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Value of college education mediating the predictive effects of causal attributions on academic success

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Abstract Causal attributions (explanations for outcomes) have been found to predict college students' academic success; however, not all students attributing success or failure to adaptive (i.e., controllable) causes perform well in university. Eccles et al.'s (Achievement and achievement motives. W.H. Freeman, San Francisco, pp 75–145, 1983) expectancy-value theory posits that subjective task value likely mediates the relationship between causal attributions and academic success. The current study tested value as a mediator of the relationship between causal dimensions and academic success measured by perceived academic success and

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academic emotions. Participants were 389 college students from a Midwestern university. Results suggested that students who attributed their failure to internal, personally controllable causes perceived themselves as more successful if they also valued college education as enjoyable, useful, and/or rated its cost value as low. Findings also revealed that value of college education mediated the predictive effects of causal dimensions on several academic emotions, including pride, anger, shame, and guilt. Theoretical developments of attribution theory as well as practical implications for improving college students' academic motivation, success, and positive emotions are discussed.

Keywords Causal attributions · Subjective task value · Perceived academic success · Academic emotions · College students

1 Introduction

The National Center for Education Statistics (2011) in the USA reported that the retention rates of first-time degree-seeking undergraduates at degree-granting universities from 2006 to 2010 averaged 71 %, which translates to a 29 % undergraduate attrition rate. Low retention rates have been a concern for institutions worldwide (Crosling et al. 2008). For instance, the attrition rate of higher education was 20 % in the Netherlands, 26 % in Sweden, and 25 % among full-time students in Canada (Thomas and Quinn 2003). Attrition is detrimental to the efforts made by higher education institutions to maintain economic stability (Institute for Higher Education Policy 2005; Strauss and Volkwein 2004). In addition, attrition may harm students in terms of losing the opportunity to earn their degree, developing their potential, and earning wages at a younger age (Card and Krueger 1992; Institute for Higher Education Policy 2005; Jaeger and Page 1996). Empirical studies have consistently shown that academic success is a predictor of college student retention; for instance, DeBerard et al. (2004) reported that the average cumulative GPAs for retained students was 3.10, but for non-retained students was 2.50 (see also Kirby and Sharpe 2001; McGrath and Braunstein 1997; Robbins et al. 2004). Thus, it is important to examine factors impacting college students' academic success in order to improve college retention rates.

The importance of causal attributions, or explanations for outcomes, has been widely demonstrated by a wealth of empirical studies showing attributions to be significantly correlated with undergraduates' academic success (e.g., Cheng and Chiou 2010; Cortes-Suarez 2008; Gobel and Mori 2007; Hsieh and Schallert 2008; Perry et al. 2008). Eccles et al.'s (1983) expectancy-value theory, however, posited that if students do not value an assignment or learning outcome they would not be motivated by adaptive causal attributions (i.e., controllable) to attain high academic achievement. As this connection has rarely been examined, the purposes of the current study was to test if subjective task value mediates the relationship between college students' causal attributions and their academic success measured by perceived academic success and academic emotions.

1.1 Attributions and academic success

Weiner (1985) defined causal attributions as individuals' explanations for their success or failure. He proposed that any causal ascription can be categorized into three causal dimensions: locus of causality (internal or external), stability (stable or variable over time), and controllability (can be controlled or not). Weiner (2010) recently suggested future research should focus on causal dimensions (i.e., locus of causality, stability, controllability) rather than single causal ascriptions (i.e., ability, effort) because "dimensional placement depends on how it seems to me" (p. 32). For instance, effort is typically recognized as a controllable causal ascription, but a chronically low effort person is likely to consider it as an uncontrollable ascription (i.e., "I am a lazy person"). A person who rates effort as controllable is more likely to be motivated to change his/her failure because he/she thinks the failure will be under their control. Alternatively, a person who rated effort as uncontrollable is less likely to be motivated to change his/her failure. Thus, Weiner suggested future studies should examine connections between causal dimensions and motivation.

Weiner posited that attributions originate from individuals' self-perceptions and influence expectancy of success, responsibility, emotions, motivation, and performance. For instance, if a student attributes his or her failure to an internal, unstable, and personally controllable cause, such as poor effort, in the future he or she will likely have higher expectations for success, experience more hope and guilt, and be more motivated to put effort into attaining future success.

A number of empirical studies have shown support for Weiner's (1985) attribution theory. Cortes-Suarez (2008) tested the relationship between causal attributions and academic achievement in college algebra learning. The results indicated that successful students were more likely to endorse internal attributions (e.g., ability and effort), whereas unsuccessful students more often attributed their failure to external causes (e.g., task difficulty and luck). The study also found that endorsing personally controllable attributions was positively associated with academic achievement. Perry et al. (2008) found that low effort was the most important causal attribution for poor academic performance rated by college students, followed by test difficulty, poor strategy, professor quality, natural ability, and bad luck. According to Weiner's (1985) theory, this ranking of causal attributions has positive implications because low effort, test difficulty, and poor strategy are typically seen as controllable, unstable factors that can motivate students to improve their poor academic performance in the future. Moreover, studies on attribution retraining (AR), a cognitive intervention that encourages students to make internal, controllable attributions, revealed a connection with improved academic achievement (e.g., Haynes et al. 2006; Haynes-Stewart et al. 2011; Perry and Penner 1990). Thus, the reviewed studies contribute to the conclusion that causal attributions significantly predict college students' academic success across academic subjects; however, the role of value of college education within this framework has yet to be empirically assessed.

1.2 Value, causal attributions, and academic success

Eccles et al.'s (1983) expectancy-value theory describes how subjective value assigned to a task predicts people's behavior choice, performance, and persistence in the task. Subjective task value includes four components (Wigfield and Eccles 2000): (a) *Intrinsic value* refers to the enjoyment a person gains from working with a task; (b) *Attainment value* is defined as the importance of engaging in a task; (c) *Utility value* refers to how a task will be helpful or useful for a person's future plans; and (d) *Cost value* is a negative value of working with a task (e.g., college students doing homework give up visiting their friends).

Empirical evidence has well supported the expectancy-value theory (Eccles et al. 1983). Several studies found that the value students assigned to an academic outcomes predicted their intention to engage in the activity, such as course enrollment (Feather 1988; Meece et al. 1990), attending a graduate school (Battle and Wigfield 2003), or self-reported effort in test taking (Cole et al. 2008). Meece et al. (1990) found that high school students' perceived ability in math or English indirectly predicted their intention of the course enrollment through the value of the courses. The study by Battle and Wigfield (2003) showed that intrinsic-attainment and utility value positively predicted college women's intentions to attend graduate school, whereas cost value negatively predicted the intention. Furthermore, Bong (2001) reported that if college students valued a course as useful, they earned a high test scores of the course. Overall, the empirical studies have lent evidence to support that value can predict students' behavior choice, effort, and academic achievement. The theory also posited that subjective task value likely mediates the relationship between causal attributions and academic success. This may be the reason why not all college students who employ adaptive attributions to explain their failure are academically successful. A research question was initiated: does value mediate the relationship between causal attribution and academic success?

Pekrun et al. (2002, p. 92) defined *academic emotions* as "emotions relating to instruction or to the process of studying". Empirical findings have supported that academic emotions are significantly associated with students' academic success. Pekrun et al. (2000) found that college students' academic emotions measured in the beginning of a semester predicted their cumulative grades as well as final test scores: positive academic emotions (e.g., enjoyment, hope and pride) predicted high achievement, but negative academic emotions (e.g., anxiety, anger, and shame) predicted low academic achievement. The findings are consistent with other studies (e.g., Frenzel et al. 2007; Meece et al. 1990; Pekrun et al. 2004, 2009). Thus, academic emotion was measured as a part of academic success in current study.

Based on above discussion and empirical findings on the relationships among causal attributions, value, and academic success (i.e., perceived academic success and academic emotions; Eccles et al. 1983; Pekrun et al. 2000, 2004, 2009; Weiner 1985), five hypotheses were proposed: Students who are attempting to explain their failure outcomes will (1) perceive more success following internal, unstable, or personally controllable attribution, or will experience (2) more pride following internal attributions, (3) more hope following unstable attributions, (4) more guilt and less shame following personally controllable attributions, and (5) more anger

following externally controllable attributions if they value college education as enjoyable, important, useful, and/or rated its cost value as low.

2 Methods

2.1 Participants and procedure

Three hundred and eighty-nine participants (female = 307, male = 82; age $M = 20.3$, $SD = 3.32$) were recruited from psychology courses at a medium-sized, research-comprehensive university in mid-western USA via an email containing an online survey hyperlink. Based on approximately 750 students who received the study invitation, the response rate was roughly 52 %. The online survey was conducted in the middle of spring semester, 2012. Ninety-four percent of the participants spoke English as a first language, and 91 % recognized themselves as White/Caucasian. The participants were awarded partial course credit for their participation.

2.2 Instruments

2.2.1 Causal attributions and dimensions

To measure causal ascriptions and their associated causal dimensions, participants were first asked, "What cause might lead to your failure in this course?" They then rated the cause on the 9-point Revised Causal Dimension Scale (CDS II; McAuley et al. 1992).[1] Twelve items were evenly used to measure four causal dimensions as follows: *locus of causality* (e.g., Outside of you 1 2 3 4 5 6 7 8 9 Inside of you), *stability* (e.g., Temporary 1 2 3 4 5 6 7 8 9 Permanent), e*xternal control* (e.g., Over which others have no control 1 2 3 4 5 6 7 8 9 Over which others have control), and p*ersonal control* (e.g., You cannot regulate 1 2 3 4 5 6 7 8 9 You can regulate). Higher scores in each construct represent higher levels of internality, stability, external controllability, and personal controllability.

2.2.2 Subjective task value

All items were adapted from the Battle and Wigfield's (2003) Value of Education Scale, which is based on Eccles et al.'s (1983) expectancy-value theory. Twelve items were evenly used to measure four components of the subjective task value on a Likert scale (1 = *Strongly disagree*, 5 = *Strongly agree*): intrinsic value (e.g., I find the idea of being a college student to be very appealing), attainment value (e.g.,

[1] The CDS II separates Weiner's (1985) causal dimension of controllability into two dimensions: external control and personal control. McAuley et al. (1992) argued that the reliability for each construct in the CDS II become higher than that in the CDS as controllability is separated into external controllable and personal controllable dimensions. Also, four causal dimensions become more statistically distinct than three causal dimensions.

I feel that I need university education to fulfill my potential), utility value (e.g., A university degree is important to me because it will provide better job opportunities), and cost value (e.g., University education would not be worth it if I had to work hard after I got out to re-pay a long term tuition loan). Higher scores in each construct represent higher levels of intrinsic, attainment, utility, and cost value.

2.2.3 Academic success

This study included two measures of academic success: *perceived academic success* and *academic emotions*. First, participants were asked how successful they felt in their psychology course so far this year on a 9-point scale (1 = *Very unsuccessful*, 9 = *Very successful*). Second, based on academic emotions recognized by Pekrun et al. (2002), as well as emotions associated with each causal dimensions listed by Weiner's (1985) attribution theory, the current study measured two positive emotions (hope and pride) as well as three negative emotions (anger, shame, and guilt). Participants were asked to indicate the extent to which they had experienced each emotion in regards to their psychology course on a 10-point scale (1 = *Not at all*, 10 = *Very much so*).

3 Results

The reliability of all constructs were acceptable (i.e., $\alpha \geq .70$; see Table 1), with the exception of the stability causal dimension scale ($\alpha = .66$). Examination of the frequency distributions and variable mean scores indicated that participants

Table 1 Means, standard deviations and Cronbach's alpha level of variables

Variable	*M*	*SD*	Min	Max	α
Locus of causality	6.27	1.83	1.00	9.00	.76
Stability	4.89	1.83	1.00	9.00	.66
External control	4.53	1.74	1.00	9.00	.70
Personal control	6.70	1.82	1.00	9.00	.83
Intrinsic value	4.12	0.76	1.00	5.00	.86
Attainment value	4.27	0.78	1.00	5.00	.85
Utility value	4.60	0.66	1.00	5.00	.88
Cost value	2.42	0.97	1.00	5.00	.81
Perceived academic success	7.15	1.50	1.00	10.00	–
Hope	6.36	2.46	1.00	10.00	–
Pride	6.15	2.56	1.00	10.00	–
Anger	3.92	2.67	1.00	10.00	–
Shame	3.21	2.50	1.00	10.00	–
Guilt	2.65	2.14	1.00	10.00	–

typically made adaptive attributions for their failure, specifically to internal, unstable, and personally controllable causes. In addition, the participants often valued college education as enjoyable, important, useful, and rated its cost value as low. The participants also reported high levels of perceived academic success, and experienced more positive than negative emotions.

3.1 Correlations

Table 2 presents a large number of significant bivariate correlations among all study variables. Regarding *attributions and value*, if students attributed failure to internal causes, they more valued college education as enjoyable, important, useful, and rated its cost value as low; if students attributed failure to externally controllable causes, they less valued college education as useful, and rated its cost value as high; and if students attributed failure to personally controllable causes, they more valued college education as enjoyable, useful, and rated its cost value as low. Regarding *attributions and emotions*, students who made an internal attribution for their failure experienced more hope and pride; students who attributed an externally controllable cause experienced more anger; and students who made a personally controllable attribution experienced less anger and shame. Regarding *value and emotions*, if students valued college education as enjoyable, they experienced more hope and pride, as well as less shame; if they valued college education as important, they experienced more hope and pride; if they valued college education as useful, they experienced less anger, shame, and guilt; if they rated the cost value of college education as high, they experienced more anger, shame, and guilt.

3.2 Mediational models

A tested model (see Fig. 1) was constructed to test two mediational mechanism: (a) the mediating effect of subjective task value on the relationship between causal attributions and perceived academic success, (b) the mediating effect of subjective task value on the relationship between causal dimensions and academic emotions. Based on Baron and Kenny (1986), a three step regression was analyzed: (1) causal attributions predicted perceived academic success and emotions (separately), (2) causal attributions predicted subjective task value (intrinsic, utility, attainment, and cost separately), and (3) causal attributions and subjective task value predicted perceived academic success and emotions (separately). The significance of indirect effects were then additionally assessed using bootstrapping (Hayes 2013); specifically, if the 95 % confidence interval does not contain zero the indirect effect was considered significant.

Analyses of the model involving perceived success as the outcome variable revealed a large number of mediational relationships among causal attributions, value, and perceived success through testing 12 models (see Table 3). The findings provide support for hypothesis 1. First, students who attributed their failure to internal causes perceived more success if they also valued college education as enjoyable and useful, or rated its cost value as low. Second, students who attributed their failure to personally controllable causes perceived more success if they valued

Table 2 Correlations among variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Locus of causality	–	.11	−.15*	.70**	.17**	.20**	.16**	−.13*	.19**	.19**	−.05	−.15*	−.06	.29**
2. Stability		–	.37**	−.05	.05	.03	−.00	.08	.10	.12	.06	.07	.08	.02
3. External control			–	−.24**	−.06	−.08	−.12*	.27**	.00	.04	.25**	.31**	.33**	−.20**
4. Personal control				–	.13*	.11	.21**	−.19**	.15*	.15*	−.13*	−.21**	−.10	.35**
5. Intrinsic value					–	.51**	.44**	−.26**	.25**	.26**	−.10	−.13	−.11	.20**
6. Attainment value						–	.67**	−.10	.15**	.16**	−.05	−.02	−.03	.06
7. Utility value							–	−.21**	.04	.06	−.15**	−.12*	−.11*	.12*
8. Cost value								–	.01	−.01	.26**	.32**	.30**	−.22**
9. Hope									–	.80**	−.08	−.14*	−.02	.37**
10. Pride										–	−.08	−.13*	−.01	.37**
11. Anger											–	.54**	.44**	−.28**
12. Shame												–	.70**	−.41**
13. Guilt													–	−.29**
14. Perceived success														–

* $p < .05$, two-tailed; ** $p < .01$, two-tailed

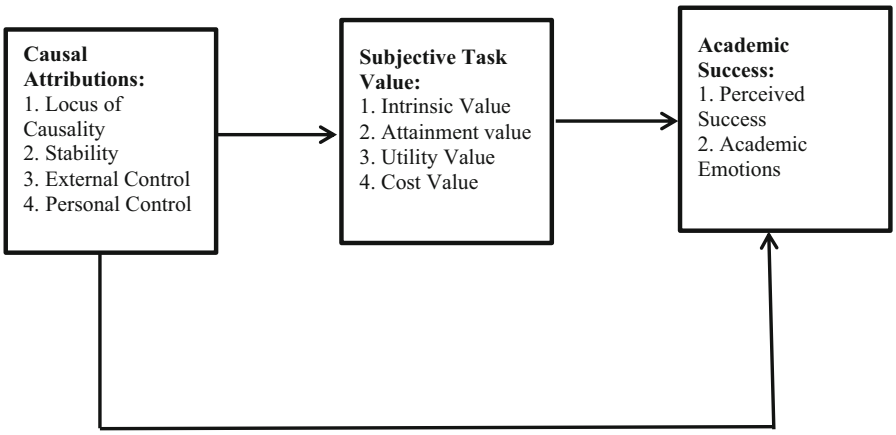

Fig. 1 The tested model: subjective task value mediate the relationship between causal attributions and academic success

college education as useful, and rated its cost value as low. Third, students who attributed their failure to externally controllable causes perceived less success if they valued college education as useful, and rated its cost value as high. Mediational analyses involving attainment value and the stability causal dimension did not yield any significant results.

Analyses of the model involving academic emotions as the outcome variable also revealed a number of mediation mechanisms among the variables through testing 28 models (see Table 4). The results of these mediational analyses on academic emotions provide support for several hypotheses. Consistent with hypothesis 2, students who attributed their failure to internal causes experienced more pride if they also valued college education as enjoyable and important. In support of hypothesis 4, students who attributed their failure to personally controllable causes experienced less shame if they rated the cost value of college education as low. In addition, students who attributed their failure to a personally controllable cause rated the cost value of college education as low, and then experienced less guilt. Finally, students who attributed their failure to externally controllable causes experienced more anger, shame, and guilt if they rated the cost value of college education as high. These findings provide support for hypotheses 4 and 5. Results for the stability causal dimension again were non-significant and are not presented.

4 Discussion

The current findings are consistent with previous studies in that causal attributions significantly predict college students' academic success (Cheng and Chiou 2010; Cortes-Suarez 2008; Perry et al. 2008). In addition, it is the first study that provided empirical support for Eccle et al.' s (1983) proposition that subjective task value mediates the relationship between causal attributions and academic success

Table 3 Subjective task value mediate causal dimension of failure attributions and perceived academic success

	Step 1: attribution on perceived success	Step 2: attribution on value	Step 3: attribution and value on perceived success	95 % Bootstrap CI[a] Attribution	Attribution → perceived success: predictive effect[b]	Final model R^2
Locus of causality—intrinsic value	.26***	.17**	.22***, .25***	.008, .064	Partial	.13
External control—intrinsic value	−.22***	−.06	–	−.051, .011	Direct	.12
Personal control—intrinsic value	.32***	.13*	.29***, .26***	−.001, .054	Direct	.17
Locus of causality—utility value	.26***	.16**	.24***, .15**	.003, .041	Partial	.09
External control—utility value	−.22***	−.12*	−.20**, .16**	−.040, −.002	Partial	.07
Personal control—utility value	.32***	.21***	.29***, .13*	.003, .047	Partial	.12
Locus of causality—cost value	.26***	−.13*	.23***, −.26***	.0001, .055	Partial	.14
External control—cost value	−.22***	.27***	−.15*, −.25***	−.102, −.026	Partial	.11
Personal control—cost value	.32***	−.19**	.27***, −.24***	.001, .069	Partial	.15

Standardized beta (β) regression coefficients presented with exception of unstandardized coefficients in confidence intervals

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed)

[a] Mediational effect present if range between lower and upper bound of confidence interval does not include zero

[b] Direct = attribution predicts perceived success with no mediation by value, partial = attribution predicts success partially mediated by value

Table 4 Subjective task value mediate locus of causality of failure attributions and emotions

	Step 1: attribution on emotions	Step 2: attribution on value	Step 3: attribution and value on emotions	95 % Bootstrap CI[a] Attribution	Attribution → emotions: predictive effect[b]	Final model R^2
Locus of causality—intrinsic value—pride	.19**	.17**	.15*, .24***	.016, .104	Partial	.09
Locus of causality—attainment value—pride	.19**	.20**	.16**, .14*	.004, .85	Partial	.05
Personal control—cost value—shame	.21***	−.19**	.16**, .29***	−.127, −.024	Partial	.13
Personal control—cost value—guilt	−.10	−.19**	−.05, .28***	−.104, −.021	Indirect	.09
External control—cost value—anger	.25***	.27***	.20**, .19**	.025, .147	Partial	.10
External control—cost value—shame	.31***	.27***	.24***, .25***	.044, .167	Partial	.16
External control—cost value—Guilt	.33***	.27***	.27***, .22***	.027, .132	Partial	.15

Standardized beta (β) regression coefficients presented with exception of unstandardized coefficients in confidence intervals

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed)

[a] Mediational effect present if range between lower and upper bound of confidence interval does not include zero

[b] Direct = attribution predicts emotion with no mediation by value, partial = attribution predicts emotion partially mediated by value, indirect = attribution predicts emotion mediated by value with no initial direct effect

measured by perceived academic success as well as academic emotions. Specifically, college students who adaptively attributed their academic failure to internal or personally controllable causes perceived more success if they also valued college education as enjoyable, useful, and/or rated its cost as worth their effort. Lower externally controllable attributions also were associated with more perceived success if students placed utility value on college education or rated its cost value as low. An unexpected finding was that attainment value did not mediate any relationships between causal dimensions and perceived academic success; thus, more studies are required to examine their relationship.

Additionally, this study found that subjective task value mediated the relationship between causal dimensions and academic emotions (measured as part of academic success) as subsequently detailed. First, college students who attributed their failure to internal causes experienced more pride if they also valued their college education as enjoyable and important. Weiner (1985, 2010) has discussed pride being associated with success rather than with failure. The findings of the study provide evidence in support of pride being positively associated with locus of causality for failure attributions. One possible explanation is if students attributed their failure to effort (an internal attribution), they believe they could have changed their failure; thus, their self-efficacy preserves their pride. However, if students attributed their failure to ability that is also an internal attribution, they likely experience less pride. Another explanation is although student experienced failure, they still felt pride if they considered they had engaged in enjoyable and important college education. Thus, more research about locus of causality for failure and pride is needed to achieve greater clarity on the connection between these constructs with the influence of value. Second, college students who attributed their failure to personally controllable causes experienced less shame if they placed low cost value on college education. However, college students experienced more shame if they made external attributions for their failure, and also placed high cost value on college education. The finding supports the necessity for dividing controllability into two causal dimensions: personal control and external control. Third, college students who made personally controllable attributions for their failure assigned high utility value to college education and then experienced more guilt. Fourth, college students who made external attributions for their failure experienced more anger if they rated the cost value of college education as high.

The findings are consistent with the hypotheses on subjective task value mediating the predictive effects of causal attributions on academic success measured by perceived academic success and academic emotions. Therefore, subjective task value should be more strongly considered as a cognitive psychological consequence of causal attributions within Weiner's (1985, 2010) attribution theory.

4.1 Limitations and future research

The current study had several strengths, including allowing students to openly report causal ascriptions for their academic failure, rating its related causal dimensions, as well as examining how subjective task value mediate the predictive effect of causal attributions on academic success measured by perceived success and academic emotions. However, this

study also had several weaknesses that should be addressed. First, 91 % participants were white/Caucasians recruited from one university, which reduces the generalizability of findings to some degree. In addition, this is a cross-sectional research design, which limits causal inferences. Thus, future research should include more diversified participants with different ethnicities and cultures within a longitudinal design to compare findings with the current study. Third, participants self-reported perceived academic success, which potentially biased their responses because of Common Method Variance (CMV). "CMV refers to variance that is attributable to the measurement method rather than to the construct of interest" (Podsakoff et al. 2003, p. 879). "At a more abstract level, method effects might be interpreted in terms of response biases, such as social desirability" (Bagozzi and Yi 1991, p. 426). Social desirable responding is the tendency to respond to self-report measures in a manner that projects a favorable self-image (Johnson and Van de Vijver 2003). In the United States, several studies reported a strong relationship between individual evaluations of social desirability and the possible responses on survey items (Edwards 1953; Kreuter et al. 2008; Phillips and Clancy 1972). Therefore, future studies should measure both objective academic success (e.g., test scores, GPAs) reported by class instructors or college administrators, and subjective academic achievement (e.g., perception of success) reported by students.

4.2 Implication of study

Identifying subjective task value as a mediator of the predictive effects of causal dimensions on academic success has important theoretical implications. Based on the current results, subjective task value should receive consideration as a cognitive psychological outcome of causal attributions within Weiner's (1985, 2010) attributional model. Specifically, when students make internal and controllable (high personal or low external control) attributions, they tend to value their college education more, which has positive implications for their perception of academic success as well as positive affective responses. Thus, the findings have added new knowledge to Weiner's (1985) attribution theory.

From an applied standpoint, the findings of the study are meaningful for improving college students' perceptions of academic success that further promote their retention. Specifically, class instructors and facilitators of motivational psychosocial interventions (i.e., AR; Haynes et al. 2006) not only should induce college students to employ adaptive causal attributions (e.g., internal, personally controllable causes) to explain their academic failure, but also should explicitly promote their value of college education in order to improve their perception of success and positive affective responses. Therefore, future researchers and educators should consider causal attributions and subjective task value in tandem when considering their impact on college students' academic success.

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