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The relationships between the 3 x 2 achievement goal model and test anxiety in Physical Education

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Running head: PE test anxiety and the 3 x 2 achievement goal model

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Abstract

The aim of the present study was to investigate the predictive role of the 3 x 2 achievement goal model on test anxiety in the specific context of PE. Four hundred and eighty-six French students ($M_{\text{age}} = 15.83$, $SD = 1.20$) voluntarily and anonymously filled out the Revised Test Anxiety and Regulatory Dimension of Anxiety in Physical Education scale (RTAR-PE) assessing test anxiety in PE and the Achievement Goal Questionnaire for Sport (AGQ-S) assessing the six achievement goals. The results showed that task-avoidance and self-avoidance goals positively predicted the four negative factors of test anxiety (worry, self-focus, bodily symptoms, somatic tension), while task-approach and self-approach goals negatively predicted them. It was the opposite for perceived control, which is the positive factor of test anxiety. Contrarily to academic general test anxiety, other-avoidance goals did not positively predict the negative factors of test anxiety in the PE context, but they negatively predicted perceived control. The previous pattern of results was reversed for task-approach, self-approach, and other-approach goals. Finally, a significant interaction was found between other-avoidance goals and gender in predicting bodily symptoms, but simple slope analysis did not reveal significant findings. Taking students' psychological characteristics into account, such as achievement goals, may contribute to a better understanding of test anxiety in PE.

Keywords

Achievement goals; test anxiety; 3 x 2 model; perceived control; evaluation

INTRODUCTION

Throughout their academic experience, students are frequently faced with different kinds of evaluations. While examination results may provide academic recognition, they are also threatening and may induce anxiety (Putwain et al., 2010). This is also the case in Physical Education (PE). The relationships between achievement goals, gender, and test anxiety have already been studied, essentially in general (i.e. irrespective of school subjects), but also recently in PE. However, the predictive role of the most recent 3 x 2 achievement goal model (Elliot et al., 2011) on test anxiety has not yet been investigated in the specific context of PE. This is the main purpose of the present study.

Test anxiety

Anxiety is a broad field of research that has been notably studied in the specific context of tests (Zeidner and Matthews, 2005). Test anxiety was initially considered a unidimensional attribute (e.g. Sarason, 1961). Then, researchers separated a cognitive component called “worry” and an affective-physiological component called “emotionality”, identifying test anxiety as a multidimensional attribute (Liebert and Morris, 1967; Spielberger, 1980). Several scales were developed to assess test anxiety. For example, Benson and El-Zahhar (1994) developed the Revised Test Anxiety scale (RTA) based on four factors: worry (thinking about consequences of failure), test-irrelevant thinking (distracting thoughts during the test, e.g. thinking about being somewhere else), tension (general autonomic arousal, e.g. feeling nervous during test), and bodily symptoms (specific physiological effects, e.g. suffering headache during tests). Recently, a fifth factor was added to these four factors (Mascret et al., 2019) to assess the regulatory dimension of anxiety (Cheng et al., 2009). Whereas test anxiety has usually been studied only through negative factors (e.g. Putwain et al., 2010), some positive factors may also be introduced. Cognitive theorists of emotion proposed that a regulatory process is directly involved in the system of emotion such as

anxiety (Ohman, 2000). It would allow individuals to cope adaptively in facing the perceived threat across a defense mechanism sending out warning signals to protect and prepare them to respond more effectively to threat through perceived control (Cheng and Hardy, 2016).

In the PE context, lessons and tests involve both learning (cognitive component) and practicing (physical component) sport skills in front of classmates and the teacher (Barkoukis et al., 2005). This exposure to others (Warburton, 2017) may be particularly stressful during evaluations and examinations because the results are immediately available and known to all (Barkoukis et al., 2005) and may lead to social pressure (Liukkonen et al., 2010). Recently, the Revised Test Anxiety and Regulatory Dimension of Anxiety in Physical Education scale (RTAR-PE, Danthony et al., 2019) was developed based on the initial RTA scale (Benson and El-Zahhar, 1994) to assess five dimensions of test anxiety in the specific context of PE: worry (more fear of failure than during the PE lesson), self-focus (what might others say or think about my performance in the PE examination task?), bodily symptoms (more accelerating heartbeats, more breathing difficulty than during the PE lesson), somatic tension (more tiredness, more nervousness than during the PE lesson), and perceived control (the positive dimension of anxiety representing the belief in one's capacity to have a good PE grade). Regardless of school subject, general test anxiety has previously been studied in relation with many frameworks, including achievement goal models.

Test anxiety and achievement goals

Achievement goals are based on a social-cognitive theory of motivation that examines different ways of demonstrating competence. The focus is on developing or demonstrating high rather than low ability. In a first step, a dichotomous model of achievement goals was defined (Nicholls, 1984). Mastery goals were constructed as an effort to develop competence through task mastery and improvement, while the purpose of performance goals was to demonstrate competence relative to others. In a second step, Elliot and Harackiewicz (1996)

separated three goals in the trichotomous model including approach (focused on success and effort to maintain the positive possibilities) and avoidance (focused on failure and effort to keep away from the negative possibilities): mastery goals, performance-approach goals, and performance-avoidance goals. In a third step, four achievement goals were identified in the 2 x 2 achievement goal model (Conroy et al., 2003; Elliot and McGregor, 2001): a performance-approach goal (doing well relative to others), a performance-avoidance goal (not doing poorly relative to others), a mastery-approach goal (developing competence through self-improvement and task mastery), and a mastery-avoidance goal (not doing poorly relative to task demands or one's performance trajectory).

Relationships between general test anxiety and achievement goals have already been investigated using the previous achievement goal models. Studies evidenced that performance-avoidance goals were positively correlated with test anxiety (e.g. Elliot and McGregor, 1999; Pekrun et al., 2006), while correlations between performance-approach goals and test anxiety were weak or non-significant (e.g. Elliot and Church, 1997; Middleton and Midgley, 1997). Other studies have specifically used the RTA scale to assess test anxiety in its different dimensions. Mastery-avoidance goals were positively correlated with worry and somatic tension (Putwain et al., 2010; Putwain and Symes, 2012), performance-approach goals were positively related to bodily symptoms (Putwain et al., 2010), and performance-avoidance goals were positively related to worry and somatic tension (Putwain and Symes, 2012). The only study (Danthony et al., 2019) assessing test anxiety in PE and achievement goals showed that approach-based goals were negatively correlated with worry and self-focus, and positively correlated with perceived control. Mastery-approach goals were negatively correlated with bodily symptoms, while performance-approach goals were negatively correlated with somatic tension. Performance-avoidance goals were positively correlated with self-focus and somatic tension, and mastery-avoidance goals were positively correlated with

worry. Further studies need to be conducted in PE, because achievement goals are related to the way students interpret and emotionally respond in achievement settings, which is particularly relevant during an examination or a test. Moreover, mastery-approach goals in PE were mainly related to the development of positive affective states and adaptive motivational patterns during PE lessons focused on learning (Ommundsen, 2001). Consequently, it may be worthwhile on the one hand to examine whether this pattern is similar during tests or examination in this school subject, and on the other hand to study accurately the relationships between these two frameworks with the most precise scales.

Recently, a 3 x 2 achievement goal model evidencing six achievement goals for students was validated by Elliot et al. (2011), who separated mastery-based goals into task-based and self-based categories. Performance-based goals remain the same but have been renamed other-based goals. In the 3 x 2 achievement goal model, the definition of competence focuses now on three dimensions (task, self, other) and the valence focuses on two dimensions (approach and avoidance), leading to six achievement goals: task-approach goals (satisfying the requirements of the task), self-approach goals (improving oneself), other-avoidance goals (being better than others), task-avoidance goals (avoiding failure in the task), self-avoidance goals (avoiding regression in the task), and other-avoidance goals (avoiding to be worse than others).

Only Flanagan et al. (2015) have used this 3 x 2 model to investigate its relations with test anxiety in general. They showed that task-approach goals negatively predicted test-irrelevant thinking and bodily symptoms, and that worry and tension were positively predicted by other-avoidance goals. To date, there is no study specifically examining the relationships between the 3 x 2 achievement goal model and test anxiety in the PE context. Recently, the 3 x 2 scale, initially validated in the school domain, was extended to the sport domain (Mascret et al., 2015). It may also be used in the PE context similarly to the procedure

followed by Riou et al. (2012) with the 2 x 2 model. Moreover, the 3 x 2 achievement goal model has already been validated in the context of PE in Spanish-language (Méndez-Giménez et al., 2014; Méndez-Giménez et al., 2018). It may be relevant to investigate the relationships between the 3 x 2 achievement goal model and test anxiety in PE because separating mastery-based goals in task-based and self-based goals allowed investigating these relationships more precisely. The moderating role of gender between achievement goals and test anxiety also needs to be investigated in PE because gender has already been studied in relation with test anxiety and achievement goals but not as a moderator between these two variables in the specific context of PE.

Test anxiety in PE, achievement goals, and gender

Gender differences have been previously considered in test anxiety research. Studies highlighted that girls had higher test anxiety scores than boys, notably in the emotionality component of test anxiety (e.g. Putwain, 2007; Putwain and Daly, 2014; Zeidner and Schleyer, 1999). In PE, gender differences may also occur because sports are often gender-typed (most often as masculine). Moreover, girls think that it is less important to succeed in sports and PE compared to boys, and boys scored higher than girls on physical self-concept (Klomsten et al., 2005). During PE lessons, girls often experience more anxiety than boys (e.g. Mouratidis et al., 2009). Only one study conducted in PE (Danthony et al., 2020) evidenced that all the components of test anxiety were predicted by gender. The scores of the four negative components of test anxiety in PE (worry, self-focus, bodily symptoms, somatic tension) were higher for girls than boys, while girls scored lower than boys in the positive component of test anxiety in PE (perceived control).

Concerning the relationships between achievement goals and gender, the PE literature remains inconclusive regardless of the model of achievement goals (Liu et al., 2017). Using the dichotomous model of achievement goals, some studies have evidenced that boys' ego

goals were higher than girls' (e.g. Standage et al., 2007), while other studies did not find differences (e.g. Barkoukis et al., 2010). Shen et al. (2007) found no differences with the trichotomous model, whereas Ommundsen (2004) evidenced that boys were more likely to adopt performance-based goals than girls. Using the 2 x 2 model, Warburton and Spray (2008) mainly highlighted that the four achievement goals' scores were higher for boys compared with girls. But some studies (e.g. Wang et al., 2008; Xiang and Lee, 2002) did not detect differences between boys and girls. In sum, Liu et al. (2017) conclude that further research is needed to investigate gender differences in achievement goals in PE settings, also with the 3 x 2 model of achievement goals (Mascret et al., 2015).

While the literature examining the relation between gender and test anxiety showed a relatively clear pattern of results (i.e. test anxiety is higher for girls than boys in general and in PE), results were more contrasted for gender and achievement goals. Consequently, investigating the potential moderating role of gender between achievement goals and test anxiety in PE may be relevant because Zeidner (1998) mentioned gender as a significant moderator of test anxiety.

The present study

Based on the 3 x 2 model of achievement goals (Elliot et al., 2011; Mascret et al., 2015), the first aim of the study was to investigate the predicting role of the six achievement goals in PE on the five components of PE test anxiety. We hypothesized that task-avoidance, self-avoidance, and especially other-avoidance goals were positive predictors of the four negative components of PE test anxiety (worry, self-focus, bodily symptoms, somatic tension) and negative predictors of the positive dimension of PE test anxiety (perceived control), due to their focus on the avoidance dimension related to fear of failure. We also hypothesized that the pattern was reversed for task-approach, self-approach, and other-approach goals due to their focus on the approach dimension related to success and effort to maintain positive

possibilities. The second aim of the study was to investigate the moderating role of gender between achievement goals and test anxiety in PE. Due to the mixed results found in the achievement goal literature focusing on the relationships between achievement goals and gender, no particular hypothesis was formulated.

METHOD

Participants and procedure

In the final sample, 486 French students (299 girls, 187 boys, $M_{\text{age}} = 15.83$, $SD = 1.20$, age range 12-19) voluntarily participated in the study. In this sample, 175 students belonged to the French *collège* (students aged from 13 to 15 years old in the present study) and 311 students belonged to the French *lycée* (students aged from 16 to 18 years old). Participants came from seven different public schools (3 *collèges* and 4 *lycées*), with a total of 20 classes (9 in *collège*, 11 in *lycée*). In France, students in *collège* have two PE classes per week for a total of three hours, while students in *lycée* have one PE class per week for a total of two hours. Examinations are frequent throughout the school year in the French PE context (between three and eight times per year) and contribute to graduation in *collège* and *lycée* (Danthony et al., 2019). The Chief Education Officer of the *Académie of Aix-Marseille*, the schools' principals, the PE teachers and the students' parents first approved the study. Questionnaires were completed by the participants midway through the school year, at the beginning of PE lessons without evaluations or exams. They were assured that their responses would remain anonymous and would not influence their schooling in PE and in other school subjects.

Measures

Test anxiety. Test anxiety was assessed with the RTAR-PE scale (Danthony et al., 2019). Four items assessed the worry dimension of PE test anxiety (e.g. “*During PE tests, I am afraid of having a lower performance than during PE lessons*”), three items assessed the

self-focus dimension (e.g. *“During PE tests, I am conscious that other students will mock my performance”*), four items assessed the bodily symptoms dimension (e.g. *“During PE tests, I have more difficulty breathing than during PE lessons”*), four items assessed the somatic tension dimension (e.g. *“During PE tests, I feel more tense than during PE lessons”*), and four items assessed perceived control, which is the positive dimension of PE test anxiety (e.g. *“During PE tests, I believe that I have the resources to get a good grade”*). Participants responded to the 19-item questionnaire using a four-point scale (*almost never* to *almost always*). A Confirmatory Factor Analysis (CFA) was conducted on the covariance matrix of the items using the JASP Software (version 0.12.2). The fit indices (Byrne, 2010; Hu and Bentler, 1999) were the Comparative Fit Index (CFI; value $\geq .90$), the Tucker-Lewis Index (TLI; value $\geq .90$), the Root Mean Square Error of Approximation (RMSEA; value $\leq .08$), and the Standardized Root Mean Square Residual (SRMR; value $\leq .08$). The results of the CFA were acceptable ($\chi^2(142, N = 486) = 614.16, p < .001, CFI = .92, TLI = .91, RMSEA = .083, SRMR = .075$), albeit questionable for RMSEA which slightly exceeded the threshold of .08, but a value of RMSEA $\leq .10$ may also be considered acceptable (Blunch, 2008). Internal consistency was considered satisfactory for worry ($\alpha = .77$), self-focus ($\alpha = .93$), bodily symptoms ($\alpha = .77$), somatic tension ($\alpha = .86$) and perceived control ($\alpha = .93$) subscales.

Achievement goals. The 3 x 2 Achievement Goal Questionnaire for Sport (AGQ-S, Mascaret et al., 2015) was used to assess participants’ achievement goals. This scale assessed task-approach goals (e.g. *“In PE, my goal is to obtain good results”*), self-approach goals (e.g. *“In PE, my goal is to be more effective than before”*), other-approach goals (e.g. *“In PE, my goal is to be better than others”*), task-avoidance goals (e.g. *“In PE, my goal is to avoid performing badly”*), self-avoidance goals (e.g. *“In PE, my goal is to avoid being less effective compared to my usual level of performance”*), and other-avoidance goals (e.g. *“In PE, my goal is to avoid doing worse than others”*). Participants were instructed to respond on a scale

from 1 (*strongly disagree*) to 7 (*strongly agree*). The results of the CFA showed a good fitting model ($\chi^2(120, N = 486) = 282.32, p < .001, CFI = .97, TLI = .96, RMSEA = .053, SRMR = .036$). Scores were computed for task-approach goals ($\alpha = .83$), self-approach goals ($\alpha = .81$), other-approach goals ($\alpha = .93$), task-avoidance goals ($\alpha = .80$), self-avoidance goals ($\alpha = .69$) and other-avoidance goals ($\alpha = .84$). Internal consistency was satisfactory, albeit somewhat weak for self-avoidance goals.

Data analysis

Preliminary analyses were first conducted. No missing values were found. Because eleven participants showed a Mahalanobis distance higher than $\chi^2(9) = 27.88, p < .001$, they were detected as gross outliers and were excluded from the final sample of the study. Table 1 shows the descriptive statistics of the final sample. Table 2 shows the correlations between variables. Then, we conducted primary analyses through five consecutive simultaneous multiple regression analyses to examine how gender (girls = 0, boys = 1), achievement goals, and the interaction between the achievement goals and gender predicted the different dimensions of test anxiety in PE. Moderational tests were then conducted following the procedures described by Baron and Kenny (1986) and Aiken and West (1991). If a significant interaction between gender and one of achievement goals was found, gender, achievement goal of interest, and their interaction were standardized. Interactions were then decomposed by simple slope analyses (Aiken and West, 1991) at $\pm 1SD$.

Please insert Table 1 and Table 2 near here

RESULTS

The first aim of the study was to examine the relation between the 3 x 2 achievement goals model and test anxiety in PE. Worry was negatively predicted by task-approach goals ($p = .005$) but positively predicted by self-avoidance goals ($p = .040$). Self-focus was negatively

predicted by task-approach goals ($p = .002$) but positively predicted by task-avoidance goals ($p = .017$). Bodily symptoms were negatively predicted by self-approach goals ($p = .013$) and positively predicted by self-avoidance goals ($p = .027$). Somatic tension was negatively predicted by task- and self-approach goals ($p = .009$ and $p = .010$, respectively) but positively predicted by self-avoidance goals ($p = .050$). Finally, perceived control was positively predicted by task- and other-approach goals ($p < .001$ and $p = .002$, respectively) and negatively predicted by other-avoidance goals ($p = .025$). Table 3 shows the detailed results of the regression analyses.

The second aim of the study was to investigate the moderating role of gender between the 3 x 2 achievement goals model and test anxiety in PE. As expected, and in line with a previous study (Danthony et al., 2020), gender was a negative direct predictor of worry, self-focus, bodily symptoms, and somatic tension, and a positive predictor of perceived control ($p < .001$ for each variable). Only one significant interaction effect was found between other-avoidance goals and gender in predicting bodily symptoms ($p = .018$). The variables were graphed at $\pm 1SD$ in order to probe significant interactions (see Figure 1), but simple slope analyses did not reveal significant findings ($p = .335$ for girls and $p = .478$ for boys).

Please insert Table 3 and Figure 1 near here

DISCUSSION

The aim of the present study was to examine the predictive role of the 3 x 2 achievement goals model on test anxiety in PE. The achievement goals were defined according to their valence (approach, avoidance) and their definition (self, task, other). Test anxiety was defined through four negative factors (worry, self-focus, bodily symptoms, somatic tension) and a fifth positive factor (perceived control).

The present study showed that avoidance-based goals were positive predictors of the

four negative factors of test anxiety in PE while approach-based goals were found to be negative predictors. These results are similar to those found in the general test anxiety literature (e.g. Flanagan et al., 2015), because avoidance-based goals are more oriented toward threat and failure, and consequently are more likely to increase test anxiety (Elliot et al., 2011). Conversely, approach-based goals are more likely to reduce test anxiety because this kind of goals focuses on competence, challenge and success (Elliot, 1999; Elliot and McGregor, 2001). The regression analyses also revealed that perceived control, namely the regulatory dimension of PE test anxiety, was negatively and positively predicted by avoidance-based goals and approach-based goals, respectively. Focusing on competence, challenge, and success (i.e. approach-based goals) may increase perceived control because positive emotions (e.g. increased hope) are positively related with approach-based goals (Elliot and McGregor, 2001; Pekrun et al., 2006). Conversely, focusing on avoiding failure (i.e. avoidance-based goals) may decrease this positive component of test anxiety, because perceived control focuses on believing in one's capacity to get a good grade, and not on avoiding a bad grade or exam failure.

Crossing the valence (approach, avoidance) and the definition (task, self, other) of achievement goals may explain more precisely the results highlighted in our study concerning the five factors of PE test anxiety. In the present study, self-avoidance goals positively predicted three of the four negative components of test anxiety (worry, bodily symptoms, and somatic tension). This result is not surprising because self-avoidance goals are avoidance-based goals focusing on fear of failure, as seen above. They also involve students' self-worth, which may theoretically induce anxiety because the students are involved in a personal way (Flanagan et al., 2015). Contrary to a previous study, which showed that self-avoidance goals were not significantly associated with test anxiety in an academic context (Flanagan et al., 2015), the pattern of our results was different in the specific context of PE, highlighting that

self-avoidance goals are the most prominent goals in predicting the negative factors of test anxiety. PE students with high scores for self-avoidance goals may have a low physical self-concept, which is an individual's evaluation of himself/herself in physical domains (Fox, 1990). A poor physical self-concept in PE is often associated with threats to psychological well-being, such as anxiety (Marsh et al., 1997), because the body is the interface between the individual and the world (Aşçı, 2003). These findings may explain why self-avoidance goals were specifically found to be significant predictors of PE test anxiety while this was not the case in the academic domain. But these hypotheses are speculative and need to be confirmed in future studies.

Similarly to the only study in the academic domain (Flanagan et al., 2015), our results showed that task-avoidance goals were not significant predictors of worry, bodily symptoms, and somatic tension, because this kind of goals are not directly centered on social evaluative implications. However, the fourth negative factor of PE test anxiety (self-focus) was in our study positively predicted by task-avoidance goals. Self-focus relates to the fear of the judgment of others during a test or an examination (Danthony et al., 2019), while task-avoidance goals are focused on avoiding failure in the task. In the specific context of PE, the result of a physical task is instantly and systematically obvious to all (Barkoukis et al., 2005), which is different from other academic disciplines. The public nature of competence in PE (Warburton, 2017) may lead to a kind of social-evaluative threat. Consequently, a student who fears failing the examination task in PE (i.e. endorsing a task-avoidance goal) is more likely to have a high level of self-focus, because he/she knows that if he/she does indeed fail the examination task, his/her failure may be seen by everyone.

The two affective-physiological components of test anxiety (bodily symptoms and somatic tension) were negatively predicted by self-approach goals. These goals are centered on the attainment of self-based competence (Elliot et al., 2011), which is mainly defined in PE

through motor skills (Walling and Duda, 1995). Because students following self-approach goals in PE are more focused on developing their motor skills and improving their physical self-awareness during the lessons before tests, they may be less sensitive to bodily symptoms and somatic tension during tests. Furthermore, task-approach goals were negative predictors of three factors of PE test anxiety (worry, self-focus, somatic tension). Endorsing a task-approach goal may reduce the negative factors of test anxiety because this achievement goal is centered on evidencing the current competence and focuses on successfully achieving or completing the requirements of the task (Elliot et al., 2011).

The present study also showed that perceived control was positively predicted by two approach-based goals and negatively predicted by one avoidance-based goal. Cheng et al. (2009) defined perceived control as concerned with coping capacity in reaction to perceived threat. Then adopting approach-based goals which are focused on success may explain a high perceived control, while adopting avoidance-based goals, focused on fear of failure, may explain a low perceived control (Elliot et al., 2011). In the present study, task-approach goals positively predicted perceived control. During PE lessons, students who pursue a task-approach goal use their own intrapersonal trajectory as the evaluative referent (Elliot et al., 2011). Because they focus on improving themselves in the PE tasks, they may feel more able to meet the requirements of the evaluation task and, consequently, they may increase their perceived control (Cheng et al., 2009)

In the general test anxiety literature, past studies evidenced that the relationships of other-approach goals (previously labeled performance-approach goals) with the four negative factors of test anxiety were weak or non-significant (e.g. Flanagan et al., 2015; Putwain et al., 2010). In the present study, other-approach goals did not predict the four negative dimensions of PE test anxiety, but they positively predicted the perceived control dimension, which is the positive dimension of PE test anxiety. Daniels et al. (2013) showed that students who

adopt performance goals have a high perceived control when they are in a context which offers the possibility of demonstrating their competence compared to others. This is the case in PE (Ommundsen, 2001) and in an evaluative context, which is probably why other-approach goals in PE were found to be positive predictors of perceived control.

Previous studies on general test anxiety also evidenced that other-avoidance goals positively predicted the negative factors of test anxiety (Pekrun et al., 2009; Putwain et al., 2010), and in particular worry and tension, recognized as cognitive components increasing vigilance for threat (Flanagan et al., 2015). In contrast, the present study did not evidence any relation in PE between other-avoidance goals and the four negative factors of test anxiety. Other-avoidance goals negatively predicted the positive dimension of PE test anxiety (perceived control). Because they are focused on normative evaluation and on fear of performing worse than classmates (Flanagan et al., 2015; Hagtvet and Benson, 1997; Putwain and Symes, 2012), anticipating failure in comparison with other students does not allow them to cope adaptively in facing the perceived threat and, consequently, decreases perceived control.

Finally, the present study also investigated the potential moderating role of gender between achievement goals and test anxiety in PE. An interaction between other-avoidance goals and gender was found in predicting bodily symptoms, but simple slope analyses did not reveal significant findings for men and women. While girls have usually higher scores than boys in PE test anxiety (Danthony et al., 2019, 2020) and while the PE literature remains inconclusive concerning the relationships between achievement goals and gender (Liu et al., 2017), the pattern of relationship between achievement goals and test anxiety in PE appeared to be similar for each gender.

This study is not without limitations. First, the present study was conducted in only one country – France – and cross-cultural designs may help us to examine if the pattern of

results would be different in other countries. Secondly, the results mainly concerned adolescents. Because test anxiety is specific for children (Wren and Benson, 2004), studying the relationships between achievement goals and PE test anxiety with children may be a promising perspective. Thirdly, some of the β coefficients from the regression equation were rather low and these results should therefore be taken with caution. Fourthly, the present study highlighted many relationships between achievement goals in PE and PE test anxiety. Since another study (Danthony et al., 2020) has shown that implicit theories about the nature of athletic ability were predictors of PE test anxiety and since achievement goals were identified as mediators between implicit theories and performance in the academic domain (e.g. Cury et al., 2006), it would be possible to test in the same study the potential mediating role of achievement goals between implicit theories and PE test anxiety. Fifthly, the present study did not show how the way of teaching PE may influence test anxiety in this school subject. While the motivational environment influences achievement goals during learning lessons (Smith et al., 2016), nothing was known to date about its potential influence on test anxiety. Identifying the motivational environment may be self-reported by PE teachers and/or students. Using the Multidimensional Motivational Climate Observation System (Smith et al., 2016), the motivational environment may also be assessed through video analyses of PE teaching during tests and examinations to highlight if it may influence test anxiety either immediately during the test (by assessing state test anxiety) or over a longer period using a longitudinal design (by assessing the evolution of trait test anxiety throughout the school year).

CONCLUSION

The aim of the present study was to investigate the predictive role of the 3 x 2 achievement goal model on test anxiety in the PE context. The four negative factors of test anxiety were positively predicted by avoidance-based goals, while approach-based goals negatively predicted them. It was the opposite for perceived control, which is the positive

factor of test anxiety. Contrary to the only study focusing on test anxiety in the academic context and the 3 x 2 model of achievement goals, which mostly highlighted the predictive role of other-avoidance goals (Flanagan et al., 2015), self-avoidance goals were the most prominent goals in predicting the negative factors of PE test anxiety. The present study also highlighted that other-avoidance goals negatively predicted the positive dimension of PE test anxiety (perceived control). All these results evidenced the specific context of PE test anxiety. There are still attractive gaps to fill to interpret the results found in this study from another point of view. A better understanding of the psychological context during evaluation may decrease test anxiety and, consequently, contribute to greater success and enjoyment of students in PE.

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Figure 1. *The interaction between other-avoidance goals and gender in predicting bodily symptoms.*

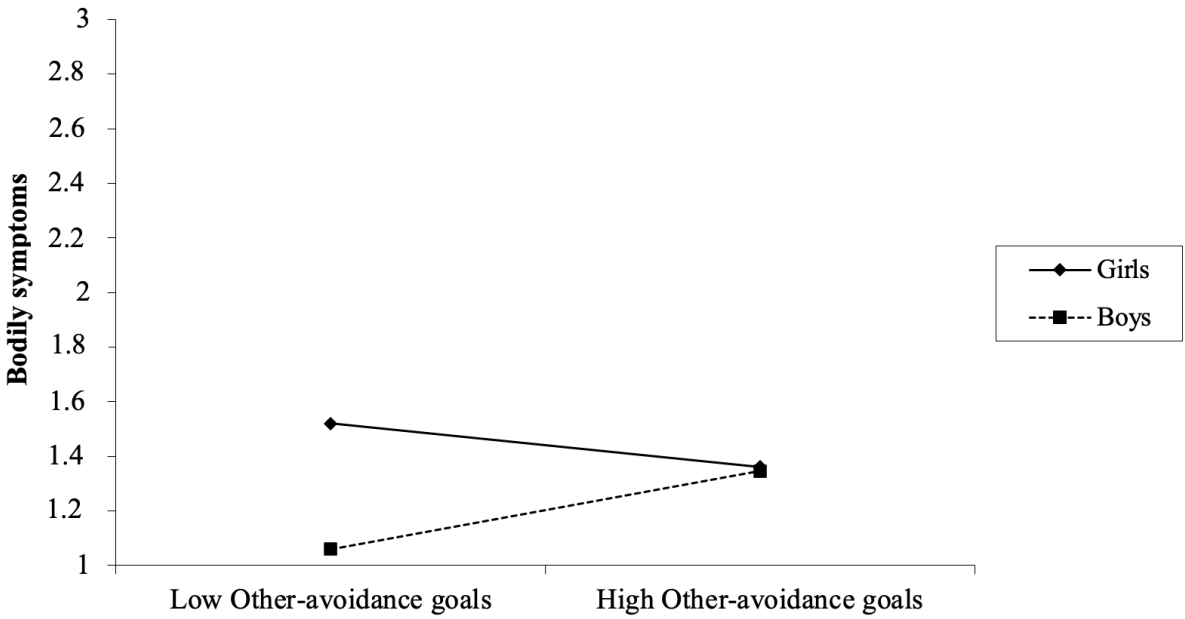


Table 1. *Descriptive statistics of the final sample*

Variables	Mean / Standard Deviation				
	Full sample	Boys	Girls	French <i>collège</i>	French <i>lycée</i>
Worry	2.13 / 0.76	1.80 / 0.67	2.34 / 0.75	2.12 / 0.78	2.14 / 0.75
Self-focus	1.79 / 0.90	1.52 / 0.70	1.96 / 0.97	1.91 / 0.95	1.73 / 0.87
Bodily symptoms	1.65 / 0.68	1.52 / 0.64	1.74 / 0.69	1.60 / 0.65	1.68 / 0.70
Somatic tension	1.65 / 0.79	1.45 / 0.60	1.78 / 0.87	1.63 / 0.77	1.67 / 0.80
Perceived control	2.80 / 0.85	3.24 / 0.72	2.52 / 0.81	2.76 / 0.85	2.82 / 0.85
Task-approach	5.95 / 1.26	6.17 / 1.09	5.81 / 1.34	6.03 / 1.25	5.90 / 1.27
Self-approach	5.93 / 1.25	5.99 / 1.11	5.89 / 1.33	6.06 / 1.22	5.87 / 1.26
Other-approach	3.12 / 1.93	3.78 / 2.08	2.70 / 1.71	3.06 / 1.92	3.14 / 1.94
Task-avoidance	5.38 / 1.59	5.20 / 1.80	5.49 / 1.43	5.29 / 1.72	5.43 / 1.51
Self-avoidance	5.43 / 1.49	5.16 / 1.73	5.59 / 1.29	5.40 / 1.52	5.44 / 1.48
Other-avoidance	3.25 / 1.84	3.53 / 1.92	3.07 / 1.76	3.05 / 1.77	3.36 / 1.87

Table 2. *Correlations between variables*

Variables	Task- approach	Self- approach	Other- approach	Task- avoidance	Self- avoidance	Other- avoidance	Gender
Worry	-.22***	-.13**	-.07	.10*	.15**	.11*	-.34***
Self-focus	-.26***	-.21***	-.10*	.10*	.07	.08	-.24***
Bodily symptoms	-.09	-.14**	.01	.03	.09*	.09*	-.16***
Somatic tension	-.18***	-.19***	-.01	.07	.10*	.11*	-.21***
Perceived control	.37***	.25***	.30***	-.03	-.10*	.02	.42***

Notes. * $p < .05$, ** $p < .01$, *** $p < .001$, Gender (boys = 1, girls = 0)

Table 3. Summary of simultaneous regression analyses predicting test anxiety components

	Worry			Self-focus			Bodily symptoms			Somatic tension			Perceived control		
	R^2	β	sr^2	R^2	β	sr^2	R^2	β	sr^2	R^2	β	sr^2	R^2	β	sr^2
	.19***			.15***			.08***			.13***			.32***		
Gender		-0.32***	-.30		-0.20***	-.19		-0.17***	-.16		-0.20***	-.18		0.33***	.31
Tap		-0.23**	-.12		-0.26**	-.13		-0.07	-.04		-0.22**	-.11		0.29***	.15
Sap		-0.03	-.02		-0.07	-.04		-0.20*	-.11		-0.20**	-.11		0.01	.01
Oap		0.02	.01		-0.06	-.03		0.17	.07		0.19	.08		0.27**	.12
Tav		0.07	.04		0.20*	.10		0.04	.02		0.14	.07		-0.03	-.01
Sav		0.16*	.09		0.00	.00		0.19*	.10		0.17*	.09		-0.10	-.05
Oav		0.10	.05		0.08	.04		-0.12	-.06		-0.04	-.02		-0.18*	-.09
Tap X Gender		0.01	.01		0.06	.03		0.08	.05		0.12	.07		-0.03	-.02
Sap X Gender		0.04	.03		-0.02	-.01		0.04	.02		0.08	.05		0.03	.02
Oap X Gender		-0.00	-.00		0.08	.04		-0.14	-.06		-0.10	-.05		-0.09	-.04
Tav X Gender		-0.02	-.01		-0.05	-.02		-0.10	-.05		-0.09	-.05		0.02	.01
Sav X Gender		-0.09	-.04		0.03	.01		-0.09	-.04		-0.06	-.03		0.03	.01
Oav X Gender		0.01	.01		-0.05	-.02		0.22*	.10		0.05	.03		0.07	.03

Note. * $p < .05$, ** $p < .01$, *** $p < .001$, Tap = Task-approach goals, Sap = Self-approach goals, Oap = Other-approach goals, Tav = Task-avoidance goals, Sav = Self-avoidance goals, Oav = Other-avoidance goals, gender (boys = 1, girls = 0), sr^2 = squared semipartial correlation.