WORKING MEMORY, PERCEIVED STRESS AND THE TECHNICAL ABILITIES OF STREET DANCERS – A PRELIMINARY STUDY

Virgil TUDOR[1], Eduard DUMITRU[1], Radu PREDOIU[1], Alexandra PREDOIU[1]*, Ryszard MAKAROWSKI[2,3], Nicoleta DUMITRU[4], Germina COSMA[5]

1 National University of Physical Education and Sports, Faculty of Physical Education and Sport, Bucharest, Romania
2 Academy of Applied Medical and Social Sciences in Elblag, Faculty of Administration and Social Sciences, Elblag, Poland; 3University of Social and Economics in Gdańsk, Gdańsk, Poland
4 University of Bucharest, Faculty of Foreign Languages and Literatures, Bucharest, Romania
5 University of Craiova, Faculty of Physical Education and Sport, Craiova, Romania
**Corresponding author: alexandra.predoiu@yahoo.com*

https://doi.org/10.52846/jskm/43.2024.1.4

Abstract: Hip Hop Culture is a unique and important source of creativity and empowerment for young people. Like other sports, based on motor actions, only in this case mostly performed to music, Street Dance can bring countless benefits to a person's life. Considering the novelty that Street Dance brings, the fact that it is in a continuous development and that young people are more and more attracted by these dance styles, we considered this research beneficial. The scope of the research was to investigate the correlations between working memory, perceived stress and the technical abilities of preadolescent Street Dancers. 12 street dancers, (2 boys and 10 girls), all secondary school students, took part in the study. As a part of the research we used the TIM test (part of the Psiselteva system) to assess working memory, the Delphy method for athletes' technical skills, and the Stress Perception Questionnaire (Makarowski & Plopa, 2010). A significant correlation between street dancers' emotional tension and working memory capacity was found. Also, a positive association between athletes' capacity to store and quickly process data, and athletes' technical skills drew our attention. Future studies should examine this possible link, on a larger number of preadolescent street dance practitioners.
Keywords: *Street Dance, Hip Hop Culture, skills, Delphi method, working memory, stress.*

Introduction

The literature gives us a general analysis of dance and highlights the positive aspects that this art has on the lives of its practitioners. Based on motor acts and actions performed to musical rhythms, dance can be considered as a sport, and, also, as a leisure time motor activity. Its important role is shown to be both psychomotor and cognitive, having a significant impact, creating unity among those who dance regardless of gender, race, ethnicity (Wulff, 2015).

About Hip Hop Culture, Watkins (2005) says that there is nothing like it in this world, it is a vital source of creativity and youth that is unparalleled. In the research he conducted, the author used a key question "why does Hip Hop matter?", referring to all those who identify with this culture and manage with its help to become stronger, thus transforming their lives through Hip Hop culture. Most experts believe that those who are part of the culture identify with freedom of expression and develop a special resilience in the face of hardship of any kind.

When did Hip Hop Culture come about? In the late 1960s, for racial and socioeconomic reasons, the predominantly African-American and Latino area of the Bronx was referred to as the South Bronx. Their differences, the problems that arose and the need to succeed led young people from that area to unite in 1973 and seek solutions for survival. This led to the birth of the Hip Hop Culture, which is still developing today (Balaban, 2010).

All these things connected together and formed a mechanism that led to the activation of young people who wanted to assert themselves and realised that it was not through violence and crime that it was possible, but through unity, groups

becoming stronger when they act in unison - this is in fact the conceptual form of Hip Hop culture, it comes from the idea of affirmation, "burning and rising up" (Dumitru & Tudor, 2022).

"Hip-hop is studied all over the globe, and the methodologies of its examination are rightly all over the map. They are multidisciplinary in exemplary fashion, borrowing from sociology, politics, religion, economics, urban studies, journalism, American studies, transatlantic studies, history, musicology, comparative literature, linguistics, and many other disciplines" (Dyson, 1993, p. 12).

How did it appear? Dj-ing is considered the first element of Hip Hop Culture, because it all started with the music played at private parties, and continued with the clothes they wore, the vocabulary they used and of course, the moves they used to the rhythm of the music. The term Street Dance emerged from these parties, and it encompasses several dance styles representative of the culture (Bragin, 2015).

In an interview with Chang (2007), one of the pioneers of Hip Hop culture, DJ Kool Herc, mentions the four existing elements of the culture, they are *dj-ing*, *mc-ing*, *b-boying* and *graffiti*, and states that he believes there would actually be many more, such as the way you walk, the way you talk, the way you look and the way you communicate, all of which are characteristics of people who are part of Hip Hop culture, it is the voice of generations.

How did this culture develop? Over time, the representatives of this culture have not been very well "seen", which is one of the reasons why its expansion has perhaps taken longer than it should have, but eventually, we are at a point where everything is visible and constantly developing (Chang, 2007).

Since 1980, all over the suburbs of America, people have been dancing to the Hip Hop beats of DJs and the lyrics of the best MCs, performing specific moves that were later borrowed even in gymnastics, and vice versa. However, no one knows who was the first breakdance dancer, only that at some point a group of Bboys, breakdance boys popularized this element, and at the same time with it, in other corners of America, people danced other similar styles known as robot dance or pop-locking. Because everything was growing, a television personality of that period, Don Cornellius, started a show called Soul Train, where people danced, leading to international visibility (Ross & Rose, 1994).

By the 1990s, culture was already a dominant force with artists who became big businessmen and women. MC Hammer, Vanilla Ice, P. Diddy, Jay-Z, Queen Latifah are just a few names that have mastered many elements of Hip Hop and have advanced to master the business side as well. These innovators have had multi-million dollar earnings, from labels such as (Def Jam Records, Bad Boy Records, Roc-A-Fella Records, No Limit Records and Flava Unit Records) (Fernando, 1994).

"If rap is the voice of Hip Hop Culture, graffiti is its public image and breakdancing is its physical embodiment" (Fitzgerald, 2009, p. 9).

As the other elements of the culture evolved, so of course did breakdancing, which along with the other styles of the time, Hip Hop, Popping, Locking and others that emerged along the way, formed a whole that became known as Street Dance. Their content is very important, since the beginning, but even today the "foundation" is a very important element for a dancer, this means that it is not only about movements, but about philosophies, about a way of thinking, about a state (Schloss, 2009).

The most recent example of evolution towards performance sport is the confirmation of the presence of Breakdance at the Olympic Games in Paris 2024, thus developing the other styles as well, with the World Dance Sport

Federation deciding to organize even from 2021 a worldwide battle competition for Street Dance dancers under 21.

In these conditions, on the road to achieving the highest sporting performance (even the gold medal at the Olympic Games), specialists will start to pay more and more attention to different sides of training, including psychological training. The ability to process information quickly in competition, and to perform under stressful conditions can make the difference between first positions in the ranking and others. The concepts of working memory and stress are essential for athletes, coaches and sports psychologists.

Working memory is closely related to general intelligence (Süß et al., 2002), being a form of temporary storage system – the short-term storage of relevant information, involving data processing (Baddeley, 2007). It has implications for countless cognitive tasks, such as reasoning, comprehension, problem solving (Engle, 2002). For example, language comprehension rely on this type of brain function. This became essential for making sense of things that unfold over time and has been shown to be the strongest predictor of school performance – low working memory is associated with poorer performance in school (Alloway & Alloway, 2010).

In sports field, Furley and Memmert (2010) mentioned that it is surprising how this concept, working memory, has received much less attention in the field of sport psychology compared to other branches of psychology, even though sport psychology research has increasingly incorporated cognitive concepts such as attention, perception and decision making, which are assumed to rely heavily on this "executive function".

Researchers found that this can be improved in female athletes (gymnastics, swimming and sport dance), after positive emotions, and after sadness were induced. „Regarding induced fear no significant differences were found in the case of working memory, before and after the emotion induction procedure“ (Predoiu et al., 2017). Also, in 2016, Predoiu et al. emphasized that „athletes practicing football and martial arts (karate and taekwondo) obtained, after the positive emotions were induced, better [...] capacity for data storage and processing“.

In dance filed, Oppici et al. (2020) carried out a dance training program with children between 8 and 10 years old, the results showing that dance practice could improve this brain capacity and motor competence in children. Regarding the relationship between dance and working memory, Norouzi et al. (2019) evaluated the effects of aerobic exercise training and Zumba dance. Participants were divided into three groups: aerobic exercise training, Zumba dance training and control group. After 12 weeks, an improvement was observed, the authors concluding that Zumba dance can be recommended to improve working memory.

Stress in sport is a topic that is well covered in the literature. For example, Mellalieu et al. (2009) found that both elite and non-elite athlete participants face a similar amount of stressors, but with different demands (it seems that elite athletes face more performance-relevant stressors). Jones and Hardy, through research in 1989, addressed stress and cognitive function in relation to sports performance. The authors concluded that the relationship between stress and sport performance is highly complex and involves the interaction between the nature of the stressor, the cognitive demands of the task performed and the psychological characteristics of the individuals performing the task. Potential sources of stress, including environmental, personal, leadership and team issues were identified in sports (Woodman & Hardy, 2001).

Sport, by its specificity, is a stress-generating environment (Gilbert et al., 2007). We can think of: psycho-social conditions, fear of failure or even of

success (nike-phobia), self-esteem issues (e.g., following a poor result), unpleasant remarks from peers, opponents, fans, the media (Predoiu, 2021). Therefore, sport psychologists should know how to intervene in possible crisis situations when working with athletes, in case of experienced distress, appropriate means of intervention including Cognitive behavioral therapy, Prolonged exposition, Cognitive therapy, Eye movement desensitization and reprocessing, etc. (Koweszko et al., 2023). Knowing how athletes react under stress is a priority objective for specialists, in order to increase athletes‘ chances of success in competitions. This objective is all the more important as „the first symptoms of maladaptive behaviors may be hidden in presumably usual activities and attitudes“ (Kawalec et al., 2023). For physical self-efficacy, researchers underlined the important role of stress tolerance (Volgemute et al., 2023).

Participants

Purpose

The aim of the study is to examine the associations between working memory, perceived stress and the technical abilities of preadolescent Street Dancers.

Hypothesis

H1: There is a significant correlation between the working memory capacity of preadolescent street dancers and their technical skills.

H2: There is a significant association between the stress level of street dancers and their technical abilities.

H3: A link between street dancers‘ perceived stress and their working memory capacity is observed.

Materials and method

At the current study attended 12 street dancers, with a minimum of 4 years experience. The participants (2 boys and 10 girls) were all secondary school students, 83.3% being in 6th and 7th grade. The distribution of the preadolescents can be seen in Table 1.

Table 1. Sample of preadolescents

Participants	Gender	Class
1.	F	7
2.	M	7
3.	F	7
4.	F	7
5.	F	8
6.	F	5
7.	F	7
8.	F	7
9.	F	6
10.	M	6
11.	F	6
12.	F	7

Measures and Procedure

The research took place in March 2024. The tests took place at Piticu Dance Studio, Bucharest. The ethical principles were assured (anonymity, data confidentiality), and the informed written consent from the parents was obtained.

Working memory was assessed with the TIM computerized test, part of PSISELTEVA system, developed by RQ Plus company. The device (lever with buttons) together with the laptop containing the software were used. TIM computerized test lasted about 5 minutes/student. TIM is constructed as a dynamic model with an unlimited number of sequences. Each sequence contains one of three signal-stimuli represented by geometric shapes (triangle, circle and square). The correct response mode for each signal-stimuli is predefined and unknown (at the beginning of the test) by the participants. The test involves learning and memory storage of the correct

response modes. Participants use a 3-button console to determine which is the correct button to press, according to each geometric shape (being a trial and error learning). If the button is pressed correctly, a green message confirms success, and the participant continues with the next randomly appearing shape, memorizing the corresponding button. The test ends when the participant achieves 30 correct answers in a row, otherwise starting the test from the beginning. At some point (some faster than others), participants will memorize which button to press (left, center or right button from the lever) depending on the geometric figure on the screen (triangle, circle or square).

To measure stress, The Stress Perception Questionnaire was used (Makarowski & Plopa, 2010). The questionnaire was translated through retroversion, in collaboration with the author of the questionnaire - Mr. Ryszard Makarowski (Predoiu, 2021), being used in previous studies with Romanian athletes, and not only (Makarowski et al., 2022; Predoiu et al., 2022; Görner et al., 2023; Piotrowski et al., 2021). The questionnaire assumes the following scales:

- Emotional tension - the individual finds it difficult to relax in a setting. High levels of emotional tension create a state of irritability in interpersonal relationships.
- External stress - occurs when an individual is unfairly evaluated by others in different social contexts, increasing feelings of helplessness and exhaustion related to defending one's own point of view or even one's social position.
- Intrapsychic stress - is characterised by an inability to cope with one's own feelings and anticipatory thoughts. This type of stress occurs when the individual is having problems with themselves, when thoughts from the past are still alive, making him/her feel lonely. At the same time, thoughts about the future bring anxiety and distress.

The total stress score is the sum of the scores for each of the three scales: external stress, emotional stress and intrapsychic stress.

As for the technical performance of the participating dancers, we used the Delphi method (Predoiu, 2020). Therefore, with the help of the 3 trainers/experts in Street Dance (having an experience of 9, 15, respectively 25 years), we managed to establish a general ranking to report to during the research.

Results

Table 2. Descriptive statistics - results for working memory (TIM test, operating memory coefficient and level of performance)

Descriptive	Working memory	Level of performance
N	12	12
Mean	2.67	3.33
Std. error mean	0.140	0.142
Median	2.94	3.00
Mode	2.94	3.00
Standard deviation	0.484	0.492
Range	1.34	1
Minimum	1.89	3
Maximum	3.23	4
Skewness	-0.650	0.812
Kurtosis	-1.23	-1.65

**Note.* Level of performance 5: very good; Level of performance 4: good; Level of performance 3: average result;
**Level of performance 2: weak result; Level of performance 1: very weak performance.

The level of performance in terms of working memory is 3.33, meaning a slightly above average result. It is worth mentioning that the norms for TIM test start from 14 years old, while in the current study, most of the street dancers have 12-13 years. Therefore, the way we interpret athletes' performance at the TIM test is with caution – the aim of our research being a different one.

Table 3. Descriptive statistics for perceived stress

Descriptive	Emotional tension	External stress	Intrapsychic stress	Total stress
N	12	12	12	12
Mean	13.5	13.9	13.3	40.8
Std. error mean	1.39	1.37	1.32	3.73
Median	13.0	14.0	12.0	41.0
Standard deviation	4.81	4.76	4.56	12.9
Range	15	15	13	43
Minimum	7	8	8	23
Maximum	22	23	21	66
Skewness	0.504	0.469	0.611	0.499
Kurtosis	-0.351	-0.556	-0.973	-0.463

Street dancers perceived stress, generally, at a low level (according to the norms, see Predoiu, 2021). However, the purpose of the study (as mentioned earlier) is to analyze the degree of association between variables: working memory, perceived stress, and street dancers' technical skills.

Table 4. Results for Delphi method (the Average result was statistically processed)

	Coach 1	Coach 2	Coach 3	Average
Experts in Street Dance	10	10	9.5	9.83
	9.5	8.5	9	9
	9.5	6	8	7.83
	9.5	8.5	7.5	8.5
	9	9.5	8.5	9
	10	10	9.5	9.83
	9	10	8.5	9.16
	9	7	7	7.66
	9	8.5	8	8.5
	8.5	8	8	8.16
	8.5	8	8	8.16
	8	6	8.5	7.5

Pearson correlation was performed. The results for each variable are normally distributed, Skewness coefficient being less than 1 (Morgan et al., 2004). Also, for Pearson correlation, the confidence intervals were reported.

Table 5. Associations between working memory, perceived stress and performance of preadolescents' street dancers

Correlation Matrix		Delphi	Working memory	ET	ES	IS
Delphi	Pearson's r	—				
	p-value	—				
	95% CI Upper	—				
	95% CI Lower	—				
Working memory	Pearson's r	0.247	—			
	p-value	0.438	—			
	95% CI Upper	0.719	—			
	95% CI Lower	-0.381	—			
ET	Pearson's r	0.018	0.602	—		
	p-value	0.956	0.038	—		
	95% CI Upper	0.586	0.874	—		
	95% CI Lower	-0.562	0.043	—		
ES	Pearson's r	-0.180	0.319	0.772	—	
	p-value	0.575	0.312	0.003	—	
	95% CI Upper	0.439	0.755	0.933	—	
	95% CI Lower	-0.684	-0.312	0.356	—	
IS	Pearson's r	-0.084	0.269	0.762	0.722	—
	p-value	0.796	0.397	0.004	0.008	—
	95% CI Upper	0.515	0.730	0.929	0.916	—
	95% CI Lower	-0.627	-0.360	0.334	0.254	—
Total stress	Pearson's r	-0.089	0.437	0.926	0.911	0.903
	p-value	0.782	0.155	< .001	< .001	< .001
	95% CI Upper	0.511	0.808	0.979	0.975	0.973
	95% CI Lower	-0.631	-0.183	0.752	0.707	0.684

Note. ET: Emotional tension; ES: External, stress; IS: Intrapsychic stress.

Data analysis in Table 5 highlights a significant correlation between athletes' emotional tension and working memory capacity ($p = 0.038$). In other words, a higher level of emotional tension is linked to better results for the ability to store and process information quickly. r^2 (the coefficient of determination/effect size) is 0.14, meaning a moderate to strong association between variables. The lower limit is 0.043, while the upper limit is 0.874.

No significant correlations were found between the technical abilities of street dancers (assessed using the Delphi method), perceived stress and working memory.

Discussion and Conclusions

Street Dance can be a very good tool to be used for improving both psychomotor and cognitive dimensions, whether we are talking about children, teenagers, young or old people, different variants could be found through which this type of dance can reach people (Dumitru et al., 2024). In these conditions, considering the benefits, street dance can be used, also, as a leisure activity, Epuran (2013) emphasizing the important role of leisure time (in compensation for the stress in an individual's life), involving physical recreational activities.

Regarding sport, due to its dynamics, it involves automation in performance activity, whether we are talking about physical actions or cognitive processes. Athletes need, among others, fast analysis and action, and a consistent amount of training leading to better automatic processing (Schmidt & Wrisberg, 2008), working memory playing a very important role in this context. With regard to stress,

it needs to be approached differently according to gender, the literature highlighting that women represent a more vulnerable subsample considering psychological stress (Tubić et al., 2022). Sport is an environment with perceived social and financial stakes, a unique event including emotional tension. Rumination and self-blame are linked with experienced stress, while „tendencies to reappraise negatives experiences boosts resilience“ (Mineva, 2023).

The current study results highlight a significant association between street dancers' emotional tension and their working memory capacity. A higher level of emotional tension (in fact, an average level/ slightly below average level) is linked to better performances for the ability to store and process information quickly. Literature asserted that „the perceived stress, on short term leads to a better processing capacity“ in the case of female athletes (Predoiu et al., 2017). Also, the Yerkes-Dodson law is discussing about a moderate level of arousal (generally), recommended to achieve superior results in a difficult task (Mitrache et al., 2018).

With respect to the correlations between the technical abilities of street dancers and the variables explored: perceived stress and working memory, no significant link was found. However, it is worth mentioning a positive association between athletes' working memory and their technical performance. Even if the alpha significance threshold is greater than 0.05, the sample is very small, and the observed trend may be the basis for future research on a larger number of preadolescent street dance practitioners - "the statistical power is low and entails the risk of a type 2 (β) statistical error" (Rizescu & Predoiu, 2022).

The research is not without limits. Technical abilities of street dancers were highlighted (by the experts) during training. Different results could be obtained if the same skills would be investigated in competition, a stress-generating environment. Also, the findings could be different at different ages (teenagers, seniors), on a larger sample, or if the athletes were analyzed separately by gender or experience.

Authors' Contribution

The third author has an equal contribution to the publication as the first author.

Acknowledgements

We thank the participants, the children street dancers from Piticu Dance Studio and the manager, former member of Simplu - music band with great significance for Romanian Street Dance.

Funding

This study did not receive any external funding.

Informed Consent Statement

The written informed consent for the children to participate in this study was obtained.

Conflicts of Interest

The authors declare no conflicts of interest.

References

Alloway, T. P., & Alloway, R. G. (2010). Investigating the predictive roles of working memory and IQ in academic attainment. *Journal of experimental child psychology, 106*(1), 20-29. DOI: 10.1016/j.jecp.2009.11.003

Baddeley, A. D. (2007). *Working Memory, Thought, and Action.* Oxford University Press.

Balaban, D. (2010). *Culture, Industry, and Hip Hop History: The Corporate World's Role in the Development of Hip Hop,* Ruttgers College.

Bragin, N. (2015). Black Power of Hip Hop Dance: On Kinesthetic Politics. *UC Berkeley*. https://escholarship.org/uc/item/7sh7885k

Chang, J. (2007). *Can't stop, won't stop*. Ebury Press.

Dyson, E. (1993). *The Culture of Hip-Hop in Reflecting Black: African-American Cultural Criticism*. University of Minnesota Press.

Dumitru, E., Tudor, V. (2022). The Evolution of Hip Hop Culture. *Research and Science*

Today, *2*(24), 223-238. DOI: 10.38173/RST.2022.24.2.16:223-238

Dumitru, E., Tudor, V., Dina, L., Stănescu, M., & Dumitru, N. (2024). The role of Street Dance in the development of psychomotor skills and creativity of secondary school students. *Discobolul – Physical Education, Sport and Kinetotherapy Journal 63*(1), 1-14. https://doi.org/10.35189/dpeskj.2024.63.1.1

Engle, R. W. (2002). Working memory capacity as executive attention. *Current Directions in Psychological Science, 11*(1), 19-23. https://doi.org/10.1111/1467-8721.00160

Epuran, M. (2013). *Motricitate și psihism în activitățile corporale. Prolegomene la o metateorie a activităților corporale (volumul 2).* [Motricity and psychism in bodily activities. Prolegomena to a metatheory of bodily activities (second volume)]. FEST.

Fernando, S. H., Jr. (1994). *New Beats: Exploring the Music, Culture, and Attitudes of Hip-Hop.* Anchor/Doubleday.

Fitzgerald, T. (2009). *Hip Hop and Urban Dance*. Heinemann Library.

Furley, P. A., & Memmert, D. (2010). The role of working memory in sport. *International Review of Sport and Exercise Psychology*, *3*(2), 171–194. https://doi.org/10.1080/1750984X.2010.526238

Gilbert, J. N., Gilbert, W., & Morawski, C. (2007). Coaching strategies for helping adolescent athletes cope with stress: Reduce the stress about reducing stress in your athlete. *Journal of Physical Education, Recreation & Dance, 78*(2), 13-24.

Görner, K., Makarowski, R., Predoiu, R., Piotrowski, A., Predoiu, A., Bertollo, M., di Fronso, S., Malinauskas, R., Vazne, Z., Croitoru, D., Boe, O., Bitang, A., Barbu, D., Miklósi, M., Kovács, K., & Vicente-Salar, N. (2023). Stress levels among winter swimmers, firefighters, martial arts athletes in Hungary, Italy, Latvia, Lithuania, Poland, Romania, Slovakia and Spain. *Archives of Budo, 19*, 213-225.

Jones, J. G., & Hardy, L. (1989). Stress and cognitive functioning in sport. *Journal of Sports Sciences*, *7*(1), 41–63. https://doi.org/10.1080/02640418908729821

Kawalec, A., Wilczyński, K. M., Biecka, A., Krupnik, D., Grabowski, W., & Kozik, M. J. (2023). Coping methods among Polish students during Covid-19 pandemic. *Psychiatria Polska, 57*(6), 1151-1167. https://doi.org/10.12740/PP/OnlineFirst/151961

Koweszko, T., de Barbaro, B., Izydorczyk, B., Mastalerz-Migas, A., Samochowiec, J., Szulc, A., ... & Gałecki, P. (2023). The position statement of the Working Group on the treatment of post-traumatic stress disorders in adults. *Psychiatria Polska, 57*(4), 705-727. https://doi.org/10.12740/PP/166172

Makarowski, R., and Plopa, M. (2010). *Skala Poczucia Stresu* [The Sense of Stress Questionnaire]. Vizja Press & IT.

Makarowski, R., Predoiu, R., Piotrowski, A., Görner, K., Predoiu, A., Oliveira, R., Pelin, R. A., Moanță, A. D., Boe, O., Rawat, S., & Ahuja, G. (2022, September). Coping Strategies and Perceiving Stress among Athletes during Different Waves of the COVID-19 Pandemic – Data from Poland, Romania, and Slovakia. *Healthcare, 10*(9): 1770. DOI: 10.3390/healthcare10091770

Mellalieu, S. D., Neil, R., Hanton, S., & Fletcher, D. (2009). Competition stress in sport performers: Stressors experienced in the competition environment. *Journal of Sports Sciences, 27*(7), 729–744. https://doi.org/10.1080/02640410902889834

Mineva, K. (2023). Regulation of positive and negative affect: Associations with stress and resilience in health professions students. *Journal of Educational Sciences & Psychology, 13*(2), 182-194. DOI: 10.51865/JESP.2023.2.14

Mitrache, G., Tüdös, Ș., & Predoiu, R. (2018). *Incursiune în psihologia educației. Profesoul de succes și exigențele contemporane* [Incursion into the psychology of education. Successful teacher and contemporary demands]. Discobolul.

Morgan, G. A., Leech, N. L., Gloeckner, G. W., & Barrett, K. C. (2004). *SPSS for introductory statistics: Use and interpretation.* Psychology Press.

Norouzi, E., Hosseini, F., Vaezmosavi, M., Gerber, M., Pühse, U., & Brand, S. (2019). Zumba dancing and aerobic exercise can improve working memory, motor function,

and depressive symptoms in female patients with fibromyalgia. *European Journal of Sport Science, 20*(7), 981-991. https://doi.org/10.1080/17461391.2019.1683610

Oppici, L., Rudd, J., Buszard, T., & Spittle, S. (2020). Efficacy of a 7-week dance (RCT) PE curriculum with different teaching pedagogies and levels of cognitive challenge to improve working memory capacity and motor competence in 8–10 years old children. *Psychology of Sport and Exercise, 50* :101675. https://doi.org/10.1016/j.psychsport.2020.101675

Piotrowski, A., Makarowski, R., Predoiu, R., Predoiu, A., & Boe, O. (2021). Resilience and subjectively experienced stress among paramedics prior to and during the COVID-19 pandemic. *Frontiers in Psychology, 12:* 664540. https://doi.org/10.3389/fpsyg.2021.664540

Predoiu, R. (2021). *Psihologia sportivă și făuritorii performanței* [Sport psychology and performance makers]. Hoffman.

Predoiu, R., Makarowski, R., Piotrowski, A., Görner, K., Predoiu, A., Malinauskas, R., Bertollo, M., di Fronso, S., Vazne, Z., Boe, O., Oliveira, R., Miklósi, M., Kovács, K., Ciolcă, C., Badea, D., Vicente-Salar, N., Ciuntea, M. L., & Rawat, S. (2022). Experienced stress among martial arts athletes from selected European Union countries during the 4th wave of the covid-19 pandemic and the frequency of using coping strategies. *Archives of Budo, 18*, 211-226.

Predoiu, R., Mitrache, G., & Predoiu, A. (2016). The Effects of Induced Emotions on Working Memory, Creativity, Repetition Speed and Precision: A Pilot Study. *Discobolul - Physical Education, Sport and Kinetotherapy Journal, 44*, 44-51.

Predoiu, R., Mitrache, G., & Predoiu, A. (2017). The effects of fear, sadness and positive emotions on working memory in the case of female athletes. *Romanian Journal of Experimental Applied Psychology (RJEAP), 8*(Special Issue 1), 122-129.

Rizescu, A. M., & Predoiu, R. (2022). Study on temperament and the occurrence of joint injuries in football-tennis. *Discobolul-Physical Education, Sport and Kinetotherapy Journal, 61*(1), 73-92. https://doi.org/10.35189/dpeskj.2022.61.1.7.

Ross, A. & Rose, T. (1994). *Editors: Microphone Fiends: Youth Music & Youth Culture*. Routledge Press.

Schloss, J. (2009). *Foundation, B-boys, B-girls, and Hip Hop Culture in New York*. Oxford University Press.

Schmidt, R., & Wrisberg, C. (2000). *Motor learning and performance*. Human Kinetics.

Süß, H. M., Oberauer, K., Wittman, W. W., Wilhelm, O., & Schulze, R. (2002). Working memory capacity explains reasoning ability – and a little bit more. *Intelligence, 30*(3), 261-288. https://doi.org/10.1016/S0160-2896(01)00100-3

Tubić, T., Živanović, B., Lakićević, N., Zenić, N., Gilić, B., Rudas, E., ... & Drid, P. (2022). Psychological distress in elite Sambo and recreational athletes. *Frontiers in psychology, 13*: 781880. https://doi.org/10.3389/fpsyg.2022.781880

Volgemute, K., Vazne, Z., & Wirkus, Ł. (2023). Examining stress tolerance and self-efficacy in soldiers. *Journal of Educational Sciences & Psychology, 13*(2), 195-203. DOI: 10.51865/JESP.2023.2.15

Watkins, C. (2005). *Hip Hop Matters - Politics, Pop Culture, and the Struggle for the Soul of a Movement, Beacon Press.*

Woodman, T., & Hardy, L. (2001). A Case Study of Organizational Stress in Elite Sport. *Journal of Applied Sport Psychology, 13*(2), 207–238. https://doi.org/10.1080/10413200175314989 2

Wulff, H. (2015). Dance, Anthropology of. *International Encyclopedia of the Social & Behavioral Sciences*, 5(2), 666–670.