

The Scare Tactic: Do Fear Appeals Predict Motivation and Exam Scores?

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Prior to high-stakes exams, teachers use persuasive messages that highlight to students the possible consequences of failure. Such messages are known as fear appeals. This study examined whether fear appeals relate to self- and non-self-determined motivation and academic performance. Data were collected in 3 waves. Self-report data pertaining to perceived fear appeals were collected in the first wave, self-report data pertaining to self-determined motivation were collected in the second wave, and exam scores were collected in the third wave. An increased frequency of fear appeals and the appraisal of fear appeals as threatening predicted lower self-determined motivation but were largely unrelated to non-self-determined motivation. An increased frequency of fear appeals and the appraisal of fear appeals as threatening predicted lower examination performance that was partly mediated by lower self-determined motivation. These findings support a position derived from self-worth theory that the negative consequences of fear appeals arise from their focus on avoiding failure rather than their focus on extrinsic consequences. We suggest that teachers and instructors need to be aware how seemingly motivational statements can unwittingly promote lower self-determined motivation.

Keywords: fear appeals, intrinsic motivation, extrinsic motivation, teacher behavior, academic performance

The classroom environment has a profound and pervasive influence on students. The motivational climate of the classroom, the interpersonal relationships, and the physical classroom characteristics can serve to enhance or detract from student's learning, educational achievement, and enjoyment and value of learning (e.g., Eccles, 2007; Woolfolk Hoy, Hoy, & Davis, 2009). This article reports on a study that examined one relatively unexplored aspect of the classroom environment: the messages communicated by teachers as students prepare for high-stakes exams concerning (a) the consequences of failure, and (b) the importance of avoiding failure. Our study examined how the use of such messages related to self-

determined motivation and examination performance as students followed the program of study for the General Certificate of Secondary Education (GCSE) in "maths." GCSEs are the school leaving examinations in England, Wales, and Northern Ireland, taken at the end of compulsory secondary education in Year 11, when students are 15 to 16 years old. A pass in GCSE maths is typically required as a minimum entry requirement for access to any form of postcompulsory education or training, whether academic, technical, vocational, or for entry into the labor market for any occupation other than those that are routine or manual. The GCSE maths program of study provides a context to the study in which the consequences of success or failure may influence future life trajectory and provides a high-stakes context that is real and not simply imagined.

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Classroom Fear Appeals: Messages That May Elicit Fear

Prior to high-stakes examinations, teachers communicate to students important information regarding that examination. Some of this infor-

mation may be administrative and informational, regarding the date, time, and venue of the examination, the length of time of that examination, what materials may be required, and so forth. However, teachers also present messages to students regarding the consequences of examinations, why they might be considered to be high-stakes, and what the consequences of success and/or failure might be (Chamberlain, Daly, & Spalding, 2011; Connor, 2001, 2003; Putwain, Connors, Woods, & Nicholson, 2012). One study reported how teachers would emphasize to students the importance of academic credentials in general and how certain subjects and/or scores would be required for entry to the labor market, particular occupations, and access to postcompulsory education (Putwain, 2009). Notably, teachers also would highlight to students how failure would threaten aspirations and limit future educational and occupational choices. These kinds of messages were intended as motivational strategies by teachers to encourage students to engage with their studies and prepare for their forthcoming examinations by drawing attention to the negative consequences of failure (Putwain, 2009; Putwain & Roberts, 2012).

Persuasive messages designed to facilitate a course of action so as to avoid a negative outcome have been referred to as fear appeals. These originated in the health literature in attempts to promote health-conscious lifestyle behaviors, such as smoking cessation and safe sex practices (e.g., Ruiters, Abraham, & Kok, 2001; Smerecnik & Ruiters, 2010). Fear appeals have been applied to the messages used in an educational or instructive context prior to taking tests and examinations (Putwain & Roberts, 2009; Sprinkle, Hunt, Simonds, & Comadena, 2006). Thus, messages presented to students prior to high-stakes examinations may focus, to a greater or lesser extent, on the negative consequences of failure that may elicit more or less fear in students. Consider the following two examples in the context of a Year 11 maths GCSE lesson. In the first message, the teacher says, "If you fail GCSE maths, you will never be able to get a good job or go to college. You need to work hard in order to avoid failure." In the second message, the teacher says, "GCSE maths is really important as most jobs that pay well require GCSE maths, and if you want to go to college you will also need a pass in GCSE

maths. It's really important to try your hardest." Both messages highlight to students the importance of effort and provide a reason for doing so. Where these messages differ is in their focus on success or avoiding failure. The former message focuses on avoiding failure and would be regarded as including a fear appeal. The latter message focuses on success and would not be regarded as including a fear appeal.

We approach the study of fear appeals from a sociocognitive perspective (Bandura, 1997) in which the outcome of an environmental event, such as messages made to students prior to high-stakes examinations, would be cognitively mediated. For example, Putwain and Symes (2011a, 2011b) have shown that test anxiety is not related to how frequently pupils perceive they are receiving fear appeals; rather, anxiety is related to the degree to which messages are perceived as *threatening*. When examining the impact of fear appeals on subsequent motivation, we distinguish, as these studies do, between how frequently pupils receive fear appeals and how threatening they perceive the messages to be.

Self-Determination Theory and Controlling Teacher Practices

Self-determination theory (SDT) provides an overarching motivational framework based on innate psychological needs for competence, autonomy, and relatedness (Deci & Ryan, 1985; Ryan & Deci, 2000, 2002). According to SDT, the critical determinant of motivation is the extent to which behavior is believed to be located within an internal or external locus of control. Intrinsic motivation, characterized by challenge, interest, mastery, and exploration, is optimized when feelings of competence or self-efficacy are accompanied with a sense of autonomy (see cognitive evaluation theory in Ryan & Deci, 2000). Extrinsic motivation is a means for obtaining a separable outcome from the behavior itself (i.e., it is a means to an end) and varies in relative autonomy (see organismic integration theory in Ryan & Deci, 2000). The least autonomous, extrinsically motivated behaviors are externally regulated to satisfy an external demand or reward contingency and are perceived to have an external locus of control. Introjected regulation occurs when behaviors are contingent on self-esteem (such as guilt or

pride) and locus of control has been part internalized. Identified regulation is more autonomous and represents a conscious value of a goal in which the locus of control is perceived to be more internal than external. A state of lacking intent or amotivation is characterized by a lack of competency, value, or expected outcome.

According to SDT, characteristics of the classroom or instructional climate that vary in the extent to which they make salient student autonomy can promote or detract from intrinsic motivation or provide conditions in which extrinsic motivations become internalized. Directly controlling teacher behaviors refer to an instructional style that is characterized by teacher pressure, teacher power, and external sources of motivation (Reeve, 2009). Such practices have been associated with an increase in negative feelings toward learning, such as anger and anxiety (Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Assor, Roth, & Deci, 2004), reduced intrinsic motivation (Deci, Ryan, & Williams, 1996), and increased extrinsic motivation and amotivation (Assor et al., 2005). In contrast, teachers' autonomy-supportive behaviors, such as the provision of choice, minimal use of controls, and explanation of the relevance of learning tasks (Ryan, Sheldon, Kasser, & Deci, 1996; Skinner & Belmont, 1993), generally promote positive outcomes, including students' views of themselves as competent and autonomous individuals (Danielsen, Samdal, Hetland, & Wold, 2009; Skinner, Furrer, Marchand, & Kindermann, 2008), and increased intrinsic and self-determined extrinsic motivation (Gillet, Vallerand, & Lafrenière, 2012; Guay & Vallerand, 1996–1997).

Classroom Fear Appeals and Self-Determined Motivation

Fear appeals, like directly controlling teacher practices, focus on the threat of failure and extrinsic reasons for engaging in behaviors likely to avoid failure. As such, fear appeals would be expected to predict lower self-determined forms of motivation (intrinsic and identified) and greater non-self-determined forms of motivation (introjected, external, and amotivation). From the SDT perspective, the critical element of messages that contain fear appeals is their focus on an external locus of control. The fear-eliciting aspect of fear appeals

is not central, but a means by which this conformance occurs (e.g., through the use of pressured language). From the SDT perspective, therefore, the appraisal of fear appeals as threatening is indicative of the extent to which the message was perceived to be controlling.

An alternative perspective is offered by self-worth theory (SWT). In this theory intrinsic and extrinsic forms of motivation are represented on separate dimensions rather than as a single continuum in SDT (Covington, 1992; Covington & Müeller, 2001). Intrinsic motivation is damaged by a focus on avoiding failure rather than a focus on extrinsic reasons for engaging in behavior. Thus, from the SWT perspective, the critical element of fear appeals is not the focus on the extrinsic character of the consequences, but the orientation toward avoiding failure. Fear appeals made prior to a high-stakes examination would be expected to predict lower self-determined forms of motivation (intrinsic and identified), but should be unrelated to non-self-determined forms of motivation (introjected, external, and amotivation). The appraisal of fear appeals as threatening is indicative of the extent to which the message was successful in eliciting fear in the recipient of the message.

The first novel way in which this study adds to the literature is by examining how fear appeals relate to self and non-self-determined motivation. Both SDT and SWT would suggest fear appeals would have a detrimental impact on self-determined motivation. From a SDT perspective, this would occur by encouraging non-self-determined motivation. However, from an SWT perspective, this would occur via a focus on failure avoidance, and fear appeals would be unrelated to non-self-determined motivation.

A Mediated Model of Fear Appeals, Autonomous Motivation, and Examination Performance

Self-determined motivation predicts higher educational achievement (e.g., Guay & Vallerand, 1996–1997; Lepper, Corpus, & Iyengar, 2005; Soenens & Vansteenkiste, 2005; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). However, inconsistent findings are reported between extrinsic motivation and academic achievement, some negative (e.g., Lep-

per et al., 2005; Ratelle, Guay, Vallerand, Larose, & Sénécal, 2007) and some positive (e.g., Putwain, Kearsley, & Symes, 2012; Ratelle et al., 2007). This latter finding may be partly attributed to the ways in which extrinsic motivations have been conceptualized and operationalized. Some research (e.g., Lepper et al., 2005; Putwain, Kearsley, et al., 2012) has used a single extrinsic motivation scale, which does not differentiate between self- and non-self-determined forms of extrinsic motivation. Other research (e.g., Soenens & Vansteenkiste, 2005; Vansteenkiste et al., 2004) combines intrinsic, self-, and non-self-determined forms of extrinsic motivation and amotivation into a single continuum in which is not possible to examine the relations different forms of extrinsic motivation may show with academic achievement. When extrinsic motivations are examined separately (e.g., Ratelle et al., 2007), inverse relations are shown with external motivation, positive relations with identified motivation, and null relations with introjected motivation.

In considering how motivation may predict educational performance, the literature has reported on achievement from low-stakes tests (e.g., Vansteenkiste et al., 2004; Yildirim, 2012), school grades (e.g., Putwain, Kearsley, et al., 2012; Ratelle et al., 2007), and reading test scores (e.g., Becker, McElvany, & Kortenbruck, 2010). Examples using performance on high-stakes tests and examinations are rare (e.g., Soenens & Vansteenkiste, 2005). Thus, a second way in which this study adds to the literature is by considering how self- and non-self-determined motivation predict academic performance on a high-stakes test, namely, the GCSE examination in maths.

This study tests a model that positions self-determined motivation as a mediating variable between fear appeals and academic performance. Prior research has shown intrinsic motivation to be a mediator of the relations between an autonomy-supportive context and achievement in a low-stakes test (Vansteenkiste et al., 2004) and with grade point average (Soenens & Vansteenkiste, 2005). More supportive environments predicted greater self-determined motivation that, in turn, predicted better educational achievement. In this study, based on the consideration of fear appeals from the SDT and SWT perspectives, the greater use

of fear appeals and their perception as threatening are expected to predict lower autonomous motivation, and, in turn, a lower performance in GCSE maths.

Aims of the Current Study

The aims of this study are twofold. First, the study aims to examine the relations between fear appeals, both the frequency of fear appeals as reported by students, and their perception as threatening, and motivation. Based on predictions of SDT and SWT, we hypothesize that a higher frequency and perceived threat of fear appeals will predict a lower self-determined motivation (intrinsic and identified). We do not offer any specific hypotheses regarding fear appeals and non-self-determined motivations (introjected, external, and amotivation), as the predictions suggested by SDT and SWT differ. Second, the study aims to test a mediational model of fear appeals, self-determined motivation, and examination performance. Based on predictions of SDT and SWT, self-determined motivation is expected to predict higher GCSE maths exam scores. Thus, a higher frequency and perceived threat of fear appeals will predict a lower GCSE score via lower self-determined motivation.

Method

Participants

The sample consisted of 347 students (males, $n = 174$; females, $n = 173$) in their final year of compulsory secondary education in England (Year 11), with a mean age of 15.3 years ($SD = .46$). Students were drawn from two participating schools in which they were following the 18-month program of study leading to school leaving qualifications (the GCSE). Students were clustered for maths instruction by ability in 20 classes ($M = 19.2$ students per class). We did not have access to students' individual ethnic or socioeconomic backgrounds. However, school demographic data indicated that 86% of students were from a White British background, 6% did not speak English as their first language, and 22% of students were eligible for free school meals (as a proxy indicator of a low-income background).

Measures

Fear appeals were measured using the Teachers' Use of Fear Appeals Questionnaire (Putwain & Roberts, 2009), in which items were made specific to the maths GCSE. This questionnaire provides scores for the perceived frequency with which teachers are reported to make fear appeals (e.g., "How often do your teachers tell you that unless you work hard you will fail your maths GCSE?") and the appraisal of fear appeals as threatening (e.g., "Do you feel worried when your teachers tell you that your maths GCSE exam is getting nearer?"). Participants rate each item on a 5-point scale (1 = *never*; 5 = *most of the time*). The construct validity of this measure has been demonstrated in prior work (e.g., Putwain & Roberts, 2009; Putwain & Symes, 2011a, 2011b). The internal reliability coefficients for the present study, established through Cronbach's alpha, were good (see Table 1).

Motivation was measured using the Academic Motivation Scale (Vallerand et al., 1992), in which items were adapted to refer specifically to GCSE maths. This questionnaire consists of 28 items that correspond to seven scales (four items per scale) designed to measure self- and non-self-determined motivations. Participants respond to a general stem ("What is the reason for doing your maths GCSE schoolwork?") on a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Intrinsic motivation represents autonomously regulated motivations and consists of three scales: intrinsic motivation to know (e.g., "Because my GCSE maths classes allow me to learn about many things that interest me"), intrinsic motivation to accomplish (e.g., "For the pleasure I experience getting good marks in GCSE maths"), and intrinsic motivation to experience stimulation (e.g., "Because for me, GCSE maths is fun"). Extrinsic motivation represent externally contingent motivations and also consists of three scales: Identified Motivation (e.g., "Because I believe that maths GCSE will improve my competence when I enter work"), Introjected Motivation (e.g., "Because I want to show myself that I can get a good grade in GCSE maths"), and externally regulated motivation (e.g., "Because I need a good maths GCSE in order to find a good job when I leave school"). The last scale is Amotivation (e.g., "Honestly, I don't know; I really feel that I am wasting my time doing GCSE maths"). The validity of this measure has been demonstrated on

numerous previous occasions (e.g., Carbonneau, Vallerand, & Lafrenière, 2012; Guay & Vallerand, 1996–1997; Vallerand, Fortier, & Guay, 1997), including a subject-specific version used in an English educational context (Putwain, Kearsley, et al., 2012). The internal reliability coefficients for the present study, established through Cronbach's alpha, were good (see Table 1).

GCSE maths is graded on an 8-point scale (A* to G), with Grade C considered to be a pass grade. Grades were converted to a numerical scale using the conventional for educational research in England (A* = 8, A = 7, B = 6, etc.)¹, so that a higher score represents a higher grade. As GCSE maths exams are marked by an external awarding body and provided to us by the participating schools, it was not possible to establish the internal reliability.

Design and Procedure

Self-report data were collected in two waves. Fear appeals were measured in the first wave of data collection, approximately three months prior to the GCSE maths exams at the end of the spring term (March, 2012). Motivation was measured in the second wave of data collection, midway through the summer term (May, 2012), approximately one month prior to the GCSE maths exam. Data were collected in school by form teachers during a period of the timetable used for registration and administrative purposes. Thus, data were not completed in the presence of a student's maths regular instructor. Participating teachers were provided with a script and instructions for administering questionnaires that emphasized to students that the questionnaires did not constitute a test, participation was voluntary, and to ask for help with reading, if necessary. We obtained the institutional consent of the head teacher at each participating school and the individual consent of participating students at both waves of data collection, including permission to use maths grades. GCSE maths grades were provided by the school as the final wave of data collection.

¹ An A* grade is an upper Grade A in the highest range of scores. Other grades do not have such equivalents to indicate high scores in that range (e.g., B* or C*).

Table 1
Descriptive Data for Fear Appeals and Motivation

| Scale | Range | <i>M</i> | <i>SD</i> | α | Skewness | Kurtosis |
|---------------------------------------|---------|----------|-----------|----------|----------|----------|
| Frequency of Fear Appeals | 1 to 5 | 2.94 | .92 | .89 | .24 | .67 |
| Perceived Threat of Fear Appeals | 1 to 5 | 2.71 | 1.03 | .84 | .23 | -.76 |
| To Know (intrinsic) | 1 to 5 | 2.95 | .90 | .86 | -.17 | -.21 |
| To Accomplish (intrinsic) | 1 to 5 | 3.16 | .86 | .84 | -.57 | .31 |
| To Experience Stimulation (intrinsic) | 1 to 5 | 2.81 | .94 | .87 | -.29 | -.62 |
| Identified (extrinsic) | 1 to 5 | 3.62 | .85 | .87 | -.65 | .44 |
| Introjected (extrinsic) | 1 to 5 | 3.33 | .85 | .81 | -.60 | .37 |
| External (extrinsic) | 1 to 5 | 3.86 | .81 | .86 | -.94 | 1.27 |
| Amotivation | 1 to 5 | 2.24 | .88 | .79 | .52 | -.38 |
| Self-Determined Motivation | -8 to 8 | 1.23 | 2.77 | .89 | -.46 | .73 |
| GCSE Maths Score | 1 to 8 | 5.18 | 1.46 | — | .09 | .05 |

Note. GCSE = General Certificate of Secondary Education.

Results

Descriptive Statistics and Bivariate Correlations

Descriptive data are reported in Table 1. All variables showed acceptable internal reliability (Cronbach's $\alpha \geq .7$) and were normally distributed (external motivation showed a slightly longer tail at the bottom end of the distribution). As anticipated, the different motivation scales show significant inter-correlations, which could result in multicollinearity effects if entered into subsequent regression analyses as simultaneous predictors (this assumption was empirically supported; see Table 2). We followed the procedure adopted in earlier research (e.g., Guay &

Vallerand, 1996–1997; Vallerand et al., 1997) to create a single motivation scale that represents the continuum of autonomy (henceforth referred to as *self-determined motivation*). Intrinsic motivation items were aggregated and weighted at +2, identified motivation items were weighted at +1, external motivation items were weighted at -1, and amotivation items were weighted at -2. Weighted items were then aggregated so that a higher score on this scale represents a more self-determined motivation. Conceptually, this approach aligns with the model of motivation as proposed within SDT (Deci & Ryan, 1985; Ryan & Deci, 2000, 2002).

Bivariate correlations are reported in Table 2. Fear appeals were negatively correlated with

Table 2
Bivariate and Intraclass Correlations for Fear Appeals, Motivation, and GCSE Score

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
|--------------------------------|---|--------|---------|---------|---------|--------|--------|--------|---------|---------|---------|-----|
| 1. Fear Appeals Frequency | — | .67*** | -.13* | -.19*** | -.23*** | -.11* | -.08 | -.03 | .12* | -.21*** | -.39*** | |
| 2. Perceived Threat | | — | -.19*** | -.23*** | -.25*** | -.13* | -.09 | -.07 | .10 | -.22*** | -.28*** | |
| 3. To Know | | | — | .77*** | .87*** | .61*** | .62*** | .40*** | -.15** | .73*** | .21*** | |
| 4. To Accomplish | | | | — | .70*** | .49*** | .73*** | .43*** | -.19*** | .68*** | .31*** | |
| 5. To Experience Stimulation | | | | | — | .54*** | .52*** | .27*** | -.13* | .73*** | .24*** | |
| 6. Identified | | | | | | — | .59*** | .78*** | -.32*** | .63*** | .24*** | |
| 7. Introjected | | | | | | | — | .62*** | -.19*** | .53*** | .21*** | |
| 8. External | | | | | | | | — | -.39*** | .42*** | .23*** | |
| 9. Amotivation | | | | | | | | | — | -.73*** | -.28*** | |
| 10. Self-Determined Motivation | | | | | | | | | | — | .32*** | |
| 11. GCSE Maths Score | | | | | | | | | | | — | |
| ρ_1 | | .23 | .15 | .03 | .02 | .09 | .03 | <.01 | .03 | .03 | .05 | .38 |

Note. GCSE = General Certificate of Secondary Education.

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

autonomous forms of motivation (intrinsic and identified) and largely unrelated to non-self-determined forms of motivation (the one expectation was a small positive correlation between a higher frequency of fear appeals and amotivation). Positive intercorrelations were shown between the intrinsic and extrinsic components of motivation, thus supporting the decision to create a single motivation variable to represent the continuum of autonomy. GCSE score was negatively correlated with fear appeals and amotivation, and positively correlated with both intrinsic and extrinsic motivations. Intraclass correlation coefficients (reported as ρ_i ; also see ICC_1 in Lüdtke, Robitzsch, Trautwein, & Kunter, 2009) were estimated using empty hierarchical models (i.e., with no predictors), which partition variance into between-class (σ_W^2) and within-class (σ_B^2) components. Therefore, coefficients represent the proportion of variance attributable to the different maths classes in which students were instructed. Between 15% and 23% of variance in fear appeals, up to 9% of variance in academic motivation, and 37% of GCSE scores was attributable to between different maths classes.

Multilevel Mediation Modeling

A mediational model was tested in which fear appeals were hypothesized as predictors of autonomous motivation, which, in turn, was hypothesized as a predictor of GCSE maths score. As noted, a substantial proportion of variance in maths GCSE scores was attributable to between-class differences. Hence, it was necessary to adopt an analytic rationale to account for the structured nature of the data. We followed the approach outlined by Krull and MacKinnon (2001) that involves three stages. The first step is to estimate the path (path β_a) between the predictor variable, in our case, fear appeals, and the mediating variable, in our case, self-

determined motivation. The second step is to estimate the path (path β_b) between the mediating variable and the outcome variable, in our case, GCSE maths scores, while controlling for the predictor variable, fear appeals. Thus, the second step also provides additional coefficients for the direct path between the predictor and outcome variables (path β_c). The third step is to test for the significance of the indirect path by estimating 95% confidence intervals (CIs) around the product of paths β_a and β_b . This analytic rationale is diagrammed in Figure 1.

The perceived frequency with which fear appeals were used by teachers was entered into analyses as a classroom-level predictor. Individual student reports of the frequency of fear appeals were aggregated for the class in which they received their GCSE maths instruction to create a group mean. This approach uses individual student reports as multiple indicators of the class-level phenomena. This is similar to the way in which observational studies might make use of multiple raters as a way of increasing reliability. It is possible to establish the extent to which students within a particular class were consistent in the way in which they reported on teachers' fear appeals using the ICC_2 intraclass correlation coefficient (as distinct from the ρ_i or ICC_1 ; see Lüdtke et al., 2009), in which values $\geq .7$ are adequate. The ICC_2 coefficient for the perceived frequency of fear appeals was calculated at .86, indicating that students within a class were highly consistent in their reporting of teachers' fear appeals. Therefore, this measure can be considered to be reliable and not subject to the idiosyncratic reporting of individual students. As the perceived threat of fear appeals and autonomous motivation are internally represented sociocognitive constructs, these were represented as individual-level variables in subsequent analyses.

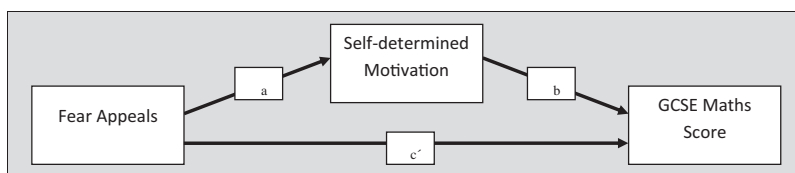


Figure 1. The mediational paths specified in Krull and MacKinnon's (2001) multilevel mediational analysis.

Multilevel mediational models are structured in such a way that a group-level predictor can estimate a mediating variable at a group or individual level, whereas an individual-level predictor can estimate a mediating variable only at the individual level (Bauer, Preacher, & Gil, 2006; Krull & MacKinnon, 2001). As we propose that self-determined motivation is an individual-level predictor, the hierarchical structure of the data can be modeled in one of two ways. The first possibility is that the appraisal of fear appeals, self-determined motivation, and GCSE are all represented as individual-level variables (a 1→1→1 model). The second possibility is that the frequency of fear appeals as a class-level variable predicts self-determined motivation and GCSE scores at the individual level (a 2→1→1 model). The alternative, in which a mediator may be represented at the class level (a 2→2→1 model), is not relevant to our series of analyses.

Predicting Self-Determined Motivation From Fear Appeals

The first set of analyses was to estimate coefficients and their standard errors for paths between fear appeals and self-determined motivation, referred to in Krull and MacKinnon's (2001) notation as β_a , using a simultaneous ordinary least squares regression analysis. The perceived frequency by which teachers used fear appeals was entered as a class-level predictor and the appraisal of fear appeals as threatening as a classroom-level predictor (thus generating two β_a coefficients). Results are presented in Table 3. The model accounted for 9% of the variance in self-determined motivation. Both perceived frequency of fear appeals ($\beta = -.23, p < .001$) and the appraisal of fear appeals as threatening ($\beta = -.15, p = .005$) predicted lower self-determined motivation.

Table 3
Predicting Autonomous Motivation From Fear Appeals

| | <i>B</i> | <i>SE</i> | β |
|---------------------------|----------|-----------|---------|
| Intercept | 5.15 | .94 | |
| Frequency of Fear Appeals | -1.32 | .30 | -.23*** |
| Perceived Threat | -.44 | .15 | -.15** |

Note. $F(3, 345) = 70.69, p < .001, R^2 = .09$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Predicting GCSE Scores From Self-Determined Motivation Controlling for Fear Appeals

The purpose of the second set of analyses was to estimate coefficients and their standard errors for the path between self-determined motivation and GCSE scores, referred to as β_b in Krull and MacKinnon's (2001) notation, while controlling for fear appeals (see Table 4). Self-determined motivation was entered into the model as an individual student-level predictor. This model also allows for the estimation of paths between fear appeals and GCSE scores, referred to as β_c . Perceived frequency was entered as a classroom-level predictor and perceived threat as an individual student-level predictor. Thus, two β_c coefficients are generated from this analysis. Models were estimated using random intercepts with restricted maximum likelihood. That is, outcome variables were assumed to differ between maths classes. We estimated three models: Model 0 contained no predictors and presents the variance partitioned into the within-class and between-class components. Model 1 added individual predictors, self-determined motivation, and the appraisal of fear appeals as threatening. Model 2 added the perceived frequency of fear appeals as a class-level predictor. The change in model fit was established using the change in the $-2 \log$ likelihood ($-2LL$) statistic.

The introduction of individual-level predictors (Model 1) significantly improved model fit. A significant path β_b coefficient was shown, in which self-determined motivation predicted a higher GCSE score ($B = .13, p = .001$), and a significant β_c coefficient was shown, in which perceived threat predicted a lower GCSE score ($B = -.34, p < .001$). Together, these predictors accounted for a proportional reduction in the individual-level variance of 14.7%. A significant improvement in model fit was shown when perceived frequency was entered into the model as a class-level predictor (Model 2). A significant β_c coefficient was shown, in which a greater frequency of fear appeals predicted a lower GCSE score ($B = -.1.302, p < .001$), accounting for a proportional reduction in the group-level variance by 60.8%.

Table 4
Predicting GCSE Scores From Autonomous Motivation Controlling for Fear Appeals

| | Model 0 | | Model 1 | | Model 2 | |
|----------------------------|----------|-------------|----------|--------------|----------|--------------|
| | <i>B</i> | <i>SE</i> | <i>B</i> | <i>SE</i> | <i>B</i> | <i>SE</i> |
| Intercept | 5.05*** | .23 | 5.05*** | .23 | 9.29*** | 1.01 |
| Student level | | | | | | |
| Self-Determined Motivation | | | .13*** | .03 | .13*** | .03 |
| Perceived Threat | | | -.34*** | .06 | -.34*** | .06 |
| Class level | | | | | | |
| Frequency of Fear Appeals | | | | | -1.19* | .45 |
| Variance components | | | | | | |
| σ^2_W | 1.29*** | .11 | 1.11*** | .09 | 1.11*** | .09 |
| σ^2_B | .79* | .32 | .79* | .32 | .31* | .15 |
| ρ_1 | | .38 | | | | |
| -2LL | | 1026.92 (3) | | 978.19 (5) | | 963.95 (6) |
| Δ -2LL | | | | 48.01 (2)*** | | 14.24 (1)*** |

Note. GCSE = General Certificate of Secondary Education.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

Significance of the Indirect Paths From Fear Appeals to GCSE Score via the Mediating Effect of Self-Determined Motivation

These analyses suggest two possible mediational routes from fear appeals to GCSE maths score via self-determined motivation. First, higher perceived threat predicts lower self-determined motivation that, in turn, predicts a higher GCSE (a 1→1→1 model). Second, greater frequency of fear appeals threat predicts lower self-determined motivation that, in turn, predicts a higher GCSE (a 2→1→1 model). The significance of the indirect path was estimated by calculating the coefficient and its standard error of $\beta_a \times \beta_b$, and then generating 95% CIs around this estimate using the PRODCLIN software (MacKinnon, Fritz, Williams, & Lockwood, 2007); 95% CIs that do not cross zero indicate a significant mediated effect (at $p < .05$).

The indirect path for the 1→1→1 model was $B = -.057$, $SE = .018$, 95% CIs [-0.016, -0.110]. Thus, students who perceive fear appeals as more threatening have lower self-determined motivation and subsequently perform lower on their GCSE maths. The indirect path for the 2→1→1 model was $B = -.120$, $SE = .039$, 95% CIs [-0.046, -0.215]. Thus, students who perceive more frequent fear appeals have lower self-determined motivation and subsequently perform lower on their GCSE

maths. However, significant β_c coefficients remained for direct paths between the frequency/perceived threat of fear appeals and GCSE score. Thus, self-determined motivation is a partial, rather than full, mediator of the relationship between fear appeals and GCSE score. The indirect paths are diagrammed in Figure 2.

Summary of Analyses

The analyses showed that when teachers are reported to be making more frequent fear appeals, and when they are perceived as threatening, students subsequently report lower self-determined motivation. Furthermore, students performed better on their GCSE maths exam when they reported higher self-determined motivation, reported their teacher used less frequent fear appeals, and perceived fear appeals as less threatening. The lower GCSE maths scores that followed more frequent fear appeals, and their appraisal as threatening, was shown to be partly due to lower self-determined motivation.

Discussion

The aims of this study were to examine how fear appeals in the context of maths GCSE instruction were related to self- and non-self-determined forms of motivation and maths exam score indirectly, via self-determined motivation. Results showed that students reported

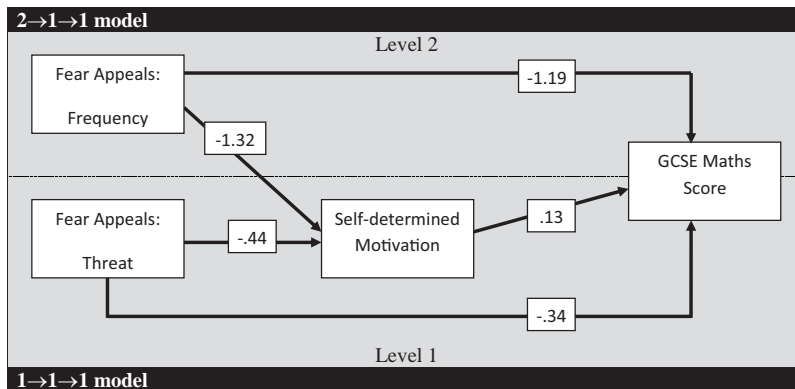


Figure 2. The indirect paths from fear appeals to GCSE score via the mediating role of autonomous motivation.

lower intrinsic and identified types of self-determined motivation when their teachers made more frequent fear appeals and when these fear appeals were perceived to be threatening. However, fear appeals (both a higher frequency and perceived threat) were unrelated to introjected and external forms of non-self-determined motivation. Although students did report greater amotivation, the remaining form of non-self-determined motivation, when their teachers made more frequent fear appeals, the association was seemingly small. Students performed lower on their GCSE maths exam when they reported teachers to be making more frequent fear appeals and when they perceived this as threatening. A mediational analysis showed that lower GCSE maths score following from frequent and threatening fear appeals was partly attributable to lower self-determined motivation.

These findings support our hypothesis, based on both SDT and SWT, that lower self-determined motivation (intrinsic and identified) would be found when teachers make more frequent fear appeals and when such fear appeals are perceived as threatening. However, this finding does not, in isolation, suggest that fear appeals are the equivalent of directly controlling teacher behaviors, as proposed in SDT (e.g., Assor et al., 2004, 2005; Reeve, 2009). To be considered the equivalent of directly controlling teacher behaviors, fear appeals would also have to relate to higher non-self-determined forms of motivation (introjected, external, and amotivation). On balance, our findings do not

show this to be the case. Fear appeals were unrelated to introjected or external motivations, and although a higher frequency of fear appeals is related to greater amotivation, the impact was small. Therefore, although fear appeals may show some similarities with directly controlling teacher behaviors and are autonomy restrictive, they cannot be considered as their equivalent or as a specific type of controlling behavior.

SDT suggests that self- and non-self-determined forms of motivation exist on a single continuum. Intrinsic motivations are placed at one end, representing the most autonomous forms of self-regulation, and amotivation at the opposing end, representing the least autonomous forms of self-regulation (Deci & Ryan, 1985; Ryan & Deci, 2000, 2002). Instructional conditions that focus on an external locus on control result in lower self-determined forms of motivation as well as stronger non-self-determined forms of motivation. Lower self-determined motivation follows more frequent fear appeals. However, there was no corresponding bilateral outcome for higher non-self-determined motivation. In SWT, intrinsic and extrinsic motivations are not represented on a single continuum (Covington, 1992). Therefore, it is possible for intrinsic motivation to relate to instructional climate in one way, which is not shown in the opposing way for extrinsic motivation. Fear of failure, rather than extrinsic reinforcers, is the greatest detriment to intrinsic motivation (Covington & Müeller, 2001; Martin & Marsh, 2003). Our findings are consistent with the position presented in the SWT and would

suggest that the characteristic of fear appeals that is damaging to intrinsic motivation is their focus on avoiding failure rather than success. It is not necessarily their highlighting academic credentials or the value of GCSEs for one's subsequent life trajectory.

These findings support the hypothesis that students with higher self-determined motivation would perform better in their GCSE maths exam and is consistent with the extant research (Soenens & Vansteenkiste, 2005; Vansteenkiste et al., 2004). We also found support for role of self-determined motivation as partly accounting for the relationship between fear appeals and GCSE maths score. Previous research has demonstrated the role of self- and non-self-determined forms of motivation in explaining how autonomy-supportive environments can influence educational achievement (e.g., Guay & Vallerand, 1996–1997; Yildirim, 2012). This study extends the literature by demonstrating the mediating role of self-determined motivation in relation to academic performance in a high-stakes exam and an autonomy restrictive context (the increased frequency and threat of fear appeals). Lower self-determined motivation and lower exam performance follow more frequent fear appeals. Lower self-determined motivation was only partly responsible for the lower performance on GCSE maths scores following fear appeals; thus, other mechanisms may be working with or alongside self-determined motivation. Prior research has shown that the worry and tension components of test anxiety also may account for lower exam scores following fear appeals (Putwain & Symes, 2011b). This finding is also consistent with our interpretation of the focus on avoiding failure as the central characteristic of fear appeals. Therefore, lower exam scores that follow from more frequent and threatening fear appeals may be explained partly by self-determined motivation and partly by test anxiety. Future research may test a model that contains both of these variables.

Implications for Practice

We cannot draw a firm conclusion regarding the causal status of fear appeals in lowering subsequent self-determined motivation and educational performance. Thus, our implications for practice are necessarily cautious. Notwith-

standing this limitation, these findings raise the possibility that fear appeals may not be an effective motivational strategy to use prior to a high-stakes test; highlighting the avoidance of failure may not be a productive motivational strategy. Our anecdotal experience of working with schools and teachers when conducting this and other projects was that teachers were desperately keen to motivate their students in the best possible way and were largely unaware of the types of messages that they communicated to their students. We suggest that this is where the role of the school and practicing educational psychologist may prove most beneficial.

Psychologists who work in, or with, schools could help teachers and instructors consider the types of messages they present to students and their outcomes in the following three steps. First, given the general lack of understanding of how teachers' messages may influence students, an initial step would be to instruct and inform teachers how classroom environments (including messages) may influence students in both positive and negative ways. Second, we suggest that a reflective exercise may be useful in which teachers are prompted to consider what types of messages they currently use and what their possible consequences might be. Some students may respond well to fear appeals, and those who work directly in an instructional capacity with students are best placed to make this judgment. Psychologists able to observe teachers in lessons may obtain valuable additional information. Third, teachers should plan what types of messages would be the most effective and how they could be incorporated into the lesson plans. For example, consider the characteristics of messages on the following four dimensions: Is the focus attaining success or avoiding failure?; What are the reasons given for avoiding failure/attaining success?; What behaviors are required to avoiding failure/attaining success?; and How can students' beliefs that they are capable of performing these behaviors be encouraged? The use of different types of messages could be practiced with peers in a microteaching activity, with feedback provided from both peers and the psychologist. After a period of attempting to alter the messages provided, teachers should be encouraged to reflect on their use and success with peers.

Limitations and Suggestions for Further Research

We would like to highlight three limitations of our study. First, one issue that pervades nearly all multiwave studies is autoregression. Our model could not control for autoregressive relations or permit a causal interpretation of findings. For example, we cannot conclude that fear appeals caused students self-determined motivation to deteriorate, because teachers may have been using such strategies more frequently in classes containing students with lower self-determined motivation to begin with. A prior control of motivation and/or prior attainment would allow for the causal direction of such relations to be established, and thus to offer a more thorough test of the relationship between fear appeals and subsequent motivation and exam scores. Such designs are very difficult to execute because pupils, especially in multiwave repeated-measures studies, can suffer from questionnaire overload. Too few multiwave studies mention the issue. We would be remiss to not highlight this potential confound. Second, we situate our study clearly in the context of GCSE maths. We believe that the context is important, as teachers may be more prone to make fear appeals in such high-stakes contexts and students may be more likely to appraise such messages as threatening. However, the generalizability of such findings can be questioned. We do not know if they apply equally to other academic subjects or in educational systems in which the consequences for future life trajectory are not as profound as they are in the English education system. These are important questions, and we urge colleagues to theorize and explore contextual influences. Third, we rely on students' reports of the frequency of fear appeals. Attaining a high level of agreement regarding student reports of the frequency of fear appeals used by teachers in different classes was reassuring. However, there would be considerable merit in collecting data pertaining to the frequency of fear appeals from other sources, such as teacher and observer reports. The triangulation of different sources of data would serve to enhance the validity of the measurement of fear appeals.

In addition to these limitations, we also draw attention to some of the other characteristics of messages that teachers may make prior to high-

stakes examinations. Messages may differ in the content of their fear content and the extent to which they include efficacy appeals, the value of academic credentials, and whether they have a failure or success focus. In short, there is a host of different ways in which the messages made to students may differ. For example, efficacy appeals refer to the behaviors required to avoid failure or attain success, and messages may differ in the extent to which these are emphasized and made salient. Furthermore, academic credentials may be valued in different ways and for different students. Thus, teachers may promote different values for different types and groups of students, and also consider how students' personal values may influence their interpretation of fear appeals. Future research may investigate such messages, either in a real-life context, to code teachers messages on such dimensions and test associations to subsequent outcomes (e.g., motivation and examination performance), or in more artificial, but carefully controlled, studies, in which messages could be presented and altered in vignettes.

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