (i.e., kinesthetic responses) are understood in this paper as a somatic part of physical experience that includes both bodily sensations and emotional experience. In other words, it could be said that physical experience includes bodily sensations and emotional experience.

Kinesthetic empathy

Previous studies related to the bodily sensations (i.e., kinesthetic responses) in a spectator's body (Foster, 2007, 2008, 2011; Hagendoorn, 2004; Jola et al., 2011; Reasons & Reynolds, 2010; Reynolds & Reasons, 2012; Strukus, 2011) have shown that the physical experience of watching dance is often

associated with "shared kinesthetic experience" (Lipps, 1906) and "kinesthetic empathy" (Martin, 1939). Lipps (1906) assumes that shared kinesthetic experience could be described as the viewer's physical and kinesthetic response when observing a painting. The concept of "shared kinesthetic experience" was adopted and upgraded into "kinesthetic empathy" by dance critic John Martin (1939). Underlying concepts of kinesthetic empathy are of particular interest for the studies of dance. In dance research, the concept of kinesthetic empathy is related to the physical responses of some spectators when watching dance. Furthermore, it may be understood as the feeling of sharing another person's movement, or vicariously experiencing another person's movement simply by watching (cf. Foster, 2007, 2008, 2011; Hagendoorn, 2004; Jola et al., 2011; Reasons & Reynolds, 2010; Reynolds & Reasons, 2012; Strukus, 2011).

However, kinesthetic empathy is a complex phenomenon as the experience of kinesthetic empathy depends on stimuli, characteristics of the perceiver and various cultural and historical factors, (Barker, 2006; Foster, 2007; Reasons & Reynolds, 2010; Strukus, 2011) as well as on contextual differences (Strukus, 2011). All of these have to be taken into account simultaneously. Regarding the nature of the perceiver, Jola et al. (2011) found that motor simulation, which is related to kinesthetic experience, is modified by both visual expertise and the empathic abilities of the dance observer. Moreover, Reasons & Reynolds (2010) reported that different experiences in dance training influenced the kinesthetic experience of dance. They have shown that observers who are not trained in dance often describe their admiration in terms of their own inability to do the movements, while trained dancers often derive enjoyment through "inner mimicry." In other words, their admiration stems from bridging the gap between them and the dancer by imagining themselves dancing.

Some studies have suggested that kinesthetic empathy, as a special way of engaging in dance, may give pleasure to spectators through inner mimicry as well as through admiration of virtuosity, which is often related to effortlessness, grace, and the flow of executing movements (Reasons & Reynolds, 2010). Furthermore, kinesthetic empathy may represent an important motivational factor in the reasons why people are inspired to watch dance. Reasons & Reynolds (2010) suggested that observers are often motivated by hopes, expectations, and pleasures derived from a sense of closeness to the dancers, from the awareness of their effort, and from seeking an escape from reality. On the other hand, Jola et al. (2011) identified similar responses from the observers when watching dance, such as a "desire to move," "admiration of virtuosity," "connection to the dancer," "embodied response," "evaluation of quality" and so forth.

Research perspective

Until now, the aesthetic experience of dance has been researched from different perspectives in previous studies, such as the somaesthetic (cf. Arnold, 2005; Fenemor, 2003;

Turner, 2008), neuroaesthetic (cf. Brown et al., 2006; Calvo-Merino et al., 2005, 2006, 2009; Cross et al., 2006), and cognitive perspectives (cf. Glass, 2005; Stevens & McKechnie, 2005). In the present study, we intended to look into the phenomenon of audiences' physical experiences when watching dance by applying a factor analysis in our approach. By using this approach, we attempted to explore the factor structure of the audiences' physical experiences and their related bodily sensations when watching dance. Earlier studies have used this approach to explore the factors of aesthetic experience of paintings (Polovina & Marković, 2006). Moreover, in their earlier study that applied factor analysis to explore the structure of aesthetic experience of dancers and their observers, Vukadinović and Marković (2012) defined three factors in the audience's aesthetic experience (Dynamism, Exceptionality, and Affective evaluation). The results have shown that an audience's aesthetic experience stems from the overall context. This includes the scenography, lighting, music, physical characteristics of the dancers, the dancers' interpretation of choreography, and its staging (c.f. Vukadinović, 2019; Vukadinović & Marković, 2012, 2017). Considering the structure of an audience's aesthetic experience, as well as the kinesthetic nature of dance as a form of art, one question remained open: What happens with the body of the observer while they are watching dance performances? That is, what is the physical experience of the audience when watching dance?

Exploring the factor structure of an audience's physical experience and its related bodily sensations may contribute to a better understanding of aesthetic experience. Based on the abovementioned concept of kinesthetic empathy and the aspects of the experience related to the body, this study aims to investigate the observers' physical experiences and bodily sensations when watching dance performances. It can be hypothesized that the structure of observers' physical experiences while watching dance will include motivational and affective dimensions. Concerning the exploration of the bodily sensations, that is, kinesthetic responses that participants have while watching dance, it can be hypothesized that the observers' structure of kinesthetic responses will also be multidimensional, including embodiment, stimulation, and direction.

Purpose of the study

Following the contextual background described in the Introduction, the main purpose of this study is to investigate the physical experience when observing dance and its related kinesthetic responses (i.e., body sensations) by using exploratory factor analysis. Physical experience and bodily sensations are operationalized through a series of descriptors. The primary aim of the study is to explore factor structure of the ratings on a set of descriptors of the observers' physical experience and bodily sensations when watching dance performances, and to determine whether the descriptors of the observers' physical experience and related bodily sensations are grouped into two, three, or more factors. In the following paragraphs, the selection of the descriptors of physical experience (i.e., scales on which the stimuli were rated) will be elaborated upon.

PRELIMINARY STUDY

The aim of the preliminary study was to select the descriptors of observers' physical experience when watching dance (i.e., scales for stimuli ratings) that would be used in the main study.

Method

Participants

Two groups participated in the experiment. The first group consisted of non-dancers who were students of Novi Sad Business School – Higher Education Institution for Applied Studies ($n = 54$), between 20 and 26 years of age ($M = 21.83$ years; $SD = 1.28$ years). There were 48.1% men and 51.9% women participating in the study. The second group consisted of professional dancers with 8 years of experience or more who performed different forms of dance ($n = 33$). They were between 25 and 33 years of age ($M = 28.69$ years; $SD = 2.83$ years) and 36.4% were men and 63.6% were women. These two groups of participants were included because previous studies have shown that there is a significant difference in perceiving and appreciating dance between professional dancers and non-dancers (Calvo-Merino et al., 2005, 2006, 2009; Cross et al., 2006; Jola et al., 2011; Jola et al., 2012; Reasons & Reynolds, 2010).

Stimuli

Ten audiovisual recordings of different forms of dance, including classical ballet, modern ballet, contemporary dance, flamenco, folklore, and tango, were presented to the two groups of participants through 10 audiovisual recordings via a video projector. The main criterion for the selection of dance video recordings was to cover a wide range of different styles of dance. These recordings of different dance forms were chosen randomly from the Internet (Appendix A contains the list of websites).

Procedure

The tasks given to the participants, both non-dancers and professional dancers, were the same. The first task for both groups was to write down as many descriptors as possible that could describe their physical experiences and bodily sensations related to watching different dance forms. The instructions given to the participants were: "Write down as many adjectives or descriptions as possible that best illustrate your physical experience and bodily sensations while watching a dance." The second task was to note down as many descriptors as possible related to their physical experience and bodily sensations while watching each dance from the recordings presented. The instructions given to the participants were: "After each

presented choreography on the video recording, please write down as many adjectives or descriptions as possible that best illustrate your physical experience and bodily sensations while watching this particular dance.”

Results

As a result of two tasks given to both non-dancers and professional dancers, four groups of descriptors were obtained: The first and second groups consisted of the descriptors produced by the non-dancers, whereas the third and fourth groups consisted of the descriptors produced by the dancers. First, the descriptors that were not adequate for describing the physical experience when watching dance were eliminated from each group (e.g., *morbid*, *selfish*, *rational*). The common category included the descriptors that were synonymous or similar to each other (e.g., *I feel calm* and *I feel relaxed*, or *I feel alive* and *I feel vivacious*). Second, the dancers' and non-dancers' lists of descriptors were formed. On the dancers' list there were 86 descriptors while on the non-dancers' list there were 78. The frequency of the occurrence of each particular descriptor was calculated in each list. The descriptors were compared, and those with the highest frequencies (those appearing at least 20 times) were singled out. When the list of the most frequent descriptors produced by the dancers was compared with the list of the most frequent descriptors produced by the non-dancers, it could be seen that the only difference was that the dancers' list included the following descriptions: *I can feel my body flutter*, *I feel vibrations*.

Furthermore, one common list of descriptors was formed for dancers and non-dancers. On that common list, there were 48 descriptors that had a frequency of occurrence of minimum 20 times. Further analyses of the list have shown that two categories of descriptors could be singled out. One is related to the observers' physical experience and the other to the bodily sensations felt by the observers. Finally, two common lists of descriptors were formed.

The first common list specified the 31 most frequent descriptors of the observers' physical experiences when watching dance: *I feel like moving*, *I feel like dancing*, *I feel like squealing*, *I feel like getting up*, *I feel like singing*, *I feel like clapping*, *I feel like whistling*, *I feel pleasant*, *I am excited*, *I feel longing*, *I feel warmth*, *I feel blissful*, *I feel calm*, *I am touched*, *I am surprised*, *I am fulfilled*, *I am cheerful*, *I feel admiration*, *I feel vivacious*, *I am amazed*, *I can feel my body flutter*, *I am fascinated*, *I feel vibrations*, *I feel pride*, *I feel wonder*, *I am inspired*, *I am happy*, *I feel impassioned*, *I feel effused*, *I am astonished* and *I am delighted*.

The second common list contained the 17 most frequent bodily sensations felt by the observers (i.e., kinesthetic responses) when watching dance: *I tap my feet*, *I hold my breath*, *I get goosebumps*, *My heart beats faster*, *My knees buckle*, *I get teary-eyed*, *I feel chills*, *My muscles clench*, *I feel vibrations in my body*, *I have butterflies in my stomach*, *I cannot look away*, *I smile*, *I cannot blink*, *I inhale slowly and deeply*, *I shake*, *I clench my fists*, *I mimic the movements while I sit*.

These descriptors, given in the form of a statement, served as the basis for the construction of an instrument for measuring the physical experience of watching dance choreographies.

THE MAIN STUDY

Method

Participants and procedure

Thirty-eight students from Novi Sad Business School – Higher Education Institution for Applied Studies, aged between 18 and 23 years ($M = 19.68$ years, $SD = 1.27$ years) participated in the study. There were 10 (26.3%) male and 28 (73.3%) female students. The participants did not have any formal experience, either in dance training or in any other form of professional physical training. Moreover, the participants' experience in watching dance performances was controlled for, that is, they were “novices.” This means that they had not watched more than one dance theater performance in the past 5 years (Jola et al., 2011). The students participated voluntarily and they did not receive any course credit or monetary compensation for their participation. Variables such as the sexual orientation of the participants, familiarity with dance styles (i.e. the level of viewing experience), as well as the attractiveness of the dancers were not controlled for.

After the participants had given their consent to participate in the study, they answered a set of questions related to their sociodemographic characteristics (age and gender) and their dance practice and experience in watching dance performances. After that, they rated the choreographies. Sixteen choreographies were presented to the participants via an LCD projector on a screen, in a randomized order. The stimuli were observed from a distance of around 4 m and the dimensions of the screen projections were $h = 1.25$ m \times $w = 2.21$ m.

The participation in the study was voluntary, anonymous, and without any financial compensation. The study was conducted in accordance with the Helsinki Declaration.

Stimuli

The stimulus set consisted of 16 dance choreographies of different types of dance, including modern, contemporary, jazz, lyrical jazz, tango, and hip-hop dance choreographies. The choreographies had been made by choreographers who were more than three-time nominees for *Primetime Emmy Awards for Outstanding Choreography*. The choreographies were originally performed within the American television dance competition show *So You Think You Can Dance* that aired on Fox between 2008 and 2016. Stimuli were video recordings of 16 original dance performances. The videos included the original music selected by the choreographers. Choreographies were performed by a couple (two female, two male, or male and female dancers) or a group of eight dancers (of both genders). The average duration of all choreographies was around 1 min 50 s. The video recordings of the

choreographies were taken from the Internet and adapted for research purposes (the websites are listed in Appendix B).

All choreographies presented in the stimuli were accompanied with music. Although the performance of a choreography is almost always closely connected to music (Carrol & Moore, 2012), it has been noted that music can be a confounding factor when studying the aesthetic experience of dance. On one hand, the way in which the cognitive system combines music and dance into a unique aesthetic experience has not been explored enough yet (Christensen & Calvo-Merino, 2013). On the other hand, it has been noticed in previous studies (Thaut et al., 2014; Thaut et al., 2015) that music stimulates blood to pump into the muscles of legs or arms. This may be the reason why people tap their feet or move their fingers to the rhythm. Furthermore, rhythm may cause changes in the heart rate and in the respiratory system so that the person can synchronize with the music (Cervellin & Lippi, 2011; Reinhardt, 1999; Tormodsdatter Færøvik, 2017). In addition, it is worth mentioning that one study (Tsay, 2013) has dealt with the relative influence of vision versus audition and showed that visual information outweighs the auditory (cf. Woolhouse & Lai, 2014). Although we had in mind this problem related to music as a possible confounding variable, in the present study, dance and music were given in their original merged form. Namely, we intended to investigate the observers' physical experience of dance as a complex and usually multi-medial artistry that includes both vision and sound (i.e., music).

Instrument

The observers' physical experiences when watching dance were measured by 31 seven-point scales specified in the Preliminary Study (please see Table 1).

The observers' bodily sensations (i.e., kinesthetic responses) when watching dance were measured by 17 dichotomous (*yes/no*) scales specified in the Preliminary Study (please see Table 2).

The scales were presented to the participants in a randomized order. The participants observed the audiovisual recordings of choreographies, and having finished watching each of them, they immediately made their ratings on seven-point scales (1 = *least intense feeling provoked within them*; 7 = *the strongest intensity of the feeling provoked in them*) containing 31 descriptors of the

TABLE 1 Descriptors of the observers' physical experiences

I feel like moving	I feel blissful	I feel vibrations
I feel like dancing	I feel calm	I feel pride
I feel like squealing	I am touched	I feel wonder
I feel like getting up	I am surprised	I am inspired
I feel like singing	I am fulfilled	I am happy
I feel like clapping	I am cheerful	I feel impassioned
I feel like whistling	I feel admiration	I feel effused
I feel pleasant	I feel vivacious	I am astonished
I am excited	I am amazed	I am delighted
I feel longing	I can feel my body flutter	
I feel warmth	I am fascinated	

observers' physical experience when watching dance, as well as on dichotomous scales (1 = *they perceived a bodily sensation*; 0 = *they did not perceive any bodily sensations*) containing 17 descriptors of the observers' bodily sensations (i.e., kinesthetic responses). The time given to them for rating each choreography was not limited. Correlations between the descriptors of physical experience, as well as bodily sensations (i.e., kinesthetic responses) are shown in the Supporting Information (please see Appendix S1).

Data analysis

A matrix for analysis was created using string-out method proposed by Osgood and collaborators (Osgood et al., 1975; see also Vukadinović & Marković, 2012). According to this method, the 3-D matrix (Participants × Stimuli × Scales) was organized into a 2-D matrix by arranging the single stimuli matrices one under the other. In other words, matrices for 16 dance choreographies were arranged in a single string-out matrix.

Data analysis was performed using statistical software SPSS for Windows Version 25.0. To explore the factor structure of participants' ratings on the scales of physical experience and kinesthetic responses when watching dance, an exploratory factor analysis (EFA) was conducted. In order to decide how many factors would be kept, a parallel analysis using syntax was also performed. For this purpose, an online syntax was used (<https://oconnor-psych.ok.ubc.ca/nfactors/parallel.sps>).

RESULTS

The observers' physical experiences when watching dance

In performing EFA, the maximum likelihood method was used to extract the factors from the data matrix. Bartlett's test of sphericity, which tests the overall significance of all the correlations within the correlation matrix, was significant, $\chi^2(465) = 17,426.229$, $p < .001$, indicating that it was appropriate to use the factor analytic model on this set of data. The Kaiser–Mayer–Olkin (KMO) measure of sampling adequacy indicated that the strength of the relationship among variables was high (KMO = .95). Four factors with eigenvalues greater than 1 were extracted. In order to decide how many factors would be kept, a parallel analysis using syntax was

TABLE 2 Descriptors of the observers' body sensations

I tap my feet	I feel chills	I cannot blink
I hold my breath	My muscles clench	I inhale slowly and deeply
I get goosebumps	I feel vibrations in my body	I shake
My heart beats faster	I have butterflies in my stomach	I clench my fists
My knees buckle	I cannot look away	I mimic the movements while I sit
I get teary-eyed	I smile	

TABLE 3 Parallel analysis with SPSS and syntax

	Initial eigenvalues			Extraction sums of squared loadings			Random data eigenvalues
	Eigenvalue	% variance	% cumulative variance	Eigenvalue	% variance	% cumulative variance	Means
Factor 1	15.270	49.259	49.259	14.907	48.086	48.086	1.498
Factor 2	3.625	11.695	60.954	3.279	10.578	58.664	1.386
Factor 3	1.801	5.809	66.763	1.387	4.473	63.136	1.341
Factor 4	1.118	3.608	70.371	.758	2.445	65.582	1.303

Note: The results from Parallel analysis using syntax are shown in the last column.

TABLE 4 Four extracted factors presented with factor loadings based on a maximum likelihood procedure with Promax rotation for 31 descriptors of the observers' physical experience when watching dance

	F1 Action Tendency	F2 Arousal	F3 Relaxation
Descriptors of the observers' physical experiences when watching dance			
I feel like dancing	.891		
I feel like moving	.792		
I feel vibrations	.789		
I feel vivacious	.780		
I feel like getting up	.778		
I can feel my body flutter	.759		
I feel like singing	.724		
I feel like clapping			
I feel like squealing			
I feel impassioned		.829	
I feel pride		.815	
I am cheerful		.814	
I feel effused		.804	
I am inspired		.802	
I am happy		.785	
I feel like whistling		.704	
I feel wonder		.700	
I feel longing			
I am touched			.830
I feel warmth			.818
I feel calm			.792
I feel blissful			.756
I feel pleasant			.756
I am amazed			
I feel admiration			
I am delighted			
I am fascinated			
I am fulfilled			
I am excited			
I am astonished			
I am surprised			

Note: bolded values are significant at p level, 001

performed. It has been indicated that only three factors have a mean (random data eigenvalues obtained in parallel syntax) that is lower than the initial eigenvalues obtained in SPSS (see Table 3). These analyses indicated that the three factors gave the most interpretable solution.

Altogether, the three factors have a common explained variance of 63.13%. A Promax rotation was performed as the factors were expected to be correlated. The highest factor loadings on each factor are displayed in Table 4. Only descriptors with factor loadings of .70 and above are shown.

With regards to the contents of the obtained factors (i.e., items with the highest factor loadings), the factors are named as follows: Factor 1 – Action Tendency, Factor 2 – Arousal, and Factor 3 – Relaxation. Action Tendency and Relaxation showed low inter-correlation between them ($r = .381$). Other inter-correlations between Action Tendency and Arousal ($r = .550$) and between Relaxation and Arousal ($r = .660$) were found to be medium strong.

To resume and indicate our final solution – the results of EFA have shown that the structure of the observers' physical experience when watching dance consisted of three factors: Action Tendency (*I feel like dancing, I feel like moving, I feel vibrations and I feel vivacious*), Arousal (*I feel impassioned, I feel pride, I am cheerful and I feel effused*) and Relaxation (*I am touched, I feel warmth, I feel calm and I feel blissful*). For each factor, only the first four items with higher loadings ($r > .75$) were kept. The descriptive statistic for each factor (M , SD , MIC and Chronbach's alpha) after the item selection is shown in Table 5.

Furthermore, the correlations between factors after the item selection were calculated. The correlation between Action Tendency and Relaxation is low and significant ($r = .167$, $p < .001$) while those between Action Tendency and Arousal ($r = .527$, $p < .001$) and between Arousal and Relaxation ($r = .555$, $p < .001$) are significant and medium strong.

The correlations between factors of the scale that measures the observers' physical experiences when watching dance and factors of the scale measuring the observers' bodily sensations will be displayed in the next section.

The spectators' bodily sensations (i.e., kinesthetic responses) when observing dance

In performing EFA, the maximum likelihood method was used to extract the factors from variable data. Bartlett's test of

sphericity, which tests the overall significance of all the correlations within the correlation matrix, was significant, $\chi^2(136) = 3,439.522, p < .001$, indicating that it was appropriate to use the factor analytic model on this set of data. The KMO measure of sampling adequacy indicated that the strength of the relationship among variables was high (KMO = .84). Four factors with eigenvalues greater than 1 were extracted. Furthermore, to decide how many factors should be retained, a parallel analysis using syntax was also performed. According to the results of analyses conducted, it is indicated that the three factors gave the most interpretable solution (please see Table 6).

Altogether, the three factors have a common explained variance of 42.66%. A Promax rotation was performed as the factors were expected to be correlated. The highest factor loadings on each factor are displayed in Table 7. Only the descriptors of kinesthetic responses with factor loadings above .50 are shown. In relation to the content of the obtained factors (i.e., items with the highest factor loadings), the factors are named as follows: Factor 1 – Focus, Factor 2 – Excitement, and Factor 3 – Embodied Anticipation. The inter-correlation between factors Excitement and Embodied Anticipation is low ($r = .208$). Other inter-correlations between Excitement and Focus ($r = .413$) and between Focus and Embodied Anticipation ($r = .327$) are medium strong.

To resume, the results of the exploratory factor analysis have shown that the structure of the observers' kinesthetic responses when watching dance consists of three factors: Focus (*I hold my breath, I get goosebumps, I cannot look away, and I cannot blink*), Excitement (*My heart beats faster, I have butterflies in my stomach, I feel vibrations in my body, and I mimic the movements while I sit*) and Embodied Anticipation (*My knees buckle, I get teary-eyed, and I shake*). For each factor, only items with higher loadings ($r > .60$) were kept. The descriptive

TABLE 5 Descriptive statistics for factors of scale measuring physical experience

Scale 1: Physical experience					
Factors		<i>M</i>	<i>SD</i>	<i>MIC</i>	α
1	Action Tendency	3.32	2.07	.671	.891
2	Arousal	2.85	1.88	.651	.881
3	Relaxation	2.79	1.75	.614	.864

Abbreviation: MIC, mean inter-item correlation.

TABLE 6 Parallel analysis with SPSS and syntax

	Initial eigenvalues			Extraction sums of squared loadings			Random data eigenvalues
	Eigenvalue	% Variance	% Cumulative variance	Eigenvalue	% Variance	% Cumulative variance	Means
Factor 1	5.145	30.264	30.264	4.565	26.885	26.885	1.299
Factor 2	1.972	11.598	41.862	1.261	7.420	34.275	1.238
Factor 3	1.716	10.114	51.976	1.426	8.386	42.661	1.192
Factor 4	1.106	6.504	58.489	.634	3.727	46.389	1.150

Note: The results from Parallel analysis using syntax are shown in the last column.

statistic for each factor (*M*, *SD*, *MIC* and Chronbach's alpha) after the item selection is shown in Table 8.

Next, the correlations between factors after the item selection were calculated. The correlations between Focus and Excitement ($r = .421, p < .001$), as well as between Focus and Embodied Anticipation ($r = .358, p < .001$) are significant and medium strong. Furthermore, the correlation between Excitement and Embodied Anticipation ($r = .309, p < .001$) is also significant and medium strong.

The correlation between the factors of two scales, that is, the one measuring the observers' physical experiences and the other measuring their bodily sensations (kinesthetic responses) when watching dance show that all factors are correlated. Correlations are significantly low or medium strong (see Table 9).

TABLE 7 The three factors extracted and presented with factor loadings based on a maximum likelihood procedure with Promax rotation for 17 descriptions of kinesthetic responses (i.e., body sensations) when watching dance

	F1 focus	F2 excitement	F3 embodied anticipation
The observers' kinesthetic responses when watching dance			
I hold my breath	.815		
I get goosebumps	.660		
I cannot look away	.615		
I cannot blink	.600		
I inhale slowly and deeply	.568		
I feel chills	.535		
My heart beats faster		.667	
I have butterflies in my stomach		.638	
I feel vibrations in my body		.626	
I mimic the movements while I sit		.608	
I tap my feet		.505	
I smile			
I clench my fists			
My knees buckle			.724
I get teary-eyed			.691
I shake			.654
My muscles clench			.530

Note: bolded values are significant at p level, 001

TABLE 8 Descriptive statistics for factors of scale measuring physical experience

Scale 2: Bodily sensations (i.e., kinesthetic responses)					
Factors		<i>M</i>	<i>SD</i>	<i>MIC</i>	α
1	Focus	1.86	1.54	.432	.754
2	Excitement	1.08	1.26	.408	.727
3	Embodied Anticipation	.28	.71	.476	.730

Abbreviation: MIC, mean inter-item correlation.

TABLE 9 Correlation between factors of the observers' physical experience and bodily sensations when watching dance

Physical experience	Bodily sensations (kinesthetic responses)		
	Focus	Excitement	Embodied anticipation
Action Tendency	.350**	.577**	.167**
Arousal	.574**	.242**	.128**
Relaxation	.506**	.085*	.219**

* $p < .01$.

** $p < .001$.

Excitement has a positive and medium strong correlation with Action Tendency, which means that the higher the Excitement is, the higher is the Action Tendency. Moreover, Focus has a positive and medium strong correlation with Arousal as well as with Relaxation. That means that higher the Focus is, the higher are Arousal and Relaxation.

DISCUSSION

The purpose of this study was to explore the factor structure of the observers' physical experiences of dance and their bodily sensations when watching dance choreographies. The results show that the structure of the observers' physical experiences when watching dance choreographies consists of three factors: Action Tendency, Arousal, and Relaxation.

Factors of physical experience when observing dance choreographies

The factor of Action Tendency includes descriptors such as *I feel like dancing*, *I feel like moving*, *I feel vibrations*, and *I feel vivacious*. This finding is in line with previous studies reporting that one of the most frequent experiences of observers watching dance is their desire to move (Christensen & Calvo-Merino, 2013; Hagendoorn, 2004; Jola et al., 2011; McFee, 1992; Montero, 2016; Reasons & Reynolds, 2010; Strukus, 2011). The fact that the observers have such an active engagement with dance is closely related to the concept of kinesthetic experience. In other words, kinesthetic empathy is understood as the feeling of sharing another person's movement (Martin, 1939; Strukus, 2011). The conceptualization of kinesthesia as "the muscular connection with

our deepest feelings" (Foster, 2008, p. 52) suggests that the observers' kinesthetic engagement when watching dance has the function "either to awake or to enliven feelings" (Foster, 2008, p. 53). Thus, it could be assumed that the observers' desire to move and their tendency for action represent some of the crucial responses to dance. In short, the factor of Action Tendency is more closely related to the effect of dance as kinesthetic art, that is, "art of the muscular sense" (Arnheim, 1966, p. 21). This is an effect that may be experienced in the entire body. Furthermore, the results of the present study indicate that the scale measuring physical experience is correlated with the scale measuring bodily sensations. Between the factors of Action Tendency (physical experience) and Excitement (bodily sensations, i.e., kinesthetic responses) there is a positive and medium strong correlation. This implies that Action Tendency as a part of physical experience when watching dance is closely related with kinesthetic responses (i.e., Excitement – described by sensations such as *My heart beats faster*, *I have butterflies in my stomach*, *I feel vibrations in my body*, and *I mimic the movements while I sit*).

The factor of Arousal, which includes descriptors such as *I feel impassioned*, *I feel pride*, *I am cheerful*, and *I feel effused*, can be associated with the feelings that frequently accompany the observers' physical experiences when watching dance. Joyfulness, happiness, and cheerfulness are reported as the observers' most frequent and most recognizable emotional experiences when watching dance (Brownlow et al., 1997; Dittrich et al., 1996; Jola et al., 2011; Reasons & Reynolds, 2010; Sawada et al., 2003). Furthermore, the factor of Arousal, which forms the structure of the observers' physical experience when watching dance, may be strengthened with a suggestion given by Niedenthal (2007). He proposed that the aspects of experience related to the body include not just sensory and motor experience, but emotional experience as well.

The factor of Relaxation is the factor that includes descriptors such as *I am touched*, *I feel warmth*, *I feel calm*, and *I feel blissful*. It seems that these descriptors are very close to what could be comprehended as the observers' pleasure-based responses when watching dance. In previous studies, it has been reported that when engaged in the observation of dance, many spectators are motivated by the pleasures that they find within the dance choreographies themselves, for example, "It gladdens the heart," "It calms me down," "It relaxes me," and "It makes me happy." The audiences' emotional experiences relate not only to the specific quality of the dance movement, but also to the observers' "interpretative abilities in which the individual spectators engage with that dance movement" (Reasons & Reynolds, 2010, p. 66). Therefore, it may be assumed that the Relaxation factor of the observers' physical responses when watching dance may be related to the viewers' motivation, that is, to what the observers are looking for in a dance performance and how they experience it (Jola et al., 2011).

This factor structure suggests that the observers' physical experience of dance choreographies is a multidimensional phenomenon and its structure could be related with different aspects of the observers' physical experience. In other words, Action Tendency is mostly related to the concept of the kinesthetic empathy, Arousal with emotional experience, and Relaxation with pleasure-based motivation.

Factors of kinesthetic responses when observing dance choreographies

In the context of the observers' physical experience when watching dance, there is a number of somatovisceral and sensory-motor kinesthetic responses that form a part of their physical experience (e.g., tapping one's feet, shaking, getting goosebumps, and changing the tempo of breathing). The results of this study have also shown that a wide range of kinesthetic responses when observing dance choreographies may as well be articulated through a factor structure that consists of three factors: Focus, Excitement and Embodied Anticipation.

The factor of Focus, which includes bodily sensations such as *I hold my breath, I get goosebumps, I cannot look away, and I cannot blink*, may be related to the "wow" factor previously described by Reason & Reynolds (2010, p. 58). They connect the "wow" factor with an audience's amazement, fascination, and admiration of virtuosity. Moreover, they propose that these sensations are the most prominent audience's kinesthetic responses when observing dance. In addition to this, the results of the present study have shown that Focus has a positive and medium strong correlation with Arousal as well as with Relaxation, which are the factors of the scale measuring observers' physical experience when watching dance. That means that the higher the Focus is, the higher are Arousal (i.e., emotional experience) and Relaxation (pleasure-based motivation). It can be recognized that kinesthetic responses referring to the Focus may also be related to the components of aesthetic experience, such as "admiration of virtuosity" and "fascination with the unusual" described by Kubovy (1999) and Marković (2010). Kinesthetic responses related to the Focus may be understood as a way for the observers to engage in dance. They are a means of participating with the dancers in their movement. This assumption suggests a strong link between the Focus and aesthetic experience, which has previously been defined as an exceptional state of mind that is characterized by a strong focus on a certain object that engages and fascinates a subject, whereby all other objects and actions in the environment are excluded from consciousness (cf. Beardsley, 1982; Csikszentmihalyi, 1990; Cupchik & Winston, 1996; Koestler, 1970; Kubovy, 1999; Marković, 2010; Ognjenović, 2003; Polovina & Marković, 2006; Telegan & Atkinson, 1974). However, the link between kinesthetic responses and the dimensions of aesthetic experience (Vukadinović & Marković, 2012) would require further empirical testing.

The factor of Excitement includes bodily sensations such as *My heart beats faster, I have butterflies in my stomach, I feel vibrations in my body, and I mimic the movements while I sit*. Kinesthetic responses referring to the Excitement seem to be closely related to what has previously been described as "inner mimicry" or "imagining movement" (Foster, 2008; Jola et al., 2011; Martin, 1939; Reasons & Reynolds, 2010; Strukus, 2011). Those kinesthetic responses may indicate the spectators' excitement that is drawn from the pleasure of imagining themselves doing the movement. Furthermore, the results of the present study regarding the correlation between factors of two scales, one measuring the observers' physical experience and the other

measuring the observers' bodily sensations (i.e., kinesthetic responses), showed that Excitement has positive and medium strong correlation with Action Tendency, which means that the higher the Excitement is, the higher is the Action Tendency. Thus, these results may be interpreted with the fact that bodily sensations related to Excitement may represent a means by which viewers attempt to connect with a dancer (cf. Foster, 2008; Jola et al., 2011; Martin, 1939; Strukus, 2011). However, as Strukus (2011) suggested, seeing somebody else's movements would not necessarily include imagining movement nor result in "mirroring." Previous research reported the differences in the spectators' kinesthetic responses related to imagining themselves performing the movements, depending on the observers' level of experience in watching dance, their dance training, and their being professional dancers themselves (Calvo-Merino et al., 2005, 2006, 2009; Christensen & Calvo-Merino, 2013; Cross et al., 2006; Jola et al., 2011; Jola et al., 2012). Since in this study some of students who participated had no experience in dance training or in watching dance, the results should be taken with reservations, concerning the generalization related to all the different "types" of dance observers. The question of the relationship between the observers' factors of kinesthetic responses and their previous experience with dance remains open for further empirical studies. Furthermore, in future studies, the question of the gender of the dancer and the gender of the observer (Strukus, 2011) in the context of the observers' factors of kinesthetic responses should be empirically tested and addressed.

The factor of Embodied Anticipation is related to bodily sensations such as *My knees buckle, I get teary-eyed, and I shake*. Reason and Reynolds (2010) propose that there is a connection between empathy and Embodied Anticipation, reporting that kinesthetic responses involve embodied sensations referring to anticipation connected with the development of choreography. They suggest that there is a relationship between breathing, body rhythms, and emotions while perceiving dynamics through dance observation. According to these authors (2010, p. 66), these kinds of kinesthetic responses are related to the effects of suspense, and involve the "automatic/instinctive anticipation" of movement, such as falling or jumping, which changes the observers' breathing pattern and muscular tension. Previous studies (Vukadinović & Marković, 2017) have also explained the influence of the characteristics of dance choreography on the observers' aesthetic experience. Furthermore, the characteristics of a dance choreography that are listed as dynamisms structure, progression, and temporality (Foster, 2008; Hagendoorn, 2004) are suggested to be crucial in shaping the observers' anticipation (cf. Berthoz, 2000; Reasons & Reynolds, 2010). Further research would be required to answer the question of how the objective characteristics of dance choreographies (regarding the effect of suspense) influence the factors of the observers' kinesthetic responses when watching dance.

Limitations

Even though this study provided a better insight into the phenomenon of the observers' physical experience and their related

bodily sensations when watching dance, there are three aspects of limitations which should be mentioned. There are limitations concerning the sample, which included a small and unbalanced number of male and female participants. Also, there are limitations regarding the instrument used in the study because there were no other variables for its validation. Also, the limitation related to the instrument is related with marginal Chronbach's α obtained as a reliability measure for scale of the observers' bodily sensations, which implies that this result should be taken with caution.

Furthermore, there are limitations regarding the stimuli used in the main study where the variable of dance type (modern, contemporary, lyrical jazz, tango, and hip-hop) was not controlled for. Moreover, there is a lack of control of how the objective characteristics of dance choreographies, such as dance technique, elegance, and dynamic (Vukadinović, 2019), influence the observers' physical experience of watched performances. Another limitation related to the stimuli is that it was presented as a video recording and not a live performance. Previous studies have shown that there is a significant effect on the observers' experience in general when they watch live performances compared to video recordings (Jola & Grosbras, 2013; Vukadinović & Marković, 2017). There is also a high probability that these results may be shaped by the influence of music, which could be a confounding variable in perceiving dance. Since in the previous studies (Cervellin & Lippi, 2011; Reinhardt, 1999; Thaut et al., 2014; Thaut et al., 2015; Tormodsatter Færøvik, 2017) it has been shown that listening to music involves not only the auditory areas of the brain but also motor and sensory cortex among others, there is a possibility that some bodily sensations are the result of the influence of music and rhythm. For example, there is evidence that "auditory stimulation primes the motor system in a state of readiness to move, because rhythm provides anticipatory time cues for the brain to plan ahead and be ready" (Thaut et al., 2015, p. 2).

In future studies, when exploring the structure of the observers' physical experience and the structure of the observers' kinesthetic responses while watching dance, it would be important to take into account the possible influence of music. It would also be significant to assure control of the music/rhythm variable, by, for example, comparing the observers' physical experiences and bodily sensations while only listening to music and while watching dance choreographed to that particular music.

CONCLUSION

One of the benefits of this study is the construction of an instrument for measuring the observers' experiences when watching dance. While the previous studies dealing with physical experience and bodily sensations when watching dance did not quantify responses (Batson, 2008; Foster, 2008; Jola et al., 2011; Montero, 2006, 2012; Reasons & Reynolds, 2010; Strukus, 2011), the instrument constructed in the present study measures and quantifies kinesthetic responses when watching dance. Using a factor analysis to research the structure of audiences' physical experiences and their related bodily sensations when watching dance, the instrument constructed

in this study does not just enable a more precise quantification of kinesthetic empathy, but it also provides a better insight into this phenomenon.

This instrument could be used in future studies to address the differences in the observers' physical experiences when watching dance performances depending on the audience's previous experience in dance training. Also, it could be applied to the research into the differences between the audiences' physical experiences when watching live dance compared to recorded dance. Studying particular dance types (e.g., classical ballet, contemporary dance, jazz dance, street styles of dance [e.g., hip-hop, break dance], folk, and flamenco), or specific characteristics of choreographies (e.g., complexity, tempo, dance technique), or specific characteristics of individual dancers (e.g., staging or attractiveness of the dancers' face) in relation to the observers' physical experiences and related bodily sensations when watching dance would also be fruitful. Likewise, with this instrument, the relationship between the aesthetic experience of dance choreographies and the observers' kinesthetic responses that accompany the aesthetic experience could also be studied. In addition, using this instrument for exploring observers' physical experiences and bodily sensations in other artistic disciplines (e.g., painting, music, literature, theater, film) may be very useful in order to compare spectators' body reactions. It would be especially challenging to see if there are some similarities among observers in response to different disciplines of art.

Generally, it can be concluded that observers' physical experiences of dance choreographies are complex, multi-dimensional phenomena that have a structure consisting of Action Tendency, Arousal, and Relaxation. In addition to this factor structure, we explored the factor structure of a bodily sensation—kinesthetic responses—which accompany the observers' physical experience when watching dance. Compared to earlier studies, our scale measuring bodily sensation is very closely related with what is most frequently assumed to be "kinesthetic experience" (Jola et al., 2011; Martin, 1939; Reasons & Reynolds, 2010; Strukus, 2011). Factors such as Focus, Excitement, and Embodied Anticipation form the structure of the observers' kinesthetic responses (bodily sensations) when they engage in observing dance.

CONFLICT OF INTEREST

The authors declare there are no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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APPENDIX A.

The list of dances downloaded from the Internet for the Preliminary study

1. Folk: “Čačak kolo” <http://www.youtube.com/watch?v=eisq2319P7U>
2. Contemporary Dance: “Philia” <http://www.youtube.com/watch?v=ysG2dyV3Vt4>
3. Flamenco: “Farruca” <http://www.youtube.com/watch?v=y5triYK92IA>
4. Giselle “Duet” <http://www.youtube.com/watch?v=WYShMJxep7c>
5. “Kolo – Great Final of the Balkan Odyssey” <http://www.youtube.com/watch?v=YFOU87LANfM>
6. Swan Lake “Odette Variation” <http://www.youtube.com/watch?v=d3jAD4Dr7BI>
7. Flamenco: “Solea por Bulerias” <http://www.youtube.com/watch?v=plTTJFP7YYO>
8. “Duet – Srodne duše” <http://www.youtube.com/watch?v=YWCwMGnGbQU&feature=Playlist&p=9CF4C2BA82377382&>
9. “Tango Fire – Verano Portenas” <http://www.youtube.com/watch?v=cFeAwZslAHY>
10. Contemporary dance: “Why” <http://www.youtube.com/watch?v=qaKJNs3cSLcZ>

APPENDIX B.

The list of dance choreographies originally performed within the American televised dance competition show *So You Think You*

Can Dance that aired on Fox between 2008 and 2016. Downloaded from the Internet and used as stimuli in this research

1. "How it ends" – De VotchKa <https://www.youtube.com/watch?v=9YbEtfJryXA>
2. "Tore my Heart" – Oona & Dave Tweedie <https://www.youtube.com/watch?v=I6tp8xByIAE>
3. "Wave" – Back <https://www.youtube.com/watch?v=SnoQlthExKA>
4. "The Gulag Orkestar Beirut" <https://www.youtube.com/watch?v=lecijwOXX1g>
5. "So Broken" (Live version) – Björk <https://www.youtube.com/watch?v=0UO4dLY3vBI>
6. "Medicine" – Daughter <https://www.youtube.com/watch?v=LXvCEfq39ws>
7. "Game on" – District 78 <https://www.youtube.com/watch?v=DdsTQoN4WcQ>
8. "Mirror" - Alexandre Desplat <https://www.youtube.com/watch?v=DctLJHijgOI>
9. "Run the World (Girls)" – Beyonce <https://www.youtube.com/watch?v=qdxxN0sUsUI>
10. "Outta your Mind" – Lil Jon & LM*AO <https://www.youtube.com/watch?v=mhyWzC7df-0>
11. "Raise your Weapon" – Deadmouse <https://www.youtube.com/watch?v=VklCjZyjVBw>
12. "Get Low" – Dilan Francis & DJ Snake <https://www.youtube.com/watch?v=neexFho8Z0I>
13. "Libertango" – Bond Quartet <https://www.youtube.com/watch?v=k4A97bZ0mZ4>
14. "Hello Good Morning (Remix)" – Diddi Dirty Monay feat. Nicky Minay & Rick Ross https://www.youtube.com/watch?v=tCb_UOakEQI
15. "My Chick Bad" – Ludacris & Nicky Minay <https://www.youtube.com/watch?v=XrT5ca9EbTw>
16. "Brotsjór" – Olafur Arnolds https://www.youtube.com/watch?v=Skb_urlQ4Zg