

WHEN CHOICE IS MOTIVATING:
THE MODERATING EFFECTS OF CONTEXTUAL AND INDIVIDUAL FACTORS

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ABSTRACT

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Considerable motivational research has proposed that students making choices for academic tasks need to be intrinsically motivated. Research from self-determination theory, the most commonly used framework for studying choice, suggests that providing choices regarding academic tasks plays a significant role in satisfying students' need for autonomy (Deci & Ryan, 1985). Further, providing choices may lead to increased intrinsic motivation and task performance (Ryan & Deci, 2000, 2006). Recent evidence, however, suggests that choice can have no effect, or even negative effects, on students' intrinsic motivation and learning (e.g., Patall, Cooper, & Robinson, 2008). Kats and Assor (2007) described that simply offering choice itself is not motivating and not helpful for students' learning. Rather, contextual factors (e.g., the number of choices) and individual factors (e.g., task value and decision-making strategies) can moderate the effects of choice on students' intrinsic motivation and task performance.

Two experimental studies were conducted to examine this conclusion by considering contextual and individual factors. In Study 1, participants were randomly assigned to lists of either 30 different sets of course ideas (i.e., extensive choice condition) or six different sets of course ideas (i.e., limited choice condition) to choose from, for their book analysis. The book analysis task was a required and high-stakes assignment. Students' task value, decision-making strategy, and intrinsic motivation were rated using a self-report survey. Task performance was determined by grades students received from two unbiased graduate raters. The results of Study 1 suggest no significant difference for intrinsic motivation and task performance by choice

condition. However, there was an interaction between the number of choices and task value with regard to intrinsic motivation. Extensive choices enhanced intrinsic motivation, especially effort, among students who thought the given task was not important for receiving a good grade (i.e., a lower level of extrinsic task value).

Study 2 investigated the same research questions by using an elective low-stakes assignment. Participants were asked to complete an extra-credit movie response essay under one of two choice conditions: limited choice, and extensive choice conditions. They completed the same surveys for measuring students' task value, decision-making strategy, and intrinsic motivation. Task performance was also determined by grades students received from two unbiased graduate raters. The results of Study 2 show that an extensive number of choices may enhance intrinsic motivation and task performance. There was an interaction between the number of choices and decision-making strategy with regard to intrinsic motivation. Extensive choices increased intrinsic motivation, especially value, among students who used maximizing (i.e., a higher level of well-informed decision-making strategy).

Overall, the findings from the two experimental studies surprisingly indicate the contrasting patterns of the previous choice overload studies (e.g., Iyengar & Lepper, 2000). One possible explanation for these results is that extensive choices may not necessarily be perceived as excessive. Furthermore, individual factors can moderate the relations between the number of choices and intrinsic motivation, and between the number of choices and task performance. Implications for research and practice on the effects of choice are also discussed.

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To my dad –
who teaches me passion and persistence as a scholar, who provides a clear direction in my life journey as a role model, and who shows me the true love of the Heavenly Father as a Christian.

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CHAPTER 1: Introduction

In U.S. education, many teachers believe that choice plays a role in students' motivation and learning (Flowerday & Schraw, 2000). Choice plays a key role in a democratic society like the United States, because the nature of democracy is to encourage people to choose representatives for their state or nation. In a democratic society, people have individual freedom to make choices on whether and how government will make choices on their behalf. Furthermore, all members of a democratic society have freedom of speech, freedom of the press, and freedom of assembly and association; thus, they can freely express their political thoughts to the public. In this way, teachers in a democratic society ponder how to encourage students' individual freedom by allowing students to exercise choice and to discuss effective decision-making.

Well-known humanistic psychologist Carl Rogers assumed that meaningful learning, which is to pursue achieving wholeness in oneself, occurs through self-determination and autonomy by providing students with choices of academic tasks, whereas meaningless learning is decided and initiated by other people (Rogers, 1951, 1961). With respect to Rogers' theory, the role of a teacher is a facilitator who allows students to make their own choices for learning, rather than an instructor who simply teaches content based on a lesson plan (Rogers & Freiberg, 1969).

The concept of choice has also been shown to be important in the field of educational and psychological research, especially within motivational frameworks (Pintrich, 2003; Katz & Assor, 2007) (see *Figure 1*). Weiner's attribution theory (1986) argued that human beings are decision makers, trying to understand the causal factors about their behaviors. Specifically, when students believe their success on an exam is because of their internal and controllable factors (e.g., effort, knowledge, the use of effective strategies, interest), students' perceived control of

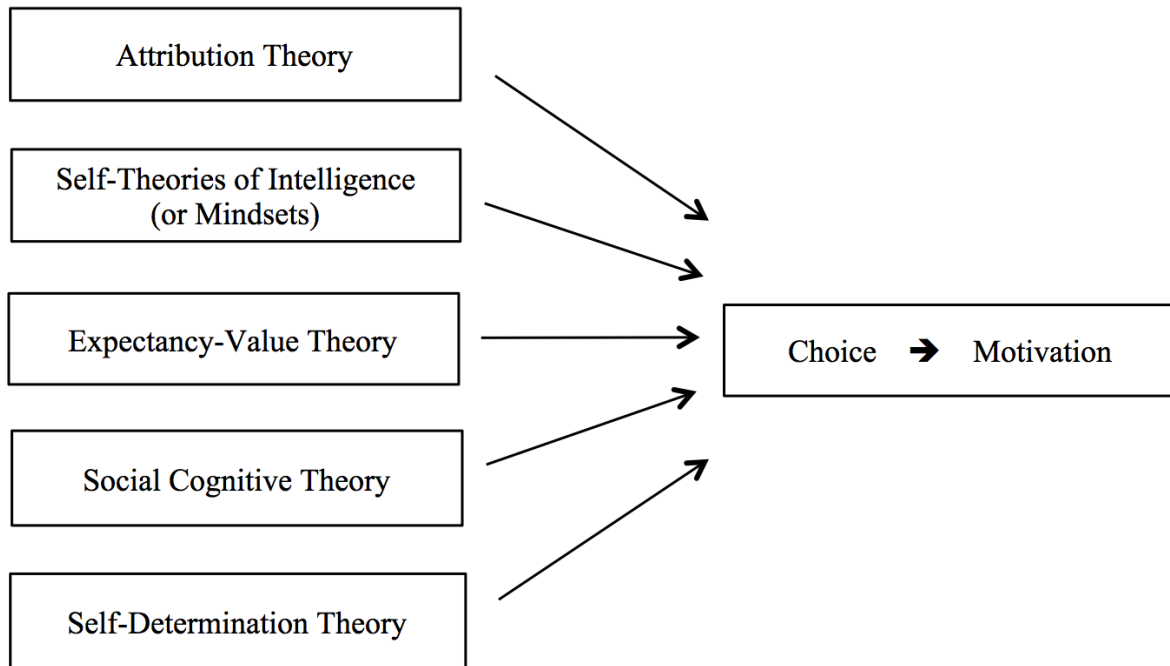


Figure 1. Motivational frameworks suggesting the effects of choice.

their own learning will increase; this further leads to choosing for more challenging academic tasks, rather than easier tasks, as well as increasing their motivation (Schunk, 2008; Pintrich & Schunk, 2002; Weiner, 1994).

Self-theories of intelligence (or mindsets; individuals' beliefs about their learning abilities) also affect students' choice behavior. Dweck (1999, 2002) identified two theories of intelligence: entity theory of intelligence (or fixed mindset) and incremental theory of intelligence (or growth mindset). The entity theory of intelligence is the belief that ability is fixed, whereas the incremental theory of intelligence is the belief that ability can be changed. Dweck suggested that students who have an entity theory of intelligence tend to choose easier tasks because they do not want to make mistakes, or they want other people to think they are smart. On the other hand, students with an incremental theory of intelligence tend to choose challenging tasks because they regard tasks as an opportunity to learn.

According to expectancy-value theory, students' choices for academic tasks are highly influenced by their positive or negative values toward given tasks (Eccles, 1983; Eccles, Wigfield, & Schiefele, 1998; Wigfield & Eccles, 1992, 2000). Eccles' (1983) expectancy-value model of achievement motivation shows that students are likely to make choices associated with the positive values of tasks, such as interest, importance, and usefulness, which increase students' motivation in engaging with the tasks. On the other hand, the negative values of tasks can decrease students' motivation. Brophy (2008) also argued, "Students who are motivated to learn will not necessarily find learning activities pleasurable or exciting, but they will find them meaningful and worthwhile and will take them seriously by trying to get the intended benefits from them" (p. 133).

Within the perspective of social cognitive theory, choice for academic tasks has been discussed in terms of self-regulated learning (Zimmerman, 1994, 1998). Self-regulated learning is how students take advantage of the given choices by using effective strategies. Winne and Hadwin's (1998) model of self-regulated learning suggests that its strategies include (a) analyzing tasks, (b) setting goals and planning, (c) engaging in learning by using strategies, and (d) revising approaches to learning. Good self-regulated learners can manage their cognitions and emotions by using effective self-regulated learning strategies in order to make good decisions for academic tasks. Bandura's current view of social cognitive theory proposed the term self-efficacy, which is a sense of one's own capability for learning and how to deal efficiently with given tasks (Bandura, 1997). Research suggests that students who have a higher level of self-efficacy choose more complex tasks, which need multiple steps and an extended time period of in-depth thinking but are not overly difficult, compared to students who have a lower level of self-efficacy (Garcia & Pintrich, 1994; Turner, 1995).

Although several motivational theorists have discussed the concept of choice in their theories, self-determination theory is the most commonly used for studying choice regarding academic tasks (e.g., Katz & Assor, 2007; Flowerday, Schraw, & Stevens, 2004; Patall, 2013). This is because self-determination theory focuses on how to satisfy students' autonomy, or a feeling of freedom, by providing students with choices (Deci & Ryan, 1985). Research from this perspective has claimed that allowing students to have choices plays a significant role in increasing students' need for autonomy, which further leads to increasing their intrinsic motivation and task performance (Ryan & Deci, 2000, 2006). When individuals are intrinsically motivated, they engage in a task for its own sake and interest, which increases task performance. For instance, when high school students were given two homework choices, compared to students with no homework choices, they felt more intrinsically motivated and competent with their homework, they performed better on a test, and their homework completion rates increased (Patall, Cooper & Wynn, 2010).

Self-determination also suggests that choice and student motivation are related to classroom structure. An autonomy-supportive classroom structure, for example, provides students with useful resources, while encouraging them to choose and manage the resources in their own ways, which further leads to students' motivation and learning (Ames, 1992; Epstein, 1989; Black & Deci, 2000; Jang, Reeve, & Deci, 2010). Turner (1995) also compared open and closed task structures. Open task structures, which can be regarded as autonomy-supportive classroom structures, offer chances for students to choose what, where, and when they read a book. On the other hand, closed task structures offer limited chances for students to make choices for academic tasks. Turner's study showed that 12th grade students in the open task

structures have a higher persistence with difficulty and use more effective strategies by focusing on the important parts of reading assignments.

Recent evidence, however, suggests that choice can have no effect or even negative effects on students' engagement in the classroom (e.g., Flowerday et al., 2004; Iyengar & Lepper, 1999, 2000; Patall et al., 2008; Reeve, Nix, & Hamm, 2003). Kats and Assor (2007) argued that simply offering choice is not necessarily motivating or helpful for students' learning. Rather, considering contextual factors may be more important in affecting the motivational benefits of choice (Pintrich, 2003; Schunk, Meece, & Pintrich, 2014). Iyengar and Lepper (2000) suggested that there might be a critical point related to the number of choices. Specifically, when options become larger and more complex (i.e., extensive choice condition), students feel more overwhelmed, leading to a decrease in students' intrinsic motivation and task performance, also referred to as *choice overload*. In contrast, situations providing a limited number of choices (i.e., limited choice condition) can be more beneficial to intrinsic motivation and task performance.

However, Iyengar and Lepper's choice overload study did not consider individual factors that may influence the effects of choice regarding academic tasks on students' intrinsic motivation and task performance under choice overload conditions (Pintrich, 2003). Task value and decision-making strategies in particular can influence the motivational benefits of choice (see *Figure 2*). Students tend to choose a task they regard as important and meaningful, and this further increases their motivation to engage with the task. This notion is consistent with the expectancy-value model of achievement motivation, which suggests students' choices are closely related to their positive or negative values towards academic tasks (Eccles, 1983; Wigfield & Eccles, 1992, 2000). For example, Cordova and Lepper (1996) found that elementary school students showed higher intrinsic motivation and task performance when choices were provided

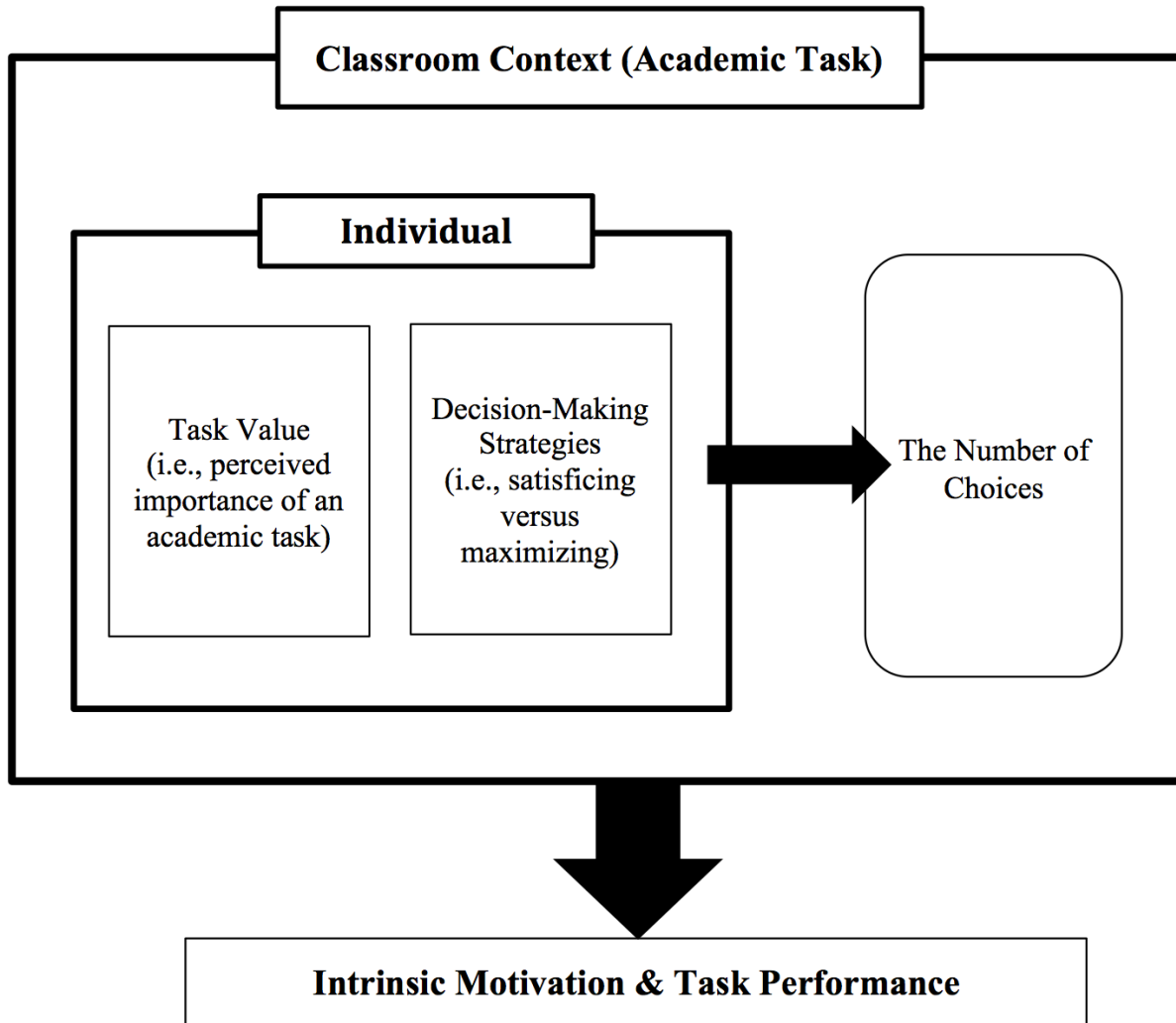


Figure 2. Conceptual framework examining the effects of choice on intrinsic motivation and task performance.

with individually personalized reading material, rather than with general reading material. Students in the “personalized reading material condition” received personalized messages, into which each student’s name was inserted, whereas students in the “general reading material condition” received identical messages that did not include their names. In addition, students felt more positive emotions, such as competence, when the choices and personally relevant reading material were presented together. Accordingly, we can assume that if students have a higher

positive value towards given tasks, they have higher levels of intrinsic motivation and task performance, even under choice overload, compared to students who have a less positive value.

Another individual factor that moderates the relations among choice, intrinsic motivation, and task performance can be decision-making strategies. Simon (1955, 1956, 1957) suggested two types of decision-making strategies: *satisficing*, which is to gather information spontaneously and make a good enough decision; and *maximizing* (or optimizing), which is to gather information systematically and choose the best option. When options become more complex, satisficing is considered more adaptive and realistic than maximizing, and people in general also prefer satisficing to maximizing (Bereby-Meyer, Assor, & Kats, 2004). Schwartz and his colleagues (2002) developed a measure to assess the individual tendency to satisfice or maximize based on Simon's work. This decision-making strategy measure includes items related to daily life (e.g., when I watch TV, I channel surf, often scanning through the available options even while attempting to watch one program). Their study proposed that maximizers, who had a higher score on the maximization survey, had lower levels of positive emotions, such as happiness, self-esteem, and life satisfaction, compared to satisficers (i.e., non-maximizers). On the other hand, maximizers had higher levels of negative emotions, such as depression and regret, compared to satisficers. Therefore, I expected that decision-making strategies would moderate the effects of choice on intrinsic motivation and task performance.

Accordingly, we should consider contextual and individual factors when we allow students to exercise their choices in order to promote their intrinsic motivation and adaptive learning. Furthermore, a comprehensive understanding of the effects of choice is important for teachers who believe that allowing students to exercise choices for academic tasks is beneficial for students' learning (Flowerday & Schraw, 2000). However, there has been little empirical

evidence that choice situations should be combined with contextual and individual factors. In this dissertation, I investigated how to maximize the benefits of the exercise of choice by considering the number of choices as a contextual factor. In addition, I examined whether individual factors, such as task value and decision-making strategies, can moderate the effect of the number of choices on students' intrinsic motivation and task performance.

This dissertation was targeted at college students because they often get cognitively and emotionally overwhelmed, frequently face critical choices, such as majors and career paths, and receive less guidance from parents or teachers as compared to elementary and secondary school students (Bembenutty, 2011; Wrosch, Scheier, Miller, Schulz & Carver, 2003; Scheibehenne, Greifeneder, & Todd, 2010). Patall and her colleagues (2008) conducted a meta-analysis to explore the effects of choice on intrinsic motivation with both child and adult samples. The results showed that there were no significant differences in the effects of choice on intrinsic motivation between primary, preschool, and middle school students. However, the effects of choice on intrinsic motivation were significantly higher for children than for adults. College students are at the beginning stage of adulthood, so figuring out how to enhance the positive effects of choice on their intrinsic motivation and task performance may play a more significant role in directing and guiding college students' choice behaviors as adults.

I conducted two experimental studies in an undergraduate course by closely following the model of Iyengar and Lepper's choice overload study (2000) to explore (a) whether the number of choices (as a contextual factor) affects students' intrinsic motivation and task performance, (b) whether the effects of the number of choices on students' intrinsic motivation and task performance can be maximized when students perceive the importance of an academic task (as an individual factor), and (c) whether the effects of the number of choices on students' intrinsic

motivation and task performance can be maximized when students use a more compelling decision-making strategy (as an individual factor).

In Study 1, participants were randomly assigned to lists of either 30 different sets of course ideas (i.e., extensive choice condition) or six different sets of course ideas (i.e., limited choice condition) to choose from, for their book analysis. The book analysis assignment was a required and high-stakes assignment and it focused on how accurately students apply specific course ideas (e.g., negative/positive reinforcement, nature/nurture, or short-term/long-term memories) to episodes from one book (e.g., stories, narratives, anecdotes, description of experiments, or descriptions of real-world phenomena). Students, for example, might choose to apply the course idea of cognitive load to the book *Invisible Gorilla* (about “inattention blindness”) and explain why people sometimes fail to pay attention to things that are right in front of them. Task value, the decision-making strategy, and intrinsic motivation were rated using a self-report survey. Task performance was determined by the book analysis task grades students received from two graduate raters who were unaware of the students’ choice conditions and the hypotheses of Study 1. The results of Study 1 suggest no significant difference for intrinsic motivation and task performance by choice condition. However, there was an interaction between the number of choices and task value with regard to intrinsic motivation. Extensive choices enhanced intrinsic motivation, especially effort, among students who thought the given task was not important for receiving a good grade (i.e., a lower level of extrinsic task value). This implies that 30 choices can be beneficial to intrinsic motivation among students who have a lower level of extrinsic task value under the context of a required high-stakes task. Imagine a group of students who think that the given task is not important for getting a good grade, even though the task is a required high-stakes assignment. How do teachers help these

students increase their intrinsic motivation and put more effort into the assignment? This dissertation suggests that teachers should give students more choices, rather than fewer choices.

Study 2 investigated the same research questions by using an elective low-stakes assignment. Participants were asked to complete an extra-credit movie response essay under one of two choice conditions: limited choice and extensive choice conditions. They completed the same surveys for measuring task value, the decision-making strategy, and intrinsic motivation. Task performance was determined by the movie response essay grades students received from two graduate raters who were unaware of the students' choice conditions and the hypotheses of Study 2. The results of Study 2 show that an extensive number of choices may enhance intrinsic motivation and task performance. Specifically, among students who are provided with an elective low-stakes assignment, 30 choices may contribute to motivational benefits—especially perceived choice regarding course ideas—and a higher level of task performance. These results suggest an opposite pattern of the choice overload hypothesis (i.e., an extensive number of choices decreases intrinsic motivation and task performance). Why then, were the results not consistent with choice overload hypothesis? One possible explanation for the results can be students' feelings of frustration. According to the results of manipulation check, students who received six course ideas felt more frustrated when choosing course ideas for the movie response essay, compared to students who received 30 course ideas. Thus, we can assume that 30 choices might not be an excessive number of choices in Study 2. Rather, 30 choices might be a moderate number of choices, which decreased students' feelings of frustration. There was also an interaction between the number of choices and decision-making strategies with regard to intrinsic motivation. Extensive choices increased intrinsic motivation, especially value, among students who used maximizing (i.e., a higher level of well-informed decision-making strategy). This

implies that maximizing is a more compelling decision-making strategy under a limited number of choices within the context of an elective low-stakes task. On the other hand, satisficing (i.e., a lower level of well-informed decision-making strategy) did not affect intrinsic motivation among students who had limited choices, regardless of task characteristics. Imagine there is a group of students who were asked to submit their book choice from a list of six books for their *extra-credit* book review assignment (not like the required and high-stakes book review report used in Study 1). How do teachers help these students increase their intrinsic motivation? This dissertation proposes that teachers should encourage students to use the maximizing decision-making strategy by comparing and contrasting every option, which may result in students experiencing a higher level of value for the assignment.

Overall, the findings from the two experimental studies surprisingly indicate the contrasting patterns of the previous choice overload studies (e.g., Iyengar & Lepper, 2000). Then, what critical factor can provide a more comprehensive understanding of the effects of choice that can embrace Iyengar and Lepper's study (2000), Study 1, and Study 2? I suggest that the critical difference across the three studies is related to the difference that explains how the number of choices can have the opposite effect on feelings of frustration derived from *task difficulty*. Even though care was taken to use a task similar to Iyengar and Lepper (2000), it may be the case that the tasks were, in fact, not at the same level of difficulty. Specifically, by comparing Iyengar and Lepper's study, Study 1, and Study 2, there are four different task features that may affect task difficulty: (a) media (i.e., long movie, long book, or short movie); (b) memory load (i.e., view once, read repeatedly, or view repeatedly); (c) content familiarity (unfamiliar movie, familiar book, or familiar movie); and (d) task structure (low structured, medium structured, or high structured). This analysis of four different task features demonstrates

how the task became easier as we moved from Iyengar and Lepper (2000) to Study 1 and to Study 2 in this dissertation.

In conclusion, this analysis can provide a better understanding of the underlying mechanisms of the effects of choice that implies choice situations should be combined with task features and difficulty. This argument is aligned with Baumeister and his colleagues' (1998) ego-depletion model which suggests that tasks or activities that require significant consumption of self-regulatory resources may result in a state of exhaustion. Choosing activities under a context of difficult tasks can bring more ego-depletion, which may decrease students' intrinsic motivation and task performance. On the other hand, choosing activities under a context of easy tasks can lead to less ego-depletion, which may increase students' intrinsic motivation and task performance. In this way, I believe this dissertation provides meaningful implications for future research and practice in that task features and difficulty should be carefully considered when people explore the effects of choice as a researcher, as well as when people provide students with choices for academic tasks as a teacher.

Research Questions

This dissertation focused on the following research questions:

1. Does the number of choices affect college students' intrinsic motivation and task performance?
2. Does task value (i.e., perceived importance of the task) moderate the effects of the number of choices on college students' intrinsic motivation and task performance?
3. Does a decision-making strategy (i.e., satisficing versus maximizing) moderate the effects of the number of choices on college students' intrinsic motivation and task performance?

CHAPTER 2: Theoretical Framework

In a score of studies, having choices and control of one's own learning have been shown to have positive effects on a student's intrinsic motivation and task performance regardless of developmental stage (e.g., Deci & Ryan, 1985; Ryan & Deci, 2000, 2006; Stipek et al., 1995; Turner, 1995; Perry, 1998; Winne & Perry, 2000). For instance, one experimental study conducted by Zuckerman and his colleagues (1978) found that choice affects college students' puzzle solving. Students in the choice condition, who were asked to choose three of six puzzles and how much time they wanted to spend completing them, spent more time and had a greater feeling of control and willingness to return for doing more puzzles, compared to students in the no-choice condition, in which their partners chose the puzzles and time allotments for them. Students with choice also had better task performance.

Stipek and her colleagues (1995) also distinguished child-centered classrooms and teacher-directed classrooms in terms of whether children of ages 4-6 have their own choices for activities and materials. Child-centered classrooms are more autonomy-supportive, whereas teacher-directed classrooms are less autonomy-supportive and more controlling. Their study suggested that children in child-centered classrooms have higher appreciation for their abilities, expectations for success on academic tasks, and preference for challenging assignments. Autonomy-supportive environments facilitate students' engagement in assignments by allowing students to exercise choice. In this way, choice is a determinant in increasing students' intrinsic motivation and learning regardless of developmental stage, although the levels of intrinsic motivation can be varied depending on the developmental factors (Patall et al., 2008).

The motivational benefits of choice have also been discussed within a cultural perspective. Iyengar and Lepper (1999) conducted an experimental study on the cultural issues in

choice. Their results showed that Anglo-American students are most motivated and performed best when they make choices for themselves, whereas Asian-American students are most motivated and performed best when their mothers make choices for them. This implies that Asian-American students prefer choices that are made by trusted authority figures, such as their mothers, because they live in a hierarchical culture. In contrast, Anglo-American students prefer their own choices because they live in a less hierarchical culture.

These findings are also supported by an argument of cultural psychologists that Asian cultures encourage interdependent selves (i.e., identity that is constructed by relationships with others rather than by personal attributes), whereas Western cultures encourage individualism or independent selves (i.e., identity that is constructed by personal values rather than by group identification) (Kitayama & Markus, 1995; Markus & Kitayama, 1991; Nisbett, 2003). By connecting this idea with Iyengar and Lepper's study, Asian-American students, who have interdependent selves, might perceive the relationship between the person and the chooser as important; thus, they have higher levels of intrinsic motivation and task performance in the "mom-choice" condition (i.e., choosing what their mothers chose for them). In contrast, Anglo-American students, who have independent selves, might value making their own choices more.

Exploring the relation between choice and intrinsic motivation has been important in the field of educational and psychological research because this reflects a diverse range of individual and contextual factors, such as developmental and cultural variables. How then can the motivational benefits of choice be conceptualized to gain a better understanding of the choice mechanisms that depend on individual and contextual factors? In other words, can we assume that choice is always motivating for every student and in every situation? The purpose of this dissertation is to provide a comprehensive understanding of the motivational benefits in students'

academic choices. I begin with a brief overview of research on the relation of choice to intrinsic motivation, and then I examine how the effects of choice can be conceptualized within self-determination theory, which is the most commonly used framework for studying choice.

Overview of Research on Choice in Intrinsic Motivation

Considerable motivational research has proposed that students who make choices for academic tasks are intrinsically motivated. Various perspectives of intrinsic motivation have emphasized that motivation derives from the desire that individuals can be autonomous and can control their environments, and this need can be satisfied with having choices (Schunk et al., 2014). For example, White (1959) suggested the term *effectance motivation* (i.e., a feeling of independent mastery), which is related to whether people have choices and control over their environment. Harter (1981) further developed the model of *mastery motivation*, based on White's effectance motivation. She proposed that allowing students to exercise independent choosing, rather than depending on the teachers' decision, is the best way to create students' mastery motivation. In addition, de Charms (1968) contrasted *Origins* with *Pawns* in terms of perceived control. He defined Origin as "a person who perceives one's behavior as determined by one's own choices," which can be regarded as autonomy and self-determination, whereas Pawn is "a person who perceives one's behavior as determined by external forces" (pp. 273-274). This distinction is consistent with Rotter's (1966) *internal locus of control* (i.e., a belief that one has much control over one's behavior) versus *external locus of control* (i.e., a belief that one has little control over one's behavior).

The concepts of effectance motivation, mastery motivation, origins, and internal locus of control refer to intrinsic motivation, and they explain the relation between choice and intrinsic motivation in terms of autonomy and self-determination. These perspectives of intrinsic

motivation have been developed by self-determination theory. Much research on self-determination theory empirically supports the notion that students who perceive that they have choices for and control of their own learning have positive cognitive, affective, and motivational outcomes (Deci & Ryan, 1985; Ryan & Deci, 2000, 2006).

Choice and Self-Determination Theory

Numerous researchers have studied choice within the broader theoretical framework of self-determination theory (e.g., Ryan & Deci, 2000, 2006; Deci & Ryan, 2008; Reeve et al., 2003; Jang et al., 2010). Self-determination theory proposes that students have three basic psychological needs that must be satisfied to enhance their intrinsic motivation and task performance: autonomy, competence, and relatedness (e.g., Ryan & Deci, 2000; Deci & Ryan, 2008). Autonomy is a perception of freedom, competence is a feeling that one is capable of succeeding in tasks, and relatedness is a sense of belonging and being connected to others. According to self-determination theory, intrinsic motivation is regarded as “the human need to be self-determining and competent in relation to the environment” (Deci, 1980, p. 27). Therefore, among those three basic psychological needs, autonomy is most connected to the effects of choice. When students recognize that they are given choices for academic tasks, their perception of autonomy increases, which enhances intrinsic motivation and task performance (e.g., Ryan & Deci, 2006; Deci & Ryan, 2008). This connection between choice and increased intrinsic motivation and task performance has been supported by research. For example, allowing students to choose academic tasks facilitates their affective engagement—including overall liking, autonomous functioning, enjoyment, and persistence in a task, as well as intrinsic motivation (Cordova & Lepper, 1996; Schraw, Flowerday, & Reisetter 1998; Williams, Grow, Freedman, Ryan, & Deci, 1996; Reeve et al., 2003).

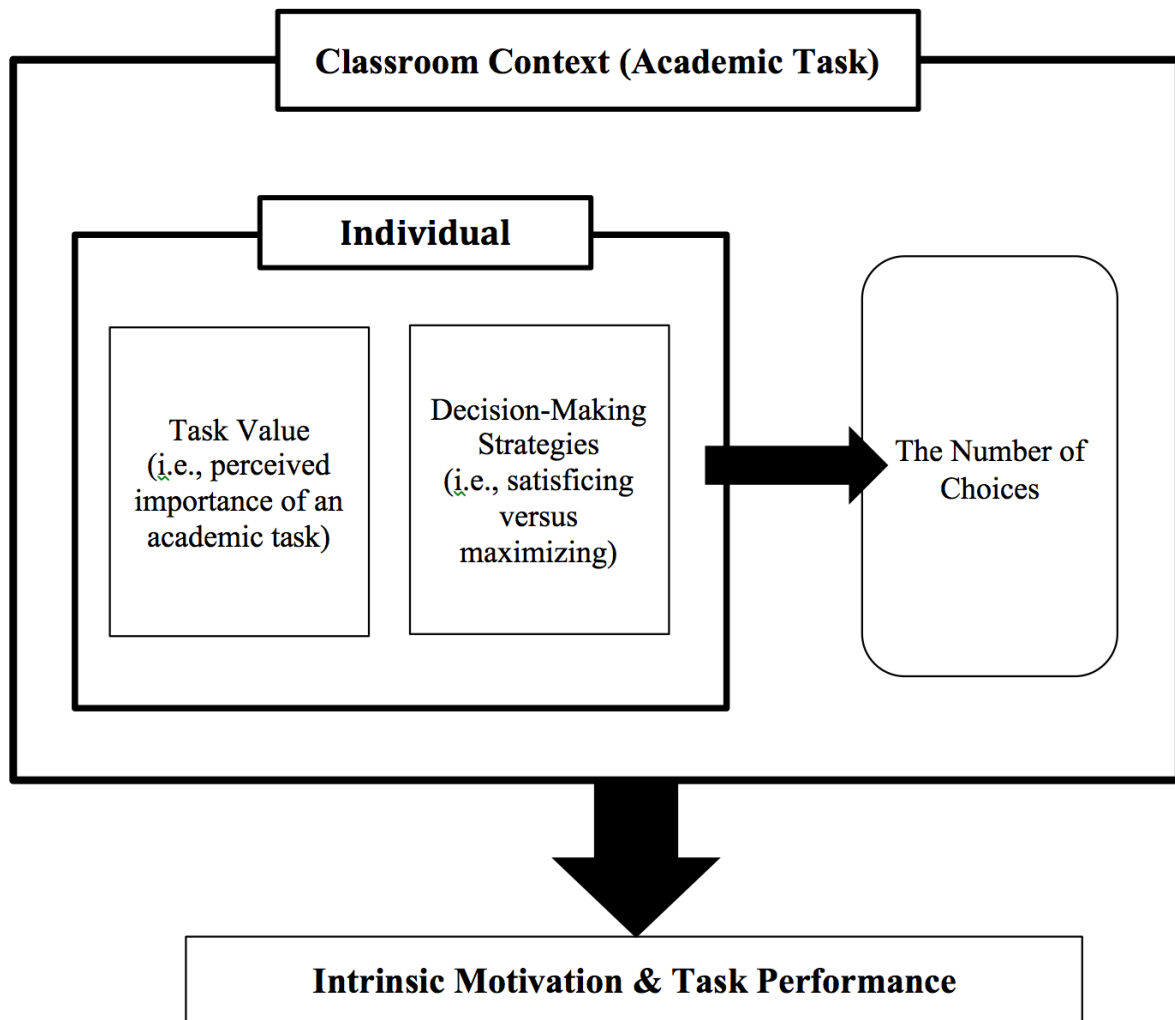


Figure 3. Conceptual framework examining the effects of choice on intrinsic motivation and task performance.

Recently, self-determination theory has further specified that this connection between choice for academic tasks, intrinsic motivation, and task performance can either increase or decrease, depending on contextual and individual factors (Black & Deci, 2000; Deci & Ryan, 2006; Pintrich, 2003). Providing choices is more effective when the options are related to motivational constructs, such as providing students with optimal choice situations, helping students regard content as meaningful, and facilitating students to use effective decision-making

strategies (Katz & Assor, 2007; Ames, 1992; Brophy, 1987, 1999; Iyengar & Lepper, 2000; Patall et al., 2008). In contrast, when choice situations are overwhelming or personally irrelevant, or when students do not use an effective decision-making strategy with the given options, students' intrinsic motivation and task performance can decrease.

In this dissertation, I focused on the number of choices as a contextual factor, and on task value and decision-making strategies as individual factors that can influence the adoption of choice exercises within self-determination theory (see *Figure 3*). This examination can lead to an increased understanding of the comprehensive choice mechanisms, and it can be useful to researchers and teachers who believe that simply offering choice is all that is needed to promote students' intrinsic motivation and task performance.

Number of Choices as a Contextual Factor

Research on choice has shown that the effects of choice on intrinsic motivation and task performance can be differentiated depending on the number of choices. Iyengar and Lepper (2000) termed this context as *choice overload*. They argued that the effects of a limited number of choices should be distinguished from the potential effects of an extensive number of choices, such as an intense workload or an exhaustion of self-regulatory resources (e.g., resources of physical energy or strength). In addition, this may also lead to increasing students' feelings of being overwhelmed, and can further lead to decreasing their intrinsic motivation and task performance (e.g., Iyengar & Lepper, 2000; Schwartz, 2000; Roets, Schwartz, & Guan, 2012). This perspective is consistent with Baumeister and his colleague's (1998) ego-depletion model, which suggests that human beings have a limited amount of self-regulatory resources; thus, choosing activities that require a significant consumption of self-regulatory resources may result in a state of exhaustion, which is called ego-depletion. Ego-depletion is a key factor that

decreases the effects of choice on intrinsic motivation and task performance. Muraven and Baumeister (2000) also suggested that although every task of making a choice is an ego-depleting process, there are simpler choices that lead to less ego-depletion, and there are more complex choices that bring about more ego-depletion.

In Iyengar and Lepper's choice overload research (2000), students were randomly assigned either a limited number of choices or an extensive number of choices, and their intrinsic motivation and task performance were compared. They found that "the more, the better" is not ubiquitously applicable. Rather, more choices can be "demotivating." To test the choice overload, they conducted one experimental study. College students in a social psychology course were shown a film in class, and they were assigned to write a two-page response paper to the film, choosing from either 30 (extensive choice condition) or six essay topics (limited choice condition). The researchers used task completion as a proxy for intrinsic motivation since they assumed that the students completed the essay task *because* they were genuinely interested in it. Iyengar and Lepper also assessed the quality of the essays (a measure of students' task performance) by measuring two criteria: essay form and content. Each was measured on a 10-point scale. Essay form was judged based on structure and grammar, whereas the content of the essays was judged based on the usage of proper social psychology concepts and clear examples. Students who were provided with a limited number of choices had higher intrinsic motivation and better performance on essays, compared to students who had an extensive number of choices. These results support the choice overload hypothesis.

Haynes (2009) also found that college students who had to choose a prize from 10 options (an extensive number of choices) experienced more difficulty deciding and felt less satisfied with their decisions, compared to students who had three options (a limited number of

choices). Furthermore, he explored the interaction between the number of choices and decision time (limited versus extended decision time). The results suggested that students reported more difficulty when given an extensive number of choices with limited decision time to choose, than in the alternative choice conditions. Although Haynes' study provided a different number of choices for extensive and limited choice conditions and did not involve measuring students' intrinsic motivation and task performance, as in Iyengar and Lepper's study, its findings still support the view that the number of choices should be considered as a contextual factor when choices are given.

This dissertation is closely modeled on Iyengar and Lepper's study (2000), in order to explore whether the number of choices as a contextual factor may affect students' intrinsic motivation and task performance. Unlike Iyengar and Lepper's study, this dissertation used a survey to assess students' intrinsic motivation, rather than regarding task completion as a proxy for intrinsic motivation. In Iyengar and Lepper's study, participants obtained two extra points on their midterm exam for completing the essay task, which could be problematic, because students might be motivated by the two extra points to earn better grades. If so, the difference between the percentages of essays turned in across the two conditions was due to extrinsic motivation (i.e., an individual engages in a task because of the rewards it brings) rather than intrinsic motivation (i.e., an individual engages in a task because of one's own sake and interest). Using the survey can more precisely measure the intrinsic motivation variable. Overall, I expected that the results of this dissertation would show the same pattern of Iyengar and Lepper's study and support the choice overload hypothesis. I also discussed the relations among the number of choices, intrinsic motivation, and task performance with regard to two individual factors, such as task value and decision-making strategies.

Task Value and Decision-Making Strategies as Individual Factors

Research on choice also emphasizes the importance of individual factors such as task value and decision-making strategies. For example, Eccles, Wigfield, and their colleagues suggested that when an important, interesting, and useful task is given, the motivational benefits of choice could be increased (Eccles, 1983, 2005; Eccles & Wigfield, 1995, 2002; Wigfield & Eccles, 1992, 2000; Eccles et al., 1998). In contrast, when the given task is more costly and energy draining, the effects of choice on motivation can be decreased.

In Eccles, Wigfield, and their colleagues' research, task value is derived from expectancy-value theory, which is a description of motivation that can be positively influenced by the interaction between a student's expectation for success and how much the student values a task or activity. There are four components of task value: attainment value (importance), intrinsic value (interest), utility value (usefulness), and cost. Attainment value is related to how much a student wants to succeed at a given task, which can also be called the perception of the importance of the task. Intrinsic value indicates the sense of enjoyment a student gains from the task. Utility value refers to the value associated with how the task will contribute to achieving one's future goals. Cost indicates the negative consequences of doing the task, including consumption of time and effort, and the loss of a chance to perform alternative activities.

Patall (2013) explored whether interest (i.e., intrinsic value) affects preferences for making choices and the effects of providing choices on intrinsic motivation. Participants in her study were informed that they would be asked to complete a trivia game (e.g., Question: "What state can be spelled by rearranging the letters in the phrase: OLD FAIR?" Answer: "Florida"). Then the participants reported on how interesting the activity was, which was regarded as initial individual interest. After the first exercise, participants were randomly assigned to either a choice

or a no choice condition, and they were then asked to complete another trivia game. This time, however, the game included six different categories, with questions for each category.

Participants in the choice condition had a chance to choose three categories, from which they were guaranteed to receive questions, whereas participants in the no choice condition were given questions from random categories. After completion of the second game, participants were asked to report their post-task interest, which was measured by the interest-enjoyment subscale from the Intrinsic Motivation Inventory (IMI; Ryan, 1982). The results showed that students who had choices and a higher level of initial individual interest for the trivia games displayed a greater post-task interest for the game in general. In other words, choosing provides motivational benefits (e.g., post-task interest/enjoyment), especially when individuals perceive that a task is interesting at the beginning of the activity. In this way, task value may interact with choice to affect students' intrinsic motivation and task performance, so this may be an important moderator in predicting the relations among choice, intrinsic motivation, and task performance.

Another individual factor that may moderate the relations among choice, intrinsic motivation, and task performance can be decision-making strategies. Simon (1955, 1956, 1957) suggested that there are two different types of decision-making strategies: satisficing and maximizing (or optimizing). Satisficing is a decision-making strategy of searching through the available options until a choice is found that seems acceptable, whereas maximizing is a decision-making strategy of computing an overall value for every option and then choosing the best option available. According to Simon's (1957) argument, human beings have cognitive limitations, which make it hard for decision-makers to evaluate all the possible effects of their choice. Therefore, people in limited choice conditions can engage in maximization and find the

best option, whereas people in extensive choice conditions can be overwhelmed if they attempt to use maximizing for choosing.

Schwartz and his colleagues (2002) suggested that the effects of choice overload could be differentiated depending on an individual's decision-making strategy. Specifically, students who use maximizing may be negatively influenced by more choices since they have to examine all the options, which may seem impractical and overwhelming. On the other hand, students who use satisficing may feel less overwhelmed under choice overload because they find a "good enough" choice rather than the "best" choice; thus, more choices can simply be ignored, which further leads to increasing students' satisfaction and decreasing regret about their choice.

For this dissertation, I focused on how students' task importance (i.e., perception of the importance of a given task) from the expectancy-value theory and how students' decision-making strategies potentially moderate the effects of choice by connecting with the number of choices as a contextual factor. Task importance is closely related to students' self-schema (i.e., people's beliefs about themselves; Wigfield & Eccles, 1992). Thus, if students want to retain their positive sense of self as a student of high standard, academic tasks may be highly important to them, which further leads to increasing their motivation. As mentioned earlier, Brophy (2008) also argued that motivated students will find learning activities meaningful and strive hard to get the benefits from them, but they may not necessarily find them interesting or enjoyable. Therefore, I expected that students who perceive that a particular task is important, compared to other students, may be more motivated to put effort into the task, which will further lead to increasing their task performance, even under choice overload.

With respect to decision-making strategies, I expected that using satisficing may lead to increased intrinsic motivation and task performance under choice overload, because satisficing is

a less cognitively demanding strategy, compared to maximizing. Kats and Assor (2007) also argued that when options become more complex, people tend to use less complex strategies. In this way, I hypothesized that the use of effective decision-making strategies can be an important moderator of the relations between the number of choices and intrinsic motivation, and between the number of choices and task performance.

CHAPTER 3: Study 1

In Study 1, students in an undergraduate educational psychology course were asked to choose one book from a given list of books. They were assigned to either extensive or limited choice conditions. In the limited choice condition, students received one of three random lists of six course ideas. They were asked to choose three to use for their book analysis. In the extensive choice condition, students received a list of 30 course ideas and chose three sets of course ideas. The book analysis assignment was a major project in the course, and it focused on how accurately students apply specific course ideas (e.g., negative/positive reinforcement, nature/nurture, or short-term/long-term memories) to episodes from the book (e.g., stories, narratives, anecdotes, description of experiments, or descriptions of real-world phenomena). Students, for example, might choose to apply the course idea of cognitive load to the book *Invisible Gorilla* (about “inattention blindness”) and explain why people sometimes fail to pay attention to things that are right in front of them.

Students completed surveys to assess their task value (i.e., perceived importance of the task), decision-making strategy (i.e., satisficing versus maximizing), and intrinsic motivation. They also responded to manipulation check questions regarding their choice experience. Task performance was determined by grades students received on the assignment.

Method

Participants

The initial plan for the study involved 111 undergraduate students, who were taking an introductory educational psychology course in the Fall 2014 and in the Spring 2015 semesters at Michigan State University. Unexpectedly, seven participants did not complete the book analysis assignment, and 13 participants did not grant permission to use their data collected from the

course in the results of this study. The final sample therefore consisted of 91 students (59 females, 32 males). The procedures for Study 1 were reviewed and approved by Michigan State University's Institutional Review Board (IRB No. x14-1017e).

Setting

Study 1 was conducted in the “TE 150 Reflections on Learning” online class at Michigan State University. This course is an introductory educational psychology course in which three sections are taught via the Desire to Learn (D2L) online learning management system. Each section is taught by one graduate student instructor. Although TE 150 is a required course for pre-service teachers, most students in the online course took it as an elective class.

Procedures

All students were randomly assigned to complete the book analysis task under one of two choice conditions: limited choice and extensive choice conditions. Students in the limited choice condition received one of three random lists of six sets of course ideas from a list of 30 sets of course ideas, and they were asked to choose three sets of course ideas from the list to use for their book analysis task. Comparatively, students in the extensive choice condition received a list of 30 sets of course ideas, and they were also asked to chose three sets of course ideas from the list (see Appendix A). Specific procedures are in Table 1 on the next page.

Table 1: *Timeline for Study 1*

Week in Semester	Timeline
Week 4	Students submitted their book choice from a list of six books.
Week 7 & 8	Students were assigned to the limited or extensive choice conditions and received a list of six or 30 course ideas. Students had 24 hours to choose three sets of course ideas from the given list of ideas. Immediately after choosing three sets of course ideas to use for their book analysis task, students completed surveys for: - Task value - Decision-making strategy - Manipulation check: post-decision emotions (e.g., difficulty, frustration, and enjoyment).
Week 9	Students submitted the book analysis task. Students completed surveys for: - The Intrinsic Motivation Inventory (IMI) - Manipulation check: post-task emotions (e.g., satisfaction and regret emotions with choice). - Students were asked to complete surveys within 24 hours of submitting their book analysis.
Week 11	Students' task performance was determined based on the course rubric.

Measures

Study 1 included a number of measures, which were adapted or modified from Iyengar and Lepper's study (2000), to answer the three research questions. When students were assigned to have choices from the set of course ideas, their task value and decision-making strategy were measured. During this portion, students responded to manipulation check questions regarding their post-decision emotions (e.g., difficulty, frustration, and enjoyment). After the book analysis task was completed, a measure of intrinsic motivation about the task itself and another set of manipulation check questions regarding their post-task emotions (e.g., satisfaction and regret

emotions with their choice) were collected. The book analysis task grade was also used to measure students' task performance. Specific descriptions for the measures in Study 1 are provided below.

Task value. Task value, especially the perceived importance of the task, was assessed using the task importance subscale of the task value questionnaire (Eccles, 1983; see Appendix B). The two task importance items were “I feel that doing well on the book analysis assignment is important for learning the course material in this class” and “The book analysis assignment is important for me to get a good grade in the course.” However, the two questions were not significantly correlated ($r = -.11, p = .28$), so they could not be combined into a composite task value measure. Therefore, this study regarded the first task value question as an intrinsic task value, since the item focuses on learning instead of rewarding, and the second task value question was regarded as an extrinsic task value since the item focuses on rewarding rather than learning. Students responded to each item on a seven-point Likert scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

Decision-making strategy. One item, which was adapted from Iyengar and Lepper (2000, Study 3), was used to determine whether students were satisficers or maximizers (see Appendix C). The item “I felt that I made a well-informed decision on the set of course ideas I chose for the book analysis assignment” indicates that students use the maximizing decision-making strategy. Therefore, in terms of decision-making strategies, students whose score on the item was equivalent to or above the median were considered a maximizer, whereas below the median they were considered a satisficer. Students responded to this item on a seven-point Likert scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

Manipulation check. A manipulation check consisting of five questions was used to determine whether 30 choices are actually an excessive choice condition, and thus to support the choice overload hypothesis, which states that too many choices contribute to students' post-decision emotions (e.g., difficulty, frustration, and enjoyment) and post-task emotions (e.g., satisfaction and regret) (see Appendix D). These questions were adapted from Iyengar and Lepper (2000, Study 3). Students responded to each item on a seven-point Likert scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

Intrinsic motivation. Five subscales from the Intrinsic Motivation Inventory (IMI) ($\alpha = .89$ to $.94$; Ryan, 1982) were used, and items were rephrased to refer to the book analysis assignment (see Appendix E). They are perceived choice (seven items; $\alpha = .84$), perceived competence (six items; $\alpha = .87$), interest (seven items; $\alpha = .93$), value (seven items; $\alpha = .93$), and effort (five items; $\alpha = .82$). Similar to previous research (e.g., Ryan, 1982), this study also provided strong support for the reliability of each subscale. Students responded to each item on a seven-point Likert scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

Task performance. The book analysis task grade was used to measure the students' task performance. Unbiased graduate student instructors graded the students' book analysis tasks based on the course rubric (see Appendix F). The course rubric allocated a maximum of 35 points and had two major criteria: form and content. Form was evaluated (on a 8-point scale) based on structure (e.g., flow/readability, organization, topic sentences, and paragraph transitions) and writing conventions (e.g. grammar, punctuation, transition words, citation, and written rather than spoken convention). Content was evaluated (on a 27-point scale) on the clarity of descriptions of a set of course ideas and the three episodes from the book that students were discussing in the assignment, as well as on how the students connected the set of course

ideas to the three episodes. Inter-rater reliability was determined by comparing independent grading by each of the two graduate student instructors (who were unaware of the students' choice conditions and the hypotheses of Study 1) on 10 percent of the book analysis task essays. The inter-rater reliability for form score was $\alpha = .90$ ($p < .01$), and the inter-rater reliability for content scores was $\alpha = .93$ ($p < .01$). These reliability results indicated that agreements between the two raters were above 80 percent; therefore, the instructors graded the rest of the book analysis essays individually, without any calibration of the task performance ratings.

Research Hypotheses

My expectations with respect to the effects of choice overload were formulated in the following three research hypotheses:

- H1: Students who are in the extensive choice condition will display lower levels of intrinsic motivation (see solid path H1-a in *Figure 4* and *Figure 5*) and task performance (see solid path H1-b in *Figure 4* and *Figure 5*) than students who are in the limited choice condition.
- H2: Task value, especially the perceived importance of the task, will moderate the relations between the number of choices and intrinsic motivation (see broken path H2-a in *Figure 4*), and between the number of choices and task performance (see broken path H2-b in *Figure 4*), so that the relations will be weaker under the condition of high task importance than under the condition of low task importance.
- H3: Decision-making strategies will moderate the relations between the number of choices and intrinsic motivation (see broken path H3-a in *Figure 5*), and between the number of choices and task performance (see broken path H3-b in *Figure 5*),

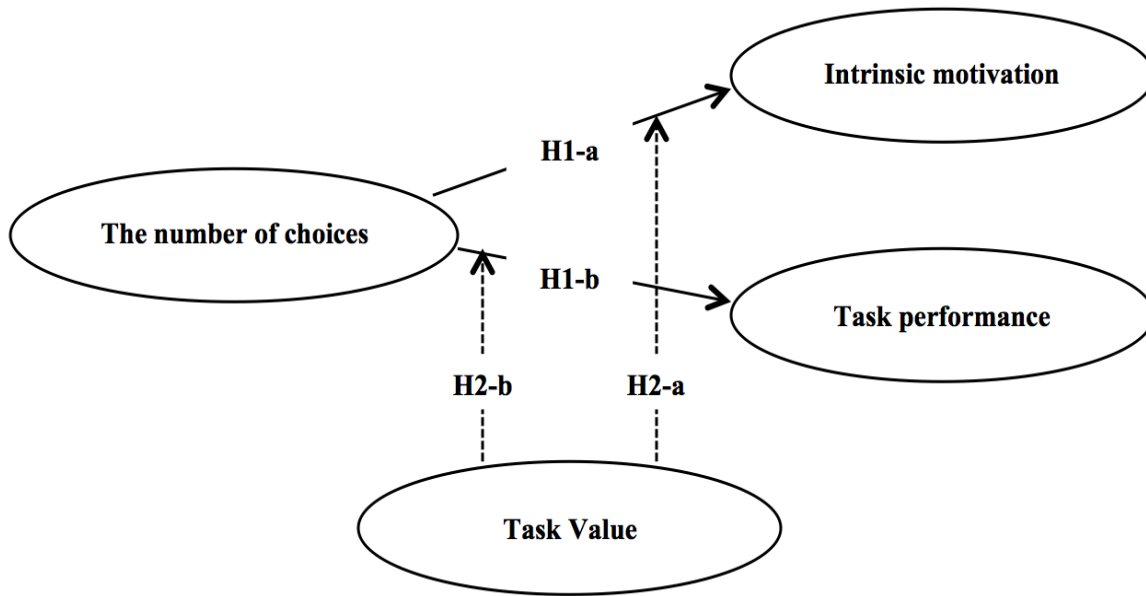


Figure 4. Hypothesized model of the relationships among choice, intrinsic motivation, and task performance, with task value acting as a moderator.

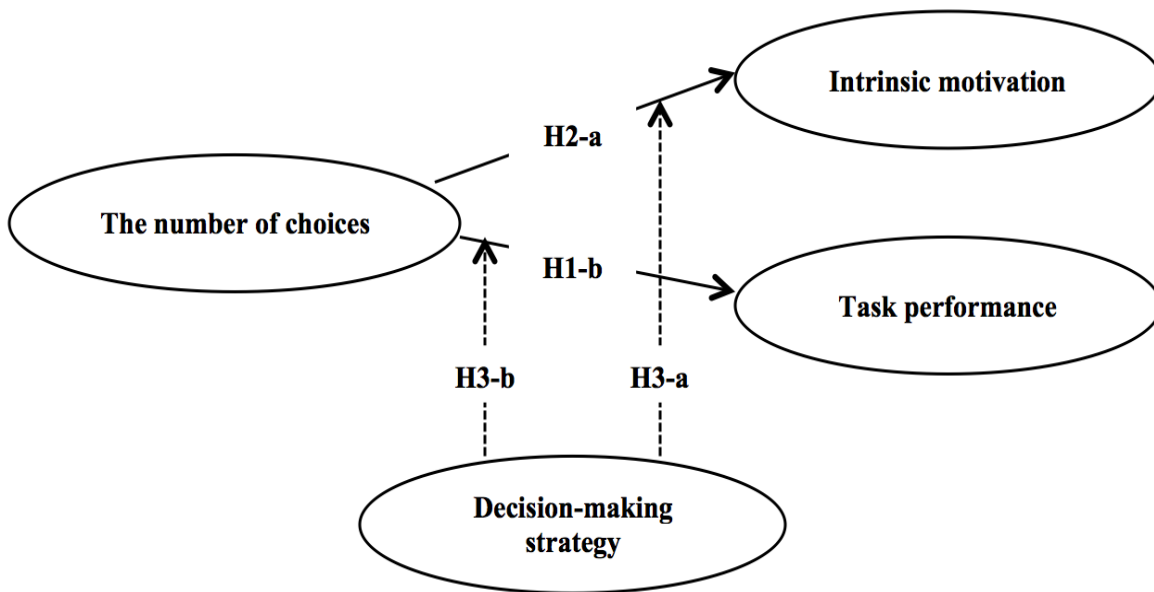


Figure 5. Hypothesized model of the relationships among choice, intrinsic motivation, and task performance, with decision-making strategy acting as a moderator.

so that the relations will be weaker under the condition when students have lower levels of well-informed decision-making strategy (i.e., satisficing) than under the condition when students have higher levels of well-informed decision-making strategy (i.e., maximizing).

Results

Preliminary Analyses

Box plots, the standardized way of displaying the distribution of scores, were used to look for statistical outliers on each dependent variable, and no outliers were identified. Thus, the number of participants used in the data analyses was 91 (59 females, 32 males). Means and standard deviations of students' intrinsic motivation (including perceived choice, perceived competence, interest, value, and effort) and task performance by choice condition are presented in Table 2. In addition, correlations among the relevant variables are presented in Table 3.

Table 2: *Means and Standard Deviations of Dependent Variables in Study 1*

Dependent variable	Limited choice (<i>n</i> = 56)	Extensive choice (<i>n</i> = 35)
Intrinsic motivation		
Perceived choice	20.80 (7.97)	21.69 (8.69)
Perceived competence	31.86 (5.61)	32.74 (7.02)
Interest	28.96 (8.97)	30.69 (9.87)
Value	34.61 (8.53)	36.89 (8.62)
Effort	29.23 (5.10)	30.14 (4.42)
Task performance	27.29 (4.63)	27.49 (5.46)

Table 3: *Correlations among Dependent Variables in Study 1*

	1	2	3	4	5	6
1. Perceived choice	–	.29**	.63**	.41**	.25*	.06
2. Perceived competence		–	.55**	.61**	.50**	.41**
3. Interest			–	.82**	.43**	.17
4. Value				–	.44**	.20
5. Effort					–	.15
6. Task performance						–

* $p < .05$, ** $p < .01$

Table 4: *Means and Standard Deviations of Manipulation Check Variables in Study 1*

Manipulation check variable	Limited choice ($n = 56$)	Extensive choice ($n = 35$)
Post-decision emotions		
Difficulty	4.13 (1.55)	3.77 (2.03)
Frustration	4.46 (1.70)	4.06 (1.80)
Enjoyment	4.50 (1.49)	3.97 (1.47)
Post-task emotions		
Satisfaction	4.80 (1.46)	5.17 (1.51)
Regret	3.14 (1.54)	3.00 (1.53)

Manipulation Check

Before testing the hypothesized model, one-way ANOVAs on the students' post-decision emotions (e.g., difficulty, frustration, or enjoyment) and post-task emotions regarding their choices for course ideas (e.g., satisfaction or regret) were conducted to assess whether they influenced the number of choices.

Post-decision emotions. The results of one-way ANOVAs on the students' post-decision emotions showed that the extensive and the limited choice conditions did not significantly differ

with regard to students' perceived difficulty, $F(1, 89) = .88, p = .35$; frustration, $F(1, 89) = 1.19, p = .28$; or enjoyment, $F(1, 89) = 2.75, p = .10$. Thus, we can assume that the effects of the number of choices were not due to students' post-decision emotions (see Table 4 for means and standard deviations for each manipulation check variable by choice condition).

Post-task emotions. The results of one-way ANOVAs on the students' post-task emotions showed that the extensive and the limited choice conditions did not significantly differ with regard to students' post-task satisfaction, $F(1, 89) = 1.34, p = .25$, or post-task regret, $F(1, 89) = .19, p = .67$. Thus, we can assume that the effects of the number of choices were not due to students' post-task emotions (see Table 4 for means and standard deviations for each manipulation check variable by choice condition).

Testing the Hypothesized Model

To assess whether the number of choices in combination with intrinsic task value, extrinsic task value, or the decision-making strategy would predict students' intrinsic motivation and task performance, I conducted three different kinds of 2×2 between subjects factorial multivariate analyses of variance (MANOVA): (a) 2 (the number of choices) $\times 2$ (intrinsic task value); (b) 2 (the number of choices) $\times 2$ (extrinsic task value); and (c) 2 (the number of choices) $\times 2$ (decision-making strategy).

The effects of the number of choices and task value. Three dummy-coded variables were used to represent the number of choices (limited choice = 0; extensive choice = 1), intrinsic task value (low = 0; high = 1), and extrinsic task value (low = 0; high = 1) conditions. In terms of intrinsic and extrinsic task values, students were divided into two groups for each condition by using median split (Median for Intrinsic Task Value = 6; Median for Extrinsic Task Value = 6). In other words, students whose scores on intrinsic task value were below the median formed the

low intrinsic task value group, and those whose scores were equivalent to or above the median formed the high intrinsic task value group. Likewise, students whose scores on extrinsic task value were below the median formed the low extrinsic task value group, and those whose scores were equivalent to or above the median formed the high extrinsic task value group.

First, a 2 (the number of choices) $\times$ 2 (intrinsic task value) between subjects factorial multivariate analysis of variance (MANOVA) was conducted to assess whether the number of choices in combination with intrinsic task value influenced perceived choice, perceived competence, interest, value, effort, and task performance. The results indicated that the multivariate main effect of choice condition (Pillai's trace = .02), $F(6, 82) = .25, p = .96$, and the multivariate interaction between choice and intrinsic task value, were not statistically significant (Pillai's trace = .04), $F(6, 82) = .52, p = .79$. Only the multivariate main effect of intrinsic task value was statistically significant (Pillai's trace = .16), $F(6, 82) = 2.56, p = .026$. Therefore, univariate analyses of variance (ANOVAs) were separately conducted on each dependent measure (see Table 5 for means and standard deviations for each dependent variable by condition). The results showed that students who had a higher level of intrinsic task value reported a higher level of perceived choice, $F(1, 87) = 6.57, p = .012, \eta_p^2 = .07$; perceived competence, $F(1, 87) = 10.42, p = .002, \eta_p^2 = .11$; interest, $F(1, 87) = 7.40, p = .008, \eta_p^2 = .08$; value, $F(1, 87) = 6.91, p = .01, \eta_p^2 = .07$; and effort, $F(1, 87) = 6.66, p = .01, \eta_p^2 = .07$, compared to students who had a lower level of intrinsic task value. However, there were no significant main effects of choice condition on dependent variables, and there were also no significant interactions between the number of choices and intrinsic task value for dependent variables.

Table 5

Means and Standard Deviations for Dependent Variables by Choice Condition and Intrinsic Task Value in Study 1

Dependent variable	Intrinsic task value		Intrinsic task value	
	Low		High	
	Limited choice	Extensive choice	Limited choice	Extensive choice
	(<i>n</i> = 24)	(<i>n</i> = 10)	(<i>n</i> = 32)	(<i>n</i> = 25)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Intrinsic motivation				
Perceived choice	18.25 (7.47)	18.10 (5.82)	22.72 (7.90)	23.12 (9.31)
Perceived competence	28.38 (6.20)	31.00 (4.11)	34.47 (3.31)	33.44 (7.86)
Interest	25.54 (6.39)	26.90 (5.88)	31.53 (9.82)	32.20 (10.80)
Value	30.83 (7.06)	34.50 (4.65)	37.44 (8.54)	37.84 (9.69)
Effort	27.58 (4.80)	28.20 (3.71)	30.47 (5.04)	30.92 (4.51)
Task performance	25.96 (5.34)	26.30 (5.12)	28.28 (3.81)	27.96 (5.62)

Table 6

Means and Standard Deviations for Dependent Variables by Choice Condition and Extrinsic Task Value in Study 1

Dependent variable	Extrinsic task value		Extrinsic task value	
	Low		High	
	Limited choice	Extensive choice	Limited choice	Extensive choice
	(<i>n</i> = 13)	(<i>n</i> = 19)	(<i>n</i> = 43)	(<i>n</i> = 16)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Intrinsic motivation				
Perceived choice	24.77 (8.73)	21.47 (10.60)	19.60 (7.41)	21.94 (6.02)
Perceived competence	30.62 (5.52)	33.11 (8.39)	32.23 (5.65)	32.31 (5.20)
Interest	26.69 (12.15)	30.21 (11.14)	29.65 (7.81)	31.25 (8.44)
Value	30.77 (11.32)	37.16 (10.36)	35.77 (7.27)	36.56 (6.28)
Effort	26.15 (6.04)	30.47 (5.03)	30.16 (4.46)	29.75 (3.70)
Task performance	25.54 (5.16)	27.68 (6.63)	27.81 (4.39)	27.25 (3.86)

Second, to assess whether the number of choices in combination with extrinsic task value would predict students' perceived choice, perceived competence, interest, value, effort, and task performance, a 2 (the number of choices) $\times$ 2 (extrinsic task value) between subjects factorial multivariate analysis of variance (MANOVA) was conducted. The multivariate main effect of choice condition (Pillai's trace = .08), $F(6, 82) = 1.22$, $p = .30$, and the multivariate main effect

of extrinsic task value were not statistically significant (Pillai's trace = .12), $F(6, 82) = 1.77, p = .12$. Only the multivariate interaction between choice and extrinsic task value was statistically significant (Pillai's trace = .15), $F(6, 82) = 2.32, p = .04$. Therefore, univariate analyses of variance (ANOVAs) were separately conducted on each dependent measure (see Table 6 for means and standard deviations for each dependent variable by condition). There were no significant main effects of choice condition and extrinsic task value on the dependent variables. Interestingly, however, a significant interaction for effort was found between the number of choices and extrinsic task value, $F(1, 87) = 4.69, p = .03, \eta_p^2 = .05$. The interaction effect was probed by examining simple main effects, using the Bonferroni adjustment (see *Figure 6*). The results indicated that among students who had a lower level of extrinsic task value, receiving the extensive number of choices significantly enhanced their effort, $F(1, 30) = 4.84, p = .04$. Furthermore, considering the simple effect of extrinsic task value for each choice condition, students in the limited choice condition who had a higher level of extrinsic task value put significantly more effort into the book analysis task, compared to students with a lower level of extrinsic task value, $F(1, 54) = 6.81, p = .012$. However, the simple effect of the number of choices on effort was not statistically significant among students with a higher level of extrinsic task value $F(1, 57) = .11, p = .74$; and the simple effect of extrinsic task value on effort was not statistically significant among students who received the extensive number of choices $F(1, 33) = .23, p = .64$.

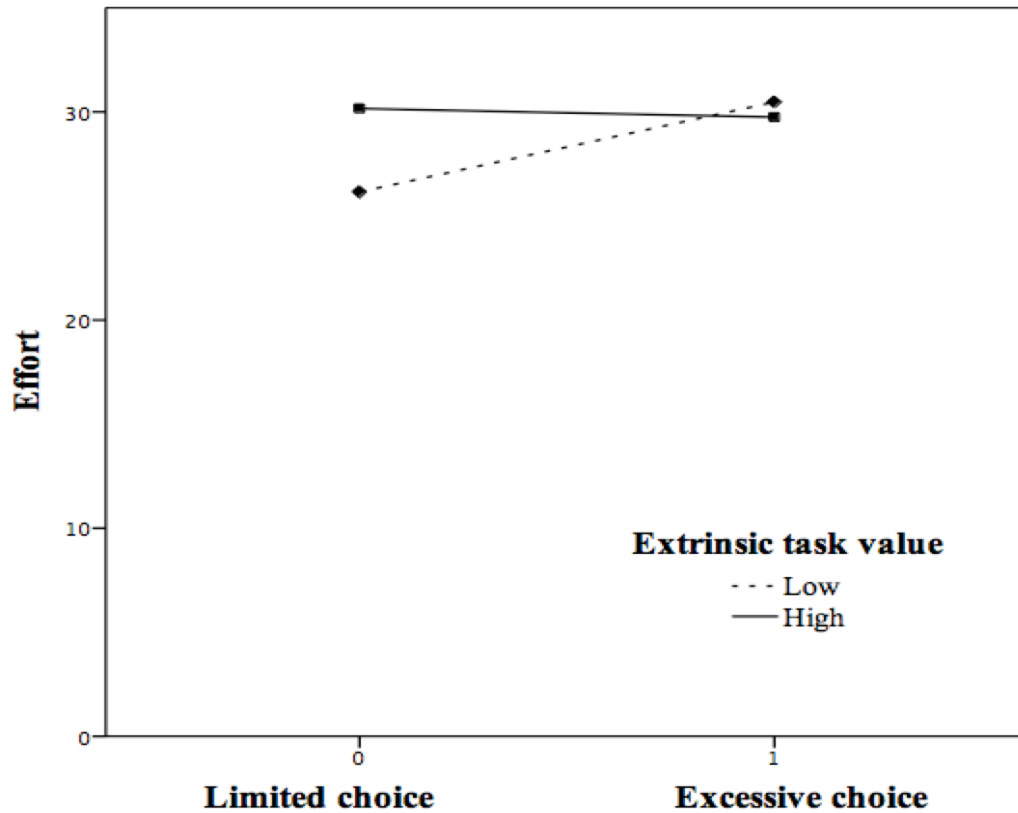


Figure 6. The relation between choice condition and effort by level of extrinsic task value in Study 1.

The effects of the number of choices and decision-making strategy. Two dummy-coded variables were used to represent the number of choices (limited choice = 0; extensive choice = 1) and the decision-making strategy (low = 0; high = 1) conditions. In terms of decision-making strategies, students were divided into two groups for each condition by using a median split (Median = 6). Specifically, students whose scores on the decision-making strategy were below the median formed the low decision-making strategy group, and those whose scores were equivalent to or above the median formed the high decision-making strategy group.

To examine whether the number of choices in combination with the decision-making strategy influenced perceived choice, perceived competence, interest, value, effort, and task performance, a 2 (the number of choices) $\times$ 2 (decision-making strategy) between subjects

factorial multivariate analysis of variance (MANOVA) was conducted. The results indicated that the multivariate main effect of choice condition (Pillai's trace = .01), $F(6, 82) = .14, p = .99$, the multivariate main effect of the decision-making strategy (Pillai's trace = .13), $F(6, 82) = 2.06, p = .07$, and the multivariate interaction between choice and the decision-making strategy were not statistically significant (Pillai's trace = .05), $F(6, 82) = .67, p = .67$. Therefore, univariate analyses of variance (ANOVAs) were separately conducted on each dependent measure (see Table 7 for means and standard deviations for each dependent variable by condition). The results showed that students who had a higher level of using the decision-making strategy reported a higher level of perceived competence, $F(1, 87) = 6.31, p = .01, \eta_p^2 = .07$; interest, $F(1, 87) = 11.30, p = .001, \eta_p^2 = .12$; and value, $F(1, 87) = 10.17, p = .002, \eta_p^2 = .11$, compared to students who had a lower level of using the decision-making strategy. However, there were no significant main effects of choice condition on the dependent variables, and there were also no significant interactions between the number of choices and the decision-making strategy for dependent variables.

Table 7
Means and Standard Deviations for Dependent Variables by Choice Condition and Decision-making Strategy in Study 1

Dependent variable	Decision-making strategy		Decision-making strategy	
	Low		High	
	Limited choice	Extensive choice	Limited choice	Extensive choice
	($n = 31$)	($n = 8$)	($n = 25$)	($n = 27$)
	$M (SD)$	$M (SD)$	$M (SD)$	$M (SD)$
Intrinsic motivation				
Perceived choice	20.90 (7.61)	17.00 (10.80)	20.68 (8.54)	23.07 (7.65)
Perceived competence	30.32 (6.62)	29.75 (6.63)	33.76 (3.24)	33.63 (7.01)
Interest	26.06 (8.45)	24.63 (11.35)	32.56 (8.41)	32.48 (8.83)
Value	31.97 (7.95)	31.75 (8.86)	37.88 (8.22)	38.41 (8.09)
Effort	28.06 (5.47)	29.12 (4.64)	30.68 (4.28)	30.44 (4.40)
Task performance	26.58 (4.98)	26.75 (6.76)	28.16 (4.09)	27.70 (5.15)

Discussion

Study 1's purpose was to improve our understanding of the relations among the number of choices for academic tasks, intrinsic motivation, and task performance, and to explore the moderating effects of students' task values and decision-making strategies in the relations between the number of choices and intrinsic motivation, and between the number of choices and task performance. Study 1 found three main findings related to the following research questions:

1. Does the number of choices affect college students' intrinsic motivation and task performance?
2. Does task value (i.e., perceived importance of the task) moderate the effects of the number of choices on college students' intrinsic motivation and task performance?
3. Does a decision-making strategy (i.e., satisficing versus maximizing) moderate the effects of the number of choices on college students' intrinsic motivation and task performance?

Extensive Choices May Not Always Decrease Intrinsic Motivation and Task Performance

Similar to the results of Iyengar and Lepper's (2000) study, I predicted that students who had 30 choices for academic tasks would display lower levels of intrinsic motivation and task performance than students who had just six choices for academic tasks. However, Study 1 did not provide evidence of the choice overload hypothesis (i.e., an extensive number of choices decreases intrinsic motivation and task performance). There was no significant difference for intrinsic motivation and task performance by choice condition. Why did the results of Study 1 not support the choice overload hypothesis? Such results can be explained in terms of students' post-decision emotions (e.g., difficulty, frustration, and enjoyment) and post-task emotions (e.g., satisfaction and regret).

Extensive Choices are Not Necessarily Perceived as Excessive Choices

Iyengar and Lepper (2000, Study 2) suggested that choice overload might have caused students' post-decision emotions and post-task emotions: (a) students in the extensive choice condition, when compared to students in the limited choice condition, found it more difficult and frustrating during the choice-making process, whereas they perceived the choice-making process to be more enjoyable at the same time; and (b) students in the extensive choice condition, compared to students in the limited choice condition, had a lower level of satisfaction with the number of choices after they completed their assignments and their regrets were higher. To test their choice overload hypothesis, Iyengar and Lepper (2000, Study 3) conducted another experimental study by comparing students who were provided with an extensive array of chocolates with students who were provided with a limited array of chocolates. Their results, based on the results of the manipulation check questions regarding students' post-decision emotions and post-task emotions, supported their hypothesis.

For my Study 1, however, the choice conditions were not distinguished by these manipulation check questions, which could have determined whether the 30 choice condition was actually an excessive choice condition and thus supported the choice overload hypothesis. This implies that students in Study 1 may not have been overwhelmed by the number of choices. Thus, there may not have been an "excessive" choice condition.

The Effect of the Number of Choices on Intrinsic Motivation is Moderated by Extrinsic Task Value, but not by Intrinsic Task Value

The effects of the number of choices on effort can be dependent on whether students perceive the given task as important in order to get a good grade (i.e., extrinsic task value), or whether the task is as important for learning the course material (i.e., intrinsic task value).

Specifically, among students with a lower level of extrinsic task value, extensive choices enhanced students' effort. On the other hand, intrinsic task value enhanced students' effort regardless of the number of choices that were given. Unlike task value, the decision-making strategy did not enhance students' efforts in either the six or the 30 choice conditions. Therefore, extensive choices may be beneficial for effort among those students who think that the given task is not as important for receiving a good grade.

Conclusions

Study 1 investigated the underlying mechanisms of the effects of choice by randomly assigning students to complete the book analysis task under either limited or extensive choice conditions. Unlike Iyengar and Lepper's study (2000), the book analysis task was a required assignment, worth 25 percent of the course grade. Therefore, although the results of Study 1 did not support the choice overload hypothesis, they elicited the following question:

Will the effects of choice on students' intrinsic motivation and task performance show the same levels when students are provided with an elective low-stakes assignment (e.g., the movie response essay in Iyengar and Lepper's study) as when they are provided with a required high-stakes assignment (e.g., the book analysis task in Study 1)?

In this way, Study 2 explored the same research hypotheses by using an elective low-stakes assignment, modeled more closely on Iyengar and Lepper's study. I added one additional item for measuring decision-making strategies, which represented the maximizing decision-making strategy more explicitly (see Appendix C). Furthermore, Study 2 added one additional subscale for measuring intrinsic motivation in regards to perceived choice regarding course ideas (e.g., survey item: "I didn't really have a choice about which course ideas to use for this

assignment”) in order to differentiate it from perceived choice regarding the task itself (e.g., survey item: “I didn’t really have a choice about doing the given assignment;” see Appendix E). Finally, Study 1’s results can be limited because of its relatively small sample size, which further leads to decreased statistical power. Thus, I collected data from a course which was divided into seven sections of 50 students each in Study 2, in order to have more participants.

CHAPTER 4: Study 2

Study 1, which investigated the choice overload phenomenon by using a required high-stakes assignment, was not consistent with Iyengar and Lepper's choice overload study (2000). Therefore, Study 2 explored the same research hypotheses by using an elective low-stakes assignment modeled more closely after Iyengar and Lepper's study. In addition, similar to Iyengar and Lepper's study, Study 2's participants were asked to complete a movie response essay after watching a collection of movie clips (instead of the book analysis task after reading a book) under one of two choice conditions: limited choice and extensive choice.

In both conditions, students were provided with a link via their email to a 250-300-word extra-credit assignment. They were asked to apply ideas from the course to a collection of clips from popular movies (also included in the link). In the limited choice condition, students chose and analyzed three course ideas from a list of six options. Students in the extensive choice condition chose three course ideas from a list of 30 options. Students also completed the same manipulation check questions regarding the choice experience and the same surveys to assess task value, the decision-making strategy, and intrinsic motivation. Unlike Study 1, however, Study 2 included one additional item for measuring decision-making strategies and one additional subscale for measuring intrinsic motivation. Task performance was determined by grades on the extra-credit assignment.

Method

Participants

The initial plan for the study involved 264 undergraduate students, who were taking an introductory educational psychology course in the Spring 2015 semester at Michigan State University. However, only 44 percent (116) of the students completed the assignment. The final

sample therefore consisted of 116 students (85 females, 31 males). The procedures for study 2 were reviewed and approved by Michigan State University's Institutional Review Board (IRB No. x15-085e).

Setting

Study 2 was conducted in the “TE 150 Reflections on Learning” face-to-face class at Michigan State University. This course is an introductory educational psychology course required for pre-service teachers. Therefore, most students in the TE 150 face-to-face course take it as a required class. This course is divided into seven sections, with each section taught by two graduate student instructors.

Procedures

The procedures of Study 2 were aligned with Iyengar and Lepper's study (2000). I recruited students by attending seven sections of the course and by presenting a five-minute video introduction of the study and the procedures. After showing the video, I distributed sign-up sheets, which asked for the full name, college major, and e-mail address for those students who wanted to participate in the study. Students who signed up to participate in the study also received extra-credit for their class grade.

The recruited students were randomly assigned to complete the movie response essay under one of two choice conditions, and they were provided with a link. In the limited choice condition, students received a link to one of three random lists of six course ideas from a list of 30 course ideas, and they were asked to choose three to use for their movie response essay. In the extensive choice condition, students received a link to a list of 30 course ideas, and they were asked to choose three course ideas from the list (see Appendix A). Each link also included a collection of clips from popular movies; surveys on task value, the decision-making strategy, and

intrinsic motivation; a manipulation check; and a place for students to place their 250-300-word movie response essays.

The movie response essay was an extra-credit assignment in the course, and students applied their knowledge from the course to the movie clips they watched. Specifically, this assignment focused on how accurately students applied specific course ideas to episodes from the collection of popular movie clips. After choosing three course ideas, students completed surveys on task value and decision-making strategies, and on post-decision emotions (e.g., difficulty, frustration, enjoyment) from the manipulation check. Next, students wrote the movie response essay. Surveys for intrinsic motivation and post-task emotions (e.g., satisfaction and regret) from the manipulation check were presented at the end of the given link. Students should have completed the assignment within 24 hours of when they initiated it, and the assignment was due one week after they were provided with the link.

Measures

All measures in Study 2 were the same as those used in Study 1. As mentioned previously, however, Study 2 included one additional item for measuring decision-making strategies: “I believe that my choice for course ideas will be among the best I have ever had. I believe the course ideas I chose represent the *best choices* I could have possibly made, not simply choices that are *good enough*” (see Appendix C). This item represented the maximizing decision-making strategy more explicitly. It was also significantly correlated with the decision-making strategy item used in Study 1: “I felt that I made a well-informed decision on the course ideas I chose for the assignment,” ($r = .59, p < .01$). Thus, these two items were combined into a composite decision-making strategy measure in Study 2, and the reliability of this measure was

also moderately significant ($\alpha = .65$). Students responded to each item on a seven-point Likert scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

In addition, one additional subscale was used to measure intrinsic motivation, which was called perceived choice regarding course ideas. This subscale was derived from the perceived choice subscale of the Intrinsic Motivation Inventory (IMI; Ryan, 1982). The original perceived choice subscale focused on perceived choice regarding the task itself (e.g., I didn't really have a choice about doing the given assignment), but is not related to the number of choices for course ideas. Thus, Study 2 differentiated perceived choice regarding course ideas from perceived choice regarding the task itself. The five items on perceived choice regarding course ideas were modified from the original perceived choice subscale and rephrased to refer to choosing the course ideas instead of doing the given task (e.g., I didn't really have a choice about which course ideas to use for this assignment). Furthermore, each survey question on the Intrinsic Motivation Inventory was rephrased to refer to the movie response essay instead of the book analysis task (see Appendix E). Similar to previous research (e.g., Ryan, 1982), this study also provided strong support for the reliability of each subscale: perceived choice regarding the task itself (seven items; $\alpha = .77$), perceived choice regarding course ideas (five items; $\alpha = .72$), perceived competence (six items; $\alpha = .76$), interest (seven items; $\alpha = .91$), value (seven items; $\alpha = .90$), and effort (five items; $\alpha = .84$). Students responded to each item on a seven-point Likert scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

Finally, the movie response essay grade was used to measure students' task performance in Study 2. Two graduate student instructors graded the assignment based on the same course rubric, which was also used in Study 1 (see Appendix F). Inter-rater reliability was determined by comparing the independent grading by each of the two graduate student instructors (who were

unaware of the students' choice conditions and the hypotheses of Study 2) on 10 percent of all movie response essays by each of the two instructors. The inter-rater reliability for form scores was $\alpha = .90$ ($p < .01$), and the inter-rater reliability for content scores was $\alpha = .93$ ($p < .01$). These reliability results indicated that agreements between the two raters were above 80 percent; therefore, the instructors graded the rest of the movie response essays individually, without any calibration of the task performance ratings.

Research Hypotheses

My expectations with respect to the effect of choice overload in Study 2 were the same as for Study 1.

- H1: Students who are in the extensive choice condition will display lower levels of intrinsic motivation (see solid path H1-a in *Figure 7* and *Figure 8*) and task performance (see solid path H1-b in *Figure 7* and *Figure 8*) than students who are in the limited choice condition.
- H2: Task value, especially the perceived importance of the task, will moderate the relations between the number of choices and intrinsic motivation (see broken path H2-a in *Figure 7*), and between the number of choices and task performance (see broken path H2-b in *Figure 7*), so that the relations will be weaker under the condition of high task importance than under the condition of low task importance.
- H3: Decision-making strategies will moderate the relations between the number of choices and intrinsic motivation (see broken path H3-a in *Figure 8*), and between the number of choices and task performance (see broken path H3-b in *Figure 8*), so that the relations will be weaker under the condition when students have

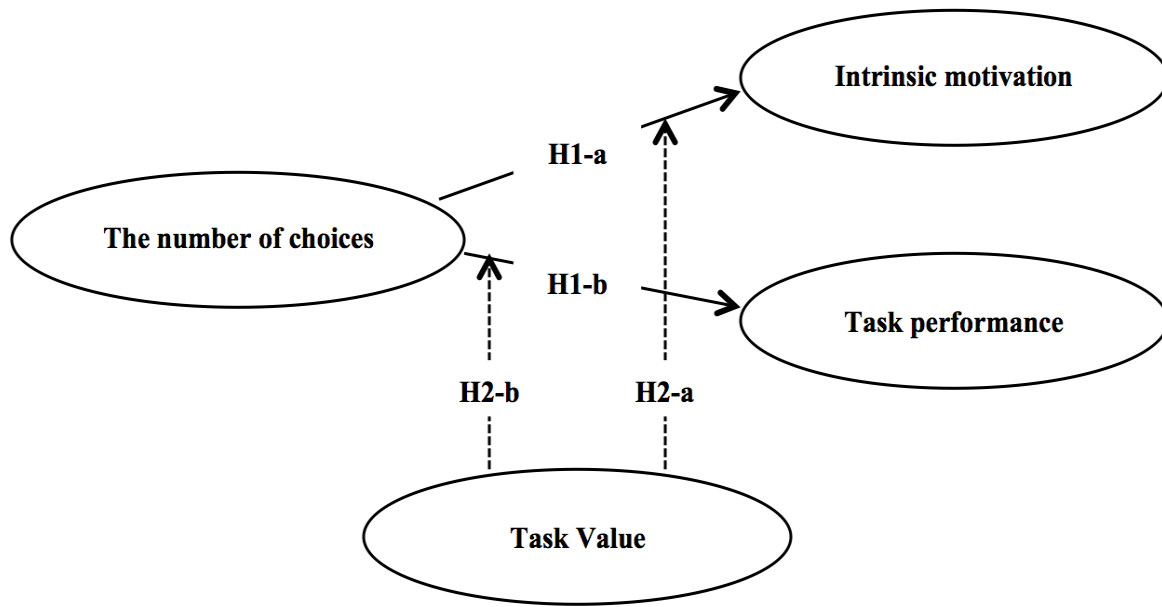


Figure 7. Hypothesized model of the relationships among choice, intrinsic motivation, and task performance, with task value acting as a moderator.

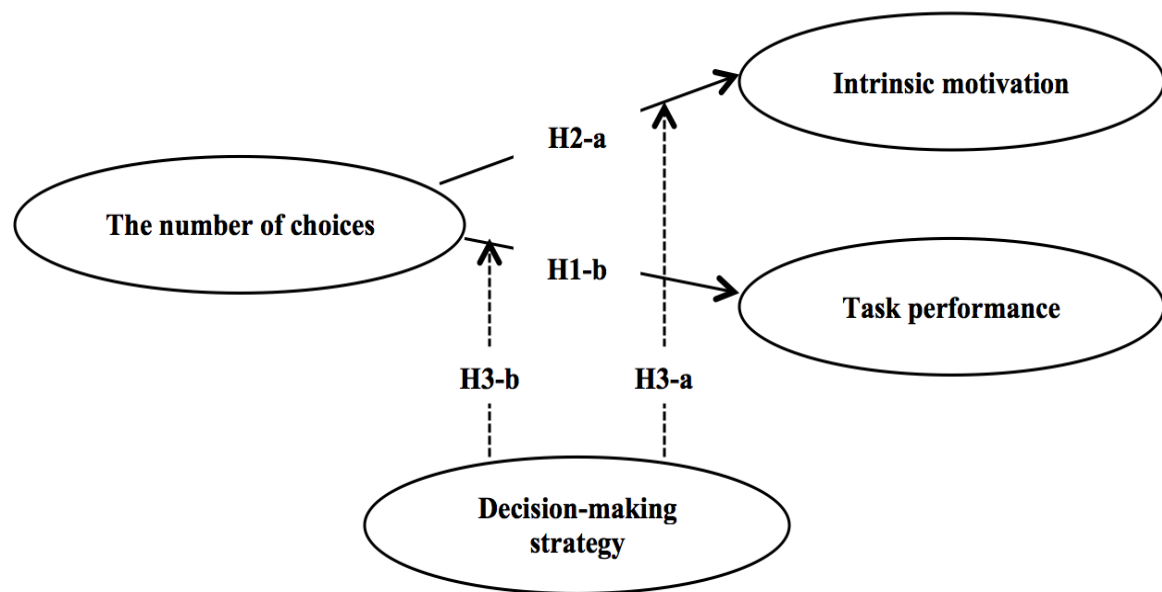


Figure 8. Hypothesized model of the relationships among choice, intrinsic motivation, and task performance, with decision-making strategy acting as a moderator.

lower levels of well-informed decision-making strategy (i.e., satisficing) than under the condition when students have higher levels of well-informed decision-making strategy (i.e., maximizing).

Results

Preliminary Analyses

Box plots, the standardized way of displaying the distribution of scores, were used to look for statistical outliers on each dependent variable, and no outliers were identified. Thus, the number of participants used in the data analyses was 116 (85 females, 31 males). Means and standard deviations of students' intrinsic motivation (including perceived choice regarding the task itself, perceived choice regarding course ideas, perceived competence, interest, value, and effort) and task performance by choice condition are presented in Table 8. In addition, correlations among the relevant variables are presented in Table 9.

In addition, I explored whether the number of choices affected the percentage of students' extra-credit task completion. Of the 62 students assigned to the limited choice condition, 47 percent chose to complete the assignment. On the other hand, of the 54 students assigned to the extensive choice condition, 41 percent chose to complete the assignment. However, unlike the results of Iyengar and Lepper's study, there was no statistically significant difference by choice condition $\chi^2(1, N = 116) = .552, p = .458$.

Table 8: *Means and Standard Deviations of Dependent Variables in Study 2*

Dependent variable	Limited choice (<i>n</i> = 62)	Extensive choice (<i>n</i> = 54)
Intrinsic motivation		
Perceived choice (task itself)	39.77 (6.06)	40.83 (5.72)
Perceived choice (course ideas)	25.18 (5.12)	27.81 (4.34)
Perceived competence	33.21 (4.19)	33.15 (4.06)
Interest	32.23 (7.53)	31.93 (7.40)
Value	36.97 (7.43)	36.74 (5.39)
Effort	28.68 (4.46)	27.54 (5.07)
Task performance	23.84 (5.76)	26.13 (4.89)

Table 9: *Correlations among Dependent Variables in Study 2*

	1	2	3	4	5	6	7
1. Perceived choice (task itself)	–	.57**	.29**	.32**	.24**	.02	-.04
2. Perceived choice (course ideas)		–	.34**	.35**	.26**	.09	-.05
3. Perceived competence			–	.35**	.44**	.35**	.02
4. Interest				–	.70**	.35**	-.19*
5. Value					–	.48**	-.18
6. Effort						–	.12
7. Task performance							–

* $p < .05$, ** $p < .01$

Manipulation Check

Before testing the hypothesized model, one-way ANOVAs on the students' post-decision emotions (e.g., difficulty, frustration, or enjoyment) and post-task emotions regarding their choices for course ideas (e.g., satisfaction or regret) were conducted to assess whether they influenced the number of choices.

Table 10: *Means and Standard Deviations of Manipulation Check Variables in Study 2*

Manipulation check variable	Limited choice (<i>n</i> = 62)	Extensive choice (<i>n</i> = 54)
Post-decision emotions		
Difficulty	4.03 (1.70)	3.35 (1.68)
Frustration	4.63 (1.58)	4.24 (1.45)
Enjoyment	4.03 (1.63)	3.93 (1.70)
Post-task emotions		
Satisfaction	5.37 (1.28)	5.76 (0.85)
Regret	2.76 (1.34)	2.37 (1.32)

Post-decision emotions. The results of the one-way ANOVAs on the students' post-decision emotions showed that the extensive and the limited choice conditions did not significantly differ with regard to students' perceived difficulty, $F(1, 114) = 1.88, p = .17$ or enjoyment, $F(1, 114) = .85, p = .36$. However, students who received six course ideas felt more frustrated when choosing course ideas for the movie response essay, compared to students who received 30 course ideas, $F(1, 114) = 4.67, p = .03$. Thus, we can assume that the effects of the number of choices were not due to either students' perceived difficulty or enjoyment, but we can assume that the number of choices was influenced by students' frustration (see Table 10 for means and standard deviations for each manipulation check variable by choice condition).

Post-task emotions. The results of the one-way ANOVAs on the students' post-task emotions showed that the extensive and the limited choice conditions did not significantly differ with regard to students' post-task satisfaction, $F(1, 114) = 3.59, p = .06$, or post-task regret, $F(1, 114) = 2.45, p = .12$. Thus we can assume that the effects of the number of choices were not due to students' post-task emotions (see Table 10 for means and standard deviations for each manipulation check variable by choice condition).

Testing the Hypothesized Model

To assess whether the number of choices in combination with either intrinsic task value, extrinsic task value, or the decision-making strategy would predict students' intrinsic motivation and task performance, a 2 (the number of choices) $\times$ 2 (intrinsic task value/extrinsic task value/decision-making strategy) between subjects factorial multivariate analysis of variance (MANOVA) was conducted.

The effects of the number of choices and task value. Three dummy-coded variables were used to represent the number of choices (limited choice = 0; extensive choice = 1), intrinsic task value (low = 0; high = 1), and extrinsic task value (low = 0; high = 1) conditions. Similar to Study 1, students were divided into two groups for each condition by using a median split (Median for Intrinsic Task Value = 5; Median for Extrinsic Task Value = 5). In other words, students whose scores on intrinsic task value were below the median formed the low intrinsic task value group, and students whose scores were equivalent to or above the median formed the high intrinsic task value group. Likewise, students whose scores on extrinsic task value were below the median formed the low extrinsic task value group, and students whose scores were equivalent to or above the median formed the high extrinsic task value group.

First, to assess whether the number of choices in combination with intrinsic task value predicted students' perceived choice (task itself), perceived choice (course ideas), perceived competence, interest, value, effort, and task performance, a 2 (the number of choices) $\times$ 2 (intrinsic task value) between subjects factorial multivariate analysis of variance (MANOVA) was conducted. The results indicated that the multivariate main effect of choice condition (Pillai's trace = .14), $F(7, 106) = 2.52, p = .019$ and the multivariate main effect of intrinsic task value were statistically significant (Pillai's trace = .13), $F(7, 106) = 2.19, p = .041$. However, the

multivariate interaction between choice and intrinsic task value was not statistically significant (Pillai's trace = .01), $F(7, 106) = .22, p = .98$. Therefore, univariate analyses of variance (ANOVAs) were separately conducted on each dependent measure (see Table 11 for means and standard deviations for each dependent variable by condition). The results showed that there were significant main effects of the number of choices. Specifically, students who were in the extensive choice condition reported higher levels of perceived choice regarding course ideas, $F(1, 112) = 7.62, p = .007, \eta_p^2 = .06$; and task performance, $F(1, 112) = 4.29, p = .041, \eta_p^2 = .04$, compared to students who were in the limited choice condition. There were also significant main effects of intrinsic task value. In other words, students who had a higher level of intrinsic task value reported higher levels of value $F(1, 112) = 8.63, p = .004, \eta_p^2 = .07$; and effort, $F(1, 112) = 8.57, p = .004, \eta_p^2 = .07$, compared to students who had a lower level of intrinsic task value. However, there were no significant interactions between the number of choices and the intrinsic task values for the dependent variables.

Table 11
Means and Standard Deviations for Dependent Variables by Choice Condition and Intrinsic Task Value in Study 2

Dependent variable	Intrinsic task value Low		Intrinsic task value High	
	Limited choice	Extensive choice	Limited choice	Extensive choice
	($n = 23$)	($n = 18$)	($n = 39$)	($n = 36$)
	$M (SD)$	$M (SD)$	$M (SD)$	$M (SD)$
Intrinsic motivation				
Perceived choice (task itself)	40.22 (6.41)	41.17 (6.31)	39.51 (5.91)	40.67 (5.49)
Perceived choice (course ideas)	28.09 (5.56)	30.11 (4.07)	28.38 (5.30)	30.81 (4.48)
Perceived competence	32.43 (4.17)	33.33 (4.69)	33.67 (4.19)	33.06 (3.77)
Interest	30.65 (6.18)	30.78 (8.24)	33.15 (8.16)	32.50 (6.98)
Value	34.43 (7.62)	34.56 (4.63)	38.46 (6.98)	37.83 (5.46)
Effort	26.61 (4.82)	26.22 (6.00)	29.90 (3.79)	28.19 (4.49)
Task performance	23.39 (5.12)	25.33 (5.51)	24.10 (6.15)	26.53 (4.58)

Table 12

Means and Standard Deviations for Dependent Variables by Choice Condition and Extrinsic Task Value in Study 2

Dependent variable	Extrinsic task value Low		Extrinsic task value High	
	Limited choice (<i>n</i> = 26)	Extensive choice (<i>n</i> = 15)	Limited choice (<i>n</i> = 36)	Extensive choice (<i>n</i> = 39)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Intrinsic motivation				
Perceived choice (task itself)	41.00 (5.76)	43.07 (5.57)	38.89 (6.19)	39.97 (5.61)
Perceived choice (course ideas)	28.50 (5.44)	32.27 (3.15)	28.11 (5.37)	29.92 (4.57)
Perceived competence	32.77 (3.75)	33.67 (3.70)	33.53 (4.51)	32.95 (4.22)
Interest	30.42 (7.49)	30.00 (6.35)	33.53 (7.40)	32.67 (7.71)
Value	34.96 (7.31)	34.20 (4.51)	38.42 (7.27)	37.72 (5.43)
Effort	26.65 (4.86)	24.33 (5.30)	30.14 (3.55)	28.77 (4.46)
Task performance	24.92 (4.73)	25.93 (5.52)	23.06 (6.35)	26.21 (4.70)

Second, a 2 (the number of choices) $\times$ 2 (extrinsic task value) between subjects factorial multivariate analysis of variance (MANOVA) was conducted to assess whether the number of choices in combination with extrinsic task value influenced perceived choice (task itself), perceived choice (course ideas), perceived competence, interest, value, effort, and task performance. The multivariate main effect of choice condition (Pillai's trace = .21), $F(7, 106) = 3.95$, $p = .001$, and the multivariate main effect of extrinsic task value were statistically significant (Pillai's trace = .26), $F(7, 106) = 5.25$, $p < .001$. However, the multivariate interaction between choice and extrinsic task value was not statistically significant (Pillai's trace = .03), $F(7, 106) = .44$, $p = .88$. Therefore, univariate analyses of variance (ANOVAs) were separately conducted on each dependent measure (see Table 12 for means and standard deviations for each dependent variable by condition). The results showed that there were significant main effects of the number of choices. Specifically, students who were in the extensive choice condition reported higher levels of perceived choice regarding course ideas, F

(1, 112) = 10.93, $p = .001$, $\eta_p^2 = .09$; and task performance, $F(1, 112) = 3.78$, $p = .05$, $\eta_p^2 = .03$, compared to students who were in the limited choice condition. In contrast, students in the limited choice condition put more effort into the movie response essay than students in the extensive choice condition, $F(1, 112) = 4.41$, $p = .038$, $\eta_p^2 = .04$. There were also significant main effects of extrinsic task value. In other words, students who had a higher level of extrinsic task value reported higher levels of interest, $F(1, 112) = 3.84$, $p = .05$, $\eta_p^2 = .03$; value, $F(1, 112) = 7.48$, $p = .007$, $\eta_p^2 = .06$; and effort, $F(1, 112) = 20.33$, $p < .001$, $\eta_p^2 = .15$, compared to students who had a lower level of extrinsic task value. On the other hand, students who had a lower level of extrinsic task value showed a higher level of perceived choice (task itself), compared to students who had a higher level of extrinsic task value, $F(1, 112) = 5.03$, $p = .027$, $\eta_p^2 = .04$. However, there were no significant interactions between the number of choices and the extrinsic task values for the dependent variables.

The effects of the number of choices and decision-making strategy. Two dummy-coded variables were used to represent the number of choices (limited choice = 0; extensive choice = 1) and the decision-making strategy (low = 0; high = 1) conditions. In terms of decision-making strategies, students were divided into two groups for each condition by using median split (Median = 11). Specifically, students whose scores on the decision-making strategy were below the median formed the low decision-making strategy group (i.e., satisficing), and students whose scores were equivalent to or above the median formed the high decision-making strategy group (i.e., maximizing).

To examine whether the number of choices in combination with the decision-making strategy influenced perceived choice (task itself), perceived choice (course ideas), perceived competence, interest, value, effort, and task performance, a 2 (the number of choices) $\times$ 2

(decision-making strategy) between subjects factorial multivariate analysis of variance (MANOVA) was conducted. The results indicated that the multivariate main effect of choice condition (Pillai's trace = .18), $F(7, 106) = 3.21, p = .004$, and the multivariate main effect of the decision-making strategy were statistically significant (Pillai's trace = .13), $F(7, 106) = 2.23, p = .038$. However, the multivariate interaction between choice and the decision-making strategy was not statistically significant (Pillai's trace = .09), $F(7, 106) = 1.58, p = .15$. Therefore, univariate analyses of variance (ANOVAs) were separately conducted on each dependent measure (see Table 13 for means and standard deviations for each dependent variable by condition). The results showed that there were significant main effects of the number of choices. Specifically, students who were in the extensive choice condition reported higher levels of perceived choice regarding course ideas, $F(1, 112) = 7.40, p = .008, \eta_p^2 = .06$; and task performance, $F(1, 112) = 5.72, p = .018, \eta_p^2 = .05$, compared to students who were in the limited choice condition. There were also significant main effects of the decision-making strategy. In other words, students who had a higher level of using the decision-making strategy reported higher levels of perceived competence, $F(1, 112) = 5.99, p = .016, \eta_p^2 = .05$; interest, $F(1, 112) = 5.26, p = .024, \eta_p^2 = .05$; value, $F(1, 112) = 13.50, p < .001, \eta_p^2 = .11$; and effort, $F(1, 112) = 6.88, p = .01, \eta_p^2 = .06$, compared to students who had a lower level of using the decision-making strategy. In addition, there was a significant interaction between the number of choices and the decision-making strategy for value, $F(1, 112) = 4.79, p = .031, \eta_p^2 = .04$; thus the interaction effect was probed by examining simple main effects, using the Bonferroni adjustment (see *Figure 9*). The results indicated that among students with a higher level of decision-making strategy, receiving the extensive number of choices significantly decreased students' value, $F(1, 57) = 5.95, p = .018$. Furthermore, considering the simple effect of the decision-making strategy

for each choice condition, among students in the limited choice condition, those who had a higher level of decision-making strategy had a significantly higher level of value, compared to students with a lower level of decision-making strategy, $F(1, 60) = 15.59, p < .001$. However, the simple effect of the number of choices on value was not statistically significant among students with a lower level of decision-making strategy, $F(1, 55) = .82, p = .37$; and the simple effect of the decision-making strategy on value was not statistically significant among students who received the extensive number of choices $F(1, 52) = 1.32, p = .26$.

Table 13
Means and Standard Deviations for Dependent Variables by Choice Condition and Decision-making Strategy in Study 2

Dependent variable	Decision-making Strategy Low		Decision-making Strategy High	
	Limited choice ($n = 35$)	Extensive choice ($n = 22$)	Limited choice ($n = 27$)	Extensive choice ($n = 32$)
	$M (SD)$	$M (SD)$	$M (SD)$	$M (SD)$
Intrinsic motivation				
Perceived choice (task itself)	39.51 (5.95)	39.41 (5.84)	40.11 (6.28)	41.81 (5.52)
Perceived choice (course ideas)	28.23 (5.07)	29.50 (4.31)	28.33 (5.81)	31.31 (4.25)
Perceived competence	32.26 (4.29)	32.23 (4.90)	34.44 (3.79)	33.78 (3.30)
Interest	30.80 (7.82)	30.09 (7.90)	34.07 (6.85)	33.19 (6.87)
Value	34.03 (7.77)	35.73 (5.15)	40.78 (4.89)	37.44 (5.52)
Effort	27.34 (4.87)	26.64 (5.64)	30.41 (3.19)	28.16 (4.64)
Task performance	23.89 (5.74)	27.00 (3.24)	23.78 (5.89)	25.53 (5.74)

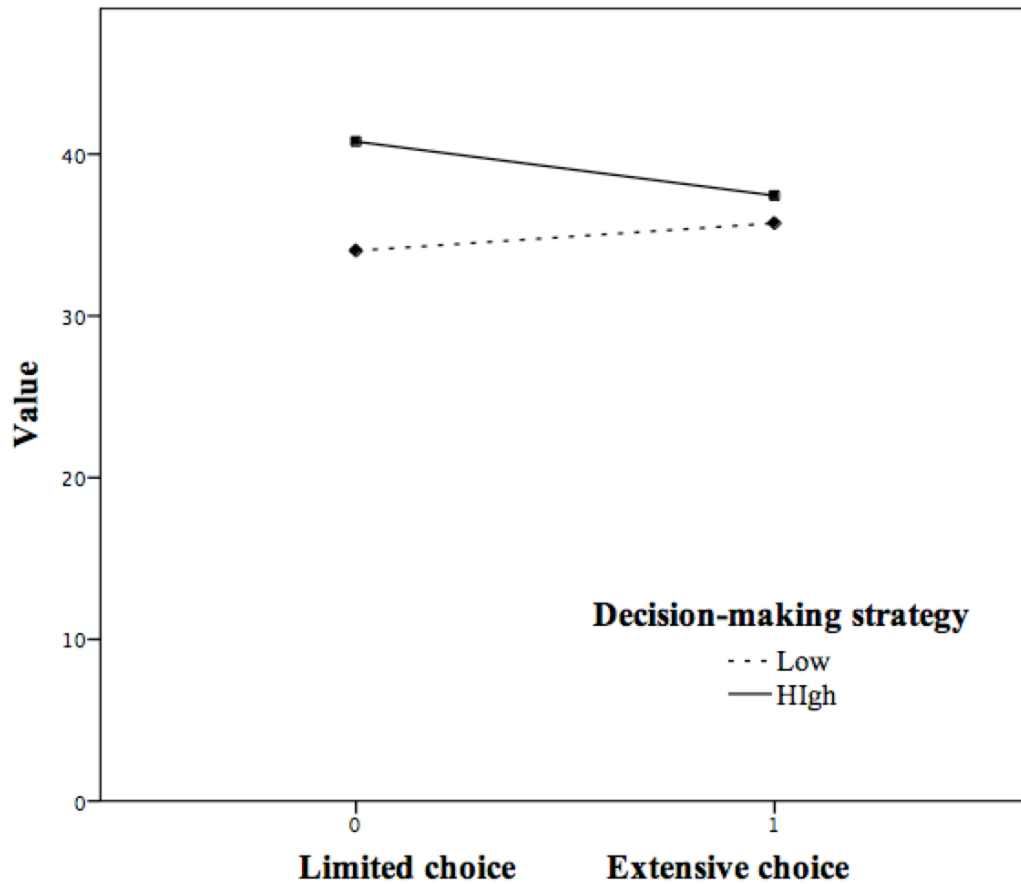


Figure 9. The relation between choice condition and value by level of decision-making strategy in Study 2.

Ancillary Analyses

As mentioned before, participants in Study 2 were recruited from a course, and they obtained extra-credit for their course grade. Receiving extra-credit implies that the recruited students might have a tendency to overachieve regardless of choice condition, which can raise the concern of a selection bias. However, the means for each dependent variable in Study 2 were not as high as in Study 1, which helps to argue against the selection bias issue.

Ancillary analyses were conducted on data from Study 1 and Study 2 and compared. The results of ancillary analyses by using the one-way ANOVAs on students' intrinsic motivation (e.g. perceived choice regarding task itself, perceived competence, interest, value, and effort) and

task performance indicated that students in Study 1 had higher levels of effort $F(1, 205) = 4.56$, $p = .034$, and task performance, $F(1, 205) = 11.20$, $p = .001$, compared to students in Study 2. On the other hand, students in Study 2 had higher levels of perceived choice (task itself), $F(1, 205) = 379.54$, $p < .001$, and interest, $F(1, 205) = 4.47$, $p = .036$, compared to students in Study 1. However, Study 1 and Study 2 did not significantly differ with regard to students' perceived competence, $F(1, 205) = 1.88$, $p = .17$, and value, $F(1, 205) = 1.72$, $p = .19$. Perceived choice regarding course ideas, which was only used in Study 2, was not included in these analyses.

Thus, we can conclude that participants in Study 2 would have generally higher levels of perceived choice (task itself) and interest regardless of choice condition. However, the conclusion does not necessarily imply that participants in Study 2 were composed of overachieving students in regard to extra points. This is because participants in Study 2 were shown to have generally lower levels of effort and task performance, which might more precisely display the characteristics of overachieving students. Hence, the extra-credit assignment in Study 2 probably did not cause the selection bias (see Table 14 for means and standard deviations for each dependent variable across Study 1 and Study 2).

Table 14: *Means and Standard Deviations for Dependent Variables across Study 1 and Study 2*

Dependent variable	Study 1 ($n = 91$)	Study 2 ($n = 116$)
Intrinsic motivation		
Perceived choice (task itself)	21.14 (8.21)	40.27 (5.90)
Perceived competence	32.20 (6.17)	33.18 (4.11)
Interest	29.63 (9.31)	32.09 (7.44)
Value	35.48 (8.59)	36.86 (6.53)
Effort	29.58 (4.85)	28.15 (4.77)
Task performance	27.36 (4.94)	24.91 (5.47)

Discussion

Study 2's purpose, as in Study 1, was to explore the effects of the number of choices on intrinsic motivation and task performance and to investigate whether task value and the decision-making strategy may influence the effects of choice on intrinsic motivation and task performance. Study 2 examined these issues by using an elective low-stakes assignment, modeled more closely on Iyengar and Lepper's study, whereas Study 1 used a required high-stakes assignment. I conducted Study 2 because the results of Study 1 did not support the choice overload hypothesis, and I assumed that different patterns of the effects of choice on students' intrinsic motivation and task performance would be due to task characteristics. Study 2 found three main findings related to the following research questions:

1. Does the number of choices affect college students' intrinsic motivation and task performance?
2. Does task value (i.e., perceived importance of the task) moderate the effects of the number of choices on college students' intrinsic motivation and task performance?
3. Does a decision-making strategy (i.e., satisficing versus maximizing) moderate the effects of the number of choices on college students' intrinsic motivation and task performance?

Extensive Choices May Actually Increase, Not Decrease, Intrinsic Motivation and Task Performance

Study 2 showed that 30 choices enhanced higher levels of perceived choice regarding course ideas and task performance. These results suggest an opposite pattern of the choice overload hypothesis (i.e., an extensive number of choices decreases intrinsic motivation and task performance). It indicates that among students who are provided with an elective low-stakes

assignment, 30 choices may contribute to motivational benefits—especially perceived choice regarding course ideas—and a higher level of task performance. However, at this time, the roles of perceived choice regarding course ideas and perceived choice regarding the task itself could be considered separately in explaining the effects of choice. This is because 30 choices only enhanced perceived choice regarding course ideas, but did not affect perceived choice regarding the task itself. Why then, were the results not consistent with other previous choice overload studies?

Extensive Choices May be Perceived as Moderate Choices, Not Excessive Choices

The choice conditions were distinguished by students' feeling of frustration. Specifically, in Study 2, students who received six course ideas felt more frustrated when choosing course ideas for the movie response essay, compared to students who received 30 course ideas. Thus, we can assume that 30 choices might not be an excessive number of choices in Study 2. Rather, 30 choices might be a moderate number of choices, which decreased students' feeling of frustration. These results contrasted with the results of Haynes's study (2009). Participants in his study were asked to complete a composite measure of difficulty/frustration regarding the given task, and the results showed that students who had ten options (i.e., extensive choice condition) found their decisions to be more difficult and frustrating, compared to students who had three options (i.e., limited choice condition). Therefore, students' feeling of frustration can be a possible explanation for why Study 2 showed that students with 30 choices had higher levels of students' perceived choice regarding course ideas and task performance, compared to students with 6 choices.

The Effect of the Number of Choices on Intrinsic Motivation is Moderated by Students' Decision-Making Strategy, but not by Task Value

Study 2 suggests that 30 choices decreased intrinsic motivation, especially value, among students who used maximizing (i.e., a higher level of well-informed decision-making strategy). On the other hand, 30 choices did not affect intrinsic motivation among students who used satisficing (i.e., a lower level of well-informed decision-making strategy). These results are consistent with Schwartz and his colleagues' study (2002). Although they did not measure students' motivational outcomes, their study displayed that satisficers had higher levels of positive emotions, such as happiness, self-esteem, and life satisfaction, compared to maximizers.

Overall, as predicted, the result showed a similar pattern of the research hypothesis, wherein 30 choices decreased intrinsic motivation among students who used maximizing. However, such a result should be cautiously interpreted, according to Simon's (1957) argument that people who are provided with extensive choices can be overwhelmed if they attempt to use maximizing for choosing, which may contribute to decreasing intrinsic motivation. This is because students who had 30 choices felt less frustrated by their choice experience, compared to students who had 6 choices, based on the results of the manipulation check in Study 2. In this way, we can assume that maximizing can be influenced by the actual number of choices, rather than whether participants perceive the given number of choices as overwhelming (or frustrating).

Unlike the decision-making strategy, however, the two types of task value did not enhance students' intrinsic motivation in either the six or the 30 choice conditions. In this way, extensive choices contributed to decreasing intrinsic motivation, especially value, only for students who used the maximizing decision-making strategy in Study 2.

Conclusions

Study 2, in comparison to Study 1, showed different patterns of the effects of choice on students' intrinsic motivation and task performance. Study 2 showed that 30 choices enhanced higher levels of intrinsic motivation and task performance, whereas Study 1 showed no significant difference for intrinsic motivation and task performance by choice condition. So, why did Study 1 and Study 2 show different patterns of the effects of choice? One possible explanation is that there was a significant difference in frustration (i.e., among the manipulation check questions) by the choice condition in Study 2, whereas no manipulation check questions were distinguished by the choice condition in Study 1. Specifically, students who received limited course ideas felt more frustrated when making choices for the movie response essay, compared to students who received extensive course ideas. This can lead to a conclusion that many choices might have been beneficial in Study 2 because students who received many choices felt less frustrated.

CHAPTER 5: General Discussion

Prior research suggests that many choices can decrease students' intrinsic motivation and task performance (e.g., Iyengar & Lepper, 2000, Schwartz, 2000; Schwartz, Ward, Monterosso, Lyubomirsky, White, & Lehman, 2002). In this dissertation, I conducted two experimental studies by closely following the model of Iyengar and Lepper's choice overload study (2000) in order to explore how to maximize the motivational benefits of choice by considering the number of choices as a contextual factor. In addition, I investigated whether individual factors, such as task value and decision-making strategies, can moderate the effect of the number of choices on students' intrinsic motivation and task performance.

Unexpectedly, the two experimental studies showed mixed findings regarding the effects of choice, with neither supporting the choice overload hypothesis. Even more surprisingly, the results of Study 2 were the exact opposite of Iyengar and Lepper. Study 2 showed that extensive choices increase students' intrinsic motivation and task performance, whereas Iyengar and Lepper suggested that extensive choices decrease students' intrinsic motivation and task performance. In this general discussion section, these contradictory findings of the three studies are examined closely. This investigation analyzed all three studies simultaneously, and in doing so, interesting patterns and possible explanations appeared.

Finding 1. The Relation between Feelings of Frustration, Intrinsic Motivation, and Task Performance are Internally Consistent within Each Study

In Iyengar and Lepper's study, the extensive condition, which was designed to produce feelings of frustration, was associated with lower levels of students' intrinsic motivation and task performance. Although they did not perform a manipulation check in this particular study, this check has been performed on the same conditions in another experimental study. The

manipulation check questions indicated that extensive choices with this particular task did produce feelings of frustration. In Study 2, however, the extensive choices were not perceived as frustrating based on the results of the manipulation check, which might be a possible explanation for why the extensive choices decreased students' intrinsic motivation and task performance. Accordingly, even though the extensive choice condition might have the opposite effects of choice on students' levels of frustration regarding the number of choices between Iyengar and Lepper and Study 2, they might show a similar relation between these feelings of frustration in choices, intrinsic motivation, and task performance. That is, once students felt frustrated about choice, intrinsic motivation and task performance consistently suffered.

Study 1 can be seen as an “intermediate” condition between Iyengar and Lepper and Study 2. In Study 1, the two choice conditions did not differ in terms of frustration in choice experience. Following the same consistent pattern, if feelings of frustration did not differ, then intrinsic motivation and task performance did not differ. The overall effects of choice in Iyengar and Lepper's study (2000), Study 1, and Study 2 are compared in Table 15.

Table 15: *An Overview of the Effects of Choice in Iyengar & Lepper's Study (2000), Study 1, and Study 2*

A. Iyengar & Lepper (2000)

Measure	Limited choice	Extensive choice
Feeling of frustration in choice experience	N/A	N/A
Intrinsic motivation	+	–
Task performance	+	–

B. Study 1

Measure	Limited choice	Extensive choice
Feeling of frustration in choice experience	no diff.	no diff.
Intrinsic motivation	no diff.	no diff.
Task performance	no diff.	no diff.

C. Study 2

Measure	Limited choice	Extensive choice
Feeling of frustration in choice experience	+	–
Intrinsic motivation	–	+
Task performance	–	+

Finding 2. Difference in Task Difficulty is a Critical Factor that Explains How the Number of Choices Can Have the Opposite Effect on Feelings of Frustration among the Three Studies

When considering the different, seemingly opposite, effect of choice on feelings of frustration across these three studies, the obvious question becomes “What critical factor can provide a more comprehensive understanding of the effects of choice that can embrace these three studies?”

First, by comparing Study 1 and Study 2, we can assume that *task characteristics* (i.e., a required high stakes task versus an elective low-stakes task) may play a significant role in understanding college students' intrinsic motivation and task performance. Study 1, which investigated the choice overload phenomenon by using a required high-stakes assignment, was not consistent with Iyengar and Lepper's study (2000). Motivational researchers also emphasized the importance of understanding task features because this helps teachers make better decisions that can increase students' motivation in engaging with given tasks. For example, Ames (1992) identified three dimensions that can influence student motivation: task, evaluation and recognition, and autonomy (or the locus of responsibility). In addition, Epstein (1989) suggested the acronym *TARGET* which highlights six dimensions for student motivation: task, autonomy, recognition, grouping, evaluation, and time. Thus, task characteristics can play a critical role in a comprehensive understanding of the effects of choice on motivational outcomes. In this way, Study 2 explored the same research hypotheses by using an elective low-stakes assignment, modeled more closely Iyengar and Lepper's study.

By comparing Study 2 and Iyengar and Lepper's study (2000), however, we found that the relations among the number of choices, intrinsic motivation, and task performance cannot be simply explained in terms of task characteristics. Study 2 explored the choice overload phenomenon by using the extra-credit movie response essay after watching video, which was aligned with Iyengar and Lepper's study (2000). Nevertheless, Study 2 and Iyengar and Lepper's study showed the opposite patterns: Study 2 suggested that many choices increase students' intrinsic motivation and task performance, whereas Iyengar and Lepper's study suggested the choice overload hypothesis that many choices decrease students' intrinsic motivation and task performance. Furthermore, Study 2 showed that extensive choices were not perceived as

frustrating based on the results of the manipulation check, which might result in students' increased intrinsic motivation and task performance. In contrast, we may assume that extensive choices might be perceived as frustrating in Iyengar and Lepper's study, although they did not measure students' feeling of frustration regarding their choice experiences.

Rather than the task characteristics, what critical factor can provide a more comprehensive understanding of the effects of choice that can embrace the two experimental studies in this dissertation and Iyengar and Lepper's study? In my opinion, the critical difference—the difference that explains how the number of choices can have the opposite effect on feelings of frustration—is *task difficulty*. Even though care was taken to use a task similar to Iyengar and Lepper (2000), it may be the case that the tasks were, in fact, not at the same level of difficulty. Specifically, there are four different task features that may affect task difficulty: (a) media, (b) memory load, (c) content familiarity, and (d) task structure. Table 16 illustrates how these four features of the task contribute to the levels of task difficulty.

Table 16: *Task Feature and Difficulty in Iyengar & Lepper's Study (2000), Study 1, and Study 2*

Task feature	Iyengar & Lepper (2000)	Study 1	Study 2
Media	Long movie	Long book	Short movie
Memory load	View once	Read repeatedly	View repeatedly
Content familiarity	Unfamiliar movie	Familiar book	Familiar movie
Task structure	Low structured	Medium structured	High structured
Level of task difficulty	Difficult	Medium	Easy

Media

Students in Study 1 were asked to read an entire book for the book analysis task. On the other hand, students in Study 2 were asked to watch a collection of popular movie clips for the movie response essay; and students in Iyengar and Lepper's study (2000) were asked to watch an entire movie for the movie response essay. In this case, books can be regarded as the text version, whereas movies can be regarded as the video version. In addition, the length of the medium was distinguished among the three studies: students in Study 1 and Iyengar and Lepper's study used the entire book or the entire movie, whereas students in Study 2 used a short collection of movie clips. Using different types and lengths of media for an assignment may explain the opposite effect of the number of choices on feelings of frustration among the three studies.

Memory Load

Students in Study 1 and Study 2 had multiple chances to read a book or watch a collection of movie clips, even while they were writing up their essay assignments. Comparatively, students in Iyengar and Lepper's study (2000) had only one chance to watch a movie in the classroom before they were assigned the movie response essay. This indicates that students in Study 1 and Study 2 might have a lower level of memory load, as compared to students in Iyengar and Lepper's study. Therefore, the opposite effect of the number of choices on feelings of frustration among the three studies would be due to different levels of memory load.

Content Familiarity

Students in Study 1 and Study 2 were assigned a familiar book or popular movie clips, whereas students in Iyengar and Lepper's watched an unfamiliar movie. Specifically, the book students read for the book analysis assignment was already familiar to them because they had

already completed a book review essay on the same book beforehand. In addition, students in Study 2 watched a collection of popular movie clips that students might have already watched. Students in Iyengar and Lepper's study (2000), however, watched the movie "Twelve Angry Men," which was released in the 1950s, and which many students might not have watched before. Therefore, it can be assumed that content familiarity may play a role in differentiating the effects of the number of choices on feelings of frustration among the three experimental studies.

Task Structure

The three experimental studies showed different levels of task structure, which might differentiate the effects of choice. For example, Iyengar and Lepper's study (2000) did not provide any specific instructions for the movie response essay. They simply asked students to write a one or two page paper after choosing an essay topic from the given list. Students in Study 1, however, were given specific instructions for the assignment, with a rubric providing detailed information. Students in Study 2 received even more detailed information on the movie response essay by watching a well-structured video introduction of the study, in addition to being given detailed information on the assignment rubric. In this way, Iyengar and Lepper's study can be regarded as a low structured task; Study 1 can be regarded as a medium structured task; and Study 2 can be regarded as high structured task. This implies that the opposite effects of the number of choices on feelings of frustration can be explained in terms of task structure.

This analysis of four different task features illustrates how the task became easier as we moved from Iyengar and Lepper (2000) to Study 1 and to Study 2 in this dissertation. If we now compare levels of difficulty directly to levels of frustration, we see the following relations (see Table 17).

Table 17. *Task Difficulty and the Relation between Choice and Frustration in Iyengar & Lepper's Study (2000), Study 1, and Study 2*

	Iyengar & Lepper (2000)	Study 1	Study 2
Level of task difficulty	Difficult	Medium	Easy
Relation between choice and frustration	Extensive choice, more frustration	No relation	Extensive choice, less frustration
Theoretical basis for relation	Choice overload hypothesis		Self-determination theory

In conclusion, this analysis can provide a better understanding of the underlying mechanisms of the effects of choice, which implies that choice situations should be combined with task features and difficulty. This implication is aligned with Eccles, Wigfield, and their colleagues' expectancy-value model of achievement motivation (Eccles & Wigfield, 1995, 2002; Wigfield & Eccles, 1992, 2000; Eccles et al., 1998). This model suggests that when the given task is more difficult, costly, and energy draining, the effects of choice on motivation can be decreased. Baumeister and his colleagues' (1998) ego-depletion model also supports this implication. Their model proposes that tasks or activities that require significant consumption of self-regulatory resources may result in a state of exhaustion. Therefore, choosing activities under a context of difficult tasks can bring more ego-depletion, which may decrease students' intrinsic motivation and task performance. On the other hand, choosing activities under a context of easy tasks can lead to less ego-depletion, which may increase students' intrinsic motivation and task performance.

Implications

In accordance with the above argument, task features and difficulty should be carefully considered when people explore the effects of choice as a researcher, as well as when people provide students with choices for academic tasks as a teacher. What other implications can be considered with regard to the general findings of this dissertation? Further implications for research and practice on the effects of choice are discussed below.

Implications for Research

This dissertation is closely modeled on Iyengar and Lepper's study (2000); thus I hypothesized that the results of this dissertation would show the same pattern of the results of their study and support the choice overload hypothesis. However, my two experimental studies did not support the choice overload hypothesis. In this vein, there are two implications that may contribute to future research: (a) choice overload can be beneficial in the context of an elective low-stakes task; and (b) choice overload can be influenced by students' levels of frustration after choosing course ideas.

Do not assume that extensive choices always decrease intrinsic motivation and task performance. Providing extensive choices does not always lead to decreasing intrinsic motivation and task performance. Rather, providing many choices can be beneficial in the context of an elective low-stakes task. Specifically, extensive choices can positively affect students' perceived choice regarding course ideas and task performance under the conditions that students have an elective low-stakes assignment. Can it be assumed that students who are assigned an extra-credit assignment will always show the same attitude as when they are assigned a required high-stakes assignment? Perhaps not, because the students can freely choose whether or not to do the extra-credit assignment, and they do not have to complete the

assignment to receive a good grade for the course. This may lead students to have a lower expectation of performing well on the assignment. Then, how may one increase students' intrinsic motivation and task performance? This dissertation suggests that providing many choices can facilitate students' intrinsic motivation—especially perceived choice regarding course ideas and task performance.

Do not assume extensive choices are necessarily excessive. Students' levels of frustration after choosing course ideas should be considered to understand the effects of choice. There were no significant differences in frustration by choice conditions in Study 1. Thus, we can assume that the number of choices may not affect students' intrinsic motivation and task performance, since both choice conditions showed similar levels of frustration. On the other hand, there was a significant difference in frustration by the choice conditions in Study 2. Specifically, students who could choose from six course ideas felt more frustrated when choosing course ideas for the movie response essay, compared to students who could choose from 30 course ideas. This implies that students in limited choice conditions might have lower levels of intrinsic motivation and task performance because they feel more frustrated when choosing course ideas, compared to students in extensive choice conditions. In this way, 30 choices may not always be excessive, which results in decreasing students' levels of frustration.

Implications for Practice

Whereas the overall findings of this dissertation contradict Iyengar and Lepper's (2000) choice overload hypothesis, they do not contradict the general pedagogical belief that more choices are better. Thus, the two implications for research are not relevant for teachers who already believe that providing more choices is desirable. Two conclusions, however, can contribute to classroom practice: (a) for required high-stakes assignments, providing many

choices can be a solution for students who do not consider the task important for their grade; and (b) for elective low-stakes assignments, maximizing (i.e., a higher level of well-informed decision-making strategy) can be an effective decision-making strategy when limited choices are given.

Provide extensive choices when students do not perceive the task as important for the course grade. When students were provided with the book analysis assignment, extensive choices increased effort among students who had a lower level of extrinsic task value. This implies that 30 choices can be beneficial to intrinsic motivation among students who have a lower level of extrinsic task value under the context of a required high-stakes task. However, among students who were provided with an elective low-stakes task, such as the movie response essay, extrinsic task value enhanced their value and effort despite the number of choices that were given. Furthermore, intrinsic task value significantly increased students' intrinsic motivation regardless of the number of choices and task characteristics.

Imagine a group of students who think that the given task is not important for getting a good grade, even though the task is a required high-stakes assignment. How do teachers help these students increase their intrinsic motivation and put more effort into the assignment? This dissertation suggests that teachers should give students more choices, rather than fewer choices.

Help students to use the maximizing decision-making strategy when they have limited choices. When students were given the movie response essay, maximizing increased intrinsic motivation, especially value, among students who had limited choices. This implies that maximizing is a more compelling decision-making strategy under a smaller number of choices within the context of an elective low-stakes task. On the other hand, satisficing (i.e., a lower

level of well-informed decision-making strategy) did not affect intrinsic motivation among students who had limited choices, regardless of task characteristics.

Imagine that there is a group of students who were asked to submit their book choice from a list of six books for their *extra-credit* book review assignment (not like the required and high-stakes book review report used in Study 1). How do teachers help these students increase their intrinsic motivation? This dissertation proposes that teachers should encourage students to use the maximizing decision-making strategy by comparing and contrasting every option, which may result in students experiencing a higher level of value for the assignment.

Directions for Future Research

First of all, task features and difficulty could be a focus of future research in order to understand the comprehensive choice mechanisms that underlie the two studies in this dissertation and Iyengar and Lepper's study (2000). As I mentioned previously, task features and difficulty can be a critical explanation of why Iyengar and Lepper's study, Study 1, and Study 2 surprisingly showed mixed findings regarding the effects of choice on feelings of frustration. For example, students who are given a difficult task, such as the movie response essay in Iyengar and Lepper's study, can be easily frustrated by extensive choices, which leads to a decrease in students' intrinsic motivation and task performance. Students who are assigned a task that has a medium level of task difficulty, such as the book analysis task in Study 1, experienced no significant differences in the feeling of frustration based on the number of choices, which suggests no significant differences for students' intrinsic motivation and task performance by choice condition. Students who receive an easy task, such as the movie response essay in Study 2, can perceive extensive choices as a less frustrating choice condition, which contributes to increasing students' intrinsic motivation and task performance. Therefore, future research could

manipulate task difficulty conditions (i.e., an easy task versus a difficult task) and could use surveys for task difficulty to analyze and understand students' perception of task difficulty.

Other individual and contextual factors that can increase students' motivation to learn should also be discussed within choice contexts. For example, Epstein's model of TARGET (1989) can provide a comprehensive understanding of choice that can offer useful information to teachers who use choice exercises in various ways. This model suggests that task, autonomy/authority, recognition, grouping, evaluation, and time are six dimensions for increasing students' motivational outcomes. Among them, two dimensions, such as task and autonomy, have already been covered in this dissertation. Therefore, future research that examines the relations between choice and the rest of the dimensions is needed.

The amount of decision time should be cautiously considered when choice situations are designed. For example, students in Study 1 were asked to submit the 3-5-page book analysis task about 2 weeks after they chose the course ideas, whereas students in Study 2 were asked to submit the 250-300-word movie response essay within 24 hours after they chose the course ideas. The book analysis required more pages; thus, students were provided with more time to complete the assignment. The different time gap between the choice provision and the assignment due date may differentiate the effects of choice on intrinsic motivation and task performance. Haynes (2009) also provided empirical evidence that college students who had extensive choices and limited decision time to choose reported more difficulty and frustration.

The development and validation of measures for students' choice-making or decision-making that can apply to educational contexts are needed. As discussed earlier, Schwartz and his colleagues (2002) developed a decision-making strategy measure to assess people's degree of using maximizing (or satisficing) in daily life (e.g., when I watch TV, I channel surf, often

scanning through the available options even while attempting to watch one program). Therefore, their items are not applicable to classroom settings, which is the reason I could not use their measure to assess students' decision-making strategies in this dissertation.

In addition, the perceived choice subscale from the Intrinsic Motivation Inventory (IMI, Ryan; 1982) should be modified. Students' perceived choice regarding course ideas should be distinguished from perceived choice regarding the task itself. According to the results of Study 2, students who had extensive choices reported higher levels of perceived choice regarding course ideas, but not perceived choice regarding the task itself. This implies that the original perceived choice subscale, which focused on perceived choice regarding the task itself, cannot be a good measure to assess students' perceived choice regarding the number of options for course ideas.

Finally, replication or modification studies should be conducted with students of different domains, ages, and cultures. In this dissertation, the two experimental studies included data from students who took the TE 150 "Reflections on Learning" course online or face-to-face at Michigan State University. The sample was not randomly selected from a population, which indicates that the results might be changed if the sample were collected from other courses, different ages, or different cultures. The TE 150 course requires students' high quality of writing or verbal skills, rather than mathematical ability, so two different writing assignments (i.e., the book analysis task and the movie response essay) were used for measuring students' task performance in this dissertation. However, if choice studies were designed in a natural science or an engineering course, which expects more mathematical competence than writing skills, different task formats, such as an in-class mathematics test, should be used for measuring students' task performance, and this further leads to different the effects of choice on students' motivational outcomes and learning. Moreover, this dissertation was targeted at college students,

who have more choices for their academic tasks in class, consider their career paths, and have less guidance from parents and instructors, compared to elementary and secondary school students (Bembenutty, 2011; Wrosch et al., 2003; Scheibehenne et al., 2010). Therefore, the motivational benefits of choice in this dissertation can be differentiated if the choice studies were conducted with students of different ages. Patall and her colleagues also suggested in their meta-analysis that the levels of intrinsic motivation could be varied depending on the developmental factors (Patall et al., 2008). The motivational benefits of choice should also be examined within a cultural perspective. Another experimental study conducted by Iyengar and Lepper (1999) proposed that Asian-American students prefer choices that are made by trusted authority figures, because they live in a hierarchical culture. In contrast, Anglo-American students prefer their own choices, because they live in a less hierarchical culture. This dissertation was conducted at a college in the United States. This implies that the results of this dissertation can be changed when the choice studies are conducted in East Asian countries which have a more hierarchical culture and set of values.

APPENDICES

Appendix A: Course Ideas Choices

Study 1

Limited Choice Condition (Students received one of three random lists of six course ideas)

List 1

Episodic Memory, Semantic Memory
Schema, Stereotype
Classical Conditioning, Operant Conditioning
Positive Reinforcement, Negative Reinforcement
Chunking, Maintenance Rehearsal
Short-term Memory, Long-term Memory

List 2

Nature, Nurture
Primary Effect, Recency Effect
Inference, Categorization
Intelligence, Praise
Retention, Recall
Cueing, Reinforcement Schedule

List 3

Phonological Loop, Visuospatial Sketchpad
Encoding, Retrieval
Positive Punishment, Negative Punishment
Modeling, Positive Feedback
Attention, Working Memory
Assimilation, Accommodation

Extensive Choice Condition (Students received the following list of 30 course ideas)

Classical Conditioning, Operant Conditioning
Schema, Stereotype
Elaboration, Distinctiveness
Praise, Reward
Modeling, Positive Feedback
Attention, Working Memory
Phonological Loop, Visuospatial Sketchpad
Assimilation, Accommodation
Top-down Processing, Bottom-up Processing
Sensory Memory, Environment

Episodic Memory, Semantic Memory
Explicit Memory (Declarative Memory), Implicit Memory (Procedural Memory)
Heuristic, Priming
Positive Reinforcement, Negative Reinforcement
Eyewitness Testimony, Misinformation Effect
Categorization, Schema
Primary Effect, Recency Effect
Nature, Nurture
Retention, Recall
Inference, Categorization
Chunking, Maintenance Rehearsal
Short-term Memory, Long-term Memory
The Magic Number 7 Plus or Minus 2, Mnemonic
Selective Attention, Arousal
Inattentional Blindness, Executive Function
Positive Punishment, Negative Punishment
Cueing, Reinforcement Schedule
Encoding, Retrieval
Intelligence, Praise
Rehearsal, Elaboration

Study 2

Limited Choice Condition (Students received one of three random lists of six course ideas)

List 1

Operant Conditioning
Selective Attention
Metacognition
Rehearsal
Positive Reinforcement
Shaping

List 2

Negative Reinforcement
Monitoring
Retention
Working Memory
Reinforcement Schedule
Organization

List 3

Long-term Memory
Chunking
Punishment

Multi-tasking
Classical Conditioning
Automaticity

Extensive Choice Condition (Students received the following list of 30 course ideas)

Operant Conditioning
Selective Attention
Metacognition
Reward
Reinforcement Schedule
Organization
Long-term Memory
The Magic Number 7 Plus or Minus 2
Punishment
Sensory Memory
Positive Reinforcement
Classical Conditioning
Chunking
Information Processing
Monitoring
Retention
Multi-tasking
Embodied Cognition Model
Extinction
Short-term Memory
Elaboration
Generalization
Shaping
Retrieval
Active learning
Negative Reinforcement
Working Memory
Automaticity
Cognitive Load
Rehearsal

Appendix B: Task Value

For each of the following statements, please indicate using the following scale how true it is for you:

1	2	3	4	5	6	7
strongly disagree			neither agree nor disagree			strongly agree

Study 1

Intrinsic Task Value

I feel that doing well on the book analysis assignment is important for learning the course material in this class.

Extrinsic Task Value

The book analysis assignment is important for me to get a good grade in the course.

Study 2

Intrinsic Task Value

I feel that doing well on the movie response essay is important for learning the course material in this class.

Extrinsic Task Value

The movie response essay is important for me to get a good grade in the course.

Appendix C: Decision-making Strategy

For each of the following statements, please indicate using the following scale how true it is for you:

1	2	3	4	5	6	7
strongly disagree			neither agree nor disagree			strongly agree

Study 1

I felt that I made a well-informed decision on the set of course ideas I chose for the book analysis assignment.

Study 2

I felt that I made a well-informed decision on the set of course ideas I chose for the movie response essay.

I believe that my choice for course ideas will be among the best I have ever had. I believe the course ideas I chose represent the “*best choices*” I could have possibly made, not simply choices that are “*good enough*.”

Appendix D: Manipulation Check Questions

For each of the following statements, please indicate using the following scale how true it is for you:

1	2	3	4	5	6	7
strongly disagree			neither agree nor disagree			strongly agree

Study 1

Post-decision Emotions

a. Negative Affect during the Choice-Making Process

I felt frustrated when choosing a set of course ideas for the book analysis assignment.

I found it was difficult to choose which set of course ideas to be used for the book analysis assignment.

b. Positive Affect during the Choice-Making Process

I enjoyed selecting a set of course ideas for the book analysis assignment.

Post-task Emotions

a. Satisfaction

I am satisfied with the set of course ideas I chose for the book analysis assignment.

b. Regret

I regretted my choice for the set of course ideas for the book analysis assignment.

Study 2

Post-decision Emotions

a. Negative Affect during the Choice-Making Process

I felt frustrated when choosing a set of course ideas for the movie response essay.

I found it was difficult to choose which set of course ideas to be used for the movie response essay.

b. Positive Affect during the Choice-Making Process

I enjoyed selecting a set of course ideas for the movie response essay.

Post-task Emotions

a. Satisfaction

I am satisfied with the set of course ideas I chose for the movie response essay.

b. Regret

I regretted my choice for the set of course ideas for the movie response essay.

Appendix E: Intrinsic Motivation Inventory (IMI)

For each of the following statements, please indicate using the following scale how true it is for you:

1	2	3	4	5	6	7
strongly disagree			neither agree nor disagree			strongly agree

Study 1: *(R) indicates reverse coding.

Perceived Choice (for Task Itself)

- I believe I had some choice about doing the book analysis assignment.
- I felt like it was not my own choice to do the book analysis assignment. (R)
- I didn't really have a choice about doing the book analysis assignment. (R)
- I felt like I had to do the book analysis assignment. (R)
- I did the book analysis assignment because I had no choice. (R)
- I did the book analysis assignment because I wanted to.
- I did the book analysis assignment because I had to. (R)

Perceived Competence

- I think I am pretty good at the book analysis assignment.
- I think I did pretty well at the book analysis assignment.
- After working at the book analysis assignment for awhile, I felt pretty competent.
- I am satisfied with my performance on the book analysis assignment.
- I was pretty skilled at the book analysis assignment.
- This was an assignment that I couldn't do very well. (R)

Interest

- I enjoyed doing the book analysis assignment very much.
- The book analysis assignment was fun to do.
- I thought the book analysis was a boring assignment. (R)
- The book analysis assignment did not hold my attention at all. (R)
- I would describe the book analysis assignment as very interesting.
- I thought the book analysis assignment was quite enjoyable.
- While I was doing the book analysis assignment, I was thinking about how much I enjoyed it.

Value

I believe the book analysis assignment could be of some value to me.

I think that doing the book analysis assignment was useful for understanding the course material.

I think the book analysis assignment is important to do.

I would be willing to do the book analysis assignment again because it has some value to me.

I think doing the book analysis assignment could help me to understand the course material.

I believe doing the book analysis assignment could be beneficial to me.

I think the book analysis assignment is an important activity.

Effort

I put a lot of effort into the book analysis assignment.

I didn't try very hard to do well on the book analysis assignment. (R)

I tried very hard on the book analysis assignment.

It was important to me to do well on the book analysis assignment.

I didn't put much energy into the book analysis assignment. (R)

Study 2: *(R) indicates reverse coding.

Perceived Choice (for Task Itself)

I believe I had some choice about doing the movie response essay.

I felt like it was not my own choice to do the movie response essay. (R)

I didn't really have a choice about doing the movie response essay. (R)

I felt like I had to do the movie response essay. (R)

I did the movie response essay because I had no choice. (R)

I did the movie response essay because I wanted to.

I did the movie response essay because I had to. (R)

Perceived Choice (for Course Ideas)

I believe I had some choice about which course ideas to use for the movie response essay.

I felt like it was not my own choice about which course ideas to use for the movie response essay. (R)

I didn't really have a choice about which course ideas to use for the movie response essay. (R)

I chose the course ideas because I wanted to.

I chose the course ideas because I had to. (R)

Perceived Competence

I think I am pretty good at the movie response essay.

I think I did pretty well at the movie response essay.

After working at the movie response essay for awhile, I felt pretty competent.

I am satisfied with my performance on the movie response essay.

I was pretty skilled at the movie response essay.

This was an assignment that I couldn't do very well. (R)

Interest

I enjoyed doing the movie response essay very much.

The movie response essay was fun to do.

I thought the movie response essay was a boring assignment. (R)

The movie response essay did not hold my attention at all. (R)

I would describe the movie response essay as very interesting.

I thought the movie response essay was quite enjoyable.

While I was doing the movie response essay, I was thinking about how much I enjoyed it.

Value

I believe the movie response essay could be of some value to me.

I think that doing the movie response essay was useful for understanding the course material.

I think the movie response essay is important to do.

I would be willing to do the movie response essay again because it has some value to me.

I think doing the movie response essay could help me to understand the course material.

I believe doing the movie response essay could be beneficial to me.

I think the movie response essay is an important activity.

Effort

I put a lot of effort into the movie response essay.

I didn't try very hard to do well on the movie response essay. (R)

I tried very hard on the movie response essay.

It was important to me to do well at the movie response essay.

I didn't put much energy into the movie response essay. (R)

Appendix F: The Course Rubric

The course rubric allocates a maximum of 35 points and has of two major criteria: essay form and content. Form evaluates on an 8-point scale and Content evaluates on a 27-point scale. Specific information on the rubric is below.

Table F1: *The Course Rubric (Form)*

Criteria for essay form	Grades
Structure (e.g., organization, flow/readability, topic sentences, paragraph transitions, etc.)	N/A (0pts) Poor (1pt) Fair (2pts) Good (3pts) Excellent (4pts)
Writing conventions (e.g., grammar, transition word, citation, written rather than spoken convention, etc.)	N/A (0pts) Poor (1pt) Fair (2pts) Good (3pts) Excellent (4pts)

Detailed Rubric for Form

- ✓ 0pts: 0 of 4 aspects complete
- ✓ 1pt: 1 of 4 aspects complete
- ✓ 2pts: 2 of 4 aspects complete
- ✓ 3pts: 3 of 4 aspects complete
- ✓ 4pts: 4 of 4 aspects complete

Table F2: *The Course Rubric (Content)*

Criteria for essay content	Grades
Clear description of course idea(s) (3 course ideas; total points: 9 points)	N/A (0pts) Poor (1pt) Modest (2pts) Excellent (3pts)
Clear description of the episode you are discussing: who, what, where, when, why, and how involved? (3 episodes; total points: 9 points)	N/A (0pts) Poor (1pt) Modest (2pts) Excellent (3pts)
Accurate connections you are making between at least one set of course ideas (or one course idea) and an episode (3 episodes; total points: 9 points).	N/A (0pts) Poor (1pt) Modest (2pts) Excellent (3pts)

Detailed Rubric for Content

- ✓ 0pts: Barely mentioned any references to text or course
- ✓ 1pt: Briefly mentioned any references to text or course
- ✓ 2pts: Mentioned some explanation including some references to text or course
- ✓ 3pts: Mentioned very concise, sufficiently detailed explanation including references to text or course

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