Teacher-Ready Research Review

Utility value interventions: Why and how instructors should use them in college psychology courses.

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Abstract

According to expectancy-value models of achievement motivation, a core component of increasing student motivation is utility value. Utility value refers to the importance that a task has in one's future goals. Utility value interventions provide an opportunity for students to make explicit connections between course content and their own lives. A large body of literature suggests that utility value interventions are effective for a wide range of students (e.g., both adolescent and adult learners) in a variety of courses (e.g., introductory psychology, introductory biology, and physics). This review provides (1) an overview of an expectancy value model of achievement motivation, (2) a comprehensive review of the experimental studies of utility value interventions in psychology, (3) concrete pedagogical recommendations based on the evidence from over thirty studies of the utility value intervention, and (4) suggestions for future research directions. After reading this review, college-level psychology instructors should be able to decide whether the utility value intervention is appropriate for their own course and, if so, implement the intervention effectively.

Keywords: utility value, interventions, motivation, implementation, pedagogy

Psychological science has much to offer students in the way of effective learning strategies. For example, practice testing (taking tests over the to-be-learned material) and spaced practice (spreading out learning activities over time) are both highly effective strategies for improving memory and performance (Dunlosky & Rawson, 2015). Despite the effectiveness of these strategies, many students do not actually use them. For example, Gurung and colleagues (2010) found that students reported using application behaviors (e.g., creating quiz questions about the material) with a low frequency but reported organizational behaviors (e.g., writing down due dates) with a high frequency. Slow or minimal uptake of evidence-based practices, by instructors and students, has also been noted consistently in the scholarship of teaching and learning literature (e.g., Chew et al., 2018; Daniel & Chew, 2013; Dunlosky et al., 2013; Dunlosky & Rawson, 2019). What leads a student to engage meaningfully with course materials in a way that supports learning and achievement?

Because students perceive effective strategies, like repeated, spaced self-testing, to be more effortful and less helpful than less effective strategies (Bjork et al., 2013; Karpicke, 2009; Kirk-Johnson et al., 2019), effective implementation of evidence-based study strategies may require attention to student motivation in addition to dissemination of strategies. In particular, a student's likelihood of engaging in an academic task depends on two factors: expectancy ("Can I do it?") and value ("Do I want to do it?"). Students' beliefs underlying each of these factors is related to critical educational outcomes such as performance and persistence (Eccles, 2009). Moreover, students' expectancies and values can be targeted by interventions to produce meaningful improvement in student outcomes (Lazowski & Hulleman, 2016).

One motivational intervention, the *utility value* intervention, is the topic of this review (Eccles, 1983). In this review, we aim to provide (a) an overview of both utility value and the

comprehensive model of achievement motivation from which it is derived (the Expectancy-Value model, Eccles 1983), (2) a review of the experimental literature investigating the effectiveness of utility-value interventions in both laboratory and classroom settings , (3) concrete pedagogical recommendations for higher education resulting from this body of literature, and (4) suggestions for future research directions.

Expectancy-Value Model of Achievement

The Expectancy-Value Model of Achievement (Eccles, 1983) was born of a desire to understand why girls were less likely than boys to enroll in advanced math courses in high school, despite similar levels of math proficiency. This model builds on earlier foundational work on expectancy-value theory (e.g., Atkinson et al., 1966; McClelland et al., 1953) and expands to include the role of cultural factors, historical events, a person's expectancies, and their values, on achievement-related behaviors (e.g., activity choice, effort to expend, and performance).

Expectancy

Expectancy, defined as an individual's perception of whether they can accomplish a task, is illustrated by the question "Can I do it?". Expectancy beliefs encompass both ability beliefs (sense of competence) and expectancies for success (how successful an individual believes they can be). In the expectancy-value model, these expectancies function at a broad level (e.g., competency in math), rather than a specific task level (e.g., multiplication tables). As such, this model subsumes many other self- and expectancy-related constructs from psychology, including those from attribution theory (Weiner, 1985), Bandura's theory of self-efficacy (1986), and incremental views of intelligence (e.g., "mindset"; Dweck & Leggett, 1988). All these theories highlight the importance of an individual believing they can accomplish a task. Furthermore,

research in all these areas suggest that expectancy is a critical factor in determining a student's academic choices (for a review, see Eccles & Wigfield, 2002). That being said, another aspect of self-perception, value, also influences these same choices.

Value

Value refers to an individual's perceptions of whether a specific task has meaning for them. This is illustrated by the question "Do I want to do it?". Task value is a subjective judgment made by an individual related to three independent components: attainment value, intrinsic value, and utility value (Eccles, 1983). Attainment value refers to whether an individual thinks it is important to do well on a task, intrinsic value is the amount of inherent enjoyment an individual gets from engaging in the task, and utility value is the importance of the task in a future goal. All three of these task value components reflect positive reasons for engaging in a task.

Cost

Originally proposed as fourth sub-component of task value (Eccles, 1983), but more recently considered as a major component in its own right (Barron & Hulleman, 2015) is the concept of cost. Cost refers to the negative feelings an individual would have toward engaging in an activity. Cost can derive from many aspects of task engagement (Barron & Hulleman, 2015; Flake et al., 2015), including the amount of effort required to be successful at a task (effort-related costs), the loss associated with being unable to engage in other desirable activities, any negative psychological states resulting from struggle or failure, and more general effort expenditure of being engaged in many tasks at once (effort-unrelated costs). Overall, the extent to which a particular task can facilitate reaching an individual's goals, affirming their values, enjoying their time, or avoiding failure, the more likely an individual is to engage with a task.

Motivational Interventions

A long line of empirical work, mostly correlational in nature, has provided extant evidence for the existence of expectancy, value, and cost components as they relate to achievement motivation (for reviews, see Eccles, 1983, 2009; Eccles & Wigfield, 2002). Specifically, expectancy, value, and cost directly impact specific academic choices (e.g., whether to enroll in advanced courses), persistence (e.g., intent to remain in a STEM major), and performance (e.g., final course grade; Durik et al., 2006; Eccles & Wang, 2015; Hulleman et al., 2008; Meece et al., 1990). Recently, Hulleman and colleagues (2016) identified research-based psychological processes related to these components that could be targeted with interventions to improve motivation. In their meta-analysis of motivational interventions, Lazowski and Hulleman (2016) found more than 60 interventions from more than 10 theoretical frameworks, but which could be organized into expectancy-, value-, and cost-related sources. The total average effect size of all the motivational interventions combined on behavioral, self-report, and performance outcomes is practically significant ($d = 0.49$) given the generally low investment needed. The interventions with the strongest empirical support, briefly, were:

- Expectancy Interventions: attribution retraining (Boese et al., 2013) and growth mindsets (Yeager et al., 2019).
- Value Interventions: utility value (Hulleman & Harackiewicz, 2009) and classroom choice (Vansteenkiste et al., 2004).
- Cost Interventions: values affirmation (Cohen et al., 2009) and belonging (Walton & Cohen, 2011).

Specifically, this teacher-ready review focuses on the intervention literature targeting value interventions, and specifically utility value interventions, as a method for improving student motivation.

Utility Value Interventions

A utility value intervention is a task that is “designed to increase students’ perceptions of the relevance of academics to their lives” (Hulleman et al., 2016, p. 265). The two most common ways to deliver this intervention are to directly communicate the utility value to them or ask students to generate the utility value themselves. In a directly communicated utility value intervention, the experimenter (or instructor) provides the student with information about how a concept or topic will be useful to them. For example, in an instructional video outlining a new way to solve multiplication problems, participants would receive explicit examples of how this method is useful in their daily lives (e.g., to tip servers in a restaurant) and also for their future selves (e.g., how professionals in different careers rely on this method). In a self-generated utility value intervention, students are asked to select some aspect of the course material and write a brief essay describing how that content will be useful either to themselves or to someone close to them (e.g., relative or friend).

Initial success with utility value interventions was specific to adolescents. For example, Hulleman and Harackiewicz (2009) found that a self-generated utility value intervention improved interest in science and course grades for high school students. In another study, Harackiewicz and colleagues (2012) found that highlighting the usefulness of science, technology, math, and engineering courses to the parents of high school students led to those students taking more math and science in the last two years of high school. More recently, researchers have extended this work to study utility value interventions with college students.

However, the utility value intervention studies conducted with college student participants has yet to be synthesized. In this article, we review the experimental literature from both laboratory and classroom studies of the intervention with college students, which suggests that (1) the utility value intervention is a viable method for improving student interest and performance and (2) a unique function of the intervention is that it is especially effective for students who are at-risk for failure (e.g., low expectations for success, low prior performance, identification with an underrepresented group).

Method

We conducted searches of the following academic databases using the keywords “utility value”: PsychNet, EBSCO, and Google Scholar. We included articles according to the following criteria: published in academic, peer-reviewed journals and/or theses/dissertations, published in English, and empirically investigated the impact of a utility-value intervention on college student outcomes either in a laboratory or classroom setting (i.e., used an experimental or quasi-experimental design). Studies of a utility-value intervention with adolescents or children were excluded. Studies were included regardless of the subject/topic of the course (e.g., statistics, biology, psychology). Review articles, meta-analyses, and correlational studies were excluded.

After generating an initial list of 26 results (19 PsychNet, 6 EBSCO, 1 Google Scholar), we conducted a backward citation search through the reference lists of each article to identify additional articles. Three additional articles were located using this method. Lastly, we conducted a forward citation search in Google Scholar for each of the articles. Three additional articles were located using this method. Thus, the final sample size of articles to review was 32 (see Table 1). For each of the articles, we evaluated the following criteria: (1) academic discipline, (2) participants, (3) setting (laboratory or classroom), (4) type of utility value

intervention (directly communicated or self-generated), (5) outcome variable(s), and (6) impact of the intervention. Any statistical effects were considered significant if the accompanying p-value for the analysis was less than or equal to .05.

[Table 1 here]

Utility Value Interventions in Psychology

Nine studies, of the 32 reviewed, were conducted in the context of a psychology course (noted with “f” in Table 1). Four of these were specific to the content in Introductory Psychology courses (Canning et al., 2019; Hulleman et al., 2010, 2017; Lindeman, 2018). The remaining studies were conducted regarding a range of topics in a variety of courses, including the importance of discussion boards in upper-level psychology courses (Clinton & Kelly, 2017, 2019), academic writing in psychology (Fritea & Opre, 2015), and educational psychology (Ivanov, 2017; Shin et al., 2017). The outcome variables most commonly measured across these nine studies were: interest, utility value, and performance.

Interest

Of the nine studies specific to psychology, students’ interest in the course and/or materials was measured in six of them. In two of these studies, researchers reported that students’ interest increased because of the utility value intervention. Specifically, a self-generated utility value intervention in introductory psychology led to greater interest in psychology at the end of the course and interest in pursuing a psychology major (Hulleman et al., 2010, Study 2) and a self-generated utility value intervention in introductory psychology led to greater interest in course materials (Hulleman et al., 2017, Study 2). In both of these studies, the main effect of interest was moderated by prior course performance. Students who had lower scores on a prior exam, but not students who performed higher on a prior exam, had increased

interest in the course material compared to students in a control condition. In three of these studies, researchers reported no effect of the utility value intervention on interest. Ivanov (2017) measured students' interest in a single lesson on epistemic beliefs in an introductory methodology in education course, immediately after, and again two weeks after, they completed the lesson. Lindeman (2018) measured students' interest in psychology in a single laboratory session following a review of introductory psychology concepts. Shin and colleagues (2017) assessed introductory educational psychology students' interest in the course and interest in future courses in the final week of the semester. In one of these studies, the researchers reported that introductory psychology students' interest in the course decreased due to the utility value intervention (Canning et al., 2019).

In one study, researchers reported decreased interest in psychology for students in introductory psychology in a 2-year college setting as a result of the utility value intervention (Canning et al., 2019). Importantly, this decrease in interest occurred only for students who had performed poorly on an initial exam in the course. Students who performed better on the initial exam showed increased interest in psychology at the end of the course. One potential explanation for this discrepancy is the indirect effect of the intervention on struggling students' confidence. Additional data from the researchers suggest that, for poorer performing students in this 2-year college setting, the utility value intervention may highlight a lack of competence which leads to less interest the course content. For higher performing students, the utility value intervention may confirm competence, resulting in increased interest in the course. To date, this is the only published study to be conducted in a 2-year college setting. More research in this context is needed to determine whether students in 2-year versus 4-year colleges respond differently to the utility value intervention.

Perceived Utility Value

In eight of the nine studies in psychology, researchers examined the effect of the utility value intervention on students' perceived utility value of course content. Five of these studies found that the utility value intervention increased students perceived utility value (Clinton & Kelly, 2017, 2019; Fritea & Opre, 2015; Hulleman et al., 2010, Study 2; Ivanov, 2017). In two of these studies, researchers used the utility value intervention to improve student engagement with discussion boards in social, cognitive, and history of psychology courses (Clinton & Kelly, 2017, 2019). In both cases, students who received a directly communicated utility value message had greater perceived utility value of discussion boards compared to a control group. Fritea and Opre (2015) found that students who participated in a utility value intervention perceived greater utility value for academic writing compared to students in other conditions (pedagogical interventions related to self-efficacy and situational interest). Ivanov (2017) found that students in utility value intervention conditions perceived greater utility value of epistemic beliefs than students in a control condition. Lastly, Hulleman and colleagues (2010) found that, in an introductory psychology course, students who performed worse on a first exam in the course had greater perceived utility value for psychology than students in a control condition. There was no change in interest for higher performing students.

In two of the eight studies, researchers reported no effect of the utility value intervention on perceived utility value (Hulleman et al., 2017, Study 2; Shin et al., 2017). Hulleman and colleagues (2017) delivered a self-generated utility value intervention to introductory psychology students twice over the semester and measured utility value at the end. Although utility value predicted performance in the class, this did not differ based on the intervention. Shin and colleagues (2017) delivered both directly communicated and self-generated utility value

interventions in an online introductory educational psychology course and found no effect of either intervention format on perceived utility value.

Lastly, in one of the eight studies, researchers reported that, for 2-year college students in introductory psychology, the utility value intervention reduced perceived utility value for students struggling in the course (Canning et al., 2019). As was the case with interest, the researchers themselves proposed that, in the 2-year college context, it may be the case that struggling students become demotivated, rather than motivated, by the utility value intervention. One proposed mechanism for this was that, after students performed poorly on a first exam in the course, completing the utility value intervention may have highlighted poor preparedness for the course and reduced competence valuation. This, in turn, could have led poorer performing students to find the course material less valuable to them in the future.

Performance

In seven of the nine studies in psychology, researchers measured the effect of utility value interventions on students' performance in the course. There is little evidence that the utility value intervention improves final course grades in psychology courses. For example, Shin and colleagues (2017) found that final course grades were higher for students receiving a peer-based directly communicated utility value intervention (a brief video of a graduate student confederate stating how the upcoming information was useful when they started in their career) versus control, but not for an instructor-based directly communicated utility value intervention (a brief video of the course's two instructors explaining how the content would be useful in the students' future career) in an online introductory educational psychology course. Both Hulleman and colleagues (2010, Study 2) and Canning and colleagues (2019) found that, for students in

introductory psychology courses (at 4-year and 2 year colleges, respectively), the utility value intervention had no direct effect on final course grades.

With respect to performance on an end-of-unit test, two studies found a positive effect of the utility value intervention. Following a single lesson on epistemic beliefs, students who received a directly communicated utility value intervention performed better on a test of the lesson materials than either a control group or a self-generated utility value intervention group (Ivanov, 2017). In a study of students completing a 30-minute online lesson about academic writing, students who completed a directly communicated utility value intervention performed better on an end of unit test than a control group (Fritea & Opre, 2015). These results suggest that in a brief learning scenario, students may have improved immediate recall following a directly communicated utility value intervention.

In the remaining studies where researchers examined performance (Clinton & Kelly, 2019; Hulleman et al., 2017, Study 2), there was no effect of the utility value intervention on measures of performance. Clinton and Kelly (2019) found that a directly communicated utility value intervention about course discussion boards did not influence performance either on points earned for discussion board posts or exams throughout online cognitive and history of psychology courses. Hulleman and colleagues (2017) found that there was no direct effect of a self-generated utility value intervention on course performance as measured by the cumulative score across four midterm exams in an introductory psychology course.

Overall, the results regarding performance are inconclusive. It would appear that performance is measured in such widely varied ways that it is nearly impossible to discern whether or not the utility value intervention itself impacts students' performance. One consistent finding across some studies is that perceived utility value is positively associated with final

course grades (e.g., Hulleman et al., 2017; Shin et al., 2017). Thus, to the extent that the utility value interventions increase students' perceived utility value, this may positively impact their overall course performance.

Summary of Utility Value Interventions in Psychology

The nine studies of utility value interventions in psychology reviewed above vary widely in terms of the (1) research question being asked (e.g., comparing two different framings of a utility-value intervention v. the effectiveness of a self-generated utility value intervention compared to a control group), (2) context in which the utility value interventions were implemented (e.g., introductory psychology course v. a 30-minute lesson on academic writing with psychology students), (3) format of the utility value intervention (e.g., video, written explanation, or self-generated), and (4) outcome variables measured (and the way they are measured). Thus, it is difficult to make generalizations about whether utility value interventions are an effective tool for instructors or make concrete recommendations about how the utility value interventions can be incorporated into an instructor's pedagogy. Fortunately, there are a relatively large number of studies investigating utility value interventions in Science, Technology, Engineering, and Mathematics (STEM) courses other than psychology. Next, we synthesize the literature across these disciplines to make recommendations about how instructors can use the utility value intervention to benefit students in university classrooms.

Evidence-Based Pedagogical Recommendations

A tangible benefit of utility value interventions for educators is how easily they can be implemented, at no cost to the instructor or students except for the time it takes to complete them. Unfortunately, it is often the case that when effective interventions are scaled up for pedagogical use, there is the potential for null or adverse effects (Daniel, 2012; Lazowski &

Hulleman, 2016). To improve the likelihood that the intervention will achieve the intended benefit for college students, this review is organized to highlight specific aspects of implementation that have been well-researched so far: format, dosage (how many times the students should complete the intervention), instructions for students, and characteristics of students for whom the intervention should work. By synthesizing the literature in this way, instructors are able to use the available evidence to make informed decisions about adopting the intervention in their own pedagogical practice.

1. **Format of the utility value intervention.** Typically, utility value interventions take one of two forms: directly communicated or self-generated. In a directly communicated intervention, students receive utility value information about a topic from the instructor or course materials. In a self-generated intervention, students write brief essays to a prompt asking them how the topic is useful to themselves or others. Instructors should opt for a self-generated utility value intervention or a combination of both self-generated and directly communicated utility value.

The findings regarding the use of only directly communicated utility value are mixed. For example, a number of studies have found that directly communicated utility value interventions increase either interest in the topic (Geerling et al., 2019; Kera & Nakaya, 2017), performance on a task or in a class (Ivanov, 2017; Shin et al., 2017), or both (Fritea & Opre, 2015; Simons et al., 2003). However, some studies have found either no effect of the intervention on any outcomes (Gray, 2018; Lindeman, 2018) or even that directly communicated utility value may decrease student interest for some students (e.g., less confident students; Bailey, 2017; Durik et al., 2015; Shechter et al., 2011).

In comparison, the evidence in support of using self-generated utility value interventions is more consistent. Self-generated utility value interventions lead to increased perceptions of value (Acee & Weinstein, 2010; Ivanov, 2017; Lindeman et al., 2018), interest (Hulleman et al., 2010, Studies 1 and 2; Johnson & Sinatra, 2013; Kale & Akcaoglu, 2018), performance (Canning et al., 2018; Canning & Harackiewicz, 2015; Harackiewicz et al., 2016; Kosovich et al., 2019; Rosenzweig et al., 2020), or a combination of these variables (Canning et al., 2018; Curry et al., 2020; Hulleman et al., 2017; Rosenzweig et al., 2019). Only a few studies have found null effects of the intervention (Bailey, 2017; Hoang, 2019; Lindeman, 2018; Robinson, 2019).

As a compromise, it may be tempting to think that a combination of both directly communicated and self-generated utility value may lead to the best outcomes. In a laboratory study where participants learned a new mental math technique, the combination intervention increased value, performance, and interest for participants who had low confidence before learning the technique (Canning & Harackiewicz, 2015). However, in a classroom study of the combination intervention, students with low first exam scores experienced decreased interest and value as a result of the intervention and no change in course grades (Canning et al., 2019). In one direct comparison of a combination intervention to both directly communicated and self-generated conditions, the researchers concluded that the self-generated utility value intervention showed the most promise for increasing student motivation (Curry et al., 2020). Given that there is at least some evidence that the combination of directly communicated and self-generated utility value may be potentially harmful to already struggling students, a self-generated version of the intervention may be the better choice.

2. **Dosage of the Utility Value Intervention.** Instructors could use the utility value intervention once or multiple times in a single academic term. Classroom studies of the intervention have implemented the intervention once (Acee & Weinstein, 2010; Clinton & Kelly, 2017, 2019; Ivanov, 2017; Kosovich et al., 2019; Simons et al., 2003), twice (Bailey, 2017; Hoang, 2019; Hulleman et al., 2010, 2017; Priniski et al., 2019; Rosenzweig et al., 2020), or three or more times throughout the term (Canning et al., 2019; Curry et al., 2020; Geerling et al., 2019; Harackiewicz et al., 2016; Kale & Akcaoglu, 2018; Robinson, 2019; Rosenzweig et al., 2019; Shin et al., 2017). From the results of these studies, it appears that providing one, two, or three opportunities for students to complete a utility value intervention is equally effective for increasing student values, interest, and performance. However, none of these studies was specifically meant to answer the question of how many times students should complete the intervention assignments.

Only one study was designed with the research question about dosage in mind (Canning et al., 2018). In this study, introductory biology students were assigned to complete between one and three self-generated utility value assignments. There was a main effect of the intervention such that any dosage (one, two, or three times) led to higher course grades, greater likelihood to enroll in a subsequent course in the series, and a greater likelihood of persisting in a STEM major, even after controlling for the influence of prior performance. Additionally, researchers found that either one dose or three doses throughout the semester was equally effective. Thus, all the evidence available indicates that using the utility value just once is a viable option – and less time- and resource-intensive – but that using it consistently throughout the term will also be beneficial.

3. **Instructions for the Utility Value Intervention.** Students should be encouraged to choose between writing about utility value for themselves or for someone who is close to them (e.g., a friend or family member). Where multiple utility value interventions are assigned, students should be instructed to write a variety of responses (both self- and other-focused) (Priniski et al., 2019). In a study specifically designed to explore the role of choice in utility value interventions, researchers found that when students completed three assignments, the benefit of the intervention was greatest when there was a choice provided for all three (Rosenzweig et al., 2019). Moreover, most of the research using the self-generated essay format of the utility value intervention has provided this option, suggesting that providing students a choice of who to write to/about is a preferable form of the intervention (Canning et al., 2018; Harackiewicz et al., 2016).
4. **Students with whom to use the intervention.** The intervention is most effective for diverse students in a university setting. Researchers examining student characteristics that moderate the influence of the intervention have reported on students who identify as an underrepresented minority and/or first-generation college student (Harackiewicz et al., 2016; Hecht et al., 2019; Shechter et al., 2011), students with differing competency beliefs (i.e., confidence; (Canning & Harackiewicz, 2015; Durik et al., 2015; Harackiewicz et al., 2016; Hecht et al., 2019; Hulleman et al., 2010), and students with differing levels of prior performance (Canning et al., 2018, 2019; Harackiewicz et al., 2016; Hulleman et al., 2010, 2017; Rosenzweig et al., 2020). Overwhelmingly, the evidence suggests that students who are most at-risk in our courses benefit the most from the utility value intervention.

For example, in one study, the intervention was most effective for students identifying as both first-generation and underrepresented minority and for students with low

prior grade point averages (Harackiewicz et al., 2016). In fact, in this study, the effect of the intervention amounted to a 61% reduction in the achievement gap between first-generation, under-represented minority students compared to their continuing-generation, majority counterparts. In follow-up study (Hecht et al., 2019), the extent to which the intervention improved engagement and course grades for students identifying as first-generation, under-represented minorities, was positively associated with long-term persistence in biomedical education two years later.

The evidence is generally consistent in suggesting that students who start with either low competency expectations, confidence, or low prior performance especially benefit from the utility value interventions. In other words, students who are most likely to struggle get the most out of the intervention. Where more confident students or higher performing students are concerned, there are either no changes because of the intervention or they also see a small benefit. Only two studies contradict these findings. In one, struggling community college students assigned to a utility value intervention showed less interest and value afterward (Canning et al., 2019). It should be noted, these students received directly communicated utility value prior to writing an essay with their own examples, which the researchers suggest may have heightened their feelings of inadequacy, leading to disengagement with the material. In the other, a laboratory study, participants with low perceived competence showed decreased interest following a utility value intervention, but this was ameliorated by a message telling them they had high potential for success in the task (Durik et al., 2015).

Summary of Pedagogical Recommendations

Based on a review of the literature, there are four recommendations for instructors wishing to use the utility value intervention in their own classrooms: (1) assign a self-generated

version of the intervention (see Appendix A), (2) provide students with a choice whether to write about themselves or others, (3) use the intervention either once in the beginning of the term or multiple times throughout the term, and (4) use the intervention in classroom settings with diverse students. Although these recommendations are based on a relatively large number of studies, many of which were conducted in ecologically valid settings, some questions about the utility value intervention and its underlying expectancy-value framework remain.

Recommendations for Future Research

The wealth of evidence in support of the utility value intervention shows the intervention to be effective in both laboratory and classroom settings. Thus, the next step in translating research on the utility value intervention to classroom practice is to conduct research on implementation of the intervention (Lane-Fall et al., 2019; Soicher et al., 2019). Indeed, the decline in effect size of the intervention from the laboratory to the classroom highlights the need to better understand the process of implementing the intervention in real world contexts (Hulleman & Cordray, 2009). Implementation science, a field of research which explicitly studies the process of using evidence-based practices in natural settings, identifies specific variables related to implementation which can be systematically examined: acceptability, adoption, appropriateness, feasibility, fidelity, cost, and sustainability (Proctor et al., 2011; Soicher et al., 2019). Of these implementation outcomes, only fidelity has been examined as it relates to the utility value intervention.

Fidelity, also referred to as adherence or compliance, is the degree to which an intervention is implemented as intended by the developers. This can refer both to how the students complete the assignment (i.e., did they successfully describe ways in which the concept would be useful to them?) and how the instructor used the assignment (e.g., timing or dosage).

Hulleman and Cordray (2009) were the first to examine how the amount of achieved fidelity for utility value interventions in classroom settings differed from those in laboratory settings. Using an index of achieved relative strength, these researchers found that (1) achieved relative strength varies more in classroom settings than laboratory ones and (2) lower achieved relative strength in classrooms was explained better by teachers failing to provide the opportunity to students, rather than students choosing not to complete the intervention.. In a more recent study of fidelity (Nagengast et al., 2018), researchers found a difference in treatment effects for compliers versus non-compliers in a large sample of ninth grade students. As is implied by both studies, capturing elements of treatment fidelity (Fixsen et al., 2005), and incorporating this systematically into analyses, is of paramount importance when considering classroom evaluations of interventions.

In addition to continuing research on fidelity of implementation of the utility value intervention, future research should begin to examine additional implementation outcomes. This research could focus on student perceptions, instructor perceptions, or both. For example, appropriateness refers to the perceived fit or compatibility of an intervention. An investigation into the appropriateness of the intervention may help to identify courses in which the students or instructors are more willing to complete/assign the intervention versus those where the assignment seems out of place. As another example, sustainability refers to the continued use or routinization of an intervention. A systematic analysis of whether instructors who were asked to implement the utility value intervention in their classrooms for research purposes continue to use the intervention in their courses may highlight strategies for sustainability and add to knowledge about how to scale up use of the intervention in more settings. More research on the effectiveness of the intervention will not necessarily lead to more uptake of the intervention – for this reason, it is necessary to move forward with implementation research (Fixsen et al., 2005).

Conclusion

Overall, the existing research evidence is clear that the utility value intervention is an effective way to develop college students' perceptions of value in their courses, potentially leading to improvements in course performance and student retention. It is relatively simple to implement, especially considering it can be effective with only a single dose. Furthermore, most evidence suggests that the intervention is especially helpful for students who face the most challenges in a college setting. That being said, there is still plenty to learn about the contexts and processes related to implementing the utility value intervention, leaving it a field ripe for additional research.

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Appendix A

Example of Self-Generated Utility Value Intervention (Harackiewicz et al., 2018)

Select a concept or issue that was covered in lecture and formulate a question. Select the relevant information from class notes and the textbook and write a 1–2 page essay. In this essay, address this question and discuss the relevance of the concept or issue to your own life. Be sure to include some concrete information that was covered in this unit, explaining why this specific information is relevant to your life or useful for you. Be sure to explain how the information applies to you personally and give examples.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
Acee & Weinstein (2010)	Statistics	82 university students (76 undergraduates, 7 graduate students)	Task value	Gains on task value from pretest to immediate posttest and to delayed posttest versus control.
	Laboratory		Instrumentality (usefulness of statistics-related skills for future goals)	
	Both directly communicated (in a reading) and self-generated (accompanying activity)	82.9% women	Self-efficacy	Gains on instrumentality from pretest to immediate posttest and to delayed posttest versus control.
		59.8% White		
		Average Age = 21.43 years	Postintervention exam performance	No effect on self-efficacy.
Bailey (2017)*	First year writing composition	333 university undergraduates	Choice-behavior measure of interest (use of optional website)	
Bailey (2017)*	First year writing composition	333 university undergraduates	Utility value Interest	Students in the intervention group 9.23 times more likely to access the websites than students in the control group.
				Students in the intervention group scored higher on postintervention exam than students in the control group, but only for one of the two instructors' classes.
Bailey (2017)*	First year writing composition	333 university undergraduates	Utility value Interest	No main effect of the intervention on utility value.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
	Classroom Self-generated	67% women	Performance	<p>Students with high utility value for writing before the intervention showed gains in utility value for writing after a combined utility value + transformative experience intervention</p> <p>No main effect of the intervention on interest.</p> <p>Students with high interest before the intervention showed gains in interest after the utility value intervention.</p> <p>No main effect of the intervention on writing performance.</p>
Brown et al. (2015)	Biomedical Science Laboratory Directly Communicated	<p>Study 2: 140 undergraduates 69.3% women median age: 19 years</p> <p>Study 3: 160 undergraduates 58.8% women median age: 19 years</p>	<p>Positivity toward biomedical research</p> <p>Future career motivation for biomedical science</p>	<p>Participants reading biomedical research descriptions highlighting communal utility value had higher positivity and career motivation for biomedical science compared to control condition and condition highlighting agentic utility value.</p>

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
Canning & Harackiewicz (2015)	Mental math Laboratory	Study 1: 88 undergraduates	All studies: Confidence, Math performance, Perceived utility value, task interest	Study 1: Only self-generated intervention increased performance for participants with low confidence in math. Participants with high confidence in math performed better under both intervention types.
	Study 1: Self-generated versus directly communicated	47.7% women 92% White		
	Study 2: Self-generated OR directly communicated OR both	Study 2: 113 undergraduates 70.8% women 94% White		Participants with high confidence in math, but not those with low confidence in math, showed increased perceived value following both types of interventions.
	Study 3: Directly communicated	Study 3: 134 undergraduates 68.7% women 94% White		Study 2: For participants with low confidence, the combination intervention increased perceived utility value (no effect for participants with high confidence). Combination intervention increased confidence in math regardless of initial confidence levels. Study 3: No effect of the intervention on performance. No effect of the intervention on perceived utility value.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
				Leisure-focused utility value message led to increased interest for participants with low confidence in math.
				Participants with high confidence in math show increased interest following both the leisure-focused and career-focused utility value interventions.
				Leisure-focused utility value message led to increased confidence for participants with low initial confidence.
Canning et al. (2018)	Introductory Biology Course (1 st in a 2-course sequence) Classroom Self-generated	577 undergraduates 57.2% women 86% White 14% Asian American	Biology course grade (4.0 scale) Continuation to second course in the sequence STEM major persistence Articulated utility value	Students articulated greater levels of utility value in their responses than control (manipulation check). Articulated utility value greatest when students completed three utility value essays. Intervention led to persistence of STEM majors in the major. Intervention increased performance relative to control with either three UV essays or 1 UV essay.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
Canning et al. (2019) [†]	Introductory Biology and Introductory Psychology Classroom Self-generated (preceded by examples of connections generated either by a student or the instructor)	415 2-year college students 62% women 57% first-generation 79% White 10% Hispanic 64% Biology students average age: 19.57 years	Course belonging Perceived difficulty of the course Perceived preparedness Competence Confidence Interest Perceived utility Course grade Articulated utility value	Intervention increased enrollment in the second course with either three UV essays or one UV essay at either the beginning or the end of the term.
				Students with lower prior GPA earned higher course grades if they completed the UV essay at the beginning of the term. Students with higher prior GPA earned higher course grades if they completed the UV essay at the end of the term.
				For students with low 1st exam scores, UV decreased interest and perceived utility value compared to control. No effect for high performing students.
				No effect of the intervention on course performance.
				Student-framed UV decreased performance for low performing students (v. instructor-framed), no difference among high performing students.
				Student-framed UV increased interest and perceived value only for higher

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
Clinton & Kelly (2017) [†]	Discussion boards in Social Psychology Classroom Self-generated (preceded by video with directly communicated value)	51 undergraduates 86.3% women average age: 20.89 years 92% White	Intrinsic value Utility value Cost	performing students. No effect for lower performing students.
				Low performing students in UV conditions reported lower preparedness for the course.
				Low performing students reported less confidence in UV conditions.
				Low performing students reported caring less about doing well in UV conditions v. control.
				High performing students perceived class as less difficult in UV conditions.
				High-performing students reported more belongingness in UV conditions.
				No effect of intervention on intrinsic value.
				Intervention increased perceived utility value compared to control.
				No effect of intervention on perceived cost.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
Clinton & Kelly (2019) [†]	Discussion boards in Cognitive Psychology & History of Psychology Online classroom Self-generated (preceded by video with directly communicated value)	65 undergraduates 83.1% women 90% White average age: 26.01 years	Intrinsic value Utility value Performance	Intervention led to greater perceived utility value. No effect of the intervention on intrinsic value. No effect of the intervention on performance.
Curry et al. (2020)	Introductory Biology Laboratory Classroom Directly communicated, self-generated, or both	837 undergraduates 63.2% women 75% White average age: 19 years	utility value attainment value cost intrinsic value instructor self-efficacy	At the end of the term, combined intervention and self-generated intervention led to greater utility value. All interventions led to lower attainment value. All interventions led to lower perceived cost.
Durik et al. (2015)	Mental math Laboratory Study 1: Directly communicated Study 2: Directly communicated + “expectancy boost” (statement that	Study 1: 62 undergraduates 50% women 92% White Study 2: 148 undergraduates 49% Women 93% White	Study 1: perceived competence in math, individual interest in math, math performance, situational interest Study 2: perceived competence in math,	Self-generated intervention led to greater interest. Study 1: Participants with higher perceived competence in math had greater interest due to the intervention. People with lower perceived competence had lower interest due to the intervention.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
	participant had high potential of being successful)		task involvement, perceived competence (after the task)	<p>No effect of the intervention on performance after controlling for initial interest.</p> <p>Study 2: Participants with lower perceived competence and no expectancy boost reported lower interest due to the intervention.</p> <p>Participants with lower perceived competence and an expectancy boost had increased interest due to the intervention.</p> <p>No effect of the intervention on performance.</p> <p>Intervention with expectancy boost increased task involvement for participants with low perceived competence.</p>
Fritea & Opre (2015) [†]	Academic writing Laboratory Directly communicated	134 psychology undergraduates 83% women	Perceived utility value Performance	Intervention increased perceived utility value.
Geerling et al. (2019)	Computer science Online classroom Directly communicated	63 undergraduates 27.3% women 66% White	Interest Confusion Course performance	Intervention led to improved performance. For women in the intervention condition, higher levels of confusion were associated with increased

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
				interest over time (versus decreased interest in control condition).
				For women in the intervention condition, higher levels of interest were associated with decreased confusion over time.
				No results for the effect of the intervention on performance were reported.
Gray (2018)*	Mental math Online laboratory Directly-communicated (either student-framed or instructor-framed)	131 2-year college students	Utility value Interest	No effect of intervention on utility value or interest.
Harackiewicz et al. (2016)	Introductory Biology Classroom Self-generated	1040 undergraduates 40.7% continuing-generation, majority 41.0% first-generation, majority 12.1% continuing-generation, URM 6.1% first-generation, URM	Articulated utility value Course grade	Intervention decreased achievement gap by 61% for first-generation, URM students versus continuing-generation, majority students.
				Intervention improved course grades most for students with low prior GPA but not students with low prior confidence.
Hecht et al. (2019)	Introductory Biology Classroom Self-generated	Same sample as Harackiewicz et al. (2016)	Enrollment in second course in biology sequence	No main effect of the intervention on either subsequent enrollment or persistence in the major.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
			Persistence in biomedical major two years after intervention.	<p>In control condition, there was no effect of confidence on subsequent enrollment or in persistence in the major.</p> <p>In intervention condition, there was a positive effect of confidence on enrollment and persistence in the major.</p> <p>There was no interaction between identification as first-generation or URM status and the intervention.</p> <p>Students who enrolled in the second course in the sequence were more likely to persist in the major.</p>
Hoang (2019)*	College algebra Classroom Self-generated (preceded by directly communicated value)	426 undergraduates 79.1% women 40% Hispanic 39% White mean age: 18.56 years	Perceived value Perceived cost Performance	<p>Intervention led to increased perceived value (compared to control condition).</p> <p>No effect of the intervention on perceived cost.</p>
Hulleman et al. (2010) [†]	Study 1: Mental math Laboratory Self-generated	Study 1: 107 undergraduates 53.3% women 92% White	Study 1: Utility value, situational interest, maintained interest, performance	<p>No effect of the intervention on performance.</p> <p>Study 1: Participants with low performance expectations had greater interest in task due to the intervention</p>

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
	Study 2: Introductory Psychology Classroom Self-generated	Study 2: 318 undergraduates	Study 2: Utility value, interest in the course, intent to major in psychology, course grade	<p>(no change for participants with high performance expectations).</p> <p>No effect of the intervention on performance.</p> <p>Study 2: Students with lower first exam scores had more interest in psychology due to the intervention (no change for students with higher first exam scores).</p> <p>Students with lower first exam scores had greater intent to major in psychology due to the intervention (no change for participants with higher first exam scores).</p> <p>No direct effect of the intervention on course performance. Indirect effect of intervention on performance through increase in utility value.</p>
Hulleman et al. (2017), Study 2 [†]	Introductory Psychology Classroom Self-generated	357 undergraduates 70% women 84% White average age: 18.6 years	Cumulative exam scores, interest in psychology	<p>Main effect of the intervention on exam scores and interest in psychology.</p> <p>Intervention increased final exam scores and interest in psychology for lower performing students.</p>

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
Ivanov (2017)* †	Introductory methodology in educational psychology, lesson on epistemic beliefs Classroom Directly communicated (instructor framed) OR self-generated	88 graduate students	Situational interest Sustained interest Perceived utility value Performance	Directly communicated intervention led to better performance compared to control. Both UV interventions led to higher perceived utility value compared to control.
Johnson & Sinatra (2013)	Causes of the common cold Laboratory Self-generated (preceded by directly communicated value)	166 undergraduates 77.7% women 61% White 15% Hispanic	Task value Engagement Performance	No effect of the intervention on either utility value or attainment value. Intervention increased perceived engagement compared to control.
Kale & Akcaoglu (2018)	technology for teaching Classroom Self-generated	111 3 rd year elementary and secondary preservice teachers 79.3% women	utility value situational interest maintained interest competence	No effect of intervention on utility value. Participants maintained interest from pre- to post-test only in the intervention condition.
Kera & Nakaya (2017)	Logic problems Laboratory Directly communicated	48 Japanese undergraduates 85.4% women	Situational interest Maintained interest Engagement Performance	Intervention increased situational interest, maintained interest, and engagement. No effect of intervention on performance.
Kosovich et al. (2019)	Intermediate algebra Classroom	177 2-year college undergraduates 57% women 37% White	Perceived value of learning math Perceived cost of learning math	Intervention improved immediate utility value but not interest.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
Lindeman (2018)* [†]	Self-generated (preceded by quotes about utility from former students) Introductory Psychology Laboratory Directly communicated OR self-generated OR both	36% Hispanic 18% Black 133 undergraduates 50.4% women 53.3% White 21.5% Hispanic 15.6% African American average age: 19.91 years	utility value for math interest in material Pass rates Expectancy for success Interest in psychology	Main effect of the intervention on pass rate, with the greatest improvement for male students. No effect of the intervention on outcome variables.
Lindeman et al. (2018)	Biology Laboratory (online) Self-generated (additional instructions on number of connections to make)	Study 1: 85 adults 47.7% women 73.3% White average age: 36.24 years Study 2: 95 adults 66.7% women 67.7% White average age: 34.48 years	Subjective task experience Value	Positive effect of the intervention on perceived value so long the number of statements doesn't make the task too difficult.
Priniski et al. (2019)	Biology Classroom Self-generated (additional instructions to write about self or a significant other)	590 undergraduates 63% women 78% White 14% Asian American average age: 19.61 years	Interest in biology Personal importance of biology Task engagement Course performance	Course grades highest when students completed a mixture of self- and other-focused essays or when students were able to choose which format to complete. For students with low expectations of performance, grades were higher

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
				when students completed a specific order of formats: self-focused, then other-focused. Students with high expectations of performance performed equally well regardless of format.
				Students had greater engagement and interest in biology with choice of intervention format (versus fixed).
				Men had higher levels of importance of biology in the self-first condition. No effect of the intervention on any outcomes.
Robinson (2019)*	Introductory engineering Classroom Self-generated	1021 undergraduates 25% women 78.4% White	Task value Engineering self-efficacy Perceived competence Belongingness Achievement Persistence	
Rosenzweig et al. (2019)	Introductory Biology Classroom Self-generated (high choice of format or low choice of format)	406 undergraduates 58.6% women 84% White 15% Asian American average age: 19.19 years	Utility value Interest Course grades Enrollment in next course in the sequence	High choice intervention led to higher perceived value and interest in biology compared to low choice condition. No direct effect of choice on grades or subsequent course enrollment.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
				Indirect effect of high choice on course grades via greater interest and utility value.
Rosenzweig et al. (2019)	Introductory Physics Classroom Self-generated	148 undergraduates 28% women 50.7% White 25% Asian American	Utility value Perceived cost Perceived competency Course performance	No main effect of the intervention on outcomes. Main effect of the intervention on exam scores, course grades, and perceived competence. For students with lower initial exam scores, intervention led to higher exam scores and course grades. No difference for students with higher initial exam scores.
Shechter et al. (2011), Study 1	Mental math Laboratory Directly communicated	282 undergraduates 53.5% women	Interest Effort on task Task performance	Westerners with low initial interest in math reported less interest after the intervention. Westerners with high initial interest in math reported greater interest after the intervention. East Asian participants with low interest in math reported more interest after the intervention. No effect of the intervention for East Asian participants with high initial interest.

Table 1. Criteria for Articles Reviewed

Author (Year)	Discipline, Setting, Intervention	Participants	Outcome Variables	Results
Shin et al. (2017) [†]	Educational psychology Online classroom Self-generated (preceded by either an instructor-framed or peer-framed directly communicated value)	59 teacher education students 76.3% women average age: 21.02 years	Utility value Interest in course topics Interest in future similar courses Autonomy Applied knowledge Final grades	Intervention increased effort for East Asian participants with low initial interest but not for any other group.
				No effect of the intervention on performance.
				No effect of the intervention on utility value.
				No effect of the intervention on interest in course topics or future courses.
				Intervention led to increases in reported autonomy compared to control condition.
Simons et al. (2003)	Physical education Classroom Directly communicated	695 undergraduates in Belgium average age: 18.7 years	State task orientation Intrinsic motivation Enjoyment Effort Performance	Applied knowledge increased over time for all conditions, but at a lower rate for instructor condition.
				Final grades increased for the peer-framed condition but not for the instructor-framed condition compared to control condition.
				Intervention led to higher task engagement, enjoyment, motivation, effort, and performance.