The Physical Educator Vol. 79 • pp. 280–304 • 2022
https://doi.org/10.18666/TPE-2022-V79-I3-10851

Motivational Climate, Basic Psychological Needs, and Students' Self-Talk in Physical Education

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Abstract

The purpose of this study was to examine the relationships between students' perceived motivational climate (mastery and performance), satisfaction of basic psychological needs (autonomy, competence, and relatedness), and self-talk (positive and negative) in physical education (PE). Six hundred six students (282 males, 315 females, 9 did not provide their gender), aged 10 to 17 years old (M_{age} = 13.32 ± 2.12), from seven primary schools (n = 250), five secondary schools (n = 131), and eight high schools (n = 225) in Greece voluntarily participated in this study. During a PE class, students completed online a number of valid and reliable questionnaires measuring perceived motivational climate, basic psychological needs, and self-talk. Results showed that students' positive self-talk was positively related to mastery motivational climate, autonomy, competence, and relatedness. In contrast, negative self-talk was positively related only to performance motivational climate and negatively related to perceived mastery climate, competence,

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and relatedness. Separate hierarchical regression analyses revealed that perceived mastery climate and competence were the most significant predictors of students' positive self-talk. On the contrary, perceived performance climate, competence, and autonomy were the most significant predictors of students' negative self-talk. On the basis of the results, it seems that PE teacher-initiated motivational climate and satisfaction of basic psychological needs is strongly related to students' self-talk.

People during their daily activities have thoughts. These thoughts may be related to the activity being performed or could be completely irrelevant to the subject matter. We often do not fully understand the way we think or speak to ourselves (Ellis, 1994); however, this inner dialogue affects our emotions and behavior. In psychology, conversation to ourselves has been described in various terms such as inner speech, self-statements, internal dialogue, verbal thought, self-directed, sub-vocal, covert or communicative speech, and private speech (Guerrero, 2005; Winsler, 2009).

However, in the context of sports psychology, the term "self-talk" has been defined as

> statements, phrases, or cue words that are addressed to the self which might be said automatically or strategically, either out loud or silently, phrased positively or negatively, having an instructional or motivational purpose, an element of interpretation, and incorporating some of the same grammatical features associated with everyday speech. (Hardy & Zourbanos, 2016, p. 450)

According to a group of researchers (e.g., Hardy et al., 2018; Latinjak et al., 2014), there are two main types of self-talk: (a) goal-directed, which is detailed "as a mental process deliberately employed towards solving a problem during reasoning and decision making" (Hardy et al., 2018, p. 5), and (b) undirected self-talk, which is refers to "unintentional and emergent thoughts" (Hardy et al., 2018, p. 5).

It is well established that self-talk intervention programs have a significant impact on individuals' enhancement of performance and skills development in both sport (for reviews, see Hardy et al., 2009; Hatzigeorgiadis et al., 2011; Tod et al., 2011) and physical education (PE; Anderson, 1997; Kolovelonis et al., 2011, 2012; Theodorakis

et al., 2001). Additionally, researchers have argued that self-talk can help students to improve their skills by directing their attention to the key point of the learning skill and helping them recall the individual movements of the skill (Landin, 1994; Weiss & Klint, 1987). Furthermore, research has shown that self-talk is a technique that students prefer to apply more compared with other self-regulation techniques for learning, effort, and better school performance (Wolters, 1999).

Research findings have indicated that positive or negative thoughts could lead to specific outcomes. The sport setting is a context for which a significant number of studies have examined the influence of self-talk on athletes' performance. More specifically, the findings of a systematic review (Tod et al., 2011) revealed that positive self-talk has a positive effect on athletes' performance. Similarly, a meta-analytic review of Hatzigeorgiadis et al. (2011) confirmed the moderate effect of self-talk interventions on sport-related task performance. However, self-talk has received limited attention in the PE context. The majority of the studies conducted in this context showed that self-talk strategy can help students to increase their confidence and become self-regulated learners (Anderson, 1997; Landin, 1994; Weiss & Klint, 1987). Similarly, the findings of another study revealed that positive self-talk positively influences students' self-esteem (Philpot & Bamburg, 1996). On the contrary, negative self-talk relates to increased stress levels in elementary school students (Lodge et al., 2000).

According to Hardy et al.'s (2009) model of self-talk in sport, personal (e.g., personality traits) and situational (e.g., task difficulty, coaches' behaviors) factors influence athletes' self-talk, which in turn affects cognitive, motivational, behavioral, and affective mechanisms, and subsequently their sport performance. Although self-talk appears to play a pivotal role in students' participation in PE, a limited number of studies that examine the factors that influence students' self-talk in the PE context have been conducted in this context (e.g., Ada et al., 2019; Marjanović et al., 2019).

Motivational Climate and Self-Talk

Research (e.g., Ames, 1992a; Høigaard & Ommundsen, 2007; Ommundsen & Lemyre, 2007; Papaioannou et al., 2007; Vazou et al., 2006) in the context of sport and PE has noted that "significant others"

such as PE teachers, coaches, parents and peers can create a motivational climate that affects the development of human character and leads individuals to adopt a mastery goal (emphasis on personal improvement and learning) or a performance goal (emphasis on social comparison). The majority of these studies have distinguished this motivational climate in two dimensions: (a) the "mastery climate," which focuses on students' learning, personal improvement, effort, perseverance, and cooperation, and (b) the "performance climate," which focuses on social comparison, on how to outperform others, and on social recognition (for reviews, see Braithwaite et al., 2011; Ommundsen et al., 2003; Papaioannou et al., 2007; Roberts, 2012).

Research in the PE context has shown that a mastery motivational climate is positively associated with enjoyment (e.g., Barkoukis et al., 2010; Jaakkola et al., 2017), task goal orientation (Digelidis et al., 2005; Ommundsen, 2006), intrinsic motivation (Jaakkola et al., 2017), effort (Ommundsen, 2006), moral behavior (Digelidis & Krommidas, 2008), discipline (Giannoudis et al., 2009), and participation in out-of-school physical activity (Digelidis et al., 2005; Jaakkola et al., 2017). On the contrary, a performance motivational climate created by the PE teacher is positively related to boredom (Barkoukis et al., 2010), performance goal orientation (Digelidis et al., 2005; Ommundsen, 2006), extrinsic motivation and amotivation (Jaakkola et al., 2017), unsportsmanlike behavior (Digelidis & Krommidas, 2008), and self-handicapping (Ommundsen, 2006).

Research (Zourbanos et al., 2007; Zourbanos et al., 2010) has noticed that coaches' behavior might influence athletes' self-talk. Similarly, the findings of studies conducted in the PE context suggest that teacher-initiated motivational climate can shape students' positive or negative self-talk (e.g., Ada et al., 2019; Marjanović et al., 2019). More specifically, the research in the field of education initially focused on the relationships between teacher behavior and significant others' expressions and students' or children's self-talk. For example, Burnett (1996) found that teachers' positive statements were positively correlated with students' positive self-talk, while teachers' negative statements were positively correlated with students' negative self-talk. Additionally, children's self-talk had a mediating role in the relationships between significant others' positive and negative statements and children's self-esteem (Burnett &

McCrindle, 1999). Burnett (2003) also found that teachers' positive expressions and feedback were related to students' positive self-talk and academic self-concept. Finally, Oliver et al. (2008), in an experimental study, found that during an autonomy-supportive class environment, students mainly used positive self-talk, compared with a controlling class environment in which students used more negative self-talk.

Marjanović et al. (2019) revealed that mastery climate was positively and directly related to students' positive self-talk in PE and had an indirect effect on their positive self-talk through their task goal orientation. On the contrary, performance-approach and avoidance climate were both positively related to students' negative self-talk, but the only performance-avoidance climate had a negative impact on students' positive self-talk (Marjanović et al., 2019). Similarly, the findings of another study in PE (Ada et al., 2019) indicated that the subscale of the motivational climate "students' learning orientation" positively predicted students' positive self-talk dimensions and negatively predicted students' negative self-talk dimensions. Conversely, the motivational climate subscale "students' worry about mistakes" positively predicted students' negative self-talk.

In summary, it can be assumed that teacher-initiated mastery motivational climate might be a crucial factor in shaping students' self-talk. However, it seems that the relationship between the motivational climate and self-talk in the PE setting has been insufficiently explored. To our knowledge, only a small number of studies have examined this relationship between teacher-initiated motivational climate and students' self-talk in PE (Ada et al., 2019; Marjanović et al., 2019).

Basic Psychological Needs and Self-Talk

Self-determination theory (SDT; e.g., Deci & Ryan, 2000, 2012) points out that the three basic psychological needs (BPNs) of autonomy, competence, and relatedness are "innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being" (Deci & Ryan, 2000, p. 229). More specifically, autonomy indicates the need of individuals to be able to determine and choose by themselves the behavior they will exhibit; competence reflects the need of individuals to feel competent, skillful, or sufficient during a challenging task; relatedness refers to the

need of individuals to feel that "significant others" such as coaches or PE teachers, as well as their peers, respect them, understand their worries, and care about them (e.g., Deci & Ryan, 2000; Hodge et al., 2008; Ryan & Deci, 2000).

The fulfillment of the three BPNs in the PE context is positively related to students' self-determined motivation (Erturan-Ilker, 2014; Koka & Hagger, 2010; Ntoumanis, 2005), mastery or task-oriented climate (Ntoumanis, 2005), and autonomy-supportive climate (Standage & Gillison, 2007). Similarly, the fulfillment of students' BPNs was found to be positively related to students' physical self-concept and general or global self-esteem (Erturan-Ilker, 2014; Garn et al., 2012; Standage & Gillison, 2007), subjective vitality (Erturan-Ilker, 2014), health-related quality of life (Standage & Gillison, 2007), and intention to participate in out-of-school physical activity (Standage et al., 2003).

Regarding BPNs and self-talk, Hatzigeorgiadis and Biddle (1999) found that athletes' perceived competence was negatively related to negative self-talk. Similarly, Zourbanos et al. (2014) found that students' perceived competence was positively related to their positive self-talk during PE class and negatively related to their negative self-talk. Recently, Karamitrou et al. (2017) investigated the relationships between BPNs, the different types of motivation, and athletes' automatic self-talk. The findings showed that both satisfaction of BPNs and self-determined motivation play a significant role in the formation of athletes' self-talk. Particularly, the researchers found that sport environments that support athletes' BPNs satisfaction enhance self-determined motivation to participate in sports activities, increase the use of positive self-talk, and decrease athletes' negative self-talk.

Given the findings in the literature, it can be argued that BPNs satisfaction is related to the phenomenon of self-talk. Although the relationship between coach or teacher-initiated motivational climate and BPNs has been examined in a large number of studies (e.g., Coatsworth & Conroy, 2009; Ntoumanis, 2005; Reinboth & Duda, 2006; Standage & Gillison, 2007), a limited number of studies have examined the relationship between BPNs and self-talk. More specifically, so far only a small number of studies, mainly in the field of sports, have examined the relationship of the aforementioned

variables (Amado et al., 2019; De Muynck et al., 2017; Karamitrou et al., 2017). To our knowledge, no one study has examined the relationships between motivational climate, BPNs, and students' self-talk in PE classes. This kind of study is worthwhile as it will help us (a) to understand better the factors that shape students' self-talk in PE, (b) to design and organize PE courses that will aim to both satisfy students' BPNs and maximize positive motivational outcomes, and (c) to develop and apply effective self-talk interventions in the PE context.

Thus, the purpose of this study was to examine the relationships between perceived motivational climate (mastery, performance), satisfaction of BPNs (autonomy, competence, relatedness), and students' self-talk (positive, negative) in a PE setting. Moreover, it attempted to identify which of the variables of motivational climate and BPNs are the strongest predictors of students' positive and negative self-talk. It was hypothesized that perceived mastery climate and the three BPNs would be positively related to students' positive self-talk and negatively related to students' negative self-talk. In contrast, it was hypothesized that perceived performance climate would be positively related to students' negative self-talk.

Method

Participants

Six hundred six students (282 males, 315 females, 9 did not provide their gender), aged 10 to 17 years old (M_{age}: 13.32 ± 2.12), from seven primary (n = 250), five secondary schools (n = 131), and eight high schools (n = 225) in Greece voluntarily participated in this study. The schools were selected from a list of schools in the district of Central Greece.

Measures

Perceived Motivational Climate

A short version of the Perceptions of a Physical Education Teacher's Emphasis on Achievement Goals Questionnaire at the Situational Level of Generality (Papaioannou et al., 2007) was used. The questionnaire assesses students' perceptions of teacher-initiated mastery climate (six items; e.g., "My Physical Education teacher . . . is

very happy when I learn new skills and games") and teacher-initiated performance climate (six items; e.g., "My Physical Education teacher . . . often makes me worried if they say that I'm not capable in PE") in PE. Students gave answers on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Basic Psychological Needs Satisfaction

Students' BPNs in PE were measured with a 15-item scale (Quested et al., 2013) assessing their autonomy (five items; e.g., "I decided which activities I practiced in PE" or "It was my choice to do particular activities in PE"), competence (six items; e.g., "I thought I was quite good at PE" or "I was satisfied with what I did in PE"), and relatedness (four items; e.g., "I felt supported in PE" or "I felt valued in PE"). Students gave answers on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Self-Talk

A short version of the Automatic Self-Talk Questionnaire for Sports (Zourbanos et al., 2009) adapted for a PE setting (Zourbanos et al., 2014) was used in the assessment of students' positive and negative self-talk. The adapted short version of the questionnaire consisted of four positive (e.g., "I can make it" or "Do your best") and four negative (e.g., "I want to stop" or "I feel tired") items measuring students' self-talk during PE (total eight items). Students gave answers on a 5-point Likert scale from 1 (*never*) to 5 (*very often*).

Procedure

The study was conducted with the approval of the University Institutional Ethics Committee (Ref. Number: 1376 - 06/06/2018) and the Greek Institute of Education (Ref. Number: 160970/Δ5 - 27/09/2018). Informed consent was secured from parents and pupils before the beginning of the study. All students voluntarily participated in the study. The questionnaires were completed online in the PC lab of each school during a PE class. A researcher was always present during the completion of the questionnaire. All students were informed about the purpose of the study, the anonymity of the questionnaires, and their right to drop out of the survey at any time. Each student needed approximately 20 min to complete the questionnaires.

Data Analysis

Factorial validity for each questionnaire (perceived motivational climate, BPNs, and self-talk) was examined through confirmatory factor analysis (CFA) and the AMOS statistical software (IBM; version 20.0; Arbuckle, 2012). The parameters of each model were determined through maximum likelihood estimation. The following goodness-of-fit indices were used for the examination of each model: chi-squared (χ^2), goodness-of-fit index (GFI), Tucker–Lewis index (TLI), comparative fit index (CFI), and root-mean-square error of approximation (RMSEA; e.g., Baumgartner & Homburg, 1996; Cheung & Rensvold, 2002; Hu & Bentler, 1999).

Subsequently, descriptive statistics (means, standard deviations), Cronbach's alpha reliability coefficient (Cronbach, 1951), and Pearson's *r* correlation coefficient were calculated. Finally, two hierarchical regression analyses were conducted with the variables positive self-talk and negative self-talk as dependent variables and perceived motivational climate (mastery, performance) and BPNs (autonomy, competence, relatedness) as independent variables.

Results

Confirmatory Factor Analysis

Goodness-of-fit indices for the three measurement models (perceived motivational climate, basic need satisfaction, and self-talk) were satisfied (Table 1).

Descriptive statistics, reliability, and correlation analyses

Table 2 presents the descriptive statistics (means, standard deviations), Cronbach's alpha reliability index, and correlation analyses between the examined variables. All scales revealed acceptable reliability (α = .74 to .89). Correlation analysis showed that positive self-talk was positively related to perceived mastery climate and the three BPNs of autonomy, competence, and relatedness. On the other hand, negative self-talk was positively related to perceived performance climate and negatively related to perceived mastery climate, competence, and relatedness.

Table 1
CFAs Goodness of Fit Indices for the Measurement Models

N	Questionnaire	*N*	χ^2	*df*	GFI	TLI	CFI	RMSEA
1	Perceived motivational climate (2 factors, 12 items)	514	170.388	53	.947	.923	.938	.066
2	Basic needs satisfaction (3 factors, 15 items)	512	192.483	87	.951	.959	.966	.049
3	Self-talk (2 factors, 8 items)	559	110.231	19	.953	.906	.936	.093

Note. *N* = number of instruments. GFI = goodness-of-fit index; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root-mean-square error of approximation.

Table 2
Descriptive Statistics, Reliability, and Correlation Analyses of the Examined Variables

Variable	*M*	*SD*	α	1	2	3	4	5	6	7
Perceived mastery climate	3.86	.69	.83	-						
Perceived performance climate	2.14	.80	.78	.00	-					
Autonomy	3.45	.82	.77	.26**	.09	-				
Competence	3.94	.72	.89	.38**	-.20**	.36**	-			
Relatedness	3.50	.75	.79	.51**	-.15**	.47**	.52**	-		
Positive self-talk	3.56	1.00	.83	.25**	-.04	.21**	.25**	.22**	-	
Negative self-talk	2.51	.93	.74	-.16**	.26**	.04	-.21**	-.16**	.18**	-

*$p < .05$. **$p < .01$.

Hierarchical Regression Analysis of the Positive Self-Talk

A hierarchical regression analysis was conducted for the examination of whether the motivational climate and BPNs would predict students' positive self-talk. The motivational climate variables (mastery, performance) were included as predictors at Step 1, whereas the BPNs subscales (autonomy, competence, and relatedness) were entered as predictors at Step 2.

At Step 1, when motivational variables were entered, results revealed that they significantly predicted positive self-talk, explaining 7% of the variance by themselves. Examination of the beta coefficients at Step 1 revealed that only perceived mastery climate ($\beta = .27$, $p < .001$) significantly predicted positive self-talk. At Step 2, when BPNs subscales were added as predictors, they significantly improved the prediction model (12%). Examination of the beta coefficients from the entire model revealed that only perceived mastery climate ($\beta = .16$, $p < .01$) and competence ($\beta = .15$, $p < .01$) were significant predictors of positive self-talk. Table 3 summarizes the results of this hierarchical regression analysis.

Hierarchical Regression Analysis of the Negative Self-Talk

A hierarchical regression analysis was also conducted, examining whether the motivational climate and BPNs would predict students' negative self-talk. The motivational climate variables (mastery, performance) were included as predictors at Step 1, whereas the BPNs subscales (autonomy, competence, and relatedness) were entered as predictors at Step 2.

At Step 1, when motivational variables were entered, results revealed they significantly predicted negative self-talk, explaining 8% of the variance by themselves. Examination of the beta coefficients at Step 1 showed that both perceived mastery climate ($\beta = -.16$, $p < .001$) and perceived performance climate ($\beta = .23$, $p < .001$) were significant predictors of negative self-talk. At Step 2, when BPNs subscales were added as predictors, they significantly improved the prediction model (11%). Examination of the beta coefficients from the entire model revealed that perceived mastery climate ($\beta = -.12$, $p < .05$), perceived performance climate ($\beta = .19$, $p < .001$), autonomy ($\beta = .17$, $p < .001$), and competence ($\beta = -.16$, $p < .01$) were significant predictors of negative self-talk. Table 4 summarizes the results of this hierarchical regression analysis.

Table 3
Hierarchical Regression Analysis of Positive Self-Talk

Step	Predictor(s) entered	*R*	R^2_{Ch}	F_{ch}	*B*	SE *B*	β	*t*	*p*
1	Perceived mastery climate	.27	.07	18.284**	.39	.07	.27	6.01	.000
	Perceived performance climate				-.04	.06	-.04	-.77	.443
2	Perceived mastery climate	.34	.12	7.403**	.23	.08	.16	3.03	.003
	Perceived performance climate				.02	.06	.01	.30	.768
	Autonomy				.11	.06	.09	1.87	.063
	Competence				.21	.07	.15	2.90	.004
	Relatedness				.08	.08	.06	1.02	.308

Note. R^2_{Ch} = R^2 change; F_{ch} = F change.

**$p < .001$.

Table 4
Hierarchical Regression Analysis of the Negative Self-Talk

Step	Predictor(s) entered	*R*	R^2_{Ch}	F_{ch}	*B*	SE *B*	β	*t*	*p*
1	Perceived mastery climate	.28	.08	18.786**	-.23	.06	-.16	-3.601	.000
	Perceived performance climate				.27	.05	.23	5.025	.000
2	Perceived mastery climate	.34	.11	6.294**	-.17	.07	-.12	-2.366	.018
	Perceived performance climate				.23	.05	.19	4.187	.000
	Autonomy				.20	.06	.17	3.356	.001
	Competence				-.22	.07	-.16	-3.025	.003
	Relatedness				-.06	.08	-.044	-.758	.449

Note. R^2_{Ch} = R^2 change; F_{ch} = *F* change.

**$p < .001$.

Discussion

The purpose of this study was to examine the relationships between students' perceived motivational climate (mastery and performance), satisfaction of BPNs (autonomy, competence, and relatedness), and self-talk (positive and negative) in a PE context. Furthermore, it attempted to identify which of the variables of motivational climate and BPNs are the strongest predictors of students' positive and negative self-talk.

The findings of this study suggest that perceived mastery climate is positively related to positive self-talk. In contrast, perceived mastery climate is negatively associated with students' negative self-talk. Perceived performance climate is positively related to students' negative self-talk. These findings align with those in research in the context of sport and PE (e.g., Marjanović et al., 2019; Zourbanos et al., 2016). More specifically, Marjanović et al. (2019) found that perceived mastery climate had a positive relationship with students' positive self-talk and a negative relationship with students' negative self-talk in the PE context. In contrast, they found a negative relationship between perceived performance-avoidance climate and positive self-talk (Marjanović et al., 2019). Similarly, Zourbanos et al. (2016) revealed that the coach-created empowering coaching climate (Duda, 2013), which includes the dimensions of autonomy, task orientation (mastery), and social support simultaneously, was positively related to young athletes' positive self-talk, whereas the coach-initiated disempowering coaching climate (Duda, 2013), which includes the dimensions of ego orientation (performance) and controlling behaviors, was positively linked with young athletes' negative self-talk.

Additionally, the findings of this study suggest that the fulfillment of the three BPNs (autonomy, competence, and relatedness) is positively related to students' positive self-talk. In contrast, competence and relatedness are negatively associated with students' negative self-talk. Similarly, separate hierarchical regression analyses of this study revealed that perceived mastery climate and competence are the only significant predictors (positive) of students' positive self-talk. On the contrary, perceived performance climate and competence need satisfaction are the strongest predictors (positive and negative, respectively) of students' negative self-talk. The need for relatedness,

however, does not predict both positive self-talk and negative self-talk significantly.

On the basis of these findings, it seems that PE teacher–initiated motivational climate and BPNs satisfaction can shape students' self-talk. Regarding the relationships between the three BPNs satisfaction and the students' self-talk, to our knowledge this is the first study to examine these links in the PE setting. According to the literature, it is well documented that perceived mastery climate is positively related to the three BPNs in sport and PE settings (e.g., Ntoumanis, 2005; Reinboth & Duda, 2006; Standage & Gillison, 2007). Further, it seems that a teacher-initiated mastery climate might have a direct effect on students' positive self-talk or an indirect effect through the satisfaction of their three basic needs. Overall, the findings of this study imply that PE teachers should create a mastery-oriented climate and try to fulfill students' BPNs to promote their positive self-talk, which in turn will foster students' self-esteem (Philpot & Bamburg, 1996) and confidence and help them to become self-regulated learners (Anderson, 1997; Landin, 1994; Weiss & Klint, 1987). To create a mastery-oriented climate that will satisfy students' BPNs, PE teachers should

a. emphasize students' personal improvement by using a goal-setting strategy; provide them with positive, specific, and constructive feedback to improve their skills or increase their effort during a PE lesson; and avoid comparing students' performance against others' (competence need satisfaction);
b. give students a choice to decide how they will perform a task, as well as a "voice" to express their feelings and their opinions during PE, and avoid using controlling words such as "must" or "should" (autonomy need satisfaction); and
c. take time to listen to them carefully and understand them (relatedness need satisfaction; Hancox et al., 2015; Su & Reeve, 2011).

Limitations

Limitations of this study are the use of self-report measures (questionnaires) and all subjects being students from certain schools and parts of Greece. Self-report measures are considered subjective and inaccurate because of participants' high response bias (e.g., Fan et al., 2006). These results cannot be generalized to other cultures

or other age populations and should be interpreted with caution by other researchers. Furthermore, this study uses the dimensions of mastery and performance motivational climate to assess students' perceptions of their PE teacher–initiated class climate. It would be innovative for future researchers to use the new dimensions of the teacher-initiated motivational climate (empowering, disempowering) proposed by Duda (2013) to examine the links between empowering–disempowering motivational climate and students' self-talk in the PE context.

More research that uses more accurate and reliable techniques, such as an observation tool, is also needed in this area. Similarly, more in-depth research needs to be done through the use of qualitative methods (interviews) for a deeper and clearer view of the links among motivational climate, BPNs, and students' self-talk in a PE setting. It is also necessary for future researchers to conduct longitudinal studies to capture any changes in the relationships between students' perceived motivational climate, BPNs, and self-talk during the whole school year. Finally, for the identification of the causal links among these variables, experimental studies are also needed.

Conclusion

Research has shown that implementation of self-talk intervention programs in PE can act as a powerful learning tool (e.g., Anderson et al., 1999; Marjanović et al., 2020) that helps students to facilitate their motor skills, improves their performance, and increases their sense of accomplishment and confidence while creating positive experiences for the PE course (Kolovelonis et al., 2012). Furthermore, the combined use of self-talk with other self-regulated strategies (e.g., goal setting) may enhance students' performance (Kolovelonis et al., 2011). Additionally, a coach- or teacher-initiated motivational climate can affect athletes' or students' beliefs about their ability, self-regulation, and emotional states (e.g., Ames, 1992b; Gagne et al., 2003; Ommundsen, 2001). On the basis of these findings, it can be assumed that a PE teacher–created motivational climate that emphasizes students' personal improvement, learning, and satisfaction of the three BPNs can bring about self-talk intervention programs that promote students' performance, learning, and psychosocial development.

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