Putwain, DW, Symes, W and Wilkinson, HM

Fear appeals, engagement, and examination performance: The role of challenge and threat appraisals.

Fear Appeals, Engagement, and Examination Performance: The Role of Challenge and Threat Appraisals

Abstract

Background: Fear appeals are persuasive messages that draw attention to the negative consequences (e.g. academic failure) that follow a particular course of action (e.g. not engaging in lessons) and how negative consequences can be avoided with an alternate course of action. Previous studies have shown that when fear appeals are appraised as threatening they are related to lower examination performance.

Aim: In this study we examined how challenge, as well as threat, appraisals are indirectly related to performance on a mathematics examination through behavioural engagement.

Sample: 579 students from two secondary schools.

Method: Data were collected over four waves at approximately three month intervals. Behavioural engagement data was collected at T_1 and T_3, fear appeals frequency and appraisal at T_3, and examination performance at T_2 and T_4.

Results: A challenge appraisal of fear appeals predicted better examination performance through higher behavioural engagement whereas a threat appraisal of fear appeals predicted worse examination performance through lower behavioural engagement.

Conclusion: The relationship between fear appeals and examination performance depended on their appraisal.

Keywords: Fear appeals; challenge; threat; engagement; achievement

Introduction

Fear appeals are persuasive messages used to highlight the negative consequences of a particular course of action, and how an alternative course of action can avoid those negative consequences (Witte, & Allen, 2000; Maloney, Lapinksi, & Witte, 2011). Research examining fear appeals has typically been found in the health literature to promote health conscious behaviours including, but not limited to, smoking cessation, safe-sex practices, and self-examination for breast and testicular cancer (Ruiter, Abraham, & Kok, 2001; Ruiter, Kessels, Peters, & Kok, 2014). When a person feels susceptible to the negative outcomes presented, and capable of enacting those behaviours required to avoid the threat, fear appeals can be an effective method of behaviour change (e.g., Maloney et al., 2011; Peters, Ruiter, & Kok, 2012; Popova, 2012).

Studies have begun to move beyond the health domain, to examine the use and impact of fear appeals in educational settings. Teachers, for instance, can highlight to students the negative consequences of educational failure as a means to encourage students to engage in those actions likely to result in success (Putwain, 2009; Putwain & Roberts, 2012). The linkages from these messages to salient educational outcomes (motivation, engagement, and examination performance) depend on how they are interpreted by students (e.g., Putwain & Symes, 2011; Putwain & Remedios, 2014a). The aims of this paper were to examine how the appraisal of fear appeals as a challenge (focused on growth and mastery) or as a threat (focused on self-worth protection) related to subsequent examination performance, and whether relationships were indirect, through engagement.

The Appraisal of Fear Appeals: Challenge and Threat

The appraisal model of fear appeals proposes that the educational consequences that follow fear appeals do not depend on their use, per se, but their interpretation (Putwain & Symes, 2014; 2016). In common with models from other domains (e.g., stress and sports performance) appraisals are primarily conceptualized as cognitive judgments, concerning one's values and beliefs, that are accompanied by emotions and behavioural intentions (e.g., Folkman, 2008; Lazarus, 2006; Skinner & Brewer, 2002). If a student values, and believes that they are capable of, educational success, fear appeals are likely to be interpreted as a challenge. Challenge is focused on growth and mastery and will be accompanied by positive behavioural intentions, such as making an effort, and emotions such as hope and optimism. If the student values, but does not believe that they are capable of, educational success, fear appeals are likely to be interpreted as a threat. Threat is focused on self-worth protection and negative emotions such as anxiety. For summaries of how values and beliefs (e.g., academic self-efficacy, attainment value, and utility value) relate to challenge and threat appraisals see Putwain and Symes (2014, 2016).

Studies examining the threat appraisal of fear appeals in cross-sectional and longitudinal designs with secondary school students have shown that threat is related to higher test anxiety, a higher performance-avoidance goal (to avoid performing worse than one's classmates), lower intrinsic motivation, and lower examination performance (Putwain & Roberts, 2009; Putwain & Symes, 2011; Putwain & Remedios, 2014a, 2014b). Furthermore, it has been demonstrated with experimental manipulation that fear appeals lead to greater test anxiety in primary school (Putwain & Best, 2011, 2012) and undergraduate (von der Embse, Shultz, & Draughn, 2015) students. Recent studies incorporating both threat and challenge appraisals have shown that challenge can result in greater self-efficacy, attainment value, and engagement, while threat results in lower self-efficacy, attainment value, and student engagement (Putwain, Remedios, & Symes, 2015; Putwain et al., 2016).

Somewhat paradoxically, when teachers use fear appeals more frequently, students report making more challenge and threat appraisals (e.g., Putwain, Remedios, & Symes, 2014; Putwain et al., 2016). Given that challenge and threat have differing foci and outcomes, this finding might seem initially puzzling. Findings from the positive education literature show that reflecting on one's strengths serves to enhance and reinforce those beliefs (e.g., Oades, Robinson, Green, & Spence, 2011; Sin & Lyubomirsky, 2009; Waters, 2011). In a similar way, the more frequently that students are prompted to reflect on those beliefs and values that underpin appraisals, by regular use of fear appeals, the more salient those beliefs and values become. Although this can lead to enhanced challenge appraisals if a student values educational attainment and believes they can achieve success (e.g., Symes & Putwain, 2016; Symes, Putwain, & Remedios, 2015), it can also lead to enhanced threat appraisals if a student does not believe that success is possible (Putwain & Remedios, 2014; Putwain, Remedios, & Symes, 2015).

Challenge and Threat Appraisals, Behavioural Engagement, and Examination Performance

Behavioural engagement refers to active participation in lessons and school activities (e.g., Appleton, Christenson, Kim, & Reschly, 2006; Fredricks et al., 2011; Reschly & Christenson, 2012). Theoretically speaking, challenge and threat appraisals would not be expected to impact on examination performance directly but indirectly through more or less adaptive study and examination-related behaviours. The mastery focus of a challenge appraisal as well as the associated positive emotions, and effortful intentions, would be likely to result in greater behavioural engagement. Accumulated evidence from the educational psychology literature show that mastery foci and goals are associated with greater behavioural engagement (e.g., Gonida, Voulala, & Kiosseoglou, 2009; McGregor & Elliot, 2002; Reschly, Huebner, Appleton, & Antaramian, 2008).

On the other hand, the self-worth protection focus of a threat appraisal along with the associated negative emotions, and avoidance intentions, would result in lower behavioural engagement. Similarly, these propositions are consistent with theory and evidence showing that avoidance foci and behaviours are associated with lower behavioural engagement (e.g., Lau, Liem, & Nie, 2008; Liew, Lench, Kao, Yeh, Kwock, 2014; Schwinger, Wirthwien, Lemmer, & Steinmayr, 2014; Shutz, Benson, Decuir-Gunby, 2008). Empirically speaking, challenge appraisal of fear appeals has been shown to predict greater behavioural engagement in secondary school students, and threat appraisal to predict lower behavioural engagement, when controlling for prior engagement (Putwain et al., 2016).

Studies have shown that students who are more behaviourally engaged (i.e. show more active participation in their lessons and on-task behaviour) have greater academic achievement in both primary and secondary education (e.g., Dotterer, & Lowe, 2011; Finn & Zimmer, 2012; Hughes & Kwok, 2007; Martin & Liem, 2010; Patrick, Ryan, & Kaplan, 2007; Reyes, Brackett, Rivers, White, & Salovey, 2012; Wang, & Holcombe, 2010). Thus a link can be established from fear appeals to behavioural engagement and from engagement to student achievement. Previous studies on fear appeals have shown a higher performance-avoidance goal (Putwain & Symes, 2011) and lower self-determined motivation (Putwain & Remedios, 2014a) as mediating the relationship between threat appraisal and examination performance. We expand the nascent body of fear appeals research in the present study by including challenge in addition to threat appraisals, and examining indirect relationships with performance through behavioural engagement.

Aims and Hypotheses

The aim of this study was twofold. First, to examine how the appraisal of fear appeals as challenging or threatening related to subsequent examination performance and, second, whether those relationships were indirect through behavioural engagement. Importantly we were able to control for prior engagement and examination performance. As the constructs in this study (engagement, appraisal of fear appeals, and examination performance) differ from one school subject to another (e.g., Bong, 2001) it is necessary to adopt a subject-specific approach. Following the matching specificity principle (e.g., Swann, Chang-Schneider, & McClarty, 2007) all constructs were conceptualized and measured at the same level of specificity. Accordingly, we focused on a single school subject, mathematics, and operationalized all constructs specifically in relation to mathematics. The following hypotheses were tested:

H_1: Challenge appraisal will be positively related to, and threat appraisal negatively related to, behavioural engagement.

H_2: Behavioural engagement will be positively related to examination performance.

H_3: There will be an indirect relationship from the frequency of fear appeals to examination performance, through behavioural engagement, that is positive when fear appeals are appraised as a threat and negative when appraised as a challenge.

The a priori model is shown in Figure 1, which also includes: (i) autoregressive paths from T_1 to T_3 behavioural engagement and T_2 to T_4 examination performance, (ii) paths from T_1 behavioural engagement to T_3 fear appeals appraisal and T_2 examination performance, and T_2 examination performance to T_3 fear appeals appraisal, and (iii) direct paths from T_3 fear appeals frequency to T_3 behavioural engagement and T_3 fear appeals appraisal to T_4 examination performance. For robustness, gender and age were included as covariates (although omitted from Figure 1for simplicity).

[Figure 1 here]

Method

Participants

The participants in this study were 579 secondary school students (male *n* = 302, female = 273, missing *n* = 4) from two secondary schools, taught in twenty eight classes (*M* = 20.1 students per class). At the first point of data collection, participants were in their penultimate year of compulsory secondary schooling (Year 10) and following the eighteenmonth program of study in GCSE mathematics (taken over Years 10 and 11). The mean age of participants was 14.9 years (*SD* = .71) and the ethnic heritage of participants was predominantly white Caucasian (*n* = 517). Smaller numbers of participants were from Asian (*n* = 16), Black (*n* = 7), other (*n* = 16), or mixed heritage backgrounds (*n* = 23). Forty-six participants were eligible for free school meals (FSM), taken as a proxy for low income. In the school year that data were collected, 13.9% of students in English secondary schools were eligible for FSM on average (DfE, 2015), suggesting that our sample included a smaller proportion (7.9%) of students from low income families than was typical.

Measures

Behavioural engagement. Behavioural engagement was measured using three items drawn from the *Engagement vs. Dissatisfaction with Learning Questionnaire* (Skinner, Kindermann, & Furrer, 2009). All items were adapted to be specific to GCSE mathematics (e.g., ‘I participate in the activities and tasks in my GCSE maths class’). Participants responded to items on a five-point scale (1 = strongly disagree, 5 = strongly agree) so that a higher score represents greater behavioural engagement. The reliability and construct validity of data collected using this scale has been evidenced in previous studies (Skinner & Chi, 2012; Skinner, Furrer, Marchand, & Kinderman, 2008). In the present study the internal reliability estimate was acceptable (Cronbach’s alpha >.7) at both T_1 and T_3 (see Table 1).

Fear appeals use and appraisal. The use and appraisal of fear appeals were measured using nine items (three items each for frequency of use, challenge appraisal and threat appraisal) from the *Teacher’s Use of Fear Appeals Questionnaire* (Putwain & Symes, 2014). As with engagement, all items were made specific to GCSE mathematics (e.g., ‘How often does your teacher tell you that unless you work hard you will fail your maths GCSE?’ for frequency, ‘Does it make you want to pass GCSE maths when your teacher tells you that unless you work hard you will fail?’ for challenge, and ‘Do you feel worried when your teacher tells you that unless you work hard you will fail your maths GCSE?' for threat). As shown in these exemplar items, pairs of challenge and threat items have a common referent (these were failure in general, progression to a college course, or entry to the labour market). Participants responded to items on a five-point scale (1 = strongly disagree, 5 = strongly agree), so that a higher score represents a greater challenge or threat appraisal. The reliability and construct validity of data collected using this scale has been demonstrated in previous studies (e.g., Putwain et al., 2015; 2016). In the present study the internal reliability estimates (see Table 1) were acceptable (Cronbach's alpha >.7).

Mathematics examination performance. Mathematics examination grades were taken from examinations sat by students in Years 10 and 11. Examination objectives were based on GCSE curriculum content appropriate to the stage of the program of study (i.e. the Year 10 examination assessed all curriculum content to that point in this course). Examinations were marked by teachers using standardized GCSE assessment criteria and graded on the eight-point scale (Grades A* – G) used in the English education system for GCSE examinations (see Office of Qualifications and Examinations Regulation, 2011). The grade was converted to a numerical equivalent (grade A* = 8, grade A = 7, Grade B = 6, and so on, to grade G = 1). Using this metric, a higher score represents a higher grade and a 5, or grade C, represents a 'pass'. As examinations were marked and graded by teachers and made accessible by participating schools, it is not possible to calculate the internal reliability of the Mathematics examination performance data collected for this study. However, it should be noted that other studies have shown GCSE mathematics examination data is highly reliable (average Cronbach's $\alpha = .91$) due to the objective nature of mathematics questions (Tisi, Whitehouse, Maughan, & Burdett, 2013).

Procedure

Self-report data for T_1 behavioural engagement were collected in March 2015 and T_2 examination performance from a Year 10 mathematics examination three months later in June 2015. Self-report data for T_3 behavioural engagement, and fear appeals frequency and appraisal, were collected in September 2015 after students had moved into their final year of compulsory secondary education (Year 11). T_4 examination performance was from a Year 11 mathematics examination taken in December 2015. Both examinations were sat under formal conditions, with the latter Year 11 examination treated as a ‘mock’ for the actual final school leaving examination taken in June the following year (this is a common practice in the English secondary education system). Self-report data were collected in a ‘form period’ used for administrative practices by the form tutor. Data were not, therefore, collected in the presence of the participants’ mathematics teacher. Form tutors followed a standardized script that emphasized the purpose of the study, ethical details (anonymity, withdrawal, and so on), that questionnaires did not constitute a ‘test’, and to ask for help with reading if required. Institutional, parental, and individual consent was obtained. We utilised the participants’ school ICT login details (a series of letters and numbers) to match questionnaires with examination grade data without compromising anonymity.

Results

Descriptive Statistics

Descriptive statistics are reported in Table 1. In the main, data were normally distributed although a leptokurtic pattern of dispersal was shown for T_3 behavioural engagement and T_2 mathematics test scores. The intraclass correlation coefficient (σ_I), estimated from ‘empty’ multilevel models (i.e., with no predictors) showed that a relatively high proportion of variance in fear appeals frequency, threat appraisal, and mathematics test scores, was attributable to the classroom level. Factor loadings for self-reported variables, taken from the measurement model described below, were satisfactory (λ >.4). The ICC_2

statistic, reflecting the reliability of classroom aggregated fear appeals from multiple sources (i.e., the student self-reports) was .91 (ICC_2 >.7 is considered satisfactory).

Measurement Model

The measurement model contained three indicators for behavioural engagement at T_1 and T_3. Accordingly, residual variance was allowed to correlate over time for the corresponding indicator at T_1 and T_3. T_3 fear appeals frequency, challenge, and threat appraisal were also measured using three indicators each. Residual covariance was allowed to correlate between pairs of challenge and threat appraisal items using the same referent. Analyses were performed in M*plus* version 7.3 (Muthén & Muthén, 2012) using maximum likelihood estimation with robust standard errors to account for the deviations from the normal distribution observed in T_3 behavioural engagement and T_2 mathematics test score. In order to control for the variance observed at the class level, which can bias estimates of standard errors if left unaccounted, the ‘complex’ and ‘cluster’ commands were used to estimate adjusted standard errors (Bowen & Guo, 2011). This offers an expedient alternative option to multilevel modelling for dealing with class-level variance where there are no differential hypotheses at individual and class levels.

Model fit was established using the root mean square error of approximation (RMSEA), standardized root means square residual (SRMR), comparative fit index (CFI), and the Tucker-Lewis index. Interpretive guidelines suggest a good fitting model typically shows RMSEA and SRMR values ≤ .05, and CFI and TLI values ≥ .95 (Marsh, Hau, & Grayson, 2005; Marsh, Hau, & Wen, 2004). A confirmatory factor analyses showed the measurement model showed a good fit by these criteria: $\chi^2(74) = 115.45$, p <.001; RMSEA = .033, SRMR = .034; CFI = .970, and TLI = .961. No substantial decline in model fit was observed (ΔCFI/ TLI >.01) when factor loadings and residual variance was constrained to be equal for T_1 and T_3 behavioural engagement.

In order to estimate latent bivariate correlations (see Table 2), gender (0 = male, 1 = female) and age were added to the measurement model as manifest variables. Mathematics examination scores from both Years 10 and 11 were treated as a single-indicator latent variable ($\lambda = 1$, $\sigma_\varepsilon = 0$). A confirmatory factor analyses showed a good fit to the data: $\chi^2(115) = 179.68$, $p < .001$; RMSEA = .032, SRMR = .034; CFI = .974, and TLI = .961.

Structural Equation Modelling

A structural equation model (SEM) was constructed to examine paths specified in Figure 1. Following the approach adopted for the measurement model, the SEM was estimated using M*plus* 7.1 using maximum likelihood with robust standard errors in conjunction with the cluster and complex commands. The SEM showed a good fit to the data, $\chi^2(121) = 181.10$, $p < .001$; RMSEA = .033, SRMR = .036; CFI = .972, and TLI = .958. A plausible alternative model was examined in which T_3 fear appeals, appraisals, and T_3 behavioural engagement were represented at the same level, and relations between these represented as covariances rather than structural paths. Although marginal, this model did not show quite as good a fit as the theoretically derived model, $\chi^2(121) = 219.32$, $p < .001$; RMSEA = .038, SRMR = .051; CFI = .963, and TLI = .951.

Furthermore to rule out the possibility that covariates may have unduly influenced the size and/ or direction of coefficients we also examined the theoretically derived SEM with covariates removed. This model also showed a good fit to the data: $\chi^2(135) = 255.37$, $p < .001$; RMSEA = .040, SRMR = .048; CFI = .951, and TLI = .938. For transparency the standardised coefficients for the SEM with and without covariates are reported in Table 3. In the SEM with covariates removed, there were no changes in the direction of coefficients, or coefficients becoming statistically significant ($p < .05$) when they were not previously (or vice versa), and so we proceeded to examine path coefficients and indirect effects from the model that included covariates. Statistically significant paths are shown in Figure 2.

[Table 3 here]

[Figure 2 here]

Paths from T_3 fear appeals frequency to T_3 appraisal, and from T_3 fear appeals (frequency and appraisal), to T_3 behavioural engagement. The frequency of fear appeals was positively associated with challenge (β = .66, *p* <.001) and threat (β = .65, *p* <.001) appraisals. T_3 challenge was a positive predictor (β = .51, *p* <.001), and T_3 threat a negative predictor (β = -.37, *p* =.01), of T_3 behavioural engagement, having controlled for the autoregressive path from T_1 to T_3 behavioural engagement (β = .47, *p* <.001). The direct path from T_3 frequency of fear appeals to T_3 behavioural engagement was not statistically significant (β = -.04, *p* =.69). In short, having controlled for prior (T_1) engagement, T_3 challenge was associated with greater, and T_3 threat with lower, T_3 behavioural engagement.

Paths from T_3 fear appeals (frequency and appraisal), and T_3 behavioural engagement, to T_4 examination performance. Having accounted for the relationship with prior (T_2) examination grades (β = .61, *p* <.001), T_3 behavioural engagement was positively related to T_4 examination grade (β = .46, *p* <.001). T_4 examination grade was unrelated to T_3 challenge (β = .23, *p* =.12), and T_3 threat (β = -.27, *p* =.09) appraisals. In short, having controlled for prior (T_2) examination scores, greater T_3 behavioural engagement predicted better T_4 examination score.

Paths from T_1 engagement to T_2 examination performance and T_3 appraisals, and from T_2 examination performance to T_3 appraisals. T_1 behavioural engagement was positively related to T_2 mathematics examination grade (β = .29, *p* <.001) and T_3 challenge (β = .21, *p* =.02), but was unrelated to T_3 threat (β = .03, *p* =.67). T_2 mathematics examination grade was unrelated to T_3 challenge (β = .08, *p* =.35) and T_3 threat (β = -.14, *p* =.06). In short, students who were more behaviourally engaged at the outset appraised fear appeals as more of a challenge and performed better in a subsequent examination.

Relations with covariates. Female students reported higher T_3 challenge ($\beta = .10$, $p = .006$) and T_3 threat appraisals was ($\beta = .19$, $p < .001$). Older students reported higher T_3 threat ($\beta = .12$, $p = .02$) and performed better in the T_2 mathematics examination ($\beta = .21$, $p < .001$). Relations with all other covariates were not statistically significant (*p*s all >.05).

Indirect paths from T_3 fear appeals (frequency and appraisal) to T_4 examination scores via T_3 engagement. The indirect paths were assessed by estimating 95% confidence intervals, in M*plus* around the point beta estimate of the indirect effect. If zero does not fall within the 95% confidence intervals, the indirect path is statistically significant effect at $p < .05$ (MacKinnon, Lockwood, & Williams, 2004). The total indirect effect of T_3 fear appeals (i.e., which does not decompose indirect relationships by challenge or threat appraisal) on T_4 mathematics examination score was not statistically significant as 95% CIs crossed zero: $\beta = .03$, $SE = .07$, 95% CIs [-.08, .14]. The indirect linkages from T_3 fear appeals to T_4 mathematics examination score did, however, show statistically significant relationships when challenge and threat were examined separately.

More frequent T_3 fear appeals were related to a higher T_4 mathematics examination score, when appraised as a challenge, via greater T_3 behavioural engagement, $\beta = .15$, $SE = .06$, 95% CIs [.05, .26]. When appraised as a threat, more frequent fear appeals were related to a lower T_4 mathematics examination score, via lower T_3 behavioural engagement, $\beta = -.13$, $SE = .06$, 95% CIs [-.01, -.22]. In short, more frequent fear appeals were related to a better examination score, through higher behavioural engagement, when appraised as a challenge, and a worse examination score, through lower behavioural engagement, when appraised as a threat.

Discussion

The aim of this study was twofold. First, to examine how the appraisal of fear appeals as a challenge or a threat related to examination performance. Second, whether that relationship was indirect through behavioural engagement. We hypothesised that challenge appraisal would be positively related to, and threat appraisal negatively related to, behavioural engagement (H_1), behavioural engagement would be positively related to examination performance (H_2), and the frequency of fear appeals would be indirectly related to examination performance, via appraisals and engagement (H_3). Self-reported data were collected over two waves in a sample of secondary students in compulsory secondary education and matched with performance data for two mathematics examinations.

How Does a Challenge or Threat Appraisal Relate to Behavioural Engagement?

Results supported H_1 that a challenge appraisal would lead to greater behavioural engagement whereas a threat appraisal would lead to lower behavioural engagement. Stronger T_3 challenge appraisal predicted greater, and a stronger T_3 threat appraisal lower, T_3 behavioural engagement over and above the variance accounted for by prior (T_1) behavioural engagement. These findings are consistent with theoretical propositions that the growth and mastery focus of a challenge appraisal leads to more adaptive outcomes, such as study behaviours, whereas the avoidance and self-protective focus of a threat appraisal leads to less adaptive outcomes. Results are consistent with the previous findings concerning fear appeal appraisals and student engagement (Putwain et al., 2016) as well as findings from the educational psychology literature more generally that link mastery to positive learning and achievement outcomes and avoidance to negative learning and achievement outcomes (e.g., Lau et al.2008; Liew et al., 2014; Martin, 2014; McGregor & Elliot, 2002; Schwinger et al., 2014; Shutz et al., 2008).

How Does Behavioural Engagement Relate to Subsequent Examination Performance?

Results supported H_2. Stronger T_1 behavioural engagement predicted better performance in the subsequent T_2 mathematics examination and stronger T_3 behavioural engagement predicted better performance in the subsequent T_4 mathematics examination, over and above the variance accounted for by prior T_2 mathematics examination performance. Thus, behavioural engagement was related to subsequent examination performance at both waves of measurement. This finding is consistent with the body of work showing how behavioural engagement, such as on-task behaviour, persistence and class participation, are related to higher achievement in school-aged populations (e.g., Finn & Zimmer, 2012; Martin & Liem, 2010; Patrick, Ryan, & Kaplan, 2007; Reyes, Brackett, Rivers, White, & Salovey, 2012; Wang, & Holcombe, 2010).

How Does the Frequency of Fear Appeals Indirectly Relate to Examination Performance?

The indirect relationship from fear appeals frequency to Year 11 examination performance includes three sets of indirect relationships. First, from T_3 fear appeals frequency to T_3 fear appeals appraisals, second from T_3 fear appeals appraisals to T_3 behavioural engagement, third from T_3 behavioural engagement to T_4 examination performance. As fear appeals frequency is ostensibly a classroom level construct, in the notation of methodologists, this would be referred to as a $2\rightarrow1\rightarrow1\rightarrow1$ model (Krull & MacKinnon, 2001). Results supported H_3. As expected, the indirect relationship between the T_3 frequency of fear appeals and T_4 examination grade depended on how they were appraised. When appraised as a challenge, more frequent fear appeals predicted better examination performance, through higher behavioural engagement. When appraised as a threat, more frequent fear appeals predicted worse examination performance, through lower behavioural engagement.

Support for the indirect role of behavioural engagement is consistent with, and adds weight to, other studies showing how the appraisal and examination performance are indirectly linked through test anxiety (Putwain & Symes, 2011) and autonomous motivation (Putwain & Remedios, 2014a). When combined, the findings from these studies present the beginnings of a more complex model to account for the outcomes of the fear appeals appraisal process. It is likely that the appraisal of fear appeals influences the motivations, emotions, and behaviours associated with the forthcoming examination that the fear appeals were made in relation to. The differential foci of appraisals would result in distinct trajectories; more adaptive motivation, emotion, and behaviour following a challenge appraisal and less adaptive motivation, emotion, and behaviour following a threat appraisal. As our discussion of affective engagement above highlights, a particular challenge will be to decipher the precise ordering of the motivation, emotion, and behaviour that follow appraisals.

Study Limitations

There are two limitations that should be highlighted. First, the use of two waves of self-reported data collection was sufficient in the present study to control for prior behavioural engagement, however fear appeals frequency and appraisals were measured at the same time as the second wave of engagement data. It is preferable for models examining indirect relationships using naturalistic data to temporally separate the predictor and mediator variables to rule out plausible alternative models (e.g., Kline, 2015; Trafimow, 2015). Although we tested a plausible alternative model, that did not show as good a fit to the data, it would be extremely prudent for future studies to employ three waves of data collection. Second, our sample contained a smaller proportion of students from low income families than was typical for English schools. There is a well-established link between income and educational attainment in both the UK and elsewhere (e.g., Barro, & Lee, 2013; Blanden & Gregg, 2004). It is possible that income moderates relations from fear appeals to appraisals, and appraisals to educational outcomes, in such a way to favour students from high-income backgrounds. Future research should examine how a disadvantaged background influences the pattern of relations described in this study.

Implications for Practice

The findings of this study have relevance to classroom teachers, teacher educators, and psychologists who work in educational settings. Fear appeals in themselves are neither effective nor damaging, but depend on how they are appraised by the student. Thus, fear appeals could be an effective strategy to use with some students (those who value educational attainment and believe they can achieve success) and damaging when used with others (those who value educational attainment and do not believe they can achieve success). Given the extremely limited time available to teachers in secondary schools to reflect on their practice, it may be difficult for teachers to effectively judge which students would likely benefit from fear appeals. We would therefore suggest that teachers do not use fear appeals with whole classes, or groups of students, since these will inevitably contain some students for whom fear appeals may be damaging. Psychologists working in schools can facilitate teacher reflection on their use of achievement-oriented language and assist with group assessment of students' values and beliefs as the basis for sensitised and differentiated student-teacher interaction (see Putwain & Woods, 2016).

Conclusion

This study showed that fear appeals indirectly lead to differential performance in a secondary school mathematics examination, depending on whether they are appraised as a challenge or threat, over and above the variance accounted for by previous examination performance. A challenge appraisal leads to better examination performance through higher behavioural engagement whereas a threat appraisal leads to worse examination performance through less behavioural engagement. These findings have implications for those involved in teaching or supporting students. Fear appeals will benefit some students but not others and so it may be more appropriate to target their use at those individuals who will respond positively to them, rather than to groups of students containing some individuals who may respond positively and others who will respond negatively.

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Table 1

Descriptive statistics for T_1 and T_2 engagement, the appraisal of fear appeals as challenging and threatening, and mathematics test performance in Years 10 and 11

	Range	Mean	SD	α	σ_I	Skewness	Kurtosis	Factor Loadings
T_1 Behavioural engagement	1–5	4.02	.63	.71	.13	-.43	.26	.64 – .70
T_3 Behavioural engagement	1–5	4.02	.70	.80	.07	-.88	1.95	.74 – .79
T_3 Fear Appeals Frequency	1–5	2.48	1.12	.79	.34	.43	-.71	.69 – .82
T_3 Challenge appraisal	1–5	3.30	1.09	.85	.14	-.35	-.69	.68 – .77
T_3 Threat appraisal	1–5	2.73	1.18	.76	.23	.11	-.93	.76 – .85
T_2 Mathematics exam score	1–8	5.87	1.46	—	.26	-.80	1.35	—
T_4 Mathematics exam score	1–8	5.61	1.53	—	.25	-.83	.98	—

Table 2
Standardized latent bivariate correlations for T_1 and T_2 engagement, the appraisal of fear appeals as challenging and threatening, mathematics test performance in Years 10 and 11, gender and age.

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**
1. T_1 Behavioural engagement	—	.59***	-.12	.20**	-.11	.24**	.39***	.05	.04
2. T_3 Behavioural engagement		—	.02	.38***	-.16**	.46***	.47***	.03	-.03
3. T_3 Fear appeals frequency			—	.64***	.69***	-.08	-.25**	.08	-.01
4. T_3 Challenge appraisal				—	.59***	.24**	.27**	.12*	.05
5. T_3 Threat appraisal					—	-.11	-.23**	.17**	.14**
6. T_2 Mathematics exam score						—	.71***	.03	-.01
7. T_4 Mathematics exam score							—	-.01	-.01
8. Gender								—	—
9. Age									—

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .01$

Table 3

Standardised β Coefficients from the theoretically derived SEM with and without covariates.

	T_1 BE	T_2 MS	T_3 FA	T_3 CH	T_3 TH	T_3 BE	T_4 MS
SEM with covariates included:							
T_1 BE		$.29^{***}$		$.21^{*}$	.03	$.47^{***}$	
T_2 MS				.08	-.14		$.61^{***}$
T_3 FA				$.66^{***}$	$.65^{***}$	-.04	-.02
T_3 CH						$.51^{***}$	.23
T_3 TH						$-.37^{**}$	-.27
T_3 BE							$.46^{***}$
Gender	.07	.04	-.02	$.10^{**}$	$.19^{***}$	.01	-.06
Age	.04	$.21^{***}$	.08	-.01	$.12^{*}$	-.02	-.09
SEM with covariates excluded:							
T_1 BE		$.36^{***}$		$.22^{**}$	.08	$.49^{***}$	
T_2 MS				.12	-.13		$.65^{***}$
T_3 FA				$.69^{***}$	$.67^{***}$	-.04	-.02
T_3 CH						$.55^{***}$	.17
T_3 TH						$-.43^{***}$	-.15
T_3 BE							$.33^{**}$

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

Note. BE = Behavioural engagement, MS = Mathematics examination score, FA = Fear appeals frequency, CH = Challenge appraisal, and TH = threat appraisal.

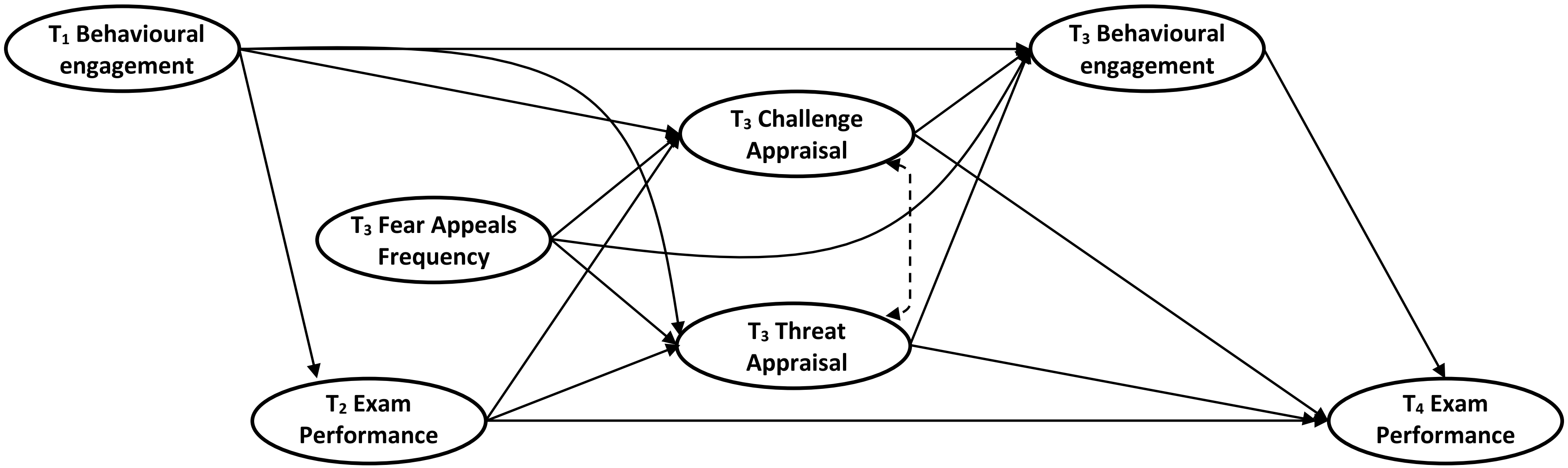

Figure 1. The hypothesized model showing linkages from T_3 fear appeals (frequency and appraisal) to T_3 behavioural engagement, and T_4 examination performance, controlling for T_1 behavioural and affective engagement and T_2 Mathematics examination performance.

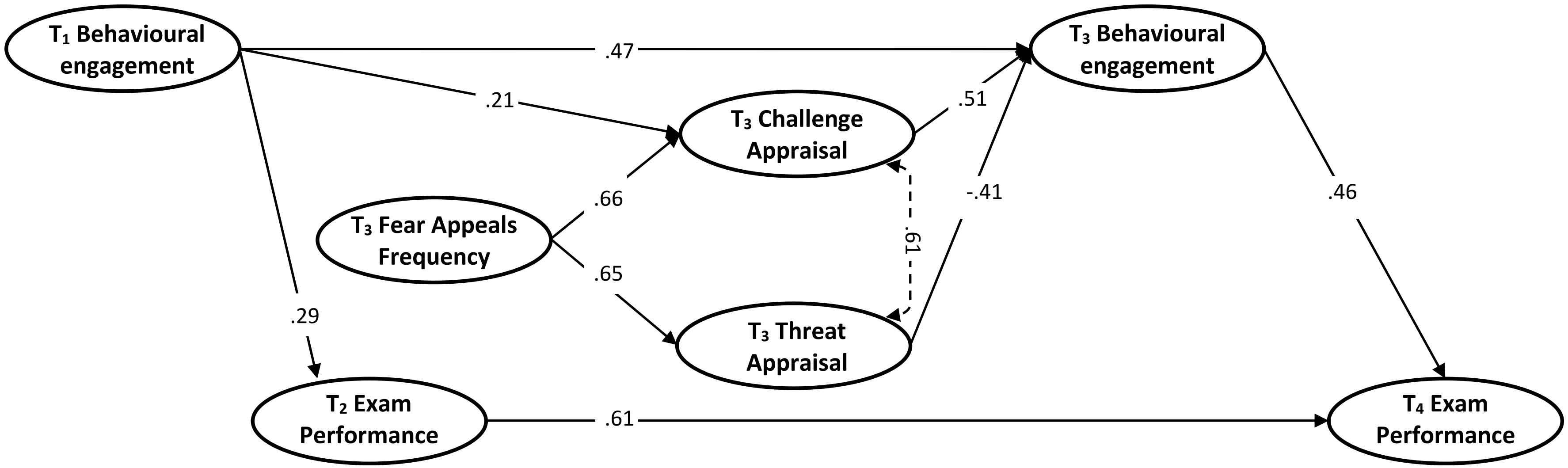

Figure 2. The SEM showing statistically significant linkages from T_3 fear appeals (frequency and appraisal) to T_3 behavioural engagement, and T_4 Mathematics examination performance, controlling for T_1 behavioural engagement and T_2 Mathematics examination performance (for simplicity, covariates were not included).