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"I wouldn't do it; it looks dangerous": Changing students' attitudes and emotions in physical education

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Abstract

The purpose of the study was to verify whether physical education (PE) acrobatic activities would be effective in modifying the individual's tendency to undertake out-of-school leisure and adventurous sports typified by physical and psychological challenges. The Motor Activity Anxiety Test and pictures of adventurous sports were presented to Italian male high school students ($N = 72$) to assess their approach–avoidance attitude towards the activities portrayed. An emotion-profiling assessment grounded on the IZOF framework was also employed to identify idiosyncratic optimal-dysfunctional and pleasant–unpleasant emotional descriptors. Two experimental groups were engaged in highly emotion-arousing PE tasks for 12 lessons, while two control groups were involved in team sports. Findings demonstrated the effectiveness of the intervention in modifying the participants' attitudes.
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Keywords: Emotions; Physical education; Adventurous sports; The IZOF model

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1. Introduction

The physical and mental health benefits deriving from the adoption of an active lifestyle are well documented (Biddle, Gorely, & Stensel, 2004). Physical educators can have an important role in enhancing students' motivation for school physical education (PE) and out-of-school physical activities, sport, leisure, and healthy behaviours. Unfortunately, there are few reports of intervention studies aimed at changing the attitudes, motivation and emotions of children and adolescents towards sport and exercise (e.g., Digelidis, Papaioannou, Laparidis, & Christodoulidis, 2003). In addition, research of the affective correlates of physical activity in the PE context has generally been focused on a few positive or negative feelings, such as enjoyment or boredom (e.g., Spray, Biddle, & Fox, 1999), rather than on a broad range of idiosyncratic emotions. Finally, the emotion-arousing effects of PE activities per se have been somewhat overlooked, despite there being agreement among practitioners and investigators that pleasant feelings related to PE can improve intrinsic motivation for and adherence to physical activity programmes (Biddle & Chatzisarantis, 1999). According to the self-determination theory, intrinsically motivated persons are much more likely to undertake physical activity for the sake of fun, satisfaction and other pleasant emotions (Deci & Ryan, 1985).

A number of PE tasks and open-air sports have the potential for eliciting positive or negative emotional reactions, because of the physical and psychological challenges inherent in the activity. PE acrobatic tasks, such as trampoline jumps, parallel bars exercises and rope climbing (Robazza & Bortoli, 2005), and leisure and adventurous activities, such as mountaineering, hang-gliding, snowboarding and sky-diving, are usually experienced by participants with a mixture of positively or negatively toned emotions (Cogan & Brown, 1999; Jack & Ronan, 1998; Price & Bundesen, 2005). Pleasant emotions (e.g., elation and excitement) can be associated with approach behaviour, whereas unpleasant emotions (e.g., apprehension and fear of injury) can accompany avoidance behaviour. Pleasant or unpleasant experiences are a function of the performer's interpretation of the situation as either stimulating or dangerous, and the perception of being able to successfully deal with situational demands (Deci, 1980; Frijda, 1986).

In a study on the attitudes and emotions of Italian high school PE students, Robazza and Bortoli (2005) involved boys and girls in acrobatic activities. Experimental participants increased their predisposition to face acrobatics and experienced optimal-pleasant emotions in relation to the tasks. Findings also demonstrated the feasibility of applying the assessment methodology of the Individual Zones of Optimal Functioning (IZOF) model (Hanin, 2000) to the context of PE. Although the IZOF model has been employed mainly in competitive and elite sports, there have been applications outside the sport setting, such as in business and management (Hanin, 1993) and PE (Hanin, 1989).

The IZOF model makes a distinction between the impact of emotion on performance (optimal or dysfunctional) and hedonic tone (pleasant or unpleasant). The interaction of the two factors results in four global emotion content categories: optimal-pleasant, optimal-unpleasant, dysfunctional-unpleasant, and dysfunctional-pleasant. The four content categories incorporate a "constellation" of idiosyncratic and task-specific emotions that performers can experience before, during and after successful and unsuccessful or poor performances. Optimal emotions in PE are expected to facilitate task involvement, resource recruitment and utilisation, performance process and task achievement. In contrast, dysfunctional emotions would result in de-energising and

disorganising effects on performance. An optimal performance state can include not only pleasant emotions, but also unpleasant emotions (e.g., anxiety and fear), which can be instrumental in energising functional behaviour. For instance, a high intensity of anxiety while climbing a rope may result in a strong grip, vigorous movements and heightened focus of attention. The performer can then interpret anxiety as facilitative and even pleasant because it is helpful. However, if the situation is perceived as being out of control, feeling anxious may result in a detrimental and unpleasant state.

A main goal of PE teachers is to increase students' intrinsic motivation for PE and sports, and to promote the adoption of an active lifestyle. Acrobatic tasks are often proposed at school because they are deemed intrinsically motivating. Outside of school, a growing number of persons are participating in adventurous sports in the pursuit of pleasure and excitement (Cogan & Brown, 1999). Adventurous sports, indeed, seem to provide intrinsically gratifying experiences that are unique to this form of sport (Zuckerman, 1994). For example, Price and Bundesen (2005) noted that pleasant feelings associated with skydiving were dominant for both novice and experienced skydivers. The emotional experience was expected to change from anxiety to intense euphoria as the performer gained in experience. Similarly, thrilling PE acrobatics were shown to engender a pattern of pleasant feelings, particularly after a period of practice (Robazza & Bortoli, 2005). However, the effects of PE tasks on adventurous sports have not been examined. Therefore, the purpose of this study was to examine whether PE acrobatics would be effective in modifying an individual's tendency to undertake out-of-school adventurous sports. At the end of the programme, experimental participants were expected to be more disposed to participate in PE and out-of-school sports, and thus have a higher level of optimal-pleasant emotions.

2. Method

2.1. Participants

The sample consisted of 79 male students aged 14–15 years ($M = 14.31$, SD = .65) drawn from a high school located in a town in north eastern Italy. All students were in the first year of high school, and were involved in PE as an obligatory course twice a week. Agreement to conduct the study was sought from the headmaster. Following the explanation of the study's purposes, two expert PE teachers agreed to conduct 12 lessons. The intervention included an experimental group and a control group. To maximise practice time and individual involvement in the activity, the sample was split in two for each group. Each teacher was responsible for an experimental group and a control group. Five students were excluded from data analysis because they were absent from one or more lessons. The final sample ($N = 72$) was thus composed of four groups of 18 students each. Parental consent for taking part in the study was obtained for all participants.

2.2. Measures

2.2.1. The Motor Activity Anxiety Test

The Motor Activity Anxiety Test (MAAT; Bortoli & Robazza, 1994) is intended to gauge the student's attitude towards participating in PE activities characterised by challenging tasks

presenting some risks of physical injury. The test is made up of 16 coloured pictures of students involved in acrobatics and other similar PE tasks in a gymnasium, such as forward somersault on the floor, rope climbing, acrobatic jumps on the trampoline, and handstands on the parallel bars. These tasks can elicit pleasant emotions (e.g., thrill and excitement) or unpleasant emotions (e.g., anxiety and fear) linked to approach behaviour or avoidance behaviour, respectively.

The participant is required to look at each picture, imagine himself or herself as facing the task at that moment, and choose a sentence that best describes his or her own feelings on a Likert-type scale ranging from 1 to 5: (1) "I'd like to do it immediately; it looks like fun", (2) "I'd think about it, and then I'd give it a try", (3) "I don't know if I will do it; maybe I will, maybe I won't", (4) "I don't feel very confident in doing it", (5) "I would not do it; it looks too dangerous". Total scores can range from 16 to 80. High scores reflect avoidance tendencies whereas low scores indicate approach tendencies. The test has face validity, is reliable (Cronbach $\alpha = .84$, test–retest = .84), and correlates negatively with motor skills of PE (i.e., high scores on the MAAT correspond to low scores on motor skills; see Bortoli & Robazza, 1994).

2.2.2. The Adventurous Sport Pictures Test

Two investigators, with expertise in sport psychology and motor activity, independently selected a large pool of coloured pictures of people involved in adventurous sports. Pictures were drawn from specific magazines specialising in leisure activities characterised by physical and psychological challenges and threats that participants encounter as they confront unpredictable elements in the environment, that entail a high potential for serious injury and even fatality associated with accidents (Zuckerman, 1983).

From the initial pool of 120 photos, two researchers independently identified 30 pictures portraying land, aquatic and aerial sports (10 photos each). The goal was to retain about the same number of photos of persons dealing with sports performed in different environments, capable of eliciting intense sensations associated with the appraisal of a challenging situation. The final pool of photos, named the Adventurous Sport Pictures Test (ASPT), consisted of 18 pictures selected after extensive discussion between two investigators on the purported capacity of images to evoke strong emotional reactions. The sports included in the ASPT were mountain climbing, snowboarding, motorcycling, surfing, rafting, scuba-diving, sky-diving, parachute jumping and hang-gliding.

Similar to the MAAT assessment procedure, the participant is presented with each picture, required to imagine himself or herself before the activity at that moment, and choose the sentence that best describes personal feelings (from "I'd like to do it immediately; it looks like fun", to "I would not do it; it looks too dangerous"). Total scores can range from 16 to 90. Higher scores would indicate avoidance dispositions and low scores approach dispositions for adventurous sports. The ASPT and the MAAT were preliminarily administered to 144 male students aged 14 to 15 years. The ASPT total scores were normally distributed (Kolmogorov–Smirnov goodness-of-fit test $p > .20$) and the internal consistency of the items was good (Cronbach $\alpha = .92$). Pearson's product-moment correlation between the total scores of the ASPT and the MAAT was .59 ($p > .01$).

2.2.3. Borg Category Ratio (CR-10) Scale

A modified Borg Category Ratio scale (CR-10) was employed to assess the intensity level of idiosyncratic emotional descriptors, as suggested by Hanin (2000). The CR-10 scale has been

adopted in psychophysical studies of exercise capacity, exertion, and pain (see Borg, 2001), and for investigations of emotions in sport (see Hanin, 2000) and PE (Robazza & Bortoli, 2005). A feature of the scale is the harmony or congruence between numbers and verbal anchors (e.g., if an emotion intensity corresponding to "very, very much" is rated 10, then an intensity corresponding to "much" is rated 5 to imply half that intensity). Verbal anchors were: 0 = *nothing at all*, 0.5 = *very, very little*, 1 = *very little*, 2 = *little*, 3 = *moderate*, 5 = *much*, 7 = *very much*, 10 = *very, very much*, • = *maximum possible* (no verbal anchors were assigned to 4, 6, 8 and 9). Single-item scores could range from 0 to 11 (a score of 11 was assigned to •).

2.3. Procedure

2.3.1. Administration of the MAAT and the ASPT

The MAAT and the ASPT were individually administered within school facilities although away from the gymnasium. Assessment took place a week before intervention, at the beginning of the academic year. To avoid expectation biases, the specific purposes of the assessment procedure were not explained to participants. Students were presented with pictures of the MAAT, asked to imagine themselves before the activity at that moment, and to choose a sentence describing their personal feelings (from "I'd like to do it immediately; it looks like fun", to "I would not do it; it looks too dangerous").

Emotion assessment was then conducted according to the IZOF framework, which emphasises the idiosyncratic nature of emotional experiences and the categorisation of emotions in relationship to their functional impact on performance and hedonic tone. Pupils were asked to think about the situations portrayed in the MAAT as a whole, imagine themselves as if they were actually performing the tasks, and to identify three emotions indicative of their emotional states. A list of 46 pleasant–unpleasant randomly arranged emotional adjectives was used to enable participants to choose the three idiosyncratic descriptors best representing their feelings related to the activities portrayed in the MAAT (see Robazza & Bortoli, 2005, for a description of emotional items). Emotions were identified using the individuals' own vocabulary of idiosyncratic labels to capture personal meanings and the perceived functional impact of emotion on performance. Participants were then required to specify for each emotion the perceived functional effects on performance (i.e., optimal or dysfunctional) and the hedonic tone (i.e., pleasant or unpleasant). Lastly, students were required to score the intensity of functional effect and hedonic tone on the CR-10 scale. Two scores were assigned to each emotion related to its functional effect and hedonic tone dimensions. Dysfunctional or unpleasant emotion scores were transformed into negative scores, whereas optimal or pleasant emotion scores remained positive. Hence, emotion scores could range from −11 to 11.

The whole assessment procedure was repeated for the ASPT. Thus, for each picture students chose a sentence to indicate personal feelings, identified three emotions and scored these emotions on both perceived functional effect and hedonic tone. The individual assessment (including administration of the MAAT and the ASPT, and emotion profiling) required approximately 20 min to complete. Four investigators were simultaneously involved to speed up the evaluation. All of them were certified psychologists with expertise in psychological assessment. The whole assessment was repeated a week after intervention to evaluate treatment effects.

2.3.2. Intervention

The tasks proposed to the experimental groups were floor acrobatics, horse vaulting, parallel bars exercises, trampoline jumps, ladder and rope climbing, forward and backward walks on the balance beam, and 3-m high jumps onto a mat. Floor acrobatics included forward roll, backward roll, handstand, handstand forward roll, handstand backward roll, cartwheel, cartwheel and round off rebound, front handspring, dive forward roll, and somersault. Horse vaulting comprised squat, straddle, flank and front vaults, basic vaults with half or complete twists, and handspring vault. Parallel bars exercises encompassed swings, handstand, forward roll and dismounts. Mini-trampoline exercises involved straight, straddle and tuck jumps, and jumps with turns. Practice progressed gradually from easy to difficult situations adapted to individual capabilities. Several activities were proposed in a lesson to engage all students in individualised assignments adapted to their skill level. For instance, forward and backward rolls were presented before a dive forward roll or somersault, and basic horse vaults came before a handspring vault. Students were allowed to engage in a more difficult task, with the teacher's permission, only when they were able to execute an easier task safely. Teachers' direct and verbal assistance, instructions and feedback were used to prevent injuries and to provide participants with a safe learning environment.

Low-risk team sports (i.e., volleyball, basketball and handball) without any relationship to the tasks of the experimental groups were proposed to the control groups. In order to prevent biases deriving from environmental influences, teachers were instructed to provide students of both experimental and control groups with verbal assistance, feedback, and support, so as to involve all participants in the activity and to establish an enjoyable atmosphere. All groups underwent two lessons a week for a total of 12 lessons. Pre-test and post-test took place in two additional meetings a week before and a week after intervention.

3. Results

3.1. Preliminary analyses

Preliminary analyses were performed to examine (a) emotion content, (b) correlations and reliability of measures, and (c) pre-treatment homogeneity of experimental and control groups.

3.1.1. Emotion content

The sample identified a total of 39 emotional adjectives related to the MAAT and 39 adjectives related to the ASPT. Table 1 contains the most frequently selected descriptors across the four global emotion categories. The content categorisation of emotional descriptors was based on the idiosyncratic perception of the functional effects and hedonic tone of emotions elicited by the pictures rather than on an a priori classification of emotions as functional or dysfunctional or as pleasant or unpleasant. Most items were individually perceived to be optimal-pleasant or dysfunctional-unpleasant, while a few items were experienced as optimal-unpleasant or dysfunctional-pleasant. The connotations of descriptors had not only emotional components (e.g., joyful and afraid), but also cognitive (e.g., focused and attentive), motivational (e.g., sure and motivated), body reaction (e.g., tense and relaxed), and motor reaction (e.g., active and reactive) components (Hanin & Stambulova, 2002; Ruiz & Hanin, 2004).

Table 1
Most frequently selected pre-intervention emotional descriptors

Tests	Optimal-pleasant descriptors	*n*	Optimal-unpleasant descriptors	*n*	Dysfunctional-unpleasant descriptors	*n*	Dysfunctional-pleasant descriptors	*n*
Motor Activity Anxiety Test	Attentive	12	Tense	2	Tense	12	Uncertain	3
	Focused	11	Active	1	Uncertain	9	Attentive	2
	Calm	10	Attentive	1	Unsure	9	Electrified	1
	Determined	9	Confident	1	Afraid	7	Excited	1
	Motivated	9	Content	1	Nervous	6	Nervous	1
	Courageous	7	Determined	1	Agitated	4	Sure	1
	Excited	7	Uncertain	1	Concerned	4	Vivacious	1
	Sure	6	Unsure	1	Lazy	4	Worried	1
Adventurous Sport Pictures Test	Excited	13	Tense	3	Tense	12	Afraid	2
	Focused	13	Doubtful	1	Afraid	9	Agitated	1
	Determined	10	Excited	1	Uncertain	9	Excited	1
	Courageous	9	Nervous	1	Agitated	7	Happy	1
	Active	8	Relaxed	1	Unsure	7		
	Confident	7	Uncertain	1	Nervous	6		
	Overjoyed	7	Worried	1	Worried	6		
	Sure	7			Apprehensive	3		

3.1.2. Correlations and reliability of measures

Variable scores collected at pre-test and post-test were normally distributed (Kolmogorov–Smirnov goodness-of-fit tests $ps > .10$). Descriptive statistics for variable scores collected at the first assessment are reported in Table 2. Correlations and reliability estimates are also reported. Test–retest reliability was calculated on the control groups for all variables. Acceptable reliability indices were shown.

3.1.3. Homogeneity among groups

Homogeneity of variance between grouped data was initially established using Levene's test. Violations of the assumption of homogeneity of variance did not occur ($ps > .05$). Homogeneity between the two experimental and the two control groups on the scores of the dependent variables was then checked before experimentation through analysis of variance (one-way ANOVA). Significant differences were not observed in the four groups (all $F_{3,68} < 1$, $ps > .5$). It was concluded that the experimental and control groups were homogeneous at the time of the first assessment. Data of the experimental groups were thus combined as well as data of the control groups.

3.2. Treatment effects

Levene's tests and Box's *M* tests were employed prior to the analysis of variance with repeated measures (RM-ANOVA). The assumptions of equality of variance–covariance matrices of the dependent variables across groups were met ($ps > .05$). A 2×2 (groups $\times$ tests) RM-ANOVA was performed on the dependent variable scores to examine treatment effects. Once a significance level of $p < .05$ emerged, Tukey HSD post hoc was employed to explore the locus of significant

Table 2
Descriptive statistics for the Motor Activity Anxiety Test (MAAT), the Adventurous Sport Pictures Test (ASPT), the functional effect of emotion, and the hedonic tone of emotion variables

Variables	*M*	SD	*r* test–retest	Alpha	Correlation among variables				
					ASPT	MAAT-FE	MAAT-HT	ASPT-FE	ASPT-HT
MAAT	40.32	12.10	.81	.89	.63**	−.48**	−.48**	.02	−.01
ASPT	43.00	14.71	.88	.92		−.28*	−.27*	−.29*	−.30*
MAAT Emotion Functional Effect (MAAT-FE)	1.99	3.57	.70				.89**	.01	.02
MAAT Emotion Hedonic Tone (MAAT-HT)	1.92	3.49	.70					−.02	−.02
ASPT Emotion Functional Effects (ASPT-FE)	2.41	4.05	.72						.94**
ASPT Emotion Hedonic Tone (ASPT-HT)	2.17	3.86	.72						

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

differences. The dependent variables were the total scores of the MAAT, the total scores of the ASPT, and the mean scores of the functional effect and the hedonic tone of the three idiosyncratic emotions related to the MAAT and the ASPT. According to the study's purpose, the treatment was intended to lower avoidance tendencies (or to increase approach tendencies) of experimental participants towards PE and adventurous sports. Therefore, students in the experimental group were expected to report lower scores on the MAAT and ASPT post-intervention compared to pre-intervention, and higher scores on emotion functional effect and hedonic tone.

RM-ANOVA results are contained in Table 3. At the end of treatment, the experimental participants reported lower mean scores on the MAAT compared to the control participants. In addition, a significant increase in the mean scores of the functional effect of emotions related to the MAAT was revealed. Scores of the hedonic tone of emotions also increased from pre-test to post-test, but the conventional level of significance was not reached ($p = .075$). Analysis of the ASPT scores showed a significant post-treatment reduction in the mean scores of the experimental group compared to the control group. Results of the functional and hedonic tone scores associated with the ASPT were not significant.

4. Discussion

The PE programme was effective in improving the students' attitudes towards acrobatic tasks as well as out-of-school leisure and adventurous sports typified by physical and psychological challenges. The change in an individual's attitudes for PE tasks was accompanied by a corresponding modification in the functional effect of idiosyncratic emotions. These results replicate in part those

Table 3
Descriptive statistics and analysis of variance results for the Motor Activity Anxiety Test (MAAT) and the Adventurous Sport Pictures Test (ASPT)

Variables	Groups	Test (pre-intervention)		Retest (post-intervention)		Analysis of variance			
		M	SD	*M*	SD	Source	$F(1,70)$	*p*	Partial eta squared
MAAT	Experimental	39.83	11.77	32.47	10.35	Group	2.17	.145	0.03
	Control	40.81	12.57	39.19	12.56	Test	20.63	.000	0.23
						Group × Test	8.47	.005	0.11
MAAT emotion functional effect	Experimental	1.55	3.86	3.57	2.92	Group	0.05	.832	0.00
	Control	2.44	3.25	2.41	3.05	Test	5.60	.021	0.07
						Group × Test	5.92	.018	0.08
MAAT emotion hedonic tone	Experimental	1.84	3.56	3.30	2.94	Group	0.94	.337	0.01
	Control	2.00	3.47	1.88	3.26	Test	2.41	.125	0.03
						Group × Test	3.27	.075	0.05
ASPT	Experimental	42.42	13.74	38.97	14.53	Group	1.03	.314	0.01
	Control	43.58	15.79	44.56	14.41	Test	1.84	.179	0.03
						Group × Test	5.88	.018	0.08
ASPT emotion functional effect	Experimental	2.55	3.72	2.14	3.71	Group	1.12	.294	0.02
	Control	2.28	4.41	0.68	4.40	Test	4.02	.049	0.05
						Group × Test	1.44	.235	0.02
ASPT emotion hedonic tone	Experimental	2.36	3.49	2.08	3.44	Group	1.20	.277	0.02
	Control	1.99	4.24	0.75	4.29	Test	2.41	.125	0.03
						Group × Test	0.98	.326	0.01

found in an earlier investigation (Robazza & Bortoli, 2005), where the treatment led participants to modify their tendencies and the emotions associated with PE acrobatic challenges. Regarding adventurous activities, the change in the students' attitudes was not followed by modifications in the functional effect or hedonic tone of emotions. It could be suggested that a direct exposure to emotion-arousing situations (i.e., PE tasks) has the potential to modify more strongly those individual attitudes and emotions associated with the situation, compared to related activities not directly experienced (i.e., adventurous sports). Despite this limitation, a favourable change in attitudes towards adventurous sports was noted as a consequence of the PE programme. A crucial factor accounting for this positive change was the direct experience of stimulating and intrinsically rewarding activities deemed appropriate in the pursuit of playful and enjoyable behaviours (Cogan & Brown, 1999; Zuckerman, 1994).

Findings also showed that challenging situations are capable of engendering a pattern of idiosyncratic emotions reflecting action tendencies of approach (or involvement) and avoidance (or withdrawal) behaviour. Action tendencies, as states of readiness to execute a given kind of action, are important components of emotions, which may mediate and energise behaviour (Deci, 1980; Frijda, 1986). For example, elation and fear may energise approach or avoidance behaviour, respectively. These concepts concur with the IZOF constructs of energy mobilisation/demobilisation and energy utilisation/misuse (Hanin, 2000). Optimal-pleasant emotions are expected to

mobilise an individual's energies to sustain effort and movement coordination, whereas dysfunctional-unpleasant emotions would cause energy loss or misuse by diverting resources to task-irrelevant cues.

A negative relationship was found between the MAAT and ASPT attitude scores and the functional/hedonic emotion scores (Table 3). Hence, low avoidance tendency for challenging activities was associated with high perceived functional effect and hedonic tone of emotions. These results agree with Cogan and Brown's (1999) observation that a preference for and a participation in adventurous activities, such as mountain climbing, parachute jumping and surfing, is related to an excitement-seeking personality. In conjunction with the intense arousal elicited by the experience itself, the motives people have for pursuing adventurous sports can derive from the individual's desire to control the situation and the environment. Adventurous sports as well as PE acrobatics can be a source of intense and exciting experience, especially at a later stage of proficiency when the task is perceived to be under control (Price & Bundesen, 2005; Robazza & Bortoli, 2005). Approach behaviour can thus be reinforced as the individual shifts from a novice phase to a more expert phase.

An individual's reaction and attitude changes can also be interpreted within the IZOF framework, which postulates an interactive relationship among relatively stable patterns (dispositions), emotional states, and meta-experiences (awareness and preferences/rejections of an experience) associated with performance. Hanin (2004) has suggested that individuals develop knowledge, attitudes, beliefs and preferences for (or rejection of) an emotion through successful and less than successful performances. For example, trait-anxious students who feel themselves unable to effectively deal with a range of potentially risky PE tasks can react with high levels of state anxiety, interpret anxiety as sign of peril and, therefore, keep away from the situation they perceive as dangerous. A progressive exposure to frightening situations can favourably change expectancies of being able to cope and modify the interpretation (meta-experience) of state-anxiety symptoms as functional and even pleasantly exciting.

Some limitations in the study warrant attention in future research. This study neither assessed the effects of the PE programme in promoting actual participation in out-of-school physical activities, nor examined individual differences in personality characteristics, such as trait-anxiety and sensation-seeking (Zuckerman, 1983), as potential moderators of the preference for adventurous activities. Furthermore, the idiosyncratic assessment did not make a distinction among the several components of a psychobiosocial state (e.g., emotional, cognitive and motivational) as conceptualised within the IZOF model (Hanin & Stambulova, 2002; Ruiz & Hanin, 2004). Finally, the underlining mechanisms that may have contributed to the intervention effects were not scrutinised. These may include motor skill level and improvement, mastery and coping skills, self-efficacy and self-confidence, presence and evaluation by peers and the teacher, supportive environment and the teacher's assistance.

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