



UNIVERSIDADE D  
COIMBRA

Mariana Monteiro Alves

**THE IMPACT OF TEACHERS' FEAR APPEALS ON TEST ANXIETY:  
HOW ACCEPTANCE MEDIATES THIS RELATIONSHIP  
AND WELL-BEING DOES NOT BUFFER IT**

**Dissertação no âmbito do Mestrado Integrado em Psicologia, área de especialização em Psicologia Clínica e da Saúde, subárea de especialização em Intervenções Cognitivo-Comportamentais nas Perturbações Psicológicas e Saúde, orientada pela Professora Doutora Maria do Céu Salvador e apresentada à Faculdade de Psicologia e de Ciências da Educação.**

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F A C U L D A D E  
D E P S I C O L O G I A E D E  
C I Ê N C I A S D A E D U C A Ç Ã O  
U N I V E R S I D A D E D E  
C O I M B R A

*“If you aren’t willing to have it,  
you will.”*

Steven Hayes

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**The impact of teachers' fear appeals on test anxiety:  
how acceptance mediates this relationship, and well-being does not buffer it**

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## Abstract

Although several studies have provided evidence of the positive effects of acceptance on well-being and on test anxiety, the relationship between acceptance and fear appeals (fear-induced messages used by teachers about the importance or proximity of a test/exam) and its impact on test anxiety, have never been subject of research. Furthermore, few studies have focused on fear appeals, and how they are appraised (as a challenge or a threat), as possible predictors of test anxiety; and the studies that did, usually had a more educational approach, whereas our study had a more clinical approach. Since no prior studies addressed all these variables together, this was the general aim of the present study, as was to investigate the impact of these relationships in the development and maintenance of test anxiety. The exploratory longitudinal study used measures in two time points, one month and a half from each other. The sample was constituted by students from 9<sup>th</sup> to the 12<sup>th</sup> grade ( $N = 458$ ;  $M_{age} = 15.46$ ;  $SD = 1.22$ ) from four high schools in Portugal. Partial correlations (controlling for gender) revealed that threat appraisals and test anxiety were positively and significantly associated with each other, while negatively and significantly associated with acceptance and subjective well-being. Multiple linear regressions allowed to conclude that acceptance, threat appraisals, subjective well-being and gender were significant predictors of test anxiety. A moderated mediation model, estimated using PROCESS, revealed that threat appraisals were directly and indirectly associated, through lack of acceptance, to test anxiety. However, moderator analyses revealed that subjective well-being was not a moderator of the relationships between threat appraisals and acceptance, threat appraisals and test anxiety, and acceptance and test anxiety. In conclusion, results show the importance of threat appraisals and lack of acceptance in understanding test anxiety. Other results are discussed, as well as contributions of the present study and possible clinical implications.

**Key-words:** test anxiety; fear appeals; threat and challenge appraisals; acceptance; subjective well-being.

## Resumo

Embora diversos estudos tenham demonstrado o efeito positivo da aceitação no bem-estar e na ansiedade aos testes, a relação entre aceitação e as mensagens indutoras de medo (usadas pelos professores acerca da importância ou proximidade de um exame/teste), e o seu impacto na ansiedade aos testes, nunca foi estudado. Ademais, poucos estudos abordaram o impacto das mensagens indutoras de medo, e o modo como estas são interpretadas (como desafio ou ameaça) como possíveis preditores de ansiedade aos testes; sendo que, os estudos que o fizeram, apresentavam uma abordagem mais educacional, enquanto que o presente estudo apresentava uma abordagem clínica. Uma vez que não existiam estudos que correlacionassem todas estas variáveis, esse foi o objetivo do presente estudo, explorando, particularmente, as implicações das diferentes relações estabelecidas para o desenvolvimento e manutenção da ansiedade aos testes. Este estudo longitudinal compreendeu medidas recolhidas em dois tempos, separados por um mês e meio. A amostra era constituída por estudantes do 9.º ao 12.º ano ( $N = 458$ ;  $M_{idade} = 15.46$ ;  $DP = 1.22$ ). Correlações parciais revelaram associações positivas e significativas entre interpretações de ameaça e ansiedade aos testes, associando-se estas significativamente e negativamente com o bem-estar subjetivo e a aceitação (que se correlacionaram positivamente entre si). A frequência das mensagens indutoras de medo associou-se significativamente apenas com as interpretações de ameaça, enquanto que as interpretações de desafio se associaram apenas significativamente com o bem-estar subjetivo. Regressões lineares múltiplas permitiram concluir que a aceitação, as interpretações de ameaça, o bem-estar subjetivo e o género eram preditores significativos de ansiedade aos testes. Um modelo de mediação moderada foi estimado com o PROCESS, revelando que as interpretações de ameaça estavam direta e indiretamente associadas, através da falta de aceitação, com a ansiedade aos testes. Contudo, as análises de moderação revelaram que o bem-estar subjetivo não era moderador de nenhuma das relações do modelo. Em conclusão, os nossos resultados demonstram a importância das interpretações de ameaça e da falta de aceitação para a compreensão da ansiedade aos testes. Outros resultados são discutidos, tal como as contribuições do presente estudo e possíveis implicações clínicas.

**Palavras-chave:** ansiedade aos testes; impacto das mensagens indutoras de medo; interpretações de ameaça e de desafio; aceitação; bem-estar subjetivo



## **Introduction**

### ***Test Anxiety***

“Test anxiety” refers to the set of phenomenological, cognitive, physiological, and behavioral responses that accompany concern about the possible negative consequences of a poor performance in tests, exams or similar evaluative situations (Zeidner, 1998). It is a high prevalent phenomenon, experienced by many students of different ages and with significant interference in various domains of their lives (Krispenz et al., 2019). For adolescents, the educational context represents one major life domain. They devote a considerable amount of time and effort to school, which represents a major growth environment (Tian, 2015), potentially shaping their future academic and/or professional lives. Therefore, test situations represent a major topic of concern and may turn into a source of anxiety (APA, 2013)

Test anxiety is a multidimensional construct from which several facets can be distinguished: a cognitive facet (i.e., worry, irrelevant thinking, etc.); a behavioral facet (i.e., deficient study skills, procrastination, avoidance behaviors, etc.); and an affective–physiological facet (i.e., tension, bodily reaction, perceived arousal) (Pekrun, 2006; Zeidner & Mathews, 2005). Thus, test-anxious individuals may be characterized by their thoughts, somatic reactions, feelings, and observable behaviors in evaluative situations (Sarason, 1984).

Worry is considered the most powerful cognitive component of test anxiety (Sarason, 1988), being conceptualized as a cognitive concern about the possibility of failure, embarrassment, disappointment and fear of being negatively judged by teachers, parents, and others. It may also lead to cognitive disturbances such as concentration difficulty, oversensitivity, and memory problems (Huberty & Dick, 2006; Liebert & Morris, 1967; Lowe et al., 2008; Rothman, 2004; Zeidner, 1998). Instead of engaging in task-oriented thinking, test-anxious individuals become focused on their own distractive, negative and repetitive thoughts and self-evaluation, which can possibly hinder their performance (Sarason, 1986; Zeidner, 1998).

On an affective level, the Emotionality component of test anxiety is evident through physiological disturbances such as perspiration, dizziness, nausea, and rapid heartbeat (Huberty & Dick, 2006). Test anxiety is thus associated with unpleasant feelings of agitation, panic, insecurity, and helplessness, which may evoke certain motivational

consequences (Huberty & Dick, 2006), possibly resulting in maladaptive behaviors (e.g. procrastination) (Zeidner & Mathews, 2005).

### ***Teachers' Fear Appeals and Test Anxiety***

In the educational context, classroom environment and teacher-student relationships are major tools in enhancing student motivation and resilience, with the ability of improving academic performance (Brok et al., 2004; Martin, 2001). Aiming to encourage students to work hard, persist with difficulties, and engage with their studies, teachers often make use of messages conveying the consequences of test failure (Putwain & Roberts, 2009, 2012). However, the use of these kind of messages may have a harmful effect, including increased anxiety (Putwain & Best, 2012).

Fear appeals can hence be defined as persuasive messages, given by teachers to students, prior to tests or examinations (Putwain et al., 2017), highlighting the negative consequences (e.g., academic failure) that can follow a particular course of action (e.g., not making an effort), and indicating how the threat of failure could be avoided by engaging in an alternate course of action (e.g., studying harder) (Putwain et al., 2018; Putwain & Symes, 2014;). Negative consequences pointed out by teachers may relate to future educational attainment, occupational aspirations, one's sense of self-worth, or social concerns (Putwain et al., 2018). Teachers use these messages as a means to encourage students to engage in actions that are likely to result in academic success (Putwain, 2009).

However, Putwain and Symes (2014, 2016) state that the educational consequences that follow fear appeals do not depend on their use per se, but rather on their interpretations by the students. These appraisals are conceptualized as cognitive judgements about one's values and beliefs, triggering emotions and behavioral intentions (Folkman, 2008; Lazarus, 2006). Since judgements become more salient when prompted more frequently, a higher frequency of fear appeals will relate with both threat and challenge appraisals (Putwain et al., 2014; Putwain et al., 2017). Therefore, if students value the particular outcomes featured in the message (e.g., academic success) and believe in their ability to achieve them, they will likely interpret the message as a challenge, experience positive emotions (e.g., hope and optimism), and engage in positive behavior (e.g., work hard and concentrate during lessons) (Putwain et al., 2018). However, if students value the outcomes featured in the messages but do not believe in their ability to achieve them, they will likely interpret the message as a threat,

experiencing negative emotions (e.g., hopelessness and anxiety) and responding with avoidance behaviors (e.g., procrastination) (Putwain et al., 2018). Threat appraisals have been found to predict maladaptive cognitions, emotions, and behaviors, whereas challenge appraisals have been linked to adaptive outcomes (McGregor & Elliot, 2002; Putwain & Remedios, 2011, 2014; Putwain et al., 2015; Putwain et al., 2016; Putwain et al., 2017; Putwain, Symes & Wilkinson, 2017; Skinner & Brewer, 2002).

Furthermore, threat appraisals seem to relate to higher test anxiety and a higher performance-avoidance goal (to avoid performing worse than one's classmates), lower intrinsic motivation, and lower examination performance (Putwain & Remedios, 2014; Putwain & Roberts, 2009; Putwain & Symes, 2011). On the other hand, challenge appraisals will result in higher self-efficacy, attainment value, and engagement, (Putwain et al., 2015; Putwain et al., 2016). A study carried out by Putwain and Best (2011) revealed that students with high levels of test anxiety were particularly susceptible to fear appeals, reporting increased threat appraisals.

### ***Subjective Well-being and Test Anxiety***

Subjective well-being (SWB) involves two related dimensions: a cognitive and an affective one, both of which refer to an evaluation of life (Pu, 2015). The affective component is defined as a relationship between positive affect (PA; i.e., frequent positive emotions) and negative affect (NA; i.e., infrequent negative emotions). The cognitive component can be conceptualized as a judgment of overall quality of life (LS; global life satisfaction) or with regard to specific domains (e.g., peer and family relationships, school experiences) (Long, 2012). Although there have been few studies examining SWB among children and adolescents, results suggest an equal tripartite model of well-being in youth, thus including the constructs of PA, NA and global LS (Huebner & Dew, 1996).

In children and adolescents, higher levels of SWB are associated with a number of positive attributes and behaviors (e.g. fewer anxiety and depressive symptoms) and it is also an important determinant of resilience when facing stressful life experiences (Antaramian et al., 2010).

Regarding adolescents' subjective well-being, recent research has focused on different school-related variables, demonstrating the importance of teacher support, peer behavior (Tian et al., 2013) and academic competence (Tian & Liu, 2007) to school satisfaction. Furthermore, a study carried out by Steinmayr et al. (2016) showed that test anxiety related positively to higher emotion-focus (e.g., trying to control anxiety

symptoms) and higher avoidance (e.g., trying not to think about the test), thus negatively influencing both components of SWB, being that worry, in particular, was a powerful predictor of changes in student's SWB. Other studies (e.g., Hascher, 2007; Martin et al., 2012) found associations of SWB with a range of positive outcomes, including achievement, positive academic beliefs, enjoyment of school, and lower anxiety, with subjective well-being also being negatively correlated with general school anxiety and test anxiety.

### ***Acceptance and Commitment Therapy***

Acceptance and Commitment Therapy (ACT) is grounded in the Relational Frame Theory (RFT), according to which language is associated with psychopathology since valued behavior is narrowed or abandoned in order to cope with cognitive activity (Arch et al., 2008). ACT's goal is not to reduce or remove difficult and unwanted feelings or thoughts, but rather to focus on important aspects of life, including the negative and inevitable ones (Hayes, 2004; Hayes et al., 2011; Hayes et al., 2012). Thus, ACT aims to facilitate psychological flexibility, defined as "the ability to contact the present moment more fully as a conscious human being, and to change or persist in behavior when doing so serves valued ends" (Hayes & Strosahl, 2004, p. 5). Six core processes are conceptualized to achieve psychological flexibility: acceptance, cognitive defusion, present-focused attention, self-as-context, values and commitment action (McCracken & Morley, 2014). Acceptance refers to letting thoughts and feelings be as they are, without trying to block, avoid or change them. Cognitive defusion intends to make thoughts be seen as simply what they are (thoughts) and not be taken literally. Present-focused attention relates to experiencing the here and now with openness, interest and receptiveness. Self-as-context refers to becoming aware of one's own experiences, without being attached to them; values refer to identifying aspects of life that are essential to oneself. Finally, committed action refers to actions associated with the chosen values (Hayes et al., 2012; Massumi, 2017).

As previously mentioned, worry, the cognitive component of test anxiety, is responsible for flooding test anxious students with trivial and potentially distracting thoughts, preventing them from being focused on the task itself (Brown et al., 2010). With this in mind, an acceptance-based approach may help individuals notice negative thoughts and lapsed focus, nonjudgmentally, and gently redirect their attention to the task again, rather than expending resources engaging with and trying to fight or change their

thoughts, feelings and sensations (Brown et al., 2010). Similarly, adopting a more accepting attitude towards negative feelings and somatic symptoms experienced in test anxiety situations, instead of trying to avoid or control them, could result in decreased anxiety over time (Senay et al., 2012). Thus, acceptance-based approaches may be especially suited for test anxious individuals, since evaluative situations involve the combination of anxious thoughts and feelings, distractibility and the need for attentional focus (Brown et al., 2010). In fact, a study carried out by Graça (2015) demonstrated a negative correlation between acceptance and test anxiety. Additional research has shown that ACT interventions influenced both anxiety and well-being (Hayes, 1987; Trompeter et al., 2017; Räsänen et al., 2016) and that they can be effective in treating test anxiety (Brown et al., 2010).

### ***The Present Study***

Some studies have linked the impact of teachers' fear appeals with test anxiety. Others have associated subjective well-being with test anxiety. Additionally, different studies pointed to the positive influence of acceptance in test anxiety. However, to the best of our knowledge, no studies have investigated how acceptance and well-being can influence the impact of teachers' fear appeals in test anxiety. Furthermore, most studies focused on test anxiety explored this variable mostly on college students (adults) and with cross-sectional studies, and not so much in longitudinal studies with adolescents.

Therefore, a longitudinal study was conducted, to explore, in an adolescent sample, the relationship between the aforementioned variables. Namely, we expected that threat appraisals, message frequency of fear appeals, and test anxiety would be significantly and positively correlated, and that all these measures would be significantly and negatively correlated with acceptance and subjective well-being (that would also be positively correlated to each other); we also expected challenge appraisals to be positively correlated to message frequency of fear appeals and to subjective well-being but negatively associated to test anxiety and acceptance (H1). It was also hypothesized that threat appraisals, message frequency of fear appeals, acceptance and subjective well-being would be significant predictors of test anxiety (H2). A further hypothesis was that the relationship of threat appraisal with test anxiety and the relationship of message frequency of fear appeals with test anxiety would be mediated by acceptance (H3). Finally, it was expected that subjective well-being would be a significant moderator in all the relationships proposed. Namely, on one hand, subjective well-being would weaken the

relationship between threat appraisals and test anxiety, message frequency of fear appeals and test anxiety, threat appraisals and acceptance, message frequency of fear appeals and acceptance; on the other hand, subjective well-being would strengthen the relationship between acceptance and text anxiety (H4).

## **Method**

### ***Participants***

In order to accomplish the aforementioned objectives for this investigation, an exploratory longitudinal study with measures in two time points was carried out with a sample of Portuguese adolescents, aged 13 to 18, from three schools of the North and Centre regions of Portugal. Exclusion criteria were: (1) students below 13 years old and over 18 years old, (2) incomplete filling of the questionnaires, and (3) evidence of random answers to the instruments.

The total sample consisted of 458 participants, of which 273 (59.6%) were female and 185 (40.4 %) were male, with a mean age of 15.46 ( $SD = 1.22$ ) from the 9<sup>th</sup> to the 12<sup>th</sup> grade ( $M = 10.19$ ;  $SD = 1.17$ ), most participants being found to be in the 9<sup>th</sup> grade (39.7 %). Also, the majority of participants had low socioeconomic level (52%), and their residence was predominantly in the Centre and North regions of Portugal. Most students reported to not have failed any year (85.6%), followed by one failed year (9.6%). Most participants did not report any medical or psychological illness and of those who reported the presence of the latter, 44 (9.6%) said to be having psychological counselling at the time of the filling. There were no statistically significant gender differences in age ( $F_{(1)} = .14$ ;  $p = .71$ ), school years ( $F_{(1)} = .03$ ;  $p = .87$ ) or socioeconomic level ( $\chi^2_{(3)} = 1.03$ ;  $p = .79$ ).

### ***Measures***

Firstly, participants were asked to complete a sociodemographic questionnaire in order to access information regarding their age, gender, current school year, number of school retentions, average grade in the previous school year, information on their socioeconomic level and information regarding the participants' involvement in psychological counselling at the time. Participants were then administered a set of self-report instruments in two moments in time: Time 1 (T1) and Time 2 (T2), with a month and a half interval between them.

The **Reactions to Tests for Adolescents** (RT-A; Sarason, 1984; Portuguese version for adolescents by Vicente, 2011) is a self-report questionnaire which intends to measure the anxiety felt by students in test situations. The original scale consists of 40 items (34 in the Portuguese version) rated on a 4-point Likert scale that ranges from 1 (*not at all typical of me*) to 4 (*very typical of me*). The scale is composed by four factors: Tension, Worry, Test-Irrelevant Thinking and Bodily Reactions. The original version revealed an adequate internal consistency for the total scale and its factors (between .61 and .81) and good convergent validity. The Portuguese version for adolescents presented good internal consistency ( $\alpha = .93$  for the total scale and from  $\alpha = .75$  to  $\alpha = .90$  for its factors), good test-retest reliability ( $r = .83$ ) and good convergent validity. In this study the scale was used in Time 2 and also presented good internal consistency ( $\alpha = .96$  for the total scale, and from .84 to .94 for the factors).

The **Teacher's Use of Fear Appeals Questionnaire** (TUFAQ; Putwain et al., 2019; Portuguese translation and adaptation by Pires et. al, 2020) is a self-report instrument for adolescents with 15 items structured around three factors scored separately: (a) Message Frequency, referring to the students' appraisal of how frequently their teachers transmit messages about exam failure and its consequences; (b) Threat Appraisal, referring to the appraisal of those messages as a threat, encompassing anticipation of loss and harm with a focus on self-protection; and (c) Challenge Appraisal, referring to the appraisal of those messages as a challenge, encompassing focus on growth and mastery. Items are divided in three groups of questions; each group begins with a frequency message and is followed by four items to judge appraisal of that message (two challenge and two threat items). Participants rate the frequency they think each statement occurs on a 5-point Likert scale that ranges from 1 (*never*) to 5 (*always*). Albeit not yet validated for Portuguese adolescents, Pires et al. (2020) translated and adapted the instrument for the Portuguese language and school context, being the version used in this study. In the original study, the factors presented acceptable to high internal consistencies with Cronbach's alphas ranging from .70 to .87. In this study, Time 1 score of this scale was used, having presented acceptable to high internal consistencies, with Cronbach alphas ranging from .77 to .86.

The **TestAnxiety Acceptance and Action Questionnaire for Adolescents** (TA-AAQ-A; Pires et al., 2020) is a 12-item self-report measure that aims to assess acceptance of anxiety symptoms in test situations. It was adapted from the previous validated Social Anxiety - Acceptance and Action Questionnaire (SA-AAQ; MacKenzie & Kocovski,

2010). Items are reverse-scored due to their formulation, and rated on a 7-point Likert scale ranging from 1 (*never true*) to 7 (*always true*). Higher scores refer to higher levels of acceptance of test anxiety symptoms, without trying to control, change, or avoid them. The scale presented high internal reliability ( $\alpha = .93$ ) and temporal stability, and good convergent validity with measures of test anxiety, interference of test anxiety in school and mindfulness skills. In the present study the scale Time 2 score was used. The internal consistency was high, with a Cronbach's alpha of .95.

The **Mental Health Continuum-Short Form-For Youth** (MHC-SF; Keyes, 2009; Portuguese version by Matos et. al, 2010) is a self-report measure containing 14 items, rated in a 6-point Likert scale that ranges from 0 (*never*) to 5 (*everyday*), that aims to assess subjective well-being. This scale contemplates states of mental health in a continuum, estimated by level of well-being, as perceived by the adolescent referring to the last month. The scale is divided in three factors: Emotional, Social and Psychological Well-being. The original study presented high internal consistency of the scales with Cronbach's alphas ranging from .78 to .84. The Portuguese version presented excellent internal consistency for the total scale ( $\alpha = .90$ ) and the factors Emotional well-being ( $\alpha = .85$ ), Social well-being ( $\alpha = .80$ ) and Psychological well-being ( $\alpha = .83$ ). In this study the scale was used in Time 2 and presented good psychometric measures, with Cronbach's alphas of .92 for the global scale, and ranging from .84 to .85 for its factors.

### ***Procedure***

After the study was approved by the Ethics Committee of the Faculty of Psychology and Educational Sciences of the University of Coimbra, the sample collection process began. This study was included in a broader PhD Project focusing on test anxiety in adolescents. In this larger study, several schools across Portugal were contacted to obtain their consent for the students' participation in this study. Three schools in the central and north regions agreed to collaborate. Data was collected in a classroom setting.

Since the sample was mainly composed by minors, consents had to be provided by students' legal guardians. These included an explanation of the study as well as contacts of the responsible parties in this study, in case of any emerging doubt. After explaining the research purposes, ensuring the voluntary participation and confidentiality of the participants, as well as the use of the data exclusively for research purposes, students also signed an informed consent. The research protocol was answered in paper format, had an average filling time of 20 minutes, and contemplated two counterbalanced versions, in



order to prevent effects of response contamination and fatigue. The protocol was administered in two moments in time: Time 1 (T1) and Time 2 (T2), separated one and half months from each other. In order to correctly match participants across the two waves of data collection students were asked, at Time 1, to generate an easy to remember code, that they would later use at Time 2, allowing to link the participants' data.

### *Data analysis*

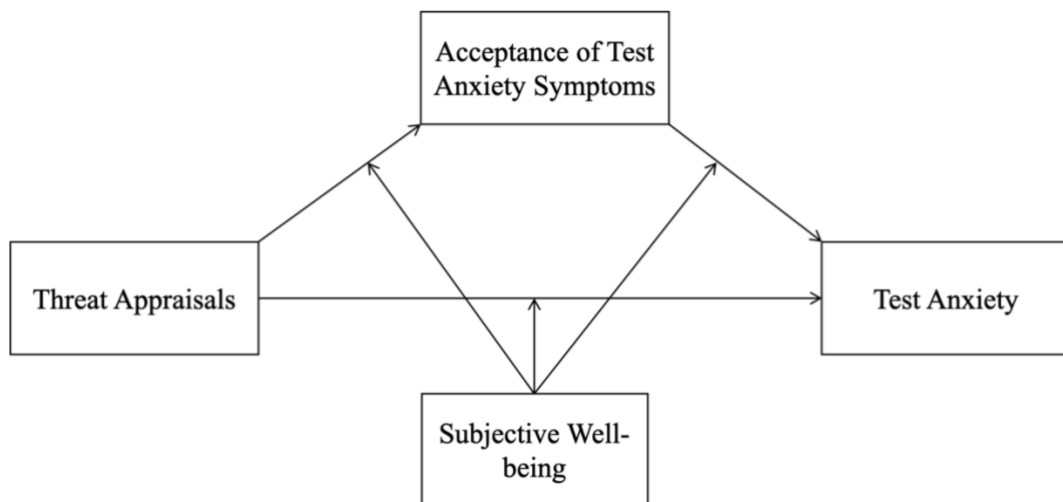
Statistical analysis was carried out using the SPSS program (Statistical Package for the Social Sciences version 23.0; Armonk, NY: IBM Corp.) and the PROCESS computation tool (version 3.3) for SPSS (Hayes, 2018). In order to distinguish socioeconomic level (low, medium and high), Simões' classification (1994) was taken into account. Through the examination of skewness and kurtosis of each variable, adherence to normality was assessed, where skewness and kurtosis values between -2 and 2 were considered reasonably normally distributed (George & Mallery, 2010). Outlier's analysis was performed by graphing the results (box diagrams). To test multicollinearity, the variance inflation factor ( $VIF < 5$ ) and the correlation matrix for all constructs were examined (Kline, 2005).

Gender differences for variables under study were tested using univariate analyses of variance (One Way ANOVA). The interpretation of the effect size parameter was based on Cohen's criteria (1988), according to which partial eta square values from .01 to .06 are considered small, from .07 to .13 medium and above .14 large. Demographic variables and variables under study were analyzed by performing descriptive statistics. Internal consistency indices for each instrument were calculated, considering Cronbach's values less than .60 as inadmissible, between .60 and .69 low, from .70 to .79 acceptable, between .80 to .89 high, and excellent between .90 to 1 (Pestana & Gageiro, 2008). In order to explore the relationship between variables under study, according to the proposed hypotheses, Pearson correlation coefficients were conducted. In assessing their magnitude, we considered values lower than .20 to reveal a very low association, between .21 and .39 a low association, from .40 to .69 a moderate one, from .70 to .89 a high correlation and between .90 and 1 an excellent one (Pestana & Gageiro, 2008).

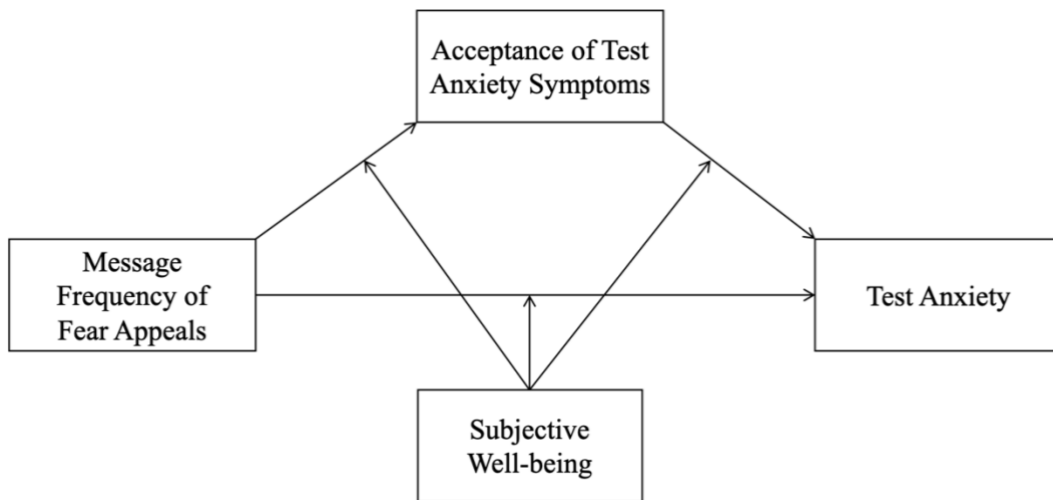
Prior to the path analysis, multiple linear regression analyses were performed to investigate the variables most likely to predict test anxiety and whether any variable would be excluded from the subsequent moderated mediation model. The predictors (threat appraisals, message frequency of fear appeals, acceptance and subjective well-

being) were simultaneously entered into the regression model. An alpha level of .05 was set for significance of hypothesis testing.

To examine weather threat appraisals and message frequency of fear appeals were associated with test anxiety through acceptance and whether all of these relationships were moderated by subjective well-being, two moderated mediation models were estimated with PROCESS (Hayes, 2018). In the first model (Fig 1.) the moderator was hypothesized to affect the paths linking threat appraisals and test anxiety, threat appraisals and acceptance, and acceptance and test anxiety (model 59 in Hayes, 2018). For the second model (Fig 2.), the moderator was hypothesized to affect the paths between frequency of fear appeals and test anxiety, frequency of fear appeals and acceptance, and acceptance and test anxiety (model 59 in Hayes, 2018). The indirect or mediation effect was assessed using a bootstrapping procedure with 10,000 resamples. This procedure creates 95% bias-corrected and accelerated confidence intervals (95% BCaCIs) of the indirect effects, which are considered significant if zero is not contained within the lower and upper CIs. The index of moderated mediation was used as a formal test of moderation of the indirect effect by the moderators in the model.



**Fig 1.** Conceptual diagram of the proposed moderated mediation model, with Threat Appraisals as the independent variable (Model 59).



**Fig 2.** Conceptual diagram of the proposed moderated mediation model, with Frequency of Fear Appeals as the independent variable (Model 59).

## Results

### *Preliminary Results*

Missing values in the variables under study were filled by factor or total mean substitution. However, in the TUFAQ a few missing values were found for all the items of the message frequency factor, thus making it impossible to fill these missing values. Therefore, the variable message frequency of fear appeals presents a smaller sample number ( $N = 386$ ), when comparing with the total sample ( $N = 458$ ). There were no severe violations to the normal distribution of the variables, with values of kurtosis and skewness within normal values (between  $-.29$  to  $.04$ ). Even though there were moderate outliers for some variables under study, after assuring there were no significant differences in results with or without outliers, we opted to keep them and insure ecological validity. No multicollinearity problems among study variables were found when checking the variance inflation factor ( $VIF < 5$ ).

Significant gender differences were found regarding most of our study variables (Test Anxiety (T2), Acceptance of test anxiety symptoms (T2), Subjective Well-being (T2) and Threat Appraisals (T1)). Female students scored significantly higher on test anxiety and threat appraisals, whereas male students scored significantly higher on acceptance and subjective well-being. All significant differences revealed medium partial

eta square values. For this reason, we decided to control for gender in our subsequent analyses, (correlations, multiple linear regressions and moderated mediation models), using it as a covariate. Table 1 presents a summary of gender differences.

**Table 1.** Gender differences for variables under study

	<b>Female</b>	<b>Male</b>	<i>F</i>	$\eta^2$
	<i>(N = 273)</i>	<i>(N = 185)</i>		
	<i>M (SD)</i>	<i>M (SD)</i>		
RT-A (T2)	82.32 (20.91)	67.96 (18.62)	56.92**	.11
TA-AAQ-A (T2)	51.67 (17.74)	61.83 (16.61)	38.08**	.08
MHC-SF (T2)	40.11 (12.72)	46.84 (11.72)	32.92**	.07
TUFAQ-TA (T1)	19.09 (5.39)	16.03 (4.92)	38.07**	.08

*Note:* \* $p < .05$ ; \*\* $p < .001$

### *Correlations*

Descriptive statistics and correlations between variables under study, with and without controlling for gender, can be found in Table 2. The correlation analysis revealed positive, significant and low to moderate associations between test anxiety, threat appraisals and message frequency of fear appeals, and between acceptance of test anxiety and subjective well-being. Moderate to high negative associations were found of acceptance of test anxiety and subjective well-being with test anxiety and threat appraisals. Although challenge appraisals was positively, significantly and moderately correlated with subjective well-being, this variable showed only low associations with the other variables.

**Table 2.** Means, standard deviation and matrix of inter-correlations among study variables

<i>Variables</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>M (SD)</b>	<b>N</b>
<b>1</b> RT-A (T2)	-						76.53 (21.21)	458
<b>2</b> TA-AAQ-A (T2)	-.73** (-.70**)	-					55.78 (17.98)	458
<b>3</b> MHC-SF (T2)	-.45** (-.40**)	.40** (.35**)	-				42.83 (12.75)	458
<b>4</b> TUFAQ-MF (T1)	.17* (.16*)	-.09** (-.07**)	-.04* (-.023*)	-			10.66 (2.65)	386
<b>5</b> TUFAQ-TA (T1)	.62** (.58**)	-.55** (-.51**)	-.41** (-.36**)	.30** (.29**)	-		17.85 (5.42)	458
<b>6</b> TUFAQ-CA (T1)	-.18** (-.20**)	-.12** (-.13**)	.39** (.41**)	.12* (.12*)	-.12** (-.14**)	-	19.94 (4.12)	458

*Note.* Values outside parenthesis represent Pearsons' correlations without controlling for gender. RT-A = Reactions to Tests for Adolescents (T2); TA-AAQ-A = Test-Anxiety-Acceptance and Action Questionnaire for Adolescents (T2); MHC-SF = Mental Health Continuum-Short Form-For Youth (T2); TUFAQ-MF = Teacher's Use of Fear Appeals Questionnaire-Message Frequency (T1); TUFAQ-TA = Teacher's Use of Fear Appeals Questionnaire-Threat Appraisals (T1); TUFAQ-CA = Teacher's Use of Fear Appeals Questionnaire-Challenge Appraisals (T1); M = Mean; SD = standard deviation; \*p < .05; \*\*p < .01.

### ***Preliminary Multiple Linear Regression***

A preliminary multiple regression was conducted to evaluate if threat appraisals, message frequency of fear appeals, acceptance and subjective well-being would predict test anxiety. In order to control for gender, we first conducted a simple regression with gender as the predictor and then a multiple regression with gender, threat appraisals, message frequency of fear appeals, acceptance and subjective well-being as predictor variables. The first model was significant ( $F(1, 384) = 47.46, p < .001$ ), explaining 11% of test anxiety's variance, and gender was found to be a significant predictor of test anxiety ( $\beta = -.33, p < .001$ ). The second model was also significant ( $F(5, 380) = 124.05, p < .001$ ) and explained 62% of test anxiety's variance. Message frequency of fear appeals did not significantly predict test anxiety ( $\beta = .05, p = .142$ ). However, gender ( $\beta = -.08, p = .014$ ), threat appraisals ( $\beta = .22, p < .001$ ), acceptance ( $\beta = -.53, p < .001$ ) and subjective well-being ( $\beta = -.13, p < .001$ ), did significantly predict test anxiety. According to the results, there was a positive association between threat appraisals and test anxiety, and a negative association of acceptance and subjective well-being with test anxiety. Additionally, the negative association between gender and test anxiety indicates that girls were associated with higher test anxiety. Furthermore, by comparing the magnitude of the standardized regression coefficients, acceptance appears to be the strongest predictor of test anxiety, followed by threat appraisals, subjective well-being and gender. Table 3 details the results of the multiple regression analyses. Given that message frequency of fear appeals was not a significant predictor of test anxiety, we opted to exclude it from the subsequent analyses. Therefore, only the model with threat appraisals as a predictor (Fig. 1) was used for the moderated mediation analysis.

**Table 3.** The results of the multiple regression analyses.

Predictor Variables	<i>b</i>	<i>Standart Error</i>	<i>B</i>	<i>p</i>
<b>Model 1</b>				
Constant	96.18	3.13		< .001
Gender	-14.44	2.10	-.33	< .001
R = .33, R <sub>2</sub> = .11, F (1, 384) = 47.46, p < .001				
<b>Model 2</b>				
Constant	100.91	5.78		< .001
Gender	-3.61	1.46	-.08	.014
Threat Appraisals (T1)	.90	.17	.22	< .001
Message Frequency of Fear Appeals (T1)	.40	.27	.05	.142
Acceptance (T2)	-.63	.05	-.53	< .001
Subjective Well-being (T2)	-.21	.06	-.13	< .001
R = .79, R <sub>2</sub> = .62, F (5, 380) = 124.05, p < .001				

### ***A Moderated Mediation Model for Test Anxiety: The Mediating Role of Acceptance and the Moderating Role of Subjective Well-being***

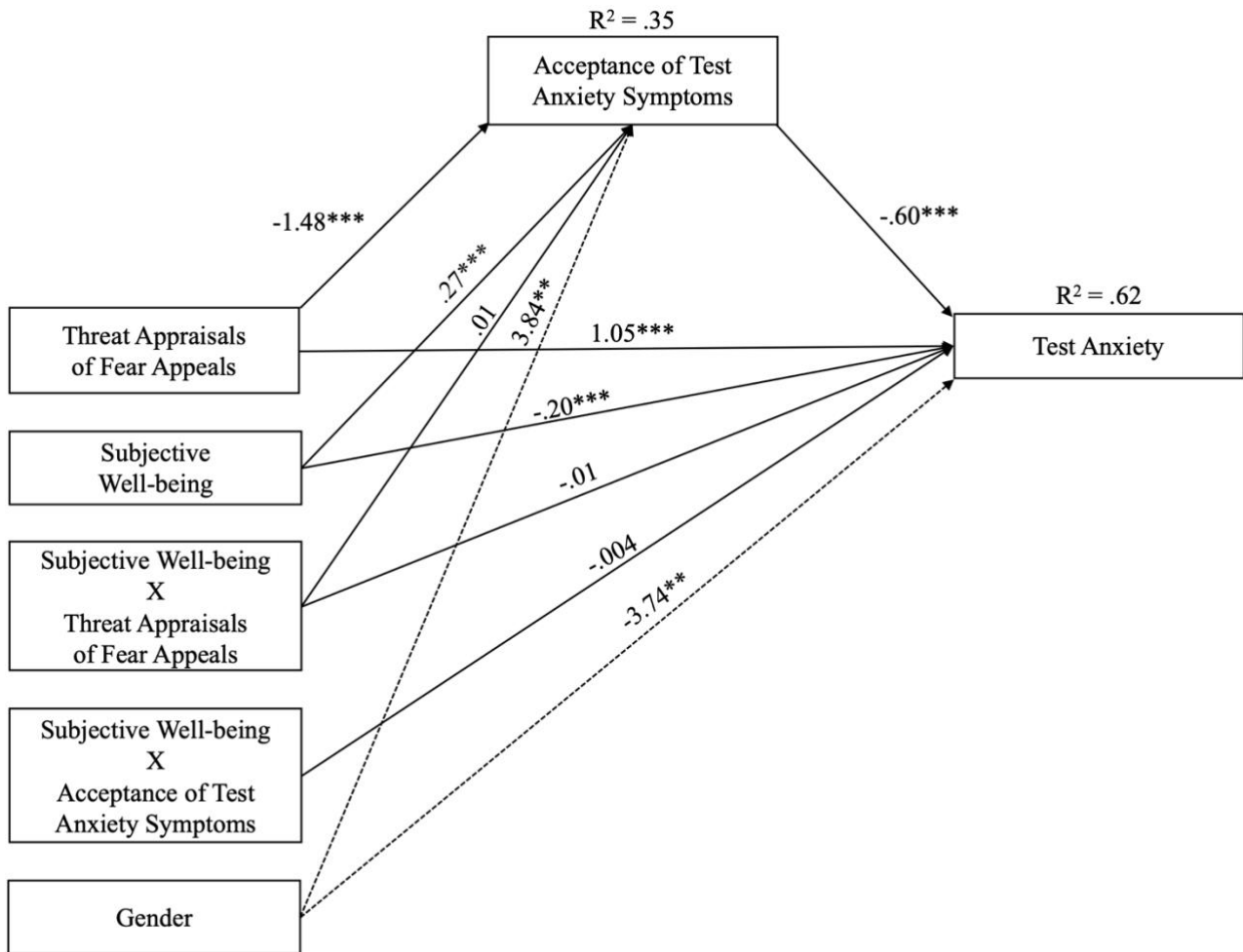
A moderated mediation model was estimated to examine whether threat appraisals was associated with test anxiety through acceptance and whether all of these relationships were moderated by subjective well-being. The conceptual diagram of the moderated mediation model is presented in Fig. 1. With regard to the analysis of individual paths, as presented in Fig 3 (and detailed in Table 4), a significant and negative association was found between threat appraisals and acceptance ( $b = -1.48$ ,  $p < .001$ ), as well as a positive and significant association between subjective well-being and acceptance ( $b = .27$ ,  $p < .001$ ) and between gender and acceptance ( $b = 3.84$ ,  $p = .01$ ). These associations, combined with the moderator interaction (between threat appraisals and subjective well-being), explained 35 % of acceptance's variance. Threat appraisals was positively and significantly associated with test anxiety ( $b = 1.05$ ,  $p < .001$ ) while acceptance, subjective well-being and gender were negatively and significantly associated with test anxiety ( $b = -0.60$ ,  $p < .001$ ,  $b = -0.20$ ,  $p < .001$  and  $b = -3.74$ ,  $p = .005$ , respectively). The moderation interactions between threat appraisals and subjective well-being, and between acceptance and subjective well-being are described below.

Furthermore, threat appraisals was indirectly associated with test anxiety through acceptance (point estimate = .95, 95 % CI = .74/1.18). Though acceptance mediated the relationship between threat appraisals and test anxiety, results showed that threat appraisals maintained some of its direct effect on test anxiety. Thus, acceptance only partially mediated the effect of threat appraisals on test anxiety.

The conditional process analyses (as seen in Table 4) demonstrated that subjective well-being did not influence any of the associations considered in the model. Specifically, the interactions between threat appraisals and acceptance ( $b = -0.01$ ,  $SE = 0.01$ ,  $p = .33$ , 95% CI = -0.01/0.03); threat appraisals and test anxiety ( $b = -0.01$ ,  $SE = 0.01$ ,  $p = .64$ , 95% CI = -0.03/0.02); and acceptance and test anxiety ( $b = -0.004$ ,  $SE = 0.004$ ,  $p = .27$ , 95% CI = -0.01/0.003) were not significant. Therefore, the indirect effect of threat appraisals on test anxiety was also not moderated by subjective well-being.

Considering the moderated mediation model altogether, it explained 62 % of test anxiety's variance.





**Fig 3.** Statistical diagram of the moderated mediation model.

*Note.* Gender was entered as a covariate. Path values represent unstandardized regression coefficients. Standard errors and confidence intervals are presented in Table 3. The visual representation of this moderation effect is depicted in Fig. 1. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**Table 4.** Regression coefficients and model summary information for the moderated mediation model.

	<b>Acceptance</b>				<b>Test Anxiety</b>			
	<i>b</i>	<i>SE</i>	<i>p</i>	95% CIs	<i>b</i>	<i>SE</i>	<i>p</i>	95% CIs
<b>Threat Appraisals</b>	-1.48	.14	< .001	-1.75/-1.20	1.05	.14	< .001	.76/1.32
<b>Subjective Well-being</b>	.27	.06	< .001	.15/.39	-.20	.06	< .001	-.33/-.11
<b>Gender</b>	3.84	1.46	.009	.96/6.71	-3.74	1.33	.005	-6.36/-1.12
<b>Threat Appraisals X Subjective Well-being</b>	.01	.01	.328	-.01/.03	-.01	.01	.636	-.03/.02
<b>Acceptance</b>	-	-	-	-	-.60	.04	< .001	-.69/-.52
<b>Acceptance X Subjective Well-being</b>	-	-	-	-	-.004	.003	.267	-.01/.003
R <sub>2</sub> = .35; F (4, 453) = 71.32, p < .001					R <sub>2</sub> = .62; F (6, 451) = 122.63, p < .001			

## Discussion

While several studies have provided evidence of the positive effects of acceptance on well-being (e.g., Eifert & Forsyth, 2005; Hayes et al., 1999; Twohig et al., 2006) and there is growing evidence of its equally beneficial impact on test anxiety (e.g., Brown et al., 2010; Trompetter et al., 2017; Räsänen et al., 2016), the relationship between acceptance and fear appeals, and its impact on test anxiety, have never, to the best of our knowledge, been subject of research. Although research has presented many possible factors as antecedents of test anxiety (e.g., Lowe et al. 2008; Segool et al. 2014; Zeidner, 1998), fewer studies have considered fear appeals, and more specifically how they are appraised, as possible predictors. Additionally, the studies that did focus on fear appeals and test anxiety (e.g., Putwain & Roberts, 2009; Putwain & Symes, 2011), had a more educational approach, where the ultimate goal was to infer about students' performance, whereas our study had a clinical approach. The general aim was to better understand the possible implications of these variables, and their relationships with each other, in the development and maintenance of test anxiety. Moreover, our study was longitudinal, using measures in two time points, in order to examine how the frequency of fear appeals, and their appraisals, were related to students' subjective well-being, acceptance of test anxiety symptoms and test anxiety.

Firstly, we searched for possible significant gender differences in our study's variables, so that we would, if necessary, control for gender, in the subsequent analyses. Our results revealed gender differences in test anxiety, threat appraisals, acceptance of test anxiety symptoms and subjective well-being. This is in line with the vast literature reporting gender differences in test anxiety, with female students presenting higher test anxiety than male students (Benson et al., 1994; Cunha & Paiva, 2012; Hembree, 1988; Lussier 1996; McDonald, 2001; Moore 2006; Zeidner, 1998). According to literature, an interpretation would be that, perhaps, female students have more to lose if they don't succeed in their education, due to gender stereotypes, thus feeling more threatened in evaluative situations (Eccles, 2007; Yildirim et al., 2008). Additionally, gender differences have been reported for acceptance of test anxiety symptoms, with male students presenting higher acceptance levels, this had also been previously demonstrated (e.g., Pires et al., in press). Moreover, male students also reported higher subjective well-being, which is in line with the available research on the topic (e.g., Graham & Chattopadhyay, 2013; Tian et al., 2013; Soysa & Wilcomb, 2013). Lastly, female students presented higher threat appraisals comparative to male students, which is also consistent

with previous research reporting gender differences for fear appeals (e.g., Nicholson et al., 2018; Putwain et al., 2016; Putwain et al., 2017).

Regarding our study aims, and as hypothesized (H1), threat appraisals and test anxiety were positively and significantly associated with each other. These findings are in line with the already existing research on the topic stating that when fear appeals are appraised as threatening they activate emotions such as worry, fear and anxiety (Nicholson et al., 2018) and are thus related to higher test anxiety (e.g., Putwain & Remedios, 2014; Putwain & Symes, 2011; Putwain et al., 2016).

In turn, message frequency of fear appeals and test anxiety were found not to be significantly associated, contrarily to our hypothesis (H1). However, explanations for this result might lie on the current research on fear appeals. Putwain and Symes (2014) have recently shown that some students simply ignore fear appeals when the outcome they refer to (e.g., achieving high grades to access higher education) is not valued. Therefore, outcomes of fear appeals will most likely depend on if they are valued, and how they are appraised by students. Furthermore, we hypothesize that our sample might have contemplated students who may not value these messages, hence presenting neither challenge nor threat appraisals, making this lack of significant association understandable.

In consonance with our hypothesis (H1) threat appraisals and message frequency of fear appeals were positively and significantly associated. Previous studies have also reported positive associations between message frequency of fear appeals and threat appraisals (Putwain & Symes, 2011a, b; Putwain et al., 2014; Putwain et al., 2016; Putwain et al., 2017; Raymo et al., 2018; Remedios & Putwain, 2013). However, many of these same studies (Putwain et al., 2014; Putwain et al., 2016; Putwain et al., 2017) reported a significant and positive association between message frequency of fear appeals and challenge appraisals, which we did not find, thus only partially confirming our hypothesis (H1). According to research on the topic, this positive association with both challenge and threat appraisals can be explained since fear appeals prompt students to reflect on the judgements that underpin appraisals (e.g., their perceived importance, and whether they believe they are capable of achieving success, or avoid failure) (Putwain et al., 2017). Thus, since judgements become more salient when prompted more frequently (Putwain et al., 2014; Putwain et al., 2017) a higher frequency of fear appeals would correlate positively with both appraisals, depending on students' beliefs. One hypothesis for the non-significant association between message frequency of fear appeals and

challenge appraisals in our study might be a higher presence, in our study's sample, of students experiencing test anxiety symptoms, thus reporting more threat than challenge appraisals. Nonetheless, our findings might provide a distinct and new insight on the disadvantageous use of fear appeals, being that for students who are already prone to threat appraisals, a higher frequency will stress and enhance the threatening component, whereas for students who tend to make challenge appraisals, frequency is not influential. Therefore, if teachers' intention is to reinforce challenge appraisals, fear appeals are a strategy that, besides seeming ineffective, also seems to enhance threat appraisals.

As expected, challenge appraisals were significantly and positively associated with subjective well-being (SWB) (H1). This finding is in line with the available research on fear appeals, according to which challenge appraisals are accompanied by positive emotions, such as optimism and positive behavioral intentions (e.g., Hijzen et al., 2007; McCarthy, 2011; Shiota et al., 2011).

Results showed a significant and negative association between challenge appraisals and test anxiety, as we hypothesized (H1), although this correlation was lower than expected. Challenge appraisals tend to be associated with adaptive outcomes (McGregor & Elliot, 2002; Putwain & Remedios, 2014; Putwain & Symes, 2011a, 2011b; Putwain et al., 2015; Putwain et al., 2016; Putwain et al., 2017; Skinner & Brewer, 2002) and relate to greater intrinsic motivation and engagement (e.g., Putwain et al., 2018). Additionally, and as abovementioned, challenge appraisals have a positive valence, relating to positive emotions (e.g., Nicholson et al., 2018; Putwain et al., 2017). Therefore, our finding is in line with the existent literature on the topic, being that challenge appraisals could be considered to have a positive influence on test anxiety, preventing its development. However, our results point to a low association between the variables that is worth discussing. One hypothesis for this low association might have to do with the fact that students can, simultaneously, appraise fear appeals as both threats and challenges, and that different patterns of threat and challenge appraisals relate to distinct outcomes (Nicholson et al., 2018). In a study by Meijen and col. (2013) it was proved that a combination of both high challenge and threat related to higher anxiety levels, whereas a combination of high challenge and low threat was associated with lower anxiety. Therefore, (and in consonance with our previous explanation of the non-significant association between message frequency of fear appeals and challenge appraisals) a stronger presence, in our study's sample, of students reporting more threat

than challenge appraisals (combination of low challenge and high threat), would explain the low association between challenge appraisals and test anxiety.

As hypothesized (H1), threat appraisals and test anxiety presented negative and significant associations with both SWB and acceptance. Indeed, according to literature, and as abovementioned, as threat appraisals are accompanied by negative emotions, such as worry, fear and anxiety (Nicholson et al., 2018), it was expected that it would be negatively related with SWB, both the affective component (infrequent negative affect) and the cognitive component (life satisfaction). Previous studies had already demonstrated a negative association between threat appraisals and SWB (e.g., Covington, 2009; Meijen et al., 2013; Roseman, 2013). Moreover, negative affect experienced in the classroom is an indicative of threat appraisals (e.g., Assor & Kaplan, 2001; Assor et al., 2005; Putwain et al., 2014; Reeve, 2009), which further suggests a possible reciprocal relationship between the variables. Regarding the negative association of SWB with test anxiety (H1), research had previously found similar results (Steinmayr et al. 2016). Moreover, research has shown that test anxiety may predict changes in SWB, especially the worry component, that negatively predicted changes in both life satisfaction and affective well-being (e.g., Ringeisen & Buchwald, 2010; Zeidner, 1998). Furthermore, other studies that focused on variables considered to reveal emotional well-being have additionally shown associations with test anxiety (e.g., Pekrun et al., 2002).

Regarding acceptance's negative association with test anxiety (H1) some studies have also reported similar findings (e.g. Graça, 2015) and these were in agreement with the already existent literature referring acceptance of unwanted thoughts as an effective strategy for reducing test anxiety symptoms (Cunha & Paiva, 2012; Saeed et al., 2016; Senay et al., 2012). As abovementioned, and to the best of our knowledge, associations between acceptance and threat appraisals have not been studied. However, our results, confirming a negative association between these variables (H1), go in line with the existent literature, stating that threat appraisals incite avoidance-oriented cognitions and behaviors (Putwain et al., 2017, 2018), considered to be the opposite process of acceptance (Hayes et al., 1999).

The variables with the highest correlation with test anxiety were, equally, its significant predictors, which was altogether consistent and anticipated. Thus, and as hypothesized, threat appraisals, acceptance of test anxiety symptoms and SWB were, in fact, significant predictors of test anxiety (H2), being that, when accounting for gender, they explained 62% of test anxiety's variance. However, this hypothesis was only

partially confirmed since message frequency of fear appeals turned out not to have a significant predictive effect on test anxiety (H2). As noted for the correlation results, one explanation for this might be that, according to research on the topic, outcomes of fear appeals will depend on if they are valued and how they are appraised by students (Putwain & Remedios, 2014). Thus, when threat appraisals are accounted for, message frequency, in itself, does not present a significant predictive effect on test anxiety.

Regarding the predictive role of threat appraisals on test anxiety (H2), our results seem to provide further evidence that threat appraisals of fear appeals are a strong cause of test anxiety, and are consistent with previous findings in this area (Putwain and Best, 2011, 2012; Putwain and Symes, 2011; Putwain et al., 2012; von der Embse et al., 2015). Explanation for this lies on the processes underpinning how fear appeals are appraised. Appraisals of this sort involve cognitive, affective and physiological processes in an anticipatory state, and refer to the potential of harm or loss, activating emotions such as worry, fear and anxiety (Nicholson et al., 2018).

Confirming our formulated hypothesis (H2), lower levels of acceptance of test anxiety symptoms revealed to be significant predictors of test anxiety. Test anxious students experience constant, intrusive, negative and sometimes catastrophic thoughts about failure and its possible consequences (worry), that can be accompanied by various somatic symptoms (Huberty & Dick, 2006; Liebert & Morris, 1967; Rothman, 2004; Zeidner, 1998). These students often report an extreme focus on both cognitive and physiological phenomena during test situations, so much that performance is hindered, as they cannot focus on the task at hand (Deffenbacher, 1978; Sarason, 1986; Zeidner, 1998). Additionally, test anxious individuals tend to adopt avoidance strategies, such as trying to ignore feelings or modify thoughts (Spielberger & Vagg, 1995), processes defined by ACT as experiential avoidance and to which acceptance is pointed out as the answer (Hayes et al., 1999, 2012). Indeed, deliberate attempts to suppress/avoid thoughts and feelings can, paradoxically, increase their occurrence (Hayes, 2016; Hayes et al., 1999, 2012) hence relating to higher levels of test anxiety. Therefore, a lack of acceptance competencies may be, to some degree, a key factor in maintaining test anxiety, as it generates more worry-like thoughts. Previous studies have proven that acceptance-based approaches may be well suited for test anxious individuals (Brown et al., 2010; Graça, 2015; Massumi, 2017; Senay et al., 2012), since rather than expending resources engaging with thoughts, feelings and sensations, students could devote maximum effort to focus on the task at hand (Zeidner, 1998). For test anxious students, this might include accepting

automatic negative thoughts and bodily sensations, as they are, without criticizing or trying to change them (Arch et al., 2008; Brown et al., 2010; Senay et al., 2012). Our results are, therefore, consistent with literature on test anxiety and research on ACT benefits, providing further evidence that acceptance may have a strong influence on test anxiety specifically, regarding its development and maintenance.

Lower levels of SWB also proved to be significant predictors of test anxiety (H2). Although many studies have investigated the relationship between these two variables, as well as the predictive effect of test anxiety on SWB, very few focused on SWB as a possible predictor of test anxiety. Steinmayr and col. (2016) had previously hypothesized a reciprocal relationship between SWB and test anxiety, however, SWB was not confirmed to be a predictor of test anxiety, in their study. According to literature, higher levels of SWB are related to positive mental health (Lyubomirsky et al., 2005), involve positive thoughts and appreciations (life satisfaction) and more frequent positive emotions (PA) (Cummins 2010; Davern et al. 2007; Long et al., 2012). Accordingly, lower levels of SWB imply fewer positive thoughts and appreciations (lower life satisfaction) and more frequent negative emotions (NA). Worry, the cognitive component of test anxiety, is generated when negative self-beliefs are accessed and counterproductive coping strategies are chosen (Steinmayr et al., 2016). A well-adjusted person, with higher levels of SWB, will present more resilience when facing stressful situations (Chen, 2016; Zubair et al., 2018), adopt more adaptive coping strategies and modify self-knowledge, strengthening positive self-beliefs (Steinmayr et al., 2016). Students scoring low on SWB, however, will present greater attention focus on feared events (e.g., test situations and negative consequences), and will tend to maintain negative coping strategies (Steinmayr et al., 2016). Therefore, our findings encompass important and new evidence regarding the influence of lower levels of SWB on test anxiety.

Considering that results from the multiple linear regression revealed that message frequency of fear appeals was not a significant predictor of test anxiety, we proceeded to exclude this variable from subsequent analyses. Hence, we did not test the moderated mediation model with message frequency of fear appraisal as a predictor, but solely the model with threat appraisals as a predictor. Thus, regarding the mediation analyses, our results showed that acceptance partially mediated the relationship between threat appraisals and test anxiety (H3). As confirmed by the regression analyses, threat appraisals predicted test anxiety, however, when acceptance was introduced in that relationship, threat appraisals lost part of its explanatory power. Thus, one can



hypothesize that lack of acceptance, expressed by avoiding negative intrusive thoughts, as well as bodily sensations that emerge, possibly elicited by fear appeals, might result in an increase of test anxiety. Considering that threat appraisals are accompanied by negative emotions and focused on self-worth protection (Putwain et al., 2016), avoidance-oriented cognitions and behaviors are likely to be adopted by students, in an attempt to cope with the perceived threat (Putwain & Woods, 2016, Putwain et al., 2017). Considering this to be a typical response from students who make threat appraisals, one might contemplate the lack of acceptance as a powerful reason why threat appraisals are strongly linked with test anxiety. According to research on ACT, there is an inherent paradox in attempting to avoid, suppress or eliminate unwanted private experiences, being that it leads to an increase in frequency or intensity of those same experiences (Clark et al., 1991; Feldner et al., 2003; Hayes et al., 1999, 2012; Wenzlaff & Wegner, 2000). Subsequently, acceptance can be utilized as a coping strategy against the negative impact of threat appraisals, being that a higher acceptance of negative internal experiences, without criticizing or trying to change them, would result in a decrease of test anxiety. Considering that the mediating role of acceptance in the relationship between threat appraisals and test anxiety had never been subject of research, our results encompass innovating findings, laying the groundwork for future research on the topic. Nonetheless, acceptance was only a partial mediator between threat appraisals and test anxiety, which suggests that there are other aspects in this relationship that were not accounted for in this study. These aspects might have to do with threat appraisal's association with lower intrinsic motivation, lower self-efficacy beliefs and lower examination performance (Putwain & Remedios, 2014; Putwain & Symes, 2011), and be related to internal and external shame, self-criticism, perfectionism, or lack of self-compassion. Although these factors were not explored in our study, they might be of interest for future research.

In addition to our formulated hypothesis, some findings are worth mentioning. Our results showed that gender, subjective well-being and threat appraisals explained 35% of the variance of acceptance of test anxiety. Being that, additionally, threat appraisals' highest correlation was with acceptance, we might consider it a strong predictor of lower acceptance levels. This finding is in line with the associations found between threat appraisals and avoidance behaviors (Putwain & Woods, 2016; Putwain et al., 2017, 2018), a behavioral strategy to avoid inner uncomfortable thoughts and feelings, and further complements the existing information on fear appeals.

Key to the present investigation was to examine whether higher levels of subjective well-being would buffer the impact of threat appraisals on acceptance and test anxiety and possibly strengthen the positive impact of acceptance on test anxiety. However, moderator analyses did not provide any statistically significant effects, therefore, SWB was not considered a moderator of the relationship between threat appraisals and test anxiety, threat appraisals and acceptance, nor acceptance and test anxiety (H4). This indicates that the relationships between the variables are robust across different levels of SWB. Although lower levels of SWB can be considered to represent a risk factor for the development and maintenance of test anxiety, moderator analyses showed that such is not the case when considering the interactions with our proposed variables. These findings provide, once again, compelling evidence of the negative impact of threat appraisals, in the sense that even high levels of SWB cannot buffer its effect on acceptance levels nor on test anxiety.

If we were to answer the question, which of the abovementioned processes contributes most to test anxiety, we would first have to focus on the correlation and regression analyses. The analysis of the correlation coefficients between study variables revealed that test anxiety's highest correlation was with acceptance, followed by threat appraisals. Additionally, in the multiple regression analyses, acceptance proved to have the strongest effect on test anxiety, followed by threat appraisals and SWB. Although the moderated mediation analysis does not offer standardized values, that would allow us to compare between processes, we do know that 62% of test anxiety's variance is explained when accounting for threat appraisals, gender, the mediating role of acceptance and all the interactions with subjective well-being. Taking all these findings into consideration, it is possible to conclude that a lack of acceptance of test anxiety symptoms, elicited by fear appeals, is what contributes most for test anxiety.

### ***Clinical Implications***

The use of a non-clinical sample impairs the generalization of the findings to the clinical population. Nonetheless, fear appeals, and how they are appraised, subjective well-being and test anxiety are transversal processes and mechanisms that would likely operate similarly at clinical and nonclinical level.

There are some clinical implications to point out from this study, regarding the use of Acceptance and Commitment Therapy (ACT; Hayes et al., 1999) with patients that tend to appraise fear appeals as threatening and report test anxiety symptoms. Our study

particularly confirms the important role of accepting internal experiences (e.g., worry, negative thoughts and emotions, bodily sensations) in the development and maintenance of test anxiety. Acceptance of test anxiety symptoms, in itself, proved to be significantly associated with test anxiety, being that deliberate attempts to suppress/avoid thoughts and feelings can, paradoxically, increase their occurrence (Hayes, 2016; Hayes et al., 1999), relating to higher levels of test anxiety. Hence, interventions focused on changing the overidentification students maintain with worry and somatic symptoms of physiological arousal will allow for the development of actions driven by personal values, instead of anxiety-based behaviors (e.g., avoidance and control strategies). Treatment interventions should help patients develop higher psychological flexibility, particularly promoting attention to the present moment, defusion with one's thoughts, acceptance of negative internal experiences, a more observational perspective of self as context, and commitment to valued actions. These are all key points and focuses of ACT (Hayes et al., 1999, 2012).

Regarding fear appeals, when combining the findings from our study with the already existing research, suggesting that threat appraisals are followed by negative outcomes (e.g. Pekrun et al., 2004; Putwain et al., 2013), some relevant points are to be made. Considering school interventions with teachers, focus should be primarily placed on educating teachers about the possible negative effects of using fear appeals (inductive of threat and/or challenge appraisals) and the outcomes associated with different types of appraisal. Secondly, although some studies suggest that the priority of educational interventions should lie on promoting challenge appraisals (e.g. Nicholson et al., 2018), when considering our results, it would be suggestable that teachers refrained from using fear appeals, as there might be some students for whom those messages will be detrimental. Considering solo interventions with students manifesting test anxiety symptoms, the focus should be placed on how internal experiences, evoked by threat appraisals, are managed. Our findings support the positive role of acceptance of test anxiety symptoms, against the impact of threat appraisals of fear appeals, on test anxiety. These findings give further support to the ACT model, and suggest that being able to contact with the present moment, with an accepting and non-judging attitude towards internal experiences, may promote a healthy adaptation to stress factors in the classroom, such as the use of fear appeals by teachers. Indeed, our study's results suggest that a lack of acceptance, experienced by students who typically appraise fear appeals as threatening, was what most contributed for the development of test anxiety.

### *Limitations, contributions and future studies*

The present study holds some limitations. First, data were collected in a two-wave design, which allowed us to examine how fear appeals, and their appraisals, were related to student's subjective well-being, acceptance and test anxiety. However, a more robust and sophisticated design, using three or more waves, could allow for an even better understanding of the causality and relationships between these variables. Additionally, one other limitation to point out refers to the time between measurements (one month and a half), that can be considered a rather short period. A longer time period between measurements would produce more reliable longitudinal data. Furthermore, this study relied on self-report measurements, which might encompass recall biases and distortions. Hence, it would be beneficial to replicate these findings using a repeated-measures methodology with less retrospection, such as daily diaries or an experience sampling method (Dunkley et al., 2012). Another limitation refers to the fact that we used a community sample, pointing to the relevance of replicating the study in a clinical sample of test anxious individuals. Despite the fact that the processes involved in appraisals of fear appeals, acceptance and subjective well-being may apply at a clinical or nonclinical level, the replication of this study in a clinical sample would add further robustness to our findings. Furthermore, our sample was recruited from only three schools, therefore it cannot be representative for all students of the same age range investigated. Future studies should investigate larger cohorts covering more schools.

One other limitation to point out has to do with the timing of measurement of fear appeals. As this variable was measured in the beginning of the school term, frequency of fear appeals would likely increase as the tests they relate to drew closer. Additionally, albeit the instrument used to measure message frequency of fear appeals (TUFAQ) demonstrated, in this study, strong psychometric properties, students had difficulty answering the items for several reasons. Firstly, we can point out that their experience varied by teacher and class, raising some confusion as to what would be the most accurate answer. Secondly, the graphic format of the questionnaire was ambiguous, not providing an effortless and straightforward filling; such became apparent by the amount of missing values found for this specific factor of the questionnaire. Moreover, in future studies it could be advantageous to use and compare multiple sources of data, in regards to the measurement of frequency of fear appeals. As previously pointed out by Putwain et al. (2014), teachers and students are both participants in the classroom, offering distinct perspectives to the perception of the frequency with which fear appeals are used. Thus,

we consider it would be beneficial to use both teacher and student's reports. In addition, considering there exists a wide variability in the messages used by teachers of distinct classes and across different settings, a generalization of the findings is limited.

Furthermore, the present study did not consider the behavioral processes of ACT (e.g., committed action) which limits a more inclusive understanding of students who typically appraise fear appeals as threatening and those who report test anxiety. Additionally, our study focused on exploring acceptance, which represents only a facet of psychological flexibility (Hayes et al., 1999). It could be interesting, for future research, to examine other dimensions of psychological flexibility (e.g., cognitive defusion, mindfulness, self as context), in order to further complement these findings and support ACT as especially well-suited for application to test anxious individuals.

Although the model tested in our study is plausible, there may be other concurrent explanatory models for these relations, using other variables or considering other types or directions of association. Considering specifically the predictive role of threat appraisals and possible mediator factors of its relationship with test anxiety, future studies could focus on the mediating role of internal and external shame, self-criticism, and/or compassion. In fact, the investigation of such concurrent models is already a work in progress as is the aim of the broader PhD Project in which this study was included.

Despite these limitations, this is the first study to ascertain an association between acceptance and fear appeals, particularly threat appraisals. Furthermore, our results demonstrate the mediating role of acceptance in the relationship between threat appraisals and test anxiety. Additionally, this study extends previous findings on the predictive role of threat appraisals on test anxiety (e.g., Putwain & Best, 2011, 2012; Putwain and Symes, 2011) and it also proved that SBW is not a protective factor in regard to the development of test anxiety. Finally, the present study allows to target some focuses of clinical intervention, when attending to test anxious students, specifically promoting acceptance and psychological flexibility.

### ***Conclusion***

Fear appeals, used by teachers in an attempt to motivate students to engage in academic-focused actions, can be appraised as both threatening or challenging, depending on students' judgements and beliefs. Threat appraisals, contrarily to challenge appraisals, are accompanied by negative cognitions and emotions, and focused on self-worth protection. It is likely for students who appraise fear appeals as threatening to adopt

avoidance-oriented cognitions and behaviors to cope with the perceived threat. However, attempting to avoid, suppress or eliminate unwanted private experiences often leads to an increase in frequency or intensity of those same experiences. Therefore, a lack of acceptance of test anxiety symptoms, that emerge from threat appraisals, may contribute for the development and maintenance of test anxiety. Moreover, subjective well-being proved not to be a protective factor when considering the impact of threat appraisals on acceptance and test anxiety, and of lack of acceptance on test anxiety, further supporting the negative role of threat appraisals and lack of acceptance for the development and maintenance of test anxiety.

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