

**In the Mindset to Return to a Healthier Past Self:
Self-Reported Attempts to Quit Gambling are a Product of Discontinuity-Induced
Nostalgia and Incremental Beliefs**

[Pre-Print]

Melissa Salmon

Carleton University

Hyoun S. Kim

University of Calgary

Michael J. A. Wohl

Carleton University

This research was supported by a Seed Grant from the National Center for Responsible Gaming (#Wohl2014). Corresponding author: Michael J.A. Wohl, Department of Psychology, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario, Canada, K1S 5B6. Tel: (613) 520-2600 x 2908, Email: michael.wohl@carleton.ca

Abstract

Despite the low rate of behavior change among those engaged in addictive behaviors, some people can and do initiate change. We propose that attempting to self-regulate addictive behavior is a function of motivation and the belief that behavior is malleable. Specifically, feeling self-discontinuous (i.e., feeling that addiction has fundamentally changed the self) should motivate change by inducing nostalgia for the pre-addicted self. Importantly, we expected that discontinuity-induced nostalgia would only be associated with an attempted change among those who believe that behavior is malleable (i.e., incremental theorists). To test this moderated-mediation model, we recruited a community sample of disordered gamblers (N=243) to assess self-reported change attempts over time. During the initial session, participants completed measures of self-discontinuity, nostalgia, and implicit theories of behavior. Three months later, participants (N=120) reported whether they attempted to change their gambling behavior, as well as the method and extent to which they sustained this change. As expected, discontinuity-induced nostalgia was positively associated with an increased likelihood of self-reporting a change attempt, but only when behavior was believed to be malleable, rather than fixed. As very few disordered gamblers take action, these findings suggest novel psychological processes to promote positive behavior change.

Keywords: *disordered gambling, self-discontinuity, nostalgia, implicit theories, behavior change*

In the Mindset to Return to a Healthier Past Self:

Self-Reported Attempts to Quit Gambling are a Product of Discontinuity-Induced Nostalgia and Incremental Beliefs

Behavior change is hard, even when that behavior is yielding significant negative outcomes. For example, when a gambler experiences significant monetary loss, objectively that gambler should recognize their gambling behavior is problematic and take action to change. However, only 15% of people living with addiction take the necessary action to regulate their behavior (Miller & Rollnick, 2002; Prochaska, DiClemente, & Norcross, 1992). This low rate of change is troubling given the array of negative consequences associated with continued problematic engagement in addictive behaviors (e.g., physical, psychological, interpersonal problems; see Lesieur & Custer, 1984; Petry, 2005). With that said, some people do muster the will to self-regulate their behavior in the hope of alleviating these harms. Curiously, however, there is a paucity of empirical work on factors that motivate such people, disordered gamblers in particular, to attempt change (Evans & Delfabbro, 2005).

Importantly, recent research has shown that motivation to change is, in part, a function of the belief that one's addictive behavior has resulted in negative psychological and physical changes to one's sense of self (i.e., self-discontinuity; Kim & Wohl, 2015; Kim, Wohl, Salmon, & Santesso, 2017; Wohl, Kim, Salmon, Santesso, Wildschut, & Sedikides, 2018). Such a sense of discontinuity elicits nostalgic reverie (i.e., a sentimental longing) for the pre-addicted self (Kim & Wohl, 2015), which motivates people to take action to reclaim this past self (Kim & Wohl, 2015; Wohl et al., 2018). However, the motivation to change elicited via discontinuity-induced nostalgia may be insufficient for those living with addiction to make a change attempt.

We argue that taking action to self-regulate an addictive behavior is a function of the motivation provided by discontinuity-induced nostalgia and the belief that human behavior is malleable. According to Dweck (1996), people differ in the extent to which they believe human behavior can change. Incremental theorists believe that behavior is malleable. In contrast, entity theorists believe that behavior is fixed. This individual difference in mindset is likely to dictate the likelihood of people initiating behavior change. Indeed, why take action if human behavior is not changeable? However, holding the belief that human behavior is changeable on its own may fail to yield positive changes to addictive behavior. Using a longitudinal design, we tested the hypothesis that people are most likely to attempt to change if they feel discontinuity-induced nostalgia for a positive past and believe that human behavior is malleable.

The Durability of Addictive Behaviors

Many unhealthy, addictive behaviors have become normalized recreational activities. Gambling is perhaps the archetype for such behavior. Historically, gambling was viewed as an activity of the morally corrupt (Martz, 1997). Now, however, gambling is an immensely popular recreational activity. For example, approximately 80% of people in the United States gamble at least once a year (Welte, Barnes, Tidwell, Hoffman, & Wieczorek, 2015). Fortunately, the majority of people who gamble incur little-to-no lasting negative consequences. However, a small but significant portion of the population gamble to excess. Indeed, 1.6% to 3.85% of the general public experience problems with their gambling behavior (Shaffer, Hall, & Vander Bilt, 1999). Particularly troubling is that excessive gambling may continue despite the resulting psychological, physical, and interpersonal harms (Lesieur & Custer, 1984; Petry, 2005).

Despite these significant harms, people are relatively unwilling to take action to self-regulate addictive behavior. In fact, most people fail to make a single change attempt

(DiClemente, Prochaska, Fairhurst, Velicer, Rossi, & Velasquez, 1991) or take the necessary action to overcome the addictive behavior (Miller & Rollnick, 2002; Prochaska, DiClemente, & Norcross, 1992). Coupled with the fact that continued engagement in these behaviors often leads to escalated harms (Raisamo, Halme, Murto, & Lintonen, 2013; Smart & Ferris, 1996), the low rates of change call for the identification of factors that promote behavior change among people engaging in addictive behaviors. Unfortunately, little empirical attention has been placed on the psychological processes that move people toward change. Rather, current models of behavior change (e.g., the transtheoretical model; DiClemente et al., 1991) place emphasis on *how* people change. Therefore, we looked to the social psychological literature for clues as to *why* people engaging in addictive behaviors initiate change.

Discontinuity-Induced Nostalgia as Motivation

Negative experiences can bring about relatively aversive states and disconnect people from who they once were (Iyer & Jetten, 2011). Importantly, feeling disconnected from the past self (i.e., self-discontinuity) is a psychologically distressing state (Lampinen, Odegard, & Leding, 2004; Sani, 2008). People who feel self-discontinuous often report negative affect, anxiety, and instability (see Spears, 2008). Furthermore, self-discontinuity can hinder people from acting in ways that can benefit their present and future selves (Chandler, Lalonde, Sokol, Hallett, & Marcia, 2003). Thus, self-discontinuity is generally characterized as an aversive state of being (Chandler & Proulx, 2008; Iyer & Jetten, 2011). That said, recent empirical evidence suggests self-discontinuity holds motivational properties for people engaging in addictive behaviors (Kim & Wohl, 2015; Kim et al., 2017; Wohl et al., 2018).

Addiction often results in negative changes to people's moods, behaviors, and self-esteem (Shaffer & Albanese, 2005; Volberg, Reitzes, & Boles, 1997). Miller and Rollnick (2002)

noted that people engaging in addictive behaviors tend to experience distress once they become aware of how their current, harmful behaviors are incongruent with their self-concept. Feeling self-discontinuous as a result of engagement in an addictive behavior may thus serve as a catalyst for change simply because people may be motivated to escape such feelings of distress.

Preliminary evidence for this supposition was provided by Nuske and Hing (2013) who found that the narratives of disordered gamblers in treatment for their addiction often included themes of self-discontinuity. Importantly for the current research, expressed discrepancy between past and present selves was one of the critical points on the pathway to recovery from disordered gambling.

A potential reason that feeling self-discontinuous may motivate people living with addiction to self-regulate their addictive behavior is because it elicits nostalgic reverie (i.e., a sentimental longing) for a more favorable time in one's past (e.g., life lived before the addictive behavior; Iyer & Jetten, 2011; Sedikides, Wildschut, Routledge, & Arndt, 2015). The motivating power of nostalgia stems, in part, from its ability to reduce the psychological distance from the past self, which promotes a sense of self-continuity (Sedikides et al., 2015; 2016). In this light, discontinuity-induced nostalgia may motivate people living with addiction to try to recapture the positive past self. This motivation should ultimately manifest in attempts to quit their addictive behavior to restore self-continuity.

Providing support for the notion that discontinuity-induced nostalgia can motivate those living with addiction to make a quit attempt, Kim and Wohl (2015) found that both problem drinkers and disordered gamblers who felt their addiction had created self-discontinuity reported nostalgic reverie for the pre-addicted self. Importantly, this discontinuity-induced nostalgia increased readiness to change. Advancing this finding, Wohl and colleagues (2018)

demonstrated that discontinuity-induced nostalgia (when manipulated) also increased the likelihood that people took action to quit or cut down on their addictive behaviors. While discontinuity-induced nostalgia may be sufficient in motivating people to return to a healthier lifestyle (i.e., one devoid of the addictive behavior), we contend that motivation alone is not sufficient to initiate change. Therefore, we hypothesized that making such an attempt to self-regulate addictive behavior is a function of discontinuity-induced nostalgia and a belief that human behavior is malleable.

Implicit Theories of Behavior

People differ in the extent to which they believe human behavior is malleable (Dweck & Leggett, 1988). Incremental theorists endorse the belief that behavior can change (i.e., it is malleable), whereas entity theorists endorse the belief that behavior does not change (i.e., it is fixed, regardless of expended effort to facilitate change). People's global belief about human behavior has direct implications for their specific goal-oriented behavior—in the face of challenges (which are frequent on the road to behavior change), incremental theorists increase their effort and persist, whereas entity theorists become preoccupied with their performance and believe that increased effort is futile (Henderson & Dweck, 1990). Put differently, incremental theorists typically set learning goals for themselves and treat failure as a challenge by responding with increased effort at the task at hand. Entity theorists, however, set performance goals and treat failure as a testament to their ability (Dweck & Leggett, 1988; Dweck, 1996).

Implicit theories of human behavior have been shown to influence, among other things, how people approach physical activity (Ommundsen, 2003), weight loss (Burnette, 2010), and social settings (Beer, 2002). Consistently, entity theorists, compared to incremental theorists, are more likely to give up on goals that seem difficult to obtain (see Burnette, O'Boyle, VanEpps,

Pollack, & Finkel, 2013). Interestingly, despite the vast literature on implicit theories and self-regulatory behavior, there is a paucity of research in the context of regulating addictive behavior. Taking action (e.g., cutting down or quitting) is, of course, a challenging goal (Polivy & Herman, 2002). However, from a goal-oriented perspective, people who endorse incremental theories of behavior should be more likely to attempt change. People who endorse entity theories of behavior, in contrast, should view taking action as an opportunity for failure, and avoid the anticipated negative feedback. Regardless of whether behavior change is a goal one sets for oneself, people who believe that their addictive behavior has the capacity to change may be more likely to make an attempt to quit or cut down on their behavior over time.

However, for implicit theories to influence an attempt to change behavior, we argue that one must also possess the initial motivation to change. Indeed, people are more likely to set goals for themselves if they believe that goal is important to them and can be attained (Locke, 1996). Therefore, simply holding an incremental mindset of behavior will not be sufficient for making a change attempt—motivation is also required to push people toward making a positive behavior change. That is, incremental theorists may be willing to exert more effort to take action to change when they feel motivated to do so. However, if incremental theorists are not motivated to change, they will be least likely to make a change attempt as they are missing the necessary drive. In contrast, entity theorists, may not view behavior change as an outcome within their control, and believe any effort exerted would be futile. Therefore, motivation will have no influence on whether behavior change is sought (see Brehm & Self, 1989). As such, we expect that taking action to change one's addictive behavior will be a function of both motivation and the belief that behavior is malleable.

Overview

In the current study, we tested the idea that initiating a change attempt is a function of discontinuity-induced nostalgia and the belief that behavior is malleable (i.e., incremental theories). We also explored the extent to which people sustained their self-reported change in behavior by assessing how successful their attempt to quit or cut down was. We assessed sustained change to further understand the process of initiating and maintaining behavior change. The extant literatures on both nostalgia (stemming from self-discontinuity) and implicit theories are relatively silent on the processes of change. Moreover, there is a paucity of empirical work examining factors that sustain change attempts. Herein, we address this gap in knowledge.

To test these moderated-mediation models, we conducted a three-month longitudinal study assessing self-reported change attempts (and the extent that these attempts were sustained) among a community sample of disordered gamblers. This design allowed us to better understand the temporal antecedents of why some people attempt to regulate addictive behavior by detecting differences in the likelihood that participants self-report a change attempt over time. Moreover, we also were able to determine the avenues by which gamblers initiated change and the extent to which they sustained this change attempt.

Methods

Participants and Procedure

Participants were 392 community gamblers (198 male, 189 female, 5 unreported) recruited from Amazon.com's Mechanical Turk (MTurk) system. Participants ranged in age from 18 to 72 years ($M=35.78$, $SD=11.80$). MTurk provides a reliable and diverse participant pool that behaves in ways consistent with known effects in psychology (Crump, McDonnell, & Gureckis, 2013). Importantly, MTurk is a reliable and valid means to recruit gamblers, drinkers, and cannabis users (Kim & Hodgins, 2017).

At recruitment, participants were informed that they would earn US \$0.25 for completing the initial survey (approximately 15 minutes in duration) and that permission would be sought to contact them for a three-month follow-up session, for which they would receive an additional US \$0.75 (with a \$1.00 bonus). The compensation rates are based on what is typically offered on MTurk for similar psychological studies with duration between 10 and 15 minutes (Buhrmester, Kwang, & Gosling, 2011). Furthermore, the inclusion of a bonus for the follow-up session was intended to reduce the attrition rate, as attrition is typically higher among gamblers (Wohl & Sztainert, 2011).

Participation was limited to those who indicated they engaged in gambling activities (e.g., slot machines, poker, roulette, sports betting) in the past 12 months. Participation was also limited to participants who reported at least one symptom of disordered gambling using the NORC DSM-IV Screen for Gambling Problems (NODS) CLiP (Toce-Gerstein, Gerstein, & Volberg, 2009). This three-item questionnaire includes a screening item for Loss of Control (“Have you ever tried to stop, cut down, or control your gambling?”), Lying (“Have you ever lied to family members, friends, or others about how much you gamble or how much money you lost on gambling?”), and Preoccupation (“Have there ever been periods lasting 2 weeks or longer when you spent a lot of time thinking about your gambling experiences, or planning out future gambling ventures or bets?”). We included a fourth item (“Has there ever been a period when, if you lost money gambling one day, you would often return another day to get even?”) to assess the extent to which participants chase their losses—a central characteristic of disordered gambling (American Psychiatric Association, 2013). Participants who responded “yes” to at least one of the four items were deemed eligible to continue on with the survey. Participants who responded “no” to all four items were re-directed to an ineligibility debriefing. This four-item

measure was used as eligibility criteria to increase the probability that we would recruit a large number of gamblers in need of behavior change to provide sufficient power (.80) for detecting a moderate effect size, $d=.5$ ($p<.05$, two-tailed; Cohen, 1992).

To ensure sufficient power, we used a rule of thumb that the sample size should be 300. However, due to the longitudinal component, we needed to take attrition into account. Based on previous longitudinal research with gamblers on MTurk (Kim, Wohl, Salmon, Gupta, & Derevensky, 2015), we anticipated 30% attrition. To account for attrition, the optimal sample size for the initial session was set at 400 participants. See results for post-hoc power analyses.

After granting consent, eligible participants completed a series of questionnaires measuring problem gambling severity (as confirmation of the initial NODS-Clip assessment and to further limit our sample to moderate and disordered gamblers), self-discontinuity, nostalgia, implicit theories, and demographics. Throughout the questionnaires, we scattered three attention check items (i.e., “Please leave this item blank”) to test whether participants were attentive and honest (Paolacci, Chandler, Ipeirotis, 2010). We decided a priori that the data of any participant who failed more than one of the three attention check items be removed from analyses. Upon completion of the survey, we asked participants for their consent to be re-contacted in three-months for a brief follow-up session. We redirected them to an abbreviated debriefing, in which we did not disclose the specific purpose of the research. Instead, we mentioned that the study assessed possible associations between how people feel about themselves, their thoughts about gambling, and their gambling behavior. To further reduce attrition, all participants (who gave permission to be re-contacted) received an email one month prior to the follow-up to remind them of the upcoming session.

Three months later, 308 participants who provided consent to be re-contacted to take part in the follow-up session were re-contacted via email. Of these 308 participants, 182 (59.09% of original sample) consented to participate in the follow-up session. Thus, the final sample for the longitudinal analyses consisted of 182 community gamblers (89 male, 93 female). Participants' age ranged from 20 to 68 years ($M=36.66$, $SD=11.43$).

After granting consent to participate in the follow-up session, participants completed a brief series of items that assessed whether they made an attempt to change their gambling behavior in the past three months (i.e., since the initial session), their method of change, and the extent to which they sustained change. Upon completion of the follow-up survey, participants were prompted to provide their Worker ID to link their data between sessions. Participants were re-assured that the purpose of providing their Worker ID was solely to link their data and provide participants with compensation through MTurk, and that any personal or identifying information was kept in strict confidentiality. Once the study was complete, participants' Worker IDs were deleted as to maintain participant anonymity. Lastly, participants were directed to the full debriefing page where the full nature of the study was disclosed.

This research was reviewed and cleared by the authors' Research Ethics Board.

Measures

Problem Gambling Severity. As a more thorough assessment of disordered gambling (compared to the NODS-CLiP), participants completed the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). The PGSI contains nine items that assess disordered gambling behavior (e.g., "Have you needed to gamble with larger amounts of money to get the same feeling of excitement?") and consequences of disordered gambling (e.g., "Have you felt guilty about the way you gamble or what happens when you gamble?"). The items were measured on a

scale anchored at 0 (*never*) and 3 (*almost always*). Participants' scores were summed to obtain a total score (ranging from 0 to 27), which was used to classify participants into one of four categories. A gambler with a score of 0 was categorized as a non-problem gambler, 1-2 as a low-risk gambler, 3-7 as a moderate-risk gambler, and 8 or more as a disordered gambler ($\alpha=.87$).

Readiness to Change. Readiness to change gambling behavior was assessed using a single item adaptation of Biener and Abrams (1991) contemplation ladder. The contemplation ladder was originally developed to assess readiness to quit smoking, and has been shown to be a strong measure of smokers' readiness to change (Biener & Abrams, 1991). The contemplation ladder is continuous and is anchored at 0 (no thought of changing) and 10 (taking action to change – e.g., cutting down, enrolling in a program).

Self-Discontinuity. Self-discontinuity was assessed with a four-item measure adapted from an Iyer and Jetten (2011) Identity Continuity measure. Sample items include “The person I was before I started gambling is different from the person I am now,” “Gambling has changed who I am,” and a reverse-coded item, “There is no difference between who I am now and who I was before I started gambling.” Each item was anchored at 1 (*strongly disagree*) and 7 (*strongly agree*). Participants' scores were calculated by obtaining the mean of the four items ($\alpha=.91$) with higher scores representing greater self-discontinuity.

Nostalgia. Nostalgic reverie for the pre-addicted self was assessed using a five-item measure adapted from Iyer and Jetten (2011). Sample items include “I am already feeling quite nostalgic about my life before gambling,” “Before I started gambling, I was a better person than I am today,” and a reverse-coded item, “I do not long for my life before gambling.” Each item was anchored at 1 (*strongly disagree*) and 7 (*strongly agree*). Participants' scores were calculated by

obtaining the mean of the five items ($\alpha=.83$), with higher scores representing greater nostalgic reverie.

Implicit Theories. Implicit theories were assessed using a three-item measure adapted from Hong, Chiu, Dweck, Lin, and Wan (1999) to assess the extent to which participants believed that gambling behavior is malleable. Sample items include “People have a predisposition to develop certain gambling habits and they really can’t do much to change it,” “People’s gambling behavior is something about them that they can’t change very much.” Each item was anchored at 1 (*strongly disagree*) and 6 (*strongly agree*), with higher scores indicating a higher tendency to endorse the belief that behavior is fixed. Participants’ scores were calculated by obtaining the mean of the three items ($\alpha=.82$).

Self-Reported Change Attempt. Self-reported change attempts were assessed with a face-valid single item measure, “Have you made an attempt to quit or cut down on your gambling in the last 3 months?” Responses to this item were dichotomous (*yes* or *no*).

Method of Change. Among participants who reported making a change attempt, we asked them to indicate their primary method for taking action to change their gambling behavior. Response options were either “self-help” or “professional treatment.”

Sustained Change. Among participants who reported making a change attempt, we also asked them about the extent to which changes to their gambling behavior had been sustained, “To what extent were you able to quit or cut down on your gambling?” Responses ranged from 1 (*not a lot*) to 5 (*a lot*).

Results

Preliminary Analyses

Because the focus of this study was on self-reported attempts to change behavior among disordered gamblers, the sample used for analysis was further limited to only participants who met criteria for moderate to disordered problem gambling severity and who were not currently taking action to change their gambling behavior. From the original sample of 392 participants, 260 moderate and disordered gamblers (125 male, 135 female) were identified using the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). Of these 260 participants, seven were currently taking action to change their gambling behavior as identified using the readiness to change ladder (Biener & Abrams, 1991), and thus were excluded from the main analyses. Additionally, eight participants indicated that they were currently seeking professional treatment for their gambling problems, and were thus excluded from analyses. Lastly, two participants did not complete the measures of interest, and were excluded from analyses due to missing data. Thus, the final sample for the initial session consisted of 243 moderate and disordered gamblers (117 male, 126 female). Participants' ages ranged from 18 to 71 years ($M=35.09$, $SD=11.38$).

Of the 182 gamblers who completed the three-month follow-up session, 62 did not meet the criteria to be classified as a moderate or disordered gamblers according to the PGSI (Ferris & Wynne, 2001). We allowed them to complete the follow-up session due to ethical considerations, but we did not include them in the main analyses. Thus, the final sample for the longitudinal analyses consisted of 120 moderate and problem gamblers (55 male, 65 female) who were not seeking professional treatment or taking action to change their gambling behavior at the initial session. Participants' age ranged from 20 to 66 years ($M=35.18$, $SD=10.66$).

Importantly, there were no observed differences between those who did and those who did not complete the follow-up session on any of the measured variables. Specifically, there were no differences in problem gambling severity, $F(1, 241)=.11$, $p=.74$, $\eta^2<.001$, self-discontinuity,

$F(1, 241)=1.22, p=.27, \eta^2=.005$, nostalgia, $F(1, 240)=1.45, p=.23, \eta^2=.006$, implicit theories, $F(1, 241)=.48, p=.49, \eta^2=.002$, or readiness to change, $F(1, 241)=.08, p=.78, \eta^2<.001$.

Main Analyses

Table 1 contains the means, standard deviations, and correlation coefficients between each variable of interest.

Self-Reported Change Attempt. We first tested the central hypothesis, in which self-discontinuity (the predictor variable) is associated with an increase in the odds of a self-reported change attempt (the outcome variable; 1 = *attempted change*, 0 = *no attempted change*) via nostalgia (the mediating variable; mean-centered), but only among those who endorse incremental theories of behavior (the moderating variable; mean-centered). As the outcome variable was binary, we used the robust weighted least squares estimation method to test the moderated-mediation model in Mplus Version 7. Bootstrapping with 5000 iterations was used to obtain bias-corrected 95% CIs for the indirect effects (Hayes, 2015). The index of moderated-mediation was significant ($p<.05$), $index=-.11, SE=.05, 95\% CI [-.24, -.001]$. Self-discontinuity was significantly associated with an increased likelihood of a self-reported change attempt via nostalgia among gamblers who endorsed incremental theories, $b=.25, SE=.09, 95\% CI [.06, .45]$, but not among those who endorsed entity theories, $b=.02, SE=.09, 95\% CI [-.18, .20]$. The results were consistent with the hypothesized moderated-mediation model (see Figure 1 for direct and indirect effects; see Figure 2 for simple slopes). A post-hoc power analysis using Monte Carlo simulation in Mplus revealed that this analysis was under powered (67%). As such, we re-tested the moderated-mediation model after conducting a missing data analysis using maximum likelihood estimation (power=91%). The pattern of results did not change (see Supplemental Materials).

Method of Change. Of the 120 eligible participants who completed the three-month follow-up session, 72 participants (60%) indicated that they had made an attempt to change their behavior. Moreover, of these 72 participants who made a change attempt, 71 participants indicated that they used self-help strategies to facilitate their self-reported change attempt whereas only a single participant indicated that they used professional treatment to make their self-reported change attempt.

Sustained Change. Among participants who self-reported making a change attempt, we tested whether self-discontinuity (the predictor variable) was associated with the extent to which participants sustained (self-reported) change in their gambling behavior (the outcome variable) via nostalgia (the mediating variable; mean-centered), but only for those who endorse incremental theories of behavior (the moderating variable; mean-centered). As the outcome variable was continuous, we used maximum likelihood to test the moderated-mediation model in Mplus Version 7. Bootstrapping with 5000 iterations was used to obtain bias-corrected 95% CIs for the indirect effects (Hayes, 2015). However, results demonstrated that the index of moderated-mediation was not significant ($p > .05$), $index = .05$, $SE = .06$, 95% CI [-.08, .18]. Discontinuity-induced nostalgia was not associated with sustained change in gambling among either incremental theorists, $b = .15$, $SE = .11$, 95% CI [-.11, .40]. Interestingly, discontinuity-induced nostalgia was positively associated with self-reported sustained change among entity theorists, $b = .25$, $SE = .13$, 95% CI [.008, .47]. However, this conditional indirect effect should be interpreted with caution because the index of moderated-mediation was not significant (see Figure 3 for direct and indirect effects; see Figure 4 for simple slopes). A post-hoc power analysis using Monte Carlo simulation in Mplus revealed that this analysis was under powered (42%). As such, we re-tested the moderated-mediation model after conducting a missing data

analysis using maximum likelihood estimation (power=60%). The pattern of results did not change (see Supplemental Materials).

Discussion

Although feeling a sense of self-discontinuity has traditionally been considered maladaptive (Lampinen et al., 2004; Sani, 2008), recent work has shown that it motivates people to engage in behavioral change by eliciting nostalgic reverie for the pre-addicted self (Kim & Wohl, 2015). Results from the current research, however, suggest that motivation stemming from nostalgic reverie for the pre-addicted self is insufficient to initiate the process of behavior change. Rather, attempts to self-regulate addictive behavior are a function of both discontinuity-induced nostalgia and the belief that human behavior is malleable. As predicted, disordered gamblers were more likely to make a self-reported change attempt when they were motivated to do so (i.e., high discontinuity-induced nostalgia) and held the belief that behavior is malleable (i.e., incremental theorists). However, discontinuity-induced nostalgia did not affect whether action was taken among those who believe behavior is fixed (i.e., entity theorists).

These findings are consistent with research supporting the role of implicit theories in regulating behavior in domains such as academic achievement, relationships, and weight loss (Beer, 2002; Burnette, 2010; Dweck & Leggett, 1988). They are also consistent with Brehm and Self's (1989) theory of motivational intensity. According to this theory, behavior change is a function of the perceived ease of making a change and the intensity of a person's motivation to change. When change is perceived to be easy or highly possible, people are more likely to take action to change their behavior, but only when they are motivated to do so. In contrast, when behavior change is perceived to be difficult or improbable, motivation will have little to no influence on action to change.

Applied to people living with addiction, change is a function of the person's belief in the ease with which they think they can quit or cut down on their addictive behavior, as well as the intensity of their motivation to change. Herein, self-reported change attempts only occurred when gamblers felt a greater sense of discontinuity-induced nostalgia and believed that behavior change was possible (i.e., beliefs commonly held by incremental theorists). When gamblers believed that behavior change was improbable (i.e., beliefs commonly held by entity theorists), the motivation to change that resulted from discontinuity-induced nostalgia was unrelated to whether a self-reported change attempt was made. This suggests that implicit theories of human behavior play a key role in the motivational intensity needed to make an attempt to change one's addictive behavior.

The current study also provides empirical support for the idea that discontinuity-induced nostalgia has motivating quality. Past research (Sedikides et al., 2015) has shown that feelings of self-discontinuity (i.e., that the current self is worse off than the past self) heightens nostalgic reverie for the past self, which helps people to regain this lost sense of self-continuity. Addictive behaviors are a pervasive force in one's life, often resulting in negative changes to one's sense of self (Shaffer & Albanese, 2005; Volberg et al., 1997). These changes give rise to feelings of self-discontinuity, where the person living with addiction feels that the current, addicted self is worse off than the past, non-addicted self (Kim & Wohl, 2015). Self-continuity cannot be reestablished whilst continuing to engage in the addictive behavior (e.g., gambling excessively). Thus, a key avenue to regain a sense of continuity is to eliminate the addictive behavior from their behavioral repertoire.

Interestingly, discontinuity-induced nostalgia did not interact with implicit theories to predict (self-reported) sustained behavior change. Thus, although discontinuity-induced nostalgia

may motivate incremental theorists to make a change attempt, it is not able to sustain that motivation to an end of meaningful change. It is important to note that all but one participant who reported an attempt to quit or cut down on their gambling made this attempt via self-help. That is, the clear majority of disordered gamblers in our sample were trying to guide themselves through their process of change. However, self-help activities are not homogeneous, and tend to vary in their effectiveness (Lubman et al., 2015). Sustained change, therefore, may require the assistance of a trained professional.

Implications

The findings of this research have a number of basic and applied implications. From a basic perspective, the social psychology literature on the functional benefits of nostalgia has only speculated about its behavioral implications (see Best & Nelson, 1985; Sedikides et al., 2008; 2016). The literature on implicit theories also has yet to illuminate the role incremental and entity beliefs may play in the regulation of addictive behaviors. Herein, we found that discontinuity-induced nostalgia holds motivational qualities for people engaging in disordered gambling behavior, but only when they believe that behavior is malleable.

Although the current study was limited to the context of disordered gambling behavior, these results can be generalized to the larger literature of addictive behaviors. Indeed, the benefits of discontinuity-induced nostalgia on behavior change have also been observed among problem drinkers (see Kim & Wohl, 2015; Wohl et al., 2018). From a biopsychosocial perspective (Griffiths, 1996; 2005), gambling shares many of the components of addiction with other traditionally addictive behaviors, such as drinking or smoking. Consistent with other addictive behaviors, disordered gambling can result in tolerance with increased play, physical withdrawal symptoms when attempting to quit or cut down, and high risk of relapse after a

sustained period of abstinence (see Griffiths, 2005). Moreover, researchers have proposed that all addictive behaviors (such as disordered gambling) share commonalities, suggesting that these behaviors are all distinct expressions of an underlying syndrome (Shaffer, LaPlante, LaBrie, Kidman, Donato, & Stanton, 2004). Thus, these findings may also contribute to the limited literature on factors that move people engaging in addictive behaviors, more generally, toward taking action. Unfortunately, much of the existing empirical research on addictive behaviors has examined *how* people change (DiClemente et al., 1991; Velicer, DiClemente, Prochaska, & Brandenburg, 1985). Relatively few studies are able to identify *why* people change (Evans & Delfabbro, 2005). The current study demonstrated both the motivating processes of change (i.e., discontinuity-induced nostalgia), in addition to for whom change is more likely to occur (i.e., incremental theorists). Thus, these findings can speak more generally to the temporal antecedents of why some people are able to regulate addictive behavior.

While self-discontinuity has been manipulated to heighten both readiness to change (Kim & Wohl, 2015) and self-reported change attempts (Wohl et al., 2018), the current research demonstrated that these effects also occur naturally over time (but only when behavior is believed to be malleable). Taken together, these findings suggest that orienting disordered gamblers to think back to a healthier past self may be a viable means to regulate addictive behaviors. It may behoove health care providers to highlight to clients a) how gambling has fundamentally changed who they are, and b) what positive elements of their past they are aiming to recapture. However, simply building motivation to change will not be enough to produce a change attempt. Health care providers must also instill the notion that human behavior is malleable when motivating their clients to engage in behavior change. In sum, the results of this

research further support the notion that self-discontinuity (by way of nostalgic reverie) holds motivational properties for the self-regulation of addictive behaviors.

Limitations and Future Directions

A limitation of the current study is that findings are based on participants' self-reported behavior change. People are motivated to present a favorable image of themselves (i.e., social desirability) and thus there may be some response bias (Van de Mortel, 2008). Importantly, however, data provided on MTurk are known to be of high quality (Crump et al., 2013), in part because people tend to provide more honest responses to sensitive matters when completing online surveys (Mishra & Carleton, 2017). Additionally, the association between discontinuity-induced nostalgia and behavior change has now been replicated a number of times with different samples and methodologies (Kim et al., 2017; Wohl et al., 2018). Thus, we have confidence in the current findings. Moreover, that we showed self-discontinuity facilitated a change attempt three months later among disordered gamblers is promising from a clinical perspective. That said, objective measures of behavior change should be used in future study designs to determine whether participants are making an actual attempt to change their behavior, in addition to the extent to which their change attempt was sustained.

Second, the attrition rate was relatively high. Only 49.38% of the original sample completed the three-month follow-up. Unfortunately, attrition tends to be high for longitudinal studies on MTurk (Daly & Natarajan, 2015), and is particularly higher among MTurk workers who gamble and participate in gambling-oriented research (see Kim et al., 2015). Knowing this, we took steps to reduce attrition where possible by offering increased remuneration for the follow-up study along with a bonus reward. Moreover, we recruited a larger sample of

disordered gamblers during the initial session to maintain sufficient power for the longitudinal analysis, which counteracted the negative effects of attrition.

Lastly, the current research did not follow participants beyond the three-month follow-up session. As such, we do not know whether gamblers' self-reported change attempts were sustained beyond this time frame. The results demonstrate that self-discontinuity and nostalgia are associated with higher likelihood of *attempting* change three months later among gamblers with an incremental mindset. However, change is not a linear process. People typically cycle in and out of action before behavior change is sustained (Prochaska et al., 1992). Therefore, it is likely that gamblers who attempted to quit or cut down on their gambling were not able to sustain this change in behavior over time. With that said, it is worth noting that moving people toward action is exceptionally difficult—people are reluctant to change. In fact, only 7 to 12% of disordered gamblers take the needed measures to change their behavior (Slutske, 2006). Thus, the fact that the current research identified factors associated with a higher likelihood of self-reported change attempts among some participants is not only encouraging, it is striking. Future research would do well to follow participants over an extended period of time to determine whether the observed effects in the current study result in sustained behavior change.

Conclusion

People seem relatively unwilling to change unhealthy, addictive behaviors despite the consequences they typically yield. However, people can and do muster the courage to remove these unhealthy behaviors from their behavioral repertoire. Self-discontinuity motivates people to make an attempt to change their addictive behavior because it elicits nostalgic reverie for a healthier past. However, possessing the initial motivation to change an addictive behavior alone will not result in a change attempt. One must also hold the belief that human behavior is capable

of change before action will be taken. People engaging in addictive behaviors are encouraged to consider their implicit beliefs when approaching difficult tasks such as making a behavior change.

References

- American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-V)*. Washington: American Psychiatric Association.
- Beer, J. S. (2002). Implicit self-theories of shyness. *Journal of Personality and Social Psychology, 83*(4), 1009-1024.
- Best, J., & Nelson, E. E. (1985). Nostalgia and discontinuity: A test of the Davis hypothesis. *Sociology and Social Research, 69*, 221-233.
- Biener, L., & Abrams, D.B. (1991). The contemplation ladder: Validation of a measure of readiness to consider smoking cessation. *Health Psychology, 10*, 360-365.
- Brehm, J. W., & Self, E. A. (1989). The intensity of motivation. *Annual Review of Psychology, 40*, 109-131.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's mechanical turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science, 6*, 3-5.
- Burnette, J. L. (2010). Implicit theories of body weight: Entity beliefs can weigh you down. *Personality and Social Psychology Bulletin, 36*(3), 410-422.
- Burnette, J. L., O'Boyle, E. H., VanEpps, E. M., Pollack, J. M., & Finkel, E. J. (2013). Mind-sets matter: A meta-analytic review of implicit theories and self-regulation. *Psychological Bulletin, 139*(3), 655-701.
- Chandler, M. J., Lalonde, C. E., Sokol, B. W., Hallett, D., & Marcia, J. E. (2003). Personal persistence, identity development, and suicide: A study of Native and Non-native North American adolescents. *Monographs of the Society for Research in Child Development, 68*, 1-138.
- Chandler, M. J., & Proulx, T. (2008). Personal persistence and persistent peoples: Continuities in

- the lives of individual and whole cultural communities. In F. Sani (Ed.), *Self-continuity: Individual and Collective Perspectives*, (pp. 213-226). New York, NY: Taylor & Francis.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155-159.
- Crump, M. J. C., McDonnell, J. V., & Gureckis, T. M. (2013). Evaluating Amazon's Mechanical Turk as a tool for experimental behavioral research. *PLoS ONE*, *8*, e57410.
- Daly, T. M., & Natarajan, R. (2015). Swapping bricks for clicks: Crowdsourcing longitudinal data on Amazon Turk. *Journal of Business Research*, *68*, 2603-2609.
- DiClemente, C.C., Prochaska, J.O., Fairhurst, S., Velicer, W.F., Rossi J.S., & Velasquez, M. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation and contemplation/action. *Journal of Consulting and Clinical Psychology*, *59*, 295-30.
- Dweck, C.S. (1996). Implicit theories as organizers of goals and behavior. In P.M. Gollwitzer and J.A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (p. 69-90). New York, NY: Guilford Press.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*, 256-273.
- Evans, L., & Delfabbro, P. H. (2005). Motivators for change and barriers to help-seeking in Australian problem gamblers. *Journal of Gambling Studies*, *21*, 133-155.
- Ferris, J., & Wynne, H. (2001). The Canadian problem gambling index. *Ottawa: Canadian Centre on Substance Abuse*.
- Griffiths, M. (1996). Behavioural addiction: an issue for everybody? *Employee Counselling Today*, *8*(3), 19-25.
- Griffiths, M. (2005). A 'components' model of addiction within a biopsychosocial

- framework. *Journal of Substance Use*, *10*(4), 191-197.
- Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate Behavioral Research*, *50*(1), 1-22.
- Henderson, V. L. & Dweck, C. S. (1990). Motivation and achievement. In S. Feldman & G. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 308-329). Cambridge, MA: Harvard University Press.
- Hong, Y. Y., Chiu, C. Y., Dweck, C. S., Lin, D. M. S., & Wan, W. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology*, *77*, 588-599.
- Iyer, A., & Jetten, J. (2011). What's left behind: Identity continuity moderates the effect of nostalgia on well-being and life choices. *Journal of Personality and Social Psychology*, *101*, 94-108.
- Kim, H. S., & Hodgins, D. (2017). Reliability and validity of data obtained from alcohol, cannabis and gambling populations on Amazon's Mechanical Turk. *Psychology of Addictive Behaviors*, *31*(1), 85-94.
- Kim, H. S. A., & Wohl, M. J. (2015). The bright side of self-discontinuity: Feeling disconnected with the past self increases readiness to change addictive behaviors (via Nostalgia). *Social Psychological and Personality Science*, *6*, 229-237.
- Kim, H. S., Wohl, M. J., Salmon, M. M., Gupta, R., & Derevensky, J. (2015). Do social casino gamers migrate to online gambling? An assessment of migration rate and potential predictors. *Journal of Gambling Studies*, *31*(4), 1819-1831.
- Kim, H. S., Wohl, M. J., Salmon, M., & Santesso, D. (2017). When do gamblers help

- themselves? Self-discontinuity increases self-directed change over time. *Addictive Behaviors*, *64*, 148-153.
- Lampinen, J. M., Odegard, T. N., & Leding, J. K. (2004). Diachronic disunity. In Beike, D. R., Lampinen, J. M., & Behrend, D. A. (Eds.), *The self and memory* (pp. 227-253). New York, NY: Psychology Press.
- Lesieur, H. R., & Custer, R. L. (1984). Pathological gambling: Roots, phases, and treatment. *The Annals of the American Academy of Political and Social Science*, *474*, 146-156.
- Locke, E. A. (1996). Motivation through conscious goal setting. *Applied and Preventive Psychology*, *5*, 117-124.
- Lubman, D. I., Rodda, S. N., Hing, N., Cheetham, A., Cartmill, T., Nuske, E., ... & Cunningham, J. (2015). Gambler self-help strategies: A comprehensive assessment of self-help strategies and actions. *Melbourne: Gambling Research Australia*.
- Martz, S. A. (1997). Legalized gambling and public corruption: Removing the incentive to act corruptly or, teaching an old dog new tricks. *Journal of Law & Politics*, *13*, 453-458.
- Miller, W. R., & Rollnick, S. (2002). *Motivational Interviewing: Preparing people for change* (2nd ed.). New York, NY: Guilford Press.
- Mishra, S., & Carleton, R. N. (2017). Use of online crowdsourcing platforms for gambling research. *International Gambling Studies*, *17*, 125-143.
- Nuske, E., & Hing, N. (2013). A narrative analysis of help-seeking behaviour and critical change points for recovering problem gamblers: the power of storytelling. *Australian Social Work*, *66*, 39-55.
- Ommundsen, Y. (2003). Implicit theories of ability and self-regulation strategies in physical

- education classes. *Educational Psychology*, 23(2), 141-157.
- Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running experiments on Amazon Mechanical Turk. *Judgment and Decision Making*, 5, 411–419.
- Petry, N. M. (2005). *Pathological gambling: Etiology, comorbidity, and treatment*. Washington, DC: American Psychological Association.
- Polivy, J., & Herman, C. P. (2002). If at first you don't succeed: False hopes of self-change. *American Psychologist*, 57, 677-689.
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: applications to addictive behaviors. *American Psychologist*, 47, 1102-1114.
- Raisamo, S., Halme, J., Murto, A., & Lintonen, T. (2013). Gambling-related harms among adolescents: a population-based study. *Journal of Gambling Studies*, 29(1), 151-159.
- Sani, F. (Ed.) (2008). *Self continuity: Individual and collective perspectives*. New York, NY: Psychology Press.
- Sedikides, C., Wildschut, T., Gaertner, L., Routledge, C., & Arndt, J. (2008). Nostalgia as enabler of self-continuity. In F. Sani (Ed.), *Self continuity: Individual and collective perspectives* (pp. 227–239). New York, NY: Psychology Press.
- Sedikides, C., Wildschut, T., Cheung, W.-Y., Routledge, C., Hepper, E. G., Arndt, J., ... Vingerhoets, A. J. J. M. (2016). Nostalgia fosters self-continuity: Uncovering the mechanism (social connectedness) and the consequence (eudaimonic well-being). *Emotion*, 16, 524-539.
- Sedikides, C., Wildschut, T., Routledge, C., & Arndt, J. (2015). Nostalgia counteracts self-discontinuity and restores self-continuity. *European Journal of Social Psychology*, 45, 52-61.

- Shaffer, H. J., & Albanese, M. (2005). Addiction's defining characteristics. In R. H. Coombs (Ed.), *Addiction counseling review: Preparing for comprehensive, certification and licensing exams* (pp. 3-31). Mahwah, NJ: Lahaska Press.
- Shaffer, H. J., Hall, M. N., & Vander Bilt, J. (1999). Estimating the prevalence of disordered gambling behavior in the United States and Canada: a research synthesis. *American Journal of Public Health, 89*, 1369-1376.
- Shaffer, H. J., LaPlante, D. A., LaBrie, R. A., Kidman, R. C., Donato, A. N., & Stanton, M. V. (2004). Toward a syndrome model of addiction: Multiple expressions, common etiology. *Harvard Review of Psychiatry, 12*(6), 367-374.
- Slutske, W. S. (2006). Natural recovery and treatment-seeking in pathological gambling: Results of two US national surveys. *American Journal of Psychiatry, 163*, 297-302.
- Smart, R. G., & Ferris, J. (1996). Alcohol, drugs and gambling in the Ontario adult population, 1994. *The Canadian Journal of Psychiatry, 41*(1), 36-45.
- Spears, R. (2008). Commenting on continuity: A view from social psychology. In F. Sani (Ed.), *Self continuity: Individual and collective perspectives* (pp. 253–266). New York, NY: Psychology Press.
- Toce-Gerstein, M., Gerstein, D. R., & Volberg, R. A. (2009). The NODS–CLiP: A rapid screen for adult pathological and problem gambling. *Journal of Gambling Studies, 25*, 541-555.
- Van de Mortel, T. F. (2008). Faking it: Social desirability response bias in self-report research. *Australian Journal of Advanced Nursing, 25*, 40-48.
- Velicer, W. F., DiClemente, C. C., Prochaska, J. O., & Brandenburg, N. (1985). Decisional balance measure for assessing and predicting smoking status. *Journal of Personality and Social Psychology, 48*, 1279-1289.

- Volberg, R. A., Reitzes, D. C., & Boles, J. (1997). Exploring the links between gambling, problem gambling, and self-esteem. *Deviant Behavior, 18*, 321-342.
- Welte, J. W., Barnes, G. M., Tidwell, M. C. O., Hoffman, J. H., & Wieczorek, W. F. (2015). Gambling and problem gambling in the United States: Changes between 1999 and 2013. *Journal of Gambling Studies, 31*(3), 695-715.
- Wohl, M. J., Kim, H. S., Salmon, M. M., Santesso, D., Wildschut, T., & Sedikides, C. (2018). Discontinuity-induced nostalgia improved the odds of a self-reported quit attempt among people living with addiction. *Journal of Experimental Social Psychology, 75*, 83-94.
- Wohl, M. J., & Sztainert, T. (2011). Where did all the pathological gamblers go? Gambling symptomatology and stage of change predict attrition in longitudinal research. *Journal of Gambling Studies, 27*, 155-169.

List of Tables

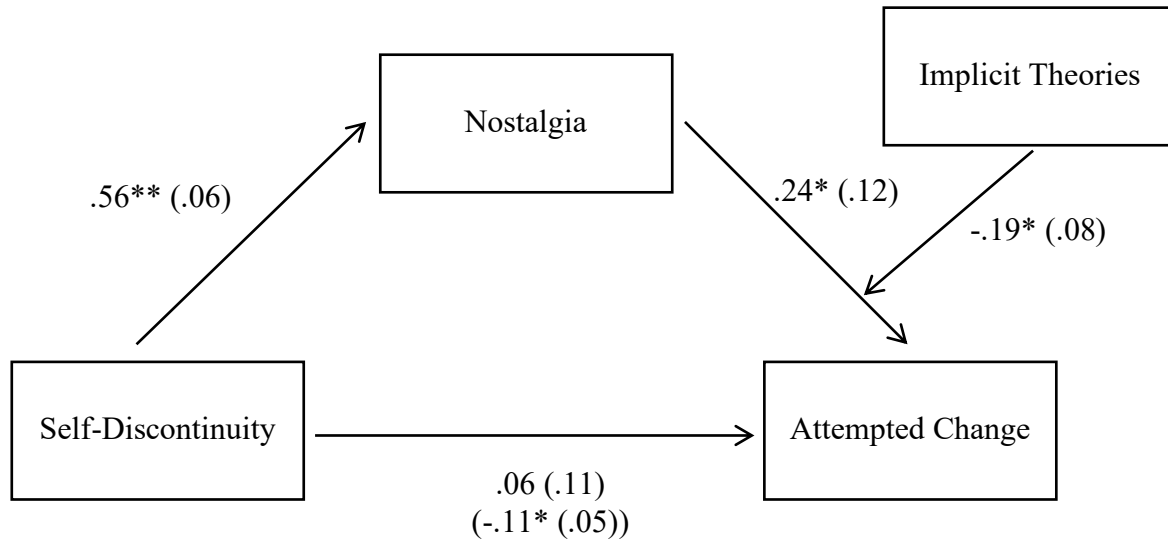
Table 1

Means, Standard Deviations, and Correlation Coefficients between each Variable of Interest

Variables	<i>M</i>	<i>SD</i>	Correlation Coefficients (<i>r</i>)				
			1.	2.	3.	4.	5.
1. Self-Discontinuity	3.64	1.55	-				
2. Nostalgia	3.31	1.30	.69**	-			
3. Implicit Theories ^a	2.88	1.05	.14*	.15*	-		
4. Attempted Change ^b	.60	.49	.25**	.28**	.13	-	
5. Sustained Change	3.10	1.31	.22	.15	-.10	^c	-

Note: * $p < .05$; ** $p < .01$; ^a Higher scores = higher entity theories; ^b Yes = 1, No = 0; ^cNote that scores on self-reported sustained change are only available for those who also indicated having made an attempt to change. Thus, these two outcome measures cannot be correlated.

List of Figures



Note: * $p < .05$, ** $p < .001$

Figure 1. Moderated-mediation model demonstrating the indirect effect of self-discontinuity on self-reported attempted change via nostalgia, conditional on gamblers' implicit theories of behavior. The regression coefficient for the indirect effect of self-discontinuity on attempted change, controlling for nostalgia, is in parentheses below the coefficient for the direct effect of self-discontinuity on attempted change.

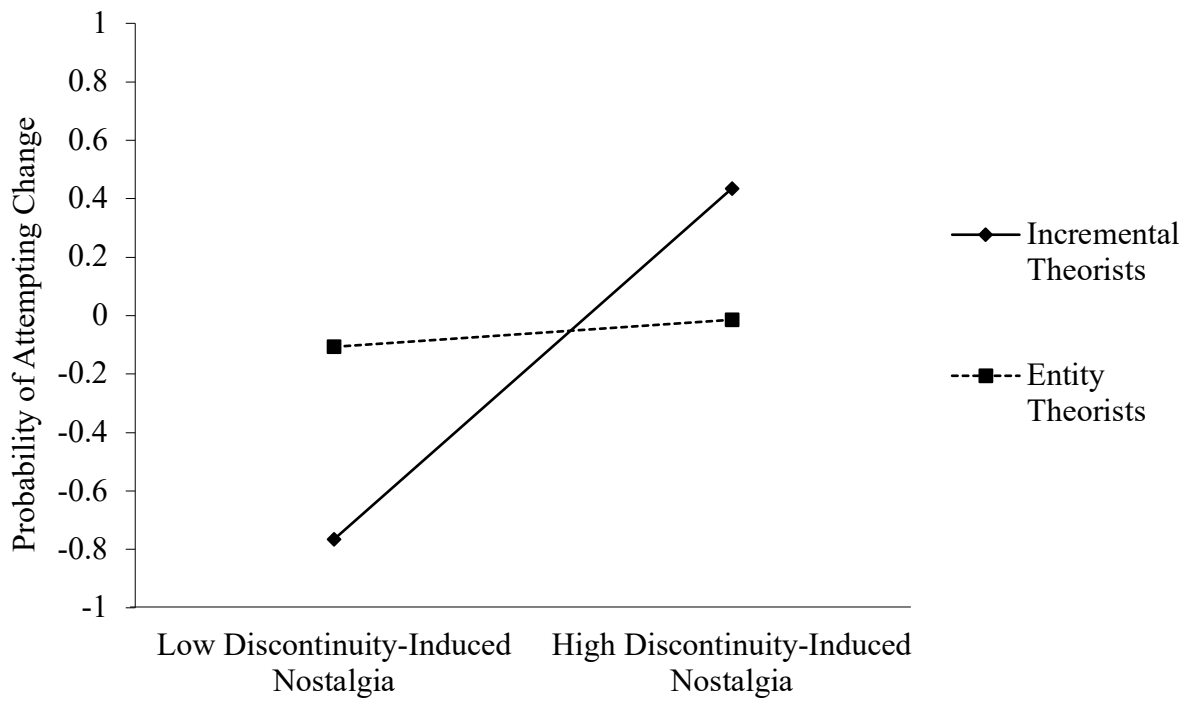
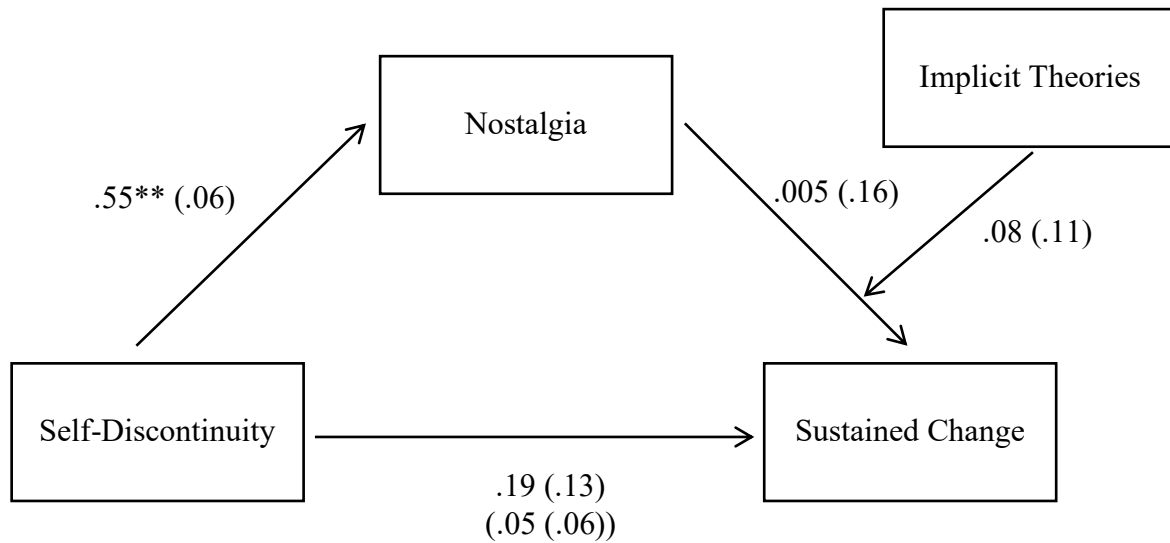


Figure 2. Simple slopes demonstrating the simple effect of discontinuity-induced nostalgia on self-reported change attempts for incremental theorists and for entity theorists.



Note: * $p < .05$, ** $p < .001$

Figure 3. Moderated-mediation model demonstrating the indirect effect of self-discontinuity on self-reported sustained change via nostalgia, conditional on gamblers' implicit theories of behavior. The regression coefficient for the indirect effect of self-discontinuity on sustained change, controlling for nostalgia, is in parentheses below the coefficient for the direct effect of self-discontinuity on attempted change.

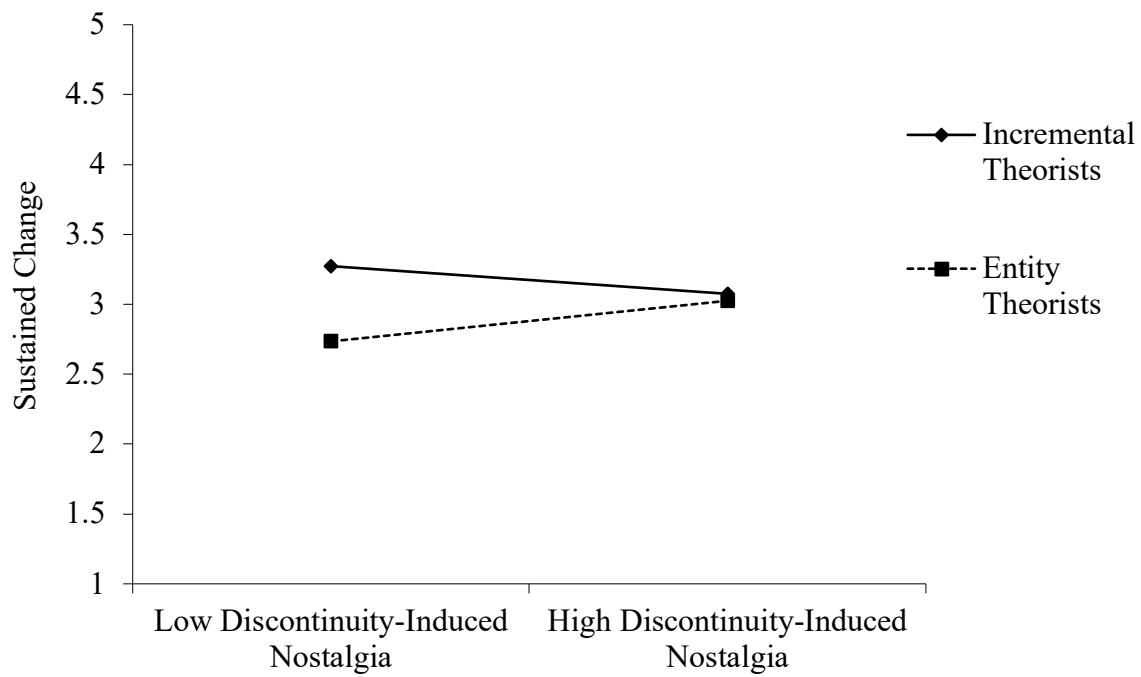


Figure 4. Simple slopes demonstrating the simple effect of discontinuity-induced nostalgia on self-reported sustained change for incremental theorists and for entity theorists.