UNIVERSITY OF CALIFORNIA SAN DIEGO

Psychological Drivers of Behavior Change

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy

in

Management

by

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2020

The Dissertation of Alicea Lieberman is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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Chair

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DEDICATION

I dedicate this dissertation to my loving and supportive family—to my amazing husband who makes life better than I ever thought it could be, and to my parents and sister who encouraged me to always follow my dreams, and have supported me every step of the way.

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I have been lucky enough to work with Uri Gneezy on several projects during my time at Rady (in addition to taking a course from him). Early on, Uri invited me to coffee to talk about research interests. While buying coffee, Uri also purchased a bar of chocolate—of which he ate one square and immediately gave the rest to someone sitting in the coffee shop. We, of course, started discussing his (odd?) behavior and soon found ourselves running a chocolate-selling field experiment examining the price people will pay for a little help with their self-control. Unfortunately, this experiment went under when the specialty shop where it was running had an oil spill and all the merchandise was soiled (which was quite a learning experience about the unpredictability of field experiments!). Uri continued to invite me to join him on projects—often large collaborations with medical partners—and has played a huge role in my development as a researcher. I am grateful for his guidance, his continued invitations to collaborate, and his willingness to always support me.

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ABSTRACT OF THE DISSERTATION

Psychological Drivers of Behavior Change

by

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Professor On Amir, Chair

This dissertation comprises three papers examining the psychological drivers of behavior change. Chapter 1 shows how the framing of a policy can harness the power of social norms to motivate behaviors. Chapters 2 and 3 investigate the role of attention in behavioral under- and over-persistence.

Chapter 1 examines how the framing of an incentive can influence consumer behaviors. We demonstrate that framing an incentive as a surcharge, compared to a

discount, signals that the incentivized behavior is more socially normative, motivating consumers to carry-out the incentivized behavior. Moreover, we show that because surcharges influence behavior by signaling a social norm—and not just through their monetary value—they also increase the likelihood of compliance downstream, even after the incentive is removed.

Chapter 2 investigates why consumers often fail to persist for long enough in beneficial daily behaviors (e.g., exercise, hygiene). Past research commonly views suboptimal persistence as a result of poor self-regulation. We offer a different perspective and propose that because many such behaviors require minimal attention, a mismatch occurs between attentional demands and available resources, causing consumers to experience boredom and stop prematurely. We thus suggest that capturing and sustaining attention in a concurrent task (i.e., tangential immersion) will occupy excess resources, balance this attentional mismatch, and increase persistence. We demonstrate when and why tangential immersion increases persistence across a range of low-attention behaviors, including toothbrushing and strength-building.

Chapter 3 examines contexts in which consumers display the opposite behavior, needlessly persisting in undesirable behaviors and foregoing opportunities to switch to preferred alternatives. We identify a novel underlying cause for this maladaptive behavior: behavioral entrenchment, a state of increasing task set accessibility that arises when performing high-attention repetitive tasks. As entrenchment grows, so does the perceived cost of switching to an alternative, decreasing the likelihood of doing so. However, decreasing both attention to and repetition of the task reduces entrenchment and increases

the proportion who make a positive change. Together, these three chapters shed light on important cognitive processes underlying behavior change, ranging from the initiation of a behavior to persistence in the behavior once its begun.

Chapter 1.

HOW INCENTIVE FRAMING CAN HARNESS THE POWER OF SOCIAL NORMS

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ABSTRACT

Incentives are an increasingly common tool used by organizations, managers, and policymakers to change behavior. We propose that more than just motivating behavior for monetary reasons, incentives also have an important, undiscovered consequence: they leak information about social norms. Four experiments reveal that framing an incentive as a surcharge, as compared to a discount, signals that the incentivized behavior is both more socially approved and more common. These implied norms lead individuals to experience emotions consistent with a desire to conform, motivating them to perform the incentivized behavior. Moreover, by shifting social norms, we find that incentives can influence behavior not only in the moment, but also downstream when there is no longer an active incentive. Further, merely being exposed to a surcharge (vs. discount) incentive—even without being financially affected by it—can increase performance of the behavior. These findings offer a novel perspective on the consequences of different incentive frames, while contributing to both organizational policy and practice by expanding the social norms messaging toolkit.

INTRODUCTION

Social norms influence behavior in powerful ways and can serve as a tool for large-scale behavior change. Indeed, perceptions of what is desirable or typical in a given context (Miller and Prentice 1996) can drive behavior change at both the individual level (e.g., increasing recycling; Cialdini, Reno, and Kallgren 1990), and the organizational level (e.g., improving group cohesion and performance; George and Jones 1997; De Jong, Bijlsma-Frankema, and Cardinal 2014; Stewart, Courtwright, and Barrick 2012), as individuals are deeply motivated to gain and maintain acceptance from their peers (Barker 1993; Cialdini, Kallgren, and Reno 1991; Perkins and Berkowitz 1986). Social norms often evolve organically over time as individuals learn what is approved of and what is common in a community (Miller and Prentice 1996; Paluck and Shepherd 2012; Feldman 1984; Ehrhart and Naumann 2004). They can also be influenced through multiple channels, such as the personality characteristics (Gonzalez-Mule 2014) or shared interactions of a group (Bettenhausen and Murnighan 1985; Hackman 1992). Commonly, efforts to shift social norms involve explicit messaging campaigns that state which behaviors are most normative. Such campaigns have successfully altered a wide range of behaviors, including decreasing binge drinking (Haines and Spear 1996), influencing healthy food choices (Robinson et al. 2014), and increasing hotel towel re-use (Goldstein, Cialdini, and Griskevicius 2008). However, such direct approaches also come with other risks, as advertising can irritate people (Aaker and Bruzzone, 1985) or even cause them to avoid an ad altogether (Speck and Elliot 1997). In this paper, we investigate whether social norms can be communicated indirectly using a simple tool commonly used by organizations,

managers, and policymakers: small monetary incentives. In particular, we propose that the framing of an incentive can influence people's beliefs about how approved of and how common the incentivized behavior is, leading to important behavioral consequences.

Monetary incentives can be framed in a negative or positive light: either as additional costs one must pay for behaving in an undesired manner (i.e., a surcharge) or as costs deducted for engaging in a desired manner (i.e., a discount). For example, companies may charge higher premiums on health insurance plans for employees with unhealthy lifestyle behaviors such as smoking (Abelson 2011; CMS 2013), or may offer their employees discounts on insurance premiums for healthy lifestyle behaviors such as participating in wellness programs (kff 2016). Customers may also pay surcharges or earn discounts when shopping, as when paying 5-cent charges for using plastic bags (National Conference of State Legislatures 2017) or earning 5-cent discounts for bringing their own reusable bags (Target 2017). Surcharge and discount incentives are increasingly common tools for behavior change, predicated on the idea that incentives are motivating for their monetary value (DellaVigna and Pope 2017). However, we propose that incentives also have an important signaling value. Specifically, we demonstrate that people who encounter an incentive framed as a surcharge infer that the targeted behavior is both more approved of and more common than when the incentive is framed as a discount. The prospect of violating this perceived norm elicits embarrassment and guilt, two negative, self-conscious emotions associated with the desire to conform to perceived norms. In turn, these anticipated emotional reactions drive individuals to carry out the encouraged behavior. Thus, the current research proposes social norm leakage as a novel consequence of

incentive framing, and further, proposes that this leakage plays a key role in the power of incentives to change behavior.

In addition to eliciting norm-related emotions and changing behavior in the moment, this framework also implies two additional novel predictions. Namely, because people strive to emulate social norms, exposure to an incentive can influence their behavior not only initially, but also downstream when there is no longer an active incentive. Furthermore, because of this norm signaling, merely learning about the existence of an incentive (as when seeing it written on a sign) can affect whether individuals carry out the behavior, even when the incentives do not financially impact them directly. In this manner, our research contributes to the organizational behavior and policy literatures by offering a deeper understanding of how and why incentives affect behavior, and by providing novel insights on how to effectively frame such policies to capitalize on the power of social norms.

Information Leakage from Policies

Past work suggests that the decision to enact certain policies may provide insight into which behaviors are prescribed within a given community (Lapinski and Rimal 2005). In a similar way, we propose that in addition to the enactment of an incentive policy revealing information about organizational or community expectations, how that incentive is framed also conveys important social norm information that can influence people's

perceptions, beliefs, and actions. We find support for this notion in the information leakage literature.

Information leakage is the phenomenon in which the structure of a policy, choice set, or other feature of the environment signals information to individuals (McKenzie 2004; Sher and McKenzie 2006), and has been used to explain certain framing effects. Consider the default effect, in which people tend to stick with the default (or "do nothing") option of a choice set (Johnson and Goldstein 2003). An information leakage account proposes that this choice arises, in part, because individuals interpret an organization's selection of a default as an implicit recommendation—that is, people perceive that the institution implementing the policy recommends that people perform the default action (McKenzie, Liersch, and Finkelstein 2006). In this way, the structuring of a choice set can provide a subtle cue for decision-makers about how the choice architect expects them to behave (e.g., Krijnen, Tannenbaum, and Fox 2017)–the "right" choice. The framing of a policy may also leak information about a company or policymaker's attitudes toward those affected. For example, Tannenbaum and colleagues (2013) demonstrate that disincentive policies (e.g., increased premiums for being overweight), can lead people to infer that the company imposing the policy holds negative attitudes toward the targeted individuals (e.g., overweight employees), while positive incentives (e.g., decreased premiums) do not lead to such inferences.

In a similar manner, we suggest that the framing of an incentive can influence people's perceptions of the expected or "right" behavior. In particular, we propose that incentive framing can affect perceptions of injunctive norms: what people perceive to be

the approved behavior—that is, what one "ought" to do (Cialdini, Reno, and Kallgren 1990, 1991). In other words, incentive framing can suggest to individuals what behaviors are approved of and accepted in a given context, projecting an expectation of compliance (Fehr and Schurtenberger 2018). This idea follows from work on policy framing. Policymakers can frame policies to either encourage a desirable behavior or to discourage an undesirable behavior, a choice that can influence the likelihood that the policy will be accepted by its stakeholders (Evers et al. 2016). Disadvantaging policies (e.g., punishments imposed on individuals who act in an undesired way) tend to be more accepted when the incentivized behavior is considered obligatory, such as required community service (Evers et al. 2016). In contrast, advantaging policies (e.g., rewards offered for acting in a desired way) tend to be more accepted when the incentivized behavior is viewed as optional, such as voluntary community service (Evers et al. 2016). This idea converges with related notions from the morality and economics literatures. Specifically, using social dilemma games, Mulder (2008) finds that punishments (vs. rewards) can signal that a behavior is morally obligatory (vs. voluntary). Similarly, Fehr and Fishbacher (2004) find that people punish others who violate cooperation norms, suggesting that sanctions may serve as a form of norm enforcement. Together, these findings suggest that the framing of a policy may signal something about the social expectations of the targeted behavior.

In our framework, surcharges are much like disadvantaging policies: they are penalties imposed on individuals who act in an undesired way, and thus should be more accepted when the behavior they incentivize is perceived as relatively obligatory. Organizations are more likely to enact policies supported by their constituents, and prior

research demonstrates that messages are the most persuasive when designed to reflect normative ideations already accepted by the group (Payne 2001). Analogously, we propose that the most effective incentives will be those designed to resonate with their target audience by reflecting ideas already accepted by the community. Accordingly, we suggest that the presence of a surcharge signals that the targeted behavior is more of an obligation, an action one ought to do (i.e., an injunctive norm). In contrast, discounts are advantaging policies that benefit individuals who act in a desired way. Thus, they should be more accepted when they incentivize a behavior that is perceived as relatively voluntary, signaling that the behavior is not necessarily a social "ought." In this way, the framing of an incentive may leak that the behavior is more of an injunctive norm.

Note that it is possible for individuals to construe surcharges as a form of punishment, and discounts as a form of reward. However, in our framework, surcharges are simply additional costs, and discounts are simply cost deductions. Thus, while surcharges may be viewed as a form of punishment relative to discounts, we suggest that surcharges will signal that the targeted behavior is more normative regardless of whether or not people construe them as explicit punishments, reducing potential concerns of reactance or anger (e.g., Balliet, Mulder, and Van Lange 2011). Employees, customers, and other individuals may not necessarily perceive surcharges as punishments (and discounts as rewards)—they may instead perceive them as cost passing tactics (i.e., that the organization or retailer is passing on the cost of supplying additional products or services to the employee or customer) or, either explicitly or implicitly, as merely small incentives designed to nudge behaviors. Thus, while construing a surcharge as a punishment would

likely only strengthen the signal that the incentivized behavior is a social a norm, our theory suggests that this signal will remain even if people do not view the incentive in this light. Indeed, we demonstrate that surcharges (vs. discounts) still project stronger social norms and serve as stronger drivers of behavior even when adjusting for the extent to which individuals perceive these incentives as punishments and rewards.

We further propose that the framing of an incentive can signal not only what behavior is most approved of, but also what behavior is most common—that is, the descriptive norm (Cialdini, Reno, and Kallgren 1990, 1991). Often, people's perceptions of the approved behavior are consistent with how most people tend to behave—that is, injunctive and descriptive norms often (although do not always) converge (Erikkson, Strimling, and Coultas 2015; Lapinski & Rimal, 2005). Thus, framing an incentive as a surcharge (vs. a discount) may signal not only that performing the incentivized behavior is more approved of and more expected (an injunctive norm), but also that it is more typical (a descriptive norm).

In addition to the common linkage between injunctive and descriptive norms, a rational account would also suggest that surcharges would likely only be successfully enacted in contexts where the incentivized behavior is already common, and thus few people would incur the extra charge. To illustrate our logic, consider a coffee shop that imposes a 10-cent surcharge on customers who do not bring their own mugs. If bringing a mug were uncommon, then many customers would be required to pay this additional charge. Because customers are motivated to avoid paying an extra cost, even if it is small, implementing a surcharge when the incentivized behavior is uncommon may result in

customers choosing to go to another shop, making it unlikely that a store would enact, or maintain, such a policy. Thus, the existence of a surcharge may suggest that few people behave in the undesired way (i.e., few people must pay the charge), signaling that the desired (i.e., incentivized) behavior is more common—a stronger descriptive norm.[1] On the other hand, consider a coffee shop that offers a 10-cent discount to customers who bring their own mugs. It is highly unlikely that a shop owner would offer this policy when the behavior is already common, as it would unnecessarily pay people for a behavior they are already performing.[2] Said another way, because people are more likely to accept policies that are aligned with their perceptions of the targeted behavior (Evers et al. 2016), a shop owner is unlikely to enact a policy that is misaligned with the community's beliefs, and further, a misaligned policy is unlikely to stay enacted. Thus, we predict our proposed process should apply equally at both the enactment and maintenance stages of policy implementation. Thus, together, our theorizing suggests that surcharges (vs. discounts) leak that the incentivized behavior is more approved of and more common. Next, we draw

[1] Note that a related, but alternative, logic would also make the same prediction. Specifically, individuals may infer that there is a standard, baseline outcome to which adjustments can be made (and they may assume that it is more efficient to set baselines in a way that adjustments are rare). In this case, surcharges and discounts would serve as adjustments that arise when behavior does not align with the baseline outcome. As such, the presence of a surcharge could suggest that needing to pay this charge (i.e., not performing the desired behavior) deviates from the standard baseline behavior and, thus, is rare. Similarly, the presence of a discount could suggest that performing the desired behavior (and earning this benefit) deviates from the standard baseline behavior and, thus, is rare. This inference process can explain why individuals infer that performing the desired behavior (and avoiding the charge/earning the discount) is more common under a surcharge than a discount. We thank an anonymous reviewer for this suggestion.

[2] A related practical argument would suggest that if it is effortful for a shop owner to collect a surcharge, it is less practical to impose this policy when many customers would be charged (i.e., when the desired behavior is rare), while it is similarly impractical to offer a discount when many customers would earn it (i.e., when the desired behavior is common). This logic suggests another pathway through which incentive framing could signal descriptive norms surrounding the incentivized behavior. We thank the review team for these insights.

on social norms research to propose that these inferences carry important consequences for how individuals behave.

Social Norms and Their Consequences

As social animals, people's behaviors are strongly shaped by their perceptions of social norms (Ajzen and Fishbein 1980; Asch 1951; Fishbein and Ajzen 1975)—both how one ought to and is expected to behave (injunctive norms) and how most others behave (descriptive norms; Cialdini and Trost 1998; Cialdini, Reno, and Kallgren 1990, 1991; Goldstein, Cialdini, and Griskevicius 2008). While injunctive and descriptive norms are often congruent (Lapinski and Rimal 2005), they are conceptually distinct, and both types of norms provide important information about how to act in a given setting (e.g., Cialdini, Kallgren, and Reno 1991). Thus, while we primarily focus on injunctive norms throughout this paper, we also measure and report descriptive norms. Notably, research suggests that it is perceptions of the norm, more so than the actual norm, that influence behavior (Berkowitz 2004). Accordingly, many social norm interventions aimed at changing a community norm do so by attempting to shift the subjective perceptions of the norm (Tankard and Paluck 2016), which can change behaviors even when the behavior is not performed by the majority (Goldstein, Cialdini, and Griskevicius 2008). Thus, throughout the paper when discussing a "norm," we are alluding to this subjective perception of the norm.

Given the well-established power of social norms, they are featured as a key construct in many behavior change models (e.g., Ajzen 1991; Fishbein and Yzer 2003). This provides reason to suspect that if surcharges leak stronger social norms than discounts, they will also lead to greater behavior changes. Drawing on individuals' fundamental desire to fit in with their peers, we propose that by shifting perceptions that a behavior is more normative, surcharges (vs. discounts) will also better motivate behavior. Moreover, this increased motivation should be strongest among individuals who have the highest tendency to conform to social norms (Bearden & Rose, 1990). That is, we predict that the superior effectiveness of surcharges over discounts will be moderated by the extent to which individuals tend to conform to their peers.

One key mechanism by which social norms influence behavior is through anticipated emotions. Past research demonstrates that violating a perceived social norm can elicit self-conscious emotions (e.g., Hareli and Parkinson 2008; Keltner and Anderson 2000), which include embarrassment, guilt, shame, and pride. Self-conscious emotions are unique in so far as they all involve a heightened awareness and evaluation of the self (e.g., Tangney and Fischer 1995), resulting from appraisals of one's own actions. As a result, self-conscious emotions help individuals maintain or improve their social status and avoid group rejection (Keltner and Buswell 1997; Tracy and Robins 2004).

In the current research, we focus on the two self-conscious emotions that are action-oriented and motivate social behavior, and thus most relevant to the contexts we investigate: embarrassment and guilt (see Appendix for a discussion of shame and pride, two other self-conscious emotions that share some conceptual features with embarrassment

and guilt). Embarrassment often arises when violating a perceived social convention, typically in the presence of an external audience (Keltner and Buswell 1997), and leads to concern that a social mishap may threaten the individual's social identity or position within a social group. Accordingly, embarrassment motivates appeasement behaviors designed to elicit reconciliation with others and signal a commitment to upholding social norms (Keltner, Young, and Buswell 1997).

Guilt involves an appraisal of personal responsibility for a specific action or choice (Lewis 1971; Tracy and Robbins 2004; Duke and Amir 2018), and results when individuals feel that their behavior falls short of appropriate, desired conduct (Baumeister, Stillwell, and Heatherton 1994). Like embarrassment, guilt also arises when people perceive themselves as violating social conventions (Keltner and Buswell 1996; Tangney and Dearing 2002; Fehr and Schurtenberger 2018), and this emotion motivates atonement behaviors aimed at amending the social harm imposed (e.g., Lindsay-Hartz, De Rivera, and Mascolo 1995).

Thus, we propose that because surcharges (vs. discounts) signal that the incentivized behavior is more desired, expected, and common to perform, the prospect of failing to uphold this norm will lead to the anticipation of embarrassment and guilt. In order to prevent these negative feelings and their associated consequences, individuals will be more motivated to perform the behavior. Said another way, anticipated embarrassment and guilt may serve as a key pathway through which incentive framing affects behavior. These self-conscious emotions of embarrassment and guilt have been intimately linked to

social norms violations; accordingly, in the remainder of this paper, we refer to them as "norm-related emotions."

Critically, a key consequence of this social norm mechanism is the possibility for behavior change to linger and carry over to later instances where incentives are not in place, but where the same social norms are expected. Indeed, past work has documented that efforts to shift social norms can have long-lasting effects (Neighbors, Larimer, and Lewis 2004; Schultz et al. 2007). In this research we posit that because surcharges leak information about social norms, they hold the power to have an extended impact on individuals' perceptions and behaviors. We further propose that it is the presence of a surcharge, even when it is not experienced directly, that signals that a behavior is more normative—affecting anyone who is simply exposed to the incentive. In other words, experiencing or merely observing an incentive at one point in time can shift perceptions of social norms and thus influence behaviors after the incentive is no longer in place, as well as in other similar locations without active incentives. In this way, everyday incentives used by employers, policymakers, and marketers may have a surprising and previously undiscovered impact on individuals' future actions.

A Note on Loss Aversion

Social norms are not the only mechanism through which incentives can change behavior; individuals are undoubtedly also motivated by incentives for their pure monetary value. Further, the framing of an incentive can influence how individuals react to and value

it. Prior research suggests that losses are more impactful and perceived as larger than equivalent gains, an asymmetry termed "loss aversion" (Kahneman, Knetsch, and Thaler 1991; Kahneman and Tversky 1979). In some situations, people may evaluate the presence of an incentive in comparison to a situation with no incentive at all. In this case, they may perceive the payment of a surcharge as a potential loss, and the receipt of a discount as a potential gain (Kahneman and Tversky 1986; Thaler 1980). With this idea in mind, some research uses loss aversion to describe why individuals might react more strongly to surcharges than to discounts (Nasiry and Popescu 2011; Homonoff 2015; Poortinga 2017). However, attributing surcharges' motivational power entirely to loss aversion requires that individuals value losses to be substantially higher than gains. For example, Homonoff (2015) evaluates surcharge and discount incentives in the field and calculates a loss aversion coefficient between 5 and 14, which is quite high relative to other observed measures (~2; Abdellaoui, Bleichrodt, and Paraschiv 2007; Camerer 2005). This suggests that another mechanism might be at play—which we propose is the leakage of social norms. In this research, we also offer predictions and demonstrate evidence for several important consequences that would not be predicted by valuation of the incentives (as a result of perceiving them as losses or gains; i.e., loss aversion), and instead would only arise if incentive framing leaked social norms. We discuss these differences in each study and return to the psychology of loss aversion in the General Discussion.

OVERVIEW OF STUDIES

Four studies test our proposed account. Study 1 demonstrates that surcharges (vs. discounts) heighten expectations to conform to an environmentally friendly behavior and increase the perceived prevalence of that behavior—thus leaking both an injunctive and a descriptive norm. Further, it finds that failing to conform under a surcharge (vs. discount) elicits stronger norm-related emotions which, in turn, increase one's intention to perform the incentivized behavior. Study 2 conceptually replicates these findings in a new context and provides further process evidence of a social norms account by demonstrating that exposure to a surcharge at one location influences intentions to engage in the focal behavior in another similar location where no incentive is offered. Study 3 provides additional evidence that the social information leaked by surcharges is a key driver of their ability to motivate behavior by demonstrating that one's likelihood of engaging in a behavior incentivized with a surcharge (vs. a discount) is moderated by individual differences in sensitivity to social influence. That is, the motivational power of surcharges over discounts is driven by those individuals who care the most about conforming to the expectations of their peers. Finally, Study 4 provides behavioral evidence supporting the notion of carryover effects. Specifically, it shows that exposure to a surcharge (vs. a discount) at one point in time increases incidence of the encouraged behavior at a second point in time when no incentive is offered. Moreover, we find that this effect holds even among individuals who merely witnessed the incentive at the earlier point in time and were not financially affected by it. In all studies, we predetermined sample size and report all data exclusions (if any), all manipulations, and all measures.

STUDY 1: SURCHARGES LEAK STRONGER SOCIAL NORMS AND INCREASE BEHAVIORAL INTENTIONS

Study 1 investigated the decision to bring a reusable mug to a coffee shop, a behavior incentivized by either a surcharge or a discount. This context mirrors a growing real-world phenomenon: organizations increasingly offer surcharge or discount incentives to encourage reuse behaviors. For example, in early 2018, several UK Starbucks shops launched a trial "latte levy," requiring customers to pay a surcharge if they did not bring a reusable mug (The Guardian 2018). In contrast, US Starbucks shops offer a 10-cent discount for customers who bring reusable mugs (Starbucks 2017). Study 1 examined whether framing the incentive as a surcharge (vs. a discount) signals that bringing a reusable mug is more of a social norm which, in turn, increases people's anticipated self-conscious emotions and intention to perform the incentivized behavior.

Method

Three hundred two Mechanical Turk workers (43.4% female, M_{age} = 34.6 years, SD_{age} = 11.9 years) participated. Participants were randomly assigned to one of two conditions (incentive framing: surcharge vs. discount) in a between-subjects design. All participants read, "Imagine that you have just moved to a new town, Newbury, and are looking for opportunities to get to know your new neighborhood and your new neighbors! You see a flyer for your local coffee shop and decide to go check it out!" On the next page,

participants saw a flyer for "Newbury Bean House," with text varying by condition (see Appendix for stimuli). For those in the discount condition, the sign read, "Customers will get a 10-cent discount for bringing their own mugs!" while those in the surcharge condition read, "Customers will be charged 10 cents for not bringing their own mugs!"

Participants then responded to two items in randomized order, capturing their perceptions of the injunctive norm: "Most people at this shop think that everyone ought to bring their own reusable coffee mug" and "Most people at this shop think that I should bring my own reusable coffee mug" (1 = No, definitely not to 7 = Yes, definitely). These items were adapted from prior research investigating perceived injunctive norms (White et al., 2009; Smith-McLallen & Fishbein, 2008), and were averaged to form a single scale ($r = .83$). Participants then provided their perceptions of the descriptive norm, answering: "Out of every 100 customers, how many do you think bring their own reusable mug?" (0-100).

On the following page, participants read, "Take a moment to think about how you would feel if you did NOT bring your own coffee mug to this shop." They then responded to 10 items capturing their anticipated guilt and embarrassment, in randomized order (1 = Not at all to 7 = Very much). Five items ($\alpha = .95$) were drawn from the guilt subscale from the State Shame and Guilt Scale (Marschall, Sanftner, & Tangney, 1994) and slightly altered to capture anticipated (vs. in-the-moment) emotions. These items were, "I would feel remorse, regret"; "I would feel tension about something I have done"; "I would not be able to stop thinking about something bad I have done"; "I would feel like apologizing, confessing"; and "I would feel bad about something I have done." Five items ($\alpha = .94$)

were designed to capture anticipated embarrassment, based on Keltner and Buswell (1997)'s description of the characteristics and psychological experience of embarrassment. These items were, "I would feel awkward"; "I would feel foolish"; "I would feel self-conscious"; "I would feel nervous"; and "I would feel worried."

On the next page, participants reported their intention to conform to the incentivized behavior, answering: "How likely would you be to bring your own reusable mug to this shop?" (1 = Not at all to 7 = Very). Finally, participants provided demographic information.

Results

Injunctive Norms. In line with our predictions, participants perceived significantly higher injunctive norms regarding reusable mug use in the surcharge condition (M = 5.73, SD = 1.26) than in the discount condition (M = 5.01, SD = 1.44; t(300) = 4.65, $p < .001$, 95% $CI_{difference}$ = [.42, 1.03], d = .31).

Descriptive Norms. Participants also expected that significantly more customers would bring a reusable mug in the surcharge condition (M = 60.66, SD = 21.72) than in the discount condition (M = 49.53, SD = 23.40; t(300) = 4.28, $p < .001$, 95% $CI_{difference}$ = [6.02, 16.25], d = .49), indicating a stronger descriptive norm.

Norm-Related Emotions. As predicted, participants who read about a surcharge (vs. discount) also anticipated feeling guiltier (surcharge: M = 3.20, SD = 1.71 vs. discount: M = 2.66, SD = 1.75; t(300) = 2.70, $p = .007$, 95% $CI_{difference}$ = [.15, .93], d = .31) and more

embarrassed (surcharge: M = 3.63, SD = 1.75 vs. discount: M = 2.76, SD = 1.75; t(300) = 4.32, $p < .001$, 95% $CI_{difference}$ = [.47, 1.26], d = .50) for failing to bring their own mug. The guilt and embarrassment scales were highly correlated (r = .92) and were accordingly combined to form a single scale for the serial mediation analysis.

Intention. Importantly, participants indicated significantly higher intention to bring their own mug in the surcharge condition (M = 5.44, SD = 1.45) than in the discount condition (M = 4.80, SD = 1.68; t(300) = 3.57, $p < .001$, 95% $CI_{difference}$ = [.29, 1.00], d = .41; see Figure 1.1).

Serial Mediation. To test whether the higher intention in the surcharge (vs. discount) condition was driven by participants' norm perceptions and anticipated emotions, we conducted a serial mediation analysis with 5,000 bootstrapped samples (Hayes, 2013, model 6). Incentive framing (surcharge vs. discount) was the predictor, perceived injunctive norms was the first mediator, norm-related emotions served as the second mediator, and intention to bring a reusable mug was the dependent variable. The serial mediation confirmed the predicted path: the surcharge boosted norm perceptions, heightening norm-related emotions which, in turn, increased intention (serial paths $a_1 \times d_{21} \times b_2$ = .04, SE = .02, 95% CI: [.02, .08]; see Appendix for model). We also find significant patterns when replacing the injunctive norms measure with the descriptive norms measure (see Appendix).

Discussion

Study 1 demonstrates that surcharges (vs. discounts) lead individuals to perceive that conforming to an incentivized behavior is both more of an injunctive and descriptive norm. Consistent with our predictions, and with prior research that norm violations elicit embarrassment and guilt (e.g., Hareli and Parkinson 2008), these norm perceptions increased anticipated embarrassment and guilt for failing to carry out the incentivized behavior. This, in turn, increased participants' intention to bring a reusable mug under a surcharge (vs. under a discount).

The Appendix presents a conceptual replication of these results and addresses one alternative explanation by changing the description of the incentives. In Study 1, the surcharge was imposed on participants for not performing a behavior (i.e., not bringing a reusable mug), while the discount was offered for performing a behavior (i.e., bringing a reusable mug). In the experiment presented in the Appendix, both incentives are designed such that the highlighted behavior involves performing a behavior (i.e., "Customers will get a 10 cent discount for bringing their own bags" and "Customers will be charged 10 cents for using our bags"). Even in this case, participants still perceived stronger injunctive and descriptive norms and anticipated stronger norm-related emotional reactions under surcharges relative to discounts.

Importantly, our theory suggests that surcharges (vs. discounts) more strongly influence behaviors because they leak social norms. Thus, we predict that incentive framing should influence behaviors not only in the location offering the financial incentive, but also in other locations that do not offer any incentives, but where a similar norm might be expected. We test this conjecture in Study 2.

STUDY 2: SURCHARGES INCREASE DOWNSTREAM BEHAVIORAL INTENTIONS

Study 2 replicated the effect of incentive framing on social norm perceptions and anticipated norm-related emotions in a different, increasingly common, context. To encourage reusable bag use, surcharges and discounts are being implemented by organizations (Target 2017) as well as state and local policymakers (National Conference of State Legislatures 2017). A recent archival study investigating the effectiveness of such policies found that while a bag discount had little impact on behavior, a bag surcharge tripled reusable bag use—an effect the researcher attributed primarily to loss aversion (Homonoff 2015).[3] Study 2 provides deeper insight into this finding, presenting evidence that leaked social norms may contribute to this greater effectiveness of surcharges over discounts.

Further, Study 2 investigated whether the social norms signaled via surcharges at one location would carry over to another nearby location with the same reference group, but where no incentives were offered. We predicted that a surcharge at one store would signal the neighborhood norm of bringing reusable bags, and thus bringing bags would also be perceived as the norm at another local store frequented by the same community

[3] Note that Homonoff (2015) also discusses the possibility of the enactment of government-imposed taxes or surcharges signaling a shift in social norms. She collected measures pre- and post-policy implementation and found no significant differences. However, most of the measures categorized as social norms in that work diverge from the definitions of injunctive and descriptive norms used in the present research. The items that were more aligned with our definition were directionally consistent with our theorizing.

members—even though there was no financial incentive to bring bags to this other location. As a result, we predicted that participants exposed to a surcharge (vs. discount) at one location would be more inclined to bring their own reusable bags to the second store where there was no financial incentive.

Method

Six hundred two Mechanical Turk workers (47.2% female, M_{age} = 35.8 years, SD_{age} = 12.0 years) participated. Participants were randomly assigned to one of two conditions (incentive framing: surcharge vs. discount) in a between-subjects design. All participants read, "Imagine that you have just moved to a new town, Newbury, and are looking for opportunities to get to know your new neighborhood and your new neighbors! You need groceries for the week and decide to go grocery shopping! Your new neighborhood has two local stores that are both very popular among your neighbors. You head to one of these neighborhood stores to do your shopping for the week." On the next page, participants were told that as they entered the neighborhood store they saw a sign. The sign presented the store's bag policy with text varying by condition. In the discount condition the sign indicated, "Customers will get a 10-cent discount for bringing their own bags!" while the sign in the surcharge condition read, "Customers will be charged 10 cents for not bringing their own bags!" (see Appendix for stimuli).

Participants then responded to the two injunctive norm measures from Study 1 (r = .85), in randomized order: "Most people at this shop think that everyone ought to bring

their own reusable bags" and "Most people at this shop think that I should bring my own reusable bags" (1 = No, definitely not to 7 = Yes, definitely). They then responded to the descriptive norm measure from Study 1: "Out of every 100 customers, how many do you think bring their own reusable bags?" (0-100). On the following page, participants reported their anticipated guilt and embarrassment in the same manner as Study 1.

On the next page, participants read, "The following weekend you need to go grocery shopping for the upcoming week. You decide to check out the second neighborhood store. This store does not offer an incentive for bringing reusable bags but otherwise is similar to the first store, carries similar inventory, and most of your neighbors shop at both locations." They then reported their perceptions of "the norm" at this incentive-less store, answering, "What do you think "the norm" (standard) is for customers at this neighborhood store?" (to bring reusable bags; to not bring reusable bags). This measure was meant to capture whether inferred social norms would carry over from the first store to the second store. Thereafter, they reported their intention, answering, "How likely would you be to bring your own reusable bags to this neighborhood store?" (1 = Not at all to 7 = Very). Finally, participants provided demographic information.

Results

Injunctive Norms. In this context, participants again perceived significantly higher injunctive norms regarding reusable bag use in the surcharge condition (M = 5.99, SD =

1.11) than in the discount condition (M = 5.22, SD = 1.48; t(600) = 7.26, $p < .001$, 95% $CI_{difference}$ = [.57, .99], d = .59).

Descriptive Norms. Participants also expected that significantly more customers would bring reusable bags in the surcharge condition (M = 68.93, SD = 20.60) than in the discount condition (M = 52.67, SD = 23.42; t(600) = 9.04, $p < .001$, 95% $CI_{difference}$ = [12.72, 19.79], d = .74), indicating a stronger descriptive norm.

Norm-Related Emotions. Participants who read about a surcharge (vs. discount) again anticipated feeling guiltier (surcharge: M = 2.97, SD = 1.70 vs. discount: M = 2.60, SD = 1.64; t(600) = 2.70, $p = .007$, 95% $CI_{difference}$ = [.10, .63], d = .22) and more embarrassed (surcharge: M = 3.39, SD = 1.75 vs. discount: M = 2.86, SD = 1.67; t(600) = 3.77, $p < .001$, 95% $CI_{difference}$ = [.25, .80], d = .31) for failing to bring their own bags.

Norm Perceptions at the incentive-less store. Even though the second neighborhood store had no incentive for reusable bag use, participants still perceived stronger norms of usage in the surcharge (vs. discount) condition, as predicted. Significantly more surcharge participants perceived that the "norm" was to bring bags (vs. not bring bags) to this store (47.83%) than did discount participants (32.34%; $\chi^2(1, N = 602) = 15.03$, $p < .001$, 95% CI [7.58%, 23.11%], $\varphi = .16$).

Intention at the Incentive-less Store. In line with our theorizing, participants who had learned about a surcharge at one store in town were significantly more likely to bring their own reusable bags to the second neighborhood store that did not offer an incentive (M = 4.43, SD = 2.00) than were those who had learned about a discount at the first location

(M = 4.07, SD = 1.93; t(600) = 2.26, p = .02, 95% $CI_{difference}$ = [.05, .68], d = .18; see Figure 1.2).

Serial Mediation. To test whether the higher downstream intention in the surcharge (vs. discount) condition was driven by participants' norm perceptions and anticipated emotions at the first grocery store, we conducted a serial mediation analysis with 5,000 bootstrapped samples (Hayes, 2013, model 6). Incentive framing (surcharge vs. discount) was the predictor, perceived injunctive norms at store 1 was the first mediator, norm-related emotions at store 1 served as the second mediator (r = .88), and intention to bring reusable bags to store 2 was the dependent variable. The serial mediation confirmed the predicted causal path: the surcharge boosted norm perceptions at store 1, heightening norm-related emotions which, in turn, increased intention at store 2, where no incentive was offered (serial paths $a_1 \times d_{21} \times b_2$ = .05, SE = .02, 95% CI: [.03, .09]; see Figure 1.3). Consistent with Study 1, we find significant patterns when replacing the store 1 injunctive norms measure with the store 1 descriptive norms measure (see Appendix for model).

Discussion

Study 2 again finds that surcharges project stronger injunctive and descriptive norms than do discounts in a context that reflects a growing policy trend: the use of small financial incentives to encourage reusable bag use. Moreover, a broad implication of a social norms account is the potential for carry over effects. Study 2 demonstrated that participants who saw a surcharge at one neighborhood store perceived that bringing a bag

was more socially normative at that store and anticipated feeling stronger norm-related emotions for failing to bring a bag there. This, in turn, led them to perceive reusable bags as more normative at another local store where no incentive was in place, and increased their intention to bring a bag to this other incentive-less location. An important feature of this study is that both locations belonged to the same general community, so it would be reasonable to expect social norms to transfer between the locations. Thus, while it is not necessary for both locations to have the exact same clientele for our effects to hold, our theorizing suggests that carry over effects are most likely to arise when the locations, at the very least, belong to similar communities.

In the next study, we investigate a new behavior and provide further support for a social norms account by testing whether individuals' susceptibility to social influence moderates their intention to comply with surcharge (vs. discount) incentives.

STUDY 3: THE TENDENCY TO CONFORM TO NORMS MODERATES RESPONSES TO INCENTIVES

Study 3 had three key goals. First, to provide further support for a norms-based account, we tested whether intention to comply with a surcharge (vs. discount) is moderated by an individual's tendency to conform to the norms of their peer group. Prior research suggests that individuals vary in the extent to which they are sensitive to information about what others are doing (e.g., Lennox and Wolfe 1984). This individual difference in sensitivity to perceived norms has been shown to moderate the influence of

social pressure on individuals' tendency to conform (Bearden and Rose 1990). We posited that surcharges would again lead to greater behavioral intention relative to discounts, driven by the social norm information they leak. Thus, we predicted that the gap in intention to carry out the targeted behavior under a surcharge should be larger among individuals who have the strongest tendencies to conform to peer influence.

Second, we generalized to a new context and behavior. Specifically, we investigated whether our theory extends to situations where the incentivized behavior is not inherently moral. Some prior work suggests that punishments (vs. rewards) can signal whether morally driven behavior is obligatory and can influence judgments of an individual's moral character (Mulder 2008, 2016). It is possible that individuals may construe surcharges as punishments, and this construal could lead them to draw inferences about the morality of the behavior. However, note that at their core, surcharges are simply costs imposed (while discounts are costs removed) for behaving in a certain manner. Also note that while injunctive norms may signal what "should be done" and thus carry a moral flavor, this is distinct from whether the behavior itself is perceived as moral or immoral. Thus, diverging from prior research, in our framework it is not necessary to perceive the behavior as moral, nor the incentives as punishments/rewards. Therefore, this experiment tested whether we would still observe our effects in a social context that is divorced from moral concerns, while testing and controlling for the extent to which participants view the incentives as punishments or rewards.

Finally, this study provides further evidence that our results diverge from a pure loss aversion account by testing whether perceived norms and behavioral intentions

remained different between conditions even when the value of the discount was twice that of the surcharge. Across several domains, a loss (e.g., a surcharge) has been estimated to carry approximately twice the weight of an equally valued gain (e.g., a discount; Abdellaoui, Bleichrodt, and Paraschiv 2007; Camerer 2005). Thus, under a loss aversion account, offering a discount twice the value of a surcharge should be similarly motivating. However, even with this asymmetric structure, we expected that participants who were exposed to a surcharge would still perceive greater injunctive and descriptive norms, anticipate stronger norm-related emotional responses for failure to conform, and be more likely themselves to conform to the incentivized behavior.

Method

Eight hundred Mechanical Turk workers from the United States (43.5% female, 0.3% other, M_{age} = 33.8 years, SD_{age} = 10.6 years) participated the day before the American holiday of Thanksgiving. Participants were randomly assigned to condition (incentive framing: surcharge vs. discount) in a between-subjects design. They then viewed a flyer for a Thanksgiving Turkey Trot 5k Run, where dressing up like a turkey was optional but encouraged. Participants in the discount [surcharge] condition read, "Participants who do the 5k [not] dressed in a turkey costume will receive $4 off [pay an additional $2 on] their race ticket" (see Appendix for stimuli).

After reading the scenario, participants responded to a measure of injunctive norms surrounding the incentivized behavior: "How much do you think it's an expectation to

dress up for the race?" (1 = Not at all to 7 = Very much). Next, we captured their anticipated emotional reactions. Whereas in Studies 1 and 2 we measured anticipated embarrassment and guilt in multi-item scales that implicitly measured these focal emotions, this study assessed whether participants would explicitly report anticipating feeling guilt and embarrassment. Specifically, participants indicated how embarrassing it would be to not dress up for the race and how guilty they would feel if they did not dress up for the race (1 = Not at all to 7 = Very much). Next, they responded to an additional item designed to capture their perceptions of the normative behavior: whether "the norm (standard) for other participants" was to dress or not dress in a turkey costume.

Participants then imagined that several of their friends decided to run with them, and responded to three items assessing their intention to dress up. These items were adapted from previous research measuring behavioral intentions (Moon, Chadee, & Tikoo, 2008): "Given a choice, my friends will choose to dress up in a turkey costume for the run"; "There is a strong likelihood that I will dress up in a turkey costume for the run"; and, "I will recommend to my friends that we dress up in turkey costumes for the run" (1 = Do not agree at all to 7 = Agree completely). These items demonstrated high internal consistency ($\alpha = .89$) and were averaged together to create an index of behavioral intention.

In order to properly address alternative explanations, we followed the method used by Mulder (2008) by assessing perceived incentive size and using it as a covariate in all analyses. Discount [surcharge] participants answered, "How big does $4 off for dressing up [a $2 charge for not dressing up] feel?" (1 = Not at all to 7 = Very).

Next, we assessed whether participants viewed the discount and surcharge as a reward and punishment, respectively. We posit that surcharges (vs. discounts) will project stronger social norms regardless of whether individuals view them as punishments or rewards. As such, participants allocated 100 points across a set of potential reasons why the race organizers would offer $4 off for dressing up [charge $2 for not dressing up], with the most points given to the reasons they think are most likely. The potential reasons were: "they want to reward participants for dressing up"; "they want to punish participants for not dressing up"; "they want to make more money"; "they care about how much spirit people show"; "they expect participants to want to show spirit"; and "a different reason."

Next, participants completed the Attention-to-Social-Comparison-Information (ATSCI) scale ($\alpha = .88$; Lennox & Wolfe, 1984), measuring one's tendency to conform to the behaviors of others. This scale includes items such as, "At parties I usually try to behave in a manner that makes me fit in" and "It's important to me to fit into the group I'm with." We predicted that this measure would moderate participants' responses to surcharges versus discounts, such that the incentive framing would influence only the individuals who care the most about fitting in. Finally, participants provided demographic information.

Results

Norm Perceptions. Supporting the idea that participants indeed perceived a stronger injunctive norm of dressing up in the surcharge condition, surcharge (vs. discount)

participants reported that there was a significantly stronger expectation that runners would dress up (surcharge: M = 5.44, SD = 1.44 vs. discount: M = 4.55, SD = 1.59; b = .99, t(797) = 9.22, $p < .001$, 95% $CI_{difference}$ = [.78, 1.20], d = .66). Participants were also significantly more likely to report that "the norm" was to dress up like a turkey for the race rather than not dress up (surcharge = 80.0% vs. discount = 64.7%; b = .94, z = 5.53, $p <$ .001, 95% CI [9.24%, 21.46%], φ = .17).

Norm-Related Emotions. Surcharge participants anticipated feeling more embarrassed (surcharge: M = 3.20, SD = 1.74 vs. discount: M = 2.59, SD = 1.67; b = .73, t(797) = 6.12, $p < .001$, 95% $CI_{difference}$ = [.50, .97], d = .43) and guiltier than discount participants (surcharge: M = 3.18, SD = 1.95 vs. discount: M = 2.79, SD = 1.59; b = .54, t(797) = 2.90, $p = .004$, 95% $CI_{difference}$ = [.28, .80], d = .29) for not dressing up, consistent with the previous studies.

Intention. In line with our predictions, surcharge participants indicated significantly higher intention to dress as a turkey (M = 4.48, SD = 1.78) than did discount participants (M = 4.29, SD = 1.80; b = .41, t(797) = 3.43, $p < .001$, 95% $CI_{difference}$ = [.18, .65], d = .23). Thus, the surcharge again more strongly motivated intention to engage in the incentivized behavior.

Moderation by Conformity Tendency. We next examined intention to dress in a turkey costume as a function of condition (surcharge vs. discount), individual tendency to conform to others' behavior, and their interaction, in a linear regression with incentive size

perceptions as a covariate.[4] We mean-centered conformity tendency and effect-coded condition (1 vs. -1 for surcharge vs. discount) for proper interpretation of the main effects (Aiken & West, 1991). This analysis revealed a significant main effect of condition (b = .20, t(795) = 3.35, $p < .001$, 95% CI = [.08, .32], d = .22), whereby surcharge participants reported significantly higher intentions, and a significant main effect of conformity tendency (b = .38, t(795) = 5.04, p < .001, 95% CI = [.23, .53], d = .34), whereby individuals higher in conformity were more likely to dress up, qualified by a significant interaction (b = .18, t(795) = 2.47, $p = .01$, 95% CI = [.04, .33], d = .21).

To examine this interaction, we conducted a floodlight analysis (Spiller et al., 2013), applying the Johnson-Neyman procedure to identify the range(s) of conformity tendency (ranging in value from 1 = low to 6 = high) for which the simple effect of condition was significant. This analysis revealed that there was a significant positive effect of being in the surcharge condition on intention for any value of conformity tendency greater than 3.24 (71.25% of participants; b = .26, t = 1.96, $p = .05$), but no effect for any value of conformity tendency less than 3.24. Thus, participants who tend to conform to their peers' expectations were significantly more likely to dress up under the surcharge than under the discount, but participants who are less influenced by their peers' expectations were equally likely to dress up in both conditions. See Figure 1.4 for this pattern and Table 1.1 for regression results.

[4] Without the covariate, the main effect is directionally consistent but marginal ($b = .10$, $t(796) = 1.57$, $p = .12$) and the interaction remains significant ($b = .20$, $t(796) = 2.45$, $p = .01$), with the floodlight analysis revealing a similar pattern.

Perceived Purpose of Incentive. Finally, to test whether participants perceived different reasons for the surcharge versus discount incentives, we examined how they allocated "points" to each rationale.[5] In both conditions, participants allocated the greatest number of points on average to the rationale that "they want to reward participants for dressing up" (surcharge: M = 25.71, SD = 22.46 and discount M = 33.56, SD = 22.52), suggesting that participants viewed both incentives primarily as rewards. Consistent with expectations, participants assigned more points to the reward rationale in the discount than the surcharge condition (b = 8.76, t(743) = 5.25, $p < .001$, 95% CI = [5.48, 12.03], d = .39). Further, while participants in both conditions assigned few points overall to a punishment motive, surcharge participants assigned more points to punishment (M = 6.59, SD = 12.91) than did discount participants (M = 2.72, SD = 7.44; b = 4.58, t(743) = 5.94, $p < .001$, 95% CI = [3.07, 6.10], d = .44). Importantly, the effect of condition on behavioral intention remains significant when controlling for both of these point allocations ($p < .001$ and neither allocation significantly predicted intention, ps > .26), suggesting these motives alone are not entirely responsible for participants' responses. This pattern further suggests that people may view surcharges more as punishments relative to discounts, but that overall, they are not considered a strong form of punishment, at least in this context. Point allocations for the other rationales are included in the Appendix.

Discussion

[5] Note that 6% of participants did not allocate a total of 100 points and were not included in the primary analyses, although including them does not change the pattern nor the significance of the results.

Study 3 shows that under a surcharge loss-equated at half the size of a discount, participants were still more likely to perceive stronger social norms and anticipate stronger emotional reactions to violating these norms, which led to higher intentions to carry out the incentivized behavior. Further, this effect was moderated by conformity tendencies: participants who tend to conform to their peers expressed higher intention to engage in a behavior incentivized with a surcharge than with a discount, but participants low in the tendency to conform expressed equal intention across incentive frames. This finding further corroborates the role of norm leakage in the influence of incentives on behavior.

This study also demonstrates that surcharges and discounts may align with a punishment and reward frame, but that it is unlikely we need to be concerned with some of the downsides of punishments such as reactance (e.g., Balliet, Mulder, & Van Lange, 2011), at least in this context. Further, these findings suggest that surcharges (vs. discounts) signal social norms not only in contexts where the incentivized behavior may be construed as moral (e.g., green behaviors like reusable mug and bag usage), but also in contexts where the incentivized behavior has no moral flavor (e.g., dressing up). A pretest verified this assumption, finding that participants did not judge others who fail to conform to an incentive in this context as immoral (see Appendix for details). However, a clear limitation of this study is its hypothetical nature. Therefore, in Study 4, we test whether exposure to an incentive can influence real behavior, particularly once the incentive is removed.

STUDY 4: SURCHARGES CHANGE DOWNSTREAM BEHAVIORS

Study 4 investigated a new domain, health promotion, and assessed whether exposure to a surcharge incentivizing a behavior at one point in time could influence whether individuals would carry out that behavior in the same location, but when the incentive was no longer in place. Participants were given an opportunity to make a purchase and were offered an incentive, framed either as a surcharge or a discount, for using hand sanitizer before purchasing. We tested if participants who initially witnessed a surcharge (vs. discount) were more likely to spontaneously carry out the encouraged behavior at a second point in time, when no incentive was present.

This design also allowed us to examine the downstream consequences of merely being exposed to these incentive policies, without necessarily being monetarily impacted by the incentives. All participants learned about the presence of a surcharge or a discount, but some chose not to purchase the item associated with this incentive. Thus, these individuals heard about the policy, but were not financially affected by it. We tested whether these individuals still exhibited an increased tendency to carry out the initially incentivized behavior under a surcharge (vs. discount), consistent with our norms account.

Method

Two hundred ninety-four undergraduates (56.4% female; .7% other; 4.8% undisclosed; M_{age} = 21.2 years, SD_{age} = 2.2 years) from a large West Coast University

participated in a laboratory study in return for course credit.[6] Participants were randomly assigned to condition (incentive framing: surcharge vs. discount) in a between-subjects design. Participants came into the lab, signed in, and were given $.50 as a thank-you for their participation in the study.

In the first phase of the study, participants proceeded one at a time to a room where a research assistant (RA) and a confederate waited, both of whom were neither informed about the study's purpose nor informed about the hypotheses. During each participant's interaction in this room, a confederate sat at a computer facing the participant and was instructed to appear to be working, but also to periodically glance at the participant. The confederate's presence was intended to increase participants' perceptions that they were in a social setting with a member of their reference group (another college student). The RA, seated behind a table, asked the participants to view two school t-shirts hanging on the wall. Participants indicated which t-shirt they thought best represented the school community. This interaction was designed to subtly encourage participants to think about their social environment, while also masking the true focus of the study.

Next, the RA drew participants' attention to the table in front of them, which held several packs of gum and four signs (see Appendix for materials). One sign announced a sale on chewing gum, with a picture of the gum and its price (45 cents in the discount condition, and 40 cents in the surcharge condition).[7] A second sign informed participants

[6] One participant was excluded because she wished to wash her hands, but had a cut on her hand and thus could not use the hand sanitizer; a second participant was excluded because the research assistant did not inform this participant about the chance to take a cookie.

[7] The price of the gum was structured so that the eventual price would be the same in both conditions: it cost 40 cents for all participants who used the hand sanitizer (after a 5-cent discount; or without a 5-cent surcharge) and 45 cents for participants who did not (without a 5-cent discount; or after a 5-cent surcharge).

of an incentive related to the gum, the text of which varied by condition. In the discount condition, this sign read, "You'll get a 5 cent discount if you use hand sanitizer! Help protect yourself and keep [school name] safe for everyone!" In the surcharge condition, this sign instead read, "You'll pay a 5 cent surcharge if you don't use hand sanitizer! Help protect yourself and keep [school name] safe for everyone!" A third and fourth sign on the table were intended to present a rationale for the incentive. One sign included a picture of people holding hands and read, "We're all in this together! Stop Germs from Spreading. Clean your Hands." The other sign had a picture of a toilet and someone using hand sanitizer and read, "Public keyboards can contain more germs than a toilet seat! Protect yourself & others!" The hand sanitizer was located on a separate table in the room.

To initiate this brief interaction, the RA said,

> "We have Extra gum for sale at a special low price – 1 for 45 [40] cents! In addition, we are letting all lab participants know we're making an effort to reduce the spread of germs across campus. As it turns out, public keyboards can be one of THE dirtiest surfaces and a key way in which germs are spread. So, to encourage participants to protect themselves and reduce the spread of germs across campus, the lab is offering a 5 cent discount [charging an additional 5 cents] on the price of the gum for participants who use the hand sanitizer [don't use the hand sanitizer] before purchasing."

The RA recorded whether or not the participant purchased the gum (yes/no), whether or not they used hand sanitizer (yes/no), and the number of pumps of hand sanitizer they used.[8]

[8] Of participants who used the hand sanitizer, nearly all used exactly 1 pump (89.4%). The number of pumps participants used was equal across conditions ($\chi^2(2, N = 179) = 2.06$, $p = .36$).

Participants were then taken to the computer lab where they completed 30 minutes of filler survey material and unrelated studies (more details are in the Appendix), as in a typical session in the lab. Embedded in a filler survey, participants answered on a 10-point scale, "Out of every 10 participants, how many do you think used the hand sanitizer before coming to the computer lab?" and provided demographic information.[9]

After this half hour of unrelated studies, participants returned individually to the same room used during phase 1 of the study. The RA handed the participants a sheet of paper and asked them to complete a "memory test" as the final part of the study. The paper had a picture of the two t-shirts on it from phase 1 and asked participants to circle the shirt they had voted for. This task was designed to justify why participants needed to return to the original room. When finished, participants handed their sheet to the RA and signed out of the lab session. On the table near the exit (across the room from the RA) was a tray of cookies along with a bottle of hand sanitizer. The RA dismissed each participant, telling them, "Thank you very much; you are free to go! There were extra cookies available from an earlier event here, so you can take one on the way out!" Thus, during the entirety of this second interaction, there was no mention of the hand sanitizer. The RA surreptitiously recorded whether the participant used the hand sanitizer (yes/no) as they left the lab.[10]

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[9] Participants also responded to the ATSCI scale. This measure did not moderate behavior in this experiment; we suspect this is the case because this individual difference scale was presented completely divorced of any social context. Further, the scale leans toward descriptive norm items, for which we found no effect in this experiment. This may serve as further evidence of the important role of injunctive norms in driving behavior in this setting.

[10] The RA also recorded how many pumps of hand sanitizer participants used. As in phase 1, of participants who used the hand sanitizer, nearly all used exactly one pump (88.6%) and the number of pumps used was equal across conditions ($\chi^2(2, N = 44) = .72$, $p = .70$). The RA also recorded whether the participant took a cookie and whether the participant took napkins with their cookies. Participants were equally likely across conditions to take a cookie (discount: 71.4% vs. surcharge: 65.3%, $\chi^2(1, N = 294) = 1.27$, $p = .26$), and to take a napkin (discount: 53.7% vs. surcharge: 51.7%, $\chi^2(1, N = 294) = .12$, $p = .73$). Thus, exposure to the

Results

Phase 1. Participants purchased gum at equal rates in both conditions (surcharge: 58.5% vs. discount: 54.4%, $\chi^2(1, N = 294) = .50$, $p = .48$, 95% CI [-15.31%, 7.25%], $\varphi = .04$). It turns out that the calibration of the incentives led to a ceiling effect on phase 1 hand sanitizer usage among participants who purchased gum (surcharge: 94.2% vs. discount: 96.3%; $\chi^2(1, N = 166) = .38$, $p = .54$, 95% CI [-6.00%, 10.20%], $\varphi = .05$) and equal usage among those who did not (discount: 16.4% vs. surcharge: 16.4%, $\chi^2(1, N = 126) < .001$, $p > .99$, 95% CI [-13.02%, 13.32%], $\varphi < .001$).

Phase 2. The focus of this experiment was on phase 2 hand sanitizer usage. As predicted, even with the incentive no longer in place, surcharge participants were significantly more likely to spontaneously use the hand sanitizer in phase 2 (19.7%) than were discount participants (10.2%; $\chi^2(1, N = 294) = 5.24$, $p = .02$, 95% CI [1.39%, 17.84%], $\varphi = .13$). Thus, encountering an incentive framed as a surcharge at one point in time nearly doubled the proportion of participants who carried out the encouraged behavior later on, when it was no longer incentivized—and not even mentioned.

Importantly, the effect of condition on hand sanitizer usage in phase 2 was driven by the participants who had not purchased any gum in phase 1 (43.5% of participants). These individuals were merely exposed to either a surcharge or discount, and were not financially affected by it. Yet, even among these participants, those who had observed a

incentive in phase 1 influenced only the specific behavior that was incentivized, and not other behaviors.

surcharge in phase 1 were significantly more likely to spontaneously use the hand sanitizer in phase 2 (36.1%) than were those who had observed a discount (16.4%; $\chi^2(1, N = 128) = 6.44$, $p = .01$, 95% CI [4.48%, 34.48%], $\varphi = .22$). This pattern suggests that merely being exposed to a surcharge, even while not being financially affected by it, can leak social norm information and significantly alter behavior thereafter.

Survey Measure: Descriptive Norm. Participants perceived similar rates of hand sanitizer usage by their peers in both conditions (surcharge: M = 5.80, SD = 3.17 vs. discount: M = 5.74, SD = 3.31; t(278) = .17, $p = .87$, 95% $CI_{difference}$ = [-.83, .70], d = .02), contrary to our expectations. However, participants' estimates of others' behavior was reflective of their own actual usage: participants who used hand sanitizer reported thinking that significantly more of their peers also did so (b = 4.05, t(278) = 12.87, $p < .001$, 95% $CI_{difference}$ = [3.43, 4.67], d = 1.55).

Discussion

Study 4 provides behavioral evidence that exposure to a surcharge (vs. discount) can leave a lingering impact: the use of surcharges (vs. discounts) to encourage hand sanitizing doubled the proportion of individuals enacting this behavior at a later point in time, when no incentive was in place and the behavior was not even mentioned. Further, this effect arose even among individuals who were not financially impacted by the original incentives, providing evidence that mere exposure to an incentive frame can leave lasting

impressions even on individuals who do not experience the surcharges or discounts themselves.

Despite the social nature of our effect, we did not find that surcharge participants perceived a significantly stronger descriptive norm of hand sanitizer use. This result may be explained by false consensus, the phenomenon in which people's egocentric tendencies lead them to expect similarities between themselves and others and overestimate the commonality of their own behaviors (e.g., Mullen et al. 1985; Ross, Green, and House 1977). Indeed, participants may very well have inferred that others had simply behaved just as they had (Tankard and Paluck 2016). As this question was asked directly after their own usage (or non-usage) of the hand sanitizer, this item may not be a clean measure of a perceived descriptive norm, as it is possible that they were merely projecting their own behavior onto their peers.

GENERAL DISCUSSION

Shifting social norms is a valuable organizational tool, as norms can influence talent and performance (Swaab and Galinsky 2015) and even organizational productivity, spontaneity, and success (De Jong et al. 2014; George and Jones 1997; Stewart et al. 2012). Across four studies, we demonstrate that framing an incentive as a surcharge, as compared to a discount, leaks stronger injunctive and descriptive social norms, signaling both greater social expectations to perform and higher prevalence of the incentivized behavior. The prospect of violating these perceived social norms if one fails to perform the

incentivized behavior elicits higher anticipated emotional reactions of embarrassment and guilt which, in turn, increase one's likelihood of carrying out the perceived normative behavior.

Importantly, this framework implies a set of novel predictions as to the function and consequences of incentives. First, we show that incentives framed as surcharges have a lingering effect, influencing behaviors even in locations and at times when no incentive is in place (Studies 2 and 4), an effect mediated by perceived norms and norm-related emotions (Studies 1 and 2). Second, because their framing leaks information about social norms, surcharges can cause people to anticipate feeling embarrassed and guilty if they fail to perform the incentivized behavior (Studies 1-3). Third, by invoking norms, incentives framed as surcharges (vs. discounts) can influence downstream behaviors of both individuals who were previously financially affected by the incentive as well as those who merely observed the incentive (without being financially affected by it; Study 4). Finally, we find that surcharge (vs. discount) incentives impact people differently depending upon their individual sensitivity to social norms, with surcharges most strongly affecting the individuals who care the most about conforming to their peers (Study 3).

We show the robustness of our findings by demonstrating that they hold across a range of domains and contexts, including both moral (e.g., "green" behaviors like bringing reusable grocery bags) and non-moral contexts (e.g., dressing up for a themed event), as well as for both hypothetical and real behaviors. Further, our results persist both when there is and when there is not a plausible cost-passing justification for the incentive. That is, people may perceive that retailers implement surcharges when they want to pass along

the cost of providing a material product (e.g., the cost for them to provide plastic grocery bags), or the cost of providing additional services (e.g., additional minutes of childcare; Gneezy & Rustichini, 2000). However, we find that surcharges leak stronger social norms and have similar consequences for behavior in contexts both with (e.g., when supplying grocery bags or coffee cups) and without (e.g., when encouraging individuals to dress in costume or use hand sanitizer) the potential for cost-passing, increasing the application of our findings.

Theoretical Contributions

The present work makes notable theoretical contributions to research on social norms and organizational behavior, incentives, and policy. First, we contribute to the organizational behavior and social norms literatures by introducing a novel tool that can be used to harness the well-established power of norms to effectively change behaviors across many domains (e.g., Berkowitz 2004; Cialdini and Trost 1998; Cialdini, Reno, and Kallgren 1990; Larrick, Soll, and Keeney 2015). Prior research suggests that individuals infer social norms via several channels, including the behavior of other individuals, the behavior of groups, and signals from institutions, such as organizational rules or public policies (Tankard and Paluck 2016). In this work, we demonstrate that the framing of incentives is a novel channel through which injunctive and descriptive social norms are leaked, signaling the approved behaviors in a community, as well as how others tend to behave. More broadly, our work opens the door to investigate whether other features of

organizations and the marketplace have the potential to similarly signal social norm information, and thus potentially serve as tools for changing behaviors.

Second, the current research also adds to the policy and morality literatures by building on previous work suggesting that the structure of a law or policy can lead to inferences about the morality of a behavior. Specifically, using social dilemma games, Mulder (2008) finds that participants judge violators as more immoral in a setting where punishments are given for non-compliant behaviors than when rewards are given for compliant behaviors, which she suggests occurs because punishments signal that a behavior is morally obligatory. While injunctive norms may convey a moral principle, we suggest that this diverges from whether a behavior is inherently moral (e.g., donating to charity), from moral concerns (e.g., if I do not perform this behavior, others will think I am a bad person), and from moral judgments (e.g., that someone who does not behave in this manner is morally unfit). Thus, the current research expands this previous work on the roles of policy framing and morality by demonstrating that surcharges leak general injunctive and descriptive social norms, not just moral norms, across a broader context of consumer and organizational behaviors. Further, we demonstrate that while surcharges and discounts map on to punishments and rewards and indeed may be perceived as such in some contexts, this is certainly not always the case and is not a necessary component of our theory. This suggests that policy framing may not be limited to a punishment/reward domain and may have larger implications than has been investigated in prior research (Evers et al. 2016; Mulder 2008, 2016).

Finally, this work contributes to the incentives literature by demonstrating that the framing of an incentive has greater implications than previously believed, and by illustrating the potential behavioral ripple effects of incentives. Prior research investigating surcharges has attributed their superior effectiveness over discounts mainly to loss aversion (Homonoff 2015; Nasiry and Popescu 2011; Poortinga 2017), under the assumption that surcharges are perceived as losses and discounts as gains. However, loss aversion draws on the monetary valuation of the incentive itself. Accordingly, loss aversion can help describe responses to active incentives in which an individual is directly impacted by the feeling of a monetary loss. However, our research demonstrates several important consequences that would not be predicted by this monetary valuation asymmetry, and instead would only arise if incentive framing does indeed leak social norms. First, we demonstrate that failing to carry out the incentivized behavior led individuals to anticipate emotions associated with the violation of a social norm (e.g., embarrassment and guilt). Second, mere exposure to a surcharge at one point in time led to downstream changes in behavior where the incentive was not in place—even among people who merely observed the incentive and were not monetarily impacted by it, an outcome consistent with research demonstrating that shifts in perceived social norms can lead to lasting behavioral effects (Neighbors, Larimer, and Lewis 2004; Schultz et al. 2007). Third, even with loss-equated incentives, individuals responded more strongly to a surcharge because of the social norm information it carried. Finally, individuals who exhibited a natural propensity to be influenced by peer expectations responded more strongly to surcharges than discounts, while individuals who cared less about conforming to peer expectations responded similarly to both—a result that

would not be predicted by individuals merely responding to the financial value of the incentives. In summary, our findings offer novel evidence of an important undiscovered consequence of incentives.

Managerial Implications

Incentives are a popular organizational tool used to encourage engagement in a wide variety of behaviors, ranging from environmentally friendly actions (e.g., using renewable energy, purchasing a hybrid car, and recycling) to health-related behaviors (e.g., wellness programs that offer incentives for smoking cessation, weight loss, and management of chronic diseases; Cigna 2017). Thus, in addition to the theoretical contributions of this research, our work carries key practical implications relevant to organizational behavior.

First, our findings suggest that the manner in which organizations and policymakers frame these incentives may shift perceptions of social norms, leading to carryover behaviors and potentially habit formation (Ouellette and Wood 1998)—even once the incentive ends. Specifically, we demonstrate that incentive policies framed as surcharges have the potential to influence behaviors downstream both in the same location as well as carry over to other locations where similar social norms are expected.

Second, framing an incentive as a surcharge can give managers a "bigger bang for their buck." As shown in Study 3, a surcharge can lead to greater compliance than a discount even twice its price. Thus, managers wishing to best incentivize positive

workplace behaviors may consider that the way they frame a policy may have a larger impact than previously realized. For example, if they choose to frame an incentive as a surcharge, in the right context, they may successfully signal that a behavior is more normative. This could better motivate organizational citizenship behaviors such as meeting attendance, corporate social responsibility activities such as volunteering, or uptake of flexible work hours. However, it is important to consider whether employees will perceive such surcharges as aligned with the community and organizational beliefs or as unjust, a possibility that could elicit reactance. A further consideration is that surcharges (if perceived as "stick" policies) may increase perceptions that a person or behavior is viewed negatively by the organization or policymaker, potentially stigmatizing certain groups and increasing distaste for the policy (Tannenbaum et al. 2013). The current studies examining small-scale surcharge and discount incentives (e.g., 10 cents) did not find evidence for these concerns, but they should be considered.

Finally, our findings suggest that signaling a social norm through the framing of an incentive may influence a larger audience than would be expected by a financial-motivation account, as individuals who are not motivated by a 5-cent, 10-cent, or even two-dollar incentive may still care about conforming to what they perceive to be a social norm. Further, the framing of the incentive may spill over to a larger audience by influencing individuals who observe the incentive but are not directly financially impacted by it. Indeed, we demonstrate that merely encountering a surcharge (and not directly experiencing it) led to greater incidence of the previously incentivized behavior. In sum, our findings suggest a new lever for influencing norm perceptions, with the potential to

influence a wider audience and cause behaviors to linger and carry over to locations where no incentive is in place.

Limitations and Directions for Future Research

While this investigation outlined robust support for our account, naturally the power of surcharges is not without limits. Our theorizing rests on people inferring that the surcharge is acceptable and put in place by a reasonable policymaker. Thus, an important boundary condition for our work may be that the incentive has to seem legitimate and justified. Beginning to impose an extra charge that goes against any established, well-known group norms or that seems unfair may provoke reactance, and would likely not have the intended effect on perceived norms or behavior (Payne 2001; Shah et al. 2014; Thaler 1980). Thus, future research could investigate whether the perceived appropriateness of the incentive moderates the impact of incentive framing on perceived social norms and behavioral responses.

An additional potential boundary condition concerns the magnitude of the incentives. In the present research, we investigated relatively small pricing incentives (a few cents to a few dollars). It is possible that at larger incentive values, the motivational superiority of surcharges over discounts may cease to exist, or may even reverse, or that financial considerations might dwarf the social norms mechanism we identified. Further research could explore such possibilities. Future research could also examine whether incentivizing a behavior affects other different, but related, behaviors. For example, if

framing an incentive as a surcharge encourages an individual to bring her own bags to the grocery store, it may serve as a self-signal (Bem 1972) that she cares about the environment, leading to potential shifts in her environmental attitudes and other environmentally friendly behaviors (Poortinga, Whitmarsh, and Suffolk 2013; Thomas, Poortinga, and Sautkina 2016). On the other hand, increases in environmentally responsible behaviors such as using fewer plastic bags may give individuals license to misbehave in other ways (Khan and Dhar 2006; Karmarkar and Bollinger 2015), pointing to an interesting potential avenue for research.

Furthermore, the current research investigated potential spillover effects of exposure to an incentive at one point in time. Specifically, we find that exposure to a surcharge (vs. discount) can lead individuals to carry out the encouraged behavior at a later point in time when no incentives are in place. However, the time scale of our studies was relatively short (a 30-minute gap in consequential Study 4 and a hypothetical 1-week gap in scenario Study 2). Future research may wish to examine longer-term interventions and test potential longer-lasting impacts of initial exposure to surcharge incentives. Finally, we examine differences in the psychology of loss and gain frames and how they invoke norm inferences, leading to differential effects on emotions and behavior. It is possible that this psychology could contribute to the general phenomenon of loss aversion; however, specific work would be needed to test this conjecture, providing a potential avenue for future research.

In sum, our studies add to the growing body of knowledge about the nature of incentives and the inferences people draw from them by demonstrating that merely framing

an incentive as a surcharge, rather than a discount, can influence perceived social norms and lead to meaningful changes in behavior. With this knowledge, careful consideration should be given to the behavioral nudges we use in management, marketing, policy-making, economics, psychology, and beyond, as the mere framing of incentives is more powerful than previously realized.

ACKNOWLEDGEMENTS

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Chapter 1, in full, is a reprint of previously published material as it appears in Organizational Behavior and Human Decision Processes, 151: 118—131, Lieberman, Alicea, Kristen Elizabeth Duke, and On Amir. The dissertation author was one of the primary investigators and authors of this paper.

FIGURES

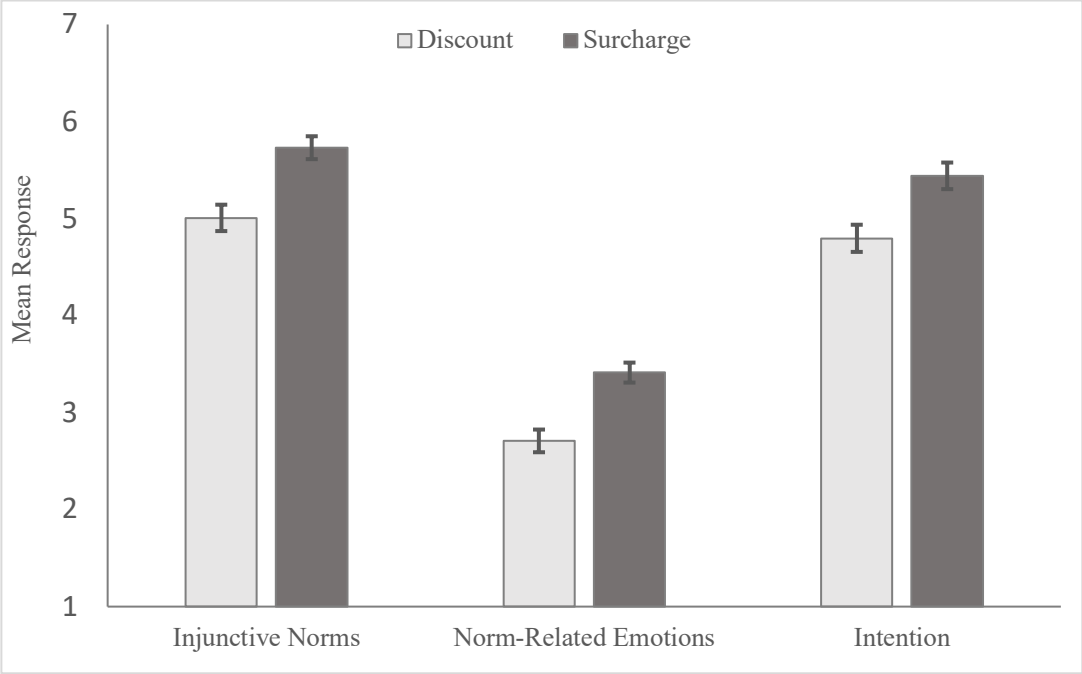

Figure 1.1. The effects of incentive framing on perceived injunctive norms, embarrassment and guilt (averaged), and intention to bring a reusable bag, Study 1. Error bars represent ± 1 SE around the mean.

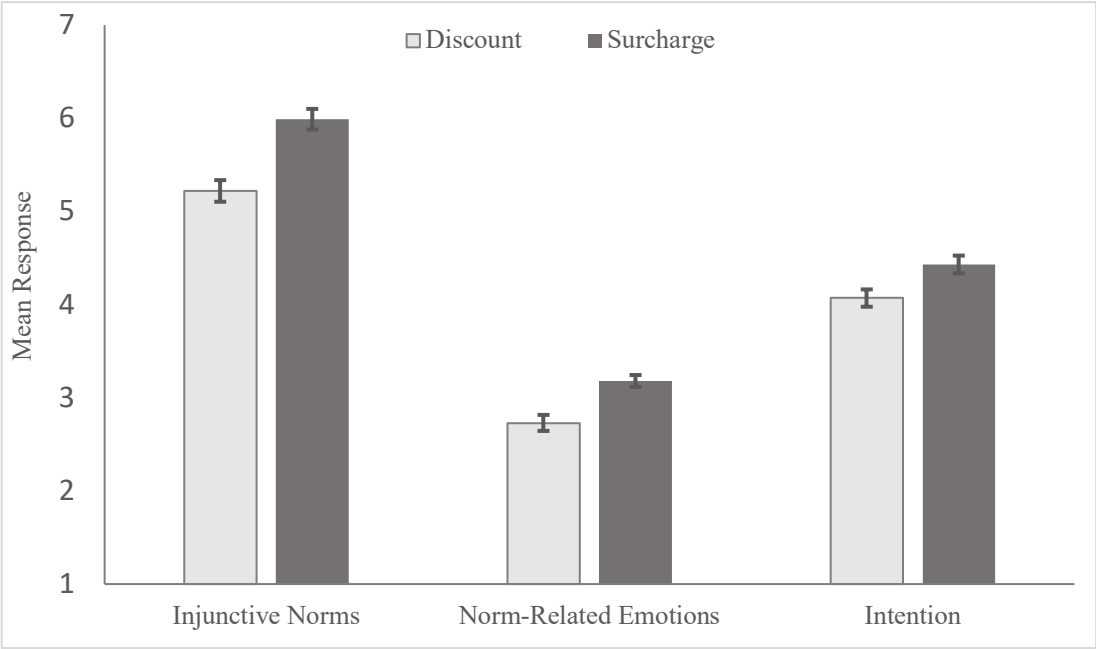

Figure 1.2. The effects of incentive framing on perceived injunctive norms, embarrassment and guilt (averaged), and intention to bring a reusable bag, Study 2. Error bars represent ± 1 SE around the mean.

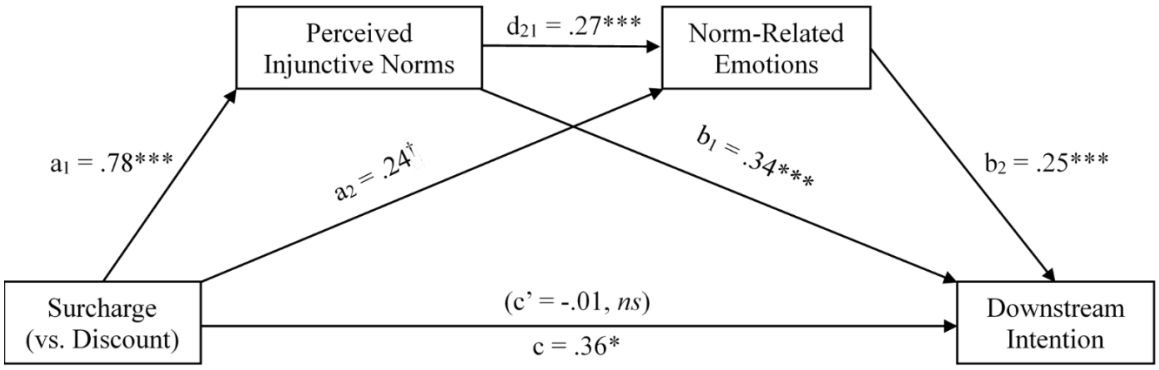

Figure 1.3. The effects of incentive framing on downstream intention to bring reusable bags, through perceived injunctive norms and norm-related emotions, Study 2. The path coefficients are unstandardized betas. The value in parentheses indicates the direct effect of surcharges on downstream intention after accounting for the two mediators. Norm-related emotions are an average of guilt and embarrassment. *** $p < .001$; ** $p < .01$; * $p < .05$; † $p < .10$

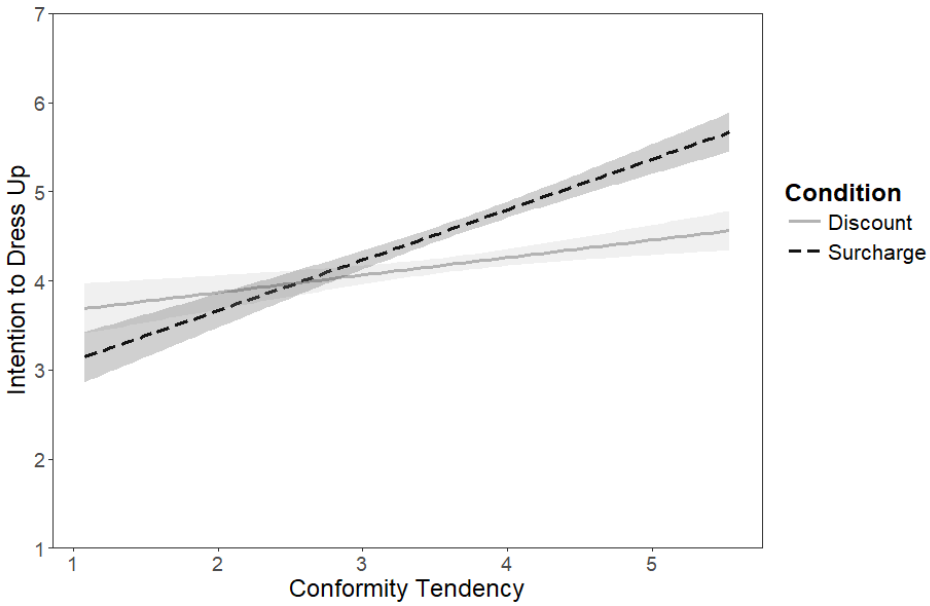

Figure 1.4. Regression-predicted intention to dress up by incentive condition, moderated by conformity tendency, Study 3. Incentive size perceptions was included as a covariate: regression-predicted values were computed at the mean level of incentive size perceptions. Shaded areas reflect ± 1 SE around the predictions.

TABLES

Table 1.1. Linear regressions predicting behavioral intention, Study 1.

	(1)	(2)	(3)
Condition	.21*** (.06)	.20*** (.06)	.20*** (.06)
Perceived incentive size	.38*** (.04)	.35*** (.04)	.35*** (.04)
Conformity tendency		.38*** (.08)	.38*** (.08)
Conformity tendency x condition			.18* (.07)
Constant	4.38*** (.06)	4.38*** (.06)	4.38*** (.06)
# Observations	800	800	800
R^2	.13	.15	.16

Standard errors in parentheses. *Levels of significance*: * $p < .05$, ** $p < .01$, *** $p < .001$. Condition is effect-coded (i.e., 1 = Surcharge, -1 = Discount) to allow for interpretation of the main effects. All continuous variables (perceived incentive size, conformity tendency) are mean-centered for the same goal.

APPENDIX

ADDITIONAL DISCUSSION OF SELF-CONSCIOUS EMOTIONS

In the manuscript, we provide a discussion of guilt and embarrassment, two self-conscious emotions that are action-oriented and have been shown to follow violations of social norms (Lewis, 1971; Tracy & Robins, 2004). However, there are two additional self-conscious emotions, shame and pride, that are less relevant to the contexts in this research, and thus were not included in our experiments. Nevertheless, here we provide a more thorough discussion of these two self-conscious emotions.

Shame

Shame involves a global evaluation of the self as violating "society's definition of what it means to be a worthy, competent, good, and respectable person" (p. 205-206, Edelstein & Shaver, 2007), and accordingly motivates extreme withdrawal and social avoidance (e.g., Tangney, Miller, Flicker, & Barlow, 1996). Shame is typically viewed as an intense emotional response to a behavior that violates deeper moral rules (Turiel, 1983), whereas our theory proposes that social norm signaling in these contexts does not necessarily involve moral concern.

Moreover, shame involves an appraisal about an individual's overall character (Lewis, 1971; Tracy & Robins, 2004), motivating avoidance behavior (Tangney et al., 1996). As such, imagining "undoing" the past to avoid shame elicits thoughts of changing aspects of oneself (Niedenthal, Tangney, & Gavanski, 1994), versus undoing aspects of one's behavior (as with guilt). For these reasons, shame is less relevant to our contexts, as we do not expect small incentives to fundamentally shift whether people perceive a dispositional flaw in their character (Hart & Matsuba, 2007) which would lead to behaviors of avoidance; rather, we expect that they project social conventions that drive individuals to seek to fit in.

Pride

Pride is a positive self-conscious emotion. Prior research contrasts two forms of pride that parallel the distinction between shame and guilt (e.g., Tracy & Robins, 2007). Like shame, hubristic pride arises following attributions about positive stable, global aspects of the self (e.g., Lewis, 2000), while like guilt, authentic pride involves a focus on specific behaviors (Tracy & Robins, 2004). And, while authentic pride is at times a motivating emotional force, it tends to involve an appraisal of the self as outperforming others, rather than matching others' behavior (as would be expected when one attempts to match the norm; Exline & Lobel, 1999; van Osch, Zeelenberg, & Breugelmans, 2018). Thus, we do not expect that the social norm signaled by an incentive frame will elicit strong experiences of pride in our contexts.

STUDY 1

Study Stimuli

In Study 1, participants were presented with visual stimuli of coffee shop signs differing by condition. Discount participants saw a sign that read, “Customers will get a 10 cent discount for bringing their own mugs!” while surcharge participants saw a sign that read, “Customers will be charged 10 cents for not bringing their own mugs!” (see Figure A1.1).

Discount

Surcharge

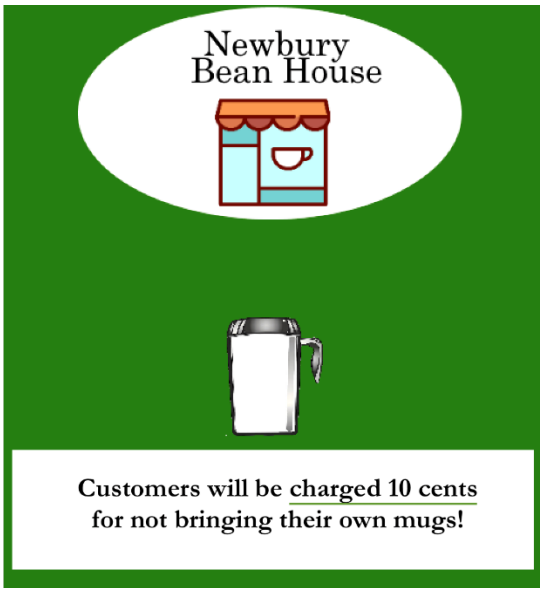

Figure A1.1. Flyers in each condition.

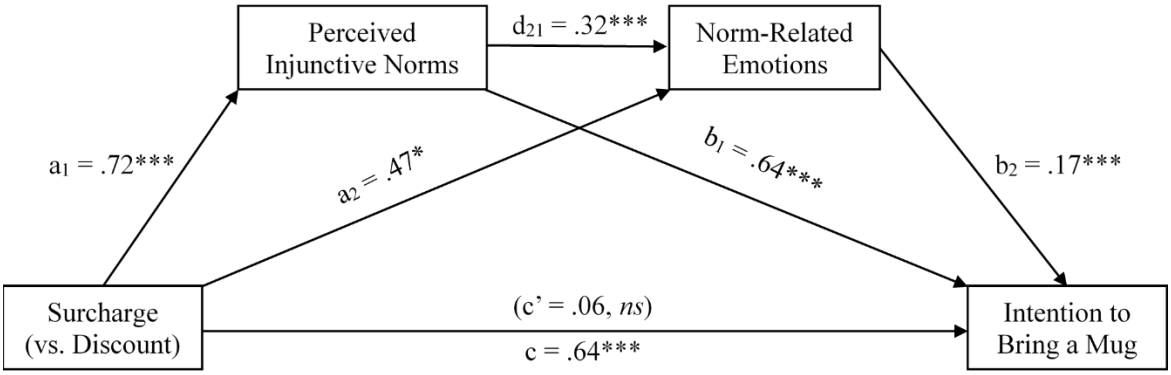

Figure A1.2. Injunctive norms as the first mediator. The effects of incentive framing on behavioral intention to bring a reusable mug, through perceived injunctive norms and anticipated norm-related emotions, in Study 1. The path coefficients are unstandardized betas. The value in parentheses indicates the direct effect of surcharges on intention after accounting for the two mediators. Norm-related emotions are an average of guilt and embarrassment. *** $p < .001$; ** $p < .01$; * $p < .05$

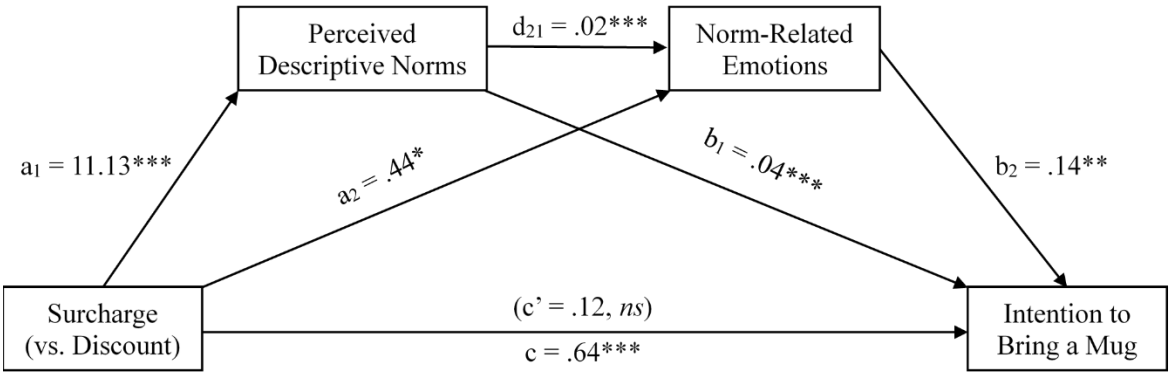

Figure A1.3. Descriptive norms as the first mediator. The effects of incentive framing on behavioral intention to bring a reusable mug, through perceived descriptive norms and anticipated norm-related emotions, in Study 1. The path coefficients are unstandardized betas. The value in parentheses indicates the direct effect of surcharges on intention after accounting for the two mediators. Norm-related emotions are an average of guilt and embarrassment. *** $p < .001$; ** $p < .01$; * $p < .05$. Serial paths $a_1 \times d_{21} \times b_2 = .04$, SE = .02, 95% CI: [.01, .07].

REPLICATION OF STUDY 1

In Study 1, a surcharge was imposed on participants who did not perform a behavior, while a discount was offered to participants who did perform a behavior. Thus, the surcharge condition involved inaction and the discount involved action. In this study, we replicate the effects of Study 1 while eliminating this difference. Specifically, the incentives here are designed such that the focal behavior involves an action in both conditions (i.e., "Customers will get a 10 cent discount for bringing their own bags" and "Customers will be charged 10 cents for using our bags"). We demonstrate that when both conditions are framed as requiring an action, surcharges again lead to stronger injunctive and descriptive norms and greater norm-related emotions surrounding the encouraged behavior.

Method

Two hundred Mechanical Turk workers (37.5% female, 0.5% other, M_{age} = 33.7 years, SD_{age} = 9.78 years) participated.[11] Participants were randomly assigned to one of two conditions (incentive framing: surcharge vs. discount) in a between-subjects design. All participants read, "Imagine that you have just moved to a new town, Newbury, and do not know anyone yet. You are looking for opportunities to get to know your new neighborhood. You remember that you need to pick up some groceries, so you head to the closest grocery store." On the next page, participants read that upon entry to the store, they saw a sign. They were presented with an image of this sign. Discount participants saw, "Bring your own reusable bags to reduce waste! Customers will get a 10 cent discount for bringing their own bags!" Surcharge participants instead saw, "Bring your own reusable bags to reduce waste! Customers will be charged 10 cents for using our bags!"

Following this description, participants answered two questions in counterbalanced order designed to measure both an injunctive norm (item 1) and a descriptive norm (item 2): "How much do you think the checkout cashier expects customers to bring their own bags?" (1= Not at all to 7 = Very much) and "Out of every 100 customers, how many do you think bring their own bags?" On the following page, participants responded to two questions in counterbalanced order measuring their anticipated emotional reactions: "How embarrassed would you feel if you did not bring your own bags to this store?" and "How guilty would you feel if you did not bring your own bags to this store?" (1 = Not at all to 7 = Very). Finally, participants provided demographic information.

Results

Injunctive Norms. Surcharge (vs. discount) participants believed that the checkout cashier had significantly higher expectations that customers would bring their own bags

[11] Twelve participants failed an attention check ("What was the incentive offered at the grocery store?" [10 cent discount, 5 cent discount, 10 cent charge, 5 cent charge, or I don't remember/I'm not sure]), indicating they were unaware of the incentive framing for their condition. Therefore, we excluded these participants from analyses, although including them does not change the pattern of results.

(surcharge: M = 4.98, SD = 1.71 vs. discount: M = 3.99, SD = 1.64; t(186) = 4.04, $p <$ .001), indicating a stronger injunctive norm.

Descriptive Norms. Participants expected that significantly more customers would bring reusable bags in the surcharge condition (M = 55.24, SD = 25.82) than in the discount condition (M = 40.55, SD = 25.21; t(186) = 3.95, $p < .001$), indicating a stronger descriptive norm.

Norm-Related Emotions. Participants who read about a surcharge (vs. discount) anticipated feeling guiltier (surcharge: M = 3.80, SD = 1.95 vs. discount: M = 3.19, SD = 1.93; t(186) = 2.14, $p = .03$) and more embarrassed (surcharge: M = 3.31, SD = 1.86 vs. discount: M = 2.67, SD = 1.78; t(186) = 2.40, $p = .02$) for failing to bring a bag to the store.

Discussion

Even in a context where both incentives involved action, the surcharge still projected stronger injunctive and descriptive norms than did the discount, leading to consistent shifts in anticipated embarrassment and guilt.

STUDY 2

Study Stimuli

In Study 2, participants were presented with visual stimuli of neighborhood grocery store signs differing by condition. Discount participants saw a sign that read, "Customers will get a 10 cent discount for bringing their own bags!" while surcharge participants saw a sign that read, "Customers will be charged 10 cents for not bringing their own bags!" (see Figure A1.4).

Discount

Surcharge

Figure A1.4 Flyers in each condition.

Serial Mediation Model

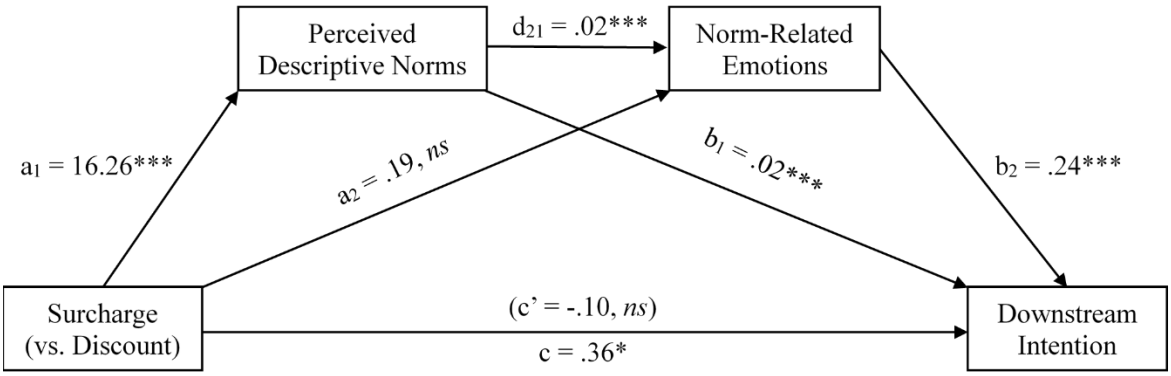

Figure A1.5. Descriptive norms as first mediator. The effects of surcharges on downstream intention to bring reusable bags, through perceived descriptive norms and norm-related emotions, in Study 2. The path coefficients are unstandardized betas. The value in parentheses indicates the direct effect of surcharges on downstream intention after accounting for the two mediators. Norm-related emotions are an average of guilt and embarrassment. *** $p < .001$; ** $p < .01$; * $p < .05$. Serial paths $a_1 \times d_{21} \times b_2 = .06$, SE = .02, 95% CI: [.03, .10].

STUDY 3

Study Stimuli

In Study 3, in addition to reading text explaining the incentive, participants saw an image of the turkey trot flyer with text differing by condition. Participants in the discount saw a sign with text that read: "Come in costume! 'Human' participants pay an additional $2 on race tickets!" while surcharge participants saw a sign with text that read, "Come in costume! 'Turkey' participants get $4 off of race tickets!" (see Figure A1.6). In addition, right below the turkey trot flyer participants in both conditions saw an image of people dressed up in a turkey trot race (see Figure A1.7).

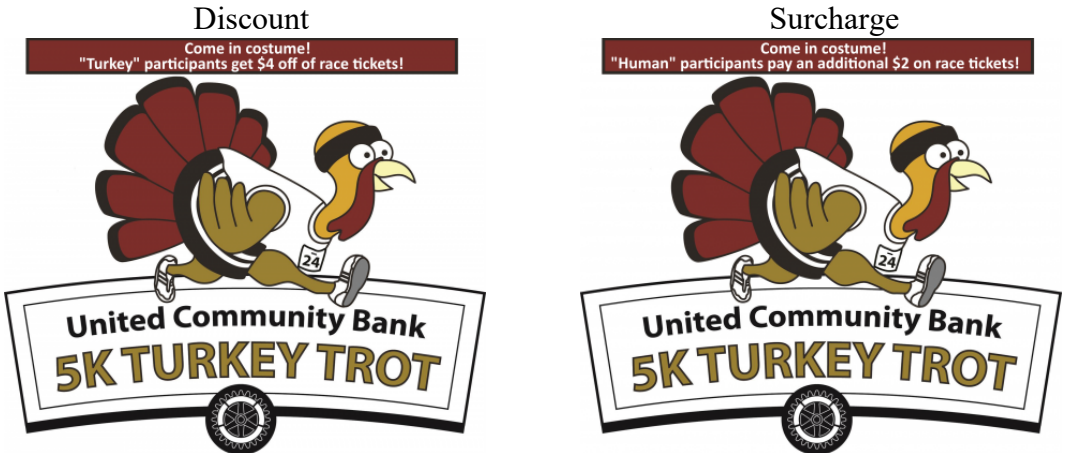

Figure A1.6. Signs announcing the incentive in each condition.

Figure A1.7. Image seen by participants in both conditions.

Pretest

Past research suggests that sanctions framed as punishments (vs. rewards) signal a moral obligation, leading people to judge a violator of these perceived obligations as more immoral (Mulder, 2008). Our account of the effect of incentive framing is agnostic to any moral concerns, as discussed in the manuscript. As such, the scenario in Study 3 was designed such that the focal behavior had no moral flavor: dressing up in a turkey costume for a Thanksgiving-themed run.

To verify the assumption that this context was not morally linked, we conducted a pretest with 201 Mechanical Turk participants. Participants were randomly assigned to read either the discount or surcharge scenario and view the flyers from the main study (described in the main text, and shown in Figure 6). Following the scenario, participants read, “Imagine it’s the day of the run, and you’re lining up for it to begin. You’re standing

behind someone who is not dressed in a turkey costume. To what extent is this person acting immorally?" (1 = Not at all to 7 = Very much).

As expected, participants did not judge this violation to be immoral—77% of participants responded "not at all"—and surcharge and discount participants responded equally (surcharge: M = 1.58, SD = 1.18 vs. discount: M = 1.48, SD = 1.24; t(199) = .56, p = .58). This suggests both that this context is not viewed as morally linked, and that the incentive frame does not leak information about the moral obligation of the incentivized behavior itself.

Additional Point Allocations

The main manuscript presents detailed analyses addressing two of the categories to which participants could allocate points (the reward and punishment motives). In Table A3.1, we present the allocations to all of the motives. Note that the effect of incentive framing on intention holds when controlling for all of these point allocations, as well.

Table A1.1. Additional point allocations, Study 3. Values in the discount and surcharge columns represent means, with standard deviations in parentheses. Statistics present t-tests comparing the two rationales, although all differences hold when also controlling for the perceived size of the incentive as in the main manuscript.

Rationale	Discount	Surcharge	Difference
"They want to reward participants for dressing up"	33.56 (22.52)	25.71 (22.46)	$t(744) = 4.76$, $p < .001$
"They want to punish participants for not dressing up"	2.72 (7.44)	6.59 (12.91)	$t(744) = 5.03$, $p < .001$
"They want to make more money"	7.27 (15.37)	21.07 (24.68)	$t(744) = 9.19$, $p < .001$
"They care about how much spirit people show"	28.01 (19.77)	22.27 (18.99)	$t(744) = 4.05$, $p < .001$
"They expect participants to want to show spirit"	26.55 (17.82)	23.38 (19.89)	$t(744) = 2.29$, $p = .02$
"A different reason"	1.89 (8.95)	0.99 (5.29)	$t(744) = 1.67$, $p = .10$

STUDY 4

Study Stimuli

In Study 4, participants encountered four signs upon entering the room. One sign announced a sale on chewing gum, with a picture of the gum and its price (45 cents in the discount condition, and 40 cents in the surcharge condition; see Figure A1.8).

Figure A1.8. Sign announcing the sale of gum. The base price was displayed as 40 cents in the surcharge condition.

A second sign informed participants of an incentive related to the gum, the text of which varied by condition. In the discount condition, this sign read, "You'll get a 5 cent discount if you use hand sanitizer! Help protect yourself and keep [school name] safe for everyone!" In the surcharge condition, this sign instead read, "You'll pay a 5 cent surcharge if you don't use hand sanitizer! Help protect yourself and keep [school name] safe for everyone!" (see Figure A1.9).

Discount Surcharge

Figure A1.9. Signs announcing the incentives.

A third and fourth sign on the table were intended to present a rationale for the incentive. One sign included a picture of people holding hands and read, "We're all in this together! Stop Germs from Spreading. Clean your Hands." The other sign had a picture of a toilet and someone using hand sanitizer and read, "Public keyboards can contain more germs than a toilet seat! Protect yourself & others!" (see Figure A1.10).

Figure A1.10. Signs providing rationale for the incentive.

Filler Survey Items

Participants completed 30 minutes of filler survey material and participated in an unrelated study between phase 1 and phase 2. The filler survey items included: “How often do you wash your hands before eating?” (1 = Absolutely never to 6 = Absolutely every time); “To what extent are you currently dieting?” (1 = Not at all to 9 = Very much); “Do you have any food allergies or dietary restrictions?” (Yes/No); “Are you keeping kosher for Passover?” (the study took place during the Passover holiday); and their demographics. There was no difference between conditions on any of these items and all results reported in the main text remain significant when controlling for them. Participants also read paragraphs of text and counted the number of occurrences of the letter “e” in each paragraph, examined Shepard-Metzler (1971) figures to determine whether sets of rotated figures were the same or not, completed a set of Raven’s Standard Progressive Matrices (Raven, 1983), and viewed 3 x 4 grids of numbers to identify pairs of numbers adding to 10 (Mazar, Amir, & Ariely 2008).

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Chapter 2.

TANGENTIAL IMMERSION: INCREASING PERSISTENCE IN LOW-ATTENTION BEHAVIORS

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ABSTRACT

Daily life is filled with myriad behaviors that benefit from persistence—such as hygiene, exercise, and chores—but that are often not performed for long enough. Past research often approaches such suboptimal persistence as a consequence of poor self-regulation. The current research takes a different perspective and proposes an attention-deficit account. Specifically, we posit that because many daily behaviors are fairly automatic (i.e., require minimal attention), a mismatch between attentional requirements and available resources occurs, causing consumers to experience boredom and stop prematurely. We suggest that concurrently performing an immersive task will help balance this attentional mismatch and increase persistence. Five experiments across a range of low-attention behaviors (e.g., strength-building, toothbrushing) demonstrate that concurrently performing an immersive tangential task (e.g., reading, listening, viewing), satisfies attentional needs and increases persistence. Moreover, two important boundaries arise. First, the focal behavior must require minimal attention, allowing consumers to sufficiently attend to the tangential task. Second, the tangential task must achieve the proper level of immersion—it must capture and sustain attention without exhausting resources. This research provides important theoretical and practical contributions, offering the potential to improve consumer and societal well-being by increasing persistence in low-attention behaviors.

INTRODUCTION

Consumers frequently perform behaviors for which persistence is beneficial—over the course of a few hours, a consumer may clean the house, fold laundry, wash her hands (multiple times), brush her teeth, and go for a walk. Consequently, countless products and services exist to help consumers perform these behaviors for longer. The behaviors we focus on in this research are those for which persistence[12]—i.e., duration of performance—is positive for both consumer and societal wellbeing. Cleanliness improves mental health (Saxbe and Repetti 2010), regular exercise helps prevent obesity—a leading cause of preventable death in the United States (CDC 2019a)—handwashing prevents communicable diseases (CDC 2019b), and good oral hygiene reduces risk for a multitude of adverse health outcomes (Mayo Clinic 2019). Yet, despite these benefits, consumers often fail to persist in these behaviors as long as they should. Consumers do not clean their homes thoroughly (NSF 2011), the average person brushes their teeth for less than half the recommended duration (Gallagher et al. 2014), 95% of people do not wash their hands long enough to be effective (Borchgrevink, Cha, and Kim 2013), and nearly 80% of people do not get enough exercise (Blackwell and Clarke 2018). The current research offers a novel theoretical explanation as to why people do not sufficiently perform low-attention behaviors and proposes an intervention to increase persistence in them.

Persistence is often viewed through a self-regulatory lens. As such, much previous research (and application) aims to increase persistence using regulatory tools that can

[12] Persistence can be defined as a continuous measure (e.g., how long someone persists in a behavior after initiation), as well as a categorical measure (e.g., frequency of performing a behavior over multiple periods). In this research, we define persistence as a continuous measure and examine how long consumers persist in a single period.

largely be grouped into three categories: first, goal setting and monitoring (e.g., setting a hard goal, tracking behaviors; Bravata 2007; Locke and Latham 1990); second, increasing internal and/or external motivation (e.g., reframing a task to increase enjoyment, or introducing incentives; Fishbach and Choi 2012; Sansone et al. 1992; Shen, Hsee, and Talloen 2019); and third, maintaining sufficient cognitive capacity to resist attention-grabbing stimuli, impulses, and temptations (e.g., automatizing positive responses, inhibiting bad habits; Gollwitzer and Schaal 1998; Neal, Wood, and Quinn 2006). Indeed, companies are selling countless products designed to combat regulatory failures and increase persistence—for instance, there are a plethora of top-selling products for setting goals and monitoring behaviors (e.g., planners; food trackers, pedometers, sleep monitors), increasing motivation (e.g., games that make tasks more fun; incentive programs), and automatizing behaviors (e.g., phone apps to help build habits or form implementation intentions). Nearly 1/3 of U.S. adults use wearable technologies to track their health (Murad 2019), 86% of large employers offer incentives to motivate behavior change (Fidelity 2018), gamifying exercise is increasingly popular (Nintendo's Wii fit sold nearly 44 million units as of September 2019; Nintendo 2019), and books on how to build good (and break bad) habits are sweeping the nation. While the aforementioned approaches have seen success, these tools are certainly not cure-alls for persistence; as such, a large gap in understanding the barriers to persistence remains. Thus, in this research, we take a different perspective: rather than treating suboptimal persistence as a consequence of poor self-monitoring, low motivation, or insufficient capacity, we suggest that failure to persist in many behaviors occurs as a result of insufficient attentional demands. That is, we propose

an attention-deficit perspective to explain why consumers often stop behaviors before they should.

The behaviors that we are most interested in have two necessary components. First, persistence in these behaviors is beneficial—this could either be because of a consumer's own instrumental or experiential desires (e.g., I strive to walk 10,000 steps a day to live longer, I strive to walk 10,000 to feel better in the moment) or because of an external motivator (e.g., I walk 10,000 steps a day to get a discount on my health insurance).[13] Second, they require very low levels of attention—either as a result of task simplicity (e.g., stuffing envelopes) or because of frequent performance (e.g., everyday behaviors like cleaning, walking, brushing teeth, washing hands). Indeed, behaviors that are frequently performed in stable contexts often become automatic (i.e., they require minimal attention; Wood and Neal 2009); and, while automaticity can be a boon for many behaviors (Ouellette and Wood 1998), we propose it can also be a burden. Performing tasks that require less attention than one has cognitively available—as is the case with many behaviors that benefit from persistence—results in feelings of boredom (Eastwood et al. 2012). Boredom is a highly aversive emotion which people will go to great lengths to alleviate (Westgate and Wilson 2018), and often drives people to change activities altogether (Cziskmihayli 1990). We suggest that because many frequently performed (or simple) behaviors require minimal attention (Wood, Quinn, and Kashy 2002; Ouellete and Wood 1998), they leave the mind with excess attentional resources that, without a place to

[13] While it is certainly the case that persistence almost always has an upper limit (e.g., one can walk too much, clean too much, brush too long), the vast majority of consumers stop at a point when prolonging the behavior would be beneficial.

be used, lead consumers to experience boredom and prematurely stop. Thus, we posit that introducing an immersive concurrent task that captures and sustains consumer attention will occupy these available resources and increase persistence in low-attention behaviors. While doing two things concurrently can certainly, and often does, come at a cost (Pashler 1994), successful dual tasking can be achieved when one of the behaviors is automatized (i.e., it can be performed without much attention; Chun et al.2011; Lien, Ruthruff, and Johnston 2006; Ouellette and Wood 1998). Building on this literature, we propose that coupling a low-attention behavior with an immersive tangential task[14] can satisfy attentional desires, alleviate boredom, and increase persistence in the low-attention behavior.

This research makes important theoretical and practical contributions. First, it adds to the consumer behavior literature by suggesting a novel explanation—apart from previous self-regulatory methods—for why consumers fail to sufficiently persist in many low-attention behaviors, presents a potential negative consequence of automatizing behaviors, and demonstrates an intervention to prolong persistence. Second, it adds to the boredom literature by examining an important domain in which consumers experience boredom and empirically demonstrates that an attention-matching intervention can alleviate boredom and increase persistence. In so doing, it also adds to the distraction literature by introducing an additional mechanism—instead of subtracting attention, we focus on adding attention—that explains how concurrent tasks can increase persistence. Finally, it adds to the multitasking literature by demonstrating a form of dual tasking that

[14] We define tangential immersion as the state of being immersed (attention captured and sustained) in an unrelated concurrent task.

has positive and constructive outcomes. On a practical level, the current work proposes a new way to increase persistence that has important implications for consumer products and behaviors.

The remainder of the current article is organized as follows. First, we provide a brief overview of previous self-regulatory efforts to increase persistence. Then, we review the relevant literature on the role of attention in boredom, distractions, and multitasking and build our proposition that immersing consumers in a tangential task will increase persistence. We then test our predictions in a series of five experiments, all involving real behaviors. Finally, we conclude with a discussion of the theoretical and practical applications of our findings, their limitations, and our suggestions for future research in this important domain.

CONCEPTUAL DEVELOPMENT

Suboptimal Persistence as a Self-Regulatory Failure

Self-regulation can be defined as a system that guides behavior toward a goal or representation thereof (Baumeister, Heatherton, and Tice 1994; Carver and Scheier 1981, 1982). Previous research broadly attributes self-regulatory failures to three causes: (1) lack of standards or lack of monitoring of progress towards those standards; (2) lack of motivation; (3) or, lack of capacity to resist temptations along the way (Baumeister and Heatherton 1996). In response, interventions aiming to combat regulatory failures often do

so by targeting one of these causes. The first, lack of standards or poor self-monitoring, is commonly addressed through goal-setting and self-monitoring (e.g., Chapman et al. 2015; Suls et al., 2020; Patel, Asch and Volpp 2015). For example, a systematic review of interventions aiming to increase walking found that both having a step goal (e.g., 10,000 steps per day) and the use of a pedometer to track steps significantly increased physical activity (Bravata 2007). Of course, tracking activities may also have a downside—while quantifying behaviors can increase how much of an activity people perform, it also can make the activity feel less enjoyable (Etkin 2016).

Attempts to combat the second facet of regulatory failures, low motivation, aim to improve behaviors both by increasing extrinsic motivation—such as by offering financial incentives (Gneezy, Meier, and Biel 2011; Shen et al. 2019), and by increasing intrinsic motivation—such as by redefining a task to make it more fun and interesting (Sansone et al. 1992). For example, focusing on the experience of an activity (versus the instrumentality of it) can increase enjoyment of and persistence in that activity (Fishbach and Choi 2012). Tactics targeting the final facet, lack of capacity, aim to make it easier for consumers to ignore or bypass temptations (here, temptation would involve stopping the behavior prematurely and switching activities). Such approaches often involve inhibiting impulses (e.g., automatizing behaviors; Fishbach and Shah 2006; Verplanken and Wood 2006), or directing attention toward goal-relevant information and away from stimuli that seize attention and thus compete for limited resources (Hoffman, Schmeichel, and Braddeley 2012). For example, implementation intentions are commonly used to decrease attentional competition by automatizing temptation avoidance (Gollwitzer and Schaal

1998), and have successfully influenced a wide variety of consumer behaviors, including exercise, recycling, and other 'everyday goals' (e.g., tidying up, eating healthy; Dalton and Spiller 2012; Prestwich, Lawton, and Conner 2003).

While these approaches have certainly been effective, to a degree, at encouraging behaviors, none of them has proven to be a panacea for behavior change, and more research is needed to provide additional, critical insights. In the current research, we propose a different perspective and suggest that a mismatch between a behavior's *required attention* and a consumer's *available resources* is another key driver in many persistence-failures. Specifically, we suggest that when behaviors can be done fairly automatically (often through sufficient practice or task simplicity), they fail to sufficiently occupy available attentional resources, causing consumers to experience boredom and stop behaviors prematurely. As such, we posit that adding an immersive tangential task alongside a low-attention behavior will occupy this excess attention and thus better match attentional demands to available resources, thereby preventing boredom and increasing persistence in the focal behavior.

Resource-Matching Theory, Attention, and Boredom

A consumer's capacity to process information has implications in many important consumer contexts. For example, previous consumer behavior research has investigated the role of processing capacity in message persuasion. Resource-matching theory examines how a consumer's processing capacity and a message's processing demands come together

to influence the persuasiveness of a message. Specifically, it suggests that persuasion will be increased when a consumer's processing resources match—rather than fall below or exceed—the resources necessary to process that message (Anand and Sternthal 1998; Keller and Block 1997; Perrachio and Meyers-Levy 1997). While our theory does not speak to a consumer's elaboration of a message—as is the focus of resource-matching theory—it builds on this previous research and suggests that optimizing (or even simply improving) the match between available attentional resources and demands can improve consumer persistence—while a mismatch can undermine consumer progress. Further, whereas this previous research focuses on a match between consumers' available resources (specifically their processing capacity) and the demands of a *single* task, we suggest that attentional demands can be divided across *multiple* tasks in order to better complement available resources.

The behaviors that we investigate in this research are low-attention behaviors. We propose that these behaviors underutilize consumers' available attentional resources—resulting in boredom and the tendency to stop prematurely. Boredom is ubiquitous (Chin et al. 2017). Yet, to date, boredom has received relatively little attention in both the psychology and consumer behavior literature—especially as it relates to persistence in consumer behaviors. State boredom is a negative emotion that arises from an inability to engage in a meaningful activity (Eastwood et al. 2012; Westgate and Wilson 2018). Theories on the causes of boredom span three categories—attentional, environmental, and functional (Westgate and Wilson 2018). In the current research we draw in particular on attentional models of boredom to form our hypotheses.

Attention is the act of selecting and modulating information and can be external or internal (Chun et al. 2011). In a seminal paper defining boredom as a failure of attention, Eastwood and colleagues (2012) outline 3 conditions which give rise to boredom: (1) the inability to focus attention on a satisfying activity; (2) awareness of inability to focus attention (either through awareness of expended effort to engage or awareness of task-unrelated thoughts—i.e., mind wandering); (3) the attribution of the negative state to the current task. When these 3 elements occur, people experience boredom—a state of negative affect associated with improper allocation of executive resources, mind wandering, and a slowed sense of time.

Several authors have proposed U-shaped models of boredom, such as Westgate and Wilson's (2018) Meaning and Attentional Components (MAC) model. The MAC model defines boredom as a mismatch of both attention (imbalance between cognitive demands and available resources) and meaning (imbalance between task and goals). In this way, they suggest that attentional failures may be a sufficient—but not necessary—driver of boredom. Whereas many earlier models focus solely on boredom resulting from attentional demands being too low, the MAC model proposes that boredom may also arise when attentional demands are too high—that is, when attentional demands are greater than available resources. A similar proposition is made in flow-theory, in which a key tenant of flow is a proper match between challenge and skill (Csikszentmihalyi 1990). Similarly, Fisher (1993, 1998) suggests that boredom is U-shaped with mastery and can occur both when a task is too simple (e.g., doing a repetitive task with low mental demands) as well as

a when a task is too demanding (e.g., listening to a complicated lecture that is beyond one's understanding).

In the current research we propose that this mismatch between resource availability and task demands leads consumers to stop many behaviors prematurely. We focus our investigation specifically on behaviors that are part of the lower end of the boredom curve—those which require minimal attention, thus requiring fewer attentional resources than one has available. We propose that providing additional attentional demands—by capturing and sustaining attention in an immersive tangential task—will help balance this mismatch, thereby preventing boredom and increasing persistence.

Following from our predictions, two natural boundaries arise. First, if the *focal behavior requires too much attention*, such that consumers are unable to attend to and/or become immersed in the tangential task, adding a tangential task will not increase persistence. Second, if the *tangential task requires too much attention*, thus limiting the resources available to devote to the focal behavior, another type of mismatch will occur and persistence in the focal behavior will not increase.

Tasks vary in the amount of resources they demand (Hoffman et al. 2012)—accordingly, we suggest that the tangential tasks that will most effectively increase persistence are those which demand enough attention to occupy a consumer's available resources, but do not require so much attention that they surpass one's available capacity. Moreover, because the goal of this research is to extend persistence in the focal behavior, it is necessary for a tangential task to not only capture consumer attention, but also to sustain it. We define immersive tasks as just that—those that grab and hold attention—and view

immersion along a continuum of attention. On the low end, a stimulus may capture some attention, but not be fully engaging; on the high end, a stimulus requires so much attention that a consumer may lose awareness of all else.[15] It is in the middle—performing a moderately immersive task that holds attention but leaves enough resources available to carry out the focal task—that we propose will most effectively stave off boredom and increase persistence.

Consequences of Boredom

Boredom is an adaptive emotion with both positive and negative consequences. Boredom can be a healthy and necessary motivator, encouraging people to make positive changes by seeking out more interesting activities (Westgate et al. 2018), and even inspiring creativity (Baird et al. 2012; Schubert 1977). However, episodes of boredom can also lead to destructive risk-seeking behaviors, such as drug use (Lee, Neighbors, and Woods 2007) and gambling (Mercer-Lynn and Eastwood 2010). Across most boredom research, one thing is consistent: boredom is an extremely negative state which people will go to great lengths to alleviate (Bench and Lench 2017; Havermans et al. 2015; Nederkoorn et al. 2016; Wilson et al. 2014). For instance, several studies have shown that people will actively choose to give themselves electric shocks rather than simply sit alone with their thoughts (Wilson et al. 2014) or watch a short video on repeat for one hour

[15] We build on previous definitions of immersion from the gaming, flow, and media literature, which center around the role of attention in immersive states, propose degrees of immersion, and introduce the concept of "losing oneself" in a fully immersive stimulus (e.g., videogame, narratives; Brown and Carin 2004; Csikszentmihalyi 1990; Green and Brock 2000; Jennett et al. 2008).

(Haversman et al. 2015). That is, people will choose to inflict physical pain on themselves in order to relieve the emotional pain of boredom. Moreover, when faced with boredom, consumers may change goals (Bench and Lench 2013), seek out distractions or additional forms of stimulation (e.g., start doodling or mind wandering; Andrade 2010; Smallwood and Schooler 2015), or simply stop and switch activities altogether (van Tilburg and Igou 2012). It is this last response that we are most concerned with in the current research, as changing activities is a common reaction to boredom—resulting in failure to persist in low-attention behaviors for a sufficient length of time.

Attentional Disruptions and Boredom

Feelings of boredom can arise from the inability to successfully engage one's attention in a task. Because attention is limited (Chun et al. 2011), attentional disruptions—both external and internal—can impact one's ability to focus, which can be interpreted as a boredom signal. For example, Damrad-Frye and Laird (1989) had participants perform an activity that required attention with either no distraction, a very obvious distraction (loud TV), or a very subtle distraction (a TV playing at a barely noticeable volume). Participants who were in the subtle distraction condition reported the focal task as more boring than the other two conditions. That is, when participants were distracted and unable to engage with the task—but were not able to pinpoint the cause of their distraction—they attributed their inability to focus as a signal that the task was boring. Conversely, people who were distracted by the loud TV recognized it as the cause

of their distraction and thus did not attribute it to their primary task. When a task is very simple, on the other hand, attentional disruptions may improve perceptions of the task. Fisher (1998) demonstrated that participants who were intermittently interrupted by confederates while doing a simple task reported lower levels of boredom than participants who were not interrupted.

Mind wandering, an internal distraction, commonly occurs during boring tasks and can also affect perceptions of the task (Smallwood and Schooler 2006; Westgate and Wilson 2018). Critcher and Gilovich (2010) found that introducing a mind wandering manipulation during a focal task, thus distracting participants from it, led them to rate the focal task as more boring, increasing their displeasure with it. However, this effect was attenuated for participants who were made aware that their mind wandering may have been caused by an experimental manipulation. Mind wandering may also affect consumer experience during times devoid of another task—such as when waiting in line. For example, Wang et. al (2017) found that low-level (vs. high-level) construal individuals tend to have more task-unrelated thoughts while passively waiting (i.e., waiting in line or waiting for an online task to load). As a result, when relying on their subjective feelings, these individuals reported time passing more quickly and judged the wait to be less boring.

Distractions and tangential immersion share some properties—namely, both involve a stimulus that draws attention, and both can occur concurrently with a primary task. However, tangential immersion is distinct from distraction in at least one fundamental and critical way. Whereas distractions necessarily pull attention away from a primary task, tangential immersion does not—rather, tangential immersion provides attentional demands

in parallel to it. In other words, whereas distractions subtract attention away from a focal task, tangential immersion is about *adding* attention alongside it. Of course, for some tasks, an immersive secondary task may both provide additional attentional demands *and* distract from certain features or consequences of the task, such as physical pain (Bantick et al. 2002). For instance, a consumer listening to an audiobook while on a long walk may walk for longer because the immersive content provides the necessary attentional demands to match her available resources. At the same time, because her attention was occupied, she may not have noticed the painful blister developing as she walked. In this way, a secondary task may, in certain contexts, both provide an attentional match *and* distract from feelings associated with the focal task—both of which could affect persistence. However, the two psychological processes are quite distinct, and it is the former mechanism—the attentional match—that is the novel insight that the current research provides.

Multitasking

Multitasking is increasingly prevalent in daily life (Srna, Schrift, and Zauberman 2018). Multitasking is often viewed as a negative, as doing two things at once frequently comes at a cost (Pashler 1994). There are a number of theories as to why this occurs, but a leading theory is that two activities that require the same set of central resources cannot be attended to simultaneously—rather, one must switch their attention back and forth between them sequentially (i.e., bottleneck theory; Pashler 1984, 1994). Other leading theories include capacity-sharing models, which suggest that because attentional capacity is limited,

drawing attention to one task will necessarily pull attention away from another (Chun et al. 2011; Kahneman 1973; Tombu and Jolicœur 2003). No matter which model is a better predictor of dual-task interference, most theories agree that when two tasks requiring attention are attempted concurrently, there is likely to be a performance decrement or delay (Levy and Pashler 2001; Pashler 1994).

Although dual-task interference can be reduced in certain contexts, the possibility of completely eliminating it has been debated in the literature (Lien et al. 2006; Ruthruff et al. 2003). Nonetheless, operations that are performed consistently tend to become automatic (Shiffrin and Schneider 1977; Ouellette and Wood 1998), and because automatic tasks require minimal cognitive resources, they may not always suffer from interference (Lien et al. 2006). Indeed, practicing tasks has been shown to successfully reduce dual-task interference (Hazeltine, Teague, and Ivry 2002; Schumacher 2001). Moreover, frequently performing a behavior in a stable context (i.e., forming a habit) allows individuals to successfully perform the behavior in parallel with other tasks (Oullette and Wood 1998). Notably, certain tasks—even those that seem simple and are well practiced—may never become fully automatized and thus always suffer from some minor form of interference (e.g., driving; Levy, Pashler, Boer 2006).

Recent literature investigates contexts in which multitasking may have positive implications for consumer behavior. For example, Chinchanchokchai, Duff, and Faber (2019) investigate methods to decrease mind wandering in an effort to increase memory for mundane advertisements. In a series of experiments, the authors demonstrate that performing a low-load perceptual task (i.e., a visual search task) can decrease mind

wandering and increase recall for monotone advertisements, which the authors conclude occurs by increasing focus on the primary task. In related work, Zane, Smith, and Reczek (2020) demonstrate that when consumers are distracted, such as by background advertisements while multitasking, they sometimes use their level of distraction as a metacognitive cue suggesting interest in the distractor. Finally, Srna et al. (2018) investigate the role of perceptions of multitasking. They find that holding the activity constant, merely perceiving a behavior as multitasking can boost performance.

We build on this literature and investigate a new case in which dual tasking can lead to positive outcomes. We focus on the role of dual tasking during low-attention behaviors such as those which are unlikely to suffer from much, if any, dual-task interference. We propose that, because many behaviors for which persistence is beneficial require minimal attention, immersing consumers in a secondary task will increase persistence with little impact on performance. Importantly, as attention is limited (Chun et al. 2011), our theory gives rise to two boundaries. Specifically, we propose that tangential immersion will increase persistence in a low-attention behavior, but only in so far as both tasks, together, do not surpass attentional capacity. Thus, our first predicted boundary is that the focal behavior must require little enough attention that consumers still have the resources available to attend to and become immersed in a tangential task. Moreover, while the behaviors we investigate are somewhat automatic, they still require very low levels of attention. In this way, a tangential task must only be immersive to the degree that it allows for enough attentional resources to be devoted to the focal behavior. That is, our second boundary prediction is that a tangential task that is overly immersive—i.e., demands too

much attention—will not increase persistence. In this way, a natural coupling of concurrent tasks arises such that, to increase persistence, the tasks together cannot demand more attentional resources than are available.

THE CURRENT RESEARCH

The analysis above yields several tenets on which we build. First, both simple behaviors and oft-repeated behaviors require minimal levels of attention. When people perform tasks that require fewer attentional resources than are available, they experience boredom. Boredom is a highly aversive state that signals to consumers that something should change. Consequently, they will seek additional stimulation or switch to something else entirely. Second, people are able to do two things at once with little interference when at least one of those tasks requires minimal attention. Third, immersive stimuli can both capture and sustain consumer attention. Putting these together, we suggest that combining low–attention behaviors with an immersive tangential task will better match attentional demands to available resources, thereby preventing boredom and increasing persistence in the focal behavior. Because we are interested in how tangential immersion can increase persistence, we specifically focus our investigation on behaviors for which persistence is beneficial, either for intrinsic or extrinsic reasons.

Five experiments demonstrate that participants performing a low-attention behavior while immersed in a tangential task persist longer in the focal behavior (experiments 1-4). We provide support for immersion as a key driver of persistence by demonstrating that an

immersive tangential task increases persistence more than a task that is more pleasant or enjoyable, but less immersive (experiments 1 and 4A). Moreover, tangential immersion increases persistence above and beyond a common regulatory approach, self-monitoring (experiments 2 and 3), and with different forms of immersive tasks, including watching an immersive video (experiment 1), listening to an immersive audio clip (experiments 2 and 3), and reading an immersive story (experiment 4A and 4B). Further, we show that tangential immersion increases persistence across a range of behaviors, including toothbrushing (experiment 1), a typing task (experiments 2 and 3), and a strength-building activity (experiments 4A and 4B). Finally, the two predicted boundaries arise. First, tangential immersion only increases persistence when the focal behavior requires low levels of attention, freeing up the attentional resources necessary to become immersed in a tangential task (experiment 3). Second, tangential immersion only increases persistence when the tangential task is immersive enough to sustain attention, but does not require such high levels of attention that consumers are unable to continue the focal behavior (experiment 4B). Unless otherwise noted, all measures are reported and no additional participants are excluded.

EXPERIMENT 1: TANGENTIAL IMMERSION INCREASES TOOTHBRUSHING PERSISTENCE

Experiment 1 tests whether tangential immersion increases persistence in an important everyday health behavior: toothbrushing. The American Dental Association

recommends that consumers brush their teeth for two minutes twice a day (ADA 2019). Poor oral hygiene can increase risk for periodontal disease (de Oliveira 2017), a condition that effects nearly 50% of US adults 30 years and older (Eke et al. 2012) and is linked to a number of systemic diseases, including cardiovascular disease—the leading cause of death in the U.S. (Heron 2017)—as well as diabetes and adverse pregnancy outcomes (Nazir 2017). Yet, despite recommendations and a multitude of interventions aimed at increasing brushing, poor oral hygiene is rampant (Anagnostopoulos et al. 2011; Schüz et al. 2006).

Toothbrushing is a routine behavior that, because it is repeated regularly, is done without much conscious thought (Aunger 2007). We thus propose that toothbrushing is an ideal candidate for a tangential immersion intervention, as it is a crucial low-attention behavior which many people fail to perform sufficiently long enough. Given the important health effects linked to oral hygiene, increasing the amount of time people spend brushing would have substantial implications for individual and societal well-being. In experiment 1, we test whether watching a more immersive (vs. less immersive) video increases the duration of toothbrushing. We predict that participants who watch a more immersive video while toothbrushing will brush longer than participants who watch a less immersive video. This experiment thus not only tests our primary hypothesis, but also aims to provide important insight for consumers and marketers on the choice of a tangential task—we propose that it's not enough to simply select a tangential task that is pleasant to watch (or listen to). Rather, when increasing persistence is the goal, it is essential to choose a tangential task that is immersive—something that not only captures, but also sustains, attention.

Method

Prior to data collection, this experiment was preregistered (http://aspredicted.org/blind.php?x=yy9w8t). As specified in the preregistration, this study ran in the behavioral lab for one week. Four hundred twenty undergraduates from a large West Coast University completed a study in exchange for course credit and passed our preregistered inclusion criteria (60% female, M_{age} = 21.03, SD_{age} = 2.36).

Participants began the study by reading that it was the start of a new year (it was January) and the perfect time to build new healthy habits. Participants learned about a method to improve their oral health called dry brushing. Dry brushing involves brushing one's teeth without water or toothpaste, it can be done anywhere, and is a good method for removing plaque—a main cause of tooth decay and gum disease. Participants read that on the next page they would be able to try dry brushing for themselves and that we would give them a video to watch while brushing. They were informed that dentists recommend dry brushing for at least 8 to 10 minutes and that the longer they brush the cleaner their teeth would be—but that for today's study, they could dry brush for as long as they wanted.

An individually packaged toothbrush sat on each desk. Participants unwrapped their toothbrush and dry brushed while watching one of two videos: a segment from Animal Planet (more-immersive condition) or a video with nature scenes and classical music (less-immersive condition). We chose to use a narrative for our more immersive task, as narratives are commonly used for their ability to capture and engage consumer

attention (e.g., Argo, Zhu, Dahl 2016; Van Laer, Ruyter, Visconti, and Wetzel 2014). Both video clips were around 10 minutes. We selected excerpts from longer films to demonstrate that consumers persist longer as a result of the tangential task holding their attention, and not out of a need for closure (Kruglanski and Webster 1996). A pretest (N = 95) revealed that the two videos were liked no differently ($M_{more\text{-}immersive}$ = 5.61 vs. $M_{less\text{-}immersive}$ = 5.30; t(91.54) = 1.02, p = .311); the less-immersive nature video was rated as significantly more pleasant and beautiful ($M_{less\text{-}immersive}$ = 6.01) than the more-immersive Animal Planet video ($M_{more\text{-}immersive}$ = 5.26; t(91.67) = 3.42, $p < .001$); but, Animal Planet was significantly more immersive (5-item scale; α = .85) than the nature video ($M_{more\text{-}immersive}$ = 4.94 vs. $M_{less\text{-}immersive}$ = 4.36; t(92.55) = 2.05, p = .043; see Appendix for pretest details).

Participants began the video and proceeded to dry brush for as long as they wished. When they decided that they did not want to dry brush any longer, they disposed of their toothbrush and moved to the next page of the study where they responded to several questions about their experience dry brushing. Specifically they were asked "How much did you enjoy dry brushing" , "To what extent did you find dry brushing boring?" , "While dry brushing, how much was your mind wandering (i.e., how much were you thinking about things unrelated to dry brushing or the video?), and, "How likely are you to dry brush again in the future?" (1 = Not at all to 7 = Very [or A lot]). Finally, participants responded to a comprehension check asking them for how long they were asked to try dry brushing (I was told to dry brush for as long as I wished; I was told to dry brush for the entire duration of the video; I was told to dry brush for a minimum of 2 minutes; I don't

know), if they had ever tried dry brushing before, how often they usually brush their teeth, their gender, age, and how well they speak English (see Appendix for details).

Results

Persistence. Here and in all experiments following, we present persistence in real-time seconds and conduct analyses with both real and log-transformed durations (see Table 2.1). As predicted, participants who watched the more immersive video brushed their teeth significantly longer ($M_{more\text{-}immersive}$ = 172 seconds) than participants who watched the less immersive video ($M_{less\text{-}immersive}$ = 132 seconds; untransformed: b = 39.65, t(418) = 3.70, p < .001; log-transformed: b = .17, t(418) = 2.18, p = .030; see Figure 2.1). Persistence remains significant when controlling for whether they had ever heard of dry brushing prior to the study and how often they brush their teeth (untransformed: p < .001; log-transformed: p = .031; see Table 2.1).

Self-Reported Perceptions. Across conditions, participants reported no differences in how enjoyable ($M_{more\text{-}immersive}$ = 3.07 vs. $M_{less\text{-}immersive}$ = 3.16; b = -.08, t(418) = -.503, p = .615) or boring ($M_{more\text{-}immersive}$ = 4.50 vs. $M_{less\text{-}immersive}$ = 4.67; b = -.18, t(418) = -1.00, p = .318) they found dry brushing. Further, they reported no differences in how much they mind wandered during brushing ($M_{more\text{-}immersive}$ = 4.36 vs. $M_{less\text{-}immersive}$ = 4.60; b = -.25, t(418) = -1.26, p = .207), or their intentions to dry brush again in the future ($M_{more\text{-}immersive}$ = 2.92 vs. $M_{less\text{-}immersive}$ = 3.07; b = -.15, t(418) = -.839, p = .402).

Discussion

Experiment 1 provides evidence that tangential immersion increases persistence in a critically important, routinized behavior: toothbrushing. In this experiment, participants watched a video that was either more (or less) immersive while dry brushing their teeth. We found that participants who watched the more immersive video brushed their teeth, on average, 30% longer than participants who watched the less immersive video. Despite tangential immersion prolonging the time participants spent dry brushing, it did not influence their self-reported perceptions of dry brushing or intention to dry brush in the future. We are unable to determine whether these results are due to people's notorious inability to accurately report their affective states (Winkielman and Berridge 2004), potential measurement effects (Williams, Fitzsimons, and Block 2004), or if tangential immersion truly did not influence their perceptions and intentions. In either case, these results speak to our interest in the role of tangential immersion changing persistence in actual behavior, regardless of whether or not it influences their retrospective perceptions of the behavior.

Notably, while the more immersive video captured and sustained attention more than the less immersive video, the less immersive video was still somewhat immersive (relative to watching nothing at all). This is therefore not only a conservative test of tangential immersion, but suggests that the magnitude may be even larger when compared to the more typical scenario of people brushing their teeth without any tangential activity.

Moreover, participants reported no difference in the likability of the videos, and found the less immersive video to be *more* beautiful and pleasant than the more immersive video. Yet, participants who watched the more immersive video brushed their teeth for significantly longer. These results highlight the importance of the content of the tangential task when it comes to changing persistence: tangential tasks that are more immersive (and not simply more pleasant) will lead people to persist for longer. Finally, it is worth noting that the immersive video was an excerpt from a full-length show, providing evidence that tangential immersion need only sustain attention and does not require scenarios in which consumers can reach the end of a story, reducing concerns that need for closure is driving persistence (Kruglanski and Webster 1996). Given the importance of oral health, these results suggest that a simple (and very low-cost) intervention—immersing people in a tangential activity—could have a significant impact on individual health and societal well-being.

EXPERIMENT 2: TANGENTIAL IMMERSION INCREASES PERSISTENCE BEYOND SELF-MONITORING

Experiment 2 has four goals. First, it uses different focal and tangential tasks to demonstrate the effect of tangential immersion shown in experiment 1 generalizes to other low-attention behaviors and other tangential tasks. Whereas in experiment 1 the focal task was dry brushing, in experiment 2, participants perform a real-effort typing task designed to represent many daily behaviors that require minimal attention.

Second, in experiment 1, participants performed either a more (or less) immersive tangential task. In experiment 2, we add a pure control condition to compare persistence when participants concurrently perform an immersive task (dual-task) versus when they only perform the low-attention task. Third, in this experiment we also compare tangential immersion to a condition in which participants are given a common self-regulatory tool—a timer—to help them track how long they do the task. In doing so, we test whether tangential immersion increases persistence above and beyond monitoring one's progress. We predict that participants in the tangential immersion condition will persist in the typing task longer than both participants in the control condition and participants in the self-monitoring condition.

Finally, in experiment 2 we also include a condition in which participants only listen to the audiobook (i.e., they do not do the typing task). Because participants in experiment 1 were told to move on after quitting the focal task, it is possible that their persistence was driven solely by the belief that to continue watching the video, they must continue performing the focal task (as opposed to persistence resulting from a better match between demands and resources). In this experiment, if participants in the audio-only condition listen for less time than those in the tangential immersion condition, it provides additional support for our attention-matching story and reduces concerns that persistence is driven by beliefs that the two tasks must be tied together.

Method

Prior to data collection, this experiment was preregistered (http://aspredicted.org/blind.php?x=5wp6gi). Two hundred ninety four Amazon Mechanical Turk workers completed a study in exchange for payment and passed our preregistered inclusion criteria (45% female, M_{age} = 36.04, SD_{age} = 10.83).

Participants began the study by reading: "In this study, we are interested in learning what makes people persist in activities for longer." On the next page participants were assigned to one of four conditions: (1) a low-attention typing task (control condition); (2) a low-attention typing task with a timer (self-monitoring condition); (3) a low-attention typing task while concurrently listening to an immersive audiobook (tangential-immersion condition); (4) listening to an immersive audiobook (audio-only condition). In the three conditions that included a low-attention typing task, participants read "Life is filled with activities that people should do for longer (e.g., brushing their teeth, exercising, doing chores, etc.). In this study, you will do a task that represents this type of daily activity." They then learned that the typing task they would do is to type the letters "zm" repeatedly for as long as they could. Participants in the tangential immersion condition further read, "while you are typing, you will also listen to an excerpt from an audiobook." Participants in the tangential immersion condition and audio-only condition listened to an excerpt from the audiobook *Divergence*. Participants in the audio-only condition were informed that they could listen for as long as they chose (but were not given a goal of persistence, as in the other three conditions). In all four conditions participants were reassured that they would receive the same payment no matter how long they did the task.

On the next page, participants completed their task. In the control condition, participants were simply told to type "zm" for as long as they could. In the self-monitoring condition, participants saw a media player with a 9:53 minute play time and were told to press play on the timer and then type "zm" for as long as they could. These participants also read "the timer will help you keep track of how long you do the task." Participants in the tangential immersion condition saw a media player with a 9:53 minute play time and were told to press play on the audio and then type "zm" for as long as they could. Finally, participants in the audio-only condition saw a media player with a 9:53 minute playtime and were told to press play and listen for as long as they chose.

After performing their task, participants responded to a comprehension check asking them for how long they were asked to do the typing task [listen to the audio] (for as long as I could [for as long as I chose], for about 15 minutes, for about 10 minutes, not sure), and reported their gender identity and age.

Results

Persistence. Relative to control ($M_{control}$ = 71 seconds), participants persisted longer in the typing task in both the self-monitoring condition ($M_{monitor}$ = 116 seconds; b = 45.37, t(290) = 2.06, p = .040; log-transformed: b = .59, t(290) = 3.31, p = .001; see Table 2.2) and the tangential-immersion condition ($M_{immersion}$ = 189 seconds; b = 118.02, t(290) = 5.35, $p < .001$; log-transformed: b = .94, t(290) = 5.20, $p < .001$). Most importantly and, as predicted, participants in the tangential immersion condition persisted longer in the typing

task than those in the self-monitoring condition (b = 72.65, t(290) = 3.23, p = .001; log-transformed: b = .34, t(290) = 1.87, p = .063). Finally, participants in the audio-only condition listened to the audio for significantly less time (M_{audio} = 111 seconds) than participants in the tangential-immersion condition (b = -78.44, t(290) = -3.45, p < .001; log-transformed: b = -.73, t(290) = -3.96, p < .001; see Figure 2.2).

Persistence (Characters Typed). Number of characters typed was assessed as a secondary measure of persistence. To account for unequal variances across conditions, we compared average number of characters typed using independent t-tests with equal variances not assumed. Compared to the control condition ($M_{control}$ = 319), participants typed marginally more characters in the self-monitoring condition ($M_{monitor}$ = 420) and significantly more in the tangential-immersion condition ($M_{immersion}$ = 887; t(119.6 and 74.86) = 1.74 and 3.07, p = .085 and .003). Moreover, participants typed significantly more characters in the tangential-immersion condition compared to the self-monitoring condition (t(81.49) = 2.47, p = .016).

Error rate. To test whether tangential immersion impacted performance, we calculated a rate of typing errors using an algorithm in R designed to identify errors in the text sequence.[16] Specifically, we counted the number of "zm" combinations typed, and subtracted it from the total number of pairs in the text sequence (i.e., we counted the number of erroneous pairs and subtracted that from the total number of pairs typed to

[16] For the algorithm to run properly, participants who chose not to type any characters had to be excluded (this excludes 3 participants total).

calculate the proportion of pairs which contained an error). Error rates did not differ across the three conditions ($M_{control}$ = 1.40 vs. $M_{monitor}$ = 3.79 vs. $M_{immersion}$ = 3.67; $F(2, 218)$ = 1.61, p = .202).

Discussion

Experiment 2 demonstrates that while a common self-regulatory approach—self-monitoring—increases persistence in a low-attention behavior relative to a control condition, tangential immersion increases persistence above and beyond self-monitoring. Participants were told to perform a low-attention typing task for as long as they could. Participants who had a timer to track their persistence performed the task significantly longer than those who were not presented with a timer. More importantly, participants who concurrently listened to an immersive audiobook while performing the typing task persisted significantly longer than participants in both the control and self-monitoring conditions.

Consistent with experiment 1, in this experiment participants in the tangential immersion condition persisted longer when listening to an excerpt of a story (vs. a story from start to finish), suggesting that need for closure (Kruglanski and Wesbter 1996) is not driving persistence. In addition, participants who were asked to simply listen to the audiobook for as long as they chose (they did not do the focal task) listened for less time than participants in the tangential immersion condition. These results suggest that persistence in the tangential immersion condition cannot be explained by participants

believing that to continue listening to the audio they must continue performing the typing task (i.e., a required bundling of the two behaviors; Milkman, Minson, and Volpp 2014). Additionally, it suggests that participants in the tangential immersion condition are not necessarily stopping when they grow tired of the audiobook—rather, it supports our theory that together these two tasks better match attentional demands to available resources. Of note, whereas in the three typing conditions participants were told to persist as long as they could, in the audio-only condition participants were merely told to listen as long as they chose. For this reason, we cannot draw clear conclusions about whether or not typing while listening affected persistence in the listening task (as opposed to being given a persistence goal; Shaddy and Fishbach 2018).

EXPERIMENT 3: TANGENTIAL IMMERSION INCREASES PERSISTENCE ONLY FOR LOW-ATTENTION BEHAVIORS

Our theory suggests that consumers often halt low-attention behaviors prematurely because the behaviors do not demand satisfactory levels of attention—thus, providing additional attentional demands corrects this imbalance and increases persistence. To test this proposition, in experiment 3, participants perform a typing task that varies in the amount of attention required—ranging from very low attentional requirements to high attentional requirements—while either being immersed in a tangential task or not. To provide the most conservative test of our theory, in this experiment the control conditions include a timer such that participants can again track their behavior, similar to the self-

monitoring condition in experiment 2. We predict a main effect of task complexity, such that participants will naturally persist for longer in higher-attention tasks. Moreover, we anticipate that tangential immersion will increase persistence, but only when the focal task requires minimal levels of attention.

Method

Prior to data collection, this experiment was preregistered (http://aspredicted.org/blind.php?x=9v864z). Consistent with the preregistration, we aimed to collect at least 100 eligible participants per condition. Six hundred eighty six undergraduates from a large West Coast University completed the study as instructed in exchange for course credit and passed our preregistered inclusion criteria (54% female, M_{age} = 20.81, SD_{age} = 2.12).[17]

Participants began the study by reading: "Life is filled with lots of daily activities that people should do for longer (e.g., brushing their teeth, exercising, doing chores, etc.). In this study, we are interested in learning how different interventions can make people persevere in these activities for longer!" On the next page they were informed that they would do a task representing one of these daily activities. Participants were assigned to one of three typing tasks that varied in degree of attention required: (1) a low-attention task (typing "zm" repeatedly); (2) a medium-attention task (typing the alphabet forward then backward repeatedly); (3) and, a high-attention task (typing words that begin with

[17] One person wrote in an age of 40,888 and thus their age was removed when calculating the average age.

each letter of the alphabet, and starting again when they reached Z, without repeating any of the same words). Further, half of the participants were randomly assigned to listen to an immersive clip while typing (tangential immersion), while half were simply shown a timer and listened to nothing (control). Participants in the tangential immersion conditions listened to an excerpt from an audio version of *The Hobbit*. On the next page, participants saw a media player with a 15:01 minute play time (in the tangential immersion conditions the media player played the audiobook clip, and in the control conditions no sound played from the media player and it simply served as a timer).[18] Participants were instructed to press play and begin typing for as long as they could, and to simply press next when they wished to move on to the next page.

After performing the typing task for as long as they chose, participants responded to several manipulation checks[19] measuring their perceptions of the focal typing task. Specifically, they responded to a two item task-enjoyability scale: "How fun was the typing task?" , "To what extent did you enjoy the typing task?"; a 3-item boredom scale: "To what extent did it feel like time was dragging?" , "To what extent was your mind wandering?" , "To what extent did you wish you were doing something more exciting?"; and, two items measuring automaticity and effort: "How effortful was the typing task?" , "To what extent did it feel you were typing on autopilot?" The first six questions were asked on likert scales and the latter two questions were asked on sliding scales (1 = Not at

[18] Whereas in experiment 2 participants in the self-monitoring condition were explicitly told the timer would help them track how long they do the task, in this experiment participants in the control condition were simply told to press play on the timer before typing.
[19]Of note, while these measures were not specified as manipulation checks in the preregistration, they better serve that role in this experiment (as opposed to being focal dependent variables).

all to 7 = Very [or A lot]). Participants also rated the typing task from 1 = Boring to 10 = Fun on a sliding scale (reverse-coded). To measure level of engagement in the audio clip—i.e., allocation of attention to the audio—participants in the tangential immersion conditions were asked to what extent they were curious to hear how the clip ended. Finally, participants responded to a comprehension check asking them for how long they were asked to do the typing task (for as long as I could, for about 15 minutes, for about 6 minutes, not sure), whether they have ever read or listened to *The Hobbit*, their gender identity, age, and how well they speak English (very well, well, not well, not at all; see Appendix for details).

Results

Manipulation Checks. A regression between complexity (dummy variables for the medium-attention and high-attention tasks), immersion (0 control vs. 1 tangential immersion), and their interaction revealed no interaction on any of the manipulation checks (*ps* > .18) or on the main dependent measures of persistence (*ps* > .36). Because both the medium-attention and high-attention tasks require attention (as opposed to being more automatic like the low-attention task) and no interactions were shown, they were collapsed for the main regression analyses.

We regressed each of the perception measures on effect-coded complexity (-1 low-attention vs. 1 medium-attention and high-attention collapsed), effect-coded immersion (-1 control vs. 1 tangential immersion), and their interaction. Results of the analyses revealed

main effects of complexity on task enjoyment (fun and enjoyability collapsed [r = .91, p < .001]; b = .22, t(682) = 3.52, $p < .001$), the 3-item boredom scale ($\alpha = .70$; b = -.26, t(682) = -4.53, $p < .001$), the single-item boredom measure (b = -.37, t(682) = -4.08, $p < .001$), how effortful the task was (b = .78, t(682) = 11.87, $p < .001$), and to what extent they felt like they were on autopilot (b = -.86, t(682) = -12.89, $p < .001$). These results support the design of our manipulation, as the higher-attention (vs. lower-attention) tasks were perceived as more fun, less boring, more effortful, and less automatic. There were no significant main effects of tangential immersion ($ps > .069$) and no significant interactions ($ps > .40$; see Appendix for details).

To test whether participants were more engaged in the audio clip when they had more resources available, and whether this correlated with persistence, we regressed curiosity on task complexity (1 low-attention task vs. 0 medium-attention and high-attention collapsed). Participants who did the low-attention task reported greater curiosity about the story (M = 2.82) than those who did the higher-attention tasks (M = 2.37; b = .45, t(345) = 2.12, $p = .035$). Moreover, persistence in the focal task was significantly correlated with curiosity (b = 18.92, t(345) = 3.64, $p < .001$). These results suggest that participants were able to devote more attention to the tangential task when the focal task required less attention, and that greater engagement in the tangential task was associated with prolonged persistence.

Persistence. Simple effects analyses revealed that within the low-attention conditions, participants in the tangential immersion condition persisted significantly longer

($M_{immersion}$ = 139 seconds) than participants in the control condition ($M_{control}$ = 90 seconds; untransformed: b = 49.79, t(243) = 2.62, p = .009; log-transformed: b = .30, t(243) = 2.72, p = .007). In contrast, there was no simple effect of tangential immersion on time spent typing within the medium-attention conditions ($M_{immersion}$ = 165 seconds vs. $M_{control}$ = 171 seconds; untransformed: b = -5.84, t(226) = -.24, p = .811; log-transformed: b = -.05, t(226) = -.411, p = .681) or high-attention conditions ($M_{immersion}$ = 254 seconds vs. $M_{control}$ = 251 seconds; untransformed: b = 2.69, t(211) = .10 p = .917; log-transformed: b = .01, t(211) = .13 p = .90; see Figure 2.3).

We regressed time spent typing on effect-coded complexity (-1 low-attention vs. 1 medium-attention and high-attention collapsed), effect-coded immersion (-1 control vs. 1 tangential immersion), and their interaction. The analysis revealed a significant main effect of complexity (untransformed: b = 47.17, t(682) = 6.70, p < .001; log-transformed: b = .32, t(682) = 8.71, p < .001), whereby participants who performed the low-attention task quit sooner than participants who performed the medium- and high-attention tasks, a marginal main effect of tangential immersion (untransformed: b = 12.82, t(682) = 1.82, p = .069; log-transformed: b = .07, t(682) = 1.95, p = .052), whereby participants who listened to an immersive story spent marginally longer on the typing task, qualified by an interaction between complexity and tangential immersion (untransformed: b = -12.08, t(682) = -1.72, p = .087; log-transformed: b = -.08, t(682) = -2.14, p = .033; see table 2.3).

Persistence (Characters Typed). Number of characters typed was assessed as a secondary measure of persistence. Simple effects analyses revealed that within the low-

attention conditions, participants who listened to the immersive clip typed significantly more characters ($M_{immersion}$ = 735) compared to control participants ($M_{control}$ = 481; b = 254.15, t(243) = 2.26, p = .025). However, there was no effect of tangential immersion on number of characters typed for participants in the medium-attention ($M_{immersion}$ = 240 vs. $M_{control}$ = 375)[20] or high-attention conditions ($M_{immersion}$ = 305 vs. $M_{control}$ = 274; bs = -135.2 and 30.74; ts(226 and 211) = -.78 and .67, ps > .43).

We regressed characters typed on effect-coded complexity (-1 low-attention vs. 1 medium-attention and high-attention collapsed), effect-coded immersion (-1 control vs. 1 tangential immersion), and their interaction. The analysis revealed a significant main effect of complexity (b = -153.67, t(682) = -4.12, p < .001), whereby participants who performed the low-attention task typed more characters than participants who did the medium- and high-attention tasks, no main effect of tangential immersion (b = 49.62, t(682) = 1.33, p = .184), qualified by a significant interaction (b = -77.46, t(682) = -2.08, p = .038).[21]

Error rate. To test whether tangential immersion impacted performance, we calculated a rate of typing errors using an algorithm in R designed to identify errors in the text sequences within each task.[22] In the low-attention conditions, we used the same algorithm described in experiment 2. In the medium-attention conditions, we followed a

[20] One participant in the medium-attention control condition typed 19,214 characters and indicated in the comments section that they copied and pasted the text. When removing this participant, the mean number of characters typed in this condition is 218 (vs. 375). Without this participant, the simple effect of tangential immersion on the medium-attention task remains nonsignificant (b = 21.75, t(225) = .49, p = .627).
[21] When excluding the participant who admitted copying and pasting, analyses reveal a significant main effect of complexity (b = -174.65, t(681) = -7.41, p < .001), a significant main effect of tangential immersion (b = 70.60, t(681) = 3.0, p = .003), qualified by a significant interaction (b = -56.47, t(681) = -2.40, p = .017).
[22] For the algorithms to run properly, participants who chose not to type any characters had to be excluded (this excludes 16 participants total).

similar logic using a-z and z-a sequences. In the high-attention conditions, we counted errors as the first letter of each word deviating from an a-z sequence (to not compound error rates, the algorithm recognized skipped words as just one error). Tangential immersion did not increase error rates for participants in the low-attention ($M_{immersion}$ = 2.91 vs. $M_{control}$ = 3.61; t(212.95) = -.71, p = .479), medium-attention ($M_{immersion}$ = 2.28 vs. $M_{control}$ = 2.32; t(184.27) = -.06, p = .95), or high-attention ($M_{immersion}$ = .21 vs. $M_{control}$ = .17; t(197.44) = 1.01, p = .313) conditions.

Discussion

Experiment 3 provides support for our first predicted boundary. Specifically, our theory proposes that tangential immersion increases persistence, but only when the focal task requires low levels of attention. Indeed, tangential immersion increased persistence among participants performing a typing task that required minimal attention but had no effect on persistence among participants performing a task that required higher levels of attention. Experiment 3 also demonstrated that engagement in the tangential task (as measured by peaked curiosity) was greater when the focal task required less attention; and, that greater engagement in the tangential task was associated with longer persistence in the focal task.

The results of experiment 3 also support our theory that consumers may stop behaviors prematurely because they do not satisfy attentional needs. Participants reported the lower-attention (vs. higher-attention) tasks as more boring, more automatic (i.e., they

were more on autopilot), and less effortful—and, indeed, participants who did not dual-task were more likely to quit the lower-attention tasks sooner than the higher-attention tasks. However, as demonstrated, immersing people in a tangential task concurrent with a low-attention behavior can address this attentional-requirement deficit and increase persistence.

EXPERIMENT 4A: TANGENTIAL IMMERSION INCREASES PERSISTENCE MORE THAN ENJOYABLE (BUT LESS-IMMERSIVE) TASKS

Experiment 4A tests whether tangential immersion increases persistence in another common and important behavior: strength building. Rising obesity in the U.S. is well documented (Hales 2018; Ward 2019). Regular exercise helps to maintain a healthy weight, but approximately 80% of US adults and adolescents fail to engage in sufficient physical activity (Piercy et al. 2018). In this study, participants perform a physical exercise with low attentional-demands for as long as they can. In addition to the health benefits participants get from exercise and from the explicit instructions to persist, this study is also incentive compatible such that participants who perform the exercise for longer have a better chance of earning a financial reward.

Additionally, in this experiment we sought to test whether doing a more pleasant (but less immersive) tangential task influences participants ratings of the overall experience, and whether this affects persistence. Notably, while tangential immersion certainly may be achieved by an enjoyable task, in this experiment we aim to demonstrate

that enjoyment alone does not increase persistence. Rather, a tangential task is more likely to increase persistence if it is immersive such that it captures and sustains attention. Put differently, experiment 4A pits a primarily affect-driven explanation against the proposed attentional-match account.

In this experiment, participants perform a low-attention strength-building exercise, while concurrently performing a control task, reading an immersive story, or viewing a pleasing image accompanied with pleasant piano music. We predict that participants in the pleasant music condition will report the experience as overall more enjoyable than the control condition, but that only participants in the reading condition—the tangential task that requires more attention—will persist for longer in the strength-building exercise.

Method

Four hundred eleven undergraduates from a large West Coast University participated in a laboratory study in exchange for course credit (56% female). The study ran in the behavioral laboratory for four weeks (one of which only had three available laboratory days).

Participants were brought into a room one at a time to reduce any concerns of competition or social influence. They read that the study was about multitasking and that they would be performing two tasks concurrently. Participants were then shown written and visual instructions for their focal activity: a low-attention strength building exercise in which they were told to hold their arm out parallel to the floor while holding their cell

phone in their hand (which acted as a weight) for as long as they could. While doing the strength exercise, participants were randomly assigned to one of three tangential tasks: watch a dot scrolling across the computer screen (control); read a short story scrolling across the computer screen (reading); or, view a pleasant picture accompanied by piano music (pleasant).

In all three conditions, participants had to press play to start the tangential task and all four media files were the same length (3 minutes and 48 seconds). To increase the likelihood that participants paid attention to the tangential task, participants in the reading condition were told that at the end of the study, they would be asked to answer a few questions about the content of what they read. These questions were designed to encourage attention to the tangential task and are thus not discussed further.

Participants held their arm straight out with their cell phone in their hand and pressed play on the screen. A research assistant in the room used a stopwatch to time how long each individual persisted in the strength exercise. The primary dependent variable in this experiment is the length of time participants persisted in holding out their arm. While performing a strength-building exercise is beneficial in and of itself, we further enhanced the advantages of persistence by informing participants that those who persisted longer than the average would be entered into a lottery to win $25.

After putting their arm down, participants responded to manipulation checks and items measuring their perception of the task: “How enjoyable was this experience”; “While holding out your arm, how immersed in the other task were you?”; “While holding out your arm, how focused on the other task were you?”; “How painful was it to hold out your

arm?"; and, "While doing the task, to what extent did you forget that you were holding out your arm?" (all on 7-point likert scales ranging from 1 = Not at all to 7 = Very [or Completely]). The first three questions were designed to be manipulation checks. The items measuring pain and to what extent they forgot they were holding out their arm were included to test the extent to which tangential immersion also distracted participants from the physical sensation of the task.

Participants then indicated how long they thought they held out their arm (minutes, seconds, milliseconds).[23] The research assistant then told them their actual time and participants entered it into the survey (minutes, seconds, milliseconds). Next, they reported on a sliding scale from $0 to $25 how many dollars they would need to be paid to hold out their arm for five minutes. Finally, participants indicated how big their phone is (large screen/small screen), their handedness (right, left, ambidextrous), which arm they held out, and their gender identity (see Appendix for details).

Results

Manipulation Checks. As intended, participants in the pleasant condition reported the experience as significantly more enjoyable than control ($M_{pleasant}$ = 3.32 vs. $M_{control}$ = 2.68; b = .64, t(408) = 3.96, $p < .001$). Participants in the reading condition (vs. control)

[23] This question was initially included in Experiment 4A and 4B to measure perceived (vs. actual) time spent on the task. However, because there was a visible timer on the computer screen during their task, their estimates were highly correlated with the actual time displayed on the screen (Experiment 4A: $r = .84$, $p < .001$; Experiment 4B: $r = .79$, $p < .001$). Thus, this measure is not discussed further.

reported the overall experience to be only marginally more enjoyable (M_{read} = 2.95; b = .27, t(408) = 1.64, p = .102). Participants in the pleasant condition also reported the experience to be more enjoyable than participants in the reading condition (b = .38, t(408) = 2.28, p = .023). The immersion and focus measures were significantly correlated (r = .53, p < .001) and were thus collapsed into a single measure of attention. However, this measure did not significantly differ in either the pleasant or reading conditions compared to control (ps > .79).

Persistence. As predicted, participants in the reading condition persisted significantly longer in the strength exercise (M_{read} = 173 seconds) than participants in the control condition ($M_{control}$ = 156 seconds; untransformed: b = 17.17, t(408) = 2.09, p = .037; log-transformed: b = .17, t(408) = 2.24, p = .026). On the other hand, persistence did not differ between participants in the control and pleasant conditions ($M_{pleasant}$ = 165 seconds; untransformed: b = 9.17, t(408) = 1.13, p = .260; log-transformed: b = .06, t(408) = .76, p = .450; see Table 2.4).

Pain. Participants reported that it was significantly more painful to hold their arm out in the reading condition than the control condition (M_{read} = 4.33 vs. $M_{control}$ = 3.89; b = .44, t(408) = 2.65, p = .008)—as would be expected given they persisted longer in the task and time on task was significantly correlated with pain (p < .001). Reported pain did not differ between the control and pleasant conditions ($M_{pleasant}$ = 3.64; b = -.25, t(408) = -1.54, p = .125).

Forget and Pay. Participants did not report any differences across conditions in the degree to which they forgot their arm was raised or the amount they would need to be paid to perform the task for five minutes (*p*s > .23).

Discussion

Experiment 4A generalized the effects of tangential immersion to a low-attention strength building exercise and provided further support that, to increase persistence, consumers must perform an *immersive* secondary task—and that a more enjoyable task (or experience) will not increase persistence if it does not capture and sustain attention. Specifically, while doing a low-attention strength exercise, performing an immersive tangential task significantly increased the length of time participants held out their arm (by more than 10%), whereas concurrently doing a non-immersive task—even one that increased the enjoyability of the overall experience—did not significantly increase persistence. This finding not only supports our theory, but also has important implications for consumer behavior, as it suggests that merely making an experience more enjoyable is not enough to increase persistence in a behavior. Rather, while participants in the pleasant condition reported greater experiential enjoyment than those in the control and reading conditions, only those who performed the concurrent reading task persisted longer than control.

In this experiment, we asked participants to report how painful it was to hold out their arm and the extent to which they forgot they held out their arm. Participants across the three conditions reported no differences in the degree to which they forgot they were doing the exercise. Moreover, participants in the reading condition reported the strength exercise as significantly more painful than the control condition—a result that reflects their prolonged persistence in the exercise. These findings suggest that increased persistence cannot be explained by dissociation or distraction from physical cues.

We predicted that participants in the reading condition would report the tangential task as capturing their attention more than participants in the control and pleasant conditions (as reading requires more attentional resources than listening to piano music or watching a dot). However, participants reported no differences in attentional engagement in the tangential task across conditions. This unexpected result may be explained by past research suggesting that, at times, people are unaware of their affective reactions (even when those reactions influence their judgments and decisions; Winkielman and Berridge 2004). Moreover, people may not always be able to accurately report their cognitive processes after making a decision (Nisbett and Wilson 1977). As such, it is of particular importance to note that our goal in this research is to *change behavior*—not simply impact the self-reported measures of the process. For this reason, while we report these measures in our studies, we rely more on the behavioral measures—what participants *actually did*—rather than post-hoc self-reported emotions and perceptions to provide support for our conceptual model. Consistently across studies we find that, whether or not post-hoc

perception measures are affected, immersion in a tangential task increases behavioral persistence in a focal behavior.

EXPERIMENT 4B: TANGENTIAL IMMERSION ONLY INCREASES PERSISTENCE IF IT DOES NOT EXCEED ATTENTIONAL CAPACITY

Experiment 4B sought to replicate the findings from experiment 4A, while also testing our second proposed boundary: tangential immersion will increase persistence in a low-attention behavior, but only when the tangential task captures the right level of attention. That is, the tangential task must provide the right degree of attentional requirements—it must occupy excess attentional resources during a low-attention focal task, but cannot demand such high levels of attention that it exceeds an individual's attentional capacity.

We suggest that tangential immersion will increase persistence in a low-attention behavior—but only if the tangential task is immersive enough to capture and sustain attention, while not requiring such high levels of attention that people are unable to concurrently perform the focal behavior. Thus, in experiment 4B, participants again perform the low-attention strength exercise from experiment 4A while concurrently doing a task that varies in the degree of attention required. We predict that, relative to participants in a control condition, being tangentially immersed will increase persistence in the low-attention exercise. On the other hand, we anticipate that persistence will not

increase (and may even decrease) when the tangential task requires very high levels of attention.

Method

One hundred seventy six undergraduates from a large West Coast University participated in a laboratory study in exchange for course credit. The study ran in the behavioral laboratory for one week.

Participants were brought into a room one at a time and read the same instructions as in experiment 4A for the strength-building exercise. Participants were randomly assigned to one of four tangential tasks while doing the strength exercise: watch a dot scrolling across the computer screen (control); listen to a short story (listening); read a short story with text scrolling across the screen (reading); add a list of single digit numbers scrolling across the screen (addition). These tasks were designed such that they varied in the amount of required attention: the control task required very little (if any) attention; the listening task required more attention than control; the reading task required more attention than listening (though they contained the exact same story; Posner, Nissen, Klein, 1976); and, the addition task required a great deal of focused attention. Both the control condition and the reading condition were the same as experiment 4A and the media clip for all 4 conditions was the same length (3 minutes and 48 seconds). Both the reading condition and the listening condition contained the same content (a short story called *A Saint and a Criminal*). To increase the likelihood that participants paid attention to the tangential task,

participants in the reading [and listening] condition were told that at the end of the study, they would be asked to answer a few questions about the content of what they read [heard]. In the addition condition, participants were told that they would be asked to report the total number that they summed. As in experiment 4A, these questions were designed to encourage participants to attend to the tangential task and are thus not discussed further.

As in experiment 4A, participants were informed that those who persisted longer than the average would be entered into a lottery to win $25. Participants then held their arm out for as long as they could and answered the same manipulation checks and perceptions questions as in experiment 4A.[24] Finally, participants indicated how big their phone is (large screen/small screen), their handedness (right, left, ambidextrous), and which arm they held out (see Appendix for details).

Results

Manipulation Checks. The items measuring immersion and focus were collapsed into an overall measure of attention (r = .69; $p < .001$). Participants reported no difference on this measure between the control ($M_{control} = 3.51$) and listening conditions ($M_{listen} = 3.14$; b = -.37, t(172) = -1.30, $p = .197$). Participants in the reading condition ($M_{read} = 4.08$) reported that the tangential task occupied their attention significantly more than participants in both the control and listening conditions (bs = .57 and .93, ts(172) = 2.00 and 3.32, *ps* = .047 and =.001). Finally, participants in the addition condition ($M_{addition} =$

[24] In experiment 4B, participants were not asked to report how painful the task was.

4.85) reported that the tangential task occupied significantly more attention than participants in the control, listening, and reading conditions (bs = 1.33, 1.70, and .77, ts(172) = 4.63, 5.94, and 2.68, *ps* = <.001, <.001, and .008, respectively).

Persistence. As predicted, participants in the reading condition persisted significantly longer in the strength exercise (M_{read} = 194 seconds) than participants in the control condition ($M_{control}$ = 165 seconds; untransformed: b = 29.11, t(172) = 2.09, *p* = .038; log-transformed: b = .21, t(171) = 1.78, *p* = .077; see Table 2.5).[25] Relative to control, participants persisted for longer in the listening condition (M_{listen} = 181 seconds) and persisted for less time in the addition condition ($M_{addition}$ = 147 seconds), though neither difference reached significance (untransformed: bs = 16.09 and -17.74, ts(172) = 1.16 and -1.25, *ps* = .249 and .212; log-transformed: bs = .18 and -.11, ts(171) = 1.57 and -.96, *ps* = .117 and .338; see Figure 2.4). Finally, participants in the addition condition persisted for significantly less time than participants in the reading condition (untransformed: b = -46.86, t(172) = -3.33, *p* = .001; log-transformed: b = -.32, t(171) = 2.73, *p* = .007).

Enjoyment. Participants in the reading condition (M_{read} = 3.44) reported the overall experience as more enjoyable than participants in the control condition ($M_{control}$ = 2.80; b = .65, t(172) = 2.11, *p* = .036). Relative to control, participants in the addition condition ($M_{addition}$ = 3.33) and listening condition (M_{listen} = 3.13) reported no differences in the

[25] One participant has a time of 0 seconds listed. This participant was removed only for the logged time analysis.

enjoyability of the experience (bs = .54 and .34, ts(172) = 1.72 and 1.10, *ps* = .087 and .273).

Forget. Relative to control, participants in the addition condition ($M_{addition}$ = 3.38) were significantly more likely to report forgetting that they were holding out their arm ($M_{control}$ = 2.52; b = .86, t(172) = 2.50, *p* = .013). There was no difference on this measure between control and participants in the reading condition (M_{read} = 2.91) or listening condition (M_{listen} = 2.47; bs = .39 and -.06, ts(172) = 1.15 and -.17, *ps* = .251 and .868).

Pay. There was no difference in amount participants would require to be paid across conditions ($M_{Control}$ = $14.00; M_{Listen} = $13.90; $M_{reading}$ = $12.70; $M_{addition}$ = $14.20; *p*s > .46).[26]

Discussion

Experiment 4B demonstrates that participants persist longer in a low-attention strength-building exercise when they are tangentially immersed in a task that sustains—but does not require too much—attention, providing support for our second predicted boundary. Unlike in experiment 4A, in this experiment participants did report significant differences in how much attention the tangential task captured. Specifically, participants in the reading and addition conditions reported greater engagement in the tangential task than

[26] Note that all participants ended the task when they chose to. This endogenous duration makes it hard to separately identify preferences for the task.

participants in the control condition. Participants in the listening condition reported no differences on this measure relative to control. Finally, as designed, participants in the addition condition reported higher levels of attentional engagement in the tangential task compared to the other three conditions.

Consistent with these self-reported measures of attention, and in support of our theory, participants who concurrently read an immersive story held out their arm significantly longer—a relative increase of nearly 18%—than participants who performed a non-immersive task (stared at a scrolling dot). In contrast, compared to control, persistence did not increase when the tangential task was reported as no more immersive (listening) or overly immersive (addition). Although in experiments 2 and 3, a listening task increased persistence, it did not do so in this experiment. One explanation for this difference (and supported by the self-reported immersion measure) is that in this experiment the story may not have been as engaging as the other audio clips. Most importantly, as predicted, we demonstrate that the immersive reading condition significantly increased persistence relative to both the control (low-attention) and the addition (high-attention) conditions.

Notably, relative to control, only participants who did the highest-attention tangential task (addition) were more likely to forget that they were holding out their arm. This further supports our theory that the addition condition required so much attention that participants no longer had attentional resources available to devote to the strength-building exercise—likely leading them to stop sooner. In sum, the findings of experiment 4B suggest that tangential immersion increases persistence in a focal task only when the

tangential task requires the proper level of attention: tangential immersion increases persistence when the two concurrent tasks, together, match attentional demands to available resources. However, if the tangential task does not require enough attention or requires too much attention, persistence in the focal task will not increase.

GENERAL DISCUSSION

Extending performance in behaviors that benefit from persistence has the potential to greatly improve individual and societal well-being. For this reason, a great deal of research—and application—has investigated techniques to motivate persistence. Much of this previous work approaches consumer persistence (or lack thereof) as a matter of self-regulation. In this research, we offer a different perspective on consumer persistence-failures. We provide a novel attention-based theory and suggest that concurrently immersing consumers in a tangential task (i.e., dual tasking with a stimulus that captures and sustains attention) will increase persistence in low-attention behaviors. Across five experiments, we demonstrate that concurrently immersing participants in a tangential task increases persistence (experiments 1-4) and that participants naturally quit low-attention tasks sooner than tasks that require more attention (experiment 3). Moreover, we provide evidence that tangential immersion occupies excess attentional resources, and that this increases persistence above and beyond common self-regulatory approaches, such as self-monitoring (experiments 2 and 3) and increasing experiential enjoyment (experiment 4A).

Importantly, because attentional resources are limited (Chun et al. 2011), tangential immersion only increases persistence if the two tasks' combined attentional demands meet, but do not exceed, a consumer's attentional capacity (Westgate and Wilson 2018), leading to two boundary conditions. First, persistence only increases when the focal behavior requires minimal attention—freeing up enough attentional resources to become immersed in the tangential task (experiment 3). Second, persistence only increases when the tangential task is immersive to the right degree, such that it captures and sustains attention without requiring too much attentional focus (experiment 4B).

The experiments presented support our theory that it is not simply poor self-regulation (e.g., lack of self-monitoring, poor motivation, or insufficient cognitive capacity) that explains consumers' insufficient persistence in many behaviors. Rather, many low-attention (e.g. automatized) behaviors fail to match consumers' attentional capacity (Raffaelli, Mills, and Christoff 2018), leading to boredom and premature abandonment. We show that tangential immersion increases persistence using various forms of tangential tasks (reading, listening, watching) and across a range of low-attention behaviors (toothbrushing, typing, strength-building). Across our experiments we find evidence that people are not necessarily aware of their behavior changes or consistently change their retrospective perceptions of the behavior. These results highlight our goal of *changing behavior* while not necessarily relying on post-hoc reports, as consumers may have inaccurate retrospective beliefs of their preferences and actions. Indeed, changing consumer *perceptions* might require explicit feedback, additional cues, or reminders of

their success (Nikolova, Lamberton, and Haws 2016; Mathur, Block, and Yucel-Aybat 2014).

Theoretical Contributions

By showing that tangential immersion significantly increases persistence across a range of low-attention behaviors, the current research makes several key theoretical contributions. First, it provides a novel explanation as to why consumers fail to sufficiently persist in many daily behaviors: such behaviors do not require *enough attention*. Existing work has largely attributed such persistence failures to poor self-regulation. In response, prior literature mainly focuses on encouraging persistence by setting goals and monitoring goal-directed behaviors, increasing motivation, and maintaining sufficient cognitive capacity. For example, a great deal of research in this domain focuses on setting and monitoring goals (Baumeister and Heatherton 1996), increasing motivation by making the task seem more fun (Sansone et al. 1992) or introducing external motivations (DellaVigna and Pope 2018; Shen et al. 2019), and reducing attentional competition by automatizing the behavior (e.g., forming good habits; introducing implementation intentions; Neal, Wood, and Drolet 2013; Verplanken and Wood 2006; Gollwitzer and Schaal 1998). Our work makes important advances to the consumer behavior literature—particularly as it relates to consumer health and wellbeing—by demonstrating that it is not only poor self-regulation that contributes to consumer failures to persist in many positive behaviors. Rather, consumers often stop many such behaviors prematurely because they require less

attention than one has available. Thus, we find that by adding a second concurrent task that captures and sustains excess attention, consumers persist for longer in low-attention behaviors.

The current research also contributes to the consumer health and wellbeing literature in a second way. While much of the previous literature focuses on initiation of health-related behaviors as a binary choice (Milkman, Rogers, and Bazerman 2008; Wood and Rünger 2016), we investigate ways to extend persistence in them. Once a behavior is initiated, persistence is critical as the duration of many behaviors is directly proportional to how beneficial they are. One area of research for which this extension is particular salient is temptation bundling. Milkman, Minson, and Volpp (2014) demonstrate that consumers go to the gym more often when they bundle working out (a "should behavior") with an indulgent behavior (a "want behavior"). In particular, they found that consumers who only allow themselves to listen to an indulgent audiobook when they are working out, go to the gym more often—thus, committing to only take part in an indulgent behavior when it is coupled with a should behavior increases initiation of it. Our research extends this finding by examining how, and why, dual tasking increases persistence in a behavior (apart from the choice to initiate a behavior in the first place). Furthermore, this research contributes to the consumer health literature by suggesting a simple intervention to influence health behaviors that does not require any type of explicit persuasion attempts or messaging, as has been done in the past and which can involve significant challenges (Keller and Block 1996; Menon, Block, and Ramanthan 2002).

By investigating the role of boredom in daily consumer behaviors and experiences, we also contribute to the consumer experience literature. Consumer experience is a key driver of happiness and wellbeing (Van Boven and Gilovich 2003). Experiential (vs. material) purchases and gifts can improve both personal satisfaction (Gilovich, Kumar, and Jampol 2015) and inter-personal relationships (Chan and Mogilner 2017). The paucity of research on boredom during consumer experiences is somewhat surprising given the majority of consumers report frequently experiencing boredom (Chin et al. 2017) and lack of engagement has important implications for consumer behavior (Zane et al. 2020) and wellbeing (Killingsworth and Gilbert 2010). Our research adds to the consumer experience literature by outlining scenarios in which consumers are likely to experience boredom (and thus have a worse experience) and by providing suggestions on how to attenuate it. Additionally, this research demonstrates that merely making an experience more pleasant or enjoyable is not enough to eliminate boredom—rather, immersing consumers in a task that sustains their attention is more likely to diminish boredom and lead to better, prolonged experiences.

Fourth, we contribute to the exercise and distraction literature by introducing a new mechanism explaining how attentional interventions can increase persistence. Distractions have been shown to reduce awareness of physical sensations, such as satiation (Bellisle, Dalix, and Slama 2004; Higgs and Woodward 2009), pain (for reviews see Dascal et al. 2017; Eccleston and Crombez 1999; McCaul and Mallott 1984), or physical exertion (Pennebaker and Lightner 1980; Masters and Ogles, 1980). For this reason, distractions have received a great deal of attention in the exercise literature (Brick, McIntyre, and

Campbell 2014; Lind, Welch, and Ekkekakis 2009), as they may reduce perceived effort (Masters and Ogles 1980; Pennebaker and Lightner 1980), lessen felt pain (Razon et al. 2009), and potentially enhance endurance (Masters and Ogles 1998; Rejeski and Kenney 1987)—particularly during low to moderate exercise (Lind et al. 2009). The current research contributes to this literature by proposing a distinct mechanism explaining why external tasks that capture attention may increase persistence during certain physical activities. While the distraction literature would suggest that a concurrent task might increase persistence by dulling physical sensations, we demonstrate that it may also impact performance by correcting insufficient attentional demands (experiments 4A-4B). This distinction is important not only for theoretical reasons, but for practical purposes as well. These findings suggest that interventions capturing attention during physical activity may increase persistence for a previously unknown reason; and, that they are likely to increase persistence in a wide-range of active behaviors that don't necessarily involve feelings of physical strain or pain—such as low-attention exercises like walking or even running for more experienced athletes. It is critical to understand these distinctions (when and why a tangential task may increase persistence) in order to implement behavior-change interventions most effectively.

Finally, we advance the attention and dual-tasking literature by demonstrating a case in which dual tasking has positive and important implications for consumer and societal well-being. While dual tasking is often discouraged because of its potential cost to performance (Pashler 1994), some recent research finds that it can have beneficial implications for certain consumer behaviors. For instance, Srna et al. (2018) find that

consumers can receive a boost in performance by merely perceiving that they are multitasking. In this work, we demonstrate that dual tasking with a focal behavior that requires minimal attention can increase persistence in that behavior. While we did not find any differences in performance accuracy (experiments 2 and 3), it is possible that dual tasking during some low-attention behaviors may come with small performance costs. However, small decrements (often characterizes by delays of milliseconds)—should they occur—would not be of large concern as any minimal costs to performance are likely outweighed by the advantages provided by performing the behaviors for longer.

Future Directions

While we focused our investigation on enacting *behavioral change and increasing persistence* in low-attention tasks, future research could examine the role of tangential immersion on perceptions of boredom during these tasks (e.g., feelings of time dragging). In our experiments, the time participants spent performing the focal tasks varied by the individual—in other words, time spent on the tasks was endogenous. As such, measuring perceptions of time passage (Zakay 2014) or boredom would necessarily correlate both with the actual duration of persistence as well as with the manipulations (i.e., each participant persisted for as long they chose and participants in the tangential immersion conditions spent longer on the focal task than those in the other conditions). Future research might standardize how long participants perform a task and then measure whether tangential immersion influences their perceptions of the focal task during that set period of

time. For instance, does cleaning the house for one hour seem to go by faster when listening to an immersive podcast compared to listening to a less immersive podcast or to nothing at all?

Also relevant to consumer behavior research is whether tangential immersion improves perceptions of the behaviors themselves—making consumers perceive them as more enjoyable and increasing the likelihood they perform them again in the future. Previous research finds that people may attribute feelings of boredom to the task at hand (Critcher and Gilovich 2010; Damrad-Frye and Laird 1989; Fisher 1993). Thus, does attenuating boredom by immersing people in a tangential task reduce such attributions and enhance the perceived enjoyability of the focal task? In our experiments, we found inconsistent self-reports measuring enjoyment of focal tasks (in some experiments tangentially immersed participants reported the focal task as more fun [experiment 3B in Appendix], and in others they did not [experiments 1 and 3]). However, because consumers are notoriously unable to accurately report their affective reactions (Winkielman and Berridge, 2004), we are reluctant to draw definitive conclusions from these findings. Researchers interested in how tangential immersion impacts perceptions of the focal task could instead exogenously manipulate time spent on a task and then compare perceptions of the task across conditions. Doing so would provide insight into questions like, do consumers who listen to an immersive podcast while walking on a treadmill for 30 minutes perceive the act of walking as more enjoyable? If so, improving consumers' perceptions of a task may not only influence persistence in the moment, but may also impact how likely they are to perform the behavior (or even frequent a business) in the

future, as emotions can influence future consumer decisions (Cavanaugh et al. 2007). Moreover, might it also increase the likelihood that consumers develop healthier habits (Ouellette and Wood 1998; Wood, Quinn, and Kashy 2002)?

Future research might also build upon the boundary conditions presented in this initial investigation. We demonstrated that participants did not persist in a focal task for longer when the *focal* task required too much attention (experiment 3) or when the *tangential* task was overly immersive (experiment 4B). Another interesting avenue to pursue would be to investigate the fragility of these boundaries and pinpoint the exact balance of optimal attentional demands between focal and tangential tasks. Moreover, future work could also explore other boundaries that may exist. For instance, while walking a familiar route (e.g., around ones neighborhood) requires very little attention and can be done while listening to a podcast, this is likely not the case when having to navigate a new place or walking through an area with many external distractions (e.g., a city full of buildings and landmarks). In such cases, people would likely not have the attentional resources available to become immersed in a tangential task—and may even judge the task as less interesting because of their inability to attend to it (Damrad-Frye and Laird 1989). An additional boundary might be optimal pairs of tasks. Even when a focal task is rather automatic, one is likely going to become more immersed—and make fewer errors—when the tangential task does not require shared capacity. In this way, tasks that require a great deal of visual attention (e.g., folding laundry, doing dishes) will likely do better when paired with an auditory tangential task (e.g., listening to a podcast) than with a visual

tangential task (e.g., watching an immersive movie). Exploring the role of modality in the effectiveness of tangential immersion could be a fruitful area for future inquiries.

Practical Contributions

Our work also makes several practical contributions. The current research suggests that both consumers and managers may wish to carefully consider which approaches or products are most likely to increase persistence in low-attention behaviors. For instance, while many existing products are designed to make boring behaviors more pleasant or engaging, our works finds that products would be more effective at increasing persistence if designed to *capture and sustain consumer attention* in a task tangential to the target behavior. Importantly, as we show in this research, it is not enough to simply "do two things at once." Rather, the combination of the two tasks requires consideration and the selection of the tangential task makes a difference. The two tasks must together achieve the proper balance between attentional demands and available resources over a period of time (long enough so that consumers continue to persist in the focal behavior). Moreover, it's not simply enough to choose a tangential task that is pleasant (e.g., listening to music)—rather, to have a significant impact on persistence, the tangential task must be sufficiently immersive to sustain consumer attention. Thus, developers would do well to consider these requirements and design products that provide immersive tasks that pair well with given behaviors (e.g., integrate audiobooks with running applications or create 2-minute videos that play while brushing one's teeth).

In sum, this research presents a novel attentional-resource explanation and intervention to increase persistence in low-attention behaviors. We propose that failure to persist in low-attention behaviors is not merely explained by poor self-regulation, and suggest an intervention that differs from previous approaches. Rather than increase self-monitoring, boost motivation, or reduce attentional competition—common regulatory approaches—we suggest that capturing and sustaining consumer attention in a tangential task will increase persistence in low-attention behaviors. In doing so, we provide novel insights as to why consumers often prematurely stop behaviors that would benefit from persistence, and provide a simple—and low-cost—intervention to prolong them.

ACKNOWLEDGEMENTS

We are grateful to Tiss Doci and research assistants in the behavioral lab for their assistance collecting data.

Chapter 2, in full, has been submitted for publication of the material. Lieberman, Alicea, On Amir, and Andrea C. Morales. The dissertation author was the primary investigator and author of this paper.

FIGURES

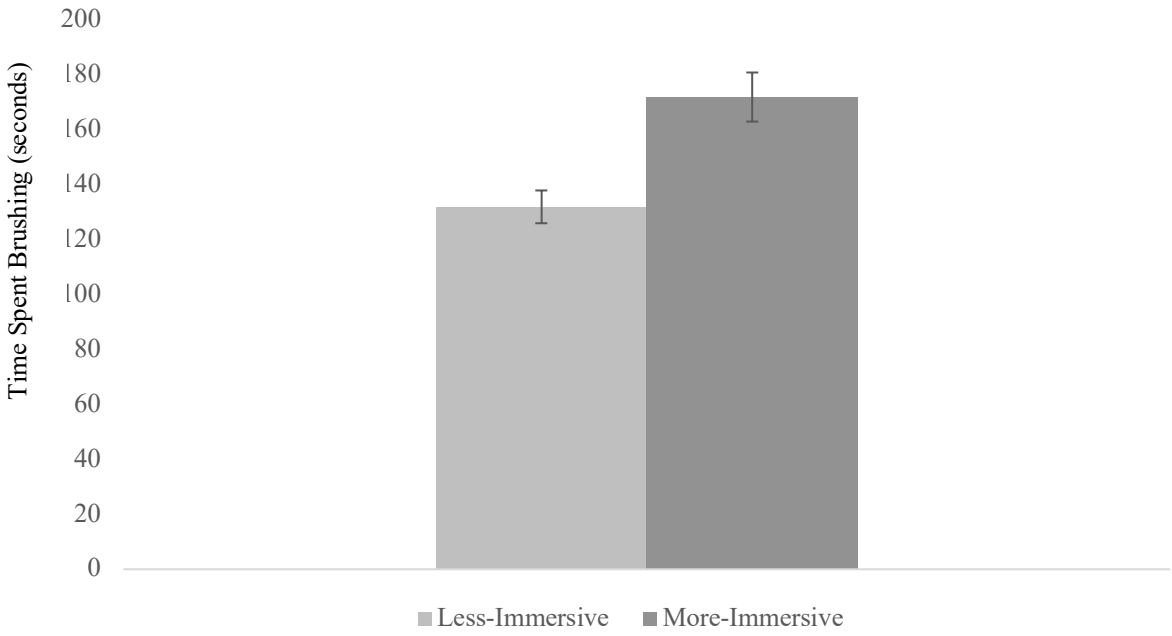


Figure 2.1. Time spent brushing, experiment 1. Error bars represent ± 1 SEM.

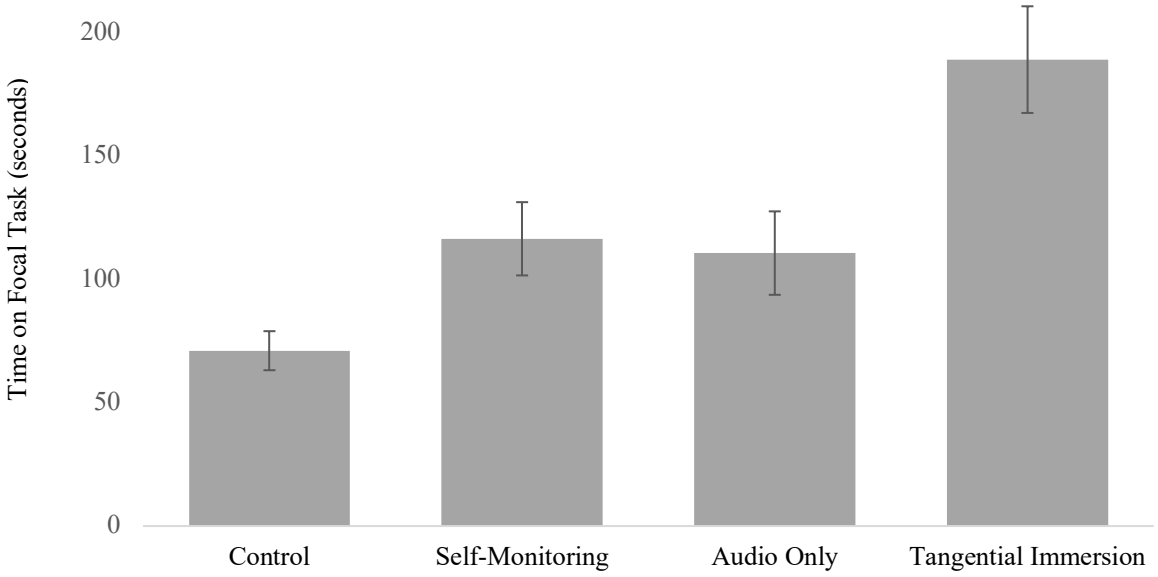


Figure 2.2. Persistence in tasks across conditions, experiment 2. Error bars represent ± 1 SEM.

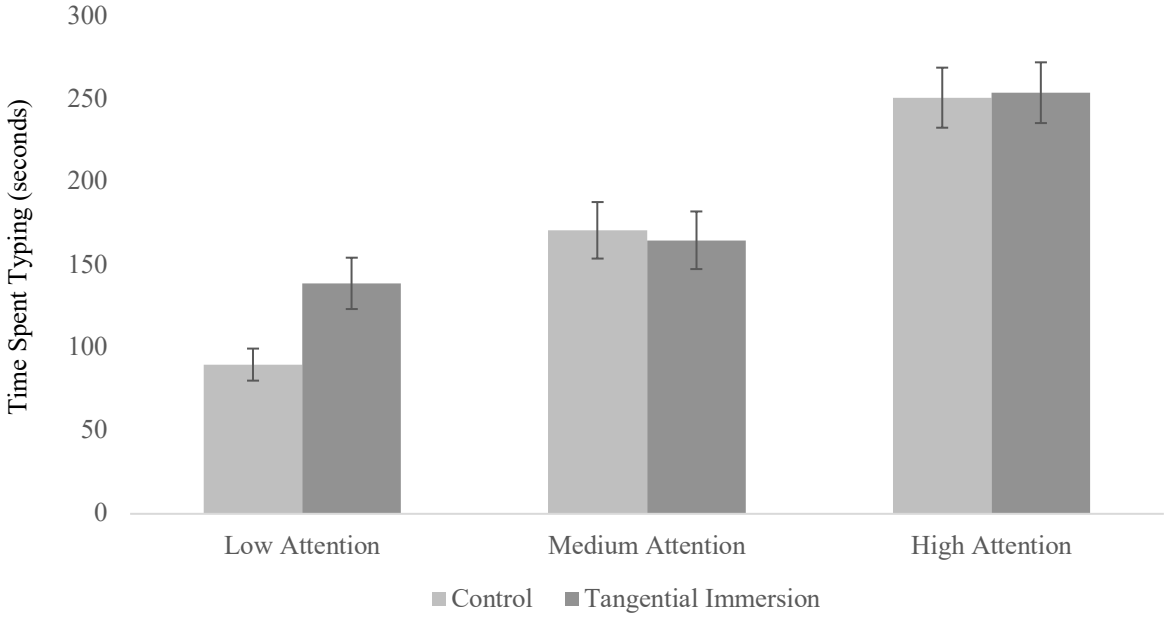


Figure 2.3. Time spent on typing task, experiment 3. Error bars represent ± 1 SEM.

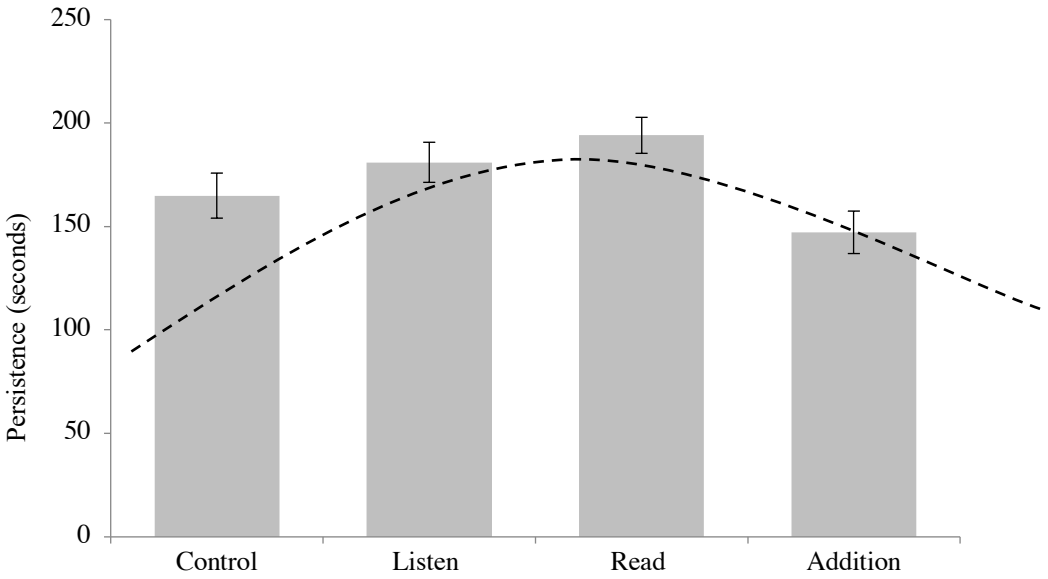


Figure 2.4. Persistence in strength task across conditions, experiment 4B. Error bars represent ± 1 SEM, and the dotted line represents the predicted pattern.

TABLES

Table 2.1. Linear regressions predicting persistence, experiment 1

	Untransformed Time (1)	Logged Time (2)	Untransformed Time + Covariates (3)	Logged Time + Covariates (4)
More-Immersive	39.65*** (10.71)	.18* (.08)	39.58*** (10.72)	.17* (.08)
Ever heard of dry brushing			-13.19 (13.58)	-.08 (.10)
How often brush teeth			-8.92 (8.75)	-.06 (.07)
Constant	132.39*** (7.54)	4.68*** (.06)	190.95*** (40.70)	5.04*** (.31)
# Observations	420	420	420	420
R^2	.03	.01	.04	.02

NOTE.—Standard errors in parentheses. Levels of significance: *$p < .05$, **$p < .01$, ***$p < .001$.

Table 2.2 Linear regressions predicting persistence, experiment 2

	Untransformed Time (1)	Logged Time (2)
Condition: Self-Monitoring	45.37*	.59**
	(21.98)	(.18)
Condition: Audio Only	39.57^{+}	.20
	(22.23)	(.18)
Condition: Tangential Immersion	118.02***	.94***
	(22.06)	(.18)
Constant	71.10***	3.78***
	(15.24)	(.12)
# Observations	294	294
R^2	.09	.10

NOTE.—Standard errors in parentheses. Levels of significance: *$p < .05$, **$p < .01$, ***$p < .001$.

Table 2.3. Linear regressions predicting persistence, experiment 3

	Untransformed Time (1)	Logged Time (2)
Complexity	47.17***	.32***
	(7.04)	(.04)
Tangential Immersion	12.82+	.07+
	(7.04)	(.04)
Complexity*Immersive	-12.08+	-.08*
	(7.04)	(.04)
Constant	161.74***	4.65***
	(7.04)	(.04)
# Observations	686	686
R^2	.07	.11

NOTE.—Standard errors in parentheses. Levels of significance: +$p < .10$ *$p < .05$, **$p < .01$, ***$p < .001$. Complexity (i.e., -1 low-attention vs. 1 medium-attention and high-attention collapsed) and immersion are effect coded (i.e., -1 control vs. 1 tangential immersion) for proper interpretation of the main effects.

Table 2.4. Linear regressions predicting persistence, experiment 4A

	Untransformed Time (1)	Logged Time (2)
Condition: Pleasant	9.17	.06
	(8.13)	(.07)
Condition: Read	17.17*	.17*
	(8.22)	(.08)
Constant	155.63***	4.89***
	(5.75)	(.05)
# Observations	411	411
R^2	.01	.01

NOTE.—Standard errors in parentheses. Levels of significance: *$p < .05$, **$p < .01$, ***$p < .001$.

Table 2.5. Linear regressions predicting persistence, experiment 4B

	Untransformed Time (1)	Logged Time (2)
Condition: Listen	16.09	.18
	(13.92)	(.12)
Condition: Read	29.11*	.21^{+}
	(13.92)	(.12)
Condition: Add	-17.74	-.11
	(14.16)	(.12)
Constant	164.95***	4.97***
	(9.90)	(.08)
# Observations	176	175
R^2	.07	.06

NOTE.—Standard errors in parentheses. Levels of significance: + $p < .10$ *$p < .05$, **$p < .01$, ***$p < .001$.

APPENDIX

EXPERIMENT 1 PRETEST

Prior to running Experiment 1, we conducted a pretest to assess whether our stimuli were indeed considered more (vs. less) immersive.

Method

One hundred one Mturk workers completed a study in exchange for payment. Ninety five participants confirmed watching the video with sound and were thus included in the analysis (67% female, M_{age} = 35.37, SD_{age} = 11.21).

Participants watched a 4-minute clip of one of two videos: (1) Animal Planet: Clash Encounters of Bears and Wolves (more-immersive video); or, (2) a nature video with scenes of nature and pleasant music (less-immersive video). The two videos both contained scenes of nature and audio-visual components. However, the more-immersive video also contained a narrative component, which we predicted would increase its ability to capture and sustain attention.

After watching the video, participants answered a five-item immersion scale meant to measure how much the video captured and sustained their attention: "To what extent did this video capture your attention?" ; "How engaging was this video?" ; "How much was your mind wandering while watching the video (i.e., how much were you thinking about things unrelated to the video?)" ; "How boring was this video?" ; "For how long did it feel like you were watching the video?" on seven-point likert scales (1 = Not at all [Very short time] to 7 = Very [A lot/Very much/Very long time); the last three items were reverse scored. On the next page participants answered three questions measuring how much they enjoyed the video: How pleasant was this video?" ; "How much did you like this video?" ; "How beautiful were the scenes in this video?" on seven-point likert scales (1 = Not at all to 7 = Very [Very much]).

Results

Immersion Scale (α = .85). As predicted, participants who watched the Animal Planet video rated it as significantly more immersive ($M_{more\text{-}immersive}$ = 4.94) than participants who watched the nature video ($M_{less\text{-}immersive}$ = 4.36; $t(92.55) = 2.05$, $p = .04$).

Pleasant and Beautiful. The two items measuring how beautiful and pleasant they found the video were highly correlated and thus collapsed into a single measure of pleasantness (r = .48, p < .001). Participants rated Animal Planet as significantly less pleasant and beautiful ($M_{more\text{-}immersive}$ = 5.26) than participants who watched the nature video ($M_{less\text{-}immersive}$ = 6.01; t(91.67) = -3.42, $p < .001$).

Liking. Participants liked the videos no differently ($M_{more\text{-}immersive}$ = 5.61 vs. $M_{less\text{-}immersive}$ = 5.30; t(91.54) = 1.02, $p = .312$).

Discussion

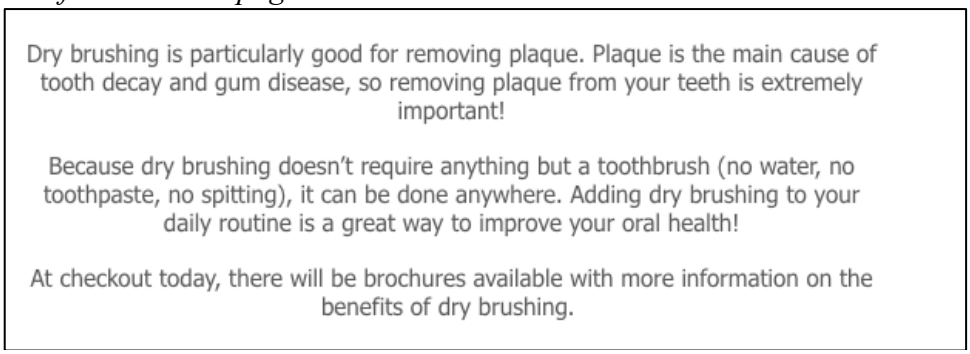
Results of the pretest indicate that participants liked the videos no differently, but thought that the nature video was more beautiful and pleasant than the Animal Planet video. Most importantly, participants rated the Animal Planet video as significantly more immersive than the nature video.

EXPERIMENT 1

Full Text of Experimental Instructions

Screenshot of instructions page 1:

Screenshot of instructions page 2:



Screenshot of instructions page 3:

To dry brush properly, you simply brush with a toothbrush (no toothpaste) until **all of your teeth feel smooth**.

We hope that once you try dry brushing, you will see how clean your teeth feel and will incorporate it into your oral hygiene routine!

Screenshot of instructions page 4:

On the next page, you can try dry brushing for yourself.
While you are dry brushing, we will give you a video to watch.

Dentists recommend that you dry brush for at least 8-10 minutes every day. The longer you brush, the cleaner your teeth will be!

In today's study, **you can dry brush for as long as you want.**

Screenshot of instructions page 5:

Please put on your headphones and unwrap the toothbrush on your desk.
When you are ready, press play on the video and begin brushing your teeth.
Because these brushes are brand new, they may have a slight taste at first, but this will go away after about 5 seconds.

You may brush for as long as you wish, but remember that the longer you brush the better!
When you are done brushing click next.

Recruitment and Attrition

Four hundred forty nine undergraduates participated in exchange for course credit. Twenty nine participants failed the comprehension check and were thus excluded,

consistent with the preregistered exclusion criteria. No other participants were excluded. Therefore, four hundred twenty participants were included in the analysis (59% female, M_{age} = 21.03, SD_{age} = 2.36).

Additional Measures Not Reported in Main Text

The majority of participants (84.52%) reported usually brushing their teeth at least twice a day and never having heard of dry brushing (80.48%). Most participants (96.67%) reported speaking English well or very well.

EXPERIMENT 2

Full Text Instructions

Screenshot of introduction:

Welcome!

In this study, we are interested in learning what makes people persist in activities for longer.

We appreciate your time and attention.

Thank you!

On the next page, participants read: "Life is filled with activities that people should do for longer (e.g., brushing their teeth, exercising, doing chores, etc.). In this study, you will do a task that represents this type of daily activity**."** Participants all then read instructions for their assigned task (screenshots below).

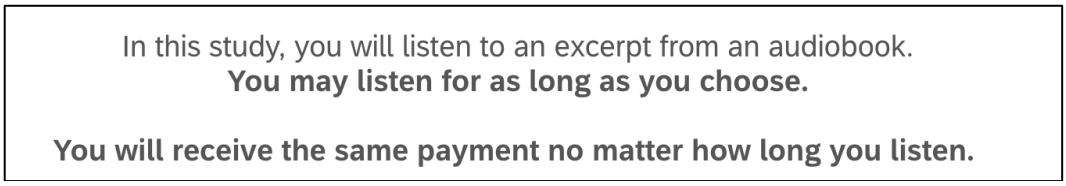
Screenshot of instructions for participants in the control, self-monitoring, and tangential immersion conditions:

The task that you will be doing is typing the letters "zm" as many times as you can.

See the picture below for an example of this typing task:

zmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzm
zmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzmzm

Screenshot of instructions for participants in the audio condition:



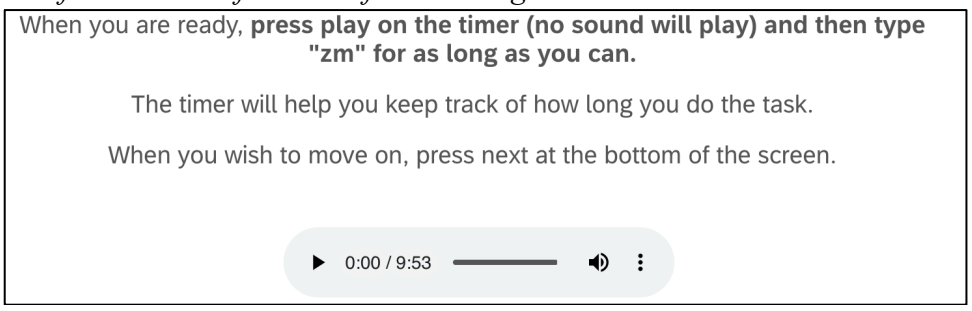
On the next page, participants in the typing conditions read: "We want to see for how long you can persist in this typing task. Please do your best to be as accurate as possible and type the letters in the proper order without using shortcuts (key strokes will be tracked). You will receive the same credit no matter how long you do this task."

Participants in the tangential immersion condition further read: "**<u>While you are typing, you will also listen to an excerpt from an audiobook. Please put your headphones on now.</u>**"

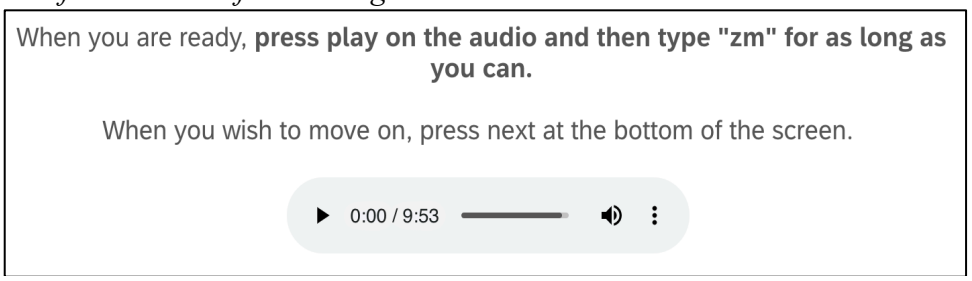
On the next page, participants began the task (screen shots of each condition below).

Screenshot of instructions for the control condition:

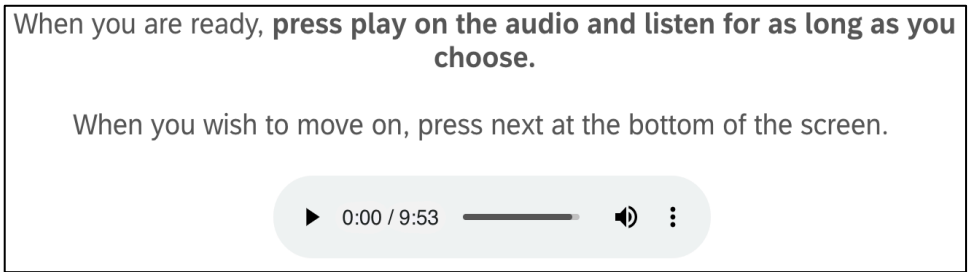
Screenshot of instructions for the self-monitoring condition:



Screenshot of instructions for the tangential immersion condition:



Screenshot of instructions for the audio condition:



Recruitment and Attrition

Four hundred seven Amazon Mechanical Turk workers completed a study in exchange for payment. One hundred thirteen participants failed a comprehension check and were thus excluded, consistent with the preregistered exclusion criteria. A one-way ANOVA revealed that attrition did not vary across conditions ($F(3, 403) = .43$, $p = .733$). Thus, two hundred ninety four participants were included in the analysis.

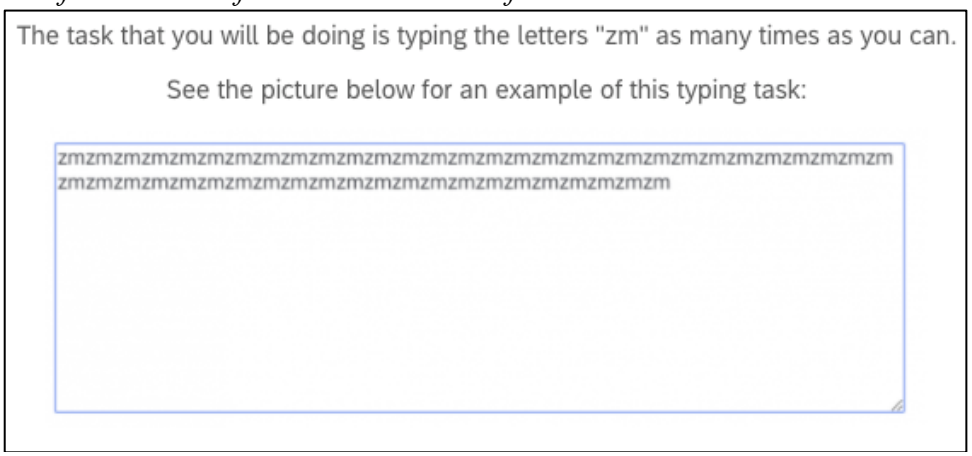
EXPERIMENT 3

Full Text Instructions

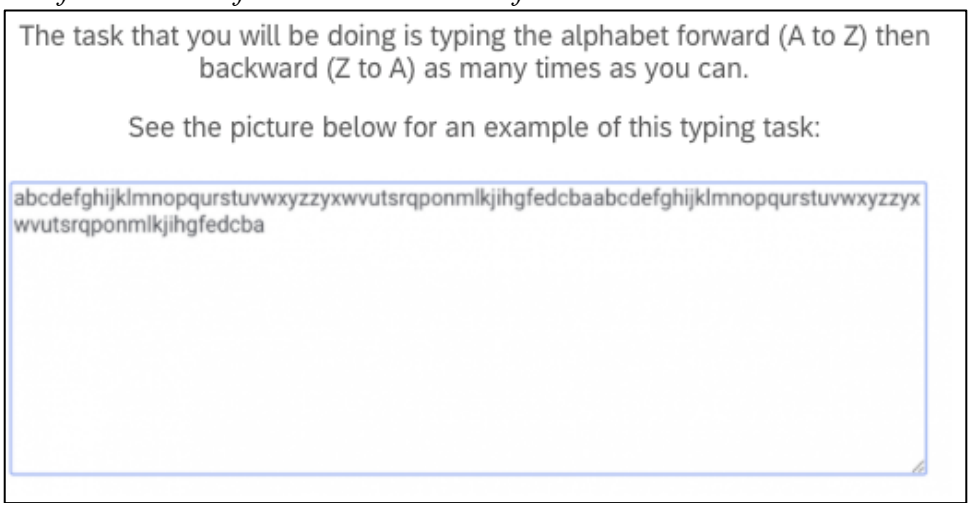
Screenshot of introduction:

On the next page, participants read: "As mentioned, life is filled with activities that people should do for longer. In this study, you will do a task that represents this type of daily activity." Participants then read instructions for their assigned task (screenshots below).

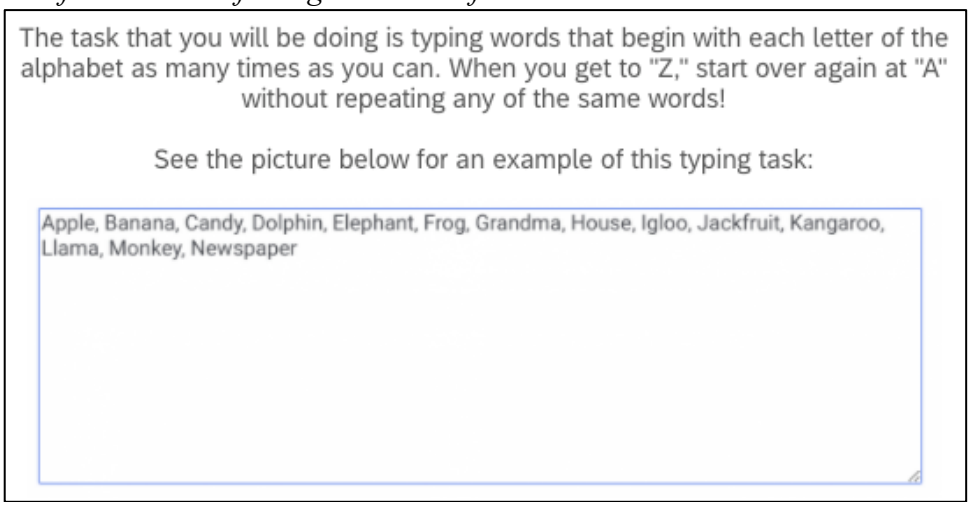
Screenshot of instructions for the low-attention focal task:



Screenshot of instructions for medium-attention focal task:



Screenshot of instructions for high-attention focal task:

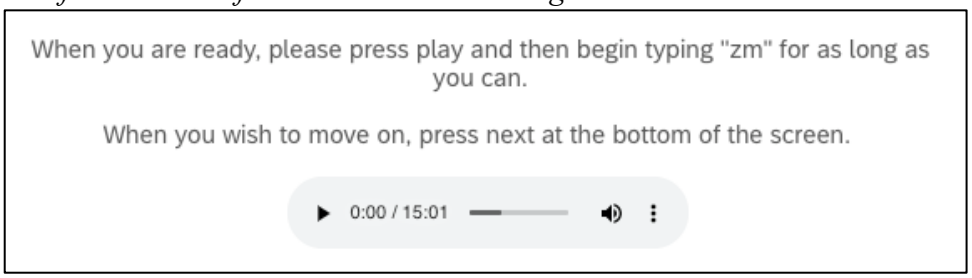


Participants all then read: “We want to see for how long you can persevere in this typing task. Please do your best to be as accurate as possible and type the letters in the proper order without using shortcuts (key strokes will be tracked). You will receive the same credit no matter how long you do this task.”

Participants in the immersed conditions further read: “**While you are typing, you will also listen to an excerpt from an audiobook. Please put your headphones on now.**”

On the next page, participants began the task (screen shots of each condition below).

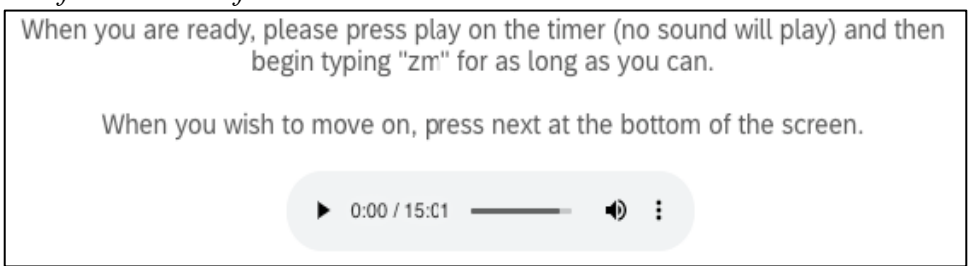
Screenshot of instructions for the low-attention tangential immersion condition:



Screenshot of instructions for the medium-attention tangential immersion condition:

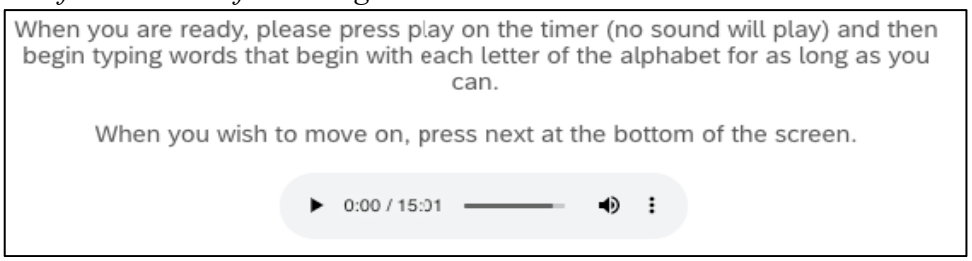
Screenshot of instructions for the high-attention tangential immersion condition:

Screenshot of instructions for the low-attention control condition:



Screenshot of instructions for the medium-attention control condition:

Screenshot of instructions for the high-attention control condition:



Recruitment and Attrition

One thousand ninety two undergraduates participated in exchange for course credit. Four hundred six participants failed the comprehension check and were excluded, consistent with the preregistered exclusion criteria. A one-way ANOVA revealed that attrition varied significantly across condition ($F(5, 1086) = 3.0$, $p = .010$). A post-hoc Tukey test revealed that attrition differed significantly between the low-attention tangential immersion condition and the high-attention control condition ($p = .011$); however, no other comparisons were significant ($ps > .11$). Therefore, six hundred eighty six participants were included in the analysis.

Experiment 3: Robustness Checks and Analyses Not Reported in Main Text

As in the main text, we regressed each of the perception measures on effect-coded complexity (-1 low-attention vs. 1 medium-attention and high-attention collapsed), effect-coded immersion (-1 control vs. 1 tangential immersion), and their interaction.

Typing-Task Enjoyment (r = .91, $p < .001$). Results of the analysis revealed a main effect of complexity (b = .22, t(682) = 3.51, $p < .001$), whereby participants who did the low-attention task found it less enjoyable than the medium-attention and high-attention tasks, no main effect of tangential immersion (b = .07, t(682) = 1.09, $p = .277$), and no interaction (b = .04, t(682) = .60, $p = .549$). Simple effects analyses revealed no simple effects of immersion on perceived enjoyment of the typing task in the low-attention or high attention conditions ($p > .74$) and a marginal effect in the medium-attention condition (b = .37, t(226) = 1.77, $p = .078$).

Boredom scale ($\alpha = .7$). Results of the analysis revealed a main effect of complexity (b = -.26, t(682) = -4.53, $p < .001$), whereby participants who did the low-attention task found it significantly more boring than the medium-attention and high-attention tasks, no main effect of tangential immersion (b = -.00, t(682) = -.02, $p = .986$), and no interaction (b = -.04, t(682) = -.76, $p = .447$). Simple effects analyses revealed no simple effects of tangential immersion on perceived boredom in the low-attention, medium-attention, or high-attention conditions (ps >.50).

Boredom (single item). Results revealed a main effect of complexity (b = -.37, t(682) = -4.08, $p < .001$), whereby participants who did the low-attention task found it significantly more boring than the medium-attention and high-attention tasks, a marginal main effect of tangential immersion (b = -.16, t(682) = -1.82, $p = .070$), and no interaction (b = -.07, t(682) = -.78, $p = .435$). Simple effects analyses revealed a significant simple effect of tangential immersion within the medium-attention condition (b = .71, t(226) = 2.45, $p = .015$), and no simple effects of tangential immersion on perceived boredom within the low-attention or high-attention conditions (ps >.49).

Autopilot. Results revealed a main effect of complexity (b = -.86, t(682) = -12.89, $p < .001$), whereby participants who did the low-attention task perceived the typing task as more automatic than participants in the medium-attention and high-attention tasks, no effect of tangential immersion (b = .01, t(682) = .15, $p = .880$), and no interaction (b = -.06, t(682) = -.83, $p = .409$). Simple effects analyses revealed no significant effect of tangential immersion within the low-attention, medium-attention, or high-attention conditions (ps > .27).

Effort. Results revealed a main effect of complexity (b = .78, t(682) = 11.87, $p <$ .001), whereby participants who did the low-attention task perceived the typing as less effortful than participants in the medium-attention and high-attention tasks, a marginal effect of tangential immersion (b = .12, t(682) = 1.79, $p = .074$), and no interaction (b = -.04, t(682) = -.61, $p = .542$). Simple effects analyses revealed no effect of tangential immersion within the low-attention, medium-attention, or high-attention conditions (ps > .15).

Additional Measures. Participants also reported whether they have ever read or listened to *The Hobbit* (Yes, No, Not sure) and how well they speak English (very well,

well, not well, not at all). The majority of participants (67.5%) had neither read or listened to *The Hobbit*, about one-third of participants had (29.0%), and a few (3.5%) were unsure. In response to the English-proficiency measure, 97.7% of participants indicated speaking English well or very well.

EXPERIMENT 3B (CONCEPTUAL REPLICATION)

Experiment 3B sought to conceptually replicate experiment 3 (in the main text) with an online population and a different tangential task. In this experiment, participants performed either a low-attention or high-attention task. We again predict that tangential immersion will increase persistence in a low-attention task but not in a high-attention task.

Method

Prior to data collection, this study was preregistered (http://aspredicted.org/blind.php?x=xr4pz8). Eight hundred Amazon Mechanical Turk workers completed a study in exchange for payment. Three entries were determined to be computer bots and were thus removed. An additional 221 participants failed the comprehension check and were thus excluded, consistent with the preregistered exclusion criteria. Attrition did not differ across conditions, $F(3, 793) = 1.45$, $p = .228$. Thus, five hundred seventy six participants were included in the analysis (53% female, $M_{age} = 35.93$, $SD_{age} = 10.17$).

Participants read the same introduction and instructions as in experiment 3, but in a 2 (tangential immersion vs. control) x 2 (low-attention vs. high-attention) design. Participants were assigned to either do a typing task that required very little attention (type "zm" repeatedly) or a typing task that required a higher level of attention (typing the alphabet forward then backward repeatedly; these tasks were the same at the low-attention and medium-attention tasks in experiment 3). Participants then read: "We want to see for how long you can persevere in this typing task. Please do your best to be as accurate as possible and type the letters in the proper order without using shortcuts (key strokes will be tracked). You will receive the same pay no matter how long you do this task." Half of the participants further read: "while you are typing, you will also listen to an excerpt from an audiobook." Participants in this condition listened to a clip from the John Grisham book *A Time to Kill*.

On the next page, participants saw a media player with a 5:58 minute play time (in the tangential immersion conditions the media player played the audiobook clip, and in the control conditions no sound played and this simply served as a timer). The media player was included so that participants in both conditions would see a timer and would be asked to press a button before starting. Participants were instructed to press play, begin typing for as long as they could, and to press next at the bottom of the screen when they wished to move on.

After the typing task, participants responded to several manipulation checks asking how they felt while doing the typing task: "How fun was the typing task?" , "To what extent did you enjoy the typing task?" , "How effortful was the typing task?" , "To what

extent did it feel like you were typing on autopilot?" on seven-point likert scales (1 = Not at all to 7 = Very [A lot]). Next, participants responded to the 29-item Multidimensional State Boredom Scale (α = .96; Fahlman, Mercer-Lynn, Flora, & Eastwood 2013). Finally, participants indicated to what extent they were curious to hear how the clip ended (1 = Not at all to 7 = Very). Participants in the tangential immersion conditions were further asked to select which statement was true based on the story they heard (a dead man was hanging from a tree, a teacher was angry at her students, a farm had a tough winter, I didn't listen). No exclusions were made based on the listening check as incorrect responses may have been a result of focusing on the focal task (as opposed to not listening to the clip). Participants then responded to a comprehension check asking them for how long they were asked to do the typing task (for as long as I wished, for about 6 minutes, for at least 2 minutes, not sure; participants who failed this measure were excluded). Finally, participants reported their gender identity and age.

Results

Manipulation Checks. We regressed each of the perception measures on effect-coded complexity (-1 low-attention vs. 1 high-attention), effect-coded immersion (-1 control vs. 1 tangential immersion), and their interaction.

Task Enjoyability. The two items measuring perceived fun and enjoyability of the task were collapsed into a single item measuring typing-task enjoyment (r = .95, $p < .001$). The analysis revealed a marginal main effect of complexity, whereby low-attention participants enjoyed the typing task more (b = -.12, t(572) = -1.64, $p = .101$). There was also a marginal main effect of tangential immersion, whereby immersed participants enjoyed the typing-task more (b = .13, t(572) = 1.74, $p = .082$). These effects were qualified by a significant interaction such that tangential immersion moderated the effect of task complexity on enjoyment of the task (b = -.16, t(572) = -2.19, $p = .029$). Simple-effects analyses revealed that tangential immersion significantly increased typing-task enjoyment among participants who did the low-attention task ($M_{immersion} = 2.73$ vs. $M_{control} = 2.15$; b = .58, t(311) = 2.83, $p = .005$). Tangential immersion, however, did not affect typing-task enjoyment among participants who did the high-attention task ($M_{immersion} = 2.17$ vs. $M_{control} = 2.23$; b = -.07, t(261) = -.315, $p = .753$).

Autopilot. Results of the analysis revealed a main effect of complexity (b = -.95, t(572) = -12.49, $p < .001$), whereby participants who did the low-attention task reported feeling more on auto-pilot when doing the task, no main effect of tangential immersion (b = .09, t(572) = 1.23, $p = .218$), and no interaction (b = .00, t(572) = .04, $p = .967$). Simple effects analyses revealed no effect of tangential immersion within the different levels of complexity ($ps > .33$).

Effort. Results of the interaction analysis revealed a main effect of complexity (b = .51, t(572) = 6.69, $p < .001$), whereby participants who did the low-attention task reported the task as less effortful compared to participants who did the high-attention task, no main

effect of tangential immersion (b = .10, t(572) = 1.28, p = .202), and no interaction (b = -.01, t(572) = -.07, p = .942). Simple effects analyses revealed no effect of tangential immersion within the different levels of complexity (ps > .35).

Multidimensional State Boredom Scale. Results of the interaction analysis revealed no simple effects, main effects, or interactions between tangential immersion and complexity on the 29-item boredom scale (ps > .39).

Curiosity (Engagement) and Listening Check. Among participants who listened to the story, participants in the low-attention condition (vs. high-attention) reported being marginally more curious to hear how the clip ended ($M_{low\text{-}attention}$ = 3.35 vs. $M_{high\text{-}attention}$ = 2.92; t(277.47) = 1.60, p = .112) and were marginally more likely to correctly respond to the listening check asking them about the content of the clip ($M_{low\text{-}attention}$ = 78.06% vs. $M_{high\text{-}attention}$ = 68.94%; t(265.38) = 1.74, p = .083). Moreover, curiosity in the clip significantly correlated with persistence in the typing task (b = 33.10, t(285) = 12.24, p < .001).

Persistence. Simple-effects analyses revealed that within the low-attention conditions, participants in the tangential immersion condition persisted for significantly longer ($M_{immersion}$ = 155 seconds) than participants in the control condition ($M_{control}$ = 112 seconds; untransformed: b = 42.16, t(311) = 3.06, p = .002; log-transformed: b = .24, t(311) = 2.21, p = .028). On the other hand, within the high-attention conditions there was no simple effect of tangential immersion on persistence ($M_{immersion}$ = 148 seconds vs. $M_{control}$ = 138 seconds; untransformed: b = 9.43, t(261) = .67, p = .507; log-transformed: b = .01, t(261) = .07, p = .944; see Figure A2.1).

We regressed time spent on effect-coded complexity (-1 low-attention vs. 1 high-attention), immersion (-1 control vs. 1 tangential immersion), and their interaction. The analysis revealed no main effect of complexity for untransformed data and a significant main effect of complexity when log-transformed (untransformed: b = 4.66, t(572) = .936, p = .350; log-transformed: b = .08, t(572) = 2.04, p = .042), a main effect of tangential immersion (untransformed: b = 12.90, t(572) = 2.59, p = .01; log-transformed: b = .06, t(572) = 1.60, p = .111), whereby participants who listened to an immersive story spent more time on the task, qualified by a marginal interaction for untransformed data and a nonsignificant interaction when log-transformed (untransformed: b = -8.18, t(572) = -1.65, p = .100; b = -.058, t(572) = -1.50, p = . 134; see Table A2.1).

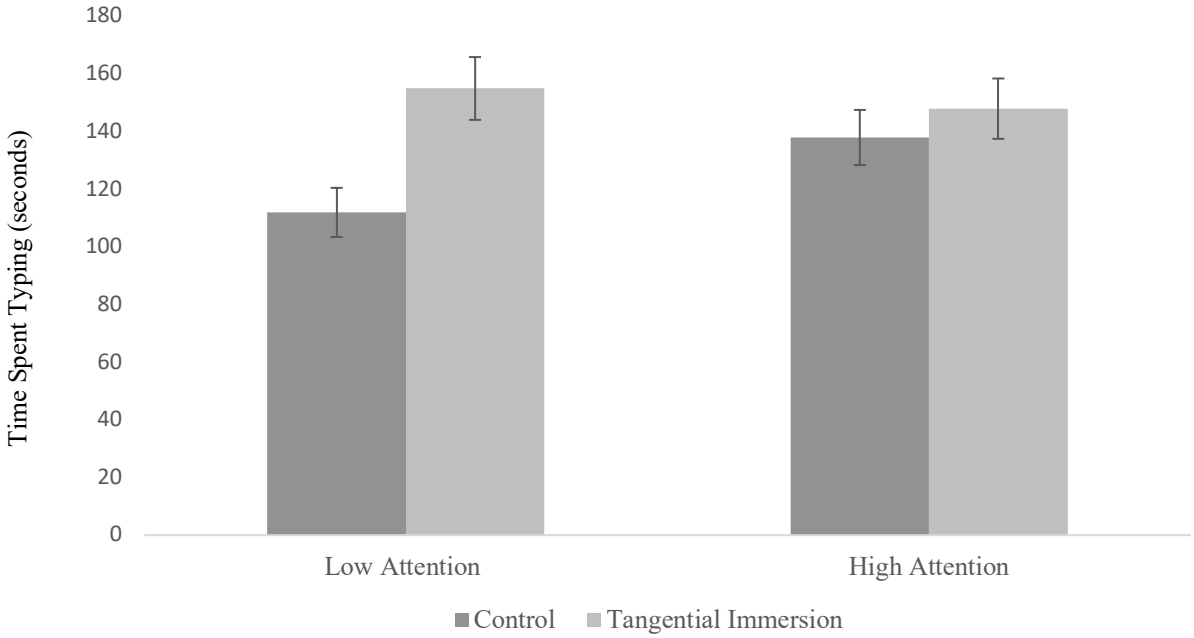


Figure A2.1. Time spent on typing task, experiment 3B. Error bars represent ± 1 SEM

Table A2.1. Linear regressions predicting persistence, experiment 3b

	Untransformed Time (1)	Logged Time (2)
Complexity	4.66	.08*
	(4.97)	(.04)
Tangential Immersion	12.90**	.06
	(4.97)	(.04)
Complexity*Tangential Immersion	-8.18	-.06
	(4.97)	(.04)
Constant	138.14***	4.55***
	(4.97)	(.04)
# Observations	576	576
R^2	.02	.02

NOTE.—Standard errors in parentheses. Levels of significance: *$p < .05$, **$p < .01$, ***$p < .001$. Complexity (i.e., -1 low-attention vs. 1 high-attention) and

immersion (i.e., -1 control vs. 1 tangential immersion) are effect coded for proper interpretation of the main effects.

Characters Typed. Within the low-attention conditions, participants who listened to the immersive story typed significantly more characters compared to participants who listened to nothing ($M_{immersion} = 667$ vs. $M_{control} = 510$; b = 156.79, t(311) = 2.34, $p = .020$). Contrary to predictions (and unlike experiment 3 in the main text), tangential immersion also increased number of characters typed within the high-attention conditions ($M_{immersion} = 201$ vs. $M_{control} = 150$; b = 50.66, t(261) = 2.03, $p = .043$).

A regression analysis predicted numbers of characters typed from effect coded complexity (-1 low-attention vs. 1 high-attention) and immersion (-1 control vs. 1 tangential immersion), and their interaction. The analysis revealed a significant main effect of complexity (b = -206.31, t(572) = -10.78, $p < .001$), whereby participants who did the low-attention task typed more characters than participants who did the high-attention task, a significant main effect of tangential immersion (b = 51.86, t(572) = 2.70, $p = .007$), whereby participant who listened to an immersive story typed more characters, qualified by a nonsignificant interaction (b = -26.53, t(572) = -1.38, $p = .167$).

Error rate. To test whether tangential immersion impacted performance, we calculated a rate of typing errors using the same algorithms described in experiment 3[27] in the main text. Tangential immersion did not increase error rates for participants in the low-attention ($M_{immersion} = 5.04$ vs. $M_{control} = 4.07$; t(297.08) = .51, $p = .612$) or high-attention ($M_{immersion} = 1.66$ vs. $M_{control} = .77$; t(141.76) = 1.43, $p = .156$) conditions.

Discussion

Experiment 3B replicates the effect of experiment 3 in the main text with a different population and a different tangential task, thus further supporting our hypothesis that tangential immersion increases persistence, but only when the focal task requires low levels of attention (i.e., it can be done rather automatically).

In this experiment, participants who were tangentially immersed while doing the low-attention task reported enjoying the typing task more than participants in the control condition. This result is consistent with previous findings that people attribute the negative affect associated with boredom to the task at hand (Critcher and Gilovich 2008; Damrad-Frye and Laird 1989; Fisher 1993). However, because the post-hoc perception measures do not replicate consistently across experiments, we do not speculate further about these results.

Participants who did the low-attention task reported marginally more curiosity in the story than participants who did the high-attention task. Moreover, curiosity significantly correlated with persistence—suggesting that the more attention participants allocated to the tangential task, the longer they persisted in the focal task. While tangential immersion did not increase persistence (time spent on task) among participants in the high-

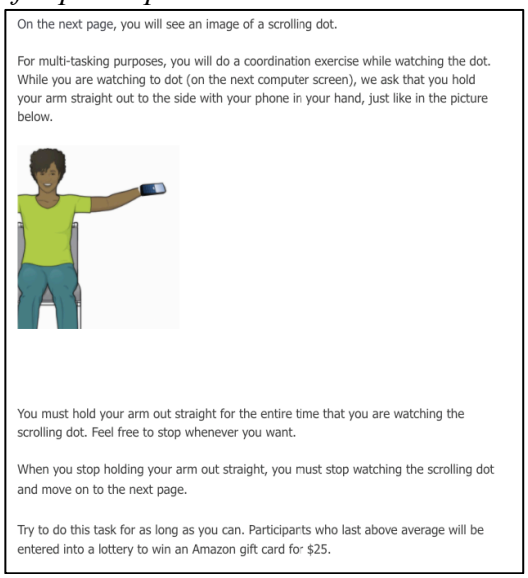
[27] For the algorithms to run properly, participants who chose not to type any characters had to be excluded (this excludes 6 participants total).

attention conditions, it did slightly increase the number of characters participants typed. This result may suggest that the high-attention task was slightly more automatic for this population than expected.

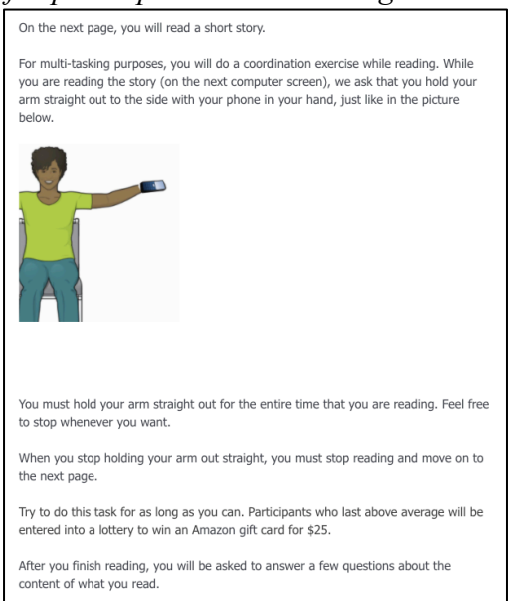
EXPERIMENT 4A

Full Text Instructions

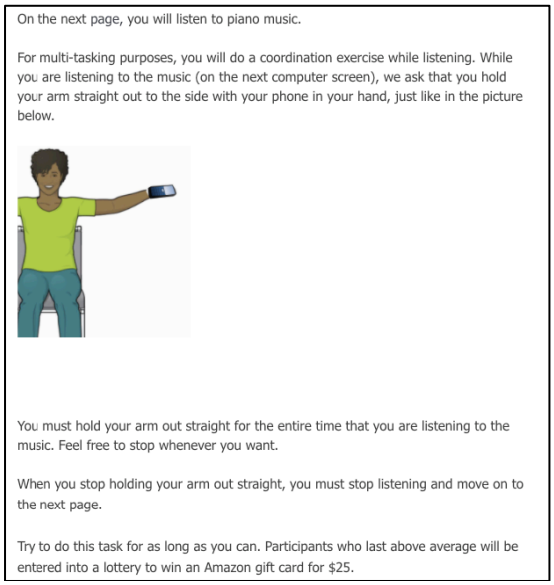
Screenshot of instructions for participants in the control condition:



Screenshot of instructions for participants in the reading condition:



Screenshot of instructions for participants in the pleasant condition:

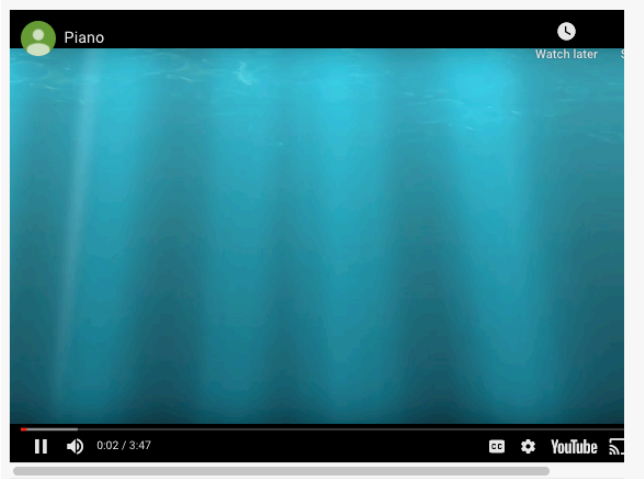


On the next page, participants held out their arm while doing the tangential task (screen shots below of the video each participant watched).

Screenshot of the control condition tangential task:

Screenshot of the reading condition tangential task:

Screenshot of the pleasant condition tangential task (piano music played):



Robustness Checks and Additional Measures Not Reported in Main Text

Additional Measures. Prior to running each participant, the RA recorded which breakout room they were in, their own (the RA's) gender, and their own (the RA's) initials. The measure of persistence remains significantly greater in the reading condition (vs. control condition), when controlling for each of these items (*ps* < .039).

Robustness Checks. As robustness checks, participants indicated the size of their phone (large screen/small screen), their handedness (right, left, ambidextrous), and which arm they held out. The majority of participants reported being right-handed (91%), holding out their right arm (42%), and having a large-screen phone (68%). The persistence measure remains significantly different in the reading condition (vs. control) when controlling for the size of their phone and their handedness (*ps* < .035) and is marginal when controlling for which arm they held out (*p* = .070).

EXPERIMENT 4B

Full Text Instructions

Screenshot of instructions for participants in the control condition:

On the next page, you will see an image of a scrolling dot.

For multi-tasking purposes, you will do a coordination exercise while watching the dot. While you are watching to dot (on the next computer screen), we ask that you hold your arm straight out to the side with your phone in your hand, just like in the picture below.

You must hold your arm out straight for the entire time that you are watching the scrolling dot. Feel free to stop whenever you want.

When you stop holding your arm out straight, you must stop watching the scrolling dot and move on to the next page.

Try to do this task for as long as you can. Participants who last above average will be entered into a lottery to win an Amazon gift card for $25.

Screenshot of instructions for participants in the listening condition:

On the next page, you will listen to a short story.

For multi-tasking purposes, you will do a coordination exercise while listening. While you are listening to the story (on the next computer screen), we ask that you hold your arm straight out to the side with your phone in your hand, just like in the picture below.

You must hold your arm out straight for the entire time that you are listening. Feel free to stop whenever you want.

When you stop holding your arm out straight, you must stop listening and move on to the next page.

Try to do this task for as long as you can. Participants who last above average will be entered into a lottery to win an Amazon gift card for $25.

After you finish listening, you will be asked to answer a few questions about the content of what you heard.

Screenshot of instructions for participants in the reading condition:

On the next page, you will read a short story.

For multi-tasking purposes, you will do a coordination exercise while reading. While you are reading the story (on the next computer screen), we ask that you hold your arm straight out to the side with your phone in your hand, just like in the picture below.

You must hold your arm straight out for the entire time that you are reading. Feel free to stop whenever you want.

When you stop holding your arm out straight, you must stop reading and move on to the next page.

Try to do this task for as long as you can. Participants who last above average will be entered into a lottery to win an Amazon gift card for $25.

After you finish reading, you will be asked to answer a few questions about the content of what you read.

Screenshot of instructions for participants in the addition condition:

On the next page, you will add a list of numbers.

For multi-tasking purposes, you will do a coordination exercise while adding. While you are adding the list of numbers (on the next computer screen), we ask that you hold your arm straight out to the side with your phone in your hand, just like in the picture below.

You must hold your arm out straight for the entire time that you are adding numbers. Feel free to stop whenever you want.

When you stop holding your arm out straight, you must stop adding the numbers and move on to the next page.

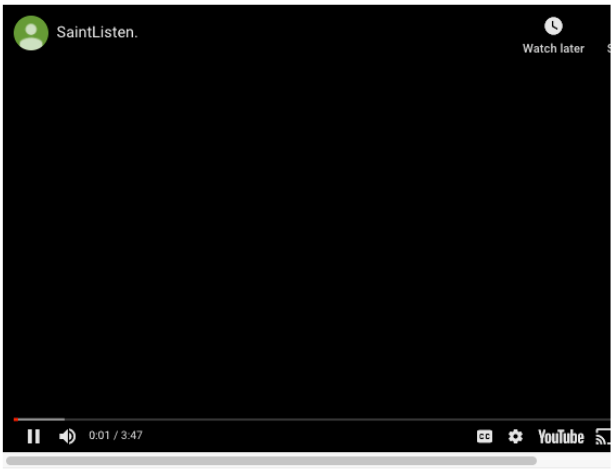
Try to do this task for as long as you can. Participants who last above average will be entered into a lottery to win an Amazon gift card for $25.

After you finish adding, you will be asked to enter the total number that you summed.

On the next page, participants held out their arm while doing the tangential task (screen shots below of the video each participant watched/listened to).

Screenshot of the control condition tangential task:

Screenshot of the listening condition tangential task (audio played):



Screenshot of the reading condition tangential task:

Screenshot of the addition condition tangential task:

Robustness Checks and Additional Measures Not Reported in Main Text

Additional Measures. Prior to running each participant, the research assistant (RA) recorded which breakout room they were in, their own (the RA's) gender, and their own (the RA's) initials. Persistence (time spent holding out arm) remains significantly longer in the reading condition (vs. control condition), when controlling for each of these measures (*ps* < .040).

Robustness Checks. As robustness checks, participants indicated the size of their phone (large screen/small screen), their handedness (right, left, ambidextrous), and which arm they held out. The majority of participants reported being right-handed (89%), holding out their right arm (33%), and having a large-screen phone (68%). Persistence in the reading condition (vs. control) remains consistently longer when controlling for these measures (*ps* < .039).

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Chapter 3.

STUCK IN A RUT: THE BEHAVIORAL ENTRENCHMENT EFFECT

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ABSTRACT

This research examines a perplexing but all too common phenomenon in which consumers actively forego nearly costless opportunities to switch from less preferred activities to preferred alternatives. The authors investigate such behavior-change failures and identify a novel underlying cause: behavioral entrenchment, a state of increasing task set accessibility that makes switching feel more costly. Five experiments demonstrate that a significant subset of participants actively choose to continue a less-preferred task when given an opportunity to change to a preferred alternative (Studies 1-4). The more participants perform the less-preferred task, the costlier it feels to change, increasing the proportion who do not switch (Studies 2a-2b). However, disrupting engagement in the task—by dividing attention or performing intermixed tasks—attenuates entrenchment, thereby increasing the likelihood of switching to a preferred alternative (Studies 3-4). More generally, this research deepens our understanding of why consumers get stuck in ruts, continuing less-preferred activities when they could easily switch to better alternatives, and provides insights to help manage customer behavior change.

INTRODUCTION

Consumers often get stuck in ruts, continuing unfavorable activities when they could easily switch to preferred alternatives. We deem such behaviors—continuing less-preferred activities while passing up clear opportunities for improvement—change failures. Consumers' daily lives are filled with instances of change failures—envision a shopper awkwardly juggling an armful of groceries as they walk through a store rather than grabbing a nearby cart; or, think about a consumer struggling to make a purchase on their phone rather than switching to a nearby computer where they could navigate the site more easily; finally, consider someone laying on the couch and continuing to consume a TV program that they are not enjoying, rather than switching to the fun book sitting right next to them on the side table. In a survey of 118 adults, 94% reported having experienced change failures, and over 50% said they find themselves exhibiting this behavior at least once a week. Change failures are perplexing and important, detracting from consumer, organizational, and societal well-being.

Consider Joe, who decides to spend an hour taking online surveys to earn money and finds his assigned task rather unenjoyable. Partway through, Joe is given an opportunity: continue the unpleasant task or switch to an alternative he prefers for the same length of time and the same pay. While common sense suggests that Joe would switch to his preferred alternative, we propose that this may not necessarily be the case—rather, we predict that Joe may choose to continue the less preferred task and remain stuck in a rut. In other words, he may exhibit a change failure.

In this research, we seek to better understand change failures by studying the scenario that Joe faced: we pay participants to do a tedious task and test what happens when we give them the chance to switch to a task they prefer for the same pay. While a naive observer might expect everyone to switch, we predict and find that a significant subset continues the tedious task. We investigate this phenomenon and explore behavioral entrenchment—a novel underlying process that explains such change failures. Specifically, we propose that continued engagement in a task can lead to behavioral entrenchment—a state of increasing task-set accessibility. As entrenchment deepens, the task procedures become increasingly accessible—that is, the ease with which they come to mind—and the accessibility of alternative task procedures decreases. As a result, switching to a different task *feels* more costly than continuing with the highly accessible task, and change failures become more likely. This *feeling of cost* can help to explain the change-failures mentioned above. For the shopper, it *feels easier* to continue piling groceries in their arms rather than breaking out of their rhythm to go get a cart; for the consumer making a purchase on their phone, it *feels easier* to struggle with the task at hand than to mentally reconfigure and switch to the computer interface; for the person watching TV, it *feels easier* to continue binging rather than turning off their TV-brain and turning on their reading-brain. And, for Joe, it *feels easier* to simply continue with the tedious—but mentally activated—task rather than switch to an alternative he prefers. Note that while we expect entrenchment can arise when engaging in both desirable and undesirable tasks, we specifically study the latter, where continuation is counterintuitive.

While a variety of reasons are known to cause consumers to stick with existing courses of action, none parsimoniously explains the change failures that we investigate. For example, consumers may *passively* remain with an existing option, even when it is inferior, because of ingrained habits (Ouellette and Wood 1998; Wood, Quinn, and Kashy 2002), having bypassed opportunities for improvement (i.e., inaction inertia; Brigden and Häubl 2020; Tykocinski, Pittman, and Tuttle 1995), inattention to outside options (Suri and Gross 2015), or a lack of readiness to begin the focal behavior (Suri, Sheppes, and Gross 2015). Consumers may also fail to act in their best interest as a result of sunk costs (Arkes and Blumer 1985), defaults (Madrian and Shea 2001; McKenzie, Liersch, and Finkelstein 2006), felt losses, substantial transaction costs, or anticipated regret (Samuelson and Zeckhauser 1988). Yet these effects and associated mechanisms cannot parsimoniously explain the behavior we examine. In our studies, participants do not engage in the activity long enough to form a habit, they had not previously made decisions or passed up opportunities to improve their state (i.e., they are not acting out of consistency or inaction inertia), the forgone task is familiar and has been recently performed (i.e., they are ready to perform it), there are no potential losses (i.e., no sunk costs), transaction costs are equated, and they actively choose whether to continue the less-preferred task or to switch to a preferred alternative (i.e., there is no clear default and they cannot passively stay). Nonetheless, a significant proportion of participants in our studies fail to switch to their preferred task.

In sum, our research adds a novel mechanism explaining why consumers often fail to change suboptimal behaviors despite preferable, and easily obtainable, alternatives (e.g.,

grabbing a shopping cart, switching to a computer, or picking up that good book). Importantly, we believe that in addition to explaining the types of change failures we study, entrenchment may also be a novel contributing factor to a wide range of instances, including the abovementioned biases in which consumers fail to make beneficial changes (e.g. status-quo bias). We thus contribute to the marketing literature and provide insights about contexts in which consumers fail to change their behaviors.

THEORETICAL FOUNDATION

The tendency to stick with existing choices or behaviors has been studied extensively in the fields of Social Psychology, Economics, Judgment and Decision Making, and Marketing—as noted above. In this section, we draw on cognitive and clinical psychology as well as consumer behavior research to build our theory of behavioral entrenchment and highlight it as an important driver of change failures. Notably, while the change failures we study cannot be attributed to these aforementioned phenomena, we suggest that behavioral entrenchment may be a previously unrecognized contributing mechanism to them.

The change failures we investigate are a form of perseveration—the continuation or repetition of a thought or behavior, even when it is no longer desirable or beneficial. Forms of perseveration have been documented in a range of clinical and cognitive contexts (e.g., Luchins 1942; Sandson and Albert 1984). Indeed, transferring a structure or solution from one situation to another is common in learning, problem-solving, consumer experience,

new product development, and creativity paradigms (Dahl and Moreau 2002; Gentner 1983; Gick and Holyoak 1983; Goode, Dahl, and Moreau 2010; Jansson and Smith 1991; Marchant et al. 1991). For example, once a problem-set has been solved, people often try and apply the same solution to future problems, even when simpler or better solutions exist (i.e., the Einstellung Effect; Luchins 1942). Another related example is functional fixedness, in which the tendency to fixate on previously learned uses for objects or concepts limits one's ability to recognize nontraditional or novel ways to use them (Duncker 1945).

Such maladaptive persistence has been attributed to cognitive resource competition, in which the increased accessibility of one mental structure, such as a schema or cognitive set, inhibits that of another. Schemas, mental representations or scripts, become more accessible with frequent activation (Bargh and Pietromonico 1982) and once stable, are resistant to change (Crocker, Fiske, and Taylor 1984). Schemas are activated, and thus highly accessible, in familiar contexts and often guide actions and behaviors (Norman and Shallice 1986). In this way, our mental representations allow us to navigate the world in a less cognitively taxing and more efficient manner. However, because mental resources are limited (Kahneman 1973), the activation or retrieval of one mental structure can reduce that of another (Hommel 2015). For instance, when asking individuals to recall items from a previously viewed list, those who are given cues (e.g., shown some items on the list) have poorer recall of the non-cued items than those who were given no reminders at all—an effect attributed to the increased accessibility of cued items blocking retrieval of the other items on the list (Bäuml and Aslan 2004). Thus, the accessibility of mental

representations can, at times, also lead to suboptimal outcomes. For instance, a leading explanation for the Einstellung Effect—people using a previously learned approach to try and solve a problem even when better solutions exist—is that previously learned solutions are the first that come to mind, blocking alternative approaches (Bilalić, McLeod, and Gobet 2008). Indeed, stabilized schemas have been proposed as an explanation for why experts are often inflexible in devising problem-solving strategies, adapting to new situations, and generating creative ideas within their domain of expertise (Dane 2010). That is, as expertise increases, so does the strength of one's domain schemas—these schemas are highly accessible and first to come to mind, blocking other approaches or considerations.

A similar concept has received attention in the consumer behavior literature—most often under the term *mindset*. Mindsets involve increased accessibility of connected cognitive processes (Wood 2010) and the activation of these processes can persist across tasks and contexts (Malkoc, Zauberman, and Bettman 2010). The effect of various mindsets—e.g., deliberative versus implemental (Gollwitzer and Mayer 1999), concrete versus abstract (Malkoc, Zauberman, and Bettman 2010; White, MacDonnell, and Dahl 2011)—have been shown to influence a range of important consumer decisions and behaviors. Most often, this research has examined how activating a given mindset affects subsequent decisions and behaviors in unrelated scenarios (Wyer and Xu 2010), such as purchase decisions (Chandran and Morwitz 2005; Dhar, Huber, and Khan 2007; Levav, Reinholtz, and Lin 2012; Xu and Wyer 2008), consumption choices (e.g., food selection; Wood 2010), product acquisition (Xu, Schwarz, and Wyer 2015), decision-making

strategies (Ülkümen, Chakravarti, and Morwitz 2010), creativity (Moreau and Engeset 2016), and responses to persuasive messages (Xu and Wyer 2012). Although this previous research focuses primarily on the role of activated mindsets on subsequent processes—whereas the current research investigates the role of activated task-set procedures within a continuous context—we draw on this literature to support the notion that cognitive processes and procedures, once activated, become more accessible and thus influence important consumer decisions.

Building on this research, we suggest that a similar cognitive process underlies behavioral entrenchment. Namely, the more a person repeats a task, the more accessible the task's procedures become, decreasing the accessibility of other task-set procedures. Because that which is more accessible comes to mind with greater ease–while that which is less accessible is harder to mentally construct–continuing with the activated task set *feels* easier, while switching to a non-activated task set *feels* more costly. Consumers often derive information from their feelings (Schwarz 2011), and the emotions associated with cognitive processes can drive judgments and behaviors (Schwarz 1990; 2000; 2004). We therefore predict that the more consumers engage in a task, even a tedious one, the more costly switching will feel and the less likely they will be to do so. Note that our predictions are not in contrast to the task-switching literature, which finds that both task and mindset switching can indeed come with cognitive or psychic costs—often manifested by lower accuracy, greater response times, or depleted resources (Hamilton et al. 2011; Monsell 2003). Rather, in this research we focus on the *felt* cost of switching and investigate

scenarios in which any minor costs (e.g., a few milliseconds slower response time on the first trial after switching) are far outweighed by the benefit of the change.

Becoming entrenched requires task engagement. This research focuses on two key determinants of engagement: attention and continuity. First, for a task set to activate and stabilize, attention must be paid to the task. That is, entrenchment requires attention. Attempting to engage in more than one task concurrently, for example, limits the ability to attend to or process any single task (Pashler 1994), restricting the activation of the task set. Second, mental representations are strengthened through repeated activation (Schwarz et al. 1991; Tversky and Kahneman 1973), and are thus reinforced as task performance continues. When alternating between tasks, on the other hand, people must reconfigure the task set with each switch (Kiesel et al. 2010; Vandierendonck, Christiaens, and Leifooghe 2008)—inhibiting the stabilization of a single task set. We thus predict that disrupting either component of engagement—either limiting attention or breaking repetition—will attenuate entrenchment and reduce change failures.

THE CURRENT RESEARCH

The present research illustrates that the more consumers engage in a task—even one that is quite tedious—the more entrenched they become. Entrenchment entails increasing accessibility of one task set at the expense of alternatives, making switching to another activity—even one that is preferred—feel more costly, causing change failures. Five experiments demonstrate that a significant subset of participants actively choose to

continue less-preferred tasks rather than switch to alternatives they prefer (Studies 1-4), and that this increases with longer engagement in the less-preferred activity (Studies 2a-2b). We show that one reason for this is an increase in the felt cost of change (Study 2a). We also present methods to reduce entrenchment. Specifically, disrupting engagement by dividing attention or breaking repetition boosts the probability of a beneficial change (Studies 3-4). Unless otherwise noted, all measures are reported and no participants are excluded.

PILOT STUDY

In all main studies, participants begin with a tedious task and are then given the explicit choice to continue the current task or to switch to a preferred task while earning the same pay. This design allows us to isolate the mechanism of interest—behavioral entrenchment—while controlling for alternative explanations where consumers passively remain with existing states. Note that whereas in passive-staying designs participants may not be fully conscious of the option to switch, our studies require them to attend to the choice options. Thus, our explicit choice design represents a conservative test of behavioral entrenchment (see Appendix for design details and materials for all studies).

This pilot study tested whether those who forgo the opportunity to switch are worse off, as we suggest. Participants began the tedious task and, partway through, half of them were automatically switched to their preferred task (and half were not). If participants who were automatically switched were to report greater satisfaction than those who were not

switched, this would support our conjecture that participants who fail to switch to their preferred task when given the opportunity to do so are worse off—even in light of increased experience with the task or any small switching costs.

Method

We pretested and selected tasks to use throughout our studies that were rated as tedious ("less-preferred task") and tasks that were rated as fun ("preferred tasks"). In all studies participants were assigned to a less-preferred task and then given the option to switch to a preferred one. The less-preferred task entailed transcribing highlighted lines of a paragraph rotated 90°. To reduce the likelihood that participants would be motivated by a need to complete the paragraph, the highlighted lines started (and ended) in the middle of the paragraph. The two preferred tasks included: (1) playing a Boggle-like word game; and, (2) playing Where's Waldo (see Appendix for pretest details).

At the beginning of each study, participants try out and rate each task. Thus, we know which task each participant prefers. While the tasks we designed to be inferior were significantly less preferred on average, there was some natural heterogeneity in preferences. We focus on participants who prefer the task that was designed to be more fun, as including participants who subjectively preferred the inferior task (and would thus prefer not to switch) would artificially inflate our results. In other words, for a conservative test of our hypotheses, the analyses in this and all following studies include only participants who rated the fun task as more enjoyable.

Three hundred two adults from Amazon Mechanical Turk participated in exchange for payment. Participants read that we (the researchers) needed help with a handful of different tasks and that the computer would randomly assign them to one. They were informed that the tasks consisted of multiple rounds and that if not enough participants were assigned to a single task the computer may switch them to one of the other tasks for the remaining rounds. They were further assured that if this were to occur, it would not influence the total number of rounds they complete. After reading the instructions, participants completed a practice round of five different tasks (transcribing paragraphs rotated 90 degrees, playing a Boggle-like word game, writing captions for fun photos, completing captchas, and categorizing stock photos) and were asked to rate how enjoyable they found each task. On the next page, they were randomly assigned to one of two conditions: (1) transcribe only (participants completed 10 rounds of the tedious sideways transcription), or (2) automatically switched (participants completed 7 rounds of transcription before being informed that too many participants had been assigned to the transcription task and were switched to the more enjoyable word game for the remaining 3 rounds.

After completing 10 rounds of tasks, participants responded to a 3-item scale (α = .9) designed to measure their satisfaction with the HIT (the term used for the surveys or assignments posted on Amazon Mechanical Turk): “How much fun was this HIT”; “How pleasant was this HIT”; “How tedious was this HIT?” on seven-point scales (1 = “not at all,” and 7 = “very”; the final item was reverse coded). To provide convergent validity, on the next page, participants were asked “How much did you like this HIT?” on a continuous

sliding scale from 0 to 10. Finally, here and in all studies that follow, participants responded to several demographic items and robustness checks (see Appendix for all ancillary measures).

Results and Discussion

As predicted, among participants who a priori preferred the word game (n = 188), those who were automatically switched to the game for 3 of their 10 rounds reported significantly greater satisfaction (M = 3.36) than those who transcribed for all 10 rounds (M = 2.02; t(165.68) = 6.34, $p < .001$, equal variances not assumed). To illustrate that the effect is driven by a general shift in the distribution rather than by outliers, we conducted a median quantile regression which revealed the predicted effect of condition on satisfaction (Mdn_{stay} = 1.33 vs. Mdn_{switch} = 3.33; b = 2.0, t(186) = 6.96, $p < .001$).

The item measuring how much participants liked the HIT highly correlated with their overall satisfaction (r = .89). Participants who were automatically switched reported liking the HIT significantly more (M = 4.98) than those who transcribed all 10 rounds (M = 2.77; t(173.07) = 5.65, $p < .001$, equal variances not assumed). Similarly, an analysis using median quantile regression revealed the predicted effect of condition on liking (Mdn_{stay} = 1.93 vs. Mdn_{switch} = 5.43; b = 3.50, t(186) = 5.05, $p < .001$). These results suggest that participants who were automatically switched to their preferred task were indeed more satisfied than those who endured the less-preferred task for the entirety of the study. Further, these findings do not support the possibility that increased task-experience

or small switching-costs would cause the value of staying to overshadow the value of switching. Thus, it is easy to conclude that participants who forgo the opportunity to switch to their preferred task will be worse off.

Of note, prior research suggests that a subsample of Mturk workers report either beginning studies without fully reading the instructions (10.2%) or responding to questions without really thinking about the question first (8.6%; Necka et al. 2016). To account for such error in the online samples used in our studies (i.e., participants inadvertently choosing their less-preferred task), we conducted a second pilot study in which participants (N = 100) tried and rated the enjoyability of tasks and then chose whether they wanted to work on the tedious (sideways transcription) or fun task (word game). Of the 74 participants who rated the word game as more enjoyable, 6 (8%) chose to perform the transcription task, arguably because they were not paying attention or misunderstood the instructions. Across all of our experiments, the majority of results hold when testing against the more conservative null hypothesis that fewer than 8% of participants (as opposed to the null of 0%) will continue their less-preferred task when given the opportunity to switch to an alternative they prefer.

STUDY 1: FAILURE TO CHANGE

Study 1 tested our prediction that a significant subset of participants would fail to switch to their preferred task when given an explicit opportunity to do so. Participants were presented with the scenario described in the introduction: they were assigned a tedious

task, and partway through given the opportunity to switch to an alternative task that they preferred for the remainder of their time. We predicted that although switching to their preferred task would be in their best interest (and be virtually costless), a significant proportion would fail to do so. Note that the active nature of this design—being required to choose whether to switch or stay—draws attention away from the focal task, which likely reduces entrenchment. Thus, this is a conservative test of our prediction, in which the proportion who fail to change is likely to be even smaller than it would otherwise be.

Study 1 also sought to rule out two alternative explanations. First, we tested whether participants would still fail to switch to their preferred task even when the transaction costs were equated, such that participants had to actively push a button to stay or push a button to switch. Second, we examined whether participants would persist with the less-preferred task when the task set stayed the same (i.e., transcribing sideways text) but the content changed (i.e., transcribing a different paragraph), making the prospect of a completion goal even less likely. That is, if participants chose to continue the tedious task in this condition, this would be consistent with our proposition that they were entrenched in the task set (i.e., the task procedures were activated and accessible) and did not simply choose to stay in order to try and complete the transcription for their specific paragraph.

Method

Based on the effect size in a pretest, we targeted 300 participants per condition. Nine hundred seven adults from Amazon Mechanical Turk completed the study in

exchange for payment. Participants read similar instructions to those in the Pilot Study—that we, the researchers, were requesting help with a handful of different tasks and that the computer would randomly assign them to one of these tasks. They were further informed that in order to equate the number of participants across tasks, they may be given an opportunity during the experiment to switch to a different task for the remainder of the study. Participants completed a practice round and rated the enjoyability of 5 tasks, including the tedious (sideways transcriptions) and fun task (Boggle-like word game). Participants rated multiple tasks that ranged in enjoyability in order to increase the realism of our cover story and decrease suspicion that they were purposefully assigned to the tedious task.

On the next page, all participants were informed that they had been randomly assigned to complete 10 rounds of the transcription task. As individuals began their 6th round of transcription, a dialogue box appeared, offering them the opportunity to continue transcribing or switch to the word game for the remaining rounds. Participants randomly received 1 of 3 switch opportunities: control (click a button to switch or continue transcribing to stay); cost-equated (click a button to switch or click a button to continue transcribing); or, new paragraph (click a button to switch or click a button to continue transcribing a new paragraph). The new-paragraph condition was designed to reduce the likelihood that participants would continue with the tedious task out of a desire to finish typing that paragraph (i.e., a completion goal; Förster, Liberman, and Friedman 2007). Thus, we tested whether participants would forgo the opportunity to switch to their preferred task even when there was no difference in the physical transaction cost (cost-

equated condition) and when the task itself remained the same (i.e., the same task set was activated), but a completion goal was unlikely (new-paragraph condition). Everyone then completed the additional rounds of the task they chose.

Our primary dependent variable is the proportion of participants who choose to continue the less desirable task (the number of participants committing a change failure). The null hypothesis is that no participants will choose to continue their less-preferred task when given a nearly costless opportunity to switch to a preferred alternative. As noted, across studies, all analyses are limited to participants who preferred what is, on average, the more fun task (the word game) and we use exact binomial tests to assess whether the proportion of participants who chose to stay with their less-preferred task is significantly greater than 0.

Results and Discussion

Among participants who preferred the word game (n = 618), 23.14% chose to continue the task they found unpleasant rather than switch when given the opportunity, a proportion significantly greater than 0 ($p < .001$, 95% CI [19.87, 26.67]). Importantly, compared to the control condition, the proportion of participants who stayed with their less-preferred task did not differ in the cost-equated condition (control: 24.54% vs. cost-equated: 22.49%; χ^2 (1, n = 425) = 0.25, $p = .619$), nor in the new-paragraph condition (22.28%; χ^2 (1, n = 409) = 0.29, $p = .59$), suggesting that neither the additional button click

nor the desire to finish a given paragraph accounted for the significant proportion of participants who chose to continue their less-preferred activity (see Figure 3.1).

These results suggest that some participants indeed appear to have gotten stuck in a rut: a significant subset who preferred the fun task actively chose to continue their less-preferred activity, even when the cost was equated (click a button to switch or click a button to stay) and when staying meant they would continue the activated task set but transcribe a different paragraph, reducing concerns of a completion goal. These findings demonstrate a change failure, and do not support alternative accounts that participants failed to switch because of switching costs or a completion goal.

STUDY 2A: ENTRENCHMENT INCREASES WITH REPETITION

Study 2 had two goals. First, Study 2a tested the relationship between task repetition and the felt cost of switching. Accessibility increases with frequency of activation (Bargh and Pietromonico 1982; Wyer & Xu, 2010). We thus expected more task rounds to boost the accessibility of task-related procedures, decreasing the accessibility of alternatives, making switching tasks feel more costly. Second, Studies 2a-2b aimed to further rule out alternative explanations related to goal gradients (Locke and Latham 1984). Specifically, whereas in Study 1 participants were told that they would complete 10 rounds of the task, in Studies 2a-2b participants were told that the number of rounds they would complete depended on exogenous factors. Thus, at the point of the switch opportunity, participants were unaware how near (or far) they were from the end of the

task. As such, participants did not know how close they were to completion and thus could not factor this information into their decision whether to switch or to stay. Finally, because asking participants to report entrenchment could break it (similarly to the difficulty of measuring immersion; Cheng and Cairns 2005), we decided to measure self-reported entrenchment in Study 2a, and examine behavior separately in Study 2b.

Method

Based on the effect size in Study 1, we targeted 200 participants per condition. Five hundred ninety-five adults from Amazon Mechanical Turk completed the study in exchange for payment. Participants read instructions similar to those of Study 1, except that the number of rounds of the task was uncertain (i.e., infinite horizon): they were informed that the number of rounds they would complete depended on the number of other participants doing the task. We designed the study such that the number of task rounds prior to the switch opportunity varied while the number of rounds after the switch opportunity was consistently uncertain. That is, since participants were unaware how many task rounds they would do, in theory, each round could have been their last, or there could have been many more ahead of them. This design element was important to prevent the consideration of how many task rounds remained. Participants' choice to switch or to stay would thus be influenced by how long they had been engaged in the task while holding constant how much remained—as this was consistently uncertain across conditions. Hence,

it would be unlikely for participants' decisions to be influenced by considerations of completion or the proximity of ending the task.

Participants completed a practice round and rated the 2 tasks (transcription and Boggle-like word game). On the next page, they were all assigned to transcription. During the task, participants were presented with a screen asking them to imagine that they were given the opportunity to either continue the transcription or to switch to Boggle. They read about this opportunity to switch at one of three points during the task (manipulated between subjects): on the third round (low-entrenchment condition); on the sixth round (medium-entrenchment condition); or, on the ninth round (high-entrenchment condition). At this point, participants rated 7 items designed to measure how costly it would feel to switch tasks ($\alpha = .94$). Specifically, using 7-point scales they were asked to what extent switching would feel annoying, effortful, bothersome, pointless, easy, pleasant, refreshing (1 = "not at all," and 7 = "very"). The items were asked in randomized order and the three positively valenced measures were reverse-coded.

Participants were asked to imagine that on the previous page they had been given the opportunity to continue transcribing or switch to Boggle for the remaining rounds and then indicated what they would have chosen (continue transcribing or switch to Boggle). On the following page, they read that in the past, participants who chose to switch (or to stay) had given a list of reasons why they made that choice and indicated how applicable each reason was for them (see Appendix).

Results and Discussion

As predicted, among participants who preferred the word game a priori (n = 322), those in the high-entrenchment condition anticipated that switching tasks would feel significantly more costly than participants in the low-entrenchment condition (M_{high} = 2.82 vs. M_{low} = 2.15; t(189.27) = 3.02, p = .003, equal variances not assumed), and in the medium-entrenchment condition (M_{medium} = 2.37; t(199.33) = 1.98, p = .049, equal variances not assumed). Participants were also more likely to report that they would have chosen to stay with their less-preferred task in the high-entrenchment condition (25.49%) than the low-entrenchment condition (11.93%; χ^2 (1, n = 211) = 6.43, p = .011), and the medium-entrenchment condition (18.92%), though this latter difference was not statistically significant (χ^2 (1, n = 213) = 1.33, p = .248).

To test whether the reduced switching rate in the high-entrenchment condition was driven by the felt cost of switching, we conducted a mediation analysis with 1,000 bootstrapped samples (Hayes 2013). The number of paragraphs completed served as the continuous independent variable (2, 5, 8), the felt cost scale as the mediating variable, and the choice to switch (1/0) as the dependent variable. A linear regression fit with least squares was used for the mediator model and a probit regression was used for the outcome model. This analysis confirmed that felt cost mediated the effect of entrenchment on participants' choice to continue with the tedious task (95% CI [-.02, .00]; see Figure 3.2). These results suggest that the more participants repeated the task, the more entrenched they became. Consequently, the more costly they anticipated switching would feel, reducing the likelihood that they would switch.

STUDY 2B: SWITCHING DECREASES WITH REPETITION

Study 2b tested whether the more participants repeated a less-preferred task, the more entrenched they would become, and the less likely they would be to switch to their preferred alternative. Whereas in Study 2a participants were asked about the felt cost of switching at various periods during the task, in Study 2b they were given the opportunity to switch to their preferred task at these same points. We expected that the more participants repeated a task, the more costly switching would feel (as shown in Study 2a), and the less likely they would be to switch to their preferred task.

Method

Based on the effect size in Study 2a, we targeted 150 participants per condition. Four hundred fifty adults from Amazon Mechanical Turk completed the study in exchange for payment. After reading the same instructions as in Study 2a, participants tried and rated 5 different tasks and were then assigned to the transcription task with an uncertain number of rounds. Participants were randomly assigned to receive the opportunity to switch either on the third round (low-entrenchment condition); on the sixth round (medium-entrenchment condition); or on the ninth round (high-entrenchment condition). Thus, once again, the number of task rounds prior to the opportunity to switch varied across conditions while the number of rounds after the switch was consistently uncertain. In this study,

everyone received the conservative cost-equated switch opportunity presented in Study 1, where they had to press a button to switch or press a button to stay (equating transaction costs regardless of their choice). Though participants did not know this ahead of time, each of them completed a total of ten task rounds.

Results and Discussion

Replicating our earlier findings, among participants who preferred the word game (n = 313), 21.09% actively chose to continue their less-preferred task, a proportion significantly greater than 0 ($p < .001$, 95% CI [16.70, 26.03]). Further, participants were more likely to stay with their less-preferred task in the high-entrenchment condition (27.55%) than in the low-entrenchment condition (15.74%; χ^2 (1, n = 206) = 4.27, p = .039), and the medium-entrenchment condition (20.56%), though the latter difference was not statistically significant (χ^2 (1, n = 205) = 1.37, p = .241; see Figure 3.1). Thus, a significant subset of participants actively chose to remain with their less-preferred task even when they did not know how many rounds remained.

Results of Studies 2a and 2b support our prediction that the longer one performs a task, the more costly it feels to switch and the less likely they are to do so. These findings are consistent with our notion that repetition increases the accessibility of the task set, deepening entrenchment. Indeed, participants in the high-entrenchment condition were nearly twice as likely to stay with their less-preferred task than participants in the low-entrenchment condition. Note that these results do not support a goal-gradient argument

(Kivetz, Urminsky, and Zheng 2006), as participants in all conditions were equally unaware of when the task would end. That is, participants were equally uncertain whether round 3 or round 9 would be their last round.

A potential explanation for the findings of Studies 2a and 2b is that the more participants are exposed to a task, the more they like it (mere exposure; Zajonc 1968). To test whether task enjoyment increased with repetition, we conducted a pilot study in which participants (N = 199) completed an enjoyment scale either on the third round of the transcription task (low-entrenchment condition) or on the ninth round of the task (high-entrenchment condition). Specifically, the scale included 4-items (α = .86) asking participants to rate the extent to which they found the task fun, annoying, fulfilling, and tedious on 10-point scales (1 = "not at all," and 10 = "very"). There were no significant differences in enjoyment of the transcription task between participants in the low-entrenchment condition and those in the high-entrenchment condition (M_{low} = 4.65 vs. M_{high} = 4.41; t(194.17) = -.688, p = .492, equal variances not assumed). Participants were also informed that some other individuals had been assigned to the word game and asked how much they would enjoy the transcription task relative to the word game (-50 = "enjoy transcription more," and 50 = "enjoy word game more"). Across the two conditions, participants equally anticipated preferring the word game relative to the transcription task (M_{low} = 24.62 vs. M_{high} = 24.14; t(187.15) = -.121, p = .904, equal variances not assumed). Thus, our finding—the more participants repeated the less-preferred task the lower their likelihood to switch to their preferred task—is difficult to explain by mere exposure or increased enjoyment.

STUDY 3: DIVIDING ATTENTION REDUCES ENTRENCHMENT AND INCREASES SWITCHING

Study 3 sought to test whether disrupting entrenchment would increase the proportion of participants who switch to their preferred task. We theorize that to become entrenched, one must be engaged in the task. Engagement requires both attention and continuity. Thus, in Study 3 we tested whether limiting one's ability to fully attend to the task would increase switching. To test this, we asked participants to perform a tedious task either on its own (i.e., single-tasking) or concurrently with another task (i.e., dual-tasking). Multitasking requires individuals to shift their attention back and forth between tasks, impairing their ability to fully attend to either one (Pashler 1994). In this way, we predicted that dual-tasking would disrupt engagement for two reasons: first, by limiting overall attention paid to the tedious task; and, second, by preventing the repeated activation of the tedious task set, as participants must switch their attention back and forth between tasks (Pashler 1994). We predicted that participants who dual-tasked (vs. those who single-tasked) would be less entrenched and thus more likely to switch to their preferred task when given the opportunity.

Method

Based on the effect size in the previous study, we targeted 200 participants per condition. Four hundred and five participants from Amazon Mechanical Turk completed the study in exchange for payment. Participants read instructions similar to those in the previous studies, explaining that they would be randomly assigned to a task and might be given the opportunity to switch to another task, depending on the performance of other Mturkers. Participants then performed practice rounds and rated 4 different tasks before being assigned to the tedious transcription task. In this study, while performing the tedious task participants also listened to background music (the soundtrack consisted of sounds from nature interspersed with soft sounds of chimes and bells). Participants were randomly assigned to one of two conditions: in one condition they read that they would listen to music while transcribing (focused-attention condition); in the other condition, they read that they would listen to music while transcribing and were asked to pay close attention and count the total number of times they heard the sound of a chime or a bell (divided-attention condition). Participants in the divided-attention condition were also told that at the end of the task we would ask them how many sounds of chimes and bells they counted (while we did ask them to report this number after the task, this instruction was simply included to increase the likelihood that they pay attention to the audio, and thus is not discussed further). Participants then pressed play and began transcribing lines from a paragraph rotated 90 degrees. Whereas in the previous studies, each round of transcription was on its own page, in this study participants saw 10 rounds of transcriptions all on a single page—thus, compared to the previous studies, the task may have felt more continuous (vs. repetitive). As participants began their 6th round of transcription, a pop-up

box appeared asking them to choose whether they wanted to switch to the preferred word game (Boggle) or to continue with the current task for their remaining rounds. After deciding whether to continue or to switch, participants were informed that enough people had enrolled, and no more tasks needed to be done.

As a manipulation check, participants were shown a list of 5 things that may have drawn their attention while transcribing: the audio clip; transcribing; other things in the room; other things on the computer; their own thoughts. They then allocated 100 points across the 5 items, with the largest number of points given to what they were paying the most attention to and the fewest number of points given to what they were paying the least attention to. Those in the divided-attention condition then reported how many chimes they heard.

Results and Discussion

Replicating the findings of Studies 1 and 2, among participants who preferred the word game (n = 257), a significant proportion (18.29%) chose to continue transcribing ($p <$ .001, 95% CI [13.76, 23.57]). Consistent with our prediction, significantly more participants in the focused-attention condition (22.86%) chose to continue their less-preferred task compared to those in the divided-attention condition (12.82%; $\chi^2(1, n = 257) = 4.30$, $p = .038$). Thus, dual-tasking reduced entrenchment and significantly increased participants' likelihood of switching to their preferred task—reducing change failures.

In support of our manipulation, participants in the divided-attention condition allocated significantly more points—indicating greater attention paid—to the audio than participants in the focused-attention condition ($M_{divided\text{-}attention}$ = 28.59 vs. $M_{focused\text{-}attention}$ = 11.88; t(185.49) = 7.13, $p < .001$, equal variances not assumed), and significantly fewer points to transcribing ($M_{divided\text{-}attention}$ = 66.02 vs. $M_{focused\text{-}attention}$ = 81.78; t(231.92) = -6.00, $p < .001$, equal variances not assumed). Participants in both conditions allocated few points to the remaining three items, and the points did not vary across condition: other things in the room ($M_{divided\text{-}attention}$= 1.37 vs. $M_{focused\text{-}attention}$ = 1.43; t(254.56) = -.114, $p = .910$, equal variances not assumed); things on their computer ($M_{divided\text{-}attention}$= .16 vs. $M_{focused\text{-}attention}$ = .57; t(184.86) = -1.62, $p = .107$, equal variances not assumed); and, their own thoughts ($M_{divided\text{-}attention}$ = 3.86 vs. $M_{focused\text{-}attention}$ = 4.34; t(198.74) = -.403, $p = .688$, equal variances not assumed). These results demonstrate that having participants dual-task—thus limiting their ability to fully attend to the tedious task—decreased entrenchment and increased switching.

STUDY 4: INTERMIXING TASKS DECREASES ENTRENCHMENT AND INCREASES SWITCHING

Study 4 had two goals. First, it tested the generalizability of our previous findings by using a new task. Participants were presented with the opportunity to switch to a Where's Waldo task, reducing concerns that switching decisions in the previous studies were specific to Boggle. Second, we tested whether having participants perform intermixed

tasks would reduce entrenchment. Whereas the same task set is used when repeating tasks, intermixing tasks requires participants to mentally reconfigure with each switch (Kiesel et al. 2010; Vandierendonck, Christiaens, and Leifooghe 2008). Thus, we predicted that performing intermixed (vs. repeated) tasks would limit the accessibility of the task set, thereby attenuating entrenchment and increasing switching.

Method

We targeted 400 participants per condition. Eight hundred and fifty-four participants from Amazon Mechanical Turk completed the study in exchange for payment. Participants read instructions similar to those in the previous studies and were then randomly assigned to one of two conditions: in one condition, participants performed a tedious task repeatedly (repeating condition); in the other condition, participants performed four rounds of the tedious transcription task with two rounds of another task interspersed between transcriptions (intermixed condition). Before starting their task, participants did a "training session," in which they performed practice rounds and rated two tasks: the (less-preferred) transcription task and the (more-preferred) Where's Waldo task. Participants in both conditions started the training session by first trying and rating one Where's Waldo and then trying and rating one transcription, so that the preference ratings were equivalent across conditions. Next, as part of the training session, participants in the repeating condition completed 3 rounds of Where's Waldo and 1 round of transcription, while participants in the intermixed condition completed 1 round of Where's Waldo and 3 rounds

of transcription. On the next page, participants then began their task. The training session and task session were purposefully designed as two separate sections so that participants in both conditions would perform the same total number of tasks during the experiment (3 Waldos and 6 transcriptions) but would construe their "task session" as comprising either repeated transcriptions or transcriptions intermixed with Waldos. If T stands for the transcription task, W stands for the Where's Waldo task, and * stands for the switch opportunity, participants completed the tasks in the following order in the repeating condition: W-T-W-W—T-T-T-T-T-T-T*, and in the intermixed condition: W-T-T-T—T-T-W-T-W-T-T*. The first 4 tasks were the "training session," and the next 6 the actual "task session," with the final transcription task cutoff by the choice to switch or to stay.

At the start of the task session, all participants read that they were assigned to the transcription task. Participants in the intermixed condition additionally read that we needed a few more Where's Waldos completed and that they would be interspersed as short breaks between the transcriptions. Participants in the repeating condition then did 6 rounds of transcription repeatedly and on the start of their 7th round were given the opportunity to continue with their task or switch to Where's Waldo for their remaining time. In contrast, participants in the intermixed condition completed 4 rounds of transcription with 2 Where's Waldos interspersed, and at the start of their 7th round (a transcription) were given the opportunity to continue with their task or to switch to Where's Waldo. The order in which participants completed tasks in the intermixed condition was designed to be nonuniform (T-T-W-T-W-T-T*) so that no clear pattern might influence their switch decision. Participants decided whether to continue their less-preferred task or to switch to

their preferred task, after which they were informed that enough tasks had been performed and no additional tasks needed to be completed.

Results and Discussion

Replicating the findings of Studies 1-3, among participants who preferred Where's Waldo (n = 656), a significant proportion (25.91%) chose to continue transcribing ($p <$ .001, 95% CI [22.60, 29.45]). As predicted, significantly fewer participants in the intermixed condition stayed with their less-preferred task (21.77%) compared to those in the repeating condition (29.79%; $\chi^2(1, n = 656) = 5.50$, $p = .019$). Thus, having participants perform intermixed tasks attenuated entrenchment and increased the proportion who switched to their preferred task. Note that while participants in the intermixed condition had the opportunity to switch to the same task (Waldo) that was interspersed during their task session, those in the repeating condition also alternated between transcription and Waldo (W-T-W-W—T-T-T-T-T-T-T-T*) prior to their repeating rounds of transcription. It thus seems unlikely that this could explain the difference in switching rates. In conclusion, the findings of Studies 3 and 4 together suggest that disrupting engagement—by reducing attention paid to the tedious task or by intermixing tasks—limits the increasing activation of the task set, attenuating entrenchment and increasing switching likelihood.

GENERAL DISCUSSION

Daily life is riddled with change failures—consumers continuing less-preferred behaviors when they could easily switch to preferred alternatives that achieve the same (or better) outcomes. Such maladaptive behavior occurs across myriad shopping and consumption contexts, including—but certainly not limited to—online and offline buying, healthcare, workplace, transportation, and leisure activities. For example, consider a consumer shopping on amazon. As she scrolls, entrenched in her search, a pop-up box appears asking her whether she'd like to switch to Amazon Smile—a choice which only requires one click and would result in a portion of her purchase being donated to charity. Yet, every time the button appears, she clicks to close the pop-up box and forgoes the opportunity. Or, consider a road trip, in which after driving for some time, and despite being rather hungry, the driver bypasses an exit despite seeing signs for restaurants because he's entrenched in the drive. Similarly, imagine a consumer taking a stroll down main street. He passes his favorite store, but chooses to continue on his walk, as that feels easier than mentally reconfiguring and switching into shopping-mode. Finally, think about the ubiquitous and frequent scenario where consumers struggle to do tasks on their phones—shop, read, browse the internet, check social media, email, work—that could be done much more easily on a computer simply because the act of switching *feels* costly. While such change failures are multiply determined, this paper explores a new mechanism that contributes to these seemingly odd behaviors: behavioral entrenchment—the increased accessibility of a task set, which strengthens with engagement and makes switching to an alternative *feel* more costly, leading consumers to forgo opportunities to make beneficial changes.

Across multiple experiments, a significant subset of participants continued a less-preferred task when given a nearly costless opportunity to switch to a preferred alternative (Studies 1-4). The more participants repeated the task, the more costly they perceived switching to be, increasing the proportion who did not switch (Study 2a-2b). However, decreasing entrenchment by having participants dual-task or perform intermixed tasks increased the proportion who switched (Study 3-4). These results support our assertion that consumers may at times continue less-preferred tasks because the task set is highly accessible—in other words, they are behaviorally entrenched. Entrenchment deepens as consumers repeat the less-preferred activity, increasing the accessibility of that task's procedures and suppressing the accessibility of alternatives, making change feel more costly and causing consumers to forgo opportunities for improvement. We find this effect repeatedly, even with our conservative design in which participants must explicitly attend to the choice options (which disrupts entrenchment).

Importantly, the design of our studies controlled for alternative explanations documented in prior research. Specifically, because participants had virtually nothing to lose by switching, and the minimal cost of switching (press of a button) was equated (Studies 1-4), loss aversion or transaction costs (Kahneman, Knetch, and Thaler 1991) are unlikely to have played a significant role. The same is true of anticipated regret (Zeelenberg and Beattie 2006) or sunk costs (Arkes and Blumer 1985), as participants tested all tasks beforehand (and thus were familiar with the alternatives) and completed the same number of rounds for the same amount of pay no matter their choice. Further, participants were assigned to the initial task, they did not previously bypass it, making it

unlikely that inaction inertia (Arkes, Kung, and Hutsel 2002; Tykocinski, Pittman, and Tuttle 1995), commitment (Cialdini 2007), or cognitive dissonance (Festinger 1957; 1964) drove their behavior. Further, as participants had to attend to the switch opportunity and had to take an action before they could proceed, motivated attention (Suri and Gross 2015), participant inertia, action readiness, and defaults (Madrian and Shea 2001; Suri, Sheppes, and Gross 2015) are improbable explanations of the behavior. Finally, participants chose to continue the less-preferred—but highly accessible— task even when the text changed (Study 1), and the number of task rounds was uncertain (Study 2a-4), supporting our entrenchment account and reducing the likelihood of goal completion considerations (Förster, Liberman, and Friedman 2007).

Theoretical Contributions

This research makes several theoretical contributions to the marketing and consumer psychology literatures. First, we add to the literature on consumer choice (Bettman, Luce, and Payne 1998) and present a novel account of situations in which consumers fail to make decisions that are in their best interest. Much research has attributed scenarios in which consumers stick with suboptimal choices to status-quo bias (Samuelson and Zeckhauser 1988), default effects (Madrian and Shea 2001; Suri, Sheppes, and Gross 2015), or inaction inertia (Tykocinski, Pittman, and Tuttle 1995). We, however, designed our studies such that these factors would be unlikely to have a significant impact on participants' decisions as they had to actively choose whether to stay or to switch and

had not previously bypassed any switch opportunities. That said, we strongly suspect that behavioral entrenchment contributes to passive change failures that have been previously attributed to other underlying factors.

Second, and relatedly, our work contributes to research in marketing and consumer behavior that explores how priming certain mindsets can impact subsequent decisions (Chandran and Morwitz 2005; Dhar, Huber, and Khan 2007; Moreau and Engeset 2016; Wyer and Shu 2010). The notion of mindsets most relevant to this research characterizes them as mental perspectives in which a cognitive set (operation, procedure) is highly accessible (Wood 2010; Wyer and Xu 2010; Xu and Schwarz 2018), though mindsets have also been defined in other ways (e.g., implicit theories, persistence in goals; Dweck 2006; Keinan and Kivetz 2011). The current work builds on that research, demonstrating how heightened task-set accessibility impacts the continuation or termination of the accessible task. Further, it contributes to the marketing and consumer behavior literature by demonstrating a novel way in which accessibility impacts consumer behaviors.

Third, this research contributes to the social and cognitive psychology literatures by demonstrating that findings from the learning and expertise literatures may be broader than previously realized. After learning how to solve a problem or becoming an expert in a given area (both of which take time and repetition), a previously learned approach is often the first to come to mind and thus used in place of better alternatives (Luchins 1942; Marchant et al. 1991). The scenarios we investigate do not involve elements of learning or expertise as operationalized in past research—our scenarios did not involve problem-solving (participants neither learned solutions nor solved problems) and our participants

were not and did not become domain experts. Yet, we find that the more participants perform a task, the more likely they are to choose to continue doing it—even at the expense of preferred alternatives. In this way, the cognitive tendency to persist with known approaches—and inhibit alternatives—may apply more broadly than previously realized.

Fourth, entrenchment may inform the literatures on flow and immersion. A great deal of research has investigated absorption in *enjoyable* activities or positive experiences (Csikszentmihalyi 1990; Jennett et al. 2008). When people are in a state of flow or immersed in a fun activity, they are intensely focused on the task at hand, often losing awareness of internal and external factors (e.g., the passage of time, hunger; Brown and Cairns 2004; Csikszentmihalyi 1990; Jennett et al. 2008; Kubey and Csikszentmihalyi 2002). Although in this research we study less-preferred behaviors (which could not lead to flow or immersion as both constructs require special circumstances, such as positive experience and balance of challenge and skill; Brown and Cairns 2004; Csikszentmihalyi 1990), our findings suggest that the underlying psychology may be similar. That is, entrenchment—increased accessibility of task components—may be a contributing mechanism to both flow and immersion. Entrenchment may thus help explain why consumers get stuck in not only negative, but also positive and neutral behaviors.

Managerial Implications

Our results suggest that attention should be paid to advertisements that occur during entrenching tasks. For instance, managers may wish to design social media ads that

play videos or sounds in an effort to divide user attention, reduce entrenchment, and increase the likelihood of click-throughs. Similarly, marketers may choose to place ads early on during entrenching activities, before entrenchment sets in (e.g., a spot in the first commercial break of an immersive show, or a clickable ad near the beginning of an online article).

Further, retailers are increasingly interested in understanding how layouts and in-store shopping behaviors affect consumers' likelihood to buy (e.g., Chandon et al. 2009; Hui et al. 2013; Walter et al. 2020). For instance, the longer customers spend in a store, the more purposeful they become—that is, they are less likely to explore and more likely to purchase (Hui, Bradlow, and Fadler 2009). Our results contribute a novel explanation for these findings, with implications for stores. As an example, designing a store that encourages focused shopping (e.g., aisles or in-store prompts designed to increase focus on the task at hand) may increase shopping persistence and planned purchases. Marketplaces could also be designed so that switch opportunities that are desirable to stores feel less costly to shoppers. For instance, placing grocery carts throughout a store or having employees bring carts to customers carrying products by hand could help counter the tendency of entrenched customers to forego a cart, increasing time spent shopping and boosting sales.

More generally, our results speak to the importance of instituting interventions early on during a task or a behavior, if change is desired, as changing behaviors once consumers are in a rut is more difficult. For instance, interventions to decrease detrimental binging behaviors—watching a TV show on repeat past the point of enjoyment or even

binge-eating, may be more effective if they are implemented early on during a binge—stopping it before it even gets started. Marketers should consider this when designing interventions aiming to change behavior.

Directions for Future Research

Our findings suggest a variety of directions for future research. First, while our experiments focused on the participants who failed to switch, many participants successfully switched. Future research may examine which individual traits increase or decrease one's likelihood of becoming entrenched. For instance, consumers' need for cognition may affect their task persistence even when continuing the task is detrimental (Steinhart and Wyer 2009). Also, traits that correlate with an individual's flexibility (e.g., ruminative coping style, obsessive-compulsivity; Davis and Nolen-Hoeksema 2000; Gu et al. 2008) may also correlate with their tendency to become entrenched. And, if so, interventions aimed at increasing flexibility may also decrease entrenchment. Consumers who fall prey to entrenchment may also be more likely to display maladaptive persistence in other areas of their life—these individuals may be more likely to develop poor habits, for example (Wood 2017). More generally, investigating what increases a consumer's tendency to become entrenched could be a productive area for future research.

A second direction may test additional ways to decrease or prevent entrenchment. Given the ubiquity of change failures and the toll they take on individual and social well-being, uncovering additional methods to attenuate entrenchment seems important. We

demonstrated that dividing attention and intermixing tasks decreased the likelihood of entrenchment and its negative consequences. Future research could investigate interventions to further reduce, or even eliminate, entrenchment.

A third area for research might be the adaptive nature of entrenchment. In this research we demonstrated ways in which entrenchment can be harmful and uncovered ways to attenuate it. However, there may be ways in which entrenchment could be desirable. For example, if one had to complete a tedious task at work (transcribing, for example), might entrenchment dull the tedium and increase focus, possibly improving performance and even well-being? Could we use entrenchment to improve concentration in educational settings?

Finally, while we designed our experiments such that the behaviors we observe do not reflect status quo or default effects, entrenchment, as a mechanism, may well contribute to the emergence of these and other related phenomena. Thus, a fruitful area for research would be to investigate how entrenchment relates to these and other important situations where consumers fail to make beneficial changes.

Behavioral ruts have important implications for managerial, consumer, and societal welfare. Behavioral entrenchment offers new insights into why consumers continue less-preferred behaviors and offers a novel mechanism that may shed light on other well-known phenomenon in which consumers needlessly stick with suboptimal behaviors. Moreover, in this research we also show that entrenchment, and its associated consequences, can be attenuated and begin to uncover methods to overcome the difficulties of behavior change.

Both marketing managers and consumers would do well to consider the hidden pull of entrenchment and consider ways to prevent getting stuck in a rut.

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Chapter 3, in full, has been submitted for publication of the material. Lieberman, Alicea, On Amir, and Ziv Carmon. The dissertation author was the primary investigator and author of the paper.

FIGURES

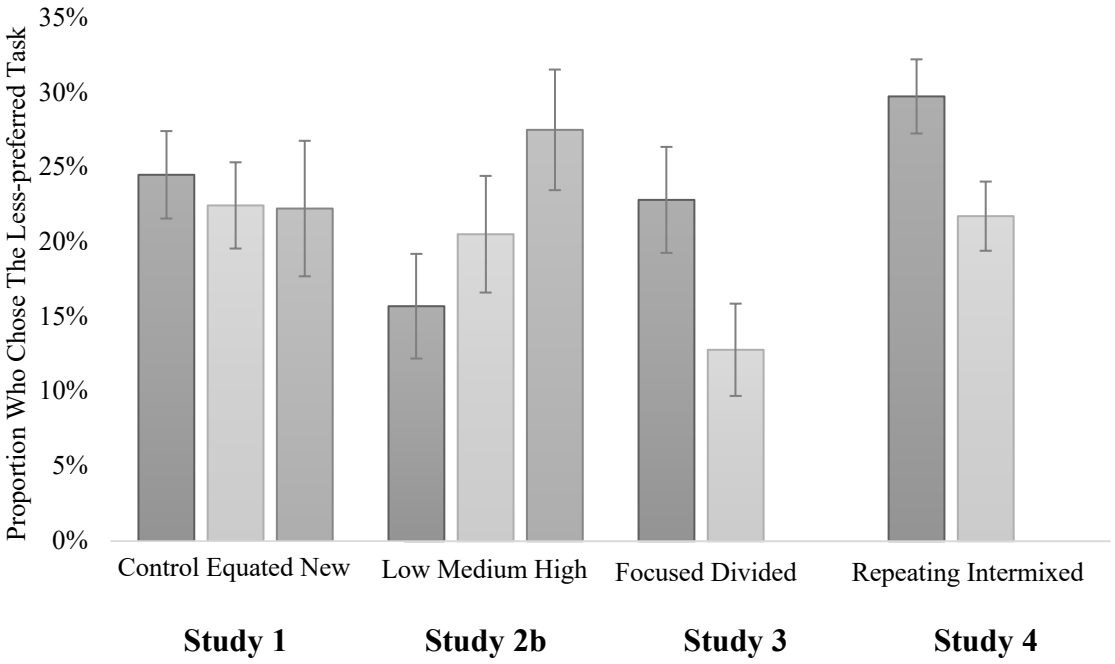

Figure 3.1. Proportion of participants who stayed with their less-preferred task when given an opportunity to switch, studies 1-4. Error bars represent SEM.

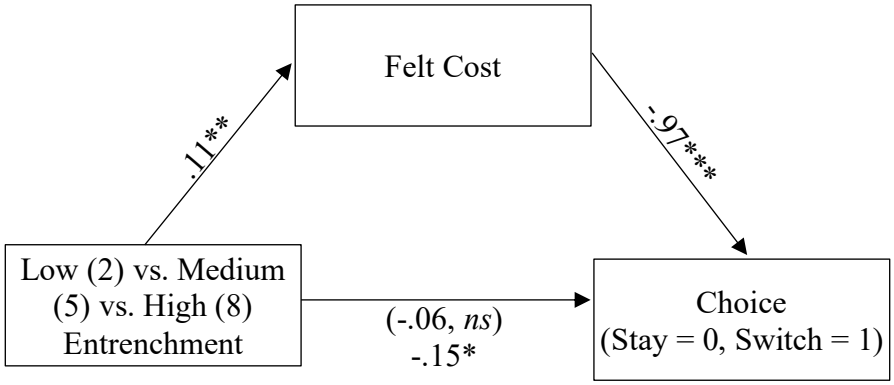

Figure 3.2. The effect of task repetition on choice of whether to switch or to stay is mediated by felt cost of switching, Study 2a. The path coefficients are unstandardized betas. The value in parentheses indicates the effect of the number of task rounds on choice after controlling for the mediator (*$p < .05$, **$p < .01$, ***$p < .001$).

APPENDIX

PRETEST 1: TESTING TASKS

Design Details and Materials

To select pairs of tasks that included one task that was objectively more enjoyable than the other, we ran a pretest of 12 different tasks, 6 that we predicted would be more enjoyable and 6 that we predicted would be less enjoyable. The unenjoyable tasks included: transcribing a paragraph rotated at a 90-degree angle; completing captchas; dragging sliders; completing a matrix; categorizing stock photos; and, counting dots. The 6 enjoyable tasks included: playing a Boggle-like word game; writing captions for funny photos; rating jokes; completing a personal survey; playing Where's Waldo; and, creating names from a matrix of letters. Participants (N = 602) were randomly assigned to one of these tasks. Participants read a description of their task and then reported how fun and how boring they anticipated the task to be on 7-point scales (1 = "not at all," and 7 = "very"). Participants then did the task for 2 minutes and were asked 11 questions: "How fun was this task?"; "How boring was this task?"; "How annoying was this task?"; "If the experimenter had given you an opportunity to switch to a new task in the middle, how likely would you have been to switch to the new task?"; "How irritated would you have been if you were interrupted during the task?"; "How much would you rather do this task than a typical task on Mturk?"; "As you were doing this task, how much did you 'get into a groove?'"; " While you were doing the task, how entrenched in it did you feel?"; "How focused were you on completing the task?"; "How focused were you on the task itself while you were doing it?"; and, "How much do you think a friend of yours might enjoy this task?" on 7-point scales (1 = "not at all," and 7 = "very"). Participants then reported their gender ("male"/"female"), their age, whether they currently live in the U.S., and if English is their primary language.

Additional Items and Analyses Not Reported in Main Text

Task selection. A factor analysis revealed 3 underlying factors (eigenvalue = .99), which we named the "fun factor" (items that loaded most strongly on this factor included items such as how fun the task was, how much a friend would like this task, how annoying/boring it was (negatively loaded), how much they would rather do this task than a typical task on Mturk, how likely they would be to switch to a new task (negatively loaded), and how much they were in a groove ([this item loaded strongly onto both the fun factor and the focused factor]); the "focused factor" (items that loaded most strongly on this factor included how focused they were on the task itself, how focused they were on completing the task, how entrenched they were, and how much they were in a groove); and, the "interrupted factor" (the item that loaded most strongly on this factor was how irritated they would be if they had been interrupted).

The studies in this paper aim to demonstrate that when entrenched in a tedious task, individuals will be less likely to switch to a task that they prefer. To test this theory, we

selected pairs of tasks based on their ratings on the fun factor. An analysis of variance on the fun factor scores revealed significant variation across tasks ($F(11, 590) = 34.01$, $p < .001$). We selected two tedious tasks that on average loaded negatively on the fun factor (sideways transcription [M = -.91] and completing captchas [M = -.38]) and, two enjoyable tasks that loaded on average positively on the fun factor (Boggle-like word game [M = .575] and rating jokes [M = .95]). A post hoc Tukey test showed that both tedious tasks significantly differed on the fun factor relative to the fun tasks (*p*s < .001).

PILOT STUDY

Additional Items and Analyses Not Reported in Main Text

Preference Ratings. In this, and all other studies that involved a practice round, participants responded to an item rating their preference for the task: "How enjoyable do you think this task would be?" (In Study 4 this wording was changed to "How much do you like the task?"). In this study, along with Studies 1, 2a, and 2b, participants were also asked "How familiar do you think others are at completing this type of task?" (1 = "not at all," and 7 = "very"). The second item was included to reduce the likelihood that participants might guess the purpose of the study, thus we do not report results for this item. In this study we present the mean ratings of enjoyability for each task and compare only the two focal tasks. In the studies that follow we present only the mean comparison for the two focal tasks.

Demographic items and robustness checks. At the end of the study, participants reported their age, gender, and whether they had ever done this transcription task in another HIT ("no, never"/"yes, in the past month"/"yes, in the past 6 months"/"yes, in the past year"/"I am not sure"). The vast majority of participants (89.4%) indicated never having done this transcription task in another HIT.

STUDY 1

Design Details and Materials

At the beginning of the survey, participants read the following instructions:

> *Welcome to our study! We need your help completing a task! We are requesting help on a handful of different tasks. However, each person will only be assigned to one of these tasks. Because we have several tasks that need to be completed, we are spreading the tasks out across mturkers.*
>
> *The computer will randomly assign participants to complete one of these tasks. <u>Each of the tasks takes the same amount of time.</u> We need an equal number of people to complete each task. If an unequal number of people are assigned to each task, you may be given an opportunity to switch tasks. If this occurs, a screen*

will pop up giving you the opportunity to either continue on the current task or to switch to the other task for the remainder of your time. Please carefully read the instructions and be as accurate as possible with your task. We appreciate your attention!

Participants then performed a practice round of 5 different tasks and rated how enjoyable they found each one: transcribing sideways paragraphs (Figure A3.1), a Boggle-like word game (Figure A3.2), completing captchas, categorizing stock photos, and writing captions for fun pictures. Participants tried the 5 tasks, as opposed to just trying the two focal tasks, to increase the believability of the cover story. Each task was designed to take approximately the same amount of time.

Figure A3.1. Image of transcription task trial (tedious task), Study 1

Figure A3.2. Image of boggle-like word game task trial (fun task), Study 1

On the next page, participants read the following text:
You were randomly assigned to transcribe text. You will see pictures of paragraphs that are rotated 90 degrees to the right. These paragraphs were scanned incorrectly and we need them to be transcribed. On each page, please transcribe the highlighted lines and then click next. You will transcribe a total of 10 highlighted portions. Thank you!

Participants were given the opportunity to switch to the preferred task on the 6th round. Participants saw one of three opportunities to switch: control (Figure A3.3); cost-equated (Figure A3.4); new paragraph (Figure A3.5).

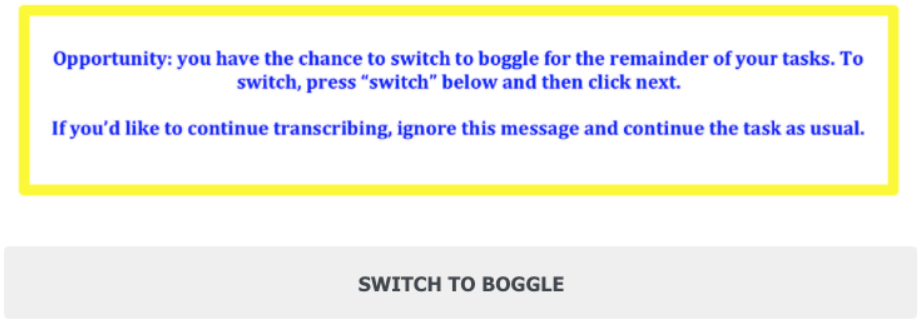

Figure A3.3. Control switch opportunity, Study 1

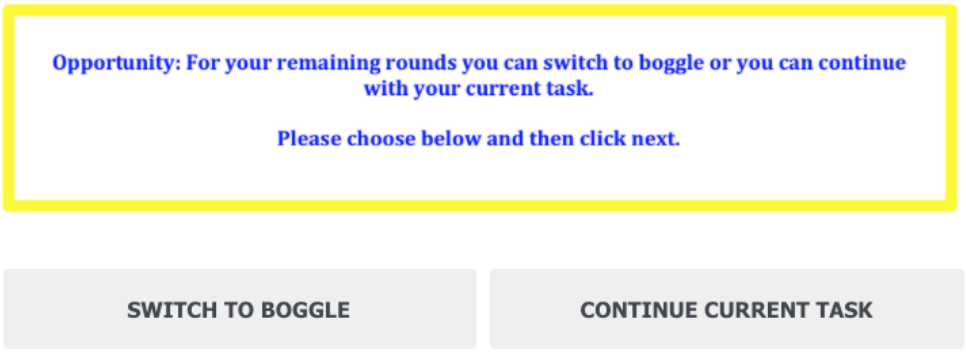

Figure A3.4. Cost-equated switch opportunity, Study 1

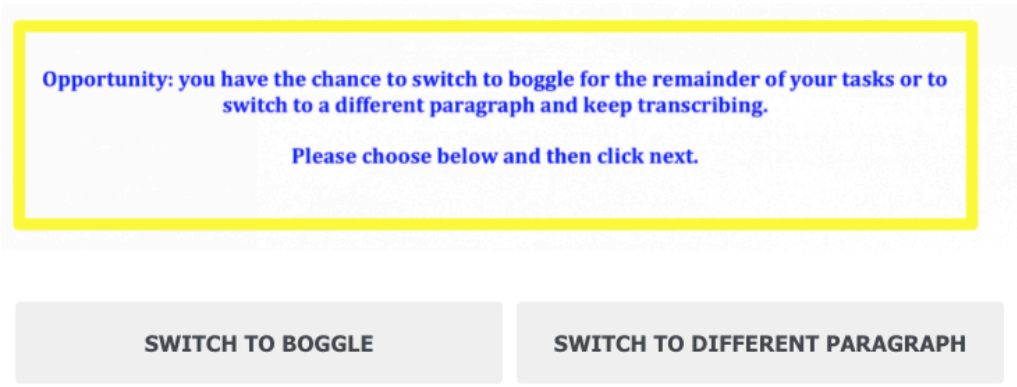

Figure A3.5. New-paragraph switch opportunity, Study 1.

Additional Items and Analyses Not Reported in Main Text

All analyses in the Appendix, as in the main text, include only participants who completed the study and preferred the fun task.

Ratings of enjoyability. The mean ratings of enjoyability for each task are presented in Table A3.1. As predicted, participants rated the word game significantly more fun on average than the transcription task ($M_{game} = 5.31$ vs. $M_{transcription} = 2.69$; $t(617) = 46.21$, $p < .001$).

Table A3.1. Mean enjoyability rating for each task, Study 1.

Task	Mean Enjoyability
Boggle-like Word Game	5.31
Categorizing Stock Photos	4.76
Writing Photo Captions	3.57
Completing Captchas	3.24
Transcription Task	2.69

Robustness checks. At the end of the experiment, participants responded to several robustness checks to ensure that they were paying attention and that there were no differences across conditions: "How happy overall were you with this HIT?" (1 = "very unhappy," and 7 = "very happy"); "Do you think you would have had more fun had you switched to boggle?" ("yes"/"no"; only asked to participants who chose to continue transcribing); "What was your reaction when you were first assigned to the transcription task?" (1 = "very disappointed," and 7 = "very pleased;" reverse-coded); "How fast of a typer are you?" (1 = "very slow," and 5 = "very fast;" reverse-coded). None of these measures significantly varied across conditions (*p*s > .45). Finally, 96% of participants reported doing the survey on their computers (vs. phones).

STUDY 2A

Design Details and Materials

In Study 2a, participants read similar instructions as Study 1 but with an uncertain task horizon:

> *Welcome to our study! We need your help completing a task! We are requesting help on a handful of different tasks. We are spreading the tasks out*

across mturkers, so each person will only be assigned to one of these tasks. The computer will randomly assign participants to complete one of these tasks. Each of the tasks takes the same amount of time.

Each task consists of multiple rounds. HOWEVER, the number of rounds that you will need to complete depends on the number of other turkers that are also helping. We need an equal number of people to complete each task. If an unequal number of people are assigned to a single task, you may be given an opportunity to switch tasks. If this occurs, a screen will pop up giving you the opportunity to either continue on the current task or to switch to the presented task for the remainder of your time. Your choice will not influence the total number of rounds you end up completing. Please carefully read the instructions and be as accurate as possible with your task. We appreciate your attention!

When assigned to the transcription task, participants read:

You were randomly assigned to transcribe text. You will see pictures of paragraphs that are rotated 90 degrees to the right. These paragraphs were scanned incorrectly and we need them to be transcribed. On each page, please transcribe the highlighted lines and then click next. How many rounds you complete in total will depend on how many other turkers are helping. Thank you!

Additional Items and Analyses Not Reported in Main Text

Ratings of enjoyability. Participants rated the word game as significantly more enjoyable than the transcription task ($M_{game} = 5.15$ vs. $M_{transcription} = 2.46$; $t(321) = 31.21$, $p < .001$).

Reasons for participants who would choose to continue to transcribe. Consistent with the other analyses, the analyses of the reasons why participants chose to switch or stay only include the participants who rated the fun task as subjectively more enjoyable. Participants who indicated that they would have chosen to continue transcribing read: "You indicated that you would have continued transcribing. In the past, participants who chose to continue transcribing shared reasons for making this choice. Please indicate how much each of these reasons is also applicable for you." They were then shown a list of reasons and reported on an 8-point scale how applicable each of the reasons was for them (0 = "not applicable," and 7 = "very applicable"). The mean ratings for each reason are presented in Table A3.2.

Table A3.2. Mean reason ratings among participants who would have chosen to stay transcribing, Study 2a.

Reason for Continuing to Transcribe	Mean Rating

I was focused on the task	5.9
I had already gotten into a groove	5.7
I felt close to the end	5.6
I thought it would be faster to keep transcribing	5.4
Switching felt effortful	4.2
I don't like change	3.3
Transcribing is more fun	2.9
I didn't give it much thought	2.0

Reasons for participants who would choose to switch to Boggle. Participants who indicated that they would have chosen to switch to the word game, read: "You indicated that you would have switched to Boggle. In the past, participants who chose to switch to Boggle shared reasons for making this choice. Please indicate how much each of these reasons is also applicable for you." They were then shown a list of reasons and reported on an 8-point scale how applicable each of the reasons was for them (0 = "not applicable," and 7 = "very applicable"). The mean ratings for each reason are presented in Table A3.3.

Table A3.3. Mean reason ratings among participants who would have chosen to switch to boggle, Study 2a.

Reason for Switching to Boggle	Mean Rating
Boggle is more fun	6.1
I wanted to try something new	5.5
Transcribing was too tedious	5.5
I thought it would be faster to do Boggle	4.7
I was bored	4.6
I didn't give it much thought	1.4

Demographic items. At the end of the experiment, participants were asked several

additional items: their political ideology (0 = “extremely liberal,” and 7 = “extremely conservative”); their age; their gender (“male”/“female”/“other”), and whether they had ever done this transcription task in another HIT (“no, never”/“yes, in the past month”/“yes, in the past 6 months”/“yes, in the past year”/“I am not sure”). On average, participants were slightly more liberal-leaning (M = 2.96) and the vast majority reported never having done this transcription task (87.9%).

STUDY 2B

Design Details and Materials

In Study 2b, participants read the same instructions as Study 2a. When given the switch opportunity, all participants saw the same switch opportunity as participants in the cost-equated condition from Study 1 (Figure W4).

Additional Items and Analyses Not Reported in Main Text

Ratings of enjoyability. Participants rated the word game as significantly more enjoyable than the transcription task (M_{game} = 5.42 vs. $M_{transcribe}$ = 2.69; t(312) = 32.05, p < .001).

*Demographic items and robustness checks***.** Participants responded to the same robustness check items as Study 1. An analysis of variance revealed that overall happiness with the HIT significantly varied across conditions (F(2, 310) = 21.67, p < .001). A post hoc Tukey test showed that participants were happier with the HIT in the low-entrenchment condition (M = 5.46) compared to participants in both the medium-entrenchment (M = 4.85; p = .012) and high-entrenchment (M = 4.57; p < .001) conditions. Reported happiness was not different between the medium-entrenchment and high-entrenchment conditions (p = .411). None of the other items varied across condition (ps > .24) and 93% of participants reported doing the HIT on their computer (vs. their phone).

STUDY 3

Design Details and Materials

In Study 3, participants read similar instructions as Studies 2a-2b, with the addition of the following information: “While doing the task, you will also listen to peaceful background sounds.” Whereas participants in the previous studies tested 5 different tasks and rated each task on 2 items (enjoyability and familiarity), in this study they tested 4 tasks and responded only to the preference item. This slight change was made to reduce participant burden.

On the next page, all participants read:

You were randomly assigned to transcribe text. You will see pictures of paragraphs that are rotated 90 degrees to the right. These paragraphs were scanned incorrectly and we need them to be transcribed. How many transcriptions you do will depend on how many other turkers enroll. Thank you!

While you are transcribing, you will listen to audio of nature and chimes!

Participants in the divided-attention condition further read:

We are interested in certain components of the audio clip. Please pay close attention and count the total number of times you hear the sound of a chime or bell. At the end of the task, we will ask you how many you heard.[28]

Participants then pressed play on the audio clip and began transcribing. In the previous studies the transcription rounds were divided across different pages such that participants had to press next before they could see the next round. In contrast, in this study, there were 10 task rounds all displayed on the same page (though participants were unaware whether or not there were additional pages of transcription). As participants began their 6th task round, the cost-equated switch opportunity popped up, giving them the option to switch tasks or continue with the transcriptions.

Additional Items and Analyses Not Reported in Main Text

Ratings of enjoyability. Participants rated the word game as significantly more enjoyable than the transcription task ($M_{game} = 5.20$ vs. $M_{transcription} = 2.61$; $t(256) = 29.61$, $p < .001$).

Attrition. On the page where participants were first assigned to their task, a greater proportion of participants who began the study dropped out in the divided-attention condition (35.9%) compared to the focused-attention condition (26.4%; $\chi^2(1, N = 590) = 5.76$, $p = .016$). Importantly, however, the people who quit the study at this point did not even attempt the first round of the task. Of those who began the transcription task, only 1 participant did not complete the study.

Demographic items and robustness checks. After completing the task, participants were asked how much they would like to perform another HIT like this and answered an attention check question asking them which sound was played in the audio clip. Participants in the divided-attention condition indicated significantly less interest in performing another HIT like this compared to those in the focused-attention condition ($M_{divided\text{-}attention} = 3.56$ vs. $M_{focused\text{-}attention} = 4.46$; $t(248.71) = -3.27$, $p = .001$, equal variances not assumed).

[28] As noted in the main text, while we did ask participants to report this number after the task, this item was included simply to strengthen the manipulation and we thus do not discuss it further.

Ten participants failed the attention check asking them which sound played in the clip (9 participants in the focused-attention condition and 1 in the divided-attention condition). The proportion who stayed with their less-preferred task remains significantly different across conditions when excluding these participants ($M_{divided\text{-}attention}$= 12.9% vs. $M_{focused\text{-}attention}$= 22.9%; $\chi^2(1, n = 247) = 4.10$, $p = .043$).

STUDY 4

Data Collection Notes

This study was run in two batches. After running the first batch (on a Friday), it became clear that we underestimated the effect size and thus ran an additional batch the following Monday. There was no difference in the proportion who stayed with their less-preferred task in batch 1 (28.4%) versus batch 2 (24.9%; $\chi^2(1, n = 656) = .142$, $p = .707$). Moreover, the interaction between batches (1 vs. 2) and condition (repeating vs. intermixed) was not significant ($p > .52$) and switching remains significantly less likely in the repeating condition when controlling for batch (b = -.43, z(655) = -2.35, $p = .019$). Thus, we combined the two datasets.

Design Details and Materials

Participants read similar instructions as the previous studies and then tried and rated tasks before being assigned to their task. The rating portion of the study differed slightly from prior studies and included the following instructions:

> *Training Session! So that you can do the tasks well, you will do a short training session first! Please try the tasks below and rate how much you like each one. On the next page, you will be assigned your task.*

Participants then tried Where's Waldo (Figure A3.6) and the transcription task and rated each by responding to the measure "How much do you like this task?" (1= "not at all," and 7 = "Very"). This item was different than the preference measure used in the previous studies and is a slightly more direct measure of one's preferences. Whereas in the previous studies participants rated 4-5 different tasks, in this study they only rated Where's Waldo and the transcription task in order to reduce participant burden as the training session already involved four rounds of tasks. The training session for participants in the repeating condition was as follows: participants tried and rated the Waldo task, tried and rated the transcription task, and then did two additional rounds of Waldo (W-T-W-W). In the intermixed condition, participants: tried and rated the Waldo task, tried and rated the transcription task, and then did two additional rounds of transcription (W-T-T-T). At the end of this page, participants read: "Click next to be randomly assigned to your task!"

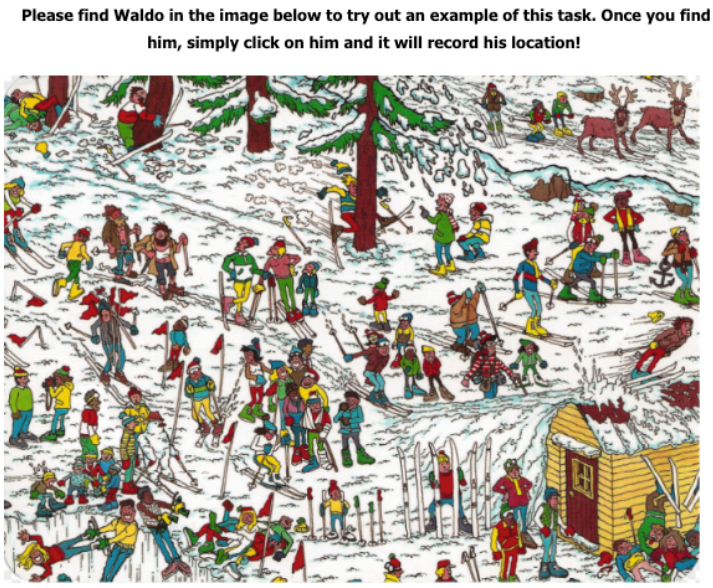

Figure A3.6. Where's Waldo task, Study 4

On the next page, all participants read:

> *You were randomly assigned to the Transcription Task! You will see pictures of paragraphs that are rotated 90 degrees to the right. These paragraphs were scanned incorrectly and we need them to be transcribed. On each page, please transcribe the highlighted lines and then click next. The number of rounds you complete in total will depend on the performance of other turkers. Thank you!*

Participants in the intermixed condition read the additional line:

> *Note: We also need a few more Where's Waldo tasks completed. These will be interspersed as short breaks in between the transcriptions!*

Additional Items and Analyses Not Reported in Main Text

Preference Rating. Participants rated the word game as significantly more likable than the transcription task ($M_{waldo} = 5.92$ vs. $M_{transcription} = 2.66$; $t(655) = 51.70$, $p < .001$).

Self-reported Entrenchment. Participants in batch 1 only responded to an additional measure at the end of the study (after the switch opportunity): "While doing the Transcription Task, to what extent did you feel entrenched (i.e., intensely focused on the transcription and unaware of distractions or other things around you)?" (1 = "not at all," and 7 = "very"). Participants' self-reported entrenchment was no different across conditions ($M_{intermixed} = 5.88$ vs. $M_{repeating} = 5.60$; $t(186.64) = 1.40$, $p = .16$).

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