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SUBJECTIVE TIME EXPERIENCE, BODILY SENSATIONS, AND THE AESTHETIC EXPERIENCE OF DANCE CHOREOGRAPHIES

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Abstract

This study investigates the relationship between the subjective time experience and aesthetic experience, including bodily sensations, as observers view recordings of dance choreographies of contemporary and hip-hop dance. After watching each of the six different video-recorded dance choreographies, the participants (Serbian students N=122, aged between 17 and 27) rated their perception of time (i.e., duration, passage), their aesthetic experience, and bodily sensations. In regard to the duration aspect of time perception, the results indicated that the observers' estimations of the duration of each choreography do not differ significantly from the objective duration of the observed choreography. In contrast, the results for the passage of time show that the participants perceived time as passing much faster when watching hip-hop choreographies. Specifically for hip-hop choreographies, Dynamism and Focus positively predict subjective time experience. In line with previous studies, these findings suggest that heightened focus on an aesthetic object, as well as immersion in an activity, tends to diminish awareness of the passage of time, leading to the sensation of time passing more quickly.

Keywords*:* dance, subjective time, aesthetic experience, bodily sensations

1. INTRODUCTION

Watching dance performances can elicit a range of emotions, impressions, and bodily sensations. For instance, observers may feel moved by the dancer's skill which is often accompanied by physical reactions like a quickened pulse or goosebumps (Cova & Deonna, 2014; Wassiliwizky et al., 2015). While many studies have dealt with different aspects of the aesthetic experience when watching dance, little research has been conducted on how individuals perceive time during this experience. This study aims to address this gap by examining observers' perception of time during dance performances.

Based on previous research that explored the experience of time and its perception, "objective time" can be defined as the current flow of time measured in hours or with a calendar, while *subjective time* refers to the experience of the past, present, and future in the current moment (Shipp & Jansen, 2021). Regarding subjective time, Thönes and Stocker (2019) differentiate three aspects of the mental representation of time: temporal processing, time perception in terms of passage, and time perception in terms of duration. Concerning time perception (i.e., subjective time) in terms of passage, the internal experience of the passage of time can be such that time passes faster or slower compared to objective time depending on the age of the observer and the aging process (Draaisma, 2004; Gruber et al., 2004; Landau et al., 2018; Lee & Janssen, 2019; Lemlich, 1975; Winkler et al., 2017). Adults often perceive time passing more quickly as they age due to the repetitive nature of their lives and decreased exposure to novel events compared to childhood (Gagnon-Harvey, McArthur, Tétreault, Fortin-Guichard, & Grondin, 2021; Lee & Janssen, 2019). This perception may also be influenced by the level of temporal pressure experienced in daily life (Gagnon-Harvey et al., 2021). Additionally, situational factors (Lee & Janssen, 2019), like watching a dance performance, can alter the subjective experience of time passing.

Observing a dance performance places one in a unique artistic context which can lead to an aesthetic experience. The aesthetic experience is recognized as a distinct state of mind (Beardsley, 1982; Cupchik, 1974; Csikszentmihalyi, 1990; Koestler, 1970; Kubovy, 1999; Marković, 2017) and is characterized by a focus on a particular object which strongly engages and fascinates the subject to the extent that other events in the environment become suppressed in their consciousness. This kind of engagement with an aesthetic object often leads to a perception of time which Csikszentmihalyi (1990) calls the transformation of time and associates with the concept of flow. The term *flow* refers to a special, optimal state of consciousness (Csikszentmihalyi, 1990, 1997). This dynamic psychological state results in a sense of wholeness that occurs when individuals are active and engaged in an activity. The experience of completeness blurs the boundaries between the self and the external environment, as well as between the present, past, and future.

In the field of dance, subjective time remains an under-researched topic, although there are notable contributions (c.f. Bachrach et al., 2015; Bläsing, 2023; Deinzer et al., 2017; Orgs et al., 2011; Sgourmani & Vatakis, 2014).

Dealing with the experience of time from the perspective of the observer, the study by Deinzer and colleagues (2017) showed that the perception of time during a dance performance is influenced by the pace of the dance and the observer's level of engagement. Slow dances tend to make time appear to pass more slowly, while faster ones may elongate the perceived duration. Additionally, audience engagement plays a significant role: disinterest can heighten awareness of time, making it seem to move slowly, whereas deep engagement can lead to a loss of temporal awareness. Further studies highlight that boredom and its opposite, the "flow experience", can contribute to the observer feeling as if time is either flying or dragging endlessly (Csikszentmihalyi, 1990, 1997; Zakay, 2014).

1.1 Aesthetic Experience and Bodily Sensations When Watching Dance

Previous studies on the aesthetic experience of dance have identified three key dimensions (Vukadinović & Marković, 2012). Dimension of *Dynamism* pertains to the energy and expressiveness of the movement, *Affective evaluation* focuses on the elegance and grace of highly articulated dance movements, and *Exceptionality* relates to the originality of the artistic content and the admiration for the required skills in performance. Subsequent research has shown that dance form (Vukadinović, 2017a), as well as the choreographer's style, can be differentiated based on these dimensions (Vukadinović, 2017b). In addition, the audience's aesthetic experience stems from the overall context of the performance, such as the scenography, lighting, music, physical characteristics of the dancers, the dancers' interpretation of choreography, and its staging (c.f. Vukadinović & Marković, 2017; Vukadinović, 2019).

In a study conducted by Vukadinović and Marković (2022), the factor structure of the audiences' bodily sensations was defined. These sensations were categorized into three dimensions: *Focus* encompasses the audience's amazement, fascination, and admiration of virtuosity, reflecting how the observers engage with the dance; *Excitement* indicates the spectators' excitement drawn from the pleasure of imagining themselves performing the movement; *Embodied Anticipation* pertains to the sense of anticipation connected with the development of choreography and movements, such as falling or jumping, which can influence the observers' breathing patterns and muscular tension.

By exploring the relationship between the observers' subjective time experiences as well as the dimensions of aesthetic experience and bodily sensations that occur when watching the recordings of contemporary and hip-hop dance choreographies, this study contributes to the existing literature in the following ways. First, it uses a quantitative approach. Quantification is based on the operationalization of the descriptors related to the observers' aesthetic experience and, subsequently, their bodily sensations while observing dance. This approach enables not only the capturing of fine differences in the assessment of the explored dimensions but also their further comparison across various specific dance-related topics (e.g., different dance forms, the choreographer's style, the characteristics of the performer, etc.). As such, the quantitative approach used in this study differs from previous research done from the perspective of neuroaesthetics (cf. Burzynska, Finc, Taylor, Knecht, & Kramer, 2017; Calvo-Merino, Glaser, Grezes, Passingham, & Haggard, 2005; Herbec, Kauppi, Jola, Tohka, & Pollick, 2015; Pollick, Vicary, Noble, Kim, Jang, & Stevens, 2018) and somaesthetics (Arnold, 2005; Carter, 2015), as well as from cognitive-oriented research on dance (cf. Glass, 2005; Stevens & McKechnie, 2005).

The second contribution of this study is the exploration of how subjective time relates to the dimensions of aesthetic experience and bodily sensations. Concerning the aesthetic experience, previous studies have shown that attention, engagement, and aesthetic preference (i.e., liking or disliking a piece) are related to the distortion of time (Csikszentmihalyi, 1990, 1997; Zakay, 2014). However, it is not clear which component of the observer's aesthetic experience (i.e., dynamism, affective evaluation, or exceptionality) correlates with the modulation of time perception. Some authors suggest that paying attention to one's own bodily signals when observing dance mediates the feeling of time (Bläsing, 2023; Deinzer et al., 2017). In this regard, some

studies have employed physiological measurements to record observers' breathing and cardiovascular parameters, finding that there is a synchronization of breathing patterns and muscle tension between dancers and observers which is manifested in a physiological synchronization between the two (Bachrach et al., 2015). However, it is not clear which bodily sensations (i.e., those belonging to focus, excitement, or embodied anticipation) are related to the modulation of time perception.

The third contribution of this research lies in the fact that this study focuses on one particular domain and the differences between its subcategories, precisely on the investigation of the relationship between subjective time experience, aesthetic experience, and bodily sensations regarding two specific dance forms: contemporary and hip hop. This is particularly noteworthy considering that studies on time perception with dance as stimuli primarily use contemporary dance (Bachrach et al., 2015; Deinzer et al., 2017) or classical ballet steps (Sgourmani & Vatakis, 2014).

1.2 The Purpose of the Study

The purpose of this study is to explore how the non-dancer observers perceive time when watching dance choreographies of contemporary and hip hop. Moreover, the study aims to investigate the relationship between subjective time experience and assessments of the aesthetic experience of these dance choreographies, as well as to examine the bodily sensations that occur when watching dance.

Considering the distinct formal characteristics of contemporary and hip-hop dance (Vukadinović, 2019), and on the basis of previous findings from Deinzer et al. (2017), it can be hypothesized that the observers will have the impression that time passes faster while watching hip-hop choreographies. Moreover, based on previous findings that various dance forms are rated differently regarding their aesthetic experience (Vukadinović, 2017a), it can be hypothesized that that contemporary and hip-hop dance choreographies will be evaluated differently on the dimension of Dynamism. By applying the same assumptions to the dimension of bodily sensations, dimension of Excitement will receive higher ratings for hip-hop dance choreographies. Finally, considering the definition of the aesthetic experience as a unique state of mind that often involves an altered time perception (Csikszentmihalyi, 1990; Tellegan & Atkinson, 1974), it can be hypothesized that the observers' aesthetic experiences and their bodily sensations elicited by observed choreographies will influence their perception of the passage of time.

2. METHODS

2.1 Participants

In the study participated 122 students from Novi Sad Business School, aged between 17 and 27 (M = 19.36, SD = 1.44; 72.1% women). Given that dance expertise could potentially impact the overall aesthetic experience of dance (Orgs et al., 2018; Rose et al., 2020), this variable was controlled for. The participants were non-dancers, they did not have any prior dance training, whether professional or recreational. Additionally, they had no training in any other form of professional physical activity.

Given the limited research into how the cognitive system combines music and dance into a unique aesthetic experience (Christensen & Calvo-Merino, 2013), the present study made efforts to control for variables related to music. None of the participants had any kind of musical training or education (e.g., playing an instrument, making music through software, or music production). Additionally, none of the participants preferred listening to hip-hop music. The majority of the participants reported listening to all music genres (93.4%), while 6.6% reported listening to rock music exclusively. Other variables, such as familiarity with dance styles, attractiveness of the dancers, and sexual orientation of the participants, were not controlled for. The students did not receive any course credit or monetary compensation for their participation. The participants took part in the study voluntarily and were ensured anonymity.

The set of original dance performances used for stimulus was taken from the American television dance competition show *So You Think You Can Dance*, which aired on Fox between 2008 and 2016. The video recordings of the choreographies were taken from YouTube and adapted for research purposes (the websites are listed in Table 1). The choice of stimuli was driven by the goal of achieving high homogeneity regarding the stimuli, ensuring ecological validity, and controlling for as many variables as possible (i.e., the duration of the choreography, stage, complexity of the choreography, the performers' age, and skill, and the choreographer's style). Thus, all video recordings included a pair of dancers of similar age and skill, while the lighting and costumes were designed and chosen by the choreographer and the team of producers in accordance with the main theme of the choreography. All of the recordings were presented with their accompanying music.

The stimuli consisted of six video recordings of original dance choreographies: three belonging to contemporary genre and three to hip-hop. These pieces were created by acclaimed choreographers who were nominees and winners of the *Primetime Emmy Awards for Outstanding Choreography*. The contemporary pieces were made by Sonya Tayeh and the hip-hop pieces by choreographers Tabitha and Napoleon D'umo. The videos included the original music selected by the choreographers. The duration of each choreography is listed in *Table 1*.

Choreographies*	**Objective duration (seconds)**
Contemporary dance	
1 „Tore my Heart" - Oona & Dave Tweedie https://www.youtube.com/watch?v=I6t-p8xByIAE	100
2 „A Gulag Orkestar Bejrút" https://www.youtube.com/watch?v=le-cijwOXX1g	104
3 „Brotsjór" - Olafur Arnolds https://www.youtube.com/watch?v=Skb_urlQ4Zg	97

Hip hop Dance	
*1 „Outta your Mind" - Lil Jon & LM*AO* https://www.youtube.com/watch?v=mhy-WzC7df-0	105
2 „Get Low" - Dilan Francis & DJ Snake https://www.youtube.com/watch?v=neex-Fho8Z0I	98
3 „My Chick Bad" - Ludacris & Nicky Minaj https://www.youtube.com/watch?v=XrT-5ca9EbTw	105

Table 1. The list of video recordings and their duration
Note: *Choreographies were made by choreographers who were nominated more than three times for the *Primetime Emmy Awards for Outstanding Choreography.*

In the present study, dance and music were presented in their original merged form, despite that the potential of music as a confounding variable. The first reason for this decision is that the main goal of this research is to explore the observers' subjective time experiences related to dance in its natural, complex, often multimedia form, which includes both vision and music. Secondly, the choice was supported by evidence that visual information outweighs auditory information, as shown in previous studies (cf. Tsay, 2013; Woolhouse & Lai, 2014).

2.2 Instruments

The study employed three instruments, with the first dedicated to measuring *Subjective time experience.* This instrument contains two items in line with Thönes and Stocker (2019), who pointed out that there are two aspects related to time perception regarding subjective time: the passage of time and duration. The first item measured the passage of time, with students providing answers to the question "How fast did time pass for you?" on a 5-point Likert scale (1 – very slowly; 2 – slowly; 3 – neither slowly nor fast; 4 – fast, 5 – very fast). The second item focused on the participants' estimation of the duration of the choreography, for which they were required to write down their impression of time duration expressed in seconds or minutes. Moreover, it is important to mention that these tasks involved retrospective time perception, meaning that participants had to make their estimations after they had finished watching each choreography. As Deinzer et al. (2017, p. 2) explain, "retrospective time perception tasks" imply retrospective time judgments focused on the passage of time only after the event has finished. In addition to this, they point out that retrospective time perception is reconstructed from memory, implying that individuals do not pay attention to time during the period of time in question.

In order to measure the *Aesthetic experience of dance choreographies*, an instrument constructed by Vukadinović and Marković (2012) was used. It consists of 12 seven-point rating scales measuring three dimensions and their corresponding characteristics: Dynamism (expressive, powerful, strong, and exciting), Exceptionality (eternal, unspeakable, unique, and exceptional), and *Evaluation* (delicate, elegant, seductive, and emotional). The instructions for completing the scales were the following: "Please mark the number according to your impression: the higher the impression, the higher the number (1 being the minimum, 7 being the maximum)". The Cronbach's alpha reliability for the Dynamism scale was α =.878, α =.872 for Affective Evaluation, and α =.919 for Exceptionality.

To assess *Bodily sensations when watching dance,* the instrument constructed by Vukadinović and Marković (2022) was utilized. It contains 11 dichotomous (yes/no) scales measuring three dimensions and using the following descriptors: Focus (*I hold my breath, I get goosebumps, I can't look away,* and *I can't blink*), Excitement (*My heart beats faster, I have butterflies in my stomach, I feel vibrations in my body, I mimic the movements while I sit*) and Embodied Anticipation (*My knees buckle, I get teary-eyed, I shake*). The participants had to mark their experience using dichotomous scales: 1 = if they perceived a bodily sensation or 0 = if they did not perceive any bodily sensations. The Cronbach's alpha reliability for the Focus scale was α =.754, α =.727 for Excitement, and α =.730 for Embodied anticipation. All scales used in this study along with their instructions were presented in the Serbian language.

2.3 Procedure

After giving their consent to participate in the study, the participants answered a set of questions related to their age, dance and music training, and music preferences. Next, they rated six choreographies which had previously been presented to them on a screen via an LCD projector. The video recordings were not presented in a specific order, that is, the order of presentation was arbitrary. For each choreography, the participants completed assessments related to their subjective time experience, as well as the scales measuring the aesthetic experience of dance and bodily sensations. The stimuli were observed from a distance of around 3 m and the dimensions of the screen projections were h=1.20m x w=2.20m. The participants were not constrained by a time limit for rating each choreography. Additionally, they were provided with a researcher's contact email in case they wanted to receive feedback on the study. The study was conducted in accordance with the Declaration of Helsinki.

2.4 Data Analysis

Data analysis was conducted using the statistical software SPSS for Windows v28.0. To explore subjective time experience in terms of passage, a *Paired samples t-test* was utilized. Regarding the subjective time experience in terms of duration, a *one-sample t-t-test* was carried out in order to compare whether the estimated duration of choreographies differed from objective duration.

Regarding the dimensions of aesthetic experience, arithmetic means were calculated for each of the six choreography stimuli and included in the analyses. In

terms of the bodily sensation dimensions, due to the use of dichotomous (yes – 1/ no – 0) scales, for each stimulus presented to the participants the scores for each dimension were cumulatively summed. The total score for Focus and Excitement ranged from 0 (minimum) – 4 (maximum), while Embodied Anticipation ranged from 0-3. These cumulative scores were then used in the analyses. Moreover, a multivariate analysis of variance (*GLM – Repeated measures*) was used to explore the participants' assessments of the aesthetic experience as well as bodily sensations when watching contemporary dance and hip-hop choreographies. In order to investigate whether Aesthetic experience and Bodily sensations dimensions could predict subjective time experience, multiple regression analysis was conducted.

3. RESULTS

3.1 Subjective Time Experience While Watching Dance Choreographies

The descriptive statistics (*M, SD*) related to the assessment of the subjective time for each choreography are reported in *Table 2*.

	Subjective time experience		**Objective duration (seconds)**	**Estimated duration (seconds)**	
	M	*SD*		*M*	*SD*
Contemporary choreographies					
1	3.01	0.96	100	105.93	69.57
2	2.86	0.99	104	104.45	86.21
3	2.69	0.98	97	106.32	70.92
Hip-hop choreographies					
1	3.20	1.01	105	95.75	60.97
2	3.41	1.01	98	97.45	68.27
3	3.16	0.97	105	95.77	64.40

Table 2. Means (*M*) and Standard deviations (*SD*) for subjective time experience. Comparison between objective duration and estimated duration of dance choreographies
Note: The range of the estimated duration of the choreographies was between 10 seconds and 600 seconds, i.e., 10 minutes.

The results of the *Paired samples t-test* revealed that the assessments of subjective time experience were significantly different (t (121) = -4.74, p <. 001, d = -.43) when the participants watched contemporary dance choreographies (M = 2.85, SD = 0.73) in comparison to hip hop choreographies (M = 3.25, SD = 0.80). When watching choreographies of hip-hop dance, participants had the impression of time passing more quickly. However, the effect size indicated by Cohen's d was -.43, indicating a small effect size, meaning that the participants' assessments do not strongly differ.

Moreover, in order to explore whether the estimated duration of the choreographies differed from their objective duration, a *One-Sample t-test* was applied. For this analysis, objective duration was set as a test value for each single choreography, while the participants' estimations of duration were set as the test variable. The results indicated that participants' estimations of the duration of each choreography did not differ significantly from the objective duration of the observed choreographies (see *Table 2*).

3.2 The Participants' Aesthetic Experience and Bodily Sensations When Watching Dance Choreographies

The results of the multivariate analysis of variance (*GLM – Repeated measures*) showed a statistically significant effect of dance form (F(3, 119) =57.19; p <. 001, η_p^2 = .590) on the students' assessments of aesthetic experience when watching contemporary dance choreographies compared to hip-hop choreographies. Further results of the univariate tests calculated for each dimension of aesthetic experience are presented in *Table 3*.

Dimensions of aesthetic experience	**Choreographie**			
	Contemporary		**Hip-Hop**	
	M	*SD*	*M*	*SD*
Dynamism (F(1, 121) = 3.96; p = .001, ηp2 = .032)	3.59	0.15	3.84	0.14
Affective Evaluation (F(1, 121) = 61.33; p = .001, ηp2 = .036)	3.40	0.13	2.44	0.11
Exceptionality (F(1, 121) = 0.58; p = .445, ηp2 = .006)	3.05	0.14	2.96	0.14

Table 3. The results of Univariate tests for participants' assessments on the aesthetic experience dimensions
Note: *M* – represents the arithmetic mean of the three choreographies belonging to each dance form. Descriptive statistics (*M, SD*) for all of the choreographies are reported in Appendix - Table A.

The results of Post-hoc Bonferroni correction method, indicate that the participants' assessments of the Dynamism dimension were significantly higher when watching hip-hop choreographies (p = .049), while the ratings for the Affective Evaluation dimension were significantly higher for contemporary dance choreographies (p < .001).

In regard to the participants' bodily sensations when watching dance choreographies, the results of the multivariate analysis of variance (*GLM – Repeated measures*) revealed that there is a statistically significant effect of dance form (F(3, 119) =24.92; p < .001, η_p^2 = .386) on the students' assessments of bodily sensations when watching contemporary dance choreographies compared to hip hop choreographies. Further results for the univariate tests calculated for each of the bodily sensation dimensions are presented in *Table 4*.

The bodily sensations dimensions when watching dance choreographies	**Choreographie**			
	Contemporary		**Hip-Hop**	
	M	*SD*	*M*	*SD*
Focus (F(1, 121) = 1.30 p = .255, ηp2 = .011)	1.11	0.09	1.01	0.08
Excitement (F(1, 121) = 31.14 p = .001, ηp2 = .210)	0.62	0.07	1.17	0.09
Embodied Anticipation (F(1, 121) = 1.46 p = .229, ηp2 = .012)	0.29	0.04	0.23	0.03

Table 4. The results of the Univariate tests for the participants' assessments on the bodily sensation dimensions when watching dance choreographies
Note: *M* represents the arithmetic mean of the three choreographies belonging to each dance form. Descriptive statistics (*M, SD*) for all of the choreographies are reported in Appendix - Table B.

The results of the Post-hoc Bonferroni correction indicate that the participants' assessments of the Excitement dimension are significantly higher when watching hip-hop choreographies (p <. 001).

Correlations between the dimensions of aesthetic experience and bodily sensations reported while watching contemporary dance and hip-hop choreographies are reported in *Table 5.*

	Bodily sensations when watching dance					
	Focus		Excitement		Embodied Anticipation	
	1	2	1	2	1	2
Aesthetic experience of dance choreographies:						
Dynamism	.653**	.479**	.539**	.460**	.574**	.450**
Affective Evaluation	.514**	.282**	.447**	.178	.462**	.413**
Exceptionality	.594**	.507**	.516**	.294**	.568**	.491**

Table 5. Correlations between the aesthetic experience and bodily sensation dimensions
Note: ** $p < .01$; 1 = Contemporary Dance, 2 = Hip-Hop

3.3 The Relationship Between Subjective Time Experience, Bodily Sensations, and the Aesthetic Experience of Dance Choreographies

To explore whether subjective time experience could predict the dimensions related to the aesthetic experience of dance choreographies, two regression analyses were conducted. The first was focused on contemporary dance, while the second was carried out in regard to hip-hop choreographies.

The arithmetic mean for subjective time experience was calculated for both the contemporary dance and hip-hop choreographies as well as the three aesthetic experience dimensions for the choreographies of each dance form.

The first regression analysis focused on contemporary dance choreographies, with the aesthetic experience dimensions for the dance choreographies entered as predictors and the subjective time experience of contemporary dance choreographies as a criterion. Similarly, in the second regression analysis the aesthetic experience dimensions for the dance choreographies were entered as predictors, and the subjective time experience of the hip-hop dance choreographies as a criterion.

The results showed that only the regression model for hip-hop dance was statistically significant (F (3, 121) = 8.79, $p < .001$). This set of predictor variables explained 18% of the variance in the criterion variable subjective time experience (R = .427, R^2= .183). Subjective time experience is significantly related to the Dynamism dimension. As shown in *Table 6*, this dimension is singled out as a significant predictor of subjective time experience (β = .485, $p < .002$).

Subjective time experience	
Dynamism	.485*
Affective Evaluation	.068
Exceptionality	-.130

Table 6. Beta partial contribution of the aesthetic experience dimensions for hip-hop dance choreographies for the prediction of subjective time experience
Note: * p< .002

The same method was employed in order to analyze the relationship between the bodily sensation dimensions and subjective time experience. Two different regression analyses were conducted on the basis of dance form: one for contemporary dance and one for hip-hop. In the first analysis, the bodily sensation dimensions were entered as predictors and the subjective time experience of contemporary dance choreographies as a criterion. In the second regression analysis, the bodily sensation dimensions were entered as predictors, and the subjective time experience of hip-hop choreographies as a criterion.

The results showed that only the regression model for hip-hop dance was statistically significant (F (3, 121) = 12.46, $p < .001$). Based on this set of predictor variables, it is possible to explain 24% of the variance for the criterion variable subjective time experience (R = .490, R^2 = .241). As shown in *Table 7*, the Focus dimension emerged as a significant predictor of subjective time experience (β = .404, $p < .001$).

Subjective time experience	
Focus	.404**
Excitement	.136
Embodied Anticipation	-.033

Table 7. Beta partial contributions of the bodily sensation dimensions when watching hip-hop dance choreographies to the prediction of subjective time experience
Note: * p< .001

Furthermore, as indicated in *Table 5*, the correlation between these two predictors (Dynamism and Focus) of subjective time experience is significant, positive, and of moderate strength (r = .479, p = .01).

4. DISCUSSION

Regarding the duration aspect of time perception, the results indicated that the observers' estimations of the duration of each choreography do not differ significantly from the objective duration of the observed choreography. On the other hand, in terms of the perception of the passage of time, the results aligned with our hypothesis. The results showed that when watching hip-hop dance choreographies, the participants have the impression that time passes significantly faster. However, due to the small effect size obtained when calculating differences in the time perception in terms of passage, practical applications of these differences may be limited.

Nevertheless, the results obtained in the present study are in line with those of a previous study, which pointed out that the experience of time while watching dance is influenced by the characteristics of the dance itself as well as on the engagement of the observer (Deinzer et al., 2017). While subjective time experience can be related to the characteristics of dance, such as fast or slow tempo (Deinzer et al., 2017), the results of this study indicate that, in addition to the formal characteristics of the dance (Vukadinović, 2019), both the observers' aesthetic experience and their bodily sensations play an important role.

In this sense, these differences in subjective time experience can be traced back to the differences between the aesthetic experiences and bodily sensations that the two dance forms evoke. Firstly, the results have shown that dance form (e.g., contemporary and hip-hop) has an effect on both aesthetic experience and bodily sensations. Secondly, the participants' assessments of the Dynamism and Excitement dimensions are significantly higher when they watch hip-hop choreographies, while the assessments of the Affective Evaluation dimension are significantly higher when they watch contemporary dance choreographies. This means that, for the observers, the hip-hop choreographies are more expressive, powerful, and exciting, and they tend to elicit more excitement (e.g., faster heartbeats, mimicry of movements, vibrating sensations in their body, etc.) than choreographies of contemporary dance. On the other hand, contemporary dance choreographies are experienced as more delicate, elegant, seductive, and emotional compared to those of hip-hop. According to our results, it seems that the expressiveness of movement characterized by qualities such as power and strength, which excite the observers, contributes to their impression that time passes faster when watching hip-hop choreographies. This aligns with previous studies, which have shown that those who are entertained by an activity tend to experience an accelerated perception of time (Conti, 2001; Wittman, 2015, 2016).

The interpretation of further results will provide a more complete picture. Regarding hip-hop choreographies, the results of multiple regression analyses have shown that Dynamism (a dimension of aesthetic experience) and Focus (a bodily sensation dimension) positively predict subjective time experience. This means that the more powerful, expressive, and exciting the dance movements are, the more rapidly time seems to pass for the observer. Furthermore, the presence of bodily sensations related to Focus, such as holding one's breath, getting goosebumps, and not being able to look away or blink, contributes to a faster impression of the passage of time.

These results suggest that the aesthetic experience and bodily sensations elicited by hip-hop choreographies play an important role in how an observer experiences the passage of time. The expressiveness of the dance movements, along with the strong focus experienced on the bodily level by the observer, shapes the time perception (in terms of passage) of hip-hop choreographies.

In addition, the observed low scores on the bodily sensation dimensions suggest that the participants of the present study did not pay attention to their own body signals or did not extensively recognize their bodily sensations. These low scores can be explained in two different ways. On one hand, participants who were non-experts in dance are likely unfamiliar with the movement vocabulary that shapes the entire experience of dance (Kirsch et al., 2013; Orgs et al., 2013). On the other hand, as noted by Wittmann (2015), reduced self-awareness can lead to the perception of time passing more quickly. When Focus is high (measured with the statements *I hold my breath, I get goosebumps, I can't look away,* and *I can't blink*), observers may pay more attention to the piece of dance and less on themselves, thus experiencing an accelerated passage of time.

Since the dimension of Focus is related to the audience's amazement, fascination, and admiration of virtuosity and the dimension of Dynamism to the expressiveness of dance movements, the results of the present study provide insights into the specific aspects of aesthetic experience (Vukadinović & Marković, 2012, 2022) that influence an observer's subjective time experience. In the broader context of aesthetic experience, it can be concluded that these results are in line with previous studies which have shown that when viewers are highly focused on an aesthetic object (Marković, 2017) and immersed in (Csikszentmihalyi, 1990) or absorbed by (Tellegan & Atkinson, 1974) an activity, they tend to become less aware of the passage of time and experience it as passing more quickly.

5. LIMITATIONS

Several limitations exist within this study. Firstly, the sample size was relatively small, with an imbalance between male and female participants, making it impractical to assess gender differences in outcomes due to the majority being female. Additionally, limitations arise from the lack of control over how objective characteristics of dance choreographies such as dance technique (Vukadinović, 2019) influenced observers' perception of time passage, aesthetic experience, and bodily sensations. Moreover, the use of video recordings as stimuli introduces another constraint, as previous research has indicated differences in observer experiences between live performances and video recordings (Jola & Grosbras, 2013).

Moreover, a major limitation concerning the stimuli, as well as the research design, is the inclusion of music, as the video recordings were presented in music-on condition. Since the music-off condition was not controlled for when presenting video recordings of the choreographies, the findings of this study could be influenced by the effect of music and, as such, should be taken with reservation. According to Bläsing (2023), music, along with human motion and emotion, are significant factors influencing the experience of time in dance. For example, the results of the present study have shown that time was perceived as passing more quickly when viewing

hip-hop choreographies, and the participants' assessments of Dynamism and Excitement were significantly higher. These results could be attributed to the specific rhythmicity of hip-hop music (Bynoe, 2006; Hoffmann, 2005). In this respect, hip-hop as a genre can be singled out for its emphasized rhythmicity both in music and in dance, which, as a result, elicits higher ratings on the dimensions of Dynamism and Excitement in the audience and contributes to the impression that time passes more quickly.

Although limitations arise in the present study due to the decision to not control for the music-off condition, the findings of Vukadinović's (2023) recent study on dance and music should be mentioned. Investigating the comparison between non-dancers' aesthetic experiences and their bodily sensations when only listening to music and when watching dance choreographed to that particular music, Vukadinović (2023) showed that regardless of the setting, the hip-hop genre elicited more excitement among the participants. She concluded that even though the contemporary genre elicits a more intense aesthetic experience, the hip-hop genre provokes a stronger body response (e.g., faster heartbeat, the feeling of vibration in the body, etc.).

In addition, the study's scope was limited to only two dance forms. In future studies, other dance forms (e.g., classical ballet or partner dances such as salsa or tango) should also be investigated. Considering that motor familiarity and dance expertise have been shown to influence the overall experience of the observed dance (Orgs et al., 2018; Rose et al., 2020), a group of dancers could be included in future studies. It is likely that those who have training in dance will perceive the passage of time when watching dance choreographies differently compared to non-dancers.

Nevertheless, the results of the present study have provided further insight into the relationship between the experience of the passage of time when watching contemporary and hip-hop dance choreographies as well as the aesthetic experience and bodily sensations evoked by watching them.

6. CONCLUSION

Before drawing the final conclusions of this study, it's essential to consider the practical implications of present results, which are relevant for both dance practitioners and psychologists. The discovery that a non-expert audience is responsive to the expressiveness of body movements offers valuable guidance for choreographers, enabling them to create more engaging pieces. Faster, dynamic, and powerful body movements tend to evoke more excitement and alter time perception. While our findings are specific to hip-hop, they can likely be extrapolated to other dance forms, particularly for non-dancer observers. Considering broader literature on art and subjective time experience (Csikszentmihalyi, 1990; Conti, 2001; Deinzer et al., 2017; Pollatos et al., 2014; Wittman, 2016), the results of our study suggest a general trend rather than an isolated case.

The findings of this study also hold potential for researchers in the domain of psychology, especially those interested in the psychology of art, aesthetic experience, and cognitive processes related to the perception of time. While previous studies across various art disciplines have shed light on aspects of how time is perceived during engagement with art, this study provides information related to the domain

of dance. The present research demonstrates how the dimensions of aesthetic experience and bodily sensation influence the perception of the passage of time when viewing choreographies of different dance forms. Regardless of dance form, body movements that are faster, more dynamic, and more powerful are more likely to heighten excitement and thus lead to the impression that time is passing more quickly. However, there are some questions that follow from the results of our study, which remain to be answered in future studies: Can dance expertise predict time perception? Would time perception differ if the choreographies were observed live? Do characteristics of the dancer, such as staging or physical attractiveness, influence time perception? Can the aesthetic experience of dance, which appears to lead to the underestimation of time, alleviate boredom?

In summary, it can be concluded that the expressiveness of body movements in hip-hop dance choreographies, particularly the excitement it elicits influences the time perception of the observers in such a way that time seems to pass more rapidly. Dance, as a multidimensional phenomenon that includes cognitive, emotional, and motivational components, offers a fruitful field for researchers. It not only offers a unique mode of human expression but also provokes, inspires, and provides both questions and answers in the dialog between researchers and artists.

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Appendix

Appendix –Table A
Means (M) and Standard deviations (SD) of the assessments of the dimensions related to the participants' aesthetic experience of the choreographies

Dimension of the participants' aesthetic experience of the dance choreographies				
	Contemporary dance		**Hip-Hop**	
	M	*SD*	*M*	*SD*
Dynamism				
Choreography 1	3.96	1.92	3.91	1.90
2	3.35	1.83	4.13	1.91
3	3.47	1.83	3.50	1.87
Affective Evaluation				
Choreography 1	3.63	1.71	2.10	1.25
2	3.28	1.77	2.77	1.58
3	3.28	1.75	2.47	1.60
Exceptionality				
Choreography 1	3.29	1.75	2.85	1.61
2	2.87	1.73	3.18	1.88
3	2.97	1.73	2.85	1.82

Appendix –Table B

Means (M) and Standard deviations (SD) of the assessments of dimensions related to the participants' bodily sensations when observing dance choreographies

Dimension of the participants' bodily sensations when observing the dance choreographies				
	Contemporary dance		**Hip-Hop**	
	M	*SD*	*M*	*SD*
Focus				
Choreography 1	1.27	1.27	1.01	1.07
2	0.90	1.19	1.22	1.28
3	1.13	1.32	0.78	0.98
Excitement				
Choreography 1	0.82	1.12	1.21	1.33
2	0.46	0.80	1.39	1.38
3	0.72	0.98	0.92	1.12
Embodied Anticipation				
Choreography 1	0.28	0.64	0.23	0.53
2	0.19	0.52	0.31	0.59
3	0.37	0.73	0.12	0.39