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**Citation** (please note it is advisable to refer to the publisher's version if you intend to cite from this work)

**Putwain, DW and Symes, W (2016) Expectancy of success, subjective task-value, and message frame in the appraisal of value-promoting messages made prior to a high-stakes examination. *Social Psychology of Education*. pp. 1-19. ISSN 1381-2890**

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**Expectancy of Success, Subjective task-value, and Message Frame in the Appraisal of  
Value-promoting Messages Made Prior to a High-stakes Examination**

### **Abstract**

Previous research has examined how subjective task-value and expectancy of success influence the appraisal of value-promoting messages used by teachers prior to high-stakes examinations. The aim of this study was to examine whether message-frame (gain or loss-framed messages) also influences the appraisal of value-promoting messages. Two hundred and fifty-two participants in Years 12 and 13 read vignettes of fictional students who were high or low in subjective-task value, and expectancy of success, and asked to imagine how that student would appraise either a gain or loss-framed message. A challenge appraisal followed vignettes with high subjective task-value and high expectancy of success whereas a threat appraisal followed vignettes with high subjective task-value and low expectancy of success. A loss-framed message resulted in a stronger threat appraisal, and a gain-framed message in a greater disregarding appraisal for the vignette with high subjective task-value and high expectancy of success. Value-promoting messages can be appraised in different ways depending on combinations of intrapersonal (subjective task-value and expectancy of success) and interpersonal (message-frame) influences.

**Keywords:** value-promoting messages; fear appeals, subjective task-value, expectancy of success, message-frame

## **Expectancy of Success, Subjective task-value, and Message Frame in the Appraisal of Value-promoting Messages Made Prior to a High-stakes Examination**

### **Introduction**

In this study we examine the appraisal of messages made prior to a high-stakes mathematics examination that are either gain or loss-framed. Prior research has shown that the messages communicated by a teacher about a forthcoming test can exert a potent influence on students' emotions, motivations, and performance. For instance, loss-framed messages that focus on the negative consequences of failure have been shown to increase test anxiety and lower test performance (Putwain and Best, 2011, 2012). However, the influence of these messages on subsequent emotions, motivation, and performance depends in part on how such messages are appraised. Studies have shown that loss-framed messages could be interpreted as a challenge, a threat, or simply ignored, depending on one's academic self-efficacy, expectancy for success, and subjective task-values (Putwain and Remedios, 2014a; Putwain, Remedios, and Symes, 2014; Putwain and Symes, 2014). At present it is not known whether gain-framed messages that focus on the benefits of attaining success are appraised in the same way as loss-framed messages. In this experimental study, vignettes of fictional students were used to examine how expectancy for success and subjective task-value influenced the appraisal of gain or loss-framed messages.

### **The Use of Value-promoting Messages Prior to High-stakes Examinations**

Prior to high-stakes examinations, teachers and instructors routinely inform students about important information that is relevant to those forthcoming examinations (Putwain, 2009; Putwain, Connors, Woods, Nicholson, 2012). Some of this information is purely informational (e.g., the date, venue, length of examination, materials required, and so on). However, other information concerns the value of forthcoming examinations for students' future life trajectory and opportunities. This might include why the subject is important, why

success and failure are important, and what consequences they may have. Such messages are used by teachers and instructors in the belief that they have a motivational quality; to try and encourage and persuade students to engage in those learning and study behaviours required to facilitate success, and/ or avoid failure (Putwain, 2009; Putwain and Roberts, 2012). As the key feature of these messages is that they highlight and draw attention to the value of a particular subject, or attainment in that subject, we refer to them as value-promoting messages.

The extant literature on messages used by teachers and instructors prior to high-stakes examinations has focused on fear appeals (Putwain and Roberts, 2009; Sprinkle, Hunt, Simonds and Comadena, 2006). Fear appeals are persuasive messages that show how particular courses of action can lead to unwanted and aversive outcomes, and how alternative courses of action can be used to avoid those outcomes (Maloney, Lapinski, and Witte, 2011; Witte and Allen, 2000). When used in an instructional context, prior to tests and examinations, studies have shown that appraisal of fear appeals as threatening is related to greater test anxiety in cross-sectional (Putwain and Roberts, 2009; Putwain and Symes, 2011a), longitudinal (Putwain and Symes, 2011b), and experimental (Putwain and Best, 2011, 2012) designs. The appraisal of fear appeals as threatening is also related to lower test and examination scores in longitudinal (Putwain and Symes, 2011a; Putwain and Remedios, 2014b) and experimental (Putwain and Best, 2011, 2012) designs. These findings show that fear appeals can result in negative educational outcomes but that this depends, in part, on how fear appeals are appraised.

However, fear appeals are not the only type of value-laden message conveyed to students prior to high-stakes examinations (Putwain and Roberts, 2012). For instance, teachers and instructors could also use messages that focus on the positive consequences of success in addition to, or in place of, fear appeals. In the adjacent health and social

psychology literature the differentiation between persuasive communications with a focus on positive or negative consequences is referred to as message frame. Gain-framed messages focus on positive consequences whereas loss-framed messages, such as fear appeals, focus on negative consequences (Gallagher and Updegraff, 2012; Moreton, Rabinovich, Marshall and Bretschneider, 2011). In this study we propose that fear appeals are re-conceptualised within a broader framework of value-promoting messages to facilitate comparison with other forms of value-laden messages. One simple dimension along which value-promoting messages can be categorised and compared is message frame.

### **The Appraisal of Value-promoting Messages: Challenge, Threat, or Disregarded**

The research conducted into fear appeals used prior to a high-stakes examination (Putwain and Best, 2011, 2012; Putwain and Roberts, 2009; Putwain and Remedios, 2014a, 2014b; Putwain and Symes, 2011a, 2011b) has largely focused on their appraisal as threatening. However, fear appeals could be appraised as a challenge as well as a threat, or be disregarded altogether (Putwain and Symes, 2014; Putwain, Nicholson, Nakhla, Reece, Porter, and Liversidge, 2016). As high-stakes examinations are highly pressured events, our appraisal model of value-promoting messages draws on transactional cognitive-appraisal models of the stress process (e.g., Folkman, 2008, 2011; Lazarus, 2006). In this framework, events or situations are evaluated in terms of their personal significance (primary appraisal) and the options, or resources, for responding (secondary appraisal). Although the terms primary and secondary appraisal imply a sequential evaluation, primary appraisal may not always occur first, and both will interact dynamically in a cycle of appraisal and reappraisal as a particular event unfolds (Lazarus, 2006).

According to this framework, a challenge appraisal would be most likely when the value-promoting message is judged to be personally significant and the student believes that she or he are capable of responding effectively to the demands posed in the message.

Challenge appraisals are accompanied by positive emotions, such as excitement and interest, and result in favourable outcomes, such as growth or mastery (e.g., McCarthy, 2011; Shiota, Neufeld, Yeung, Moser, and Perea, 2011).

A threat appraisal would most likely occur when the student judges the demands of a personally significant value-promoting message to outweigh his or her ability to respond effectively to the demands posed in the message. Harm or loss to one's sense of self-worth or wellbeing is anticipated, accompanied by negative emotions such as anxiety and fear (e.g., Meijen, Jones, McCarthy, Sheffield and Allen, 2013; Roseman, 2013). A disregarding appraisal would most likely occur when the value-promoting message is judged to be of little personal relevance, exacerbated by beliefs that one cannot respond effectively. A disregarding appraisal is likely to be accompanied by negative emotions that characterise a lack of motivation, such as low interest, and a lack of mastery focus (e.g., Ainley and Hidi, 2014; Conley, 2012; Hulleman, Durik, Schweigert, and Harackewicz, 2008).

Putwain and Symes (2014) propose that students would judge a value-promoting message to be personally significant on the basis of their subjective-task value and their options for responding to the demands posed in the value-promoting message on whether a positive outcome (e.g., a pass or target grade) was achievable. If attainment in a subject is important to one's sense of self-worth or that subject is instrumental to achieving one's career plans or goals (referred to as attainment and utility value respectively, see Eccles, O'Neill and Wigfield, 2005; Wigfield, Tonks, and Klauda, 2009), then the value-promoting message would be judged as personally significant. If a student believed that they were capable of successfully performing those actions required to respond to the demands posed in the value-promoting message then they would appraise the message as a challenge and if not as a threat. These kinds of judgements could include academic self-efficacy (see Bandura, 1997) if referring to the behaviours required to undertake the specific activities in a lesson (i.e.,

action-control beliefs). If referring to beliefs concerning one's ability to succeed or fail at a task, or course (i.e., action-outcome beliefs), these judgements could also include expectancy of success (see Eccles, 2007; Eccles and Wigfield, 2002; Wigfield and Eccles, 2000).

Cross-sectional and longitudinal studies have shown results that are consistent with this model. Higher attainment and utility value are related to a higher challenge and threat appraisal of a fear appeal (i.e., a loss-framed value-promoting messages) whereas higher academic self-efficacy/ expectancy of success is related to a challenge, and lower academic self-efficacy/ expectancy of success to a threat, appraisal (Putwain and Remedios, 2014a; Putwain et al., 2014; Putwain, Remedios and Symes, 2015). Other lines of related research also support this general proposition. Test anxiety, which is indicative of a threat appraisal, has been shown to be positively correlated with lower competence beliefs (Preiss, Gayle and Allen, 2006; Putwain and Symes, 2012). Positive learning-related emotions, such as enjoyment, that are indicative of a challenge appraisal, correlate positively with both higher competence beliefs and higher extrinsic motivation (Pekrun, Goetz, Frenzel, Barchfield and Perry, 2011; Pekrun, Goetz, Perry, Kramer, Hochstadt and Molfenter, 2004). Only one study to date has provided evidence of the expected interaction between subjective task-value and academic self-efficacy on the appraisal of fear appeals (Putwain and Symes, 2014).

However, it is not yet known whether this pattern of interactions would also generalise to a gain-framed value-promoting message. Research comparing gain and loss-framed messages in the health and social psychology literature has found that a gain-framed message evokes positive emotions, indicative of a challenge appraisal, whereas a loss-framed message evokes negative emotions, indicative of a threat appraisal (Schneider et al., 2001; Shen and Dillard, 2007; van't Riet, Ruiters, Werril, Cabdel and de Vries, 2010). Furthermore, in the health literature, loss-frame messages have been shown to be more effective at promoting positive behavioural change when the message recipient had high self-efficacy and

believed they were capable of enacting the behaviours required to effect that change (van't Riet, Ruiters, Werrij, and De Vries, 2008; van't Riet, Ruiters, Werrij, and De Vries, 2010; Werrij, Ruiters, van't Riet, and De Vries, 2010). If this line of reasoning was extended to the educational context, a loss-framed message would be expected to result in a greater challenge appraisal than a gain-framed message, but only in students who were high in academic self-efficacy or with high expectations of success.

One might also anticipate that students with greater attainment and/ or utility value would appraise loss-focused messages as more threatening than gain focused messages; losses are greater for these students when attainment is valued or seen as being instrumental to fulfil personal goals. We do not anticipate that message-frame would have any direct impact on a disregarding appraisal. That is, if a student did not value a particular subject, or attainment in that subject, message frame would be unlikely to change whether the message would be appraised as personally significant.

### **Aims**

The aim of this study was to examine how subjective task-value, expectancy of success, and message-frame, would influence the appraisal of a value-promoting message. A methodology was employed that has proved useful in previous research to examine the effect of expectancy of success and subjective task-value on the appraisal of fear appeals (see Putwain and Symes, 2014). This involved the use of vignettes that described fictional students with high or low expectancy of success, and high or low utility/ attainment values. We do not differentiate between utility and attainment values in this study. This is partly to keep the number of experimental conditions manageable, and partly as teacher messages often combine elements of attainment and utility when used in practice (Putwain, 2009; Putwain and Roberts, 2009). For brevity we use the term subjective task-value throughout to refer to the combination of utility and attainment values.

Although vignettes may lack a degree of ecological validity, they are a useful method for investigating theoretical predictions and establishing causality in an experimental approach, before turning to naturalistic data where it is more difficult to establish causality (Barter and Reynold, 2000; O'Dell, Crafter, deAbreu, and Cline, 2013). There are substantial practical, logistical, and ethical issues that prevent the manipulation of subjective task-value, expectancy of success, and message-frame in naturalistic settings prior to high-stakes examinations. Furthermore, passive designs that make use of naturally occurring changes and variance in constructs such as subjective task-value and expectancy of success require complex and time consuming panel designs with multiple points of data collection to establish causality (Huck, Cormier, and Bounds, 1974). A vignette based study offers the possibility of establishing empirical evidence for the causal status of subjective task-value, expectancy of success, and message-frame in the appraisal of value-promoting messages, before turning to more complex naturalistic designs.

The following three hypotheses were tested:

H<sub>1</sub>: Disregarding appraisal will be higher following the combination of low subjective task-value with low expectancy of success. Message frame is not expected to impact on a disregarding appraisal.

H<sub>2</sub>: Challenge appraisal will be higher following a gain-focused message, the combination of high subjective task-value with high expectancy of success, and a loss-framed message combined with high expectancy of success.

H<sub>3</sub>: Threat appraisal will be higher following a loss-focused message, the combination of high subjective task-value with low expectancy of success, and a loss-framed message with combined with high subjective task-value.

## **Method**

### **Participants**

The participants in the study were 252 students (72 = male, 180 = female) with a mean age of 17.1 years ( $SD = 0.49$ ). All participants were studying between three and five subjects in a tier of post-compulsory education that is colloquially referred to, in England, Wales and Northern Ireland, as 6<sup>th</sup> form study (this tier of education corresponds to senior high school in educational systems used in other countries). Courses typically last for two years (Years 12 and 13) leading to qualifications in the General Certificate of Education at Advanced Level (often shortened to A Levels). In our sample, 154 participants were in Year 12 (the first year of A Level study) and 98 participants were in Year 13 (the final year of A Level study). The ethnic heritage of participants was predominantly white (96.4%,  $n = 243$ ) with small numbers of participants reporting themselves to be of Asian (2%,  $n = 5$ ), Black (0.4%,  $n = 1$ ), Other (0.4%,  $n = 1$ ), or dual heritage (0.8%,  $n = 2$ ).

### **Design**

A factorial design with three independent variables was used. There were two within-participant variables: expectancy of success (high vs. low) and subjective task-value (high vs. low). Each participant was presented with a series of four vignettes in a counterbalanced order designed to manipulate subjective task-value and expectancy of success. Each vignette presented a fictional Year 11 student who was studying for the high-stakes General Certificate of Secondary Education (GCSE) examination in mathematics. The fictional students in the vignettes either held high or low expectancy of success and high or low subjective task-value. There was one between-participants variable: message frame (gain-framed vs. loss-framed). Participants were randomly allocated to conditions with a gain or loss-framed message (presented by the fictional class teacher in the vignette). In total, this study included eight experimental conditions (presented in Figure 1). There were three dependent variables: Challenge appraisal, threat appraisal, and disregarding appraisal.

[Figure 1 here]

## Materials

Vignettes were designed to present a scenario to participants that they would have encountered during a Year 11 mathematics lesson as a secondary school student (vignettes in the Appendix were adapted from those used in Putwain and Symes, 2014). The gender of the fictional students presented in the vignettes was randomised so that, of the four vignettes presented to each participant, two of the names were of a fictional male student and two were of a fictional female student. Names were drawn from a pool that was intended to be ethnically heterogeneous (female names: Sarah, Jade, Precious and Mumtaz; male names: James, Jerome, Amir and Courtney).

After student characteristics were presented, the vignette then presented the value-promoting message used by the teacher. In the loss-framed condition the statement presented was as follows: At the beginning of every maths lessons the teacher has started telling the students how important maths is for their future lives... “if you fail GCSE maths, you will find it harder to get a good job or go to college. You need to work hard in order to avoid failing”. In the gain-framed condition the statement presented was as follows: At the beginning of every maths lessons the teacher has started telling the students how important maths is for their future lives... “GCSE maths is really important as most jobs which 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”.

Appraisals were measured on a 180mm visual analogue scale anchored at each end. Participants had to indicate how they believed the fictional student would respond to the value-promoting message by placing an X anywhere along the scale. A challenge appraisal was measured with the prompt “When the teacher says this, how much would [name of fictional student] be motivated to work hard for GCSE maths?” and used the scale anchors ‘not at all motivated’ and ‘very much motivated’. A threat appraisal was measured with the

prompt “When the teacher says this, how much would [name of fictional student] be worried about failing GCSE maths?” and used the scale anchors ‘not at all worried’ and ‘very much worried’. A disregarding appraisal was measured with the prompt “When the teacher says this, how much would [name of fictional student] think “what the teacher says isn’t relevant to me?” and used the scale anchors ‘Not at all relevant’ and ‘very relevant’. The analogue scales were scored by measuring the point at which the X was placed on the line with a ruler (mm). The disregarding scores were reversed so that a higher score represents greater likelihood of disregarding. This brings the direction on the scale metric in line with challenge and threat where a higher score represents a greater likelihood of challenge and threat appraisals respectively. A score of 0mm would therefore indicate no challenge, threat, or disregarding appraisal. A score of 180 mm would indicate a very strong challenge, threat or disregarding appraisal.

### **Procedure.**

Data were collected by a member of the research team. Participants were first provided with information about the study, asked to provide written consent, and randomly allocated into the gain or loss-framed message condition. Responses were anonymous and participants were given the option to withdraw their data retrospectively, for up to two weeks, by writing a unique and unusual word on their response sheet (consisting of the combined name of their pet and their favourite sports team). None took up this option. Institutional consent was provided by the College Principal.

### **Results**

Each dependent variable was analysed separately in a 2x2x2 mixed ANOVA. Message frame was treated as a between-participants factor with two levels (gain vs. loss-framed). Expectancy of success and subjective task-value were both treated as within-participant factors with two levels each (high vs. low expectancy of success/ subjective

value). Cohen's  $d$  calculations in probing of interactions were adjusted for dependence among means (see Morris and DeShon, 2002). Estimated marginal means are reported in Table 1.

[Table 1 here]

### **Disregarding Appraisal**

For a disregarding appraisal, main effects were observed for expectancy of success,  $F(1, 250) = 37.49, p < .001, \eta_p^2 = .13$ , and subjective task-value,  $F(1, 250) = 904.44, p < .001, \eta_p^2 = .78$ , but not for message frame,  $F(1, 250) = 0.56, p = .46, \eta_p^2 < .01$ . Two-way interactions were observed between expectancy of success and subjective task-value,  $F(1, 250) = 169.06, p < .001, \eta_p^2 = .40$ , and between message frame and expectancy of success,  $F(1, 250) = 8.67, p = .004, \eta_p^2 = .03$ . The two-way interaction between message frame and subjective task-value was not statistically significant,  $F(1, 250) = 2.28, p = .80, \eta_p^2 < .01$ . A statistically significant three-way interaction was observed between expectancy of success, subjective task-value and message framing,  $F(1, 250) = 26.05, p < .001, \eta_p^2 = .09$ , that is graphed in Figure 2.

[Figure 2 here]

A disregarding appraisal was higher following the combination of low subjective task-value and low expectancy of success vignettes, than low subjective task-value and high expectancy of success vignettes, for the loss-framed message,  $t(129), = 10.23, p < .001, d = .90$ , and the gain-framed message,  $t(121), = 10.07, p < .001, d = .91$ . For the gain-framed message, a disregarding appraisal was higher following the combination of high subjective task-value and high expectancy of success vignettes, than the combination of high subjective task-value and low expectancy of success vignettes,  $t(121), = 5.99, p < .001, d = .54$ . However, for the loss-framed message there was no statistically significant difference in a

disregarding appraisal, when subjective task-value was high, between the vignettes presenting high and low expectancy of success when,  $t(121) = 1.20$ ,  $p = .23$ ,  $d = .11$ .

In summary, a disregarding appraisal followed when the vignette described a fictional student with low subjective task-value and low expectancy of success irrespective of the message frame. However when the vignette described a fictional student whose subjective task-value was high, message-frame did show an influence. A disregarding appraisal was higher when the vignette described a fictional student with high subjective task-value and high expectancy of success, rather than high subjective task-value and low expectancy of success, following the gain rather than the loss-framed message.

These findings support H<sub>1</sub>. A disregarding appraisal was expected following the combination of low subjective task-value and low expectancy of success irrespective of message-frame. The three-way interaction was an unexpected finding and was unrelated to our hypotheses. No predictions were made regarding the combination of high subjective value, expectancy of success, and message frame.

### **Challenge Appraisal**

For a challenge appraisal main effects were observed for expectancy of success,  $F(1, 250) = 157.11$ ,  $p < .001$ ,  $\eta_p^2 = .39$ , and subjective task-value,  $F(1, 250) = 1012.77$ ,  $p < .001$ ,  $\eta_p^2 = .80$ , but not for message frame,  $F(1, 250) = 0.37$ ,  $p = .54$ ,  $\eta_p^2 < .01$ . A two-way interaction was observed between expectancy of success and subjective task-value,  $F(1, 250) = 153.48$ ,  $p < .001$ ,  $\eta_p^2 = .38$ . The two-way interactions between message framing and expectancy of success and between message framing and subjective task-value were both non-significant ( $F_s < 1$ ). A statistically significant three-way interaction was observed between expectancy of success, subjective task-value, and message framing,  $F(1, 250) = 5.05$ ,  $p = .03$ ,  $\eta_p^2 = .02$ , that is graphed in Figure 3.

[Figure 3 about here]

A challenge appraisal was higher following the combination of high subjective task-value and high expectancy of success vignettes. When vignettes presented high subjective task-value, there were no statistically significant difference between high and low expectancy of success in both loss-framed,  $t(129) < 1$ ,  $d < 0.1$ , and the gain-framed message conditions,  $t(121) = 1.70$ ,  $p = .09$ ,  $d = .14$ . When vignettes presented low subjective task-value, challenge appraisals were lower in combination with low, rather than high, expectancy of success for both the loss-framed,  $t(129) = 14.31$ ,  $p < .001$ ,  $d = 1.26$ , and the gain-framed framed messages,  $t(121) = 13.89$ ,  $p < .001$ ,  $d = 1.27$ . Although a statistically significant three-way interaction was reported, the pattern of the interaction between expectancy of success and subjective task-value was similar for gain and loss-framed message conditions. The small three-way interaction is probably accounted for by the slightly larger difference in a challenge appraisal between high and low expectancy of success when subjective task-value was high for the gain-framed message condition. Accordingly, we suggest that no interpretive significance is attached to the three-way interaction.

These results provide partial support for H<sub>2</sub>. Higher challenge appraisal followed high subjective-task value and high expectancy of success as expected. However, challenge appraisals were not higher for a gain-framed message and the expected interaction between message-frame was and expectancy of success was not supported.

### **Threat Appraisal**

For a threat appraisal, main effects were observed for subjective task-value,  $F(1, 250) = 904.44$ ,  $p < .001$ ,  $\eta_p^2 = .44$ , and message frame,  $F(1, 250) = 13.29$ ,  $p < .001$ ,  $\eta_p^2 = .05$ , but not for expectancy of success ( $F < 1$ ). A two-way interaction was observed between expectancy of success and subjective task-value,  $F(1, 250) = 168.06$ ,  $p < .001$ ,  $\eta_p^2 = .40$ . The two-way interactions between message framing and expectancy of success, and between message framing and subjective task-value, were both not statistically significant ( $F_s < 1$ ).

The three-way interaction was also not statistically significant,  $F(1, 250) = 3.25$ ,  $p = .07$ ,  $\eta_p^2 = .01$ . The two-way interaction between expectancy of success and subjective task-value is graphed in Figure 4. Threat appraisal was higher in the vignette where subjective task-value was high and expectancy of success was low,  $t(251) = 8.43$ ,  $p < .001$ ,  $d = .53$ , and lower in the vignette where subjective value and expectancy of success were both low,  $t(251) = 14.04$ ,  $p < .001$ ,  $d = .88$ .

These results provide partial support for H<sub>3</sub>. As expected, a threat appraisal was higher following a loss-framed message and the combination of a high subjective-task value with low expectancy of success. However, the expected interaction between message-frame and subjective-task value was not supported.

[Figure 4 about here].

### Discussion

The aim of this study was to examine how subjective task-value, expectancy of success, and message-frame would influence the appraisal of a value-promoting message. In support of H<sub>1</sub>, results showed that a disregarding appraisal was most likely when both subjective task-value and expectancy of success were low. Results offered partial support for H<sub>2</sub>. Results showed that a challenge appraisal was most likely when subjective task-value and expectancy of success were both high. However, message-frame was unrelated to a challenge appraisal either alone or in combination with expectancy of success (notwithstanding the caveat that we did not attach interpretive significance to the small three-way interaction for a challenge appraisal). In support of H<sub>3</sub>, threat appraisals were higher in the loss-framed condition and following the combination of high subjective task-value with low expectancy of success. However, there was no interaction between subjective task-value and message frame as expected. Unrelated to our hypotheses was an unexpected interaction between expectancy of success, subjective task-value, and message-frame. A disregarding appraisal

was more likely following the gain-framed message, in the high subjective task-value vignette, for high compared to low expectancy of success. This pattern was not shown for the loss-framed message.

Results for subjective task-value and expectancy of success are in line with our appraisal model of value-promoting messages. When mathematics attainment was valued or mathematics was seen as being instrumental to fulfil personal goals, a challenge appraisal resulted when students believed they were capable of responding to the demands posed in the message. A threat appraisal resulted when mathematics was valued, but success was not expected. A disregarding appraisal resulted from low value of mathematics combined with a low expectation of success. These findings are in line with previous empirical work in this (Putwain and Remedios, 2014b; Putwain, et al., 2014, 2015; Putwain and Symes, 2014) and related areas (e.g., Preiss et al. 2006; Putwain and Symes, 2012; Pekrun et al., 2004, 2011). However it is not possible to determine which component of subjective task-value (attainment value, utility value, or both) was responsible for interacting with expectancy of success from the results of this study. Attainment value and utility value were combined in the vignettes of fictional students.

Results for message-frame were not entirely in keeping with our theorising. On the basis of research from the health and social psychology literature (Gallagher and Updegraff, 2012; Shen and Dillard, 2007; Schneider et al., 2001; van't Riet et al., 2010) we hypothesised that a gain-framed message would increase a challenge appraisal, that a loss-framed message would increase a threat appraisal, that message-frame would be unrelated to a disregarding appraisal. As expected, the loss-framed message resulted in a higher threat appraisal. However, the gain-framed message was unrelated to a challenge appraisal. Furthermore, we hypothesised that message-frame would interact with expectancy of success to influence a challenge appraisal, and subjective-task value to influence a threat appraisal. Results,

however, did not support these predictions. Nonetheless, it is useful to establish that the interactions between subjective task-value and expectancy of success for challenge and threat appraisals did not differ by message frame.

An interaction between subjective task-value, expectancy of success, and message-frame was shown for a disregarding appraisal. A disregarding appraisal was most likely when both subjective task-value and expectancy of success were low, irrespective of message frame. However, when subjective task-value was high, a difference was observed between high and low expectancy of success in the gain-framed condition (disregarding appraisal was greater for high rather than low expectancy of success) but not the loss-framed condition. This finding suggests that when subjective task-value is high, a gain-framed message may be more effective (i.e., less likely to be disregarded) for students who are low in expectancy of success compared to those that are high.

On the basis of these findings the appraisal model of value-promoting messages proposed by Putwain and Symes (2014) can be advanced to include interpersonal influences (message-frame) alongside intrapersonal influences (subjective task-value and expectancy of success). The effect of message frame on a threat appraisal appears to be direct and additive. The loss-framed messages did not interact with subjective task-value and expectancy of success for challenge and threat appraisals. However the effect of message frame on a disregarding appraisal did interact with subjective task-value and expectancy of success. Gain-focused messages may be more effective for those students who value maths, or attainment in maths, but do not believe they are capable of meeting the demands posed in the message, compared to those who value maths and expect to succeed.

### **Study Limitations**

The obvious limitation to this study is the use of vignettes to examine interactions between subjective value, expectancy of success, and message frame. The previous study by

Putwain and Symes (2014) showed conclusions from vignette data to match those using naturalistic data, so it is possible to have some confidence in the findings presented in this study. However, it would be a prudent and useful extension to replicate this study using naturalistic data. An additional limitation is that we did not differentiate between utility and attainment value in the vignettes and so it is not possible to establish exactly which element of subjective value interacted with expectancy of success. Future research, using either vignettes or self-reported data, may wish to differentiate between these. Furthermore, message-frame could be operationalised in such a way to make the differences between gain and loss-framed messages larger and more salient. The wording of the current gain-framed message may have implicitly have implied something to lose (not getting into college) that served to minimise differences between the gain and loss-framed messages. Finally, single item scales were used to measure disregarding, challenge, and threat appraisals. Although single item measures have been shown to be as reliable and psychometrically sound as multiple-item measures (e.g., Gogol et al., 2014) they remain controversial (Postmes, Haslam, and Jans, 2013).

### **Implications for Practice**

Our findings speak to practicing teachers and instructors, school leadership and management, teachers in training, those responsible for initial teacher education and teacher professional development, as well as those professionals working in schools alongside teachers (e.g., school psychologists and counsellors). The first point is to acknowledge that students can interpret achievement-orientated messages in different ways and these may not be in the same way as intended. For instance, a teacher may intend to try and motivate students by using a value-promoting message, but it only has the desired effect for some of the class. It is important to adopt a student-centred perspective and understand how achievement-orientated messages would be understood from the perspective of the intended

recipient. The second point is that value-promoting messages may not be effective for students who do not value a particular subject, or attainment in that subject. A different tactic may be required.

For students with high subjective task-value, value-promoting messages may be a double-edged sword. They lead to a challenge appraisal (the desired effect) for the student who believes that she or he is capable of performing those behaviours required to attain success. However, they lead to a threat appraisal for the student who does not believe that she or he is capable of performing those behaviours required to attain success. This leads to the third point: Would less confident students (i.e., those who do not expect success) benefit from a more gentle type of message? Our findings suggest that this may be the case. Students with high value who did not expect success were less likely to disregard messages that were gain-framed than when they were loss-framed.

### **8.3 Conclusion**

Value-promoting messages can be appraised in different ways by students based on their personal significance (i.e., subjective task-value), the options for successfully responding (i.e., expectancy of success) and whether the message is framed to emphasise gains or losses. The impact of message frame on threat appraisal was additive. For disregarding appraisal, message-frame interacted with subjective task-value and expectancy of success. Thus our appraisal model of value-promoting messages can be elaborated to account for the influence of intrapersonal (subjective task-value and expectancy of success) and interpersonal (message-frame) influences as well as when and how these elements would interact. Future research should offer a test of this model using data collected from a more naturalistic context and consider whether the key element of subjective task-value is the utility component, the attainment component, or both.

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**Table 1**

Estimated marginal means for study conditions: message frame (gain vs. loss-framed), subjective task-value (high vs. low) and academic self-efficacy (high vs. low)

|                                      | Expectancy of Success |      |        |      |        |      |
|--------------------------------------|-----------------------|------|--------|------|--------|------|
|                                      | High                  |      | Low    |      | Mean   |      |
|                                      | M                     | SE   | M      | SE   | M      | SE   |
| <b>Gain-framed message (n = 122)</b> |                       |      |        |      |        |      |
| Challenge Appraisal                  |                       |      |        |      |        |      |
| High STV                             | 134.62                | 3.68 | 127.69 | 3.21 | 131.16 | 2.71 |
| Low STV                              | 74.39                 | 3.15 | 30.38  | 2.71 | 52.61  | 2.37 |
| Mean STV                             | 104.50                | 2.68 | 79.26  | 1.96 | 91.88  | 1.84 |
| Threat Appraisal                     |                       |      |        |      |        |      |
| High STV                             | 105.88                | 4.07 | 134.33 | 3.46 | 120.10 | 2.73 |
| Low STV                              | 59.07                 | 3.13 | 28.27  | 2.89 | 43.67  | 2.37 |
| Mean STV                             | 82.48                 | 2.61 | 81.30  | 2.08 | 81.89  | 1.63 |
| Disregarding Appraisal               |                       |      |        |      |        |      |
| High STV                             | 46.82                 | 4.11 | 52.37  | 2.94 | 49.59  | 2.60 |
| Low STV                              | 114.48                | 3.37 | 152.58 | 3.13 | 133.53 | 2.49 |
| Mean STV                             | 80.65                 | 2.72 | 102.48 | 2.06 | 91.56  | 1.68 |
| <b>Loss-framed message (n = 130)</b> |                       |      |        |      |        |      |
| Challenge Appraisal                  |                       |      |        |      |        |      |
| High STV                             | 131.71                | 3.57 | 132.45 | 3.11 | 132.08 | 2.62 |
| Low STV                              | 80.86                 | 3.05 | 28.74  | 2.62 | 54.80  | 2.29 |
| Mean STV                             | 106.29                | 2.60 | 80.59  | 1.89 | 93.16  | 1.58 |
| Threat Appraisal                     |                       |      |        |      |        |      |
| High STV                             | 114.16                | 3.13 | 146.60 | 3.35 | 130.28 | 2.65 |
| Low STV                              | 70.79                 | 3.03 | 29.11  | 2.80 | 49.95  | 2.30 |
| Mean STV                             | 92.48                 | 2.53 | 87.85  | 2.02 | 90.16  | 1.58 |

|                                       |        |      |        |      |        |      |
|---------------------------------------|--------|------|--------|------|--------|------|
| Disregarding Appraisal                |        |      |        |      |        |      |
| High STV                              | 70.23  | 3.10 | 40.48  | 2.85 | 55.36  | 2.52 |
| Low STV                               | 108.74 | 3.28 | 153.80 | 3.03 | 131.27 | 2.41 |
| Mean STV                              | 89.49  | 2.64 | 97.14  | 1.99 | 93.31  | 1.63 |
| <b>Not by message frame (n = 252)</b> |        |      |        |      |        |      |
| Challenge Appraisal                   |        |      |        |      |        |      |
| High STV                              | 133.17 | 2.56 | 130.07 | 2.34 | 131.62 | 1.88 |
| Low STV                               | 77.62  | 2.19 | 29.78  | 1.88 | 53.70  | 1.65 |
| Mean STV                              | 105.39 | 1.87 | 79.93  | 1.36 | 92.66  | 1.28 |
| Threat Appraisal                      |        |      |        |      |        |      |
| High STV                              | 110.20 | 2.83 | 140.46 | 2.41 | 125.24 | 1.90 |
| Low STV                               | 64.93  | 2.18 | 28.69  | 2.01 | 46.81  | 1.65 |
| Mean STV                              | 87.47  | 1.81 | 84.58  | 1.45 | 86.03  | 1.14 |
| Disregarding Appraisal                |        |      |        |      |        |      |
| High STV                              | 58.53  | 2.87 | 46.42  | 2.05 | 52.48  | 1.81 |
| Low STV                               | 111.61 | 2.35 | 153.19 | 2.18 | 132.40 | 1.73 |
| Mean STV                              | 85.07  | 1.89 | 99.81  | 1.43 | 92.44  | 1.71 |

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| Message frame:         |      | Gain-framed |            | Loss-framed |            |
|------------------------|------|-------------|------------|-------------|------------|
| Expectancy of Success: |      | High        | Low        | High        | Low        |
| Subjective task-value: | High | Vignette A  | Vignette C | Vignette A  | Vignette C |
|                        | Low  | Vignette B  | Vignette D | Vignette B  | Vignette D |

Figure 1. The eight experimental conditions included in Study 1: message frame (gain vs. loss-framed), subjective task-value (high vs. low) and expectancy of success (high vs. low)

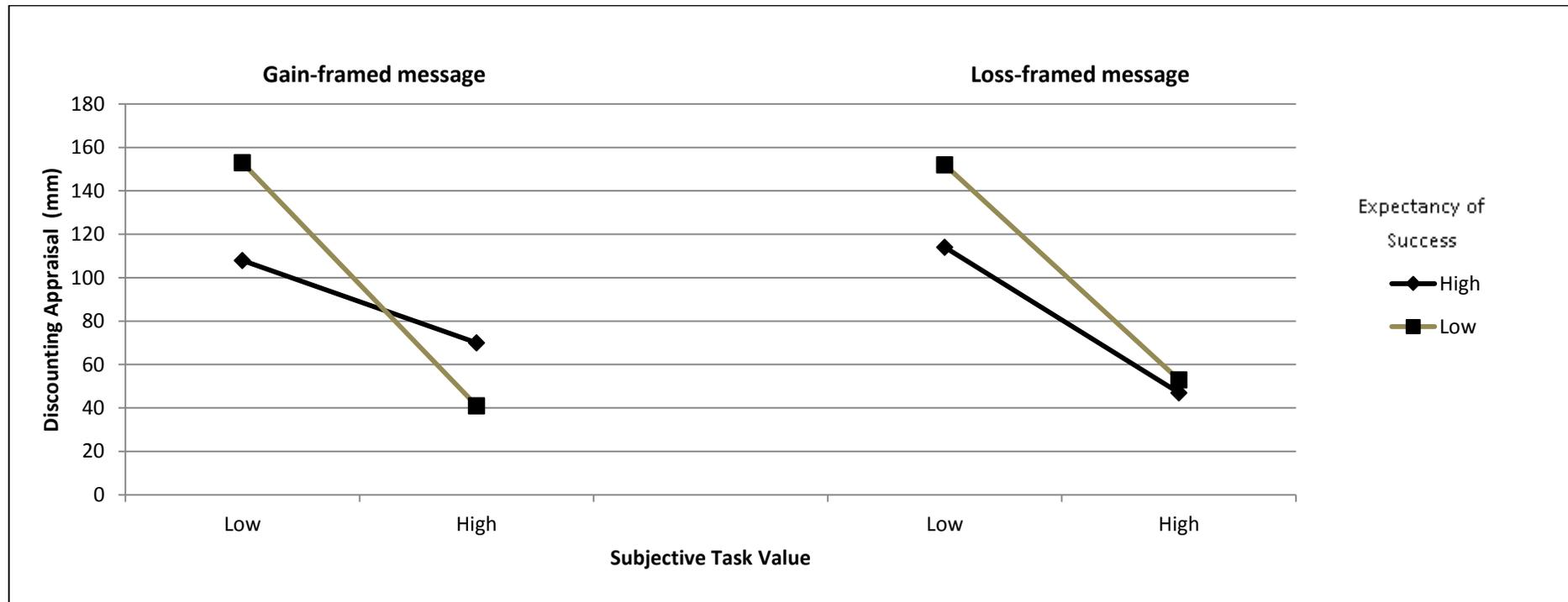


Figure 2. The interactions between subjective value, expectancy of success, and message frame for a disregarding appraisal.

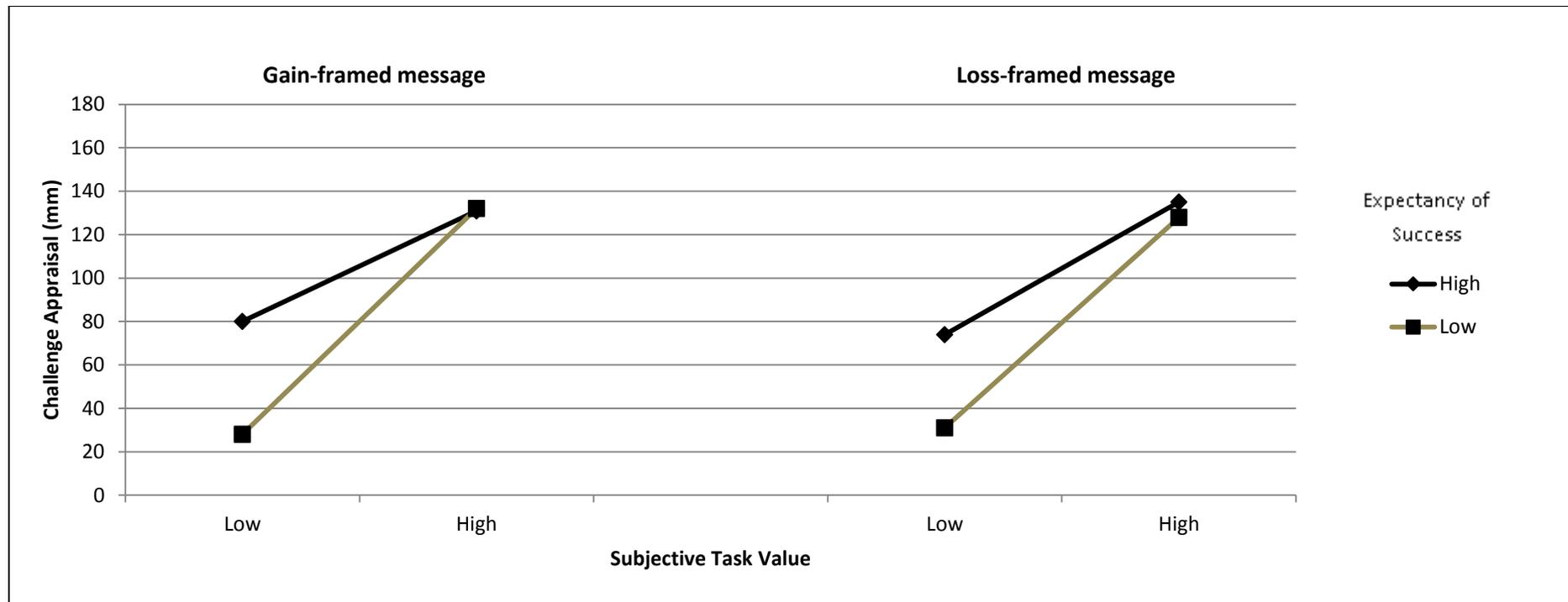


Figure 3. The interactions between subjective task-value, expectancy of success, and message frame for a challenge appraisal.

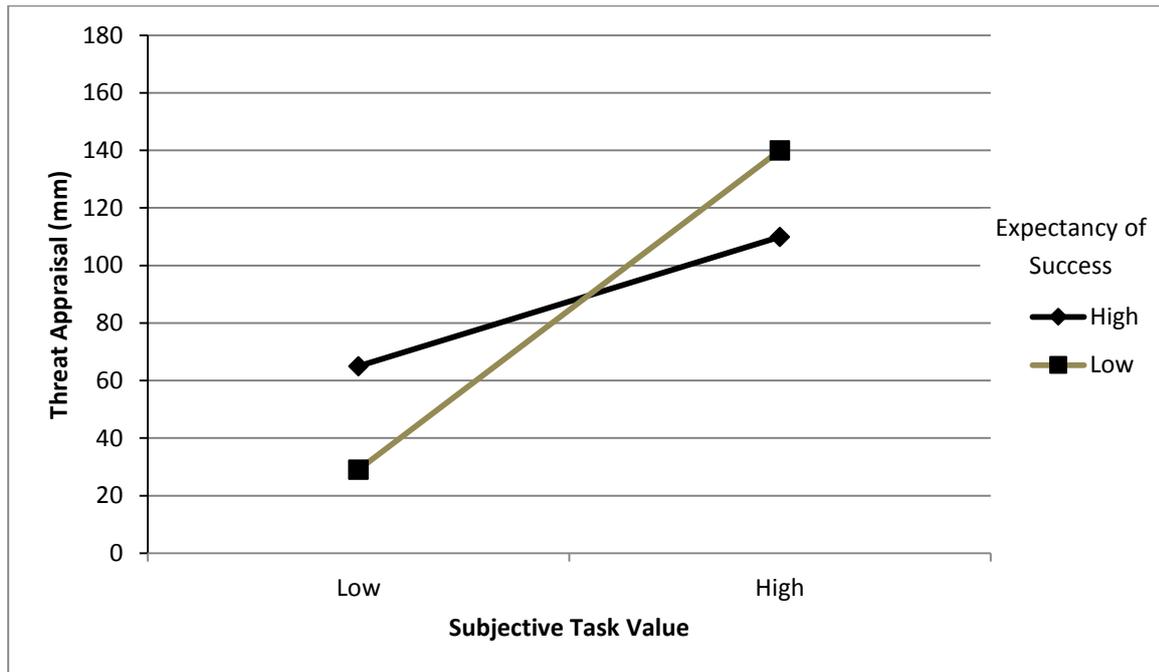


Figure 4. The interaction between subjective task-value and expectancy of success for a threat appraisal.

## Appendix

Vignette A: Sarah is a hard working Year 11 student who is good at maths. She finds the work done in lessons challenging, but usually does very well. Sarah believes that maths is an important subject to do well in. She wants to go to college to study A levels and knows she must get at least a pass in GCSE maths. She also knows that maths is a useful skill to have in daily life to help with things like bills.

Vignette B: James wants to learn a trade when he leaves school and get an apprenticeship as a plumber or plasterer. He knows that you need to know figures for this type of work, buying building materials and measuring up rooms, but thinks that GCSE maths isn't related to these kinds of calculations. Despite this, James is good at maths expects to get at least a pass in GCSE maths.

Vignette C: Jade hasn't been very good at maths since primary school. When she tries to do maths, the numbers just jumble up and she can't think clearly. She didn't do very well in the Year 10 maths exam and think that she might not pass. Jade wants to become a hairdresser and has been offered a place at college, but has to get at least a grade C to get into college. She also thinks that GCSE maths will help her in her daily life with things like bills and if she ever opens her own salon.

Vignette D: Jerome doesn't think GCSE maths is important. When he finishes school he is going to work for the family restaurant and knows that he will do this whatever grade he gets in GCSE maths. His brother didn't pass GCSE maths and he doesn't seem to have any problems working in the restaurant. Jerome has never been good at maths and doesn't really try very hard in maths lessons. He is expects to fail GCSE maths.

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Wendy Symes is a postdoctoral researcher in the Department of Psychology, University of Munich. She is interested in how psychology can be applied to improve the experiences of students preparing for high-stakes examinations. In particular, she is interested in the messages teachers use to motivate their students to prepare for such exams, and the development, impact, and treatment of test anxiety