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PEDAGOGY

Relationships Between Dispositional Flow, Motivational Climate, and Self-Talk in Physical Education Classes

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Abstract

This cross-sectional study explored the relationships between dispositional flow, motivational climate, and self-talk in physical education. Six hundred forty-eight participants completed the Dispositional Flow Scale for Physical Education, the Learning and Performance Orientation in Physical Education Classes Questionnaire, and the Automatic Self-Talk Questionnaire for Physical Education. The results revealed that dispositional flow subscales were negatively related to students' negative self-talk dimensions and positively related to students' positive self-talk dimensions. Moreover, significant relationships emerged between perceived motivational climate subscales and students' self-talk dimensions. Hierarchical regression analyses showed that the dispositional flow subscale of unambiguous feedback and the subscale of motivational climate of students' learning orientation significantly predicted students' positive self-talk dimensions (positively) and negative self-talk dimensions (negatively). In contrast, the motivational climate subscales of students' worry about mistakes significantly and positively predicted students' negative self-talk dimensions. Finally, significant differences were found in study variables as a function of gender, leisure-time sport participation, sport type, and grade level.

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Overall, these correlational findings stress the importance of dispositional flow and perceived motivational climate in physical education as potential factors that shape students' self-talk.

Sport literature uses the term *self-talk* to describe what athletes say to themselves silently or out loud. In the past 15 years, self-talk has attracted a great deal of interest, with considerable practical relevance for athletes, coaches, and sport psychologists who are interested in maintaining or changing thought patterns to enhance performance within the sport domain (Zourbanos, 2013). More particularly, self-talk has been found to improve task performance in sport and physical education (PE; Zourbanos, Hatzigeorgiadis, Bardas, & Theodorakis, 2013a). Nowadays, the amount of research evidence regarding the facilitative effects of self-talk on performance in sport (Hatzigeorgiadis, Theodorakis, & Zourbanos, 2010; Hatzigeorgiadis, Zourbanos, Mpoumpaki, & Theodorakis, 2009) and PE (Kolovelonis, Goudas, & Dermitzaki, 2011; Zourbanos, Hatzigeorgiadis, Bardas, & Theodorakis, 2013b) is growing. Also, according to Zourbanos (2013), in PE the aim of self-talk is not only enhancing performance but also getting students to love physical activity and to gain more self-confidence and higher self-esteem. According to Hardy, Oliver, and Tod's (2009) model, personal and situational factors influence athletes' self-talk, which in turn affects cognitive, motivational, behavioral, and affective mechanisms, and subsequently their sport performance. With regard to the context of PE, recently Zourbanos, Papaioannou, Argyropoulou, and Hatzigeorgiadis (2014) examined the moderating effects of perceived competence on the relationship between students' motivation (i.e., achievement goals) and self-talk.

One personal antecedent that influences individual's self-talk is achievement goal orientations. According to achievement goal theory (Nicholls, 1989), individuals in achievement settings interpret their success with respect to two goal orientations, learning or task orientation and performance or ego orientation. Ames (1992) argued that individual goal orientations may be influenced by the motivational climate created by significant others. The motivational climate can be characterized as either task-involving (i.e., emphasizing learning processes, improvement, and effort) or ego-involving (i.e., emphasizing competition, winning, and social comparison; Ames, 1992; Duda, 2001; Duda & Hall, 2000; Nicholls, 1989). Research in

PE and sport has shown that a task-involving motivational climate is associated with more adaptive cognitive, affective, and behavioral responses, while an ego climate is linked with less adaptive outcomes (Braithwaite, Spray, & Warburton, 2011; Ntoumanis & Biddle, 1999; Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012). Studies about achievement goal and self-talk in PE (Zourbanos et al., 2014) has shown that for students with low perceived competence, ego orientation was positively related to students' negative self-talk, whereas no relationship existed between ego orientations and negative self-talk for students with high perceived competence. In contrast, task orientation was positively related to students' positive self-talk irrespective of perceptions of competence. Overall, the results of Zourbanos et al.'s (2014) study stressed the importance of achievement goals and perceived competence as personal factors that can influence students' positive and negative thinking. The motivational climate is a situational factor (Daşdan Ada, Aşçı, Kazak Çetinkalp, & Altıparmak, 2012b; Weigand, Carr, Petherick, & Taylor, 2001) that can be considered as another potential antecedent of students' self-talk. Research (Zourbanos et al., 2015) in a youth sport setting has shown that athletes' perceptions of coach-created empowering climate (i.e., task-involving, autonomy-supportive, and socially supportive) were positively related to athletes' positive self-talk and negatively related to athletes' negative self-talk. In contrast, athletes' perceptions of coach-created disempowering climate (i.e., ego-involving and controlling coach behaviors) were positively related to athletes' negative self-talk and negatively (although not statistically significantly) related to athletes' positive self-talk. However, to the best of our knowledge, no study has yet examined the relationship between motivational climates and self-talk in the PE context. Also, research in sport (Kowal & Fortier, 2000) and PE (Daşdan Ada, Aşçı, Kazak Çetinkalp, & Altıparmak, 2013; Papaioannou & Kouli, 1999) has shown significant relationships between motivational climate and optimal experience.

Optimal experience or flow typically occurs when a person perceives a balance between the challenges associated with a situation and his or her capabilities to accomplish or meet these demands (Csikszentmihalyi, 1990). Csikszentmihalyi (1990) described nine characteristics or dimensions of flow, and their existence has been

supported in the sport and exercise environment through qualitative and quantitative research (e.g., Jackson, 1996; Jackson & Marsh, 1996). These dimensions include challenge–skill balance, merging of action and awareness, clear goals, unambiguous feedback, concentration on the task at hand, sense of control, loss of self-consciousness, time transformation, and autotelic experience (i.e., intrinsically rewarding, fun; Aşçı, Çağlar, Eklund, Altıntaş, & Jackson, 2007). Csikszentmihalyi suggested that experiencing flow depends on environmental (e.g., contextual and social) and personal (e.g., the individual's temperament, ability to concentrate on the task at hand, fear of ridicule, and selfishness) factors. With regard to environmental factors, Csikszentmihalyi considered that flow is enhanced in *autotelic contexts* (i.e., enjoyable environments characterized by clear goals and feedback, empathy for the subject's feelings and experiences, freedom of choice, the existence of challenge, and self-confidence). In the context of PE, Papaioannou and Kouli (1999) found that students' task orientation and perceptions of a task-involving motivational climate predicted higher levels of concentration, a more autotelic experience for those involved, and an absence of self-consciousness. However, research in PE settings (Bakirtzoglou & Ioannou, 2011; Moreno, Cervelló, & González-Cutre, 2008) revealed that task-involving and ego-involving motivational climates were significantly and positively related to students' dispositional flow. Last, González-Cutre, Sicilia, Moreno, and Fernández-Balboa (2009), extending previous research, and in line with the aforementioned findings (Bakirtzoglou & Ioannou, 2011), found that perceptions of a task-involving climate in PE positively predicted students' dispositional flow through social goals and perceived competence, while perceptions of ego-involving climate positively predicted students' dispositional flow through perceived competence.

Experiencing flow while participating in physical activity can lead to improved performance (Jackson & Marsh, 1996; Jackson, Thomas, Marsh, & Smethurst, 2001), more positive feelings after exercise (Karageorghis, Vlachopoulos, & Terry, 2000), and an increased engagement in physical activity (Jackson, 1996; Kimiecik, 2000). Research has also revealed that the dispositional flow state correlates positively and significantly with self-efficacy, the tendency toward task orientation, and the perceived value of physical activity

(Cervello, Moreno, Alonso, & Iglesias, 2006; Tipler, Marsh, Martin, Richards, & Williams, 2004). For all the aforementioned reasons, the facilitation of students' flow experiences in PE seems important, as it not only enhances student enjoyment of PE but also motivates voluntary participation in physical activity during adolescence and later in life. Moreover, flow experiences in PE lessons, as an optimal psychological state, may be the first factor regarding factors affecting situations such as students' participation in PE, perceived motivational climate, and students' self-talk.

Thus, this study examined the relationships between dispositional flow, perceived motivational climate, and students self-talk in PE. In line with the research literature, we hypothesized that dispositional flow and perceived learning climate would be positively related to students' positive self-talk and negatively related to students' negative self-talk. Furthermore, we tried to identify the best predictor of students' self-talk. We also examined differences in students' perceptions of motivational climate, dispositional flow, and self-talk, as a function of gender, leisure-time sport participation, sport type, and grade level.

Method

Participants

In this study, 318 male (M_{age} = 13.18, SD = .77) and 330 female (M_{age} = 13.23, SD = .73) secondary school students (M_{age} =13.20, SD = 0.75) voluntarily participated. Participants were randomly assigned into three groups via the proportional stratified sampling method so that the same number of boys and girls from each grade could be included in each group.

Measures

Self-talk in physical education. The Automatic Self-Talk Questionnaire for Physical Education (ASTQ-PE; Daşdan Ada, Zourbanos, Papaioannou, & Kazak Çetinkalp, 2014; Zourbanos et al., 2014) assessed students' self-talk. The instrument consists of 30 items assessing four positive and three negative self-talk dimensions. Positive self-talk consists of the dimensions of confidence (e.g., I can make it), anxiety control (e.g., Don't get upset), psych up (e.g., Do your best), and instruction (e.g., Concentrate). Negative

self-talk consists of the dimensions of worry (e.g., I am going to lose), disengagement (e.g., I want to stop), and somatic fatigue (e.g., I feel tired). Participants were asked to rate their frequency of self-talk on a 4-point scale (0 = *never*, 4 = *very often*). A confirmatory factor analysis indicated that model fit indices showed a good fit for the revised seven-factor model with 30 items, χ^2 (*df* = 384) = 790.45, χ^2 / *df* = 2.06, CFI = .93, RMSEA = .05, TLI = .92. The instrument consisted of 30 items assessing four positive (14 items) and three negative (16 items) self-talk dimensions. The internal consistencies of the subscales were .73 for worry, .77 for disengagement, .74 for somatic fatigue, .75 for psych up, .81 for anxiety control, .85 for confidence, and .87 for instruction.

Optimal experience. The Dispositional Flow Scale-2 (DFS-2) was designed as a dispositional assessment of flow experience (Kawabata, Mallett, & Jackson 2008). Respondents of the DFS-2 are directed to think about how often they experience the characteristics of the flow items (e.g., I have total concentration) within a particular activity and to rate their responses on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*). This scale was translated into Turkish by Daşdan Ada, Aşçı, Kazak Çetinkalp, and Altıparmak (2012a). The fit indices were χ^2 / *df* = 863.11 / 558 = 1.55, RMSEA = .043, NNFI = .96, CFI = .97. This study used three subscales of the DFS-2: unambiguous feedback (e.g., I am aware of how well I am performing), action-awareness merging (e.g., Things just seem to be happening automatically), and loss of self-consciousness (e.g., I am not concerned with how others may be evaluating me). The Cronbach's alpha reliability coefficients ranged from 0.46 (action-awareness merging) to 0.79 (loss of self-consciousness).

Perceived motivational climate. The original 26-item Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ; Papaioannou, 1994) was administered. This measured pupils' perceptions of achievement orientations in PE classes. The measurement model was proposed to be a hierarchical model with five first-order factors and two second-order factors (for review, see Papaioannou, 1994). Two factors, pupils' learning (7 items) and teacher-initiated learning (5 items) are first-order factors of a higher order factor, Learning. The remaining three factors, pupil competitive orientation (5 items), pupil worry (5 items), and

outcome orientation without effort (4 items) are first-order factors of another higher order factor, Performance. This scale was translated into Turkish by Daşdan Ada et al. (2012b). Confirmatory factor analysis revealed a good fit to the model, $\chi^2 / df = 863.11 / 558 = 1.55$, RMSEA = 0.05, NNFI = 0.98, NFI = 0.92, CFI = 0.98, and AG FI = 0.86). The Cronbach's alpha coefficients were 0.50 for outcome without effort, 0.88 for student learning orientation, 0.68 for teacher-initiated learning orientation, 0.67 for student competitive orientation, and 0.72 for students' worry about mistakes.

Data Collection

Data were collected from the city of Mersin, Turkey. The participants were secondary school students. Before collecting data, we obtained permissions from the university ethics committee and the provincial directorate of national education. Because the scales were self-report and needed factors such as a pencil and concentration, the classroom environment was preferred each time. The questionnaires were also anonymous and were carefully designed to be suitable for the targeted age group. All participants participated voluntarily. The questionnaires took approximately 25 min for students to complete.

Analyses

Descriptive statistics, internal reliability scores, and Pearson's correlations were conducted for all variables. Moreover, a series of independent samples *t* tests tested the effects of gender, leisure-time sport participation, and sport type on students' perceptions of motivational climate, dispositional flow, and self-talk. Also, one-way ANOVAs (run separately for motivational climate, dispositional flow, and self-talk) tested for differences among grade levels. Finally, seven hierarchical regression analyses examined the effects of dispositional flow and motivational climate on students' self-talk.

Results

Table 1 shows descriptive statistics and Pearson's correlations for all variables. Pearson correlations revealed low to moderate negative relationships between negative self-talk subscales (worry, disengagement, somatic fatigue) and dispositional flow subscales (ranging from $r = -.17$, $p < .001$ to $r = -.41$, $p < .001$) and low to moderate but

positive relationships between positive self-talk subscales and dispositional flow subscales (ranging from $r = .18$, $p < .001$ to $r = .42$, $p < .001$). Regarding motivational climate, the results revealed low relationships between perceived motivational climate subscales and self-talk, except for the subscale of perceived motivational climate of students' learning orientation, which revealed low to moderate relationships with students' self-talk (see Table 1).

Gender Differences

The independent samples *t* tests showed that the girls reported significantly higher scores than the boys on the subscale of motivational climate of students' worry about mistakes, $t(646) = 3.07$, $p = .002$, and on the negative self-talk dimensions of worry, $t(641.07) = 2.90$, $p = .004$, and disengagement, $t(638.18) = 2.56$, $p = .011$. In contrast, the boys obtained higher scores than the girls on the confidence dimension of positive self-talk, $t(646) = -2.00$, $p = .046$ (see Table 2).

However, no significant differences were observed between boys and girls on DFS-2 subscales of action-awareness merging, $t(646) = -1.92$, $p = .056$; loss of self-consciousness, $t(646) = -1.54$, $p = .125$; and unambiguous feedback, $t(646) = -1.92$, $p = .055$. Similarly, there were no significant differences between boys and girls for the subscales of motivational climate of teacher-initiated learning orientation, $t(646) = .24$, $p = .812$; students' competitive orientation, $t(646) = -.18$, $p = .857$; outcome orientation without effort, $t(632,13) = .04$, $p = .967$; and students' learning orientation, $t(646) = -.24$, $p = .810$. Finally, no significant differences were observed between boys and girls for the negative self-talk dimension of somatic fatigue, $t(646) = 1.82$, $p = .069$, and for the positive self-talk dimensions of psych up, $t(646) = -1.61$, $p = .107$; anxiety control, $t(646) = -.54$, $p = .590$; and instruction, $t(646) = -.57$, $p = .567$ (see Table 2).

Leisure-Time Sport Participation and Sport Type Differences

With regard to the effect of leisure-time sport participation on the variables, sport participants obtained higher scores than nonsport participants in all of the DFS-2 subscales of action-awareness merging, $t(646) = -2.55$, $p = .011$; loss of self-consciousness, $t(646) = -3.21$, $p = .001$; and unambiguous feedback, $t(416) = -4.39$, $p < .001$. Moreover, sport participants reported significantly higher

Table 1

Descriptive Statistics and Pearson's Correlations for All Variables

Subscale	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. AAM	3.55	.95	-														
2. LSC	3.33	1.23	.51**	-													
3. UF	3.90	.98	.55**	.40**	-												
4. TILO	3.72	.95	.26**	.21**	.37**	-											
5. SCO	3.53	.90	.29**	.08*	.27**	.42**	-										
6. SWAM	3.33	.98	.06	-.08*	.03	.23**	.51**	-									
7. OOWE	3.12	.93	.25**	.08*	.16**	.25**	.55**	.48**	-								
8. SLO	3.93	.93	.34**	.30**	.48**	.74**	.49**	.24**	.28**	-							
9. Worry	.95	.88	-.30**	-.28**	-.41**	-.17**	.01	.27**	.04	-.23**	-						
10. Disengagement	.56	.74	-.22**	-.17**	-.39**	-.25**	-.08*	.14**	-.01	-.33**	.65**	-					
11. Somatic fatigue	.86	.81	-.22**	-.23**	-.36**	-.25**	-.03	.16**	.01	-.30**	.68**	.74**	-				
12 Psych up	2.63	1.00	.20**	.18**	.32**	.22**	.17**	.09**	.11**	.27**	-.09**	-.11**	-.05	-			
13. Anxiety control	2.64	1.19	.19**	.20**	.32**	.21**	.16**	.04	.14**	.26**	-.14**	-.12**	-.12**	.72**	-		
14. Confidence	2.96	1.14	.27**	.21**	.42**	.28**	.18**	.03	.13**	.35**	-.32**	-.30**	-.27**	.72**	.68**	-	
15. Instruction	2.92	1.11	.24**	.23**	.38**	.26**	.17**	.04	.12**	.33**	-.19**	-.23**	-.21**	.77**	.74**	.77**	-

Note. AAM = action-awareness merging; LSC = loss of self-consciousness; UF = unambiguous feedback; TILO = teacher-initiated learning orientation; SCO = students' competitive orientation; SWAM = students' worries about mistakes; OOWE = outcome orientation without effort; SLO = students' learning orientation.

*$p < .05$ (one-tailed). **$p < .01$ (one-tailed).

Table 2
Results of Independent Samples t Tests on Study Variables Based on Gender, Leisure-Time Sport Participation, and Sport Type

	Gender						Leisure-time sport participation						Sport type					
	Boys (n = 318)		Girls (n = 330)				Sport participants (n = 193)		Nonsport participants (n = 455)				Individual (n = 78)		Team (n = 115)			
Variables	*M*	*SD*	*M*	*SD*	*t*	*df*	*M*	*SD*	*M*	*SD*	*t*	*df*	*M*	*SD*	*M*	*SD*	*t*	*df*
AAM	3.62	.95	3.48	.94	-1.92	646	3.70	.92	3.49	.95	-2.55*	646	3.56	.90	3.80	.92	-1.75	191
LSC	3.41	1.22	3.26	1.24	-1.54	646	3.57	1.17	3.23	1.24	-3.21**	646	3.46	1.14	3.64	1.18	-1.07	191
UF	3.97	0.97	3.82	1.00	-1.92	646	4.14	.87	3.79	1.01	-4.39***	416.02	4.09	.85	4.17	.89	-.61	191
TILO	3.71	.95	3.73	.96	.24	646	3.86	.93	3.66	.96	-2.48*	646	3.84	.94	3.87	.93	-.26	191
SCO	3.53	.90	3.52	.90	-.18	646		.89		.94	.31	646	3.42	1.05	3.57	.87	-1.06	191
SWAM	3.21	1.01	3.45	.94	3.07**	646	3.31	.97	3.34	.99	.39	646	3.28	1.01	3.33	.94	-.31	191
OOWE	3.12	.98	3.13	.87	.04	632.13	3.10	.96	3.14	.91	.54	646	3.02	.96	3.15	.96	-.91	191
SLO	3.94	.96	3.92	.90	-.24	646	4.09	.89	3.86	.94	-2.88	646	4.01	.96	4.14	.84	-1.02	191
Worry	.85	.82	1.05	.93	2.90**	641.07	.72	.71	1.06	.92	5.07***	463.03	.74	.77	.70	.68	.39	191
Disengagement	.49	.68	.64	.79	2.56**	638.18	.44	.58	.62	.80	3.16**	494.14	.46	.66	.43	.51	.35	191
Somatic fatigue	.80	.80	.91	.83	1.82	646	.70	.69	.92	.85	3.53***	444.01	.73	.73	.68	.66	.48	191
Psych up	2.70	1.03	2.57	.98	-1.61	646	2.86	.94	2.54	1.02	-3.89***	389.79	2.67	1.02	2.99	.87	-2.34*	191
Anxiety control	2.67	1.19	2.62	1.20	-.54	646	2.80	1.16	2.58	1.20	-2.14*	646	2.54	1.22	2.97	1.10	-2.59*	191
Confidence	3.06	1.13	2.88	1.14	-2.00*	646	3.27	.98	2.83	1.17	-4.92***	426.65	3.10	1.09	3.39	.89	-1.99*	143.32
Instruction	2.94	1.15	2.89	1.08	-.57	646	3.14	1.04	2.82	1.13	-3.28**	646	3.04	1.11	3.20	.99	-1.04	191

Note. AAM = action-awareness merging; LSC = loss of self-consciousness; UF = unambiguous feedback; TILO = teacher-initiated learning orientation; SCO = students' competitive orientation; SWAM = students' worries about mistakes; OOWE = outcome orientation without effort; SLO = students' learning orientation.

*$p < .05$. **$p < .01$. ***$p < .001$.

scores than nonsport participants on the motivational climate subscales of teacher-initiated learning orientation, $t(646) = -2.48$, $p = .013$, and students' learning orientation, $t(646) = -2.88$, $p = .004$. Finally, the sport participants reported statistically significantly higher scores than nonsport participants on positive self-talk for psych up, $t(390) = -3.89$, $p < .001$; anxiety control, $t(646) = -2.14$, $p = .032$; confidence, $t(427) = -4.92$, $p < .001$; and instruction, $t(646) = -3.28$, $p = .001$. But they reported significantly lower scores on negative self-talk for worry, $t(464) = 5.07$, $p < .001$; disengagement, $t(494) = 3.16$, $p = .002$; and somatic fatigue, $t(444) = 3.50$, $p < .001$ (see Table 2).

Regarding the effect of sport type, team sports participants obtained significantly higher scores than individual sport participants on positive self-talk for psych up, $t(191) = -2.34$, $p = .021$; anxiety control, $t(191) = -2.59$, $p = .010$; and confidence, $t(143) = -1.99$, $p = .049$ (Table 2).

Grade Level Differences

With regard to the influence of grade level on the variables, the one-way ANOVAs showed statistically significant differences between grade levels in the subscales of perceived motivational climate of teacher-initiated learning orientation, $F(2, 645) = 11.97$, $p < .001$; students' learning orientation, $F(2, 645) = 6.22$, $p = .002$; and students' worry about mistakes, $F(2, 645) = 9.28$, $p < .001$. Statistically significant differences were also found for the negative self-talk subscales of worry, $F(2, 645) = 9.54$, $p < .001$; disengagement, $F(2, 645) = 15.58$, $p < .001$; and somatic fatigue, $F(2, 645) = 14.92$, $p < .001$. In relation to these findings, Tukey post hoc tests revealed that students in eighth grade obtained significantly lower scores than students in sixth ($p < .001$) and seventh ($p = .003$) grades on teacher-initiated learning orientation, but significantly higher scores than students in sixth ($p = .004$) and seventh ($p = .021$) grades on students' worry about mistakes (see Table 3). Moreover, students in eighth ($p < .001$) and seventh ($p = .018$) grades reported significantly lower scores than students in sixth grade on students' learning orientation, whereas no significant differences were found for this variable between students in eighth and seventh grades ($p = .122$). Finally, findings related to self-talk showed that students in eighth grade obtained significantly higher scores than students in

sixth and seventh grades on the worry (eighth vs. sixth, $p = .032$; eighth vs. seventh, $p < .001$), disengagement (eighth vs. sixth, $p < .001$; eighth vs. seventh, $p < .001$), and somatic fatigue (eighth vs. sixth, $p < .001$; eighth vs. seventh, $p < .001$) dimensions of negative self-talk (Table 3).

Hierarchical Regression Analyses

Seven hierarchical regression analyses examined whether dispositional flow and motivational climate would predict students' self-talk. For all analyses, the dispositional variables (the three dispositional flow subscales) were included as predictors at Step 1. To analyze the increment of variance explained by contextual variables on each self-talk subscale, we entered motivational climate subscales at Step 2. Table 4 summarizes the results of these hierarchical regression analyses.

Negative self-talk. With regard to the worry dimension of students' negative self-talk, the results revealed that when entered alone (Step 1), the dispositional flow subscales negatively predicted worry self-talk, explaining 18% of the variance. However, when the five motivational subscales were added (Step 2) as predictors, they significantly improved the prediction equation ($R^2 = .27$, $p < .001$). Examination of beta coefficients from the entire model showed that unambiguous feedback ($\beta = -.29$, $p < .001$) and students' learning orientation ($\beta = -.12$, $p < .001$) significantly and negatively predicted students' worry self-talk, whereas students' worry about mistakes ($\beta = .29$, $p < .001$) significantly and positively predicted students' worry self-talk. Similar findings were also obtained for the disengagement and somatic fatigue dimensions of students' negative self-talk (see Table 4).

Regarding the predictive power of each predictor variable on negative self-talk dimensions, unambiguous feedback and students' worry about mistakes emerged as the strongest and equal predictors of worry self-talk, followed by students' learning orientation. However, for the disengagement and somatic fatigue self-talk, the strongest predictor was the unambiguous feedback, followed by students' learning orientation and students' worry about mistakes.

Positive self-talk. Similar results were found in the hierarchical regression analyses for predicting students' positive self-talk; that is, when added as predictors at Step 2 of each hierarchical

Table 3
Differences on Students' Dispositional Flow, Perceptions of Motivational Climate, and Self-Talk in Physical Education as a Function of Grade Level

	Grade level							
	6 (n = 132)		7 (n = 266)		8 (n = 250)			
Variable	***M***	***SD***	***M***	***SD***	***M***	***SD***	***F***	***p***
Action-awareness merging	3.62	.95	3.52	1.00	3.55	.89	.47	.625
Loss of self-consciousness	3.35	1.22	3.35	1.24	3.30	1.22	.15	.864
Unambiguous feedback	4.00	.92	3.84	1.02	3.90	.98	1.15	.318
Teacher-initiated learning orientation	3.98	.78	3.78	.97	3.51	.98	11.97	< .001
Students' competitive orientation	3.56	.89	3.50	.94	3.53	.86	.17	.843
Students' worries about mistakes	3.16	.97	3.27	1.00	3.50	.95	6.22	.002
Outcome orientation without effort	3.04	.92	3.13	.97	3.16	.88	.77	.463
Students' learning orientation	4.20	.81	3.94	.95	3.78	.95	9.28	< .001
Worry	.90	.86	.81	.76	1.14	.98	9.54	< .001
Disengagement	.45	.62	.43	.60	.77	.88	15.6	< .001
Somatic fatigue	.74	.73	.71	.70	1.07	.92	14.9	< .001
Psych up	2.69	.96	2.58	1.05	2.66	.98	.66	.517
Anxiety control	2.66	1.17	2.64	1.25	2.64	1.15	.01	.989
Confidence	3.01	1.10	2.93	1.16	2.98	1.12	.25	.780
Instruction	3.05	1.01	2.89	1.14	2.87	1.14	1.25	.286

regression analysis, the five motivational subscales contributed a significant amount to the prediction of each positive self-talk dimension above and beyond that explained by dispositional flow subscales alone at Step 1 (see Table 4). More specifically, examination of beta coefficients from the full model in each hierarchical regression analysis showed that although only unambiguous feedback ($\beta = .24$, $p < .001$) significantly (positively) predicted students' psych-up self-talk, unambiguous feedback ($\beta = .23$, $p < .001$) and loss of self-consciousness ($\beta = .10$, $p = .31$) were positive and significant predictors of students' anxiety control self-talk. Moreover, unambiguous feedback ($\beta = .31$, $p < .001$) and students' learning orientation ($\beta = .10$, $p = .31$) significantly and positively predicted students' confidence self-talk, while unambiguous feedback ($\beta = .31$, $p < .001$), loss of self-consciousness ($\beta = .10$, $p = .31$), and students' learning orientation ($\beta = .10$, $p = .31$) were all positive and significant predictors of students' instruction self-talk. In consistency with our results pertaining to the dimensions of students' negative self-talk (i.e., worry, disengagement, and somatic fatigue), the dispositional flow subscale of unambiguous feedback emerged again as the strongest predictor of students' positive self-talk dimensions.

Discussion

This study examined the relationship between dispositional flow, motivational climate, and self-talk in PE classes. Moreover, differences in all variables were examined as a function of gender, leisure-time sport participation, sport type, and grade level. Findings were remarkable, especially for self-talk. Correlations between self-talk and dispositional flow were highly significant ($p < .001$). In line with research in the sport and physical activity domain (e.g., Camacho Sicilia, Moreno Murcia, & Rojas Tejada, 2008; Jackson & Marsh, 1996; Jackson et al., 2001; Karageorghis et al., 2000), the dispositional flow subscales were positively related to students' positive self-talk dimensions (psych up, anxiety control, confidence, and instruction) and negatively related to students' negative self-talk dimensions (worry, disengagement, and somatic fatigue). According to Csikszentmihalyi (1990), the dispositional flow subscales positively relate to positive outcomes due to the optimal psychological state. In addition, Jackson and Roberts's (1992) quantitative results showed that athletes' best performances were associated with flow characteristics.

Table 4

Hierarchical Regression Analyses Summary for Predicting Students' Negative and Positive Self-Talk Dimensions From Dispositional Flow and Perceived Motivational Climate in Physical Education

Dependent variable	Step	Predictors entered	*B*	*SE B*	β	*t*	R^2	*F*
Worry	1	Action-awareness merging	-.05	.04	-.05	- 1.18		
		Loss of self-consciousness	-.08	.03	-.12	- 2.73**		
		Unambiguous feedback	-.30	.04	-.33	- 7.70***	.18	48.26***
	2	Action-awareness merging	-.08	.04	-.08	- 1.84		
		Loss of self-consciousness	-.05	.03	-.07	- 1.66		
		Unambiguous feedback	-.26	.04	-.29	- 6.54***		
		Teacher-initiated learning orientation	-.02	.05	-.02	-.42		
		Students' competitive orientation	.04	.05	.04	.83		
		Students' worries about mistakes	.26	.04	.29	6.91***		
		Outcome orientation without effort	-.00	.04	-.00	-.08		
		Students' learning orientation	-.11	.05	-.12	- 2.11*	.27	29.43***
Disengagement	1	Action-awareness merging	.00	.16	.00	.05		
		Loss of self-consciousness	-.01	.04	-.01	-.32		
		Unambiguous feedback	-.29	.02	-.39	- 8.82***	.15	38.90***
	2	Action-awareness merging	.00	.04	.00	.06		
		Loss of self-consciousness	.01	.04	.02	.40		
		Unambiguous feedback	-.22	.04	-.29	- 6.28***		
		Teacher-initiated learning orientation	-.02	.03	-.02	-.38		
		Students' competitive orientation	.01	.04	.02	.32		
		Students' worries about mistakes	.15	.05	.20	4.58***		
		Outcome orientation without effort	.00	.16	.00	.11		
		Students' learning orientation	-.19	.04	-.24	- 4.14***	.22	22.44***

Table 4 (cont.)

Dependent variable	Step	Predictor(s) entered	*B*	SE *B*	β	*t*	R^2	*F*
Somatic fatigue	1	Action-awareness merging	.01	.04	.02	.31		
		Loss of self-consciousness	-.07	.03	-.11	-2.54*		
		Unambiguous feedback	-.27	.04	-.32	-7.26***	.14	34.23***
	2	Action-awareness merging	.00	.04	.00	.06		
		Loss of self-consciousness	-.05	.03	-.07	-1.07		
		Unambiguous feedback	-.19	.04	-.24	-5.08***		
		Teacher-initiated learning orientation	-.06	.05	-.07	-1.35		
		Students' competitive orientation	.07	.04	.08	1.61		
		Students' worries about mistakes	.15	.04	.18	4.17***		
		Outcome orientation without effort	-.01	.04	-.01	-.16		
		Students' learning orientation	-.17	.05	-.20	-3.37**	.20	20.31***
Psych up	1	Action-awareness merging	.02	.05	.02	.31		
		Loss of self-consciousness	.04	.04	.05	1.20		
		Unambiguous feedback	.30	.05	.29	6.45	.11	25.35***
	2	Action-awareness merging	-.01	.05	-.01	-.19		
		Loss of self-consciousness	.05	.04	.06	1.39		
		Unambiguous feedback	.24	.05	.24	4.85***		
		Teacher-initiated learning orientation	.03	.06	.03	.54		
		Students' competitive orientation	.01	.06	.01	.12		
		Students' worries about mistakes	.06	.05	.05	1.17		
		Outcome orientation without effort	.01	.05	.01	.17		
		Students' learning orientation	.11	.07	.10	1.68	.13	11.46***

Table 4 (cont.)

Dependent variable	Step	Predictor(s) entered	*B*	SE *B*	β	*t*	R^2	*F*
Anxiety control	1	Action-awareness merging	-.02	.06	-.01	-.28		
		Loss of self-consciousness	.09	.04	.09	2.11*		
		Unambiguous feedback	.35	.06	.29	6.38***	.11	25.89***
	2	Action-awareness merging	-.06	.06	-.05	-.98		
		Loss of self-consciousness	.09	.04	.10	2.16*		
		Unambiguous feedback	.28	.06	.23	4.72***		
		Teacher-initiated learning orientation	.02	.07	.02	.31		
		Students' competitive orientation	.02	.07	.01	.22		
		Students' worries about mistakes	-.03	.06	-.03	-.58		
		Outcome orientation without effort	.10	.06	.08	1.70		
		Students' learning orientation	.15	.08	.12	1.90	.13	11.82***
Confidence	1	Action-awareness merging	.05	.06	.04	.85		
		Loss of self-consciousness	.03	.04	.04	.87		
		Unambiguous feedback	.45	.05	.39	8.93***	.18	47.59***
	2	Action-awareness merging	.01	.06	.01	.26		
		Loss of self-consciousness	.03	.04	.03	.77		
		Unambiguous feedback	.35	.05	.31	6.64***		
		Teacher-initiated learning orientation	.05	.06	.04	.79		
		Students' competitive orientation	.00	.06	.00	.04		
		Students' worries about mistakes	-.06	.05	-.05	-1.09		
		Outcome orientation without effort	.06	.05	.04	1.01		
		Students' learning orientation	.19	.07	.16	2.67**	.21	21.24***

Table 4 (cont.)

Dependent variable	Step	Predictor(s) entered	*B*	SE *B*	β	*t*	R^2	*F*
Instruction	1	Action-awareness merging	.00	.06	.00	.03		
		Loss of self-consciousness	.08	.04	.09	2.01*		
		Unambiguous feedback	.39	.05	.35	7.87***	.15	38.44***
	2	Action-awareness merging	-.03	.06	-.02	-.54		
		Loss of self-consciousness	.08	.04	.09	2.03*		
		Unambiguous feedback	.30	.05	.26	5.65***		
		Teacher-initiated learning orientation	.02	.06	.01	.27		
		Students' competitive orientation	-.01	.06	-.01	-.20		
		Students' worries about mistakes	-.01	.05	-.01	-.24		
		Outcome orientation without effort	.04	.05	.03	.71		
		Students' learning orientation	.22	.07	.18	3.08**	.18	17.62***

Note. *df* for Step 1 = (3, 644); *df* for Step 2 = (8, 639).
*$p < .05$. **$p < .01$. ***$p < .001$.

Research has shown that motivation, motivational climate, and flow state (flow experience) are interrelated (González-Cutre et al., 2009; Kowal & Fortier, 1999, 2000; Moreno et al., 2008; Papaioannou & Kouli, 1999). Motivation and motivational climate can facilitate the emergence of the dispositional flow state. More specifically, studies have shown positive associations between flow state, intrinsic motivation (Camacho Sicilia et al., 2008; Deci & Ryan, 1985; Kowal & Fortier, 1999), goal orientations, and task or even ego motivational climates (Bakirtzoglou & Ioannou, 2011; Camacho Sicilia et al., 2008; Daşdan Ada et al., 2013; González-Cutre et al., 2009; Moreno et al., 2008). Furthermore, Daşdan Ada et al. (2013) examined the effects of perceived motivational climate and motivation on dispositional flow state in PE classes. They found that perceived motivational climate and participation motivation moderately predicted the dispositional flow state in PE. However, the participation motivation, compared to the perceived motivational climate, was the strongest predictor of students' dispositional flow. Other researchers (Bervoets, 2013) have stated that self-talk can be reasoned to play a key role in influencing flow.

In this study, we found that dispositional flow state and motivational climate moderately predicted students' self-talk in PE lessons. More specifically, the dispositional flow subscale of unambiguous feedback negatively predicted students' negative self-talk dimensions (worry, disengagement, and somatic fatigue) and positively predicted students' self-talk dimensions (psych up, anxiety control, confidence, and instruction). Moreover, the unambiguous feedback emerged as the strongest predictor for all self-talk dimensions, both positive and negative, even though the strongest relationship was observed between the unambiguous feedback and confidence dimensions of self-talk. The findings of this study make sense if unambiguous feedback refers to the receipt of immediate and clear feedback, usually from the activity itself, which allows the person to know he or she is succeeding in the set goal (Jackson & Marsh, 1996; e.g., I am aware of how well I am performing, It is really clear to me that I was doing well). Csikszentmihalyi and Csikszentmihalyi (1988) stated that the kind of feedback can be very diverse, but the result is the same: information that one is succeeding in one's goal. Thus, it seems reasonable that the kind of feedback the person receives from

the activity itself will strongly (and possibly directly) influence his or her self-talk, as it is more instant and maybe more believable relative to others factors (e.g., feedback from significant others).

The dispositional flow subscale of loss of self-consciousness significantly and positively predicted students' positive self-talk for anxiety control and instruction. The findings of this study suggest that when students are no longer concerned with what others think of them or how others evaluate them, they tend to use more anxiety-control and instructional self-talk. According to Jackson and Marsh (1996), the characteristic of flow of loss of self-consciousness does not mean that the person is unaware of what is happening in his or her mind or body, but rather is not focusing on the information normally used to represent to oneself who one is (e.g., I am not concerned with how others may be evaluating me, I was not concerned with what others may have been thinking of me). The subscale of the task-involving motivational climate of students' learning orientation negatively predicted students' negative self-talk dimensions (worry, disengagement, and somatic fatigue) and positively predicted students' positive self-talk dimensions (psych up, anxiety control, confidence, and instruction). The findings from this study suggest that students with higher learning orientation tend to use less negative self-talk for worry, disengagement, and somatic fatigue and more positive self-talk for psych up, anxiety control, confidence, and instruction, compared to students with lower learning orientation. The findings of this study are consistent with the results in Zourbanos et al.'s (2014) study in PE, which revealed that task orientation positively predicted students' positive self-talk dimensions (psych up, anxiety control, confidence, and instruction) and negatively predicted students' negative self-talk dimensions (worry, disengagement, and somatic fatigue). Similarly, in a study in the sport domain, Hatzigeorgiadis and Biddle (1999) found that athletes' task orientation was negatively related to disengagement thoughts. Our results also align with the plethora of research findings in sport and PE, which have shown that a task orientation and a task-involving (or learning-involved) climate leads to more adaptive cognitive, affective, and behavioral outcomes (e.g., Ames & Archer, 1988; Daşdan Ada et al., 2013; Kavussanu & Roberts, 1996; Ntoumanis & Biddle,

1999; Papaioannou, 1994, 1997, 1998; Papaioannou & Kouli, 1999; Zourbanos et al., 2014).

In contrast, the subscale of the ego-involving motivational climate of students' worry about mistakes significantly and positively predicted students' negative self-talk dimensions (worry, disengagement, and somatic fatigue). The findings of this study suggest that students with higher scores in the worry about mistakes subscale of the ego-motivational climate tend to use more worry, disengagement, and somatic fatigue self-talk, compared to the students with lower scores in this subscale. As the students' worry about mistakes dimension of the ego-involving motivational climate refers to students' concerns about mistakes during task execution and, subsequently, failure in the lesson, it is reasonable and expected for this subscale of ego-involving motivational climate to be associated with more worry, disengagement, and somatic fatigue self-talk. Similar results have also been reported in the literature. More specifically, Conroy and Metzler (2004), in a study with college students who engaged in recreational physical activities, found that the fear of failure was positively associated with students' self-blame, self-attack, self-neglect, and self-talk, whether the students were failing or succeeding.

However, the subscale of the ego-involving motivational climate of students' worry about mistakes did not significantly predict students' positive self-talk dimensions (psych up, anxiety control, confidence, and instruction), while the other two subscales of the ego-involving motivational climate of students' competitive orientation and outcome orientation without effort did not significantly predict students' positive and negative self-talk dimensions. These findings align with studies in sport (Hatzigeorgiadis & Biddle, 1999; 2000) and PE (Zourbanos et al., 2014) that showed that the task orientation has more positive outcomes on the individual's thought patterns, whereas the outcome of ego orientation seems to depend on other personal or situational factors, such as perceived competence.

The practical importance of this study is clear. PE teachers and parents are encouraged to promote a task-involving, or a learning-involved, climate because this approach is more beneficial for students' flow experiences in PE and for students' self-talk. In summary, our results indicate that the dispositional flow subscale

of unambiguous feedback and the students' learning orientation subscale of the task-involving climate positively predicted students' positive self-talk dimensions and negatively predicted students' negative self-talk dimensions. In contrast, the subscale of students' worry about mistakes of the ego-involving motivational climate positively predicted students' negative self-talk dimensions.

Given the exploratory nature of this investigation, further research should address a number of limitations in this study. First, it should be noted that no causal link can be inferred from these findings. It can be speculated that dispositional flow and motivational climate may influence students' self-talk based on models of self-talk antecedents and theoretical grounds of motivation, but it is possible that the identified links reflect bidirectional relationships. For example, given the wide-reaching behavioral, motivational, affective, and cognitive consequences of self-talk (Hardy et al., 2009), students' self-talk may also affect the perceived teacher-created motivational climate and the frequency of students' flow experiences in PE. Thus, longitudinal and experimental research could give us a deeper understanding on the relationships among motivational climate, dispositional flow, and students' self-talk in PE classes. Second, the retrospective self-report methodology that was employed may have limited the information obtained. Nevertheless, self-reports provide access to cognitive processes that cannot be obtained through observation (Guerrero, 2005). Finally, although in this study the Turkish version of the ASTQ-PE showed good psychometric properties, other types of validity could be tested and its factor structure further examined in future research. Despite these limitations, and considering that no other research has examined this kind of relationship, our findings provide valuable information regarding the associations between motivational climate, dispositional flow, and students' self-talk in PE classes and may guide further research on identifying causal relationships among these variable.

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