

Working during non-standard work time undermines intrinsic motivation[☆]

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ARTICLE INFO

Keywords:

Intrinsic motivation
Time perception
Upward counterfactuals
Work persistence

ABSTRACT

How do people's perceptions about *when* they work affect their intrinsic motivation? We find that working during non-standard work time (weekends/holidays) versus standard work time (Monday-Friday, 9-to-5) undermines people's intrinsic motivation for their professional and academic pursuits. Working during non-standard work time decreases intrinsic motivation by causing people to consider better uses of their time. That is, people generate more upward counterfactual thoughts, which mediates the effect of work time on reduced intrinsic motivation. As a causal test of this process, *increasing* consideration of upward counterfactuals during standard work time reduces intrinsic motivation, whereas *decreasing* consideration of upward counterfactuals during non-standard work time helps employees and students maintain intrinsic motivation for their professional and academic pursuits. Overall, we identify a novel determinant of intrinsic motivation and address a real challenge many people face: How changing work schedules affect interest and enjoyment of work, with important consequences for work outcomes.

1. Introduction

Over the past decade, technological advances and the changing nature of work have made it easier to work any time and from any place. As a result, people have started to pursue professional activities *outside* of the standard Monday-Friday, 9-to-5 work week (Bolino et al., 2020). As an example, nearly 90% of employees in the United States have worked a non-standard schedule at some point in their career (Presser & Ward, 2011), and even during federal holidays, 60% of employees work in some capacity (White, 2015). Students are also encouraged to pursue academic activities during non-standard work time, such as by taking classes during winter and summer breaks, or studying for exams during the weekend².

Despite work time bleeding into hours typically considered “non-standard,” society continues to have clear norms for when it is appropriate to pursue work, with many businesses and schools closed on weekends and holidays. Situational cues further reinforce these norms, particularly for full-time employees (Spreitzer et al., 2017). Information

on federal holidays is readily broadcasted in the media, increasing awareness even for those who do not have this time off. Moreover, calendar reminders can prompt people to consider that they are actually working during non-standard work time, even if they may not have realized this initially. For instance, US students studying in the library on a Monday may not realize they are working during non-standard work time until seeing on their calendar that it is Presidents' Day, a federal holiday.

Subtle reminders of time-use norms are increasingly common (see Figures S1a-S1c in the Online Supplement for examples). This is especially true for periods of recognized collective time off, such as federal holidays or weekends (Young & Melin, 2019). Although prior research has shown that failure to disconnect from work outside of standard work hours undermines well-being (Sonnentag, 2018; Steed et al., 2019), little is known about how working during non-standard work time affects work motivation and, more specifically, intrinsic motivation (i.e., pursuit of work for the interest and enjoyment it provides; Ryan & Deci, 2000). This is important to understand because intrinsic motivation is a

[☆] Preregistration files, data, syntax, and experimental materials are available via the Open Science Framework: <https://osf.io/y7ngf/>.

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² Non-standard work time refers to any time that falls outside of a traditional Monday-Friday, 9-to-5, work schedule (Bolino et al., 2020). We focus on non-standard work time as working weekends and holidays, as these are the most recognized collective time off periods and for which people hold strong time-use norms (Young & Melin, 2019). We discuss other non-standard work schedules (e.g., shift work) in the General Discussion.

key driver of work persistence (Cerasoli et al., 2014; van Egmond et al., 2017; Woolley & Fishbach, 2017) and well-being (Van den Broeck et al., 2021). Integrating insights on intrinsic motivation with the counterfactuals literature (Kahneman & Miller, 1986; Roese, 1994), we argue that working during non-standard (vs. standard) work time undermines intrinsic motivation for work by triggering upward counterfactual thoughts about how one's time could have been better spent.

Our research introduces *work time* as a driver of intrinsic motivation and makes three primary contributions to the literature. First, we expand research on intrinsic motivation by showing that beyond the content of work activities (Ryan & Deci, 2000), when people work is an important determinant of intrinsic motivation. Second, we contribute to the nascent literature on subjective time (Aeon et al., 2020; Feldman et al., 2020) by showing that temporal markers, such as whether one works during non-standard versus standard work time, can be demotivating. Finally, we contribute to the literature on counterfactuals (Kahneman & Miller, 1986; Roese, 1994) by providing causal evidence that work time increases accessibility of upward counterfactuals, which in turn harms intrinsic motivation. From a practical perspective, our research challenges the overly positive portrayal of increased work schedule flexibility (Gaskell, 2016; Leslie et al., 2012) by documenting a negative consequence for intrinsic motivation. Given that people will likely continue to value having flexibility over when they work, we also test a strategy to mitigate decreased intrinsic motivation when working during non-standard work time.

2. Intrinsic motivation: What it is, why it matters, and what are its key drivers

Intrinsic motivation is an autonomous form of motivation defined as experiencing interest and enjoyment (Amabile et al., 1994; Elliot & McGregor, 2001; Gagné & Deci, 2005; Grant, 2008; Van den Broeck et al., 2021; Vansteenkiste et al., 2006). Intrinsic motivation has been widely studied within organizational psychology (Heath, 1999; Herzberg, 1959; Lin, 2007; Vroom, 1964; Wrzesniewski et al., 2014) as well as adjacent fields, such as creativity (Amabile et al., 1986; Sansone & Harackiewicz, 1998), educational psychology (Day et al., 1971; Elliot & Harackiewicz, 1994; Harackiewicz & Sansone, 2000), and sports psychology (Vallerand, 2007; Vallerand & Losier, 1999). Across these domains, people who are intrinsically motivated pursue an activity for its own sake – that is they engage in the activity for the intrinsic interest derived from it (Van den Broeck et al., 2021).

Researchers often adopt a multidimensional conceptualization of work motivation, differentiating intrinsic motivation from other extrinsic forms of motivation (Gagné & Deci, 2005; Van den Broeck et al., 2021). Whereas intrinsic motivation refers to engagement in an activity for the inherent pleasure it provides, extrinsic motivation reflects engagement in an activity to achieve a separate outcome (Ryan & Deci, 2017; Van den Broeck et al., 2021). For example, people are intrinsically motivated when they engage in work because they find it interesting and meaningful to pursue, whereas they are extrinsically motivated when they engage in work for the financial outcomes work provides.

Scholars utilize this multidimensional approach because intrinsic and extrinsic motivation are unique predictors of important work outcomes (Gagné & Deci, 2005; Glynn, 1994; Woolley & Fishbach, 2018). Supporting this view, Woolley and Fishbach (2017) found that intrinsic and extrinsic motivation differentially predict people's persistence in behaviors such as studying and exercising. In one study, they recruited people in January and asked them to rate their intrinsic and extrinsic motivation to adhere to their New Year's resolutions. The authors found that intrinsic motivation positively predicted people's pursuit of their New Year's resolutions two months later, whereas extrinsic motivation was not a significant predictor. Beyond persistence, intrinsic motivation in particular is associated with many behaviors managers wish to enhance among their employees, including greater creativity,

volunteering, and job performance (Amabile, 1985; Grant, 2008; Liu et al., 2016; Van Dijke et al., 2019). Intrinsic motivation is also beneficial outside of work, as it predicts greater work-life balance (Ilies et al., 2017). Further illustrating the unique predictive power of intrinsic motivation, a recent *meta-analysis* revealed that intrinsic motivation was an important motivation factor for explaining certain employee outcomes, such as increased well-being and decreased absenteeism, compared to more controlled, extrinsic, types of motivation (e.g., external regulation; Van den Broeck et al., 2021).

Given that intrinsic motivation matters in life and at work, scholars have focused on identifying its predictors. According to self-determination theory (Ryan & Deci, 2000), people are intrinsically motivated when the activities they pursue satisfy the fundamental needs for autonomy, competence, and relatedness (Deci & Ryan, 2000; Grouzet et al., 2005). For example, students who enter business or law to help others and improve society are characterized as more internally motivated relative to those who enter business or law to gain prestige and social status (Granfield, 1992; Greco & Kraimer, 2020; Schleef, 2000). Job characteristic theory further identifies how specific job characteristics, such as skill variety, positively shape motivation because they satisfy innate psychological needs, such as autonomy (Hackman & Oldham, 1976); thus activities within these jobs lead people to feel more intrinsically motivated. Similarly, people who pursue an activity because it is something they *want* to do are considered more intrinsically motivated than those who pursue an activity because they feel they *have* to (Woolley & Fishbach, 2018).

In understanding antecedents of intrinsic motivation, research has also focused on factors that *undermine* intrinsic motivation. Children who colored for the sake of expressing themselves continued coloring when they were offered an award for coloring. Yet this award changed how children perceived the activity of coloring such that they were less likely to color when they had previously received an award but did not expect another one to arrive (Lepper et al., 1973). At work too, the introduction of rewards can decrease intrinsic motivation when there is no norm to receive them (Staw et al., 1980).

Building on this prior research, we investigate a novel factor that can shape evaluations of intrinsic motivation — *when* work is pursued. In the following section we draw on insights from the literature on counterfactual thinking (Kahneman & Miller, 1986) to propose that working during non-standard (vs. standard) work time will *reduce* intrinsic motivation to work because it causes people to question whether pursuing work activities achieves innate needs that they value (e.g., autonomy; Ryan & Deci, 2000).

3. Reduced intrinsic motivation during non-standard work time

For many people, working during non-standard work time is a non-normative behavior. According to the literature on counterfactual thinking (Kahneman & Miller, 1986), when people engage in non-normative behaviors, they generate counterfactual thoughts, that is, they “undo” their past actions by considering how things could have turned out differently if only they had acted differently (Epstude & Roese, 2007; Roese, 1994; Roese & Olson, 1993). Counterfactual thoughts can be upward – when one compares their current action to a more desirable alternative – or downward – when one compares their current action to a less desirable alternative (Roese, 1994). Someone working during the weekend can make an upward comparison and think about how much better their time could have been spent if, for example, they were instead watching a movie with their friends. Alternatively, someone working during the weekend could make a downward comparison and think about how much worse their time could have been spent if, for example, they were instead doing chores.

People often associate non-standard work time with more desirable activities than working (i.e., they categorize this time as time off for rest and leisure; Young & Melin, 2019). Thus, we hypothesize that working during non-standard (vs. standard) work time will increase accessibility

of upward counterfactual thoughts. Furthermore, because upward counterfactuals are negatively correlated with downward counterfactuals (Nasco & Marsh, 1999), it is likely that increased accessibility of upward counterfactual thoughts when working during non-standard (vs. standard) work time will further decrease accessibility of downward counterfactual thoughts. Reflecting this, research often treats counterfactual thinking as a relative index by subtracting downward counterfactuals from upward counterfactuals (Roese, 1994).

If upward counterfactual thoughts are more accessible when working during non-standard (vs. standard) work time, how might this affect intrinsic motivation to work? Prior research has not directly tested the link between upward counterfactuals and intrinsic motivation; however, suggestive evidence supports our prediction that intrinsic motivation is likely to suffer. A correlational study of undergraduate students found that students who engaged in more upward counterfactual thinking about their primary college major (i.e., comparing their current major to another major they perceived as more beneficial), were less intrinsically motivated to complete coursework for their current college major (Leach & Patall, 2013).

Beyond this correlational evidence, generating upward counterfactuals can undermine one's sense of autonomy (Dannenberg et al., 2012). In this prior research, people prompted to generate upward counterfactuals and consider how the situation could have turned out better experienced a lower sense of autonomy relative to those prompted to generate downward counterfactuals, that is, those who considered how the situation could have turned out worse. Possibly, considering upward counterfactuals during non-standard (vs. standard) work time will decrease intrinsic motivation for work because such upward counterfactuals reduce people's sense of autonomy, which as previously noted, is a key driver of intrinsic motivation (Deci & Ryan, 1980).

Thus, this prior research suggests that increased accessibility of upward counterfactuals in particular will matter for intrinsic motivation. Upward counterfactuals lead people to realize they would rather be somewhere else and that they are not fully autonomous in their task choices, which should decrease intrinsic motivation. Overall, we unite the literature on upward counterfactuals with that on intrinsic motivation to formally predict:

H1. Working during non-standard (vs. standard) work time decreases intrinsic motivation.

H2. Working during non-standard (vs. standard) work time increases the accessibility of upward counterfactuals, which mediates the effect of work time on intrinsic motivation.

If increased accessibility of upward counterfactual thoughts is the key factor by which working during non-standard work time reduces intrinsic motivation, then manipulating consideration of upward counterfactuals, independent of work time, should reduce intrinsic motivation to work. That is, prompting people who work during standard work time to generate thoughts that are typically generated during non-standard work time (i.e., increasing accessibility of upward counterfactuals) should result in lower intrinsic motivation relative to those who work during standard work time and are not prompted to consider upward counterfactual thoughts.

At the same time, we examine whether increased accessibility of downward counterfactuals influences intrinsic motivation independent of work time. If reduced intrinsic motivation during non-standard (vs. standard) work time is driven in part by decreased accessibility of downward counterfactuals, then increasing accessibility of downward counterfactuals (i.e., by prompting people to consider that they could be spending their time in worse ways than working) could in turn increase intrinsic motivation. However, given that prior research has found suggestive evidence linking upward counterfactuals with intrinsic motivation (Dannenberg et al., 2012; Leach & Patall, 2013), we expect upward counterfactuals to be the primary factor influencing intrinsic motivation.

Overall, we propose that accessibility of upward counterfactual thoughts undermines intrinsic motivation, such that increasing accessibility of upward counterfactuals when working during standard work time will reduce intrinsic motivation relative to no manipulation of counterfactual thoughts (i.e., a control group) and a manipulation that increases accessibility of downward counterfactuals. Formally, we predict:

H3. During *standard* work time, increasing accessibility of upward counterfactual thoughts (vs. increasing accessibility of downward counterfactual thoughts or no change in counterfactual thinking) will reduce intrinsic motivation to work.

Lastly, our theory offers clear implications for how to help preserve intrinsic motivation for those working during non-standard work time. If people experience lower intrinsic motivation during non-standard (vs. standard) work time because they spontaneously generate upward counterfactuals about how their time could have been better spent, instructing people working during non-standard work time to consider thoughts unrelated to upward counterfactuals should attenuate the effect. That is, redirecting people to instead consider the benefits of working non-standard work time should help prevent a reduction in intrinsic motivation. Thus, we test our theory by manipulating accessibility of upward counterfactual thoughts during non-standard work time. Formally, we predict:

H4. During *non-standard* work time, decreasing accessibility of upward counterfactual thoughts (vs. increasing accessibility of upward counterfactual thoughts or no change in counterfactual thinking) will increase intrinsic motivation to work.

4. Research overview

Overall, we theorize that *when* people work matters for intrinsic motivation. We test this prediction in eight experiments (summarized in Table 1). We examine intrinsic motivation among employees and students who work or study full-time, as perceptions about non-standard (vs. standard) work time are more salient for full-time workers (Spreitzer et al., 2017). Throughout, we compare intrinsic motivation when working during non-standard work time (e.g., weekends) with intrinsic motivation when working during standard work time (i.e., Monday-Friday). We also hold the day itself constant and manipulate the perception of time as non-standard (e.g., by manipulating whether students studying on a Monday when their university is in session are aware that it is a federal holiday or not).

We first demonstrate that working during non-standard (vs. standard) work time decreases intrinsic motivation among students (Study 1) and employees (Study 2). We also show that this effect holds for employees working on a Saturday (vs. Tuesday), even when employees are not explicitly reminded that Saturday represents non-standard work time (Study 3). We then test our underlying process in two studies, in line with recommendations from prior research (Spencer et al., 2005; see also Vancouver & Carlson, 2015)³. Specifically, Study 4 demonstrates that non-standard (vs. standard) work time increases accessibility of upward counterfactuals, which mediates the effect of work time on intrinsic motivation. Study 5 demonstrates that increasing accessibility

³ This design was inspired by Spencer et al. (2005), who discuss research by Word et al. (1974) testing process via a causal-chain. Word and colleagues used a two-step process to test the causal theory that "Stereotypes (A) lead to behaviors consistent with the stereotype (C) because of the nonverbal behavior on the part of those who hold the stereotype (B)" (p. 846). They established the link between A and B in their first study. Then, their second study directly manipulated the mechanism to show the relationship between B and C. Following this two-step process, our Studies 4–5 test the causal theory that non-standard work time (A) reduces intrinsic motivation (C) because people generate more upward counterfactuals (B).

Table 1
Summary of studies.

Study (N)	Sample	Manipulation	Findings (Hypotheses)
1 (123)	Students	2-cell (aware vs. unaware of non-standard work time; between-subjects)	Students who believe that they are working during non-standard (vs. standard) work time report lower IM.
2 (274)	Employees	2-cell (non-standard vs. standard work time; within-subject)	Employees working during non-standard (vs. standard) work time report lower IM.
3 (472)	Employees	2 (non-standard vs. standard work time; within-subject) × 2 (reminded of non-standard work time vs. not; between-subjects) mixed design	Employees working during non-standard (vs. standard) work time report lower IM, regardless of a non-standard work time reminder.
4 (257)	Employees	2-cell (aware vs. unaware of non-standard work time; between-subjects)	Employees who believe that they are working during non-standard (vs. standard) work time report lower IM and greater upward counterfactuals.
5 (291)	Employees	3-cell (prompted to consider upward vs. downward vs. no-counterfactual thoughts during standard work time; between-subjects)	Employees working during standard work time report lower IM when prompted to generate upward counterfactuals (vs. downward counterfactuals or a no-counterfactual control condition).
6a (270)	Employees	3-cell (prompted to consider upward vs. no-upward vs. no-counterfactual thoughts during non-standard work time; between-subjects)	Employees who consider working during non-standard work time report greater IM when upward counterfactuals are less accessible (vs. more accessible or a no-counterfactual control condition).
6b (71)	Students	2-cell (prompted to consider upward vs. no-upward)	Students and employees working during non-standard work time report greater IM
6c (181)	Employees	counterfactual thoughts during non-standard work time; between-subjects)	when upward counterfactuals are less (vs. more) accessible (S6b; S6c), which affects persistence (S6c).

Note. All studies recruited full-time students or employees; IM refers to intrinsic motivation. For online studies, we pre-determined our sample size in advance to recruit a minimum of 90 participants per cell. For in-person studies, where participants were approached by research assistants in the field during non-standard work time, we aimed to recruit a minimum of 60 per cell to be adequately powered to detect a medium-sized effect. We met this threshold in Study 1, but not Study 6b. Study 6c was conducted in part to replicate Study 6b given the smaller sample size.

of upward counterfactuals during *standard* work time undermines intrinsic motivation compared to increasing accessibility of downward counterfactual thoughts or to a no-counterfactuals control condition. Finally, we examine whether decreasing the accessibility of upward counterfactuals when working during non-standard work time reverses the effect, allowing people to maintain intrinsic motivation during non-standard work time (Studies 6a–6c). In Study 6c we further examine implications for work persistence.

In some studies, we also examine extrinsic motivation (i.e., Studies 1–3 and 6b assess identified regulation: pursuing activities to attain valued career goals; Studies 2–3 and 6c assess external regulation: pursuing activities for purely external, often financial, rewards). We measure extrinsic motivation as in prior motivation research, which at times contrasts intrinsic motivation with extrinsic motivation (Gagné & Deci, 2005; Woolley & Fishbach, 2018). However, given that our focus is on intrinsic motivation, we return to discuss consequences for extrinsic motivation in the General Discussion.

Preregistration files, data, syntax, and experimental materials for our studies are available at the OSF: <https://osf.io/y7ngf/>. We report measures pre-registered as exploratory and correlations among our core variables in the Online Supplement.

5. Study 1: Studying during non-standard work time decreases intrinsic motivation

Study 1 examined whether studying during non-standard work time decreases students' intrinsic motivation to study (H1). We recruited full-time US students studying in a campus library during a federal holiday, which was not a university holiday. This allowed us to hold the time constant, and manipulate perceptions of time as non-standard (vs. standard). Since students did not have this day off, we anticipated that they would perceive this time as standard work time unless told otherwise. We accordingly told half of participants that they were working during a federal holiday (non-standard condition) whereas the other half did not learn this (standard condition). We predicted that students who perceived the time as non-standard (vs. standard) would report lower intrinsic motivation to study.

5.1. Method

Participants. We pre-registered this study (aspredicted.org/da6z6.pdf) and recruited 123 full-time students from an East Coast university

in the US (65.0% female, $M_{age} = 20.68$, $SD_{age} = 2.15$). A research assistant blind to hypothesis and condition approached students studying in a campus library during a federal holiday to complete a Qualtrics survey on an iPad.

Procedure. The Qualtrics survey randomly assigned participants to one of two conditions in a between-subjects design. In the *non-standard work time* condition, participants read: "Today is February 17th, Presidents' Day. Presidents' Day is a state holiday celebrated on the 3rd Monday of February where many people have off from work." In the *standard work time* condition, participants read: "Today is February 17th." We conducted a pre-test to confirm that people who learn that this time is a federal holiday (vs. not) perceive it as non-standard⁴.

We then asked students to list the work they were currently doing. For example, students wrote "finance homework," "starting with Econ work," and "studying for prelim." We assessed students' intrinsic motivation for the course work they were completing that day using items adapted from the interest-enjoyment dimension of the Intrinsic Motivation Inventory (Grant, 2008; McAuley et al., 1989; Menges et al., 2017; Woolley & Fishbach, 2018; $\alpha = 0.86$); specifically, we asked participants: "To what extent are the materials you are working on today:" 1. Enjoyable, 2. Engaging, 3. Interesting, and 4. A fun challenge. This validated scale captures students' intrinsic motivation to pursue their course work.

We assessed extrinsic motivation using items tapping into identified regulation (Gagné et al., 2010; Gagné & Deci, 2005) – the desire to perform an activity due to its personal importance ($\alpha = 0.84$): "Are the materials you are working on today:" 1. Useful for your long-term goals, 2. Important to finish, 3. A way to reach your goals, and 4. Effective for reaching your long-term goals. We assessed all items on seven-point scales (1 = *not at all*, 7 = *very much*). In this study, intrinsic motivation and identified regulation were weakly correlated ($r = 0.28$; Evans, 1996). For subsequent studies, we report correlations among variables in the Online Supplement.

⁴ In a pretest, we asked participants either "How do you think most people would spend Presidents' Day?" or "How do you think most people would spend February 17th, 2020?" (−3 = *spend this day relaxing*; 3 = *spend this day working*). Confirming our manipulation, people thought others would be more likely to relax (vs. work) on Presidents' Day ($M = -0.48$, $SD = 1.93$) than February 17th ($M = 1.75$, $SD = 1.12$), $t(41) = -4.54$, $p < .001$, $d = -1.38$.

5.2. Results

In line with our preregistration plan, we conducted two *t*-test analyses. As predicted, students who perceived that they studied during non-standard (vs. standard) work time reported lower intrinsic motivation ($M_{\text{non-standard}} = 3.70$, $SD = 1.16$; $M_{\text{standard}} = 4.31$, $SD = 1.29$), $t(121) = -2.80$, $p = .006$, $d = -0.50$. There was no significant effect of condition on identified regulation ($M_{\text{non-standard}} = 4.91$, $SD = 1.39$; $M_{\text{standard}} = 5.06$, $SD = 1.25$), $t(121) = -0.67$, $p = .506$, $d = -0.11$.

5.3. Discussion

Study 1 demonstrated that perceptions of non-standard work time reduce intrinsic motivation (H1). Full-time students studying on campus felt less intrinsically motivated to study when they perceived the time as non-standard (vs. standard). Although our main focus is on intrinsic motivation, we note that there was no significant effect of work time on identified regulation, which is a form of extrinsic motivation (Gagné & Deci, 2005).

6. Study 2: Working during non-standard work time decreases intrinsic motivation

Study 2 extended Study 1 in two ways. First, whereas Study 1 tested for the predicted effect by manipulating awareness of non-standard work time between-subjects, Study 2 manipulated work time within-subject, holding the person constant. Participants completed a survey on two days. During standard work time, they indicated their intrinsic motivation to work after viewing a calendar highlighting the day as a typical Monday. We surveyed the same participants one week later, asking them to indicate their intrinsic motivation to work, this time after viewing a weekly calendar highlighting the day as Monday, a federal holiday.

Second, in Study 2 we drew people's attention to the non-standard nature of work time using a more conservative and subtle manipulation (i.e., a calendar). Unlike Study 1, we did not prompt participants to consider others' time-use. We predicted that people would report lower intrinsic motivation to work during non-standard (vs. standard) work time (H1).

6.1. Method

Participants. We pre-registered this study (aspredicted.org/s43e7.pdf) and recruited 502 US-based participants from Prolific to complete a two-part survey starting on a typical Monday (standard work time). We used panel filters to recruit full-time employees (i.e., working 31–60 hours a week)⁵. In line with our preregistration plan, 368 participants who completed the first survey passed our three attention check questions and were invited to take part in the second survey one week later on Monday, a federal holiday (non-standard work time). Of those invited, 274 participants completed the second survey (44.5% female; $M_{\text{age}} = 34.79$, $SD_{\text{age}} = 9.87$)⁶.

Procedure. This study used a 2-cell (standard vs. non-standard work time) within-subject design. We recruited participants to complete a

⁵ We consider full-time as working more than 31 hours per week, based on prior research and because few people working more than 30 hours describe themselves as part-time (Duffield et al., 2008; Manning & Petrongolo, 2008).

⁶ Those who completed both surveys (included in the final sample) reported lower intrinsic motivation in the first survey ($M = 4.98$, $SD = 1.52$; $n = 274$) than those who completed only the first survey ($M = 5.33$, $SD = 1.22$; $n = 94$), $t(366) = -2.03$, $p = .043$, $d = -0.24$. This study thus serves as a conservative test of our hypothesis, as those who completed both surveys and were included in our final sample had lower intrinsic motivation during standard work time than those who were not included in the final sample.

survey about their work experience. On January 11th [January 18th], we presented participants with a weekly calendar highlighting the day (Fig. 1).

We assessed intrinsic motivation using a seven-item scale ($\alpha_{\text{standard}} = 0.95$; $\alpha_{\text{non-standard}} = 0.97$), combining the four-item scale from Study 1 (Grant, 2008; McAuley et al., 1989; Menges et al., 2017; Woolley & Fishbach, 2018) with three additional items from Mullan et al. (1997). Specifically, participants in this study read “We will ask you some questions about your experience today” and were then prompted to answer the following questions: “I am working today because...” 1. “I feel that my work is interesting,” 2. “I feel that my work is meaningful,” 3. “I feel that my work is engaging,” 4. “I feel that my work is enjoyable,” 5. “I feel pleasure in learning new things,” 6. “I feel satisfaction in taking on interesting challenges,” and 7. “I feel satisfaction in successfully doing difficult tasks” (1 = not at all, 7 = very much).

We also included a seven-item scale assessing identified regulation ($\alpha_{\text{standard}} = 0.90$; $\alpha_{\text{non-standard}} = 0.95$), combining the four-item scale from Study 1 with three additional items from Mullan et al. (1997). Participants indicated whether they were working that day because... 1. “It is useful for my long-term goals,” 2. “It is important to finish,” 3. “It is a way to reach my goals,” 4. “It is effective for reaching my long-term goals,” 5. “I need to attain certain important objectives,” 6. “I need to attain a certain lifestyle,” and 7. “I need to attain my career goals” (1 = not at all, 7 = very much).

Lastly, in line with past motivation literature (Mullan et al., 1997), we included a three-item scale for external regulation, which examines whether people work for external rewards separate from the work itself ($\alpha_{\text{standard}} = 0.89$; $\alpha_{\text{non-standard}} = 0.93$). Participants indicated whether they were working that day... 1. “For the income it provides me,” 2. “Because it allows me to earn money,” and 3. “To gain a sense of security” (1 = not at all, 7 = very much)⁷.

At the end of the first survey, we measured three attention check questions that we used to carry out pre-registered exclusions. At the end of the second survey, we confirmed that participants were planning to work during non-standard work time by asking, “Were you planning to work today?” (75.2% reported that they had planned to work that day).

6.2. Results

In line with our preregistration plan, we conducted a paired *t*-test analysis to compare intrinsic motivation to work during non-standard work time with intrinsic motivation to work during standard work time. As predicted, participants were less intrinsically motivated during non-standard work time ($M = 4.55$, $SD = 1.91$) than during standard work time ($M = 4.98$, $SD = 1.52$), $t(273) = -4.82$, $p < .001$, $d = -0.29$. Although not pre-registered, this effect held when restricting the sample to only those who planned to work during non-standard work time ($M_{\text{non-standard}} = 4.71$, $SD = 1.81$; $M_{\text{standard}} = 5.03$, $SD = 1.55$), $t(205) = -3.71$, $p < .001$, $d = -0.26$.

We next examined identified and external regulation, which we had pre-registered as exploratory. We found that working during non-standard (vs. standard) work time decreased identified regulation ($M_{\text{non-standard}} = 5.20$, $SD = 1.54$; $M_{\text{standard}} = 5.70$, $SD = 1.03$), $t(273) = -6.16$, $p < .001$, $d = -0.37$, and decreased external regulation ($M_{\text{non-standard}} = 5.73$, $SD = 1.53$; $M_{\text{standard}} = 6.06$, $SD = 1.02$), $t(273) = -3.56$, $p < .001$, $d = -0.21$. Restricting the sample to those who planned to work during non-standard work time, the effect on identified regulation remained, $t(205) = -4.92$, $p < .001$, $d = -0.34$, but the effect on external

⁷ Note the 7-item scale of identified regulation was mislabeled as “extrinsic motivation” in our pre-registration and the 3-item scale of external regulation was mislabeled as “identified regulation.” We utilized a CFA with oblique rotation and unrestricted extraction method based on “leveling off” the scree plot (Fabrigar et al., 1999) to confirm that these motivation measures load onto three separate factors (see Online Supplement for full factor analysis).

Standard Work Time Condition

Today is January 11th.

January 2021						
S	M	T	W	T	F	S
10	11	12	13	14	15	16

Non-Standard Work Time Condition

Today is January 18th, Martin Luther King Jr. Day.

January 2021						
S	M	T	W	T	F	S
17	18 Martin Luther King Jr. Day	19	20	21	22	23

Fig. 1. Standard vs. non-standard work time manipulation (Study 2).

regulation became non-significant, $t(205) = -1.30, p = .194, d = -0.09$.

6.3. Discussion

Study 2 revealed that manipulating non-standard (vs. standard) work time within-subject reduced intrinsic motivation to work. Although people engaged in work-related activities on both Mondays, they reported lower intrinsic motivation for their work when working during a federal holiday versus a regular work day. Overall, this study shows that subtle reminders that the day is non-standard for work can undermine intrinsic motivation.

Of note, in this study working non-standard work time reduced extrinsic motivation (both identified and external regulation), although the effect on external regulation was not significant when excluding people who did not plan to work during the federal holiday. One possible conclusion from Studies 1–2 is that the effect of work time on intrinsic motivation is more stable than the effect, if any, on identified or external regulation. For this reason, in our next study we again pre-registered extrinsic motivation measures as exploratory but report results in the Online Supplement. We return to discuss extrinsic motivation across studies in the General Discussion.

7. Study 3: Non-standard (vs. standard) work time decreases intrinsic motivation with and without reminders

So far, we find that both perceiving work time as non-standard (vs. standard; Study 1) and working during actual non-standard (vs. standard) work time (Study 2) decreases intrinsic motivation. Building on our prior studies, Study 3 examined whether working during non-standard (vs. standard) work time undermines intrinsic motivation even when people are not explicitly reminded that the time is non-standard. To test this, we assessed participants' intrinsic motivation first on a Tuesday and then again on the following Saturday. We further provided participants with either an explicit reminder or no reminder that Saturday was non-standard work time. In line with existing research suggesting that weekends are recognized periods of collective time off (Young & Melin, 2019), we expected participants to naturally categorize

Saturday as non-standard work time and Tuesday as standard work time⁸. We expected participants to be less intrinsically motivated to work on a Saturday (vs. Tuesday) regardless of whether they were reminded that Saturday is non-standard work time.

7.1. Method

Participants. We pre-registered this study (aspredicted.org/n46pm.pdf) and recruited 500 US- and European-based participants from Prolific to complete a two-part survey. We used Prolific panel filters to recruit full-time employees. As pre-registered, we excluded participants who did not pass attention checks in the first survey, leaving 472 participants. Of these participants, 321 completed the second survey (63.2% female; $M_{age} = 35.59, SD_{age} = 10.01$)⁹.

Procedure. This study utilized a 2 (standard vs. non-standard; within-subject) \times 2 (reminder vs. no reminder of non-standard work time; between-subjects) mixed design. We recruited participants on a Tuesday and measured their intrinsic motivation to work as detailed below. These participants were not reminded that they were working during standard work time, allowing us to rely on their spontaneous categorization of the day as standard work time.

We surveyed the same participants the following Saturday, and randomly assigned them to a condition. In the *reminder* condition, participants read "Today is Saturday, July 24th, 2021. Saturday is a weekend day." In the *no reminder* condition, participants did not view any prompt. That is, we relied on their spontaneous categorization of the day as non-standard work time.

We measured intrinsic motivation on both days using a similar scale as in Study 2 ($\alpha_{non-standard} = 0.92; \alpha_{standard} = 0.95$). Participants read that

⁸ In both surveys, we asked, "...do you consider today a work day or a non-work day?" (binary response). The majority of participants considered Tuesday a workday (91.6%) and Saturday a non-work day (97.8%).

⁹ Those who completed both surveys (vs. only the first survey) did not significantly differ in reported intrinsic motivation, $t(470) = 1.23, p = .218, d = 0.13$, suggesting our final sample did not differ from our original sample.

we would ask them questions about their subjective experience of work that day. Participants then indicated “I am working today because...” 1. “I feel that my work is interesting,” 2. “I feel that my work is meaningful,” 3. “I feel that my work is engaging,” 4. “I feel that my work is enjoyable,” 5. “I feel pleasure in learning new things,” 6. “I feel satisfaction in taking on interesting challenges,” and 7. “I feel satisfaction in successfully doing difficult tasks” (1 = *not at all to*; 7 = *very much*). Items pre-registered as exploratory are reported in the Online Supplement.

7.2. Results

In line with our preregistration plan, we conducted a repeated measures ANOVA predicting intrinsic motivation from the work time condition and the reminder condition. As predicted, and replicating Studies 1–2, we found a main effect of work time. Participants were less intrinsically motivated to work during non-standard work time ($M = 4.53$, $SD = 1.52$) than during standard work time ($M = 5.07$, $SD = 1.21$), $F(1, 316) = 55.27$, $p < .001$, $\eta_p^2 = 0.15$.

There was also a significant interaction, $F(1, 316) = 17.05$, $p < .001$, $\eta_p^2 = 0.05$ (Fig. 2). Decomposing this interaction revealed a significant effect of non-standard (vs. standard) work time when people were explicitly reminded that Saturday was non-standard work time, $F(1, 316) = 66.46$, $p < .001$, $\eta_p^2 = 0.17$, and crucially, a significant effect of non-standard (vs. standard) work time when they were *not* provided a reminder, $F(1, 316) = 5.50$, $p = .020$, $\eta_p^2 = 0.02$. Thus, working on a Saturday decreased intrinsic motivation regardless of the presence of an explicit reminder. Post-hoc, we reason that this interaction occurs because a reminder served to strengthen our work time manipulation. Yet, importantly for our theory, an explicit reminder is not necessary for non-standard work time to decrease intrinsic motivation.

7.3. Discussion

Study 3 revealed that intrinsic motivation decreases during non-standard (vs. standard) work time, both when we reminded participants that this time is non-standard (i.e., when participants read that this day was a weekend day) and when we did not include any mention of the day to participants. This result suggests that working during non-standard work time undermines intrinsic motivation independent of a reminder that the time is non-standard for work. Of note, a reminder strengthened the effect; this is important to know given the prevalence of subtle non-standard work time reminders (e.g., calendar prompts; see Figure S1a in the Online Supplement).

Having documented the basic effect that non-standard (vs. standard) work time reduces intrinsic motivation during federal holidays (Studies 1–2) and on Saturday (Study 3), our next studies (Studies 4–5) test the proposed mechanism underlying this effect: accessibility of upward counterfactuals.

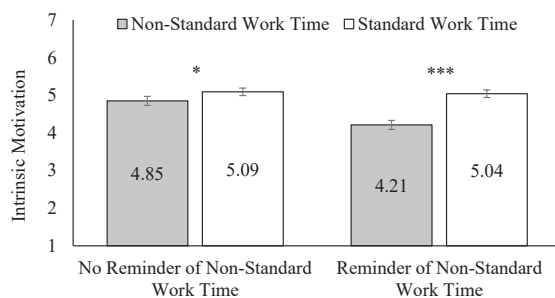


Fig. 2. Participants were less intrinsically motivated to work during non-standard (vs. standard) work time both with and without a reminder that this time was non-standard (Study 3). Note. *** $p < .001$; Error bars represent standard errors around the mean.

8. Study 4: Mediation through upward counterfactual thoughts

We propose that working during non-standard (vs. standard) work time undermines intrinsic motivation by increasing accessibility of upward counterfactual thoughts. Study 4 tested this process via mediation. We held work time constant and manipulated perceptions of work time as non-standard or standard, similar to Study 1. That is, all participants imagined working on the same day. Half of participants were reminded that this day was a federal holiday, whereas the other half of participants were not reminded of this. We then measured intrinsic motivation to work, as well as accessibility of upward counterfactual thoughts. We expected upward counterfactuals to be more accessible in the non-standard (vs. standard) work time condition, and that this would mediate the effect of work time on intrinsic motivation.

Our prediction that upward counterfactuals drive the reduction in intrinsic motivation during non-standard work time is based on prior research (Dannenberg et al., 2012; Leach & Patall, 2013). However, we also measured accessibility of downward counterfactuals, as these are often negatively correlated with upward counterfactuals (Nasco & Marsh, 1999). We reasoned that accessibility of downward counterfactuals may decrease during non-standard (vs. standard) work time, which should also mediate the effect on intrinsic motivation.

8.1. Method

Participants. We recruited 300 US-based full-time employees from Prolific. As pre-registered (aspredicted.org/bg4mq.pdf) we excluded participants who failed attention checks ($n = 43$), leaving a total of 257 participants (52.9% female; $M_{\text{age}} = 34.91$, $SD_{\text{age}} = 13.76$).

Procedure. We randomly assigned participants to a condition in a 2-cell (non-standard vs. standard work time) between-subjects design. We recruited participants the week before a federal holiday (Martin Luther King Jr. Day). Depending on condition, participants were instructed to “take a moment to put yourself in the following situation.” In the *non-standard work time* condition, participants read, “Imagine that you are working on Monday, January 18th, 2021, Martin Luther King Jr. Day. Martin Luther King Jr. Day is a federal holiday in the United States celebrated on the third Monday in January.” In the *standard work time* condition, participants did not read that this time was non-standard; they instead read: “Imagine that you are working on Monday, January 18th, 2021.” Participants read their assigned prompt and wrote what they thought they would be doing or feeling in this situation¹⁰.

We assessed intrinsic motivation for the work they would be doing that day using a four-item scale similar to Study 1 ($\alpha = 0.94$). Specifically, we asked participants, “In this situation, did you think your work would be:” 1. Enjoyable, 2. Engaging, 3. Interesting, and 4. A fun challenge. We also used a four-item scale ($\alpha = 0.93$) to assess accessibility of upward counterfactuals (Roese & Olson, 1993; Rye et al., 2008), asking participants to what extent they would be: “Thinking about how much better things could have been had I spent my time differently,” “Thinking about how I could have spent my time better,” “Wishing that I could have spent my time that day differently,” and “Feeling sad when thinking about how much better I could have spent my time that day” (1 = *not at all*, 7 = *very much*).

Additionally, we used a four-item scale to assess accessibility of downward counterfactual thoughts (Roese & Olson, 1993; Rye et al., 2008). Participants indicated the extent to which they would be ($\alpha = 0.88$): “Thinking about how much worse things could have been had I spent my time differently,” “Feeling relieved when thinking about how I

¹⁰ A research assistant blind to hypothesis and condition coded participants’ open responses to this prompt for explicit mentions of the holiday. Confirming our manipulation, significantly fewer participants in the standard (vs. non-standard) work time condition mentioned the holiday (21.5% vs. 65.9%), $\chi^2(1, 253) = 50.62$, $p < .001$, $\phi = 0.45$.

could have spent my time worse,” “Glad that I did not spend my time that day differently,” and “Feeling happy when thinking about how much worse I could have spent my time that day” (1 = *not at all*, 7 = *very much*). We counterbalanced the order of counterfactual scales (order did not affect our results). Lastly, we measured attention checks to carry out pre-registered exclusions.

8.2. Results

As predicted, participants in the non-standard work time condition reported lower intrinsic motivation to work ($M = 3.92$, $SD = 1.64$) than participants in the standard work time condition ($M = 4.40$, $SD = 1.59$), $t(255) = -2.34$, $p = .020$, $d = -0.30$.

Participants in the non-standard (vs. standard) work time condition reported greater upward counterfactual thinking ($M_{\text{non-standard}} = 4.16$, $SD = 1.81$; $M_{\text{standard}} = 3.48$, $SD = 1.67$), $t(255) = 3.13$, $p = .002$, $d = 0.39$. These participants also reported lower downward counterfactual thinking ($M_{\text{non-standard}} = 3.00$, $SD = 1.48$; $M_{\text{standard}} = 3.52$, $SD = 1.53$), $t(255) = -2.81$, $p = .005$, $d = -0.35$. Thus, imagining working during non-standard work time increased accessibility of upward counterfactuals, and decreased accessibility of downward counterfactuals (upward and downward counterfactual thoughts were negatively correlated $r = -0.22$, $p < .001$).

Next, following our preregistration plan, we conducted a parallel mediation analysis (PROCESS Model 4; Hayes, 2008) with both upward and downward counterfactuals as mediators. This analysis revealed significant mediation through upward counterfactuals ($B_{\text{indirect}} = -0.29$, $SE = 0.10$, 95% CI = [-0.50, -0.10]), and significant mediation through downward counterfactuals ($B_{\text{indirect}} = -0.17$, $SE = 0.07$, 95% CI = [-0.31, -0.05])¹¹ (Fig. 3). These results suggest that decreased intrinsic motivation in the non-standard (vs. standard) work time condition was driven by increased accessibility of upward counterfactuals relative to downward counterfactuals.

8.3. Discussion

Study 4 demonstrated that perceiving work time as non-standard (vs. standard) reduced people’s intrinsic motivation to work, conceptually replicating Studies 1–3 (H1). Moving beyond this basic effect, we found that perceiving work time as non-standard (vs. standard) resulted in greater accessibility of upward counterfactual thoughts (i.e., thoughts related to how one’s time could have been spent in better ways than working), and this increased accessibility of upward counterfactuals predicted *lower* intrinsic motivation to work (H2). At the same time, we found that non-standard (vs. standard) work time decreased accessibility of downward counterfactual thoughts (i.e., thoughts related to how one’s time could have been spent in worse ways than working), and this decreased accessibility of downward counterfactuals predicted *greater* intrinsic motivation. We suggest that the effect of work time on downward counterfactuals may be due to the negative correlation observed between upward and downward counterfactuals. Study 5 accordingly provided a causal test of the counterfactual mechanism.

¹¹ Research on counterfactual thinking often computes an index of relative counterfactual thought (Roese, 1994). We accordingly subtracted the rating of downward counterfactuals from upward counterfactuals and examined mediation through this relative counterfactual index (higher scores indicated greater upward counterfactual thinking). We found significant mediation such that non-standard (vs. standard) work time increased accessibility of upward relative to downward counterfactual thoughts, which mediated the effect of work time on intrinsic motivation ($B_{\text{indirect}} = -0.46$, $SE = 0.13$, 95% CI = [-0.71, -0.22]).

9. Study 5: Manipulating counterfactuals during standard work time

Study 5 examined the causal role of counterfactual thinking on intrinsic motivation by manipulating accessibility of counterfactual thoughts. Building on Study 4, which demonstrated that non-standard (vs. standard) work time increased accessibility of upward counterfactual thoughts, and decreased accessibility of downward counterfactual thoughts, Study 5 directly manipulated accessibility of counterfactual thoughts during standard work time (i.e., Tuesday). If considering upward counterfactual thoughts during non-standard (vs. standard) work time reduces intrinsic motivation, then prompting people to generate these thoughts when they do not typically come to mind (i.e., during standard work time), should reduce intrinsic motivation relative to a control condition in which upward counterfactuals are not considered (H3).

Furthermore, if decreased accessibility of downward counterfactual thoughts during non-standard work is responsible for reduced intrinsic motivation, encouraging people to consider these thoughts should increase intrinsic motivation relative to a control condition. However, given that prior research suggests upward counterfactuals in particular are predictive of lower intrinsic motivation (Dannenberg et al., 2012; Leach & Patall, 2013), we anticipated that manipulating upward, but not downward, counterfactuals would affect intrinsic motivation relative to a control (no-counterfactual prompt) condition.

9.1. Method

Participants. We recruited 300 US-based full-time employees from Prolific on a Tuesday. As pre-registered (aspredicted.org/rk3fc.pdf) we excluded participants who failed attention checks ($n = 9$), leaving 291 participants (90% female; $M_{\text{age}} = 25.89$, $SD_{\text{age}} = 6.90$).

Procedure. We randomly assigned participants to a condition in a 3-cell (upward counterfactuals vs. downward counterfactuals vs. control) between-subjects design. In the *control* condition, participants read: “Take a moment to think and write about how you are using your time today working. That is, what are some ways you are using this time?” In the *upward counterfactuals* condition, participants read: “Take a moment to think and write about how your time today could have been spent in better ways than working. That is, what are some things that would be a better use of this time?” In the *downward counterfactuals* condition, participants read: “Take a moment to think and write about how your time today could have been spent in worse ways than working. That is, what are some things that would be a worse use of this time?” These instructions were adapted from prior research that manipulated counterfactual thinking (e.g., Kray et al., 2009).

Using the 7-item scale adapted from Studies 2–3, we assessed participants’ intrinsic motivation for the work they were doing that day ($\alpha = 0.89$). We then measured two manipulation checks (counterbalanced), one assessing upward counterfactual thinking: “In this study, to what extent were you thinking about how much better things could have been if you spent your time today differently?” and one assessing downward counterfactual thinking: “In this study, to what extent were you thinking about how much worse things could have been if you spent your time today differently?” (1 = *not at all*, 7 = *very much*).

9.2. Results

Manipulation checks. First, we regressed the upward counterfactual manipulation check on two dummy variables representing the downward counterfactual and control conditions, with the upward counterfactual condition as the reference group. Confirming our manipulation, participants reported greater upward counterfactual thinking in the upward counterfactual condition ($M = 5.51$, $SD = 1.52$) compared with the downward counterfactual condition ($M = 3.86$, $SD = 2.07$), $B = -1.65$, $SE = 0.27$, $t(288) = -6.07$, $p < .001$, $d = -0.91$, and control

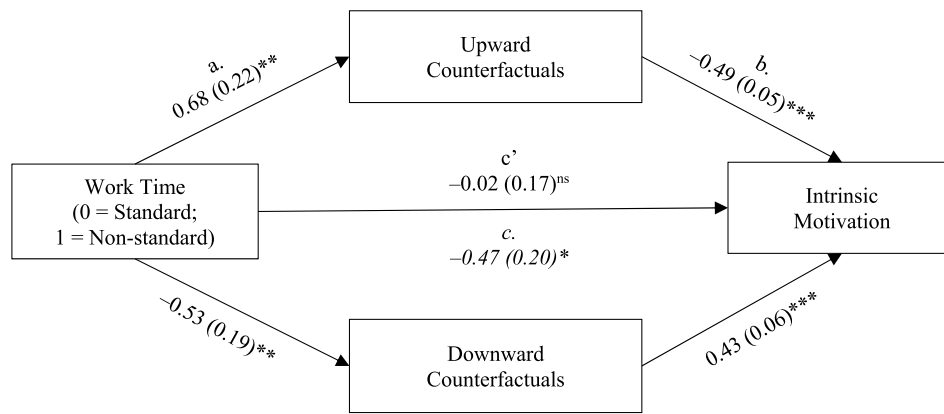


Fig. 3. Parallel mediation through upward and downward counterfactuals in Study 4. *Note.* Mediation diagram: a, b, c, and c' path coefficients representing unstandardized betas and standard errors (in parentheses). The c-prime path indicates the effect of condition on the dependent variable when controlling for the mediators. The c-path indicates the effect of condition on the dependent variable when *not* controlling for the mediators. * $p < .05$; ** $p < .01$; *** $p < .001$.

condition ($M = 3.58, SD = 2.07, B = -1.93, SE = 0.27, t(288) = -7.05, p < .001, d = -1.07$).

Next, we regressed the downward counterfactual manipulation check on two dummy variables, using the downward counterfactual condition as the reference group. Confirming our manipulation, participants reported greater downward counterfactual thoughts in the downward counterfactual condition ($M = 4.63, SD = 1.94$) compared with the upward counterfactual condition ($M = 1.76, SD = 1.14, B = -2.87, SE = 0.23, t(288) = -12.74, p < .001, d = -1.77$), and control condition ($M = 2.07, SD = 1.57, B = -2.56, SE = 0.23, t(288) = -11.22, p < .001, d = -1.45$).

Intrinsic motivation. Moving to hypothesis testing, as pre-registered, we regressed intrinsic motivation on two dummy variables representing the two counterfactual conditions, with the control condition as the reference group. We found a significant effect of upward counterfactual (vs. control) condition. Increasing the accessibility of upward counterfactual thoughts during standard work time decreased intrinsic motivation relative to control ($M_{\text{upward}} = 4.68, SD = 1.26; M_{\text{control}} = 5.17, SD = 1.28, B = -0.49, SE = 0.18, t(288) = -2.69, p = .008, d = -0.39$). However, there was no significant effect of downward counterfactuals relative to control ($M_{\text{downward}} = 5.27, SD = 1.27, B = 0.10, SE = 0.18, t(288) = 0.54, p = .588, d = 0.08$ (Fig. 4)).

9.3. Discussion

Study 5 found that considering upward counterfactual thoughts during standard work time decreases intrinsic motivation relative to a control (no-counterfactual prompt) condition. However, increasing accessibility of downward counterfactual thoughts did not affect intrinsic motivation relative to the control condition. This study

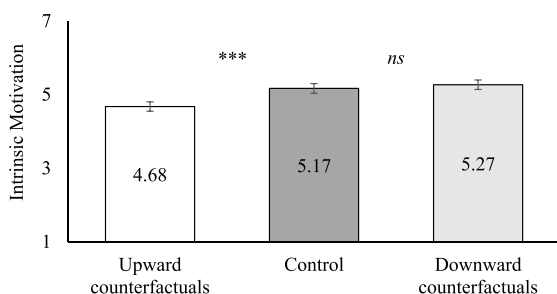


Fig. 4. Increasing accessibility of upward counterfactuals during standard work time decreased intrinsic motivation relative to a control condition and relative to increasing accessibility of downward counterfactuals (Study 5). *Note.* *** $p < .001$; Error bars represent standard errors around the mean.

provides support that it is particularly increased accessibility of upward counterfactual thoughts that decreases intrinsic motivation.

Together, Studies 4 and 5 tested the proposed causal chain, that (A) working non-standard (vs. standard) work time (C) decreases intrinsic motivation to work by (B) increasing accessibility of upward counterfactuals. Following prior research (Spencer et al., 2005; see also Vancouver & Carlson, 2015), we first demonstrated in Study 4 that non-standard (vs. standard) work time increases accessibility of upward counterfactuals (A to B link). Study 5 then prompted people working during standard work time to either generate thoughts that are typically generated during non-standard work time (i.e., increased upward counterfactual thinking) or generate thoughts that are *not* typically generated during non-standard work time (i.e., increased downward counterfactual thinking) and compared this to a no-counterfactual control condition. Increasing accessibility of upward counterfactuals reduced intrinsic motivation (B to C link). This causal manipulation of our mediator provides strong evidence for our theoretically proposed psychological process – that accessibility of upward counterfactuals reduces intrinsic motivation.

10. Studies 6a-6c: Restoring intrinsic motivation during non-standard work time

Studies 6a-6c tested a theoretically consistent intervention to preserve intrinsic motivation during non-standard work time. Specifically, we tested whether reducing accessibility of upward counterfactual thoughts would help people maintain intrinsic motivation during non-standard work time. First, in Study 6a, participants imagined working during non-standard work time and were assigned to one of three conditions: increased accessibility of upward counterfactuals, decreased accessibility of upward counterfactuals, or a no-counterfactual control condition. We predicted that reducing accessibility of upward counterfactuals during non-standard work time would result in greater intrinsic motivation relative to increasing accessibility of upward counterfactuals and to a no-prompting of counterfactuals control condition.

Study 6b recruited participants actually working during non-standard work time (students studying in the library during Spring Break) and manipulated whether upward counterfactual thoughts were more or less accessible. Study 6c replicated Study 6b among employees working on a Saturday and measured consequences for work persistence. We expected that decreased (vs. increased) accessibility of upward counterfactuals would prompt people to choose to continue working (vs. take a break by engaging in a fun task), in line with research demonstrating that intrinsic motivation promotes energy and vitality (Koestner & Losier, 2002), and that people who are less intrinsically motivated take breaks because they are bored (Thomas, 2009).

10.1. Study 6a method

Participants. We pre-registered this study (aspredicted.org/wh47s.pdf) and recruited 299 US-based full-time employees from Prolific. We excluded participants who failed attention checks ($n = 29$), leaving a total of 270 participants (49.6% female; $M_{\text{age}} = 30.32$, $SD_{\text{age}} = 7.98$).

Procedure. We randomly assigned participants to a condition in a 3-cell (more-accessible-upward counterfactuals vs. less-accessible-upward-counterfactuals vs. control) between-subjects design. We asked all participants to consider working on the weekend.

In the *more-accessible-upward-counterfactuals* condition, participants read, "Take a moment to think and write about how you feel your time on the weekend could have been spent in better ways than working. That is, what are some things that would be a better use of this time?" We showed participants an example written by another participant, which we took from a pilot of this study "For example, in response to this prompt, one participant wrote: 'you could be spending the weekend relaxing with friends; you could listen to music and have a BBQ.'"

In the *less-accessible-upward-counterfactuals* condition, we prompted participants to generate fewer upward counterfactuals and instead to consider ways in which their time was well spent, "Take a moment to think and write about how you feel about using your time on the weekend to catch up or get ahead with your work. That is, what are some of the benefits of working on the weekend?" Participants also viewed an example written by a pilot participant who was instructed to generate fewer upward counterfactuals during non-standard work time, "For example, in response to this prompt, one participant wrote: 'you could use the weekend to catch up or get ahead with your work; you could complete work tasks for your job that you've put off, or do work you aren't able to do during the week.'"

Participants in the *control* condition read, "Take a moment to think and write about how you feel to be spending your time on the weekend working." We then assessed participants' intrinsic motivation for the work they would be doing that day using a similar four-item scale as in Studies 1 and 4 ($\alpha = 0.93$).

10.2. Study 6a results

In line with our preregistration plan, we regressed intrinsic motivation on two dummy variables, with the control condition as the reference group. As predicted, decreasing accessibility of upward counterfactuals increased intrinsic motivation ($M = 4.74$, $SD = 1.57$) relative to the control condition ($M = 4.13$, $SD = 1.91$), $B = 0.61$, $SE = 0.27$, $t(267) = 2.31$, $p = .022$, $d = 0.35$. There was no significant difference between the control and the increased accessibility of upward counterfactuals condition ($M = 3.76$, $SD = 1.75$), $B = -0.37$, $SE = 0.26$, $t(267) = -1.44$, $p = .152$, $d = -0.20$. Additionally, decreased (vs. increased) accessibility of upward counterfactuals increased intrinsic motivation, $B = 0.98$, $SE = 0.26$, $t(267) = 3.78$, $p < .001$, $d = 0.59$.

10.3. Study 6b method

Participants. We recruited 71 students studying in a campus library during Spring Break (64.8% female, $M_{\text{age}} = 22.94$, $SD_{\text{age}} = 7.60$) to complete a Qualtrics survey on an iPad¹².

Procedure. The Qualtrics survey randomly assigned participants to one of two conditions (more- vs. less-accessible upward counterfactuals) in a between-subjects design. Since there was no significant difference between the control condition and the *more-accessible upward counterfactual* condition in Study 6a, we did not include a control condition for

¹² This was the largest sample size we could collect during Spring Break given that many students were off campus. We conceptually replicated this study using a larger sample size in Study 6c.

Studies 6b-6c.

To ensure that all participants in this study were aware that they were studying during non-standard work time, they read "Spring Break started in the 1930s and represents a period in early spring when universities and schools are not in session." To increase accessibility of upward counterfactuals, participants in the *more-accessible upward counterfactuals* condition read, "People usually use this time to have fun, relax, and unwind." To reduce accessibility of upward counterfactuals, participants in the *less-accessible upward counterfactuals* condition read: "People usually use this time to catch up or get ahead with their work." We assessed intrinsic motivation using a two-item scale adapted from Study 1 ($r = 0.80$).¹³ "To what extent is the work you are doing:" 1. Enjoyable and 2. Interesting.

10.4. Study 6b results

As predicted, and in line with Study 6a, manipulating accessibility of upward counterfactuals affected intrinsic motivation; participants reported greater intrinsic motivation when upward counterfactuals were less (vs. more) accessible ($M_{\text{less accessible}} = 4.89$, $SD = 1.27$; $M_{\text{more accessible}} = 4.06$, $SD = 1.68$), $t(69) = 2.37$, $p = .021$, $d = 0.56$. Even though all participants were aware that they were working during non-standard work time, reducing the likelihood of making upward comparisons resulted in greater intrinsic motivation.

10.5. Study 6c method

Participants. We recruited 181 MTurk workers on a Saturday (43.1% female, $M_{\text{age}} = 37.50$, $SD_{\text{age}} = 12.23$) to have over 95% power of detecting the effect size observed in Study 6b ($d = 0.56$). We used pre-defined panel options on Turk Prime to recruit full-time employees.

Procedure. We reminded all participants that they were working during non-standard work time by emphasizing that it was the weekend. We then randomly assigned them to one of two conditions (more- vs. less-accessible upward counterfactuals) in a between-subjects design. Participants in the *more-accessible upward counterfactuals* condition read: "People usually use weekends to relax and take a break from work. They may do something fun or meditative to unwind. They may read the paper, go for a walk, or spend time with family, things that they may not have time for during the week." Participants in the *less-accessible upward counterfactuals* condition read: "People usually use weekends to catch up or get ahead with their work. They may complete work tasks for their job that they've put off, complete extra tasks to earn extra income, or do other work that they aren't able to do during the week."

We then asked participants to reflect on the work that they were completing during the weekend and measured intrinsic motivation to work using the two-item scale from Study 6b ($r = 0.69$). We also included a behavioral measure to examine a real consequence of our manipulation: whether people choose to continue working or take a break with a fun task. We predicted that participants in the less-accessible upward counterfactuals condition would be more interested in completing a work task, compared to those in the more-accessible upward counterfactuals condition, thus illustrating the value of intrinsic motivation for work persistence (Cerasoli et al., 2014; Glynn, 1994; Staw et al., 1980; Woolley & Fishbach, 2015). To assess this, participants faced a choice between continuing to work (option to proofread a legal document for \$0.35) or take a break with a fun task (option to rate funny comics for \$0.30)¹⁴.

¹³ We used an abbreviated scale to facilitate recruitment efforts, as we anticipated it would be a challenge to recruit students in the library during Spring Break. We used the same scale in Study 6c to directly replicate Study 6b.

¹⁴ In a pilot study of similar participants, 30% preferred the work task to the fun task.

10.6. Study 6c results

As predicted, intrinsic motivation was greater when upward counterfactuals were less accessible ($M = 4.81$, $SD = 1.20$) versus more accessible ($M = 4.25$, $SD = 1.70$), $t(179) = 2.53$, $p = .012$, $d = 0.37$. People were also more likely to choose a work task when upward counterfactuals were less (vs. more) accessible (34.4% vs. 16.5%), $\chi^2(1, 181) = 7.70$, $p = .006$, $\phi = 0.21$, demonstrating real consequences of our intervention for work persistence.

10.7. Discussion of Studies 6a-6c

Studies 6a-6c demonstrated that an intervention aimed at decreasing accessibility of upward counterfactual thoughts helped preserve intrinsic motivation among those working during non-standard work time (H4). First, Study 6a revealed that people prompted to generate thoughts unrelated to upward counterfactuals reported greater levels of intrinsic motivation compared with those explicitly prompted to generate upward counterfactuals, or a control condition. Further, we found that increasing accessibility of upward counterfactuals did not affect intrinsic motivation relative to a no-counterfactuals control condition, suggesting that people naturally generate upward counterfactuals during non-standard work time.

Studies 6b-6c focused on comparing decreased (vs. increased) accessibility of upward counterfactuals among those actually working during non-standard work time. Relative to those prompted to generate upward counterfactuals during this time, encouraging people to generate thoughts unrelated to upward counterfactuals improved intrinsic motivation for students studying during Spring Break (Study 6b) and employees working on a Saturday (Study 6c). This had real consequences for work persistence, as it increased workers' choice to complete a higher paying work task (vs. take a break with a fun task; Study 6c).

11. General discussion

What is the cost of working outside the standard Monday-Friday, 9-to-5 work week? Our research finds that intrinsic motivation is what suffers. This effect occurred among students made aware that they were working during non-standard work time (Study 1), full-time employees actually working during non-standard (vs. standard) work time (Study 2), and even when employees were not explicitly reminded that the day was non-standard work time (Study 3). Thus, whereas prior research found that *what* work people pursue can affect intrinsic motivation, we are the first to demonstrate that *when* people work also matters for intrinsic motivation.

Non-standard (vs. standard) work time decreases intrinsic motivation by prompting people to generate upward counterfactual thoughts. That is, people are more likely to consider how the day could have been spent better had they not worked. Notably, people are also less likely to generate downward counterfactuals when working during non-standard (vs. standard) work time (i.e., consider how the day could have been spent worse had they not worked). However, by manipulating accessibility of both upward and downward counterfactuals during standard work time, we found causal evidence that it is particularly upward counterfactual thinking that reduces intrinsic motivation compared to baseline intrinsic motivation or to those prompted to consider downward counterfactuals (Study 5).

Identifying upward counterfactuals as the causal mechanism allowed us to examine an intervention for maintaining intrinsic motivation during non-standard work time. Rather than considering better uses for one's time (e.g., having fun, relaxing), *decreasing* consideration of upward counterfactuals during non-standard work time, such as by considering the benefits of working, helped people maintain intrinsic motivation for their professional (Studies 6a and 6c) and academic pursuits (Study 6b). This intervention had a real consequence for

participants who chose to persist in their work (vs. take a break by pursuing a fun task; Study 6c), aligning with research that demonstrates benefits of intrinsic motivation for work persistence (Cerasoli et al., 2014; Woolley & Fishbach, 2015).

In this research, we primarily focused on intrinsic motivation and consistently found that working during non-standard (vs. standard) work time reduces intrinsic motivation. In some studies, we also measured identified regulation (Studies 1-3 and 6b) and/or external regulation (Studies 2-3 and 6c), both of which tap into extrinsic motivation, and found mixed results. First, Study 1 found no significant effect of work time on identified regulation, whereas Study 2 found non-standard (vs. standard) work time reduces both identified and external regulation (although the effect on external regulation did not hold when excluding those who did not plan to work during non-standard work time). Furthermore, Study 3 found a significant effect of non-standard (vs. standard) work time on identified regulation only when people were reminded that the time was non-standard. Lastly, our studies aimed at decreasing upward counterfactuals during non-standard work time found no significant effect on identified regulation (Study 6b) or external regulation (Study 6c). Given the inconsistent results on these extrinsic motivation scales, we suggest that the effect of work time is specific to intrinsic motivation.

11.1. Theoretical contributions

This research makes three main contributions to the literature and offers new connections between research on intrinsic motivation, the subjective experience of time, and counterfactuals. First, we contribute by demonstrating that intrinsic motivation is not just a function of *what* you do, but also of *when* you do it. Previous research identified basic psychological needs (i.e., autonomy, competence, relatedness) as key determinants of intrinsic motivation (e.g., Deci & Ryan, 2000). Extending this research, we demonstrate that *when* people work, as well as their perceptions about work time (i.e., whether people construe the day as a standard vs. non-standard time to work) influence intrinsic motivation.

Second, our research contributes to the nascent literature on subjective time (Aeon et al., 2020; Feldman et al., 2020). Prior research examined how perceptions of time contribute to a "fresh start" effect, such that people are more motivated to pursue goals at the beginning of temporal markers (Dai & Li, 2019). For example, people are more likely to start new habits (e.g., eating healthily; quitting smoking) on Mondays, because they perceive "Monday" as the start of a new week (Ayers et al., 2014; Consolvo et al., 2009). Whereas fresh start effects harness perceptions of time as a fresh slate to motivate persistence, we find that perceptions of time can also be demotivating. In particular, people are less intrinsically motivated to work when they engage in work activities during non-standard (vs. standard) work time.

Finally, our research connects the literature on counterfactual thinking (Roese, 1994) with the literature on factors that undermine intrinsic motivation. Most prior research examined how the introduction of rewards can decrease intrinsic motivation (Lepper et al., 1973; Staw et al., 1980). We demonstrate that a factor that increases upward counterfactual thinking also results in a reduction of intrinsic motivation. By providing causal evidence for the link between upward counterfactuals and intrinsic motivation, we also expand prior work on counterfactual thinking that has found correlational evidence for this relationship (Leach & Patall, 2013).

11.2. Managerial implications

This research is of practical importance to workers and managers as it addresses an unintended downside of the increased work flexibility and blurred temporal boundaries between work and non-work time that characterize "the new world of work" (Ashford et al., 2018). As our research shows, pursuing work activities outside the traditional

Monday-Friday, 9-to-5 work week undermines employees' desire to engage in work out of interest, enjoyment, and meaningfulness; that is, it undermines their intrinsic motivation to work. Given the predictive value of intrinsic motivation for work persistence as well as other relevant work outcomes such as creativity, volunteering, and job performance (Amabile, 1985; Bolino & Turnley, 2003; Grant, 2008; Van Dijke et al., 2019; Woolley & Fishbach, 2015), we offer a solution for how to maintain intrinsic motivation among employees who work outside standard work time (i.e., weekends and holidays). Employees working during this time can preserve intrinsic motivation for their work by changing their thinking to reduce accessibility of upward counterfactual thoughts. That is, while upward counterfactuals readily come to mind during non-standard work time, generating other thoughts can prevent a reduction in intrinsic motivation.

Managers should take careful note of our findings and seek ways to support and protect employees who have to work during non-standard hours. This is especially important since intrinsically motivated employees are more likely than their extrinsically motivated colleagues to be asked to work during this time (Kim et al., 2020). One way to do this is by, for instance, facilitating connections among employees who must work during non-standard work time (i.e., the weekend team). Possibly knowing that others are also working outside standard work hours could help reduce upward counterfactuals and protect intrinsic motivation to work. However, managers should not misinterpret our findings as encouraging work outside standard work time, since this can harm productivity and well-being in the long-run.

Indeed, although our research offers insight into how to maintain intrinsic motivation when one has to work during non-standard work time, this is not to say that people should work around the clock. There is clear evidence for the benefits of disconnecting from work (Fritz & Sonnentag, 2006; Giurge & Bohns, 2021; Sonnentag, 2018; Steed, Swider, Keem, & Liu, 2019). Rather, an implicit assumption in our research is that working non-standard work time means that people have off during standard work time, which poses its own challenges in terms of connecting with others who work a standard work week. Managers need to be careful in encouraging employees who work during non-standard work time to also take time off, given that leisure is harder to justify than work (Etkin & Memmi, 2021), and we suspect justifying leisure may be especially challenging during standard work time (e.g., a regular Monday) when most others are working.

11.3. Avenues for future research

Given recent trends and changes in the nature of work, it is unlikely that people will stop working during non-standard work time (Spreitzer et al., 2017) and more research is needed to understand how changes in work time affect intrinsic motivation. We detail four possible avenues for future research. First, prior research has shown that people tend to substitute work for later leisure pursuits (Loewenstein & Prelec, 1993). In line with this evidence, future research could examine whether people can increase their intrinsic motivation during non-standard work time by reflecting on how working during this time frees up future time. If someone works on a Saturday so they can go skiing on a Wednesday, would reminding themselves of their plans to take off during a standard work day help restore intrinsic motivation for their work on Saturday?

Second, our research focused on intrinsic motivation to work when most others were *not* working, and identified one way to maintain intrinsic motivation during this time. However, spending time away from work when others *are* working could also affect intrinsic motivation, which future research can explore. For example, does vacationing when others work increase or decrease intrinsic motivation to work? And how might taking vacation when others work affect intrinsic motivation for *leisure*? Possibly, pursuing leisure activities during non-standard leisure time (e.g., during a regular Wednesday) dampens people's interest in and enjoyment of leisure because most others in society pursue work activities. Research is needed on how to encourage

people to make the most of their time, such that they are motivated to work when at work, and are able to relax and pursue leisure when they are not expected to work.

Third, motivation is a dynamic phenomenon and people often balance their pursuit of work and leisure activities. As such, research on work motivation has begun formalizing computational models of goal striving (Neal et al., 2017). For example, using a computational approach, Melnikoff and colleagues (2020) found that the strength of the association between an action (clicking in a tile game) and achieving an outcome (receiving a bonus) increased intrinsic motivation, defined as how immersive, engaging, and engrossing participants found the game. As research on factors affecting intrinsic motivation, and the role of work time, develops, scholars could seek to formalize this research into a computational model.

Finally, we conceptualized non-standard work time as working weekends and holidays, as these are recognized collective periods of time off (Young & Melin, 2019). However, non-standard work time can include anything that deviates from the standard Monday-Friday, 9-to-5, work week, such as shift work, contract work, and seasonal work (Ashford et al., 2018; Bolino et al., 2020; Spreitzer et al., 2017), which may also affect intrinsic motivation. For example, nurses working a fixed day schedule had better job outcomes than those working afternoon, evening, or rotating shifts (Jamal & Baba, 1997). In preliminary analyses reported in the Online Supplement, we find correlational evidence to suggest that shift work (regular evening shift, regular night shift, rotating shift, split shift, flexible schedule, or some other schedule) is associated with lower intrinsic motivation than regular daytime work. Although shift work may differ from regularly scheduled work on a number of factors (e.g., pay, working conditions), lower intrinsic motivation may in part be explained by frequently working during non-standard work time. We join calls for more research on how other forms of non-standard work time impact employees' work motivation (Bolino et al., 2020; Spreitzer et al., 2017).

CRedit authorship contribution statement

Laura M. Giurge: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. **Kaitlin Woolley:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We are grateful to Brian Lucas and Jaewon Yoon for their comments on an earlier version of this paper. We thank members of the Organizational Behavior Reading Group at the University of Zurich and Julia Vogt's lab at the University of Reading for their feedback. We also thank members of the Business Simulation Lab at Cornell University, including Brad Turner, Katie Roscoe, Armine Kalbakian, as well as Lilia Fromm for help with data collection and coding. This research was supported by Cornell University and London Business School, and by funding awarded to both authors by the Society for Personality and Social Psychology.

Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.obhdp.2022.104134>.

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