



Exploring the Relationships of Autonomy-supportive Climate, Psychological Need Satisfaction and Thwarting with Students' Self-talk in Physical Education

**Evangelos Brisimis^{1*}, Charalampos Krommidas¹, Evangelos Galanis¹,
Aristea Karamitrou¹, Ioannis Sympas¹ and Nikos Comoutos¹**

¹*Department of Physical Education and Sport Science, University of Thessaly, Trikala, 42100, Greece.*

Authors' contributions

This work was carried out in collaboration among all authors. Author EB participated in the design of the study, organized and implemented the data collection and prepared the largest part of the first draft of the manuscript. Author CK was responsible for the data management and analysis and edited the first draft of the manuscript. Author EG prepared part of the manuscript and reviewed the final manuscript. Author AK assisted the data collection and analysis and reviewed the manuscript. Author IS assisted the data collection and helped the preparation of the manuscript. Author NC devised the study, guided the preparation of the manuscript and finalized the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JESBS/2020/v33i1130276

Editor(s):

(1) Dr. Shao-I Chiu, Da-Yeh University, Taiwan.

Reviewers:

(1) Diah Royani Meisani, Universitas Brawijaya, Indonesia.

(2) Meruyert Seitova, Khoja Akhmet Yassawi International Kazakh-Turkish University, Kazakhstan.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/63838>

Original Research Article

Received 08 October 2020

Accepted 12 December 2020

Published 31 December 2020

ABSTRACT

Aims: Based on the framework of the Self-determination Theory and focusing on the theory of Basic Psychological Needs, we explored the relationships between Physical Education (PE) teachers' autonomy-supportive behaviors and students' need satisfaction, need thwarting, and self-talk during the PE lesson.

Methodology: Participants were 544 primary and secondary education Greek students (aged from 12 to 15 years), from nine elementary schools ($n = 259$) and eight secondary schools ($n = 285$) in central Greece, who completed a multi-section questionnaire.

*Corresponding author: E-mail: vaggelismpr@yahoo.gr;

Results: Results revealed that PE teachers' autonomy-supportive climate and need satisfaction was positively associated with positive self-talk and negatively associated with negative self-talk, whereas need thwarting was positively related to negative self-talk and negatively related to positive self-talk. Regression analyses revealed that autonomy-supportive climate and competence need thwarting were significant predictors (positive and negative, respectively) of students' positive self-talk. Furthermore, autonomy and relatedness need satisfaction were negative predictors, whereas competence and relatedness need thwarting were positive predictors of students' negative self-talk.

Conclusion: Overall, the findings suggest that when PE teachers create a class environment that supports students' autonomy and the satisfaction of their BPN, while at the same prevents need thwarting, they can positively influence students' self-talk.

Keywords: Autonomy; competence; relatedness; organic self-talk; psychology.

1. INTRODUCTION

School Physical Education (PE) has been recognized as a major tool for health promotion by providing a framework in which the social, psychological and health benefits associated with PA can be promoted to a large number of children, adolescents and youth [1]. A significant amount of research, as well as various educational programs, point out the importance of PE, emphasizing that it helps students to be active in school [2]. In addition, students' positive motivation in PE has been linked to the adoption of a physically active lifestyle as adults [3]. Nevertheless, many students report negative experiences in PE lessons [4,5] and display minimal motivation for PA. Understanding motivation processes is vital to engaging students in activities that will benefit them physiologically and psychologically. Hence, it is imperative to continually develop teaching strategies in the PE context that enhance students' motivation to be physically active.

1.1 Basic Psychological Needs Theory (BPNT)

Self-Determination Theory [6,7] is among the most popular motivational theories in PE research [8] attempting to understand "why" individuals do what they do [9], as well as to explain motivational processes. SDT outlines the processes through which motivation is developing and the ways it influences human behavior [7,10]. Basic Psychological Needs Theory (BPNT), one of the SDT's sub-theories, proposes that human behavior is triggered by the satisfaction of the three basic psychological needs; the need for autonomy (need to experience a sense of willingness in one's actions), the need for competence

(need to experience effectiveness in one's interactions with the world), and the need for relatedness (need for connectedness with others, satisfaction with the social environment, and feelings of acceptance) [7,10].

Previous studies [11,12] suggest that there are two parallel pathways regarding human existence, the "bright pathway" and the "dark pathway", and the three BPN. On the bright side, if BPN are satisfied, individuals feel more confident and are likely to adopt healthy motivational orientations that facilitate the development of enjoyment, effort, persistence, commitment, and lead to wellness [10]. Accordingly, the satisfaction of BPN's in within PA contexts has been linked with intention to engage in PA [13] and increased levels of PA [14].

On the dark side, [15] introduced the concept of need thwarting, that is the opposite of need satisfaction. Need thwarting defined as "the perception that need satisfactions are being obstructed or actively frustrated within a given context" [15] describes not only the absence of need satisfaction but also an active process which students experience in controlling teaching environments [12]. In particular, autonomy thwarting occurs when the individuals feel controlled through internal or external pressures, competence thwarting reflects individuals' sense of ineffectiveness or even failure and helplessness, while relatedness thwarting comes with a sense of social isolation and loneliness [12]. Research has shown that when BPN are thwarted, people tend to regulate their behavior based on controlled motivations and experience negative affect [16], boredom and exhaustion [17,18] and low intention to be physically active [18].

1.2 Autonomy-supportive Motivational Climate in PE

PE can be an ideal environment for acquiring knowledge and developing the attitudes and skills needed to integrate physical exercise in life [19]. In line with this, PE teachers play a vital role, as they contribute to the creation of educational environments that support the needs of students and encourage them [20]. In the same vein, [21] pointed out that the learning environment created by PE teacher can significantly affect students' motivation to participate in PE and leisure-time contexts. Research has shown that the teaching style used by the teacher to communicate with students, can affect their perceptions of choice, skill level, and relationships with others, which in turn affects their motivation [22].

Although the existing literature in PE emphasizes the importance of satisfaction of all three basic psychological needs [23], a plethora of research studies highlight strong support for autonomy as the most obvious factor in achieving self-determined motivation [24,20]. The PE teacher who uses a more autonomous-supportive teaching style gives students the opportunity to play a basic role in the teaching-learning process. More specifically, results from previous studies have shown that students become more responsible when making decisions, focusing on the process rather than the result, and choosing tasks that align with their interests, motivating them more towards physical activity [25,26]. In essence, behaviors that support autonomy, such as offering choices to students, as well as understanding students' perspectives, play a decisive role in promoting learning outcomes [27]. Similarly, [28] found that when the PE teacher supports autonomy, students' BPN are satisfied and intrinsic motivation is increased. Finally, supporting autonomy has been found to help students to have positive feelings and thoughts about themselves, while enhancing their intention for PA in their free time and their future behavior regarding sports [29]

1.3 Organic Self-Talk and the Social Environment

Self-talk has been described as "verbalizations addressed to the self, overtly or covertly, characterized by interpretative elements associated to their content; and it also either (a) reflects dynamic interplays between organic, spontaneous and goal-directed cognitive processes or (b) conveys messages to activate

responses through the use of predetermined cues developed strategically, to achieve performance-related outcomes" [30]. As evident in this definition, self-talk refers to inherent thoughts individuals experience but also the strategic use of cue words to enhance performance and facilitate learning. The present study concerns the former, organic self-talk, that has been described as verbalizations, addressed to the self, reflecting spontaneous and goal-directed psychological events [31]. Research on organic self-talk in physical activity context, mostly sport, but also PE, is still limited; nevertheless, some has examined the role of the social environment in shaping individuals' organic self-talk.

In the sport context [32], attested for the important role of the coach. In a combination of correlational and experimental studies they reported that supportive coaching behaviours were positively related to positive-goal-directed self-talk and negatively related to negative-spontaneous self-talk. Accordingly, unsupportive coaching behaviours were negatively related to positive-goal-directed and positively related to negative-spontaneous self-talk. Furthermore, [33] in another cross-sectional study found that perceived social support was positively related to athletes' positive-goal-directed self-talk and negatively related to athletes' negative-spontaneous self-talk. Finally, in a study exploring the role of the motivational environment, [34] found that autonomy supportive climate, positively predicted athletes' positive self-talk, whereas controlling climate positively predicted athletes' negative self-talk.

In the PE context, there are only two recent studies that have investigated the relationship between the climate created by the PE teacher and students' self-talk. More specifically, [35] highlighted that mastery climate was positively and directly related to students' positive self-talk in PE, while avoidance climate was positively related to students' negative self-talk. Finally, [36] reported that students' learning orientation positively predicted students' positive self-talk dimensions and negatively the negative self-talk dimensions. On the contrary, students' worry about mistakes positively predicted their negative self-talk.

1.4 Purpose of the Study

Based on the aforementioned literature the purpose of the present study was to examine the links between teacher-initiated autonomy-supportive climate, satisfaction and thwarting of

BPN (autonomy, competence, relatedness), and students' positive and negative self-talk in PE class.

1.5 Hypotheses

It was hypothesized that perceived autonomy-supportive climate and satisfaction of the three BPNs would be positively linked to pupils' positive self-talk and negatively related to their negative self-talk. In contrast, it was hypothesized that the BPNs thwarting would be positively related to pupils' negative self-talk. Furthermore, the relative contribution of the independent variables (autonomy-supportive climate, satisfaction and thwarting BPN) in the prediction of self-talk was examined.

2. METHODS

2.1 Design and Study Population

2.1.1 Participants

Five hundred and forty-four students (287 boys and 257 girls), aged 12 to 15 years old (M_{age} : 13.03 ± 1.15 years), from nine elementary schools ($n = 259$) and eight secondary schools ($n = 285$) in central Greece, voluntarily enrolled in the present study.

2.1.2 Procedure

Prior to conducting the study, ethical approval was obtained from the Greek Institute of Education (Ref. 160970/Δ5) and the Ethics Committee of the Department of Physical Education and Sport Science, University of Thessaly (Ref. 1104). Then, consent forms were delivered to each pupil and signed by their parents/guardians. In a quiet classroom, students completed an anonymous multi-section survey in print form. The whole process lasted about 20 minutes. During the completion of the surveys, one person of the research staff member was always present in the classroom and was responsible for assisting the participants.

2.2 Data Collection and Measurements

2.2.1 Measures

Self-talk. Students' self-talk was measured with the Automatic Self-talk Questionnaire for Sports (ASTQS), as adapted for the PE domain [37,38]. This scale consists of 40 items assessing students' positive (19 items; e.g., "I feel strong" or "I can make it") and negative thoughts (21 items; e.g., "I am going to lose" or "I think I'll stop trying"). Participants answered on a 5-point Likert

scale from 1 (never) to 5 (very often). The reliability and validity of the ASTQS have been previously demonstrated with Greek samples [33,38].

Psychological Needs Satisfaction. Participants' BPNs in PE was assessed with the Basic Psychological Needs in Exercise Scale [39]. This scale contains 12 items assessing perceptions of autonomy (4 items; e.g., "The exercise program I follow is highly compatible with my choices and interests"), competence (4 items; e.g., "I feel that I execute very effectively the exercises of my training program") and their relatedness (4 items; e.g., "I feel very much at ease with the other exercise participants"). All responses were given on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The Basic Psychological Needs in Exercise Scale has been previously used in studies with Greek participants [40,41].

Psychological Need Thwarting. Students' psychological need thwarting was measured with the Psychological Need Thwarting Scale (PNTS) [15]. It consists of 12 items measuring students' autonomy thwarting (4 items; e.g., "I feel pushed to behave in certain ways"), competence thwarting (4 items; e.g., "There are situations where I am made to feel inadequate"), and relatedness (4 items; e.g., "I feel other people dislike me"). All answers were given on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Also, the psychometric properties of the Psychological Need Thwarting Scale have been previously tested in Greece with satisfactory results [42].

Autonomy-supportive Climate. The Perceived Autonomy Support Scale in PE [13,24] was used to assess students' perceptions of the extent to which significant others, in this case the PE teachers, provide an autonomy-supportive climate during PE lesson. This questionnaire consists of 15 items (e.g., "I feel that PE teacher provides me with choices and options" or "I feel that my PE teacher understands me"). All items were scored on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The Perceived Autonomy Support Scale in PE has been previously used in research with Greek samples and had satisfactory psychometric properties [24].

2.3 Statistical Analysis

First, descriptive statistics (mean, standard deviation), reliability coefficients (Cronbach's α),

and correlations (Pearson's r coefficient) among the examined variables were calculated. Then, two separate standard regression analyses were conducted using the positive and negative self-talk as dependent variables, while autonomy-supportive climate and BPNs satisfaction and thwarting of autonomy, competence and relatedness were used as independent variables. The statistical analyses were conducted by using the PASW Statistics software (IBM; version 21.0 for Windows). The level of significance was set at $p < .05$.

3. RESULTS

3.1 Descriptive Statistics, Reliability and Correlation Analyses

Reliability analysis showed that Cronbach's alpha coefficients ranged from .61 to .82, except for competence need satisfaction ($\alpha = .50$) and autonomy need thwarting ($\alpha = .45$); these variables were excluded from further analyses. Descriptive statistics (mean, standard deviation), Cronbach's alpha reliability coefficients and correlations of the examined variables are presented in Table 1. Analysis of correlations showed that PE teachers' autonomy-supportive climate and students' satisfaction of the psychological needs for autonomy and relatedness were positively linked with students' positive self-talk and negatively linked with negative self-talk. In contrast, need thwarting of the needs for competence and relatedness, was positively related with students' negative self-talk and negatively related to positive self-talk.

3.2 Standard Regression Analyses

Separate regression analyses were conducted using students' positive and negative self-talk as dependent variables, while teacher-initiated autonomy-supportive climate and need satisfaction and thwarting as independent variables. Regarding positive self-talk, the analysis yielded a significant effect, $F(5, 543) = 8.52, p < .001; R^2 = .07$. Autonomy supportive climate ($\beta = .18, p < .001$) and competence need thwarting ($\beta = -.12, p = .02$), were significant predictors of positive self-talk. Regarding, negative self-talk, the analysis yielded a significant effect, $F(5, 543) = 36.16, p < .001; R^2 = .25$. Autonomy need satisfaction ($\beta = -.11, p = .01$), relatedness need satisfaction ($\beta = -.12, p = .001$), competence need thwarting ($\beta = .31, p < .001$), and relatedness need thwarting ($\beta = .15, p$

$< .001$) were significant predictors of negative self-talk. The results from the regression analyses are presented in Table 2.

4. DISCUSSION

The focus of the present study was to explore the relationships between PE teachers' autonomy-supportive behaviors with students' need satisfaction, need thwarting and self-talk during the PE lesson. Based on the literature review, scant attention has been given to this topic from previous researchers in the area of school PE [35,36].

A first important finding was that perceived autonomy-supportive class climate was positively linked with the satisfaction of the needs for autonomy and relatedness, and in contrast, negatively with the thwarting of the needs for competence and relatedness. Such findings are in accordance with the previous literature in education in general [12] and in PE in particular [43], thus reinforcing the importance of autonomy supportive class climate.

The key objective of the study was however to examine the relationships of the motivational variables with self-talk. The results revealed that students' perceptions of an autonomy-supportive climate and students' satisfaction of the psychological needs were positively linked with their positive self-talk and negatively related to negative self-talk. In addition, need thwarting was negatively related to positive self-talk and positively related to negative self-talk. Moreover, the results of the regression analysis further stressed the predictive strength of competence need thwarting for positive self-talk and of all dimensions of need satisfaction and need thwarting for negative self-talk.

With regard to the motivational climate, similar results have been reported in a study that showed that PE teacher-initiated mastery climate was positively linked with students' positive self-talk and negatively linked with their negative self-talk [35]. In addition, it has been supported [36] that a learning-oriented motivational climate can positively predict students' positive self-talk, while a performance-oriented motivational climate can positively predict negative self-talk. It is important to mention here that the previous studies [35,36] did not capture the PE teachers' autonomy-supportive aspect of the climate when measuring students' perceptions. This appears as a novelty of the present study.

Table 1. Descriptive statistics (mean, standard deviation), Cronbach's α reliability index and correlation analysis of the examined variables

Variables	<i>M</i>	<i>SD</i>	α	1	2	3	4	5	7	8
1. Positive Self-talk	3.06	.59	.82	-						
2. Negative Self-talk	1.16	.51	.81	-.29**	-					
3. Competence Need Thwarting	3.34	1.37	.65	-.17**	.42**	-				
4. Relatedness Need Thwarting	3.11	1.30	.66	-.13**	.34**	.50**	-			
5. Autonomy Need Satisfaction	3.61	.78	.61	.14**	-.21**	-.08	-.05	-		
6. Relatedness Need Satisfaction	3.87	.88	.64	.10*	-.26**	-.14**	-.13**	.37**	-	
7. Autonomy-Supportive Climate	5.08	.96	.77	.23**	-.23**	-.19**	-.15**	.46**	.40**	-

Table 2. Regression analyses of students' positive and negative self-talk

Dependent variables	Predictor(s) entered	<i>R</i>	<i>R</i> ²	<i>F</i>	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>P</i>
Positive Self-talk		.27	.07	8.52, <i>p</i> < .001					
	Autonomy-Supportive Climate				.11	.03	.18	3.10	<.001
	Autonomy Need Satisfaction				.04	.04	.05	1.06	.29
	Relatedness Need Satisfaction				-.01	.031	-.01	-.19	.85
	Competence Need Thwarting				-.05	.02	-.11	-2.39	.02
	Relatedness Need Thwarting				-.02	.02	-.04	-.88	.38
Negative Self-talk		.50	.25	36.16, <i>p</i> < .001					
	Autonomy-Supportive Climate				-.02	.02	-.04	-.792	.43
	Autonomy Need Satisfaction				-.07	.03	-.11	-2.50	.01
	Relatedness Need Satisfaction				-.08	.02	-.12	-3.46	.001
	Competence Need Thwarting				.12	.02	.31	7.15	<.001
	Relatedness Need Thwarting				.06	.02	.15	3.52	<.001

Furthermore, the results showed that the satisfaction of the needs for autonomy and relatedness were positively related to positive self-talk and negatively related to negative self-talk; whereas the thwarting of the needs for competence and relatedness was positively associated with students' negative self-talk and negatively related to positive self-talk. Regarding need satisfaction, the above results are in line with the previous research examining the links between self-talk and BPNs' satisfaction [44]. Regarding need thwarting, to our knowledge, there is no other study that has examined its links with self-talk. Therefore, the above results appear to be a second novelty of the present research.

In the literature, it is well established that PE teacher's autonomy-supportive behaviors affect significantly the satisfaction of the three BPN [25, 45]. On the other hand, it is also clear that PE teacher's controlling behaviors increase the frustration of these BPN [25]. It seems that PE teacher's behaviors affect students' self-talk directly or indirectly through the satisfaction or thwarting of their BPN. Therefore, PE teachers are encouraged to emphasize the development of autonomy-supportive climate, and through that the satisfaction of pupils' psychological needs, to facilitate pupils positive self-talk and, respectively, to reduce negative self-talk. The main reason would be that positive self-talk has been associated with positive outcomes in PE such as increased confidence, promotion of self-regulated learning [46,47] and positive self-esteem [48]. On the contrary, negative self-talk related to increased levels of stress [49]. Such objectives can be achieved from PE teachers by offering their students the opportunity to have choices during PE lesson, taking their perspectives, providing positive feedback, focusing on learning and personal improvement, and using more student-centered teaching styles, such as reciprocal or self-check style [25,50,51, 52,53]. On the contrary, PE teachers should avoid comparing pupils' with their classmates, ignoring their pupils' perspectives and using controlling behaviors such as punishment, directive commands, and shouts during class [25,50].

4.1 Limitations and Future Directions

A first limitation of this study is the less than optimal Cronbach's alpha coefficients for the need satisfaction and need thwarting scales in general, and in particular, for competence need

satisfaction and autonomy need thwarting that had to be dropped. Even though the scales have been validated [15,40,41,42], it seems that revising the scales through the addition of items may help improving its reliability. Moreover, to complement the use of self-report instruments for the assessment of the motivational climate, future researchers are encouraged to use systematic observation during PE lesson, thus promoting a multi-method approach for studying the impact of motivational climate on outcome measures. Finally, the cross-sectional design of the study does not allow any causal inferences. Thus, it would be useful that future studies endorse longitudinal designs to explore the long term effects of autonomy-supportive climate on students' BPN satisfaction or thwarting and their self-talk. In addition to the above propositions, and considering the relevant lack of studies, it would be of interest that future research examines the possible mechanisms under which psychological need thwarting affects students' self-talk in PE.

5. CONCLUSION

Overall, the findings suggest that when PE teachers create a class environment that supports students' autonomy and the satisfaction of their BPN, while at the same time prevents their BPN from thwarting, they can positively affect students' self-talk.

CONSENT

Prior to conducting the study, informed consent forms were delivered to each pupil and signed by their parents/guardians.

ETHICAL APPROVAL

Prior to conducting the study, ethical approval was obtained from the Greek Institute of Education (Ref. 160970/Δ5) and the Ethics Committee of the Department of Physical Education and Sport Science, University of Thessaly (Ref.: 1104).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Castillo I, Balaguer I, García-Mérita M. Efecto de la práctica de actividad física y

- de la participación deportiva sobre el estilo de vida saludable en la adolescencia en función del género. *Revista De Psicología Del Deporte*. 2007;16:201-210.
2. Lonsdale C, Hall AM, Murray A, Williams GC, McDonough SM, Ntoumanis N, et al. Communication skills training for practitioners to increase patient adherence to home-based rehabilitation for chronic low back pain: Results of a cluster randomized controlled trial. *Archives of Physical Medicine and Rehabilitation*. 2017;98(9):1732-1743.
DOI: 10.1016/j.apmr.2017.02.025
 3. Zhang T, Solmon MA, Kosma M, Carson RL, Gu X. Need support, need satisfaction, intrinsic motivation, and physical activity participation among middle school students. *Journal of Teaching in Physical Education*. 2011;30:51-68.
DOI: 10.1123/jtpe.30.1.51
 4. Moreno-Murcia JA, Coll DGC, Pérez LMR. Self-determined motivation and physical education importance. *Human Movement*. 2009;10(1):5-11.
DOI: 10.2478/v10038-008-0022-7
 5. Taylor IM, Ntoumanis N. Teacher motivational strategies and student self-determination in physical education. *Journal of Educational Psychology*. 2007; 99(4):747-760.
DOI: 10.1037/0022-0663.99.4.74
 6. Deci EL, Ryan RM. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press; 1985.
 7. Ryan RM, Deci EL. *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York: Guilford Publishing; 2017.
 8. Lindahl J, Stenling A, Lindwall M, Colliander C. Trends and knowledge base in sport and exercise psychology research: A bibliometric review study. *International Review of Sport and Exercise Psychology*. 2015;8:71-94.
DOI: 10.1080/1750984X.2015.1019540
 9. Ntoumanis, N. Motivational clusters in a sample of british physical education classes. *Psychology of Sport and Exercise*. 2002;3:177-194.
DOI: 10.1016/S1469-0292(01)00020-6
 10. Deci EL, Ryan RM. The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*. 2000;11:227-268.
DOI: 10.1207/S15327965PLI1104_01
 11. Haerens L, Aelterman N, Vansteenkiste M, Soenens B, Van Petegem S. Do perceived autonomy-supportive and controlling teaching relate to physical education students' motivational experiences through unique pathways? Distinguishing between the bright and dark side of motivation. *Psychology of Sport and Exercise*. 2015; 16:26-36.
DOI: 10.1016/j.psychsport.2014.08.013
 12. Vansteenkiste M, Ryan RM. On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*. 2013;23(3):263-280.
DOI: 10.1037/a0032359
 13. Hagger MS, Chatzisarantis N, Culverhouse T, Biddle SJH. The processes by which perceived autonomy support in physical education promotes leisure-time physical activity intentions and behavior: A trans-contextual model. *Journal of Educational Psychology*. 2003;95:784-795.
DOI: 10.1037/0022-0663.95.4.784
 14. Teixeira PJ, Carraça EV, Markland D, Silva MN, Ryan RM. Exercise, physical activity, and self-determination theory: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity*. 2012; 9(1):78.
DOI: 10.1186/1479-5868-9-78.
 15. Bartholomew KJ, Ntoumanis N, Ryan RM, Thøgersen-Ntoumani C. Psychological need thwarting in the sport context: Assessing the darker side of athletic experience. *Journal of Sport & Exercise Psychology*. 2011;33(1):75-102.
DOI: 10.1123/jsep.33.1.75
 16. Gunnell KE, Crocker PRE, Wilson PM, Mack DE, Zumbo BDP. Psychological need satisfaction and thwarting: A test of basic psychological needs theory in physical activity contexts. *Psychology of Sport and Exercise*. 2013;14(5):599-607.
DOI: 10.1016/j.psychsport.2013.03.007
 17. Bartholomew KJ, Ntoumanis N, Ryan RM, Bosch JA, Thøgersen-Ntoumani C. Self determination theory and diminished functioning: The role of interpersonal control and psychological need thwarting. *Personality and Social Psychology Bulletin*. 2011;37:1459-1473.
DOI: 10.1177/0146167211413125
 18. Cuevas-Campos R, Fernández-Bustos JG, González-Cutre D, Hernández-Martínez A. Need satisfaction and need thwarting in

- physical education and intention to be physically active. *Sustainability*. 2020;12(18):7312.
DOI: 10.3390/su12187312
19. Moreno-Murcia JA, Sánchez-Latorre F. The effects of autonomy support in physical education classes. *RICYDE. Revista Internacional De Ciencias Del Deporte*. 2016;12(43):79-89.
DOI: 10.5232/ricyde2016.04305
 20. Shen B, McCaughtry N, Martin J, Fahlman M. Effects of teacher autonomy support and students' autonomous motivation on learning in physical education. *Research Quarterly for Exercise and Sport*. 2009; 80(1):44-53.
DOI: 10.1080/02701367.2009.10599528
 21. Barkoukis V, Hagger, M.S. The trans-contextual model: Perceived learning and performance motivational climates as analogues of perceived autonomy support. *European Journal of Psychology of Education*. 2013;28:353-372.
DOI: 10.1007/s10212-012-0118-5
 22. Langdon JL, Webster CA, Monsma EV, Harris BS. A content analysis of teacher autonomy support during a high school volleyball unit. *The Physical Educator*. 2019;76(2):385-409.
DOI: 10.18666/TPE-2019V76-I2-8729
 23. Shen B, McCaughtry N, Martin JJ, Fahlman M, Garn AC. Urban high-school girls' sense of relatedness and their engagement in physical education. *Journal of Teaching in Physical Education*. 2012;31(3):231-245.
DOI: 10.1123/jtpe.31.3.231
 24. Hagger MS, Chatzisarantis NLD, Barkoukis V, Wang CKJ, Baranowski J. Perceived autonomy support in Physical Education and leisure-time physical activity: A cross-cultural evaluation of the trans-contextual model. *Journal of Educational Psychology*. 2005;97(3):376-390.
DOI: 10.1037/0022-0663.97.3.376
 25. Haerens L, Vansteenkiste M, De Meester A, Delrue J, Tallir I, Vande Broek G, et al. Different combinations of perceived autonomy support and control: identifying the most optimal motivating style. *Physical Education and Sport Pedagogy*. 2018; 23(1):16-36.
DOI: 10.1080/17408989.2017.1346070.
 26. Moreno-Murcia J, Huéscar Hernández E, Ruiz L. Perceptions of controlling teaching behaviors and the effects on the motivation and behavior of high school physical education students. *International Journal of Environmental Research & Public Health*. 2018;15(10):2288.
DOI: 10.3390/ijerph15102288
 27. Cheon SH, Reeve J, Vansteenkiste M. When teachers learn how to provide classroom structure in an autonomy-supportive way: Benefits to teachers and their students. *Teaching and Teacher Education*. 2020;90.
DOI: 10.1016/j.tate.2019.103004
 28. Pérez-González AM, Valero-Valenzuela A, Moreno-Murcia JA, Sánchez-Alcaraz BJ. Systematic review of autonomy support in physical education. *Apunts. Educ. Física Y Deportes*. 2019;138:51-61.
DOI: 10.5672/apunts.20140983.es.(20-19/4).138.04
 29. González-Cutre D, Sicilia Á, Beas-Jiménez M, Hagger MS. Broadening the trans-contextual model of motivation: A study with spanish adolescents. *Scandinavian Journal of Medicine and Science in Sports*. 2014;24(4):306-319.
DOI: 10.1111/sms.12142
 30. Latinjak AT, Hardy J, Comoutos N, Hatzigeorgiadis A. Nothing unfortunate about disagreements in sport self-talk research: Reply to Van Raalte, Vincent, Dickens, and Brewer. *Sport, Exercise, and Performance Psychology*. 2019;8(4):379-386.
DOI: 10.1037/spy0000184
 31. Latinjak AT, Hatzigeorgiadis A, Comoutos N, Hardy J. Speaking clearly...10 yearson: The case for an integrative perspective of self-talk in sport. *Sport, Exercise, and Performance Psychology*. 2019;8(4):353-367.
DOI: 10.1037/spy0000160
 32. Zourbanos N, Theodorakis Y, Hatzigeorgiadis A. Coaches' behavior, social support and athletes' self-talk. *Hellenic Journal of Psychology*. 2006; 3:117-133.
 33. Zourbanos N, Hatzigeorgiadis A, Goudas M, Papaioannou A, Chroni S, Theodorakis Y. The social side of self-talk: Relationships between perceptions of support received from the coach and athletes' self-talk. *Psychology of Sport and Exercise*. 2011;12:407-414.
DOI: 10.1016/j.psychsport.2011.03.001
 34. Zourbanos N, Haznadar A, Papaioannou A, Tzioumakis Y, Krommidas

- C, Hatzigeorgiadis A. The relationships between athletes' perceptions of coach-created motivational climate, self-talk, and self-efficacy in youth soccer. *Journal of Applied Sport Psychology*. 2016;28(1):97-112.
DOI: 10.1080/10413200.2015.1074630
35. Marjanović M, Comoutos N, Papaioannou A. The relationships between perceived motivational climate, achievement goals and self-talk in physical education: Testing the mediating role of achievement goals and self-talk. *Motivation & Emotion*. 2019; 43:592-609.
DOI:10.1007/s11031-019-09760-2
 36. Ada EN, Comoutos N, Karamitrou A, Kazak Z. Relationships between dispositional flow, motivational climate, and self-talk in physical education classes. *The Physical Educator*. 2019;76(2):357-384.
DOI: 10.18666/TPE-2019-V76-I2- 8419
 37. Zourbanos N, Hatzigeorgiadis A, Chroni S, Theodorakis Y, Papaioannou A. Automatic self-talk questionnaire for sports (ASTQS): Development and preliminary validation of a measure identifying the structure of athletes' self-talk. *The Sport Psychologist*. 2009;23(2):233-251.
DOI: 10.1123/tsp.23.2.233
 38. Zourbanos N, Papaioannou A, Argyropoulou E, Hatzigeorgiadis A. Achievement goals and self-talk in physical education: The moderating role of perceived competence. *Motivation & Emotion*. 2014;38:235-251.
DOI: 10.1007/s11031-013-9378-x
 39. Vlachopoulos SP, Michailidou S. Development and initial validation of a measure of autonomy, competence, and relatedness in exercise: The Basic Psychological Need in Exercise Scale. *Measurement in Physical Education and Exercise Science*. 2006;10(3):179-201.
DOI: 10.1207/s15327841mpee1003_4
 40. Vlachopoulos SP. Psychometric evaluation of the Basic Psychological Needs in Exercise Scale in community exercise programs: A cross-validation approach. *Hellenic Journal of Psychology*. 2007;4:52-74.
 41. Vlachopoulos SP, Ntoumanis N, Smith AL. The Basic Psychological Needs in Exercise Scale: Translation and evidence for cross-cultural validity. *International Journal of Sport and Exercise Psychology*. 2010;8(4):394-412.
DOI: 10.1080/1612197X.2010.9671960
 42. Ntoumanis N, Quested E, Patterson L, Kaffe S, Buckhouse SH, Pavlidis G, et al. An intervention to optimise coach-created motivational climates and reduce athlete willingness to dope (CoachMADE): a three-country cluster randomised controlled trial. *British Journal of Sports Medicine*. 2020;0:1-8.
DOI: 10.1136/bjsports-2019-101963
 43. Bartholomew KJ, Ntoumanis N, Mouratidis A, Katartzi E, Thøgersen-Ntoumani C, Vlachopoulos S. Beware of your teaching style: A school-year long investigation of controlling teaching and student motivational experiences. *Learning and Instruction*. 2018;53:50-63.
DOI: 10.1016/j.learninstruc.2017.07.006
 44. Amado D, Maestre M, Carlos Montero-Carretero C, Sánchez-Miguel PA, Cervelló E. Associations between self-determined motivation, team potency, and self-talk in team sports. *Journal of Human Kinetics*. 2019;70:245-259.
DOI: 10.2478/hukin-2019-0116
 45. Standage M, Duda JL, Ntoumanis N. A test of self-determination theory in school physical education. *British Journal of Educational Psychology*. 2005;75:411-433.
DOI: 10.1348/000709904X22359
 46. Anderson A. Learning strategies in physical education: Self-talk, imagery, and goal-setting. *Journal of Physical Education, Recreation & Dance*. 1997;68(1):30-35.
 47. Landin D. The role of verbal cues in skill learning. *Quest*. 1994;46(3):299-313.
 48. Philpot VD, Bamberg JW. Rehearsal of positive self-statements and restructured negative self-statements to increase self-esteem and decrease depression. *Psychological Reports*, 1996; 79(1):83-91.
 49. Lodge J, Tripp G, Harte DK. Think-aloud, thought-listing and video mediated recall procedures in the assessment of children's self-talk. *Cognitive Therapy and Research*, 2000;24(4):399-418.
DOI: 10.1023/A:1005575618941
 50. Hancox JE, Quested E, Thøgersen-Ntoumani C, Ntoumanis N. An intervention to train group exercise class instructors to adopt a motivationally adaptive communication style: a quasi-experimental study protocol. *Health Psychology and Behavioral Medicine*. 2015;3(1):190203.
DOI: 10.1080/21642850.2015.1074075
 51. Cheon SH, Reeve J, Moon IS. Experimentally based, longitudinally

- designed, teacher focused intervention to help physical education teachers be more autonomy supportive toward their students. Journal of Sport and Exercise Psychology. 2012;34:365-396.
DOI:10.1123/jsep.34.3.365
52. Reeve J, Halusic M. How K-12 teachers can put self-determination theory principles into practice. Theory and Research in Education. 2009;7(2):145-154.
53. Tessier D, Sarrazin P, Ntoumanis N. The effect of an intervention to improve newly qualified teachers' interpersonal style, students motivation and psychological need satisfaction in sport based physical education. Contemporary Educational Psychology. 2010;35(4):242-253.
DOI: 10.1016/j.cedpsych.2010.05.005

© 2020 Brisimis et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/63838>