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# Teacher use of Loss-focused, Utility Value Messages, Prior to High-stakes Examinations, and their Appraisal by Students

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## Abstract

This study set out to assess a new instrument designed to measure the perceived frequency that teachers use fear appeals (communicated value messages that focus on avoiding failure) prior to a high-stakes examination and their appraisal as a challenge or a threat. Data were collected from two samples of students preparing for their high-stakes school exit examinations. Exploratory and confirmatory factor analyses supported a three-factor structure of message frequency, challenge, and threat appraisal. Challenge appraisal positively correlated with value, academic self-efficacy, and engagement. Threat appraisal negatively correlated with academic self-efficacy and engagement. Message frequency was unrelated to value, academic self-efficacy, and engagement. The critical factor in determining relations with antecedents and outcomes is not the message frequency but how it is appraised.


*Keywords*: Challenge, threat, fear appeals, communicated utility value

## Introduction

A common feature of many educational systems is the use of high-stakes examinations at the end of a period of education (Nichols & Berliner, 2007). In England, where the present study was conducted, students take General Certificate of Secondary Education (GCSE) examinations at the end of secondary schooling (Year 11, aged 16 years) and Certificate of Education, Advanced Level, examinations after an optional period of two further years of study (Year 13, aged 18 years). In the United States, under the Every Student Succeds Act (ESSA. 2015), students are tested annually in Grades 3-8, and once in Grades 10-12, for writing and mathematics, and for science once in Grades 3-6, 6-9 and 10-12. Results from such examinations are typically used for selection to competitive education or university courses, apprenticeship, or other forms of work-based training (Heubert & Hauser, 1999), and for accountability purposes to make judgements over the effectiveness of schools and individual teachers (Hanushek & Raymond, 2005; von der Embse, Schoemann, Kilgus, Wicoff, & Bowler, 2016).

It is not surprising that teachers, and other school staff (e.g., school leadership) explain to students the opportunities arising from these examinations for one's future life trajectory. For instance, a teacher might explain to a student how particular grades are required for particular educational pathways, training programmes, entry requirements for jobs, and particular universities or courses (Putwain & Roberts. 2009). From a motivational perspective, these messages represent a form of communicated utility value information (Durik, Hulleman, & Harackiewicz, 2007). Utility value refers to the instrumental importance of a task, lesson, or academic subject, for obtaining an outcome separate from the task or activity itself (Wigfield, Tonks, & Klauda, 2016). Enhancing the utility value of a task would be expected to increase student engagement, interest, and effort, thus leading to educational gains (Hulleman & Harackiewicz, 2009; Gaspard et al., 2015).It is of greater importance, therefore, to understand

whether the utility messages used by teachers, prior to high-stakes examinations in naturalistic settings, impact on student's motivation, engagement, and grades.

Teacher messages that focus on the utility value of avoiding failure (e.g., to enable higher paid forms of work), along with behaviours that contribute to failure (e.g., not preparing for one's examinations), and/ or how failure can be avoided (e.g., effort in preparing for one's examinations) represent fear appeals (Putwain & Symes, 2014). These are persuasive messages that highlight the negative consequences of a particular course of action and how that negative course of action can be avoided with an alternate course of action (Popova, 2012; Ruiter, Kessels, Peters, & Kok, 2014). Fear appeals are intended to elicit an adaptive fear that motivates the person to take those actions required to reduce that fear (Maloney, Lapinksi, & Witte, 2011). One survey of 230 secondary school teachers found 81.6% agreed, or strongly, agreed that students should be reminded that they would fail secondary school exit examinations if they did not complete exam preparation; 67.5% agreed, or strongly, agreed that students should be reminded that they would not get into college[1] or university if they failed (Putwain & Roberts, 2012).

**An Appraisal Model of Fear Appeals and Outcomes**

Fear appeals, used by teachers prior to a high-stakes examination, would not be expected to influence student's motivation and engagement directly, but would depend on how messages were interpreted and responded to by students (Putwain & Symes, 2014, 2016). Individual differences in students resulting from prior educational experiences, dispositions, interests, and goals, will determine whether students respond positively to fear appeals (i.e., engage in study behaviours with greater effort and diligence) or not. A parallel is found in the way that educational enhancements designed to foster utility value in science and maths subjects are effective for some students but not others depending on gender and ability (Gaspard et al., 2015; Durik et al., 2015). This is the principle of universalism without

uniformity; different students will interpret and respond to the same teacher message in different ways (see Soenens, Vansteenkiste, & Van Petegem, 2015).

We propose two fundamental and basic ways that a fear appeal could be appraised by students: as a challenge and as a threat (Putwain & Symes, 2014, 2016). These are prototypical categories of appraisal found in other contexts including appraisal of stressful events, such as examinations, and performance-evaluative sporting events (Lazarus, 2006; Skinner & Brewer, 2002). A challenge appraisal is defined as growth and mastery-focused; that with effort a successful outcome can be achieved. A threat appraisal anticipates the potential for loss or harm with a focus on self-worth protection. Appraisals are proposed to be cognitive judgements that are accompanied by emotions and behavioural intentions. A challenge appraisal is accompanied by positive emotions (e.g., optimism and hope) and approach-orientated behaviours and cognitions (e.g., the intention to engage in actions likely to facilitate success). A threat appraisal will be accompanied by negative emotions (e.g., anxiety) and avoidance-orientated behaviours and cognitions (e.g., strategic withdrawal of effort, or de-valuing achievement).

Teacher fear appeals are appraised on the basis of their perceived personal significance, or relevance, and on perceived capacity for responding effectively to their demands. A fear appeal concerning the importance of avoiding failure to gain entry to ensure educational progression would only be appraised as having personal meaning and significance if that student aspired to continue their education. The perceived significance or relevance of the fear appeal, made prior to a high-stakes examination, would therefore depend on how much the student valued the outcome of the examination (e.g., Wigfield et al., 2016). The perceived capacity for responding to the fear appeal would depend on the student's beliefs about their capacity to achieve subjectively defined success on that examination. Germane beliefs could include academic self-efficacy, expectancy of success, and academic buoyancy (e.g., Bong &

Skaalvik, 2003). Empirical evidence shows a challenge appraisal follows high value (examination outcomes are judged to be important for one's self identify or goals) and expectancy of success whereas threat appraisal follows high value, but low expectancy of success, and low academic buoyancy (perceived ability to withstand routine pressures, such as testing is low) (Putwain & Symes, 2014, 2016; Symes & Putwain, 2016). Given the educational gains and losses for motivation, engagement, and grades

**Existing Measures of Fear Appeals**

The first measure of fear appeals and appraisals (Teachers Use of Fear Appeals: TUFAQ) contained items referring to the frequency of messages about the importance of avoiding failure, messages about the timing of examinations, and threat appraisals (Putwain & Roberts, 2009). Data collected using this measure showed threat appraisal correlated with test anxiety, a performance-avoidance goal (to avoid performing worse than one's classmates), and lower examination grade, in cross-sectional and predictive designs (Putwain & Symes, 2011a, 2011b). A revised TUFAQ including challenge appraisal items (Putwain and Symes, 2014) showed challenge appraisal to correlate positively, and threat appraisal negatively, with academic self-efficacy, attainment value, engagement and examination grade in cross-sectional and prospective designs (Putwain, Nicholson, Nakhla, Reece, Porter, & Liversidge, 2016; Putwain, Remedios, & Symes, 2015; Putwain, Symes, & Remedios, 2016; Putwain, Symes, & Wilkinson, 2016).

These existing measures can be criticised on two grounds. First, the challenge and threat items on the Putwain and Symes (2014) measure do not provide an adequate coverage of cognition, emotion, and behaviour; threat items are biased towards emotion and the challenge items are biased towards cognition-behaviour. Second, it is questionable whether the teacher messages concerning the timing of future examinations should be considered under the same construct as fear appeals. Timing messages (e.g., 'your examinations are only

one month away, you must start preparing) do not contain any communicated value content or explicit focus on failure. Such a message might be better conceptualised as a regulatory prompt or reminder.

### Aim of the Present Study

The aim of this paper was to address these concerns and develop a new questionnaire. Fifteen items (see Tables 1 and 3 for items) were structured around three target factors: The frequency of messages about failure or its consequences (three items), the appraisal of messages as a challenge (six items), and the appraisal of messages as a threat (six items). Items were presented as three groups of five items (Tables 1 and 3: items 1-5, 6-10, and 11-15). Each group began with a frequency message and was followed by four items to judge appraisal of that message (two challenge and two threat items presented in a random order). Appraisal items contained an equal balance of cognition-behaviour (thoughts concerning success, failure, and effort) and emotion-behaviour (feelings of worry, inspiration, encouragement and hope).

Two studies were conducted. The first was to provide a sample with which to conduct an exploratory factor analysis (EFA). The second study was to provide a sample with which to conduct a confirmatory factor analysis (CFA) and assess whether relations with related substantive constructs (value, self-efficacy, and engagement) and demographics (gender and age) established with TUFAQ v.2 were replicated with the present version. As these constructs are highly subject specific (Bong, 2001), we focused on a single subject in each study. In study one, items were made specific to science and, in study two, items were made specific to mathematics.

## Study One: Method

### Participants and Procedure

The participants were 187 students (male = 111, female = 76) in their final year of secondary schooling (Year 11) with a mean age of 15.2 years (*SD* = .39). Students were drawn from two secondary schools; one urban location in the South East of England and one rural location in the South West of England. Schools were selected on a convenience basis from those invplved in a research network with institutions at which the authors were based. The ethnic heritage of participants was heterogeneous (Asian = 85, Black = 39, White = 60, other = 3, %) and *n* = 38 were eligible for free school meals (a proxy for low income). Participants completed the questionnaire via an online website during a period of the school timetable used for non-teaching purposes. All instructions were provided online. Participants were not allowed to continue if an item was not answered, hence there were no missing data. Permission was provided by the Head Teacher, passive (opt-out) consent by parents/ carers, and individual consent provided by students on the opening page of the website. No additional measures were used in this study as the purpose of study 1 was to examine the factor structure of the new measure rather than relations with other constructs.

## Results

An EFA was performed in SPSS v.24 using the Promax rotation (an oblique rotation method that assumes factors will be correlated). The Kaiser-Meyer-Olkin (KMO) index was .791 indicating the data were appropriate for factor analysis. A three-factor solution with Eigen values >.1 was identified, accounting for 60.7% of the variance. All items loaded onto their target factors and no items cross-loaded ($\lambda > .4$). Factor 1 corresponded to the frequency of messages, Factor 2 to a challenge appraisal, and Factor 3 to a threat appraisal (standardised factor loadings are reported in Table 1). All three factors showed acceptable internal reliability coefficients (Cronbach's alpha >.70) and were normally distributed (Frequency *M* = 2.95, *SD* = .92; Challenge *M* = 3.01, *SD* = .84; Threat *M* = 2.90, *SD* = .89; skewness and kurtosis ±1). The frequency of fear appeals positively correlated with challenge and threat

appraisal (*r*s = .29 and .40, respectively, *p*s <.001). Challenge and threat appraisal were unrelated (*r* = .04, *p* >.05).

## Study Two: Method

### Participants and Procedure

The participants were 262 students (male = 127, female = 135) in the final two years of secondary schooling (Year 10 = 136, Year 11 = 123) with a mean age of 14.9 years (*SD* = .72). Students were drawn from two secondary schools (these were different schools to those used in study 1); one from a rural location in South West England and the other from a suburban location in the North West England. Schools were selected on a convenience basis from those invplved in a research network with institutions at which the authors were based. The ethnic heritage of particvipants was predominantly White (*n* = 247) with smaller numbers from other backgrounds (Asian =1, Black = 1, other = 12) and *n* = 68 were eligible for free school meals (*n* = 4 not reported). Participants completed paper and pencil questionnaires during form period (a period of the timetable used for non-teaching purposes). Questionnaires were administered by the students' form tutor (this is the teacher responsible for overseeing the form period) who followed standardised instructions (3.75% of values were missing). Permission was provided by the Head Teacher, passive (opt-out) consent by parents/ carers, and individual consent provided by students on the opening page of the questionnaire.

### Measures

Academic self-efficacy (e.g., 'I think I will receive a good grade in my maths GCSE'[2]) was measured using three items were selected from Pintrich and DeGroot's (1990) *Motivated Strategies for Learning Questionnaire*. Internal reliability was acceptable (Cronbach's α = .83). Attainment value (e.g., 'How important is it to you to get a good grade in GCSE maths?') and utility value (e.g., 'How useful is what you learn in GCSE maths

useful for your daily life outside of school?') were measured using three items each, adapted from Eccles, O'Neill, and Wigfield's (2005)*Michigan Study of Adolescent Life Transitions* scales . Internal reliability was moderate (Cronbach's α = .62 and .67 for attainment and utility value). Behavioural (e.g., 'I participate in the activities and tasks in my GCSE maths class) and emotional engagement (e.g., 'I enjoy learning things in GCSE maths') were measured using three items each from Skinner, Kindermann, and Furrer's (2009) *Engagement vs. Dissatisfaction with Learning Questionnaire*. Internal reliability was acceptable (Cronbach's α = .69 and .87 for behavioural and emotional engagement). Participants responded on a five-point scale (1 = strongly disagree/ not very useful, 5 = strongly agree/ very useful) to all items.

**Analytic Procedure**

First, the theoretically proposed three-factor measurement model (frequency of messages, challenge appraisal, and threat appraisal) was tested competitively against a one-factor model and an alternative three-factor model. The alternate three-factor specified message frequency, cognitive-behaviour appraisal items and emotion-behaviour appraisal items. All models included correlated residual variance for frequency and appraisal items within the same organisational unit of five items. Second, the relations with value, academic self-efficacy, engagement, gender, and age, were established by including all variables in a single measurement model. All models were tested using CFA performed in M*plus* 7.4 with maximum-likelihood estimation and full-information maximum likelihood to deal with missing data (Muthén & Muthén, 2013).

Models were assessed using a number of model fit criteria. These were the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR), comparative fit index (CFI), Tucker-Lewis index (TLI), Akaike Information Criterion (AIC), and sample-size adjusted Bayesian Information Criterion (aBIC). RMSEA,

SRMR, CFI, and TLI, are absolute fit indices. A good model fit is indicated by RMSEA <.05, SRMR <.08, and CFI and TLI >.95 (Hu & Bentler, 1999), although a degree of leniency should be applied when working with real-world data (Heene, Hilbert, Draxler, Ziegler, & Bühner, 2011). AIC and aBIC are relative fit indices where a better model fit is indicated by smaller values (Hix-Small, Duncan, Duncan, & Okut, 2004).

## Results

Model fit indices are reported in Table 2. The theoretically derived three-factor model (message frequency, challenge and threat appraisal) showed a good fit to the data that was superior to the one factor model ($\Delta\chi^2(3) = 452.93$, $p < .001$, $\Delta AIC = 446.93$, and $\Delta aBIC = 445.77$) and alternate three-factor model ($\Delta\chi^2(3) = 308.48$, $p < .001$, $\Delta AIC = 308.48$, and $\Delta aBIC = 308.48$). Standardised factor loadings are shown in Table 3. All items loaded onto their target factor $\lambda > .4$ and all factors showed acceptable internal reliability coefficients (Cronbach's alpha >.70).

In the subsequent measurement model academic self-efficacy, value, and engagement, were treated as latent variables. Gender and age were treated as manifest variables. A CFA showed a good fit to the data: $\chi^2(394) = 544.30$, $p < .001$, RMSEA = .034, SRMR = .050, CFI = .963, and TLI = .954. Latent bivariate correlations are shown in Table 4. Message frequency did not significantly correlate with any covariates. Challenge appraisal positively correlated with academic self-efficacy, value, and engagement. Threat appraisal negatively correlated with academic self-efficacy and engagement. Gender correlated positively with threat appraisal and negatively with academic self-efficacy. Age positively correlated with challenge appraisal and emotional engagement.

## Discussion

The aim of this study was to assess an instrument to measure the frequency that teachers were perceived to use fear appeals (communicated utility value messages that focus

on avoiding failure), and their appraisal as a challenge or as a threat. This instrument substantially differed from previous versions (Putwain & Roberts. 2009; Putwain & Symes, 2014) by only including teacher messages with an explicit reference to failure and a balance of cognitive-behavioural and emotional-behavioural appraisal items. Data were collected from two samples. The first study provided a sample for an EFA in the subject domain of science and the second study provided a sample for a CFA and to examine external relations with value, academic self-efficacy, and engagement, in the subject domain of mathematics.

Factor analytic results support the proposition that appraisals of fear appeal messages made prior to a high-stakes examination consist of cognitions accompanied by emotions and behavioural intentions (Putwain & Symes, 2014, 2016). The model whereby challenge and threat appraisals consisted of a combination of cognitive-behaviour and emotional-behaviour items was superior to the model whereby cognition and emotion were specified as separate factors including challenge and threat items. Moreover, the model was demonstrated in relation to two subject domains, science and mathematics.

The frequency of teacher messages did not significantly correlate with value, academic self-efficacy, or engagement. This is consistent with the appraisal model that messages would not relate to educational outcomes directly but through appraisal processes (Putwain & Symes, 2014, 2016), and accords with the conception of universalism without uniformity; different students will respond to the same message in different ways due to their unique individual characteristics (Soenens et al., 2015). It is likely that the relations between message frequency and value, academic self-efficacy, and engagement, are the subject of competing positive and negative mediators; positive indirect relations through challenge appraisal, and the negative indirect relations through threat appraisal. While message frequency may be less influential in determining the direction of relations with external

constructs than appraisal this does not render message frequency as inconsequential. Message frequency correlates positively with both challenge and threat appraisal and can be likened to a reflective prompt. That is, when fear appeals are used more frequently they prompt students to consider the personal significance of the fear appeal and their capacity to effectively respond more frequently. More frequent fear appeals could therefore result in greater challenge appraisals if a fear appeal was perceived as significant and one could respond effectively or greater threat appraisals if a fear appeal was perceived as significant but one could not respond effectively.

Challenge appraisal positively correlated with value, academic self-efficacy, and engagement. This is consistent with research using earlier versions of the TUFAQ (e.g., Symes & Putwain, 2016; Putwain, Remedios et al., 2015; Putwain, Symes, et al. 2016) and supports the conceptualisation of challenge appraisal as a mastery-orientated, growth-focused, response to the teacher message. Threat appraisal negatively correlated with academic self-efficacy and engagement. This is consistent with earlier research (e.g., Putwain, Nicholson, et al., 2016) and supports the conceptualisation of threat appraisal as a failure-anticipating, self-worth protective, response to the teacher message. It was surprising that value, however, did not significantly correlate with threat appraisal.

Value is one of the key ways that the personal significance and relevance of the teacher message is judged (Putwain & Symes, 2014, 2016) and threat appraisal, measured using earlier versions of the TUFAQ, has been shown to positively correlate with utility and attainment value (Putwain, Symes, et al., 2016; Putwain, Remedios, et al., 2015). Appraisal models of achievement emotions propose that subjective value judgements primarily influence the intensity of the emotions (Pekrun & Perry, 2014). Earlier versions of the TUFAQ that emphasised the emotional aspect of the message appraisal may therefore have been biased towards showing positive relations with value. The present version, which

includes a balance of cognitive and emotional elements of message appraisal may therefore attenuate positive relations with value.

Female students reported greater challenge and emotional engagement. While these findings are not unexpected, and have also been found in previous studies of fear appeals (Putwain, Symes, & Wilkinson, 2017) and student engagement (Park, Holloway, Arendtsz, Bempechat, & Li, 2012), it is notable that science and mathematics are traditionally viewed as gendered subjects where female students express less positive views and attitudes (e.g., Potvin & Hasni, 2014). These findings mirror those from intervention studies showing how increasing the utility value of science can have positive impacts on female students with high self-efficacy (e.g., Gaspard et al., 2015). These are encouraging findings and suggest practical ways for practitioners to enhance motivation and engagement for some students.

Both frequency and appraisal items are, by necessity, domain and context specific. In the present study we examined the domains of mathematics and science, and context of GCSE examinations. We anticipate the three-factor model of fear appeal frequency and appraisals would generalise to other subjects (e.g., English) and other high-stakes settings, the exact wording of items would require adapting to reflect the domain the subject and tests the fear appeals were made in relation to. We would encourage colleagues to adapt and utilise this measure in differing contexts not only to examine relations with substantive constructs (such as motivation), but also to scrutinise the cross-cultural generalisability of the model and locally adapted items.

**Limitations and Directions for Future Research**

Study one utilised an online method of data collection and study two a more traditional paper and pencil method. Although the online method might alert participants to items they may have inadvertently missed, and hence reduce the level of missing data, it is possible there are corresponding disadvantages. Those participants who would have left an item

uncompleted because they did not understood the meaning or who wished to withdraw participation tacitly, by spoiling a paper and pencil questionnaire, are forced to respond to the online version (see Weigold, Weigold, & Russell, 2013). Given the small and non-significant correlations between value and threat appraisal, it would be prudent to future research check for other ways of conceptualising the relevance and significance of teacher messages. Possible candidates include goal relevance and goal congruence (e.g., Schutz, Davis, & DeCuir-Gunby, 2014). Finally, we call for future research to further establish how fear appeals and their appraisal, relate to educational outcomes of high-stakes examinations including motivation, engagement, and achievement. Despite these limitations, we are satisfied that the three-factor model of fear appeals frequency and appraisal is adequate for research purposes and, with appropriate modification of items to reflect different subject domain and context, be utilised in differing educational systems.

**Conclusion**

This study examined the psychometric properties of an instrument to measure fear appeals (communicated utility value messages that focus on failure) and their appraisal as challenging or threatening. Data were collected from two samples and analysed using EFA and CFA. A three-factor structure was supported comprising frequency of teacher messages, challenge appraisal, and threat appraisal. Challenge appraisal is mastery-orientated, growth-focused, and showed positive correlations with value, academic self-efficacy, and engagement. Threat appraisal is failure-anticipating, self-worth protective focused, and showed negative correlations with academic self-efficacy and engagement. Consistent with the proposition that the appraisal of the message is the critical factor in determining relations with antecedents and outcomes, rather than the message itself, frequency was unrelated to value, academic self-efficacy, and engagement.

Endnote:

[1] In this context, ‘college’ referred to a tier of upper secondary education (academic, technical, or vocational) in Years 12 and 13.

[2] In the UK, mathematics is colloquially referred to as ‘maths’

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Table 1

*Standardized loadings, descriptive statistics, and internal reliability coefficients, for the three-factor solution.*

| Items | | Factors | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| 1. | How often does your science teacher tell your class that unless you work hard you will not get a grade C in science GCSE and be able to go to college or 6th form? If your science teacher says this, do you... | **.87** | .01 | -.11 |
| 2. | think 'I need to work hard to pass GCSE science' | -.08 | **.82** | .03 |
| 3. | think 'there's no point, I'm unlikely to pass GCSE science no matter how hard I try' | .12 | -.20 | **.76** |
| 4. | feel inspired to work hard in order to pass GCSE science | .08 | **.66** | -.08 |
| 5. | feel worried about the possibility of failing GCSE science even if you work hard | -.07 | -.01 | **.81** |
| 6. | How often does your science teacher tell your class that unless you work hard you will fail your science GCSE? If your science teacher says this, do you... | **.56** | .13 | .24 |
| 7. | feel worried by the possibility of failing GCSE science | .01 | .14 | **.69** |
| 8. | feel encouraged that by making an effort you can pass GCSE science | -.01 | **.81** | -.02 |
| 9. | think 'I am going to fail GCSE science no matter how much effort I make' | .15 | -.04 | **.64** |
| 10. | think 'If I make an effort I will pass GCSE science' | -.07 | **.91** | .04 |
| 11. | How often does your science teacher tell your class that you will find it difficult to get a good job if you fail GCSE science? If your science teacher says this, do you... | **.85** | -.02 | .31 |
| 12. | feel worried about failing GCSE science | -.09 | .09 | **.77** |
| 13. | think 'this isn't a problem for me, I know that I can pass GCSE science' | .09 | **.75** | .01 |
| 14. | feel hopeful that with effort you will pass GCSE science | .05 | **.60** | .17 |
| 15. | think 'this will be a real struggle for me, I'm not sure I can pass GCSE science | -.10 | -.02 | **.85** |
| Cronbach's α | | .72 | .86 | .86 |

*Note*. Emboldened items load onto factor $\lambda > .4$

Table 2
*Model fit indices for the confirmatory factor analyses*

| Models | $\chi^2$ (df) | RMSEA | SRMR | CFI | TLI | AIC | aBIC |
|---|---|---|---|---|---|---|---|
| One-factor model | 520.09 (62)*** | .169 | .158 | .781 | .629 | 10428.98 | 10457.19 |
| Theoretically proposed three-factor model | 67.16 (59) | .023 | .035 | .996 | .993 | 9982.05 | 10011.42 |
| Alternate three-factor model | 375.64 (59)*** | .144 | .144 | .849 | .730 | 10290.53 | 10319.90 |

Table 3

*Standardized loadings, descriptive statistics, and internal reliability coefficients, for the three-factor solution.*

| Items | | Factors | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| 1. | How often does your maths teacher tell your class that unless you work hard you will not get a grade C in maths GCSE and be able to go to college or 6th form? If your maths teacher says this, do you... | .66 | | |
| 2. | think 'I need to work hard to pass GCSE maths' | | .62 | |
| 3. | think 'there's no point, I'm unlikely to pass GCSE maths no matter how hard I try' | | | .81 |
| 4. | feel inspired to work hard in order to pass GCSE maths | | .68 | |
| 5. | feel worried about the possibility of failing GCSE maths even if you work hard | | | .85 |
| 6. | How often does your maths teacher tell your class that unless you work hard you will fail your maths GCSE? If your maths teacher says this, do you... | .75 | | |
| 7. | feel worried by the possibility of failing GCSE maths | | | .84 |
| 8. | feel encouraged that by making an effort you can pass GCSE maths | | .65 | |
| 9. | think 'I am going to fail GCSE maths no matter how much effort I make' | | | .89 |
| 10. | think 'If I make an effort I will pass GCSE maths' | | .66 | |
| 11. | How often does your maths teacher tell your class that you will find it difficult to get a good job if you fail GCSE maths? If your maths teacher says this, do you... | .73 | | |
| 12. | feel worried about failing GCSE maths | | | .90 |
| 13. | think 'this isn't a problem for me, I know that I can pass GCSE maths' | | .72 | |
| 14. | feel hopeful that with effort you will pass GCSE maths | | .75 | |
| 15. | think 'this will be a real struggle for me, I'm not sure I can pass GCSE maths' | | | .88 |
| Cronbach's α | | .76 | .85 | .95 |

Table 4

*Latent bivariate correlations between the frequency of fear appeals, challenge and threat appraisal, with academic self-efficacy, value, engagement, gender and age.*

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Message Frequency | — | .22** | .38*** | -.11 | -.04 | -.04 | -.12 | -.15 | .07 | .03 |
| 2. Challenge Appraisal | | — | .12 | .36*** | .49*** | .45*** | .50*** | .47*** | -.04 | .29*** |
| 3. Threat Appraisal | | | — | -.49*** | -.14 | -.10 | -.21** | -.15* | .26*** | .05 |
| 4. Academic Self-efficacy | | | | — | .51*** | .52*** | .46*** | .58*** | -.23*** | .09 |
| 5. Attainment Value | | | | | — | .83*** | .81*** | .65*** | -.10 | .08 |
| 6. Utility Value | | | | | | — | .71*** | .74*** | -.10 | .04 |
| 7. Behavioural Engagement | | | | | | | — | .59*** | -.12 | .08 |
| 8. Emotional Engagement | | | | | | | | — | -.13 | .18** |
| 9. Gender | | | | | | | | | — | — |
| 10. Age | | | | | | | | | | — |
| Mean | 3.17 | 3.69 | 3.07 | 3.80 | 3.66 | 3.44 | 3.86 | 2.72 | — | 14.96 |
| *SD* | 1.11 | .82 | 1.21 | .78 | .82 | .85 | .71 | 1.03 | — | .72 |

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

*Note*. Gender coded 0 = male and 1 = female