

Hendijani, Rosa; Steel, Piers

Article

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*Corresponding author: Rosa
Hendijani, Faculty of Management,
University of Tehran, Iran
E-mail: rosa.hendijani@ut.ac.ir

Reviewing editor:
Pantea Foroudi, MBT, Middlesex
University, London, United Kingdom

Additional information is available at
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MANAGEMENT | RESEARCH ARTICLE

Motivational congruence effect: How reward salience and choice influence motivation and performance

Rosa Hendijani^{1*} and Piers Steel²

Abstract: The effect of performance-contingent reward and choice on motivation and performance continues to be debated. Studies in economics and behavioral psychology consider performance-contingent rewards and choice as two separate motivational mechanisms that reinforce motivation and performance. However, theories on self-determination and motivational crowding predict that performance-contingent rewards negatively interact with choice, reducing its positive effect on motivation. The conceptual and methodological differences between these streams suggest a more nuanced approach that considers factors including reward salience and task type. Building upon attribution theory, we designed and conducted an experiment to test the effect of choice (choice vs. no-choice) and reward (salient, non-salient, and no reward) on overall motivation and performance. Non-salient reward and choice interacted in a positive way, resulting in motivation and performance improvement, what we describe as a “Motivational Congruence

ABOUT THE AUTHORS

Dr. Rosa Hendijani is a researcher and professor in the area of management. One of her areas of research is to examine factors influencing motivation and performance from psychology and behavioral economics perspectives. She has conducted several experiments and meta-analytical studies on motivational mechanisms influencing motivation and performance. Her research has appeared in top journals, including *Journal of Operations Management*, *Human Performance*, *International Journal of Operations and Production Management*.

Dr. Piers Steel is a renowned researcher and professor on motivation and procrastination. He is a Distinguished Research Chair at the University of Calgary, where he teaches human resources and organizational dynamics at the Haskayne School of Business. His research has appeared in several outlets around the world, including *Journal of Applied Psychology* and *Psychological Bulletin*. In addition, he is the author of the book: “The Procrastination Equation”, which is among the most popular books in the area of procrastination.

PUBLIC INTEREST STATEMENT

Motivation is one of the key elements that affects human life. Rewards and choice are two motivational mechanisms commonly used in the real world. Provision of choice has proved to enhance motivation and performance in different contexts such as health, education, and workplace. Indeed, health-related activities such as dieting are more successful when done due to one’s own choice rather than external pressure. Similarly, external reward has been extensively used to enhance performance in a variety of life domains. Despite their ubiquity and widespread use, the combined effect of rewards and choice remains hotly debated. In this paper, we examine the combined effect of reward and choice on motivation and performance. The results showed that non-salient reward and choice interacted positively, resulting in motivation and performance improvement. Similarly, salient reward in a no-choice condition had a positive effect on motivation and performance. We describe this effect as “Motivational Congruence Effect.”

Effect.” Similarly, salient reward in a no-choice condition had a positive effect on motivation and performance.

Subjects: Human Performance Modeling; Work & Organizational Psychology; Work Motivation; Cognitive Psychology; Motivation

Keywords: salient performance-contingent reward; non-salient performance-contingent reward; choice; motivation; performance

1. Introduction

Motivation is inherently complex. It is an outcome of external context, internal psychological processes, and their interaction (Steel & Weinhardt, 2018). Among the examples of this complexity are the fundamental duet of choice and external rewards. Provision of choice has proved to enhance motivation and performance in different contexts such as health (Williams et al., 1996), education (Cordova & Lepper, 1996; Iyengar & Lepper, 1999), and the workplace (Gagné & Bhave, 2011; Hackman & Oldham, 1976). As previous studies have shown, health-related activities such as dieting are more successful when done due to one’s own choice rather than external pressure (e.g., Williams et al., 1996). Similarly, external reward has been extensively used to enhance performance in a wide variety of life domains, including health (Van Herck et al., 2010), education (Roth et al., 2007), and the workplace (Garbers & Konradt, 2014).

Despite their ubiquity and widespread use, the combined effect of rewards and choice on overall motivation and performance remains hotly debated (Hewett & Conway, 2016), with at least three major schools of thought providing competing models. In the sections that follow, theories on extrinsic performance-contingent reward and choice are first reviewed. Building on this, we develop our research hypotheses, which indicates compatibility among these research streams as all can be correct under individually favorable circumstances. Then, we review and explicate the need for different research designs. Finally, we describe our new manipulation for choice and reward salience and explain how this experimental procedure addresses the limitations of prior studies.

2. Literature Review

2.1. Reward, motivation, and performance

We divide motivational theories into three categories, depending on their arguments regarding rewards and their effect on motivation and performance. These categories are *reinforcing*, *undermining*, and *contingency theories*. For each, we explain the mechanisms underlying their predictions and that each has empirical support. This review establishes the lack of consensus in the field but justifies our hypotheses and emphasizes the need to focus on the nuances of methodology to find reconciliation.

2.2. Reinforcing theories of motivation

Exemplified by behaviorism and mainstream economics (Steel & König, 2006), *reinforcing* stream predicts that rewards, especially performance-contingent ones, improve motivation and performance by increasing both the desirability of the task and the expectancy of achieving the desired outcomes. Based on these theories, extrinsic and intrinsic (i.e., automatic) reinforcements are generally additive (Eisenberger & Cameron, 1996; Porter & Lawler, 1968) and when combined, they can improve motivation and performance (Hamner & Foster, 1975). Learned industriousness theory, agency theory, and reinforcement theory are representative of this category, often classed under the broader rubric of expectancy-value theories.

Expectancy-value theories suggest that people are rational utility maximizers who try to increase their expected satisfaction by pursuing appropriate outcomes (e.g., Locke & Latham, 1990). According to this theory, motivation is influenced by (1) the expectancy of success, and (2) the valence (i.e., desirability) of the related outcomes (Jorgenson et al., 1973). Rewards can increase the attractiveness (i.e., valence) of a task by giving the ability to obtain desirable things

such as material goods (Furnham & Argyle, 1998) and by increasing the expectancy of success through enhancing the subjective estimates of one's abilities (Locke & Latham, 1990; Wright & Kacmar, 1995). Learned industriousness theory adds to the expectancy-value explanation by highlighting the informational aspect of reward (Eisenberger, 1992; Eisenberger & Cameron, 1996). Reward can provide information related to one's competence.

Several empirical studies (Eisenberger & Aselage, 2009; Jeffrey & Adomdza, 2010) and meta-analytical reviews (Byron & Khazanchi, 2012; Cerasoli et al., 2014) provided support for the positive effect of rewards including performance-contingent ones on performance.

2.3. Undermining theories of motivation

As one of the most prominent theories in this category, cognitive evaluation theory (CET) and its extension, self-determination theory (SDT), distinguish between intrinsic and extrinsic motivation (Deci & Ryan, 2008). Intrinsic motivation is the underlying process associated with performing a task for the sake of its inherent enjoyment. Extrinsic motivation, on the other hand, is associated with performing a task to achieve a separable or appended desired outcome (e.g., reward).

Based on CET, intrinsic motivation builds upon the underlying psychological needs for autonomy and self-competence, so the effect of an external event on intrinsic motivation depends on the extent to which the event is perceived as facilitating or constraining autonomy, or providing information about competence (Deci & Ryan, 2008). External rewards can be perceived as either controlling or competence-affirming. In the former case, rewards diminish the feelings of autonomy and result in a more extrinsic perceived locus of causality (De Charms, 1968), which undermines intrinsic motivation. In the latter case, they provide information regarding competence and enhance intrinsic motivation. The degree of undermining effect depends on the extent to which the reward provides information regarding competence or controls behavior.

In a classic meta-analysis, Deci et al. (1999) examined the effect of different types of rewards on intrinsic motivation. The results to a great extent supported CET's predictions regarding the undermining effect of rewards on intrinsic motivation (measured by the time spent on the task in a free time period), irrespective of whether the reward was contingent on engagement, completion, or performance (c.f. Deci et al., 1999). However, studies in the undermining category have several issues later considered in the methodological limitations section.

In line with SDT, motivation crowding-out effect in behavioral economics indicates that certain conditions, including the provision of pay-for-performance (i.e., performance-contingent rewards) and formal control can undermine intrinsic motivation, effort, and performance (Weibel et al., 2014).

2.4. Contingency theories of motivation

Unlike the reinforcing and undermining theories, *contingency* theories argue that the effect of external reward on motivation and performance is contingent on contextual factors, such as characteristics of reward (e.g., reward salience) or reward recipient (e.g., locus of causality). Attributional theories such as the overjustification effect are exemplars of this category (Lepper et al., 1982; Levy et al., 2017).

Attributional theories focus on the causal attribution rather than the actual cause of a behavior (Ferrin & Dirks, 2003; Ross, 1975). These theories highlight the importance of the individuals' perception of motivational orientation rather than objective reality. If individuals attribute their motivation to an external factor, they behave as if they were extrinsically motivated, regardless of the true cause of their behavior. In contrast, if people attribute their motivation to an inherent interest, they act as if they were intrinsically motivated. As reward becomes salient, it increases the likelihood of people attributing their motivation to an extrinsic factor. In such a case, once reward is removed, they are less likely to perceive a reason to continue the task. Still, as long as the

extrinsic reward remains, overall motivation—the sum of intrinsic and extrinsic motivation—can be high.

Attribution theory distinguishes between salient and non-salient rewards and their effect on the perception of autonomy and choice through the concept of causal attribution. Notably, a causally confusing environment may lead to no clear attributions. The provision of a salient reward along with choice may create contradiction in the perceived locus of causality (i.e., whether it is internal or external) and decrease both intrinsic and extrinsic motivation. In contrast, the provision of salient reward in a context characterized by lack of choice and feelings of control may increase overall motivation and performance by strengthening an externally regulated or controlled motivation towards the task and its outcomes (De Charms, 1968; Ryan & Deci, 2000; Williams et al., 1996).

3. Experimental hypotheses

Drawing upon our previous review, we put forth five hypotheses, focusing on the effect of reward salience and choice on overall motivation and performance. In short, salient reward and choice should interact and undermine each other by influencing perceived autonomy in two opposite directions. However, salient reward provided in a no-choice condition should increase motivation by creating an unambiguous state of controlled or extrinsic motivation characterized by an external perceived locus of causality. We refer to the interaction between reward type and choice as the “Motivational Congruence Effect.” Figure 1 depicts the schematic diagrams of research hypotheses

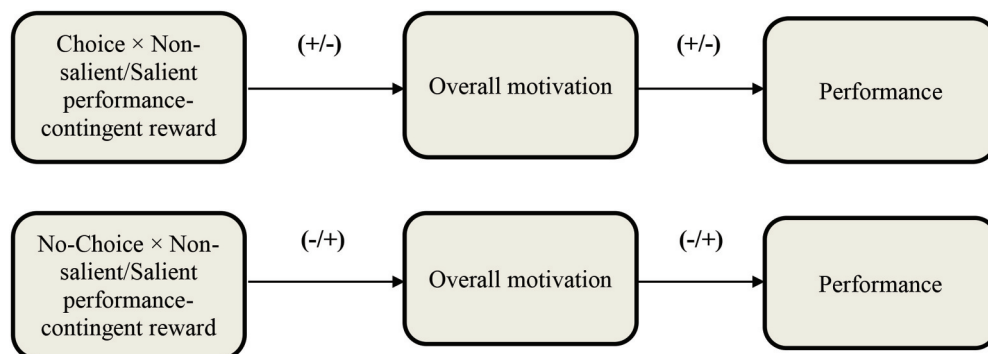
3.1. The effect of non-salient reward and choice on overall motivation and performance

As reviewed, both reinforcing and contingency theories suggest that non-salient rewards positively affect overall motivation and performance. Integrating predictions of attribution theory and learned industriousness theory, choice and non-salient performance-contingent reward can have a synergistic effect by enhancing both perceived autonomy and self-competence, the foundations of autonomous motivation (Byron & Khazanchi, 2012). Thus, we develop the following hypotheses.

H1a: In the presence of choice, non-salient performance-contingent reward improves *overall motivation* compared to the no-choice condition.

H1b: In the presence of choice, non-salient performance-contingent reward improves *performance* compared to the no-choice condition.

Figure 1. Reward salience, choice, and their interaction effect on overall motivation and performance.



3.2. The effect of salient reward and choice on overall motivation and performance

As was emphasized in the contingency theory section, the provision of salient rewards along with choice can mitigate, neutralize, or even reverse the positive effect of choice due to the confusion regarding the locus of control. According to attribution theory, in the presence of salient reward, one is likely to consider it as the main reason for behavior and become extrinsically motivated. When salient reward is accompanied by choice, it creates motivational conflict because the person cannot readily distinguish whether his/her behavior is intrinsically or extrinsically motivated. Salient reward and choice influence autonomy in two opposite directions (Patall et al., 2008). Therefore, when presented together, they may cancel out the effect of each other on motivation.

H2a: In the presence of choice, salient performance-contingent reward does not improve *overall motivation* compared to the no reward condition.

H2b: In the presence of choice, salient performance-contingent reward does not improve *performance* compared to the no reward condition.

When salient reward is administered in a condition characterized by control and lack of choice (e.g., one is told that he/she should do a task), the combination of salient reward and control increases the level of extrinsic motivation, since both of these motivational mechanisms are extrinsically motivating. This creates a state of “externally regulated” or “controlled motivation” (Ryan & Deci, 2000; Williams et al., 1996), which, in turn, should improve overall motivation and performance.

H3a: In the lack of choice, salient performance-contingent reward improves *overall motivation* compared to the no reward condition.

H3b: In the lack of choice, salient performance-contingent reward improves *performance* compared to the no reward condition.

2.3. Overall motivation as the mediator

One commonality between the reinforcing, undermining, and contingency theories of motivation is that they all predict that the effect of motivational mechanisms on performance is indirect and occurs through their effect on overall motivation.

H4: Overall motivation acts as a mediator for the effect of *non-salient* performance-contingent reward and choice on performance.

H5: Overall motivation acts as a mediator for the effect of *salient* performance-contingent reward and choice on performance.

4. Ongoing research design challenges

Sustaining the debate, and why each motivational theory has its own supportive meta-analysis, are methodological differences and design choices that make results difficult to compare and, at times, ambiguous in interpretation (Hendijani et al., 2016). Consequently, we review these design features for reward and choice focused studies. We will first review the reward-related studies and then, choice-related studies.

One of the main design issues for reward studies is that the criterion or outcome measure differs among the research streams. Empirical studies supporting reinforcing stream have mostly examined the effect of reward on *performance* during the initial task interaction when the reward is

present (Byron & Khazanchi, 2012; Lazear, 2000; Stajkovic & Luthans, 1997). The assumption is that the effect of reward on performance occurs exclusively or primarily through overall motivation (i.e., effort; Camerer & Hogarth, 1999). The independent and dependent variables in most of these studies are performance-contingent reward and performance, respectively.

On the other hand, experimental studies supporting the undermining stream have mostly tested the effect of different types of rewards on *intrinsic motivation*, by measuring the amount of time the participant voluntarily worked on a similar task in a time period after the main experimental session where the reward was no longer present. This effect was implicitly or explicitly extended to overall task motivation and performance when the reward is present (i.e., crowding-out effect; Weibel et al., 2014). However, only a few studies in this stream empirically examined undermining effect of reward on performance (Ariely et al., 2009; Gneezy & Rustichini, 2000). The issues related to these two research streams we cover in the following.

It is difficult to make clean comparisons between results in these two lines of research due to several methodological issues (Eisenberger & Cameron, 1996; Madden et al., 2013). To begin with, motivation and performance are related but not interchangeable (Campbell et al., 1993). As per Campbell et al.'s (1993) Performance Model, for any given task, performance or behavior is a function of declarative knowledge, procedural knowledge and skill, and *motivation*. It would be desirable if studies reported both motivation and performance, but this is atypical. Most studies in the undermining paradigm, for example, have not reported the changes in performance (Calder & Staw, 1975; Pinder, 1976).

Analogously, studies in the undermining literature generally focus on the effect of reward on intrinsic motivation when reward is no longer present, while studies in the reinforcing stream examine the effect of reward on performance in its presence. Thus, it is plausible that rewards enhance motivation and performance in their presence, but weaken intrinsic motivation when they are no longer present. A recent experimental study tried to reconcile this concern by testing the dynamic effect of reward on performance. This study shows that while reward temporarily reduced task engagement after termination due to “the desire to take a break,” the overall effect of reward was positive (Goswami & Urminsky, 2017).

Another issue is that in studies supporting the undermining stream, rewards are more likely to be emphasized or administered saliently (e.g., Anderson, Manoogian & Reznick, 1976; Ariely et al., 2009; Lepper et al., 1973; McLoyd, 1979). In Deci's (1971) study, participants were paid 4 USD for playing an interesting puzzle for 20 minutes. Of note, this amount of money was considered large by the participants relative to the task (Deci, 1972), equivalent to approximately 25 USD at the time of this article. In Lepper et al.'s (1973) study, the reward was shown to the participants prior to experiment and was described in a glowing way (Ross, 1975): “See? It's got a bright gold star and a bright red ribbon, and here's a place for your name and your school. Would you like to win one of these good player awards?” As reward saliency increases, there is a possibility that participants adopted an extrinsic perceived locus of causality, which would result in a decrement in intrinsic motivation and consequently less overall motivation once the reward is removed. Reward saliency would erode the likelihood of autonomy-driven intrinsic motivation.

Thus, despite that reinforcing and undermining research streams appear contradictory (Frey & Jegen, 2001; Gneezy & Rustichini, 2000), considering the timing of motivation and performance measurement (i.e., during or after) and the addition of saliency has the potential to reconcile some or even most of the discrepancies between these two lines of research. Therefore, experimental designs should address saliency effect by either explicitly describing or manipulating the level of reward saliency and also consider when motivation and performance are measured. In this study, we manipulated reward saliency and measured overall motivation and performance during the main experimental session.

In choice studies, type of manipulation is one of the main methodological variables that can influence the results of the studies. Previous studies have either used a yoked or matched design. In a yoked design, the participant in the choice condition is paired with a participant in the no-choice condition so that there are an equal number of participants in both conditions (e.g., Iyengar & Lepper, 1999). In a yoked design, the confounding effect of task type is controlled because an equal number of participants do one type of task in both choice and no-choice conditions (Patall et al., 2008).

In matched designs, participants are given the choice to select a task among different options. In order to address the confounding effect of task type, the data related to participants who did not engage in the target activity would be excluded. Thus, there is a risk that a large amount of data will be discarded. To mitigate this risk, the experimenter often implicitly forces choice participants to choose the desired option (e.g., New, 1978). This can cause a feeling of pressure on participants in the choice condition and reduce or undermine the positive effects of making autonomous, unpressured choices. An alternative approach to avoid the discarding of data is to have a target option that is more attractive than others. This tactic will ensure that most participants in the choice condition choose the target activity (e.g., Jagacinski, 1978).

The two tactics have a similar limitation. Participants in studies using matched design often do not feel they have a meaningful or completely free choice. They are either subtly pressured to choose a particular option or are encountered with options that are not equally desirable. Choice is mostly effective when perceived as *meaningful* and *indeterminate* (Williams, 1998).

Another limitation of previous studies employing yoked and matched designs is that the tasks or options are of completely different nature. For example, in Jagacinski's (1978) study participants chose between doing a tangram puzzle and solving division problems. Thus, there is a possibility that participants' personal skills and abilities influence their choices, especially those with a performance orientation and a concomitantly higher need to demonstrate competence (Bouffard et al., 1995). This can create a confounding of personal skills and choice effect due to nonrandom allocation of participants into different treatment conditions. Many statisticians have expressed concerns regarding non-randomized models (e.g., Holland, 1989; Wainer, 2013) due to their quasi-experimental design which results in selection bias, known as *nonequivalent comparison groups* (Shadish et al., 2002). Thus, performance enhancement among participants in the choice condition may be due to other uncontrolled factors such as the level of skills and capabilities in performing the target activity rather than choice. In our study, we developed a unique approach that avoided the problems of yoked and matched designs by providing what appears to be a meaningful choice between two tasks, though unknown to the participant either option is effectively the same.

5. Methodology

Our experiment has been reviewed and approved by the Conjoint Faculties Research Ethics Board (CFREB) at the related university.

5.1. Participants

Participants were 180 undergraduate business school students at a medium-sized university (80 males and 100 females) and completed the experiment for a 2% bonus mark in a course in 2013–15 academic years. They were 20.5 years old on average and were randomly assigned to experimental treatments. The sample size was determined a priori based on power analysis. Data analysis was conducted after data collection was complete. We conducted power analysis prior to the test using G*Power software (Faul et al., 2009). A priori power test showed that a sample size of approximately 180 could give us a power of 80% to detect a minimum effect size of 0.055 for reward (three levels: salient, non-salient, no reward) variable and a minimum effect size of 0.045 for choice (two levels: choice and no-choice) variable. These minimum effect sizes are acceptable, comparing to the results of previous meta-analytical studies on choice (Patall et al., 2008) and reward (Weibel et al., 2010) and their effect on motivation and performance. The meta-analysis done by Patall et al. (2008) provides the *d* effect size of choice

on motivation ($d = 0.36$, $k = 46$) and performance ($d = 0.36$, $k = 13$; Table 4, p. 287). Using this data, we calculated the approximate variance explained by choice on motivation ($R^2 = 0.036$) and performance ($R^2 = 0.032$). Converting the variance explained to f^2 , we found that a sample of 174 would give us a power of 80% to detect the minimum effect size (f^2) of 0.045 for choice.

For the reward effect, we used the results of Weibel et al.'s meta-analysis (2009). Based on the results of this study, the net effect of pay-for-performance reward on performance was: $r = 0.23$ (based on a sample of 46 studies). Therefore, a sample of 138 was sufficient to give a power of 80% for the related minimum effect. There are several meta-analyses on the effect of reward on performance in the literature (e.g., Jenkins et al., 1998; Cerasoli et al., 2014; Weibel et al., 2009). We used the study by Weibel et al. (2009) for our power calculation because it was specifically focused on the effect of pay-for-performance rewards on general performance. Jenkins et al.'s study, for example, has some limitations. First it was published in 1998 and since that time, there has been several studies in the motivation literature that need to be considered in a new meta-analysis of the field. Second, it does not provide the separate effect of performance-contingent rewards. Third, it focused on the results published in psychology and organizational behavior journals, disregarding the studies in economic journals (Frey & Oberholzer-Gee, 1997; Weibel et al., 2010). Weibel et al. (2010) try to address these issues. Similarly, Cerasoli et al. (2014) focus mainly on the effect of intrinsic motivation on performance moderated by different types of reward.

5.2. Overall procedure and variables

The experiment consisted of two levels of choice (i.e., choice and no-choice), three levels of reward (i.e., non-salient, salient and no reward), and several control variables. All questions, unless otherwise specified, were asked on a 7-point Likert scale (i.e., 1 = not at all to 7 = very much). We report all measures, manipulations and exclusions here.

At the beginning of the experiment, participants answered questions related to their interest, knowledge, and confidence in solving math problems. We followed Hendijani et al.'s procedure (Hendijani et al., 2016) to measure these variables. As per Campbell et al.'s (1993) performance model, we controlled for skills and abilities on performance, allowing the effects of motivation to be more easily detected.

After answering these questions, participants were randomly assigned to one of the six treatment conditions. Each participant took an online test implemented on MediaLab, a software developed for design and conduct of laboratory experiments (www.empirisoft.com). They were given 55 minutes to answer 40 mathematics questions. Mathematics questions were selected from the Graduate Management Admission Test (Graduate Management Admission Council, 2009). In order to make the context autonomy-supportive, participants answered the questions at their own pace with no explicit emphasis on time limit (Amabile et al., 1976).

Participants in both non-salient and salient reward treatments were told that they would receive a performance-contingent payment of 50¢ per correct answer in the math test. After the math test, participants completed a set of questions related to choice and reward salience manipulation check and their overall motivation towards the test. They were also asked to indicate what percentage of their answers to math questions were based on mere guessing. We referred to this variable as "PureGuess" (Hendijani et al., 2016). This variable was added to the models to control for the effect of random response to math questions (Hendijani et al., 2016), further improving the statistical power of the research design. Finally, they answered demographic questions including GPA, age, gender, ethnicity, and primary language. We did not provide any performance feedback to participants during the experimental session to avoid its effect on their self-reported measure of motivation towards the task. This was done to avoid the effects of performance feedback on responses to the experiment questions. Only when participants were done with their experiments, after all other assessments, did the experimenter give them individual feedback regarding their performance. Participants in the pay conditions were then guided to a separate room to receive their payment.

The study had two main dependent variables: overall motivation and performance. The number of correct answers (out of 40) in the math test was used to measure performance. Overall motivation was measured by use of both a behavioral measure, (i.e., time spent on the test) and a self-reported measure which was completed immediately after the math test. Time spent on the task (out of 55 minutes) measures the quantitative/behavioral aspect, while the self-report measures the qualitative aspects of overall motivation. Of note, though these are the traditional, standard measures used extensively in the literature to measure motivation (e.g., Deci et al., 1999; Hendijani et al., 2016), later in our analyses we confirm they are tapping into the same construct. The self-report consisted of 11 items from Intrinsic Motivation Inventory (IMI; Ryan et al., 1990, 1991). These items have been used in previous studies (e.g., Ryan et al., 1983; Plant & Ryan, 1985; Ryan, 1982) and assess the level of interest/enjoyment, perceived effort, and value. Some examples of the items in the interest/enjoyment subscale are “1. I thought this was a boring test, 2. I thought this test was interesting, 3. I enjoyed taking the test very much.” (Ryan et al., 1990, 1991). A 7-point Likert scale was used for rating all the items.

Self-reported and behavioral measures when combined can measure both internal and external dimensions of overall motivation. Behavioral and self-reported measures are collected during and after the experimental session, respectively. Thus, they are influenced by both intrinsic motivation towards the task and extrinsic motivational interventions of reward and choice that were provided as part of the experimental manipulation (Hendijani et al., 2016). To simplify interpretation and presentation, we examined if these two measures could be combined to create one composite measure of overall motivation without substantive differences in results or interpretation. To ensure that both measures were tapping into the same construct, we conducted principal component analyses (Thompson & Daniel, 1996). The details are provided in the overall motivation measurement section of the Results section.

5.3. Choice and reward salience manipulation

We developed novel manipulations for both choice and reward salience to build upon the methodological practices developed by previous studies.

5.3.1. Choice manipulation

The choice manipulation was done prior to the experimental test. Participants were randomly assigned to choice and no-choice conditions. Table A1 of Appendix I presents the descriptions related to choice manipulation, which we kept consistent with prior practice in this field (e.g., Lepper et al., 1973; Ross, 1975). In the choice condition, participants had autonomous choice to select their test while in the no-choice condition, their test was ostensibly selected for them. Departing from past practice and addressing problems with the yoked and match design, those in both choice and no-choice conditions took math tests that were functionally identical, with only minor alterations. Participants in the choice condition chose between these two types of math tests (i.e., type A vs. type B). Participants in the no-choice condition were randomly assigned to either the type A or type B math test.

In the choice conditions, participants first read a description on their computer screen explaining that they would be given the choice to select the type of test they wanted to take while participants in the other group had no choice and the experimenter selected the test for them. After reading this explanation, they read the descriptions of two types of math tests. The descriptions differed in some minor aspects and both included various innocuous information regarding GMAT collected from the Wikipedia website, so as not to encourage the participants to favor one test over the other. Table A2 of Appendix I provides the descriptions of the two test types as presented to participants in the choice condition. After selecting their test, participants read a description that reiterated their choice in selecting the type of math test: “**Based on the choice you have made, you can now start taking the math test of your own choice.**”

In the no-choice condition, participants first read a description that they would be given no choice to select the type of math test and the experimenter will assign them a test while participants in the other group had choice to select the type of test. At the beginning of the test, participants read another description that reiterated their lack of choice: “The experimenter has decided that you **SHOULD** take the following math test.”

This manipulation allowed us to examine the effect of choice without having the limitations of the previous studies. First, participants across all conditions completed similar tasks, all based on an almost identical set of questions with only minor alterations. Thus, the difference in people’s abilities and skills in the task could not confound motivation and performance through self-selection. Second, unlike previous studies that used matched design, we did not have to discard any collected data in our study. In addition, participants were not pressured to choose one option over the other as was the case in the studies that used matched design for choice manipulation. Third, the manipulation created a state of true choice where participants made autonomous, unpressured choices. Participants were not forced to choose one task over another, so the choice was true and meaningful (Patall et al., 2008). Finally, the two options were equally interesting because they were the same type of task. In this way, we avoided confounding choice manipulation with interest in the task.

5.3.2. Reward salience manipulation

In order to manipulate reward and salience, we randomly assigned participants into one of the three conditions: (1) non-salient pay, (2) salient pay, and (3) no pay. The salience manipulation was designed in keeping with Hewett and Conway (2016) recommendation of emphasizing expectation and conspicuousness during task performance. Participants in both non-salient and salient pay conditions were informed of the reward type at the beginning of the experiment. It was mentioned in the written consent form and reiterated by the experimenter at the beginning of the math test. They received 50¢ per correct answer in the math test. Participants in the salient pay condition were also presented with a picture of a large amount of money with the following explanation on their computer screen at the beginning of the math test: “You will earn a lot of money if you perform well in the math test.”

As the reward-salient participants proceeded through the math test, they saw an amount of money called *potential earning* at the bottom left corner of their screen. Potential earning on each page indicated the amount of money the person could earn if they had answered all the questions to that point correctly. For example, for the first math question, the person saw a potential earning of 50¢ on the screen, indicating that the person could potentially earn 50¢ if his/her answer to the first question was correct.

Since participants saw potential earning in a box at the bottom of their page, there is a possibility that the box creates distraction in salient group. In order to create the same level of distraction in non-salient group and to separate the effect of reward salience, participants in the non-salient and no pay conditions were also shown a number called *test progress* instead of potential earning at the bottom left corner of their screen. Test progress and pay provide essential identical information and stimuli.

5.4. Manipulation checks

After the math test, participants completed a set of questions related to choice and reward salience manipulation check. Participants were asked two questions related to choice manipulation: (1) I felt like it was NOT my own choice to take this test, and (2) I was NOT given a choice to select the type of math test. These items were devised based on similar items from intrinsic motivation inventory (Ryan et al., 1990, 1991). Using the average score on these items, we created a variable called ChoiceGrade. The regression of choice on ChoiceGrade showed that participants in the choice conditions perceived significantly higher level of choice in comparison with the participants in the no-choice conditions ($B = 2.66, p < 0.001$), confirming that the manipulation for choice was effective.

For reward salience manipulation check, participants in pay conditions answered two salience-related questions: (1) Money was very much highlighted in this experiment and (2) Monetary reward was mentioned repeatedly during the experiment. Averaging the two responses, we created a variable called Salience. The results of the regression on the relationship between Salient pay/Non-Salient pay treatment on Salience show that our manipulation for reward salience was effective; participants in the salient pay conditions perceived significantly higher emphasis on reward in comparison with participants in non-salient pay conditions ($B = 3.15, p < 0.001$).

6. Results

6.1. Overall motivation measurement

As discussed, overall measure was assessed with both a behavioral and a self-reported measure of motivation. Following previous studies (Ryan et al., 1983; Plant & Ryan, 1985; Ryan, 1982), the self-reported measure consisted of items related to interest/enjoyment, perceived effort, and value, with a 3-item factor for interest/enjoyment, a 2-item factor for perceived effort, and a 2-item factor for value. Information about the questions and the factor loadings are provided in Appendix II. To obtain one single measure for self-reported overall motivation, we converted the items into three factors of interest/enjoyment, perceived effort, and value by calculating the average value of the related items. A principal component analysis on these three factors resulted in one extracted component. The Eigenvalue for the first and second components were 1.79 (>1) and 0.71 (<1), respectively. The first and second components accounted for 59.69% and 24.40% of the variance, respectively. Thus, the second component accounted for a small percentage of the variance compared to the first component. In addition, the components matrix results showed loadings of 0.80 for interest/enjoyment, 0.71 for perceived effort, and 0.83 for value. These results are indicative of a high correlation between these dimensions and their underlying construct, justifying the combination of these variables to create a single self-reported measure.

Finally, we examined whether self-reported and behavioral measures were tapping into the underlying construct of overall motivation. To test this, first, each measure was changed into percentage by dividing the value by its maximum. For the behavioral measure, the maximum value was 55 minutes. So, each participant's time spent on the task was divided by 55. For the self-reported measure, the maximum was 7, so the participant's score on the measure was divided by 7. Then, we ran a principal component analysis on these two variables which resulted in one extracted component. The Eigenvalue for the first and second components were 1.21 (>1) and 0.79 (<1), respectively. The first and second components accounted for 60.32% and 39.68% of the variance. The results of the components matrix also showed that the loadings for both measures were 86%. This is an indicator of a high correlation between the behavioral and self-reported measures and the total measure of overall motivation. These results support the combination of these two measures and that the self-reported and behavioral measures were both assessing the broader construct of overall motivation.

It is important to note that before combining the measures, we tested our hypotheses with behavioral, self-reported, and combined measures of overall motivation, separately. Since the results remain the same with these three measures, for the sake of parsimony, we report the results for the combined measure of overall motivation but have them available separately upon request.

6.2. Descriptive statistics and correlations

In total, 180 individuals participated in our study. Sample size was determined before any data analysis using G*Power and based on the effect sizes obtained from prior studies on choice and reward. The ratio of females to males in different treatment conditions was not significantly different from each other. Participants were equally divided between the six conditions. Table 1 presents the descriptive statistics and correlations for the outcome variables. We provided the results for behavioral, self-reported, and composite measures of overall motivation. As the

Table 1. Descriptive statistics and correlations for outcome variables

No.	Variable	Min	Max	Mean	SD	1	2	3
1	Performance	6	32	17.75	5.62	–		
2	Overall (Behavioral)	7.01	55	45.32	8.76	0.26*** (0.00)	–	–
3	Overall (Self-report)	1	7	3.89	1.01	0.32*** (0.00)	0.20** (0.01)	–
4	Overall (Composite %)	26.00	94.00	55.80	14.15	0.38*** (0.00)	0.79*** (0.000)	0.75*** (0.000)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

correlation results show, there was a significant correlation between the three measures of overall motivation and between overall motivation and performance.

6.3. Moderated mediation models

To test our research hypotheses, we performed a bias-corrected bootstrap with 95% confidence intervals (Preacher et al., 2007). This method has several advantages. First, it allows us to test the hypotheses related to moderation and mediation effects in one single model and with the use of a unified statistical method (Hayes, 2013). Second, compared to the previous methods for mediation testing (e.g., Sobel tests), this method does not require the normality assumption for sampling distribution, which is often violated in empirical samples. Third, this method has higher power to detect moderated mediation effects in small-medium sized samples because it is based on the bias-corrected bootstrap confidence interval technique (Fritz & MacKinnon, 2007; Shrout & Bolger, 2002). Two important points should be mentioned. First, for testing our hypotheses, we conducted the analyses both with and without control variables. Control variables were knowledge, confidence, interest, and PureGuess. Second, we tested the models with self-reported, behavioral and composite measures of overall motivation. The results were robust and remained the same. For the sake of parsimony, we report the results for the composite measure of overall motivation with control variables here.

Table 2 provides the results of the moderated mediation model to test hypotheses H1a, H1b, and H4. Variable reward in the regression models has three levels of Non-Salient Reward, Salient Reward, and No Reward. In these models, the two levels of Salient and Non-Salient Reward are compared and contrasted with the No reward condition. As the results show, there is a significant interaction between the non-salient reward and choice on overall motivation ($B = 6.98$, $p < 0.05$). To further investigate this interaction, we ran two separate multiple regression models for the choice and no-choice conditions. In the choice condition, non-salient reward significantly improved overall motivation ($B = 6.87$, $p < 0.01$), supporting Hypothesis H1a. In the no-choice condition, non-salient reward did not have any significant effect on overall motivation ($B = 4.10$, $p = 0.13$).

To test the hypothesis H1b, we analyzed the results of the conditional indirect effects of non-salient reward on performance for no-choice and choice conditions, separately. In no-choice condition, the mediation effect was not significant (Effect = 0.25, 95% CI [-0.43, 1.02]). This indicates that non-salient reward did not significantly improve overall motivation and performance in the no-choice condition. In the choice condition, the mediation test was significant (Effect = 1.39, 95% CI [0.31, 2.91]). Thus, hypothesis H1b was supported.

The index of moderated mediation was positive and significant (Index = 1.09, 95% CI [0.12, 2.42]), indicating that the interaction effect of non-salient reward and choice on performance is mediated by overall motivation. This result provides support for hypothesis H4. Since the index of moderated mediation is positive, the indirect effect of non-salient reward on performance through overall motivation will increase in the presence of choice compared to its absence. Figure 2 shows the

Table 2. OLS regression bias-corrected analysis of non-salient reward × choice interaction on overall motivation and performance

	B	SE B	Conf. Interval	
			Lower 95%	Upper 95%
Overall motivation regressed on:				
Constant	63.87	4.03	55.96	71.78
Non-Salient Reward*	4.58	1.87	1.05	8.44
Choice	-0.59	1.63	-3.80	2.62
Non-Salient Reward × Choice*	6.98	3.24	0.58	13.37
Salient Reward	3.28	1.93	-0.52	7.09
Confidence	0.65	0.98	-1.28	2.59
Knowledge	-0.32	1.10	-2.50	1.85
Interest*	1.75	0.67	0.43	3.07
PureGuess***	-0.11	0.03	-0.18	-0.05
$R^2 = 23.42$ ($p < 0.001$).				
Performance regressed on:				
Constant	5.61	2.89	-0.09	11.32
Overall Motivation***	0.16	0.03	0.09	0.22
Non-Salient Reward*	1.97	0.87	0.24	3.69
Choice***	2.58	0.74	1.11	4.05
Non-Salient Reward × Choice*	-3.10	1.50	-6.07	-0.14
Salient Reward	0.55	0.89	-1.20	2.31
Confidence*	-0.95	0.45	-1.84	-0.07
Knowledge***	1.99	0.51	0.99	2.99
Interest	-0.33	0.31	-0.95	0.28
PureGuess***	-0.06	0.01	-0.08	-0.03

$R^2 = 35.33$ ($p < 0.001$).

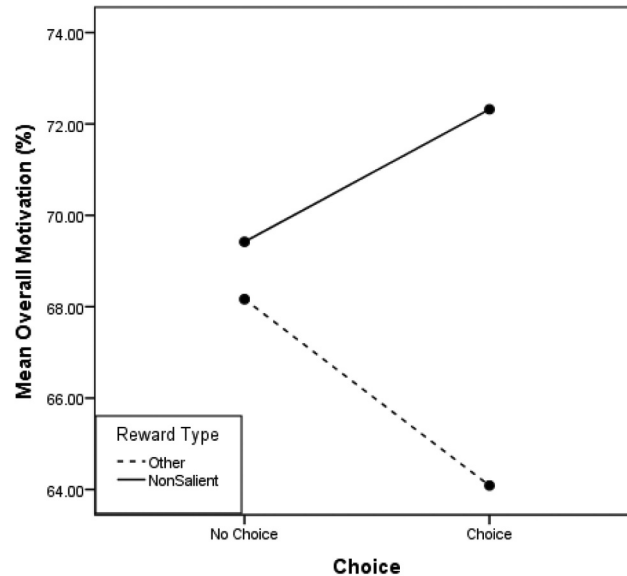
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

interaction effect of non-salient reward and choice on overall motivation. The line entitled “other” presents the results for the combined conditions of salient and no rewards.

Table 3 provides the results of the second moderated mediation to test hypotheses H2a, H2b, H3a, H3b, and H5. As was predicted, there is a significant negative interaction between salient reward and choice on overall motivation ($B = -8.74$, $p < 0.01$). In order to follow up the interaction effect on overall motivation, we ran two separate multiple regression models for choice and no-choice conditions. In the choice condition, salient reward did not have a significant effect on overall motivation ($B = 0.42$, $p = 0.87$), supporting hypothesis H2a. In the no-choice condition, salient reward significantly improved overall motivation ($B = 7.41$, $p < 0.01$), supporting hypothesis H3a.

In order to examine H2b and H3b, we analyzed the results of the conditional indirect effects of salient reward on performance for choice and no-choice conditions, separately. In the choice condition, the mediation test was non-significant (Effect = -0.05 , 95% CI $[-0.90, 0.88]$). Thus,

Figure 2. Non-salient reward × choice interaction on overall motivation.



salient reward did not indirectly improve performance in the choice condition. This supports hypothesis H2b. In the no-choice condition, the mediation effect was significant (Effect = 1.28, 95% CI [0.48, 2.37]). This supports hypothesis H3b.

The moderated mediation index was negative and significant (Index = -1.33, 95% CI [-2.64, -0.30]), so there is a significant interaction effect of salient reward and choice on performance through overall motivation. Since the index of moderated mediation is negative, the indirect effect of salient reward on performance through overall motivation will decrease in the presence of choice compared to its absence. The significance of moderated mediation index supports hypothesis H5, indicating that the effect of salient reward × choice interaction on performance is mediated by overall motivation. Figure 3 depicts the effect of salient reward × choice interaction on overall motivation. The line entitled “other” presents the results for the combined conditions of non-salient and no rewards.

7. Discussion

That the motivational mechanisms of reward and choice have positive effects on motivation and performance is a cornerstone of behavioral theories of motivation. On the other hand, an impressive amount of research draws on the competing theories of self-determination arguing that rewards undermine the positive effect of choice (Deci & Ryan, 1985). In this study, we sought to reconcile these two theoretical streams. This is what we found.

First, performance-contingent rewards are not inherently detrimental to motivation and performance as was claimed by many scholars, especially by Deci et al. (1999). Our study shows that these rewards improve motivation and performance when administered in a non-salient way and accompanied by choice, what we describe as a “Motivational Congruence Effect.” In short, non-salient performance-contingent rewards do not interact with choice in a negative way. In addition, salient rewards can have positive effects on motivation and performance when administered in a no-choice context. Congruency between the salient reward and environment appears to create an external personal locus of control that, in turn, increases extrinsic motivation. In contrast, salient rewards and choice interact with each other in a negative way. When accompanied by choice, they diminish motivation and performance, consistent with confusion regarding locus of control.

Table 3. OLS regression bias-corrected analysis of salient reward × choice interaction on overall motivation and performance

	B	SE B	Conf. Interval	
			Lower 95%	Upper 95%
Overall motivation regressed on:				
Constant	65.10	4.01	57.18	73.03
Salient Reward*	4.03	1.92	0.24	7.83
Choice	-3.10	1.66	-6.39	0.18
Salient Reward × Choice**	-8.74	3.31	-15.27	-2.20
Non-Salient Reward***	5.41	1.85	1.76	9.06
Confidence	0.65	0.97	-1.27	2.56
Knowledge	-0.28	1.10	-2.44	1.88
Interest	1.61	0.66	0.31	2.92
PureGuess***	-0.13	0.03	-0.19	-0.07
$R^2 = 49.41$ ($p < 0.001$).				
Performance regressed on:				
Constant	5.58	2.97	-0.28	11.44
Overall Motivation***	0.15	0.03	0.08	0.22
Salient Reward	0.36	0.90	-1.43	2.14
Choice***	3.33	0.78	1.79	4.88
Salient Reward × Choice	1.88	1.60	-1.22	4.97
Non-Salient Reward	1.74	0.88	-0.00	3.47
Confidence*	-0.99	0.45	-1.88	-0.01
Knowledge***	1.97	0.51	0.96	2.97
Interest	-0.26	0.31	-0.88	0.35
PureGuess***	-0.05	0.01	-0.08	-0.02

$R^2 = 58.52$ ($p < 0.001$).

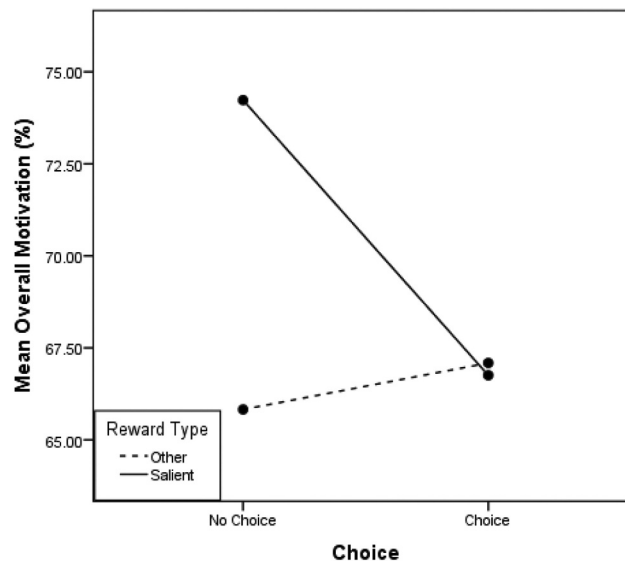
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

8. Future research and limitations

Using the new research design features we highlighted here, we suggest that these findings be extended in a variety of ways. First, we could consider expanding the experimental conditions to further address features of control. Previous empirical studies have shown that controlling factors, such as time and performance pressure (Amabile et al., 1976; Deci et al., 1994; Muraven et al., 2008; Ryan & Deci, 2000), undermine perceptions of autonomy. Thus, under controlling conditions, the effect of choice should also be reduced or cancelled out.

Second, we could track or measure the theoretical intervening variables more directly. In particular, consistent with available theory, the motivational congruence effect appears to operate through a person's locus of control. Subsequent research should directly measure locus of control under different reward salience and choice conditions. A third issue is related to the distinction between task performance and contextual performance (Podsakoff et al., 1997). Our study focuses on the technical aspect of performance (e.g., speed, quantity, or quality of production). It is

Figure 3. Salient reward × choice interaction on overall motivation.



worthwhile to examine the effect of reward salience and choice on the contextual aspects of performance (i.e., relational aspects such as quality of relationship with coworkers; Kozlowski, 2012).

Fourth, this study was conducted in a laboratory setting using university students, which is consistent with other research in this area. In order to increase the generalizability of its results to applied settings, the next step would be to conduct field research studies, such as in the workplace (e.g., Hewett & Conway, 2016). Critical differences to consider will include the size of the reward (e.g., pay rate) and the duration (e.g., over several weeks or months). For example, we might consider the transition period for those amateur or recreational gamers who become paid professionals, a career path potentially with high initial levels of intrinsic motivation and later extreme extrinsic rewards.

Finally, individual differences in general causality orientation will likely influence results (Ryan & Connell, 1989). Thus, it is worth examining the potential effect of general causality orientation on motivation and performance under different reward and choice conditions. Based on the results of this study, it can be hypothesized that those higher in autonomy orientation may be more motivated in an environment characterized by choice and provision of non-salient reward, while those higher in controlled orientation may more motivated in an environment characterized by lack of choice and provision of salient reward (Deci & Ryan, 1985; Strauss & Ryan, 1987).

8. Conclusion

While we tend to have good basic theories, what we tend to lack is a clear understanding of boundary conditions, where a simpler theory would be preferred to a needlessly more complex one (Steel & Weinhardt, 2018). Expectancy theory highlights rational components of decision-making while self-determination and motivation crowd-out theories emphasize how choice is an important motivational consideration. Rather than being in conflict, these different classes of theories appear to be incomplete, which is a common issue for most theories as we strive to explain complexity parsimoniously. Here, we try to reconcile which should be favored by examining the construct of saliency. Both can be right, that is depending on saliency of the reward and the context in which the reward is administered.

Author details

Rosa Hendijani¹

E-mail: rosa.hendijani@ut.ac.ir

Piers Steel²

E-mail: piers.steel@haskayne.ucalgary.ca

¹ Faculty of Management, University of Tehran, Tehran, Iran.

² Haskayne School of Business, University of Calgary, Calgary, Canada.

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Ethical approval

"All procedures performed in studies involving human participants were in accordance with the ethical standards of Conjoint Faculties Research Ethics Board (CFREB) at the University of Calgary which is based on Tri-Council Policy Statement (TCPS2) of Canada. This ethics approval is in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards."

Informed consent

"Informed consent was obtained from all individual participants included in the study."

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Appendix I

Table A1. Choice manipulation

Choice condition

“Select the Test of Your Own Choice! In the other group, I chose the type of math test that the participants took. They had no choice in selecting the type of test they wanted to take. But, in this group, you are given the choice to select which math test you want to take. The following part describes all the details of the two types of math tests. Please read the descriptions carefully and make your selection. After making your selection, you will be directed to the test of your own choice.”

No-choice condition

“In the other group, I let people choose the math test that they wanted to take, but I am not doing that in this group. Instead, I have assigned you the test that you SHOULD take. Click ‘Continue’ to start the test that is assigned to you.”

Table A2. Test descriptions in choice condition

“There are two types of math tests. Both tests have an acceptable level of accuracy and are able to give a validated measure of your math skills. Please select which one you would prefer to take:

Test A: This test is a well-designed math test developed by an organization that was established by North American scientists in the 1950’s. In 2007, the organization opened its first international location in London. The test can measure quantitative and analytical skills of individuals. It has been commonly used by researchers in different countries including Canada for more than 70 years and its validity is proven.

Test B: This test is a computer-adaptive math test primarily developed by a group of management scientists located in Reston, Virginia. The test is now widely used in many countries around the world including Australia, Canada, and the United States of America. It can provide a validated measure of different aspects of a person’s math skills. While its validity is proven after more than 60 years of use, it continues to perform further validity studies to verify that the test provides a good measure of the person’s math skills.”

Appendix II

Table A3. Items and reliabilities for the self-reported measure of overall motivation

Factor 1: Interest/Enjoyment ($\alpha = 0.76$)

I thought the math test was very interesting.	
I thought this was a boring test. (R)	
I enjoyed taking the math test very much.	

Factor 2: Perceived Effort ($\alpha = 0.70$)

I did not try hard to do this activity very well. (R)	
I put a lot of effort into this activity.	

Factor 3: Value ($\alpha = 0.71$)

I believe this test was of some value to me.	
I believe this test was beneficial to me.	

Table A4. Factors and factor loadings

	Components		
	1	2	3
I thought the math test was very interesting.	.89	.07	-.01
I thought this was a boring test. (R)	-.68	-.30	-.22
I enjoyed taking the math test very much.	.77	.13	.22
I did not try hard to do this activity very well. (R)	.50	-.81	-.09
I put a lot of effort into this activity.	.05	.88	.14
I believe this test was of some value to me.	-.24	.08	.70
I believe this test was beneficial to me.	.06	.16	.92

N = 180.



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