Bored by Interest:

Intrinsic Motivation in One Task Can Reduce Performance on Other Tasks

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ABSTRACT

While existing research has demonstrated that intrinsic motivation can increase task performance, jobs are composed of multiple tasks, and it remains to be seen how intrinsic motivation in one task affects performance on other tasks. Drawing on theories of psychological contrast, we hypothesize that high intrinsic motivation in one task reduces performance on less intrinsically motivating tasks. In a field study at a Korean department store, employees with the highest maximum intrinsic motivation in one task had lower average and minimum performance across their other tasks and more performance variance across their tasks. In a laboratory experiment in the U.S., working on a highly intrinsically motivating initial task led participants to perform worse in a subsequent task if it was uninteresting but not if it was interesting. This effect was mediated by boredom but not by a range of other psychological processes. Across both studies, moderate intrinsic motivation in one task was associated with better performance in less interesting tasks than high intrinsic motivation, revealing a curvilinear cross-task effect of intrinsic motivation. Our research advances knowledge about the dark side of intrinsic motivation, the design of work, and the drivers of task performance.

Keywords: motivation; job design, roles, and tasks; lab experiment

For decades, organizational scholars have recognized intrinsic motivation as a key driver of performance at work (Brief & Aldag, 1977; Hackman & Oldham, 1976, 1980; Porter & Lawler, 1968; Staw, Calder, Hess, & Sandelands, 1980). When motivation is intrinsic, employees find their work inherently interesting, which means their attention becomes more focused and their effort becomes more intense and persistent—the act of working is a reward in and of itself (Gagné & Deci, 2005). Indeed, a number of field studies have linked intrinsic motivation to better job performance (e.g., Cerasoli, Nicklin, & Ford, 2014; Grant, 2008; Menges, Tussing, Wihler, & Grant, 2017; Piccolo & Colquitt, 2006), and lab experiments have demonstrated causal effects of intrinsic motivation on task performance (e.g., Deci & Ryan, 1987; Glynn, 1994; Koestner & Losier, 2002). As Ryan and Deci (2000, p. 70) concluded, "Perhaps no single phenomenon reflects the positive potential of human nature as much as intrinsic motivation."

However, these studies focus on how intrinsic motivation in a task affects performance in *that* task, overlooking how it influences performance on other tasks. This is an important theoretical and empirical question because jobs are composed of multiple tasks (Ilgen & Hollenbeck, 1992). In an analysis of 67 different jobs spanning supervisory, professional, technical, clerical, and service, the average job had five to six core tasks (Wong & Campion, 1991). Despite the fact that all jobs require employees to perform multiple tasks, Ashford and Northcraft (2003, p. 538) lament that "we do not know as much as we need to know about how people manage and allocate their resources among multiple, competing demands."

In this paper, we propose the cross-task effects of intrinsic motivation depend on its level. Building on theories of psychological contrast, we suggest that high levels of intrinsic motivation reduce performance in less interesting tasks by increasing boredom. In a field study at a Korean

department store, we find that when employees have high maximum intrinsic motivation in one task, they have lower average and minimum performance in other tasks—and more variable performance across tasks. In a laboratory experiment, we constructively replicate this effect with U.S. participants working on two consecutive tasks with varying levels of intrinsic motivation. When the first task was intrinsically motivating, they performed worse on a second task if it was uninteresting but not if it was interesting. This effect was mediated by boredom but not by alternative emotions of anger, anxiety, sadness, disgust, relaxation, happiness, desire, or humor—and was also not explained by cognitive processes of depletion, attention residue, or perceptions of task complexity, difficulty, and cognitive load. Across the two studies, moderate intrinsic motivation yielded better performance on less interesting tasks than low or high intrinsic motivation, yielding an inverted-U-shaped cross-task effect of intrinsic motivation.

Our research extends knowledge about work motivation, design, and performance in three key ways. First, in contrast to the dominant emphasis on the performance benefits of intrinsic motivation, we document that it can be a double-edged sword. The evidence that intrinsic motivation can reduce cross-task performance addresses calls to systematically study how there can be too much of a good thing (Grant & Schwartz, 2011; Pierce & Aguinis, 2013). Second, when an employee excels in one task but struggles in another despite possessing the requisite skills to succeed in both, this discrepancy is often attributed to the fact that the first task is motivating while the second task is not (e.g., Ashford & Northcraft, 2003; MacKinnon, 1962; Schmidt & DeShon, 2007). Our studies highlight the complementary possibility that motivation and performance in the second task are not independent, but interdependent: strong interest in the first task may intensify boredom in the second task. Third, whereas work design research has traditionally emphasized how the enrichment of one task influences performance in that task, we

show that there are spillover effects with unintended consequences for other tasks. When job redesign increases motivation but decreases efficiency (Campion & McClelland, 1993; Morgeson & Campion, 2002), it may be in part because rising intrinsic motivation levels in new tasks have a depressing effect on affect and performance in other tasks. Taken together, our studies suggest that the motivational processes that prove beneficial to performance on one task can be detrimental to other tasks, underscoring the importance of recognizing motivation and performance tradeoffs in multiple-task environments.

INTRINSIC MOTIVATION IN MULTIPLE-TASK ENVIORNMENTS

Intrinsic motivation is defined as "the doing of an activity for its inherent satisfactions rather than for some separable consequence" (Ryan & Deci, 2000, p. 56). Intrinsic motivation can be conceptualized at three hierarchical levels: global, contextual, or situational (Vallerand, 1997). At the global level, intrinsic motivation is the dispositional tendency to pursue activities that are interesting and enjoyable across life domains (Amabile, Hill, Hennessey, & Tighe , 1994). At the contextual level, intrinsic motivation at work is the desire to expend effort based on finding one's job interesting and enjoyable (Grant, 2008; Menges et al., 2017). At the situational level, intrinsic motivation can be understood as the degree to which employees are driven to work on specific tasks by interest and enjoyment (Vallerand, 2001).

It is rare for employees to experience intrinsic motivation in all of their tasks (Frese & Fay, 2001). Work design research has established that within a job, tasks vary in the degree to which they are designed to facilitate intrinsic motivation (Elsbach & Hargadon, 2006; Wong & Campion, 1991), and research on person-job fit has documented that tasks vary in the extent to which they align with employees' interests (Holland, 1996; Kristof-Brown, Zimmerman, &

Johnson, 2005). For example, studies of teachers show that they experience varying degrees of intrinsic motivation toward the tasks of class preparation, teaching, evaluating students, classroom management, administrative work, and extracurricular and committee activities (Fernet, Senécal, Guay, Marsh, & Dowson, 2008) and principals experience varying degrees of intrinsic motivation toward administrative, instructional, and informational tasks (Fernet, 2011). Accordingly, it is likely that employees will experience more intrinsic motivation in some tasks than others. Our goal is to explore the consequences of intrinsic motivation in one task for performance in other tasks. Task performance refers to the proficiency or effectiveness of employees' contributions (Griffin, Neal, & Parker, 2007).

When employees experience intrinsic motivation in one task, it may increase or decrease their performance on other tasks. On the one hand, interest in a task may create an afterglow, carrying over to other tasks and making effort in them feel less aversive (Isen & Reeve, 2005). As George (1991, p. 300) summarizes, "positive moods cause people to perceive stimuli in a more positive light." On the other hand, interest in a task may create a contrast, leading employees to perceive other tasks in a more negative light (Suls & Wheeler, 2007). Accordingly, employees may choose to allocate their scarce resources of attention, energy, and time (Kanfer & Ackerman, 1989) toward the most interesting task and away from other tasks (Csikszentmihalyi, 1990).

We reconcile these competing theories by suggesting that the cross-task impact of intrinsic motivation is curvilinear. When a task is extremely uninteresting, performance on other tasks will suffer: making progress requires willpower, and pushing themselves to work depletes their energy (Grant, 2008; Grant & Sonnentag, 2010). When a task is moderately interesting, employees are freed up from emotion regulation and have more energy to perform well in other

tasks (Isen & Reeve, 2005). However, when a task is extremely interesting, intrinsic motivation is likely to have diminishing returns and increasing costs. As Coombs and Avrunin (1977, p. 224) argue, “Good things satiate and bad things escalate.”

Organizational scholars have recognized that when employees are highly intrinsically motivated in a task, they feel a magnetic pull toward working on that task (Grant, 2008; Kehr, 2004). At the same time, this may create a push away from interest in other tasks. Psychologists have found that the desire to avoid one task can motivate people to approach other tasks (McGregor, 2006a, 2006b). We suggest that the converse also holds true: the passionate pursuit of one task can reduce interest in other tasks.

Indeed, research suggests that the more intense enjoyment becomes, the more it broadens thought-action repertoires in the domain of interest (Fredrickson, 2001) but narrows the scope of attention away from other domains (Harmon-Jones, Gable, & Price, 2013). Intrinsically motivating tasks are highly conducive to absorptive states of flow (Csikszentmihalyi, 1975), employees easily lose track of time and self: there is only an awareness of the task at hand (Magni, Paolino, Cappetta, & Proserpio, 2013; Quinn, 2005). As Csikszentmihalyi (1990, p. 4) warned, there is a risk that intense intrinsic motivation leads people to become “so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will do it even at great cost.” Research on addictive technologies demonstrates that this can happen with video games: players become so immersed in the enjoyment of playing that they neglect other activities (Alter, 2017; Chou & Ting, 2003). Thus, we expect that high levels of intrinsic motivation in one task will reduce performance on other tasks.

Hypothesis 1: Intrinsic motivation in one task has an inverted-U shaped effect on performance in other tasks, such that low or high intrinsic motivation decreases cross-

task performance, whereas moderate intrinsic motivation increases cross-task performance.

We propose that intrinsic motivation in one task reduces performance in less interesting tasks by intensifying boredom. Boredom is an unpleasant emotional state characterized by disinterest and difficulty concentrating (Fisher, 1993; Loukidou, Loan-Clarke, & Daniels, 2009). According to theories of psychological contrast, working on an intrinsically motivating task may cast an affective shadow on less interesting tasks, rendering them more boring than they would seem otherwise.

When a task is intrinsically motivating, effort is its own reward (Amabile, 1993; Keller & Bless, 2008). The psychological rewards of working on an extremely interesting task are likely to create contrast effects with respect to less interesting tasks. As two experiences become further apart, the differences between them become more apparent (Parducci, 1984, 1995; Suls & Wheeler, 2007). Psychological judgments are made relative to a standard, and recent experiences are the standard against which current experiences are often judged (Brickman & Campbell, 1971; Brickman, Coates, & Janoff-Bulman, 1978; Kahneman, 1999; Schwarz, 1999). High intrinsic motivation in one task raises the standard to which other tasks are compared, creating a stark contrast in which less interesting tasks become boring in juxtaposition.

Just as tasting a particularly sweet soft drink can make one with lower sucrose taste even less sweet (Riskey, Parducci, & Beauchamp, 1979), there is evidence that intense positive affect can render other experiences less enjoyable. Diener, Colvin, Pavot, and Allman (1991, p. 492) find that “an extremely positive event can make other events less positive.” Working on a fascinating project may make other projects seem less attractive, reducing the effort devoted to those projects. When people are intrinsically motivated, they are driven by a sense of interest and

curiosity, a preference for novelty and challenge (Amabile et al., 1994; Ryan & Deci, 2000). A task that lacks these features will be even less appealing. Thus, high levels of intrinsic motivation in one task are likely to enhance boredom in less interesting tasks.

In turn, boredom is likely to reduce performance. When employees are bored, they feel that a task has little value (Johnsen, 2016; Locke & Latham, 1990). They interpret boredom as a sign that they would rather be doing something else (Martin, Ward, Achee, & Wyer, 1993). As such, boredom leads to attentional challenges, making it difficult to focus on the task at hand (Eastwood, Frischen, Fenske, & Smilek, 2012) and thereby causing poor performance in school (Pekrun, Hall, Goetz, & Perry, 2014) and at work (Mael & Jex, 2015). When employees are bored, they are more prone to mistakes and accidents (Game, 2007). They may also seek to reduce their boredom through counterproductive behaviors such as stealing or damaging property (Bruursema, Kessler, & Spector, 2011; Latham, 2001). The presence of an intrinsically motivating task is likely to provide an outlet for reducing boredom, leading employees to neglect their less interesting tasks. Indeed, it is a central tenet of motivation theory that employees regularly make choices about how to divide their time and attention between tasks, prioritizing those that prove more rewarding (Kanfer & Ackerman, 1989; Larson & Callahan, 1990; Northcraft, Schmidt, & Ashford, 2011; Schmidt & DeShon, 2007; Vroom, 1964).

However, the negative impact of high intrinsic motivation is likely limited to performance in tasks that are less interesting. If other tasks are also interesting, contrast effects are unlikely to occur. When two experiences are similar, they are assimilated rather than contrasted (Suls & Wheeler, 2007). Instead of creating an experience of boredom, when two tasks are both highly intrinsically motivating, they are likely to create a larger sense that the overall portfolio of tasks—the job or project—is interesting (Wong & Campion, 1991). Thus, we

predict that a highly intrinsically motivating task reduces performance by enhancing boredom in tasks that are less interesting but not in tasks that are as or more interesting. This constitutes a first-stage moderated mediation model whereby intrinsic motivation in one task has an inverted-U-shaped effect through boredom on performance when other tasks are low but not high in intrinsic motivation.

Hypothesis 2. The curvilinear effect of intrinsic motivation in one task on performance in other tasks is moderated by intrinsic motivation in those tasks, such that high intrinsic motivation in one task decreases performance in other tasks that are less interesting but not as or more interesting.

Hypothesis 3: The curvilinear effect of intrinsic motivation in one task on performance in less interesting tasks is mediated by boredom.

Overview

To test our hypotheses, we conducted studies in the field and the lab. In Study 1, to establish external validity, we conducted a field survey of salespeople at a Korean department store, whose jobs comprised six core tasks. We examined whether and how the intrinsic motivation level in an employee's most intrinsically motivating task related to performance in that employee's other less intrinsically motivating tasks. In Study 2, to establish internal validity and test our mediating and moderating hypotheses, we gave experiment participants two tasks. We varied intrinsic motivation at three levels in the first task, and we measured participants' performance on a second task that was either interesting or uninteresting, as well as the role of boredom in explaining the effect.

STUDY 1 METHOD

Sample and Procedures

We collected data from 105 salespeople and their supervisors at a department store in Seoul, South Korea. The salespeople were 65% female and averaged five years of tenure at this company. They worked in one of the largest department stores in Seoul, South Korea. Like most department stores in Seoul, it featured many different sections, including cosmetics and jewelry, clothing, electronics, and home goods. The department store was open seven days a week, and it was usually crowded. Peak hours were late afternoons, and peak days were weekends and holidays.

The average age of the salespeople at the store was 32, and they had worked there for five years on average. All of the salespeople in the study worked for the store full-time. We initially distributed the survey to 117 salespeople, and received completed surveys from 105 salespeople, yielding a response rate of 90%. As an incentive to participate, we offered a coupon for free coffee or tea from a popular coffee chain. We received performance ratings on these employees from their direct supervisors, obtaining a response rate of 100% for the supervisors. There were 11 supervisors for the 105 employees. To control for any supervisor effects, we conducted all our analyses in this study using hierarchical linear modeling.

The salespeople had six core tasks in their job: i) selling, ii) inventory management, iii) product learning, iv) arranging items for display, v) making returns and exchanges, and vi) assisting other salespeople. These responsibilities are consistent with how performance has been measured in other studies of retail salespeople (Bush, Bush, Ortinau, & Hair, 1990). The first author worked closely with the store's human resource manager to ensure that these were indeed the correct set of core tasks for the salespeople in this department store. The original draft of the survey only had the first five tasks, and the sixth (product learning) was added to the list after discussions with the human resource manager. This is consistent with previous research

identifying five to six as a common number of core tasks for service jobs (Taber & Alliger, 1995; Wong & Campion, 1991).

To examine the cross-task effects of intrinsic motivation, we collected task-level data for intrinsic motivation and performance. We surveyed the employees on how intrinsically motivated they were in each task, and we asked their direct supervisors to rate the performance of each employee on each task. We analyzed whether and how the intrinsic motivation level in a salesperson's most intrinsically motivating task was associated with the performance in that salesperson's other less intrinsically motivating tasks. More specifically, based on H1, we expected that a salesperson's intrinsic motivation level in her most intrinsically motivating task would have an inverted-U-shaped relationship with (a) average performance on other tasks and (b) minimum performance across those tasks. Furthermore, we predicted that a salesperson's intrinsic motivation level in her most intrinsically motivating task would have a U-shaped relationship with (c) performance variance across all tasks. For example, a salesperson whose maximum level of intrinsic motivation is a 5 on a 7-point scale will show higher average performance in her less intrinsically motivating tasks, higher minimum performance across those tasks, and less variance in performance across all tasks than a salesperson whose maximum level of intrinsic motivation is 3 or 7. Each of these relationships would support the core hypothesis that high intrinsic motivation in a task hampers performance in other tasks—as does low intrinsic motivation in a task.

Measures

All measures used a 7-point Likert-type scale.

Task-level intrinsic motivation. The employees were asked to indicate their levels of intrinsic motivation for each of their core tasks: selling, inventory management, product learning,

display, making returns and exchanges, and assisting other salespeople. We used a four-item measure adapted from existing intrinsic motivation scales (Grant, 2008; McAuley, Duncan, & Tammen, 1989; Ryan, 1982; Ryan & Connell, 1989), asking employees to rate the extent to which they found each task interesting, enjoyable, fun, and engaging (α = .92). The average intrinsic motivation scores by task were M = 4.74 (SD = 1.05) for selling, M = 4.11 (SD = 1.25) for inventory management, M = 5.38 (SD = 1.09) for product learning, M = 5.04 (SD = 1.11) for display, M = 3.73 (SD = 1.30) for making returns and exchanges, and M = 5.79 (SD = .97) for assisting other salespeople. Our independent variable is maximum intrinsic motivation—the intrinsic motivation level in one's most intrinsically motivating task. Maximum intrinsic motivation was represented by each employee's highest task intrinsic motivation score across the six core tasks.

Task-level performance. Since the average supervisor was rating between nine and ten different employees on six tasks each, it was not feasible to use multi-item scales. Performance appraisals are often done on a single overall performance question, and consistent with existing research asking supervisors to provide a global evaluation item (e.g., Schoorman & Mayer, 2008; Wright & Cropanzano, 2000), each employee's direct supervisor was asked to rate the performance of the employee on each task on a scale ranging from 1=very poor performance in this task to 7=very high performance in this task. Our dependent variables are average performance in one's less intrinsically motivating tasks, minimum performance across one's less intrinsically motivating tasks, and performance variance across all of one's tasks. For average performance in less intrinsically motivating tasks, we calculated the mean performance score for each employee across the tasks other than the one(s) with maximum intrinsic motivation. Minimum performance across tasks was represented by each employee's lowest task

performance rating. Performance variance was the standard deviation of performance ratings across all tasks. Whereas past research has used standard deviations to measure performance variance between employees (e.g., Locke, 1982; Hirst & Yetton, 1999) and within employees over time (Hofmann, Jacobs, & Baratta, 1993; Hofmann, Jacobs, & Gerras, 1992), we were interested in performance variation within employees between tasks.

Control variables. Because the tendency to be intrinsically motivated could affect both task-level intrinsic motivation and task-level performance (Amabile et al., 1994), to isolate the task-level results, we controlled for employees' trait levels of intrinsic motivation using the Amabile et al. (1994) scale (α = .86). Because extrinsic motivation can be an important influence on performance in less intrinsically motivating tasks (Gagné & Deci, 2005), we controlled for extrinsic motivation at the job level using Ryan and Connell's (1989) measure (α = .77). Because prosocial motivation is also known to affect performance in less interesting tasks (Menges et al., 2017; Yeager et al., 2014), we controlled for prosocial motivation at the job level using Grant's (2008) scale (α = .88). To assess whether our results were robust across demographic differences, we also controlled for gender, age, and job tenure.

STUDY 1 RESULTS

Means, standard deviations, and correlations for all study variables appear in Table 1. Demonstrating that intrinsic motivation varied across tasks, the unconstrained model for task intrinsic motivation showed that there was significant variance in task intrinsic motivation at the task level—78%—compared with 22% at the employee level and less than 1% at the supervisor level. The unconstrained model for task performance showed that there was also significant variance in task performance at the task level—84%—compared with 14% at the employee level and 2% at the supervisor level.

The unconstrained models for our dependent variables showed that 6% of the variance in average performance in other less intrinsically motivating tasks was at the supervisor level, while 94% of the variance in average performance in other tasks was at the employee level. Furthermore, less than 0.1% of the variance in minimum performance was at the supervisor level, while 99.9% of the variance in minimum performance was at the employee level. Lastly, less than 0.1% of the variance in performance variance was at the supervisor level, while 99.9% of the variance in performance variance was at the employee level. Since we did not find any statistically significant variance at the supervisor level for any of our dependent variables, we used random intercept models to test our hypothesis. The results remain consistent when we include a supervisor fixed effect.

As shown in Table 2, the coefficient for maximum intrinsic motivation squared is statistically significant in predicting average performance in other less intrinsically motivating tasks, $\gamma = -.13$, $p < .01$. The coefficient for maximum intrinsic motivation squared is statistically significant in predicting minimum performance $\gamma = -.29$, $p < .001$. Finally, the coefficient for maximum intrinsic motivation squared is statistically significant in predicting performance variance, $\gamma = .11$, $p < .01$. To interpret the form of the curvilinear relationship, we followed the procedures suggested by Cohen, Cohen, West, and Aiken (2003).

We first plotted the fitted relationship between maximum intrinsic motivation and average performance in other tasks as well as minimum performance. As depicted in Figures 1 and 2, maximum intrinsic motivation showed an inverted-U-shaped relationship with average performance in other less intrinsically motivating tasks and minimum performance. Employees who experienced very high intrinsic motivation in a task had lower average performance in other tasks and lower minimum performance than those who experienced more moderate intrinsic

motivation, as did employees who had low maximum intrinsic motivation. Further, as displayed in Figure 3, maximum intrinsic motivation had a U-shaped relationship with performance variance. Performance across tasks was less variable when maximum intrinsic motivation was moderate rather than high or low.

To test the robustness of the U-shaped relationships, we conducted the two-lines test (Simonsohn, 2017). As predicted, the relationship between maximum intrinsic motivation and average performance in other less intrinsically motivating tasks was significant and positive for low to moderate values of maximum intrinsic motivation ($\gamma = .24$, $p < .05$), but significant and negative for moderate to high values of maximum intrinsic motivation ($\gamma = -.44$, $p < .001$). In addition, the relationship between maximum intrinsic motivation and minimum performance was significant and positive for low to moderate values of maximum intrinsic motivation ($\gamma = .31$, $p < .001$), but significant and negative for moderate to high values of maximum intrinsic motivation ($\gamma = -.75$, $p < .001$). Finally, the relationship between maximum intrinsic motivation and performance variance fell short of statistical significance for low to moderate levels of maximum intrinsic motivation ($\gamma = -.11$, $p = .10$) but was significantly positive for moderate to high values of maximum intrinsic motivation ($\gamma = .39$, $p < .001$). Taken together, these results support Hypothesis 1.

Supplementary Analyses

As a supplementary analysis, we tested the within-task effects of intrinsic motivation. Consistent with extensive research linking intrinsic motivation in a task to higher performance in that task (for a review, see Cerasoli et al., 2014), as shown in Table 3, task-level intrinsic motivation was positively correlated with performance in that task ($\gamma = .14$, $p < .001$). The positive relationship held after adding the employee-level control variables ($\gamma = .12$, $p < .001$).

There was not a significant curvilinear relationship between intrinsic motivation and performance in the same task.

In a second supplementary analysis, we conducted a task-level analysis with performance in each of the less intrinsically motivating tasks as the dependent variable. Consistent with our Hypothesis 1, the coefficient for maximum intrinsic motivation squared is statistically significant in predicting performance in less intrinsically motivating tasks, $\gamma = -.12$, $p < .01$. Maximum intrinsic motivation has a significant inverted-U-shaped curvilinear effect on performance in other less intrinsically motivating tasks when we examine performance in each of the less intrinsically motivating tasks separately as well. However, intrinsic motivation in that less intrinsically motivating task is not statistically significant in predicting performance in that task, nor does it moderate the curvilinear effect of maximum intrinsic motivation. Similarly, the relative difference in intrinsic motivation in the most intrinsically motivating task and that less intrinsically motivating task is not statistically significant in predicting performance in that task, nor does it moderate the curvilinear effect of maximum intrinsic motivation.

STUDY 1 DISCUSSION

These results support the notion that higher intrinsic motivation is beneficial to performance in the focal task but not necessarily to performance in other, less intrinsically motivating tasks. Although these findings are consistent with our first hypothesis, they are subject to several limitations. First, it is unclear whether intrinsic motivation in a task has a causal impact on performance in other tasks. It may be that omitted variables, such as differences in task skill or competence, are common causes of both intrinsic motivation in the focal task and performance in other tasks. Reverse causality is also possible: since we were not able to control or measure task sequencing, it may be that uninteresting tasks are rendering other tasks more

intrinsically motivating and boosting performance in those tasks. Second, because task sequencing was not controlled, we were not able to rigorously test our moderating hypothesis that intrinsic motivation in one task reduces performance in other tasks that are low but not high in intrinsic motivation. Third, we did not measure the hypothesized mediating mechanism of boredom or alternative psychological processes that might explain the effects. Fourth, collecting the data in a Korean department store raises questions about whether the results will generalize to other cultures and contexts. Fifth, because supervisors rated performance, their judgments may be biased by impressions of each employee, rather than each employee's objective performance.

STUDY 2 METHOD

We conducted a laboratory experiment to investigate the causal effect of intrinsic motivation in one task on performance of a subsequent task, and to examine the proposed mediating mechanism and the moderating role of intrinsic motivation in the second task. To increase generalizability of this research, we gathered data from a U.S. sample. To overcome supervisor rating biases, we measured task performance objectively. We gave participants an initial task with one of three levels of intrinsic motivation (i.e., low, moderate, or high), and then assessed its effect on performance in a second task that was either low or high in intrinsic motivation, along with the affective states participants experienced during the second task.

Sample, Design, and Procedures

We conducted a laboratory experiment with 255 undergraduates at a large public U.S. university. The sample was 67% female, and the participants completed the study via computer using Qualtrics software. We recruited them from the university's behavioral lab subject pool, and paid them $12 for their participation for an hour. We randomly assigned participants to one

of six conditions using a 3 (initial task intrinsic motivation: low, medium, high) x 2 (subsequent task intrinsic motivation: low, high) between-subjects factorial design.

Task 1 intrinsic motivation manipulation. To induce differing levels of intrinsic motivation in the first task, we held the task structure constant, and varied the content of the task. All participants were asked to find 15 YouTube videos in ten minutes, but they were given a different topic and different levels of choice in each condition. For the low intrinsic motivation condition, the participants were asked to find YouTube videos on math tutorials, which our students have described as generally dull. For the medium intrinsic motivation condition, the participants were asked to find YouTube videos on life hacks—shortcuts for making life easier, which our students identified as often useful but rarely fascinating. For the high intrinsic motivation condition, the participants were asked to find the most interesting and enjoyable videos on YouTube.

After the ten-minute search period was complete, we asked participants to spend five more minutes watching one of the videos they found, reinforcing the intrinsic motivation manipulation by providing different levels of choice (Gagné & Deci, 2005; Grant & Berry, 2011). For the low intrinsic motivation condition, we assigned participants one video to watch. For the medium intrinsic motivation condition, we allowed participants to select one of three videos they found. For the high intrinsic motivation condition, we invited participants to watch any one of the videos they found.

We pretested these intrinsic motivation manipulations on Amazon Mechanical Turk with a different sample (n = 137) using the same intrinsic motivation measure as in Study 1 (α = .96), and a planned contrast analysis showed that they were effective in eliciting three different levels of intrinsic motivation, $t(134) = 2.89$, $p < .01$, $t(134) = 3.09$, $p < .01$. In addition, independent

samples t-tests showed that participants reported significantly greater intrinsic motivation in the high intrinsic motivation condition (M = 5.90, SD = .99) than the moderate intrinsic motivation condition (M = 5.01, SD = 1.59), $t(73) = 3.18$, $p < .01$, and these participants in turn reported significantly greater intrinsic motivation than those in the low intrinsic motivation condition (M = 4.07, SD = 1.70), $t(89) = 2.74$, $p < .01$.

To ensure that searching for different types of YouTube videos didn't create confounds with respect to cognitive processes, in the pretest of the manipulations we also assessed cognitive depletion, attention residue, and perceptions of task difficulty, complexity, and cognitive load. We measured cognitive depletion with a set of math questions at the fifth-grade level (Paas, Tuovinen, Tabbers, & Van Gerven, 2003), examining how long participants took to answer them correctly. We measured attention residue using Leroy's (2009) procedure of asking participants to recall details of the task—such as the number of minutes they were given—and assessing their response times. We used existing scales to measure perceptions of task difficulty (e.g., "I found this to be a difficult task;" Stone & Kadous, 1997; $\alpha = .96$), complexity (e.g., "This task was mentally demanding;" Maynard & Hakel, 1997; $\alpha = .90$), and cognitive load (e.g., "This task required extensive concentration;" Nygren, 1991; $\alpha = .82$). There were no significant differences between conditions on these variables (see Table 4).

Task 2 intrinsic motivation manipulation. For the second task, we gave participants either an interesting or uninteresting task, both of which required focused attention. The interesting task was to play Little Alchemy, a popular online game that involves combining elements to create new ones. The uninteresting task was to copy names and phone numbers from a phone book. We pretested these two tasks on Amazon Mechanical Turk with a different sample (n = 97) using the same intrinsic motivation scale as in Study 1 ($\alpha = .97$), and found that Little

Alchemy was highly intrinsically motivating (M = 6.06, SD = .96), while the phone book task was not intrinsically motivating (M = 1.96, SD = 1.07), $t(95) = 4.11$, $p < .001$.

Measures

Performance on the second task. We measured performance on the phone book task by counting the number of correct entries—how many names and phone numbers they entered accurately. We measured performance in Little Alchemy with the game's objective score of the number of elements participants were able to create. We asked participants to report the score and also take a screenshot of it to verify their results. We also examined time spent on the second task by tracking how many seconds each participant spent on the Phone Book task page and Little Alchemy task page.

Boredom and other emotions during the second task. We measured boredom during the second task with four items from van Tilburg and Igou's (2012) scale, using a Likert-type scale anchored at 1=disagree strongly and 7=agree strongly, including "I felt like doing something completely different" and "I was unable to stop thinking about things I would rather do" ($\alpha = .84$).

To examine alternative emotional mechanisms in a supplementary analysis, we also measured an array of emotions during the second task using four items each from the Discrete Emotions Questionnaire (Harmon-Jones, Bastian, & Harmon-Jones, 2016): anger ($\alpha = .89$), disgust ($\alpha = .85$), anxiety ($\alpha = .73$), sadness ($\alpha = .75$), desire ($\alpha = .77$), relaxation ($\alpha = .90$), and happiness ($\alpha = .94$).

Humor. Because the videos may have differed by condition in humor—which can be a distraction (Strick, Holland, van Baaren, & van Knippenberg, 2009) or a source of positive emotions (Cooper, Kong, & Crossley, in press; Filipowicz, 2006)—we measured perceptions of humor with items from Abel and Maxwell (1992), including "funny" and "humorous" ($\alpha = .97$).

Manipulation checks. To check that our intrinsic motivation manipulations were effective, at the end of each task, we used the same scale as in Study 1. We asked the participants to what extent they found each task fun, enjoyable, interesting, and engaging. ($\alpha_{YouTube}$ = .92; $\alpha_{Little\ Alchemy}$ = .96; $\alpha_{phone\ book}$ = .88).

STUDY 2 RESULTS AND DISCUSSION

Means and standard deviations by conditions appear in Table 5, and correlations across conditions appear in Table 6.

Manipulation Checks

A 3x2 ANOVA showed a significant main effect of task 1 intrinsic motivation on task 1 intrinsic motivation, $F(2, 250) = 41.24$, $p < .001$. No other effects were significant. Simple effects showed that the participants reported significantly greater task 1 intrinsic motivation in the high intrinsic motivation condition than the moderate condition, $M_{difference} = .83$, $p < .001$, and in the moderate condition than the low condition, $M_{difference} = .85$, $p < .001$. Furthermore, the manipulations did not affect time spent on the YouTube task itself. There were no significant differences in time spent on searching across the three conditions, and pairwise comparisons also revealed no significant differences across the conditions.

A 3x2 ANOVA also showed a significant main effect of task 2 intrinsic motivation on task 2 intrinsic motivation, $F(2, 248) = 450.26$, $p < .001$. No other effects were significant. Simple effects showed that the participants reported significantly greater task 2 intrinsic motivation in the high intrinsic motivation condition than the low condition, $M_{difference} = 3.24$, $p < .001$. These results confirmed the validity of the manipulations in creating significant differences in intrinsic motivation between conditions.

Performance Effects

We began by conducting a 3x2 ANOVA using standardized performance scores for the Little Alchemy and phone book tasks. The interaction of task 1 intrinsic motivation and task 2 intrinsic motivation was significant, $F(2, 248) = 4.18$, $p < .05$. To interpret this interaction effect, we conducted simple effects. There was a significant curvilinear effect of task 1 intrinsic motivation on performance in the phone book task, $F(2, 248) = 3.70$, $p < .05$, but not in the Little Alchemy task, $F(2, 248) = .04$. Pairwise comparisons of estimated marginal means showed that for the phone book task, the moderate intrinsic motivation condition had significantly higher performance than the high intrinsic motivation condition, $M_{\text{difference}} = .55$, $p = .01$, and the low intrinsic motivation condition, $M_{\text{difference}} = .44$, $p < .05$. This effect was a function of the number of correct entries, not the number of attempted entries, suggesting that high or low intrinsic motivation on the previous task reduced performance quality through attention.

Performance did not differ significantly between the low and high intrinsic motivation conditions. For the Little Alchemy task, estimated marginal means showed no significant differences in performance between any of the pairs of task 1 intrinsic motivation conditions. Together, these results support Hypotheses 1 and 2: high intrinsic motivation in the first task reduced performance in a second task that is low but not high in intrinsic motivation.

Moderated Mediation Analyses

We tested whether boredom mediated the curvilinear effect on performance in the phone book task but not the Little Alchemy task. A regression analysis showed a significant interaction of task 1 intrinsic motivation and task 2 intrinsic motivation on boredom, $b = -.42$, $SE = .21$, $t(249) = -2.00$, $p < .05$. A second regression analysis showed that the interaction of task1 intrinsic motivation and task 2 intrinsic motivation on task 2 performance decreased below

significance when we added boredom, which was a significant predictor of performance, b = -.29, SE = .08, $t(248)$ = -3.66, $p < .001$.

To complete the test of moderated mediation and calculate the size of the indirect effect of task 1 intrinsic motivation on task 2 performance through task 2 boredom at low and high levels of task 2 intrinsic motivation, we employed the bootstrap procedures recommended by Hayes and Preacher (2010). We constructed bias-corrected confidence intervals based on 1,000 random samples with replacement from the full sample, and the overall index of moderated mediation of .13 was significant (95% confidence interval: .01, .32). At low task 2 intrinsic motivation (the phone book task), the indirect curvilinear effect of task 1 intrinsic motivation on task 2 performance through boredom of .12 was positive and significant (95% confidence interval: .03, .24). At high task 2 intrinsic motivation (Little Alchemy), the indirect curvilinear effect of task 1 intrinsic motivation on task 2 performance through boredom of -.01 was not significant (95% confidence interval: -.13, .08). In tandem, these results support Hypothesis 3.

Alternative Explanations

In a supplementary analysis, we examined whether other emotions such as anger, disgust, anxiety, sadness, desire, relaxation, or happiness during the second task accounted for the effects. A MANOVA showed no significant effects of task 1 intrinsic motivation on any of these emotions, ruling them out as alternative mediators. In a second supplementary analysis, we examined whether humor mediated the main curvilinear effect for the phone book task. Although we did find significant differences between conditions for humor, humor does not predict phone book task performance, and the performance effects and moderated mediation effects through boredom are robust even when we control for humor (see Table 7). In a third supplementary analysis, we examined whether time spent on the phone book task or perceived intrinsic

motivation toward the phone book task differed across conditions. We did not find significant differences between conditions for time spent on the phone book task or perceived intrinsic motivation toward the phone book task.

GENERAL DISCUSSION

We found that intrinsic motivation in one task has a curvilinear effect on performance in other tasks, such that both low and high levels of intrinsic motivation in the focal task reduce performance in less interesting tasks. This pattern was robust across naturally-occurring variations and experimentally-induced variations in task-level intrinsic motivation, across supervisor task performance ratings and objective task accuracy, and across South Korea and the U.S. Further, this effect was explained by heightened levels of boredom after low and high intrinsic motivation on the focal task—and not by a series of other emotional and cognitive processes.

Theoretical Contributions

Our research offers three central contributions to knowledge about work motivation. First, we demonstrate the value of a conceptual and empirical focus on task-level motivation and its cross-task effects. In the motivation literature, the majority of field research takes place at the job level, examining whether and how their global motivation toward their job affects their job performance overall (e.g., Grant, 2008; Piccolo & Colquitt, 2006), and the majority of laboratory research explores how motivation in one task influences performance in that task (Cerasoli et al., 2014; Deci, Koestner, & Ryan, 1999). Our studies reveal that differences in motivation on a task can be consequential for performance in one's *other* tasks.

Second, whereas existing research has mainly focused on the positive consequences of intrinsic motivation in a task, we show that it can have negative effects on emotions and

performance in other tasks. In doing so, we advance the growing body of evidence that there can be too much of a good thing beyond personality traits, strengths, and behaviors (Grant & Schwartz, 2011; Pierce & Aguinis, 2013) toward a consideration of whether there might be such a thing as too much motivation in one task. In doing so, we advance beyond the Yerkes-Dodson (1908) prediction that high arousal would hurt performance on difficult tasks but not on simple tasks. High intrinsic motivation is a stimulating state, and we find that it has the most detrimental effect on simple tasks that are not intrinsically motivating. Third, when examining performance in the face of competing tasks and goals, researchers have shown that incentives and progress toward completion are key determinants of where employees allocate their effort (Northcraft et al., 2011; Schmidt & DeShon, 2007). Our findings accentuate that the source of motivation is also a factor in these choices, such that when one task is highly intrinsically motivating, it is more likely to enhance boredom in less interesting tasks.

Our research also presents fresh insights into why employees often perform better in some tasks than others. Classic research suggests that highly creative individuals often demonstrate performance variability, excelling in fields that interest them while returning lackluster results in others (MacKinnon, 1962). The traditional explanation is that these individuals were highly responsive to intrinsic motivation and indifferent or even resistant to extrinsic motivation (MacKinnon, 1962). Our studies point to another possibility: intense passion for one field may have rendered others more boring by contrast. Motivation in one task and performance in another task are assumed to be independent, but our research suggests that they can be interdependent: the lack of interest and poor performance in one task can actually stem in part from the intense motivational appeal of another task.

These findings have intriguing implications for work design research. Scholars have recognized that job design often poses tradeoffs between motivation and efficiency, attributing declines in efficiency to the enhanced training and skill requirements of enriched jobs (Campion & McClelland, 1993; Morgeson & Campion, 2002). Our studies suggest that when jobs are enriched to include more interesting tasks, they may reduce efficiency for another reason: these intrinsically motivating tasks lead employees to feel bored and perform poorly in their other tasks. Further, work design researchers have recognized that a highly enriched job can overwhelm employees (Xie & Johns, 1995), and recommended that "mindless work" can free up cognitive resources for creative thinking (Elsbach & Hargadon, 2006). Whereas this approach suggests that performance on more interesting tasks may be enhanced by doing less interesting tasks first, our research raises the complementary question of how to sequence work so that performance on less interesting tasks is optimized. Our research suggests that from a workday design perspective, it may be advantageous to sequence tasks that are moderately interesting—rather than highly interesting—immediately before mindless tasks, thereby enabling more positive cross-task effects. It may be that starting the day with a moderately interesting task, followed by a less interesting task and then a highly interesting task, leads to the highest performance in each of them.

Limitations and Future Directions

Our research is subject to a number of limitations that suggest avenues for further investigation. First, a key difference between our two studies is that employees were able to work on their tasks in different sequences in the field study but only worked sequentially on the two tasks in the lab experiment. We controlled task sequencing so that we could directly investigate the effect of working on an intrinsically motivating task on a subsequent task, but this

prevented us from examining a dynamic that may have operated in our field data: employees may have neglected the less interesting task in favor of the more interesting task. Although we did not find differences in time spent on the subsequent task, this may be because participants worked on the tasks sequentially rather than simultaneously. Future experiments could allow participants to work on more and less interesting tasks within the same window of time. Time pressure and multitasking may make the curvilinear cross-task effects even more pronounced, as contrast effects will be even more salient and participants may seize the opportunity to avoid the less interesting task. Future field studies could also employ daily diary methods to gain a finer-grained understanding of how working on tasks with different levels of intrinsic motivation in different sequences predicts performance. This may make it possible to examine whether the decrease in performance as employees transition from a more interesting task to a less interesting task is commensurate with the decrease in intrinsic motivation between those tasks. In addition, since our experiment only varied intrinsic motivation at high and low levels in the second task, it remains to be seen how high intrinsic motivation in one task affects performance in other tasks that are moderately intrinsically motivating, and how forces such as depletion and attention residue may alter those effects.

Second, further attention to the psychological processes that account for the performance costs of intrinsic motivation is warranted. We found evidence that after working on an intrinsically motivating task, participants were more bored by a task that lacked these properties. This is consistent with refinements to broaden and build theory (Fredrickson, 2001) suggesting that intense interest is likely to broaden thought-action repertoires within the domain but may have a narrowing effect with respect to other domains (Harmon-Jones et al., 2013). We encourage researchers to explore these mechanisms in further depth.

Third, since our performance measures focused on accuracy in the lab and proficiency at sales tasks in the field, we are unable to address how our results would change in work with greater complexity and creative requirements. This surfaces questions about factors that may moderate the cross-task effects of intrinsic motivation. We encourage researchers to explore factors such as task sequencing and scheduling, which may facilitate incubation (Elsbach & Hargadon, 2006) and help employees channel boredom into creative thoughts (Mann & Cadman, 2014; cf. Haager, Kuhbandner, & Pekrun, in press), as well as individual differences in emotion differentiation, which influence how tightly coupled intrinsic motivation and emotion tend to be (Vandercammen, Hofmans, & Theuns, 2014).

Fourth, we are also curious about the cross-task effects of extrinsic motivation—whether the long-debated undermining effect of extrinsic rewards on intrinsic motivation extends to other tasks. We suspect that with extrinsic motivation, the average cross-task effect on performance would be negative and linear rather than curvilinear, as predicted by the overjustification effect (Deci et al., 1999): the more extrinsic reasons an employee has for doing one task, the less appealing a task without these rewards may become (DeVoe & Pfeffer, 2007). However, it is worth exploring when extrinsic motivation a task causes intrinsic motivation on other interesting tasks to suffer because the meaning of work has changed, versus when intrinsic motivation increases because these tasks are being done without concern for external outcomes. On a related note, it remains to be seen whether similar results emerge for other forms of motivation. If employees have extremely high achievement motivation or prosocial motivation in one task, do they perform worse on tasks with fewer opportunities for accomplishment or less meaning?

Finally, since our studies focused on the consequences of task-level intrinsic motivation, we did not explore the consequences of intrinsic motivation at the job or contextual level and the

dispositional or trait level (Vallerand, 1997, 2001). For example, high intrinsic motivation at work can sometimes have a depleting effect on engagement in family roles, particularly for women (Rothbard, 2001). Also, if employees are high in trait intrinsic motivation, they may have higher performance variance across different roles in life (e.g., MacKinnon, 1962). Conversely, employees high in trait intrinsic motivation may invest more in job crafting (Wrzesniewski & Dutton, 2001), cognitively crafting tasks to reframe them as more interesting and behaviorally crafting tasks to redesign them as more interesting (e.g., van Hooff & van Hooft, 2014). Recent research suggests that persistence toward long-term goals can be traced back to finding ongoing enjoyment in those activities (Woolley & Fishbach, 2016). In the short run, dull tasks may suffer when juxtaposed with more intriguing work, but in the long run, employees may well find creative ways to make those tasks less dull in the first place.

Practical Implications and Conclusion

Although our research suggests that high intrinsic motivation in one task can reduce performance in less interesting tasks, we are not suggesting that managers or employees should work to limit intrinsic motivation. Indeed, low levels of intrinsic motivation had negative consequences for that task as well as for other tasks. Rather, our studies underscore the value in staying mindful of the side effects of high intrinsic motivation and the order in which tasks are completed. For managers, this means recognizing that when employees are intensely interested in a task, they are at risk for underperforming less exciting tasks. For employees themselves, such an awareness can help them manage their time, effort, and energy so they do not neglect tasks that are important but not interesting.

In sports, tapering is the practice of reducing exercise to achieve peak strength or endurance before an important competition. In the week leading up to a major event, swimmers

and runners gradually decrease their workouts. Our studies raise the possibility that at work, a similar practice of task tapering may be relevant. In days or weeks where both fascinating and tedious tasks need to be done, if performance is paramount in both, there may be value in scheduling a moderately enjoyable task in between them. By tapering interest levels down gradually, it may be possible to sustain energy and effectiveness even in tasks that lack intrinsic motivation.

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TABLE 1

Study 1 Means, Standard Deviations, and Correlations

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Average performance in other tasks	5.06	.64	-								
2. Minimum performance	4.16	.97	.79***								
3. Performance variance	.84	.41	-.49***	-.81***							
4. Maximum intrinsic motivation	6.08	.79	.02	.06	.02						
5. Age	32.08	6.23	-.01	.00	.11	-.05					
6. Gender	-	.48	-.22*	-.31**	.19	-.01	-.37***				
7. Job experience	5.32	3.42	.34**	.22*	-.16	.16	-.22*	-.10			
8. Job extrinsic motivation	4.02	1.21	.07	.05	.11	-.10	.28**	-.19	-.02		
9. Job prosocial motivation	4.21	1.22	.03	.09	.03	.31**	.18	-.26**	.00	.17	
10. Trait intrinsic motivation	5.04	.77	.25*	.29**	-.16	.47***	.03	-.29**	.15	.05	.36***

* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 2

Study 1 Results of Hierarchical Linear Modeling for Performance across Tasks

	DV: Average performance in other less intrinsically motivating tasks Linear effect		**DV: Average performance in other less intrinsically motivating tasks** Curvilinear effect		**DV: Minimum Performance** Linear effect		**DV: Minimum performance** Curvilinear effect		**DV: Performance variance** Linear effect		**DV: Performance variance** Curvilinear effect	
Predictors	Estimate	*t*	Estimate	*T*	Estimate	*t*	Estimate	*t*	Estimate	*t*	Estimate	*t*
Age	.03 (.13)	.20	.02 (.12)	.15	-.06 (.14)	-.41	-.08 (.12)	-.66	.05 (.06)	.92	.06 (.05)	1.15
Gender	-.05 (.04)	-1.43	-.04 (.04)	-1.23	-.23 (.09)	-2.66*	-.22 (.08)	-2.83**	.09 (.04)	2.06*	.08 (.04)	2.21*
Job experience	.18 (.05)	3.93***	.20 (.05)	4.35***	.17 (.07)	2.53*	.20 (.05)	3.62**	-.05 (.02)	-2.32*	-.06 (.02)	-3.20**
Extrinsic motivation	.03 (.05)	.49	.02 (.05)	.29	.00 (.08)	.06	-.02 (.08)	-.20	.05 (.03)	1.52	.06 (.03)	2.03*
Prosocial motivation	-.04 (.05)	-.98	-.01 (.05)	-.24	-.02 (.07)	-.31	.05 (.07)	.68	.03 (.03)	.83	.00 (.03)	-.03
Trait intrinsic motivation	.17 (.03)	5.70***	.18 (.03)	5.06***	.24 (.05)	4.72***	.26 (.05)	5.02***	-.07 (.03)	-2.23*	-.08 (.02)	-3.10**
Maximum intrinsic motivation	-.07 (.06)	-1.22	-.15 (.06)	-2.43*	-.09 (.07)	-1.28	-.26 (.05)	-5.65***	.05 (.04)	1.37	.12 (.04)	3.26**
Maximum intrinsic motivation squared			-.13 (.04)	-2.86**			-.29 (.03)	-8.93***			.11 (.03)	3.34**

* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 3

Study 1 Results of Hierarchical Linear Modeling for Performance at the Task Level

	DV: Task performance		**DV: Task performance**			**DV: Task performance in each of the less intrinsically motivating tasks**		**DV: Task performance in each of the less intrinsically motivating tasks**	
Predictors	Estimate	*t*	Estimate	*t*	**Predictors**	Estimate	*t*	Estimate	*t*
Level-1 predictor					**Level-1 predictors**				
Task intrinsic motivation	.14 (.03)	5.28***	.12 (.03)	4.65***	Maximum intrinsic motivation	-.01 (.09)	-.15	-.16 (.07)	-2.31*
					Maximum intrinsic motivation squared	-.09 (.03)	-2.55*	-.12 (.03)	-3.51**
Level-2 predictors					**Level-2 predictors**				
Age			-.03 (.12)	-.24	Age			.01 (.12)	.09
Gender			-.11 (.05)	-2.13*	Gender			-.05 (.04)	-1.08
Job experience			.12 (.05)	2.44*	Job experience			.20 (.05)	4.00***
Extrinsic motivation			.07 (.04)	1.60	Extrinsic motivation			.01 (.06)	.22
Prosocial motivation			.01 (.05)	.19	Prosocial motivation			-.01 (.06)	-.26
Trait intrinsic motivation			.07 (.04)	1.65	Trait intrinsic motivation			.18 (.04)	4.97***

* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 4

Study 2 Pretest Results for the YouTube Search Task

Conditions	Intrinsic Motivation	Task Difficulty	Task Complexity	Perceived Cognitive Load	Attention Residue	Cognitive Depletion
Low	4.07	2.74	2.92	3.11	5.64	367.96
(*n* = 46)	(1.70)	(1.71)	(1.48)	(1.52)	(2.70)	(240.02)
Moderate	5.01	2.12	2.26	2.72	6.67	366.74
(*n* = 45)	(1.59)	(1.14)	(1.06)	(1.44)	(6.94)	(282.18)
High	5.90	2.46	2.57	2.75	6.77	378.35
(*n* = 46)	(.99)	(1.60)	(1.38)	(1.62)	(5.54)	(252.45)
F(2, 134)	18.11***	1.91	2.86	.91	.63	.03

* $p < .05$
** $p < .01$
*** $p < .001$

Note: A planned contrast analysis showed that the manipulations were effective in eliciting three different levels of intrinsic motivation, $t(134) = 2.89$, $p < .01$, $t(134) = 3.09$, $p < .01$.

To illustrate the YouTube task, here are descriptions from participants of some of the videos they found:

- Low intrinsic motivation:
  - Multiplying fractions: https://www.youtube.com/watch?v=vn7AC43cmZ0
  - Distributive property: https://www.youtube.com/watch?v=eO3aFL6cXG4
  - Factoring polynomials: https://www.youtube.com/watch?v=HinoXYey2n4
- Moderate intrinsic motivation:
  - Organizing small bathroom space for all your needs and organizing kitchen spice cabinet: https://www.youtube.com/watch?v=3j4qwR5F--c
  - Money saving tips to clean stains and to organize things around your home: https://www.youtube.com/watch?v=edWkx_1AOko
  - How to make your apartment look expensive on a budget: https://www.youtube.com/watch?v=A2Li3dOwhYM
- High intrinsic motivation:
  - This video looks at things we see everyday that we don't really know why it happens: https://www.youtube.com/watch?v=VMldgbhdXes
  - The culture, colors and choreography of this dance made it interesting: https://www.youtube.com/watch?v=6cKErCWrb44
  - The possibilities the future has in store (in terms of technology): https://www.youtube.com/watch?v=fRj34o4hN4I

TABLE 5

Study 2 Means and Standard Deviations by Condition

n Task 1 intrinsic motivation Task 2 intrinsic motivation	43 Low Low	44 Moderate Low	43 High Low	43 Low High	39 Moderate High	43 High High
Task 2 performance	24.47	37.36	25.72	29.84	30.28	31.77
	(25.05)	(29.65)	(24.12)	(8.16)	(8.36)	(10.83)
Boredom	4.57	4.09	4.96	2.78	3.03	3.18
	(1.20)	(1.38)	(1.41)	(1.35)	(1.32)	(1.35)
Anger	2.44	2.01	2.39	1.48	1.63	1.82
	(1.41)	(1.36)	(1.48)	(.94)	(.74	(1.09)
Disgust	1.74	1.47	1.66	1.17	1.17	1.16
	(1.18)	(.84)	(1.32)	(.45)	(.62)	(.34)
Anxiety	2.48	2.31	2.62	1.53	1.64	1.60
	(1.14)	(1.12)	(1.24)	(.83)	(.91)	(.85)
Sadness	2.05	1.81	2.37	1.27	1.27	1.29
	(.94)	(1.04)	(1.46)	(.55)	(.53)	(.57)
Desire	2.51	2.11	2.55	2.24	2.26	2.30
	(1.26)	(1.22)	(1.42)	(1.11)	(1.10)	(1.38)
Relaxation	2.23	2.35	2.13	3.49	3.31	3.04
	(1.20)	(1.36)	(1.26)	(1.49)	(1.44)	(1.64)
Happiness	1.42	1.59	1.46	3.78	3.62	3.26
	(.53)	(.93)	(.71)	(1.44)	(1.46)	(1.55)
Humor	3.14	3.68	5.23	2.57	3.54	4.82
	(1.64)	(1.47)	(1.49)	(1.34)	(1.63)	(1.67)
Task 1 intrinsic motivation manipulation check	4.22	4.85	5.81	4.07	5.13	5.82
	(1.49)	(1.07)	(.85)	(1.42)	(1.33)	(1.01)
Task 2 intrinsic motivation manipulation check	2.26	2.31	2.27	5.73	5.62	5.22
	(1.33)	(1.23)	(1.18)	(1.22)	(1.06)	(1.25)
Task 2 time spent	938.53	930.75	905.92	885.61	897.77	951.55
	(64.79)	(45.15)	(85.45)	(197.03)	(247.43)	(173.39)

TABLE 6

Study 2 Correlations across Conditions

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Performance in task 2												
2. Boredom in task 2	-.25**											
3. Intrinsic motivation in task 2	.17**	-.30**										
4. Anger in task 2	-.05	.46**	-.37**									
5. Disgust in task 2	.08	.21**	-.31**	.54**								
6. Anxiety in task 2	-.02	.29**	-.39**	.58**	.53**							
7. Sadness in task 2	-.05	.41**	-.47**	.59**	.67**	.62**						
8. Desire in task 2	-.04	.20**	-0.05	.33**	.38**	.37**	.50**					
9. Relaxation in task 2	.12	-.28**	.44**	-.33**	-.12*	-.34**	-.17**	.12				
10. Happiness in task 2	.16**	-.32**	.79**	-.25**	-.12	-.23**	-.27**	.20**	.64**			
11. Intrinsic motivation in task 1	.05	.05	.06	.03	.00	.10	.05	.11	.07	.14*		
12. Humor in task 1	.12	.02	-.06	.03	.13*	.10	.08	.06	.09	-.01	.54***	
13. Time spent on task 1	.29***	-.12	.03	-.02	-.06	-.03	-.07	.01	-.09	.03	.03	-.02

* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 7

Study 2 Results with and without First Task Humor

	Without first task humor control	With first task humor control
Performance effects		
The interaction of task 1 intrinsic motivation and task 2 intrinsic motivation	$F(2, 248) = 3.74$, $p = .05$	$F(2, 248) = 4.18$, $p < .05$
The curvilinear effect of task 1 intrinsic motivation on performance in the phone book task	$F(2, 248) = 3.10$, $p < .05$	$F(2, 248) = 3.70$, $p < .05$
Pairwise comparison between the moderate intrinsic motivation condition and the high intrinsic motivation condition	$M_{difference} = .48$, $p < .01$	$M_{difference} = .55$, $p = .01$
Pairwise comparison between the moderate intrinsic motivation condition and the low intrinsic motivation condition	$M_{difference} = .43$, $p < .05$	$M_{difference} = .44$, $p < .05$
Moderated mediation effects		
The interaction of task 1 intrinsic motivation and task 2 intrinsic motivation on boredom	b = -.42, SE = .21, $t(249) = -2.00$, $p < .05$.	b = -.43, SE = .21, $t(249) = -2.05$, $p < .05$.
Boredom as a significant predictor of performance	b = -.29, SE = .08, $t(248) = -3.66$, $p < .001$	b = -.31, SE = .08, $t(248) = -3.92$, $p < .001$
The overall index of moderated mediation	.13 (95% confidence interval: .01, .32).	.13 (95% confidence interval: .01, .32).
The indirect curvilinear effect of task 1 intrinsic motivation on task 2 performance through boredom at low task 2 intrinsic motivation	.12 (95% confidence interval: .03, .24)	.12 (95% confidence interval: .02, .26)
The indirect curvilinear effect of task 1 intrinsic motivation on task 2 performance through boredom at high task 2 intrinsic motivation	-.01 (95% confidence interval: -.13, .08).	-.01 (95% confidence interval: -.12, .08).

FIGURE 1

Study 1 Plot for Average Performance in Other Tasks

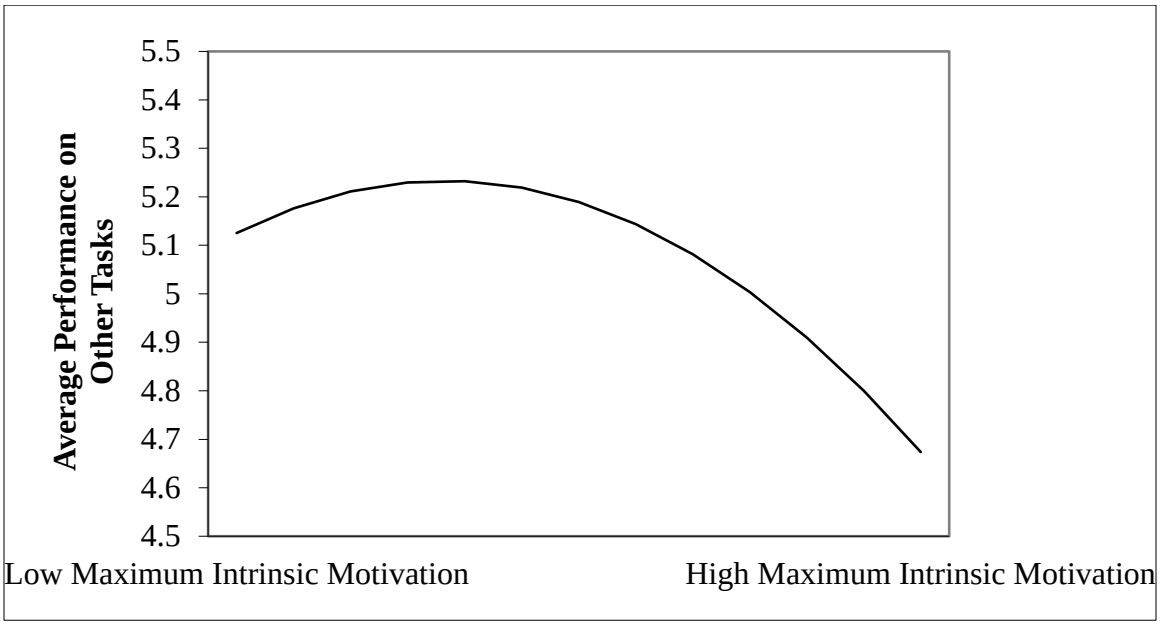


FIGURE 2

Study 1 Plot for Minimum Performance

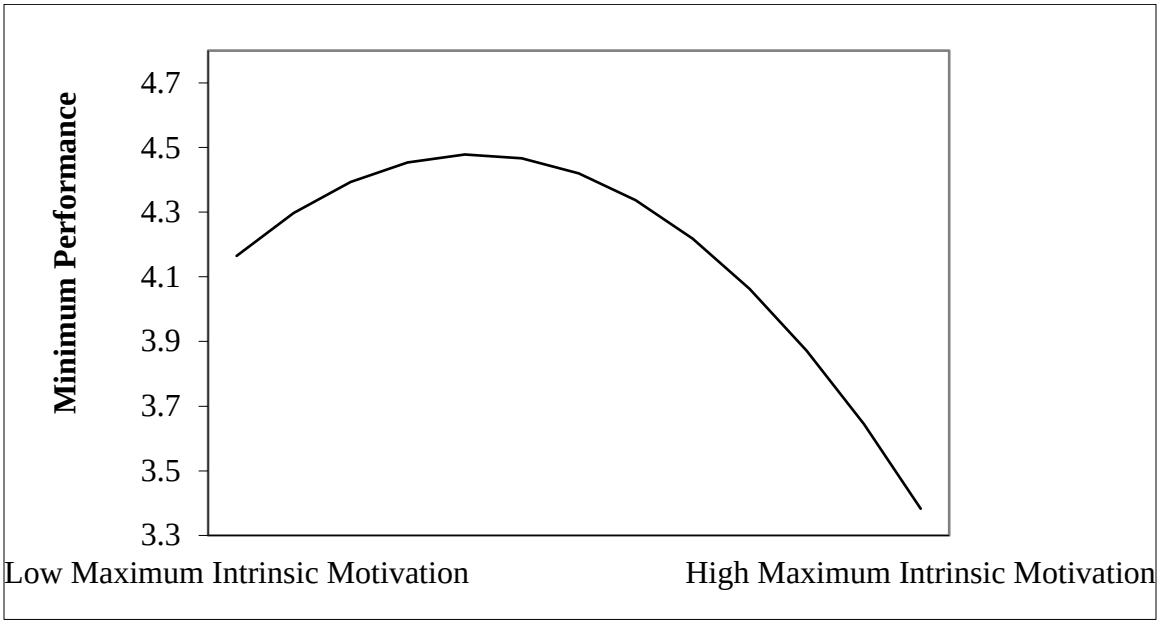
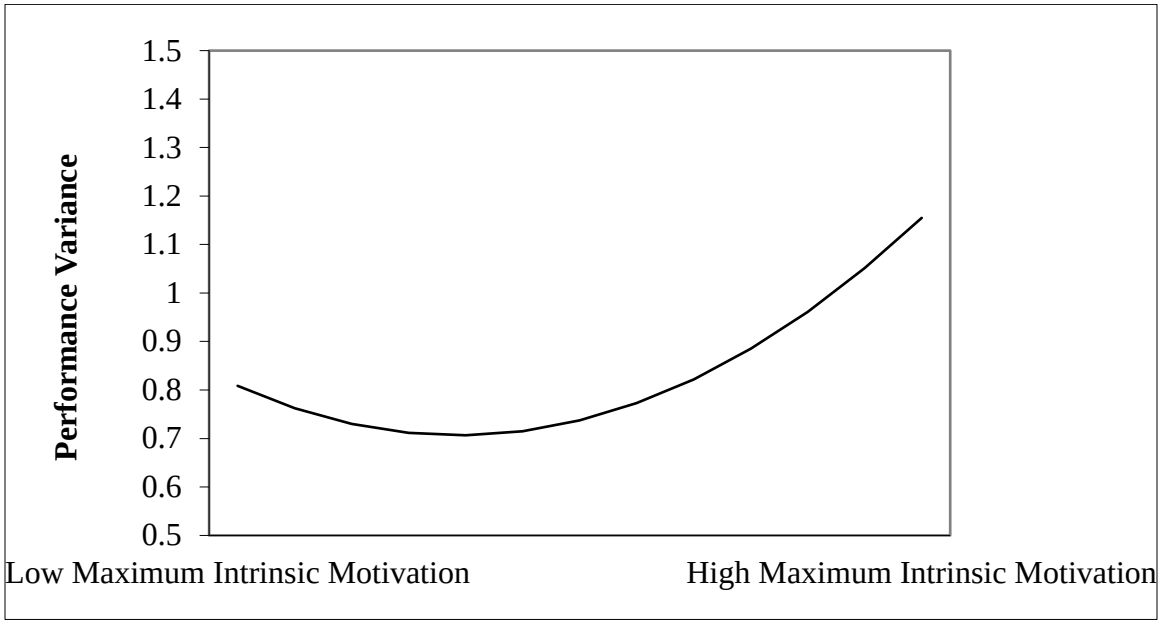


FIGURE 3

Study 1 Plot for Performance Variance



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