Discontinuity-induced nostalgia improves the odds of a self-reported quit attempt among people living with addiction☆

Michael J.A. Wohl[a,*], Hyoun S. Kim[a], Melissa Salmon[a], Diane Santesso[b], Tim Wildschut[c], Constantine Sedikides[c]

[a] Carleton University, Canada
[b] University of Winnipeg, Canada
[c] University of Southampton, United Kingdom

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ABSTRACT

Most people in need of behavior change do not take action. Moreover, it has proven difficult to motivate people to engage in behavior change. In two longitudinal experiments, among people living with addiction, we tested a heretofore unexamined route to motivating behavior change—heightening a person's sense that their addictive behavior has fundamentally changed the self (i.e., the addiction has created self-discontinuity). We hypothesized that self-discontinuity would motivate self-reported behavior change by inducing nostalgic reverie for the pre-addicted self. We also hypothesized that this mediational model would be moderated by addiction severity. In both Experiment 1 ($N = 180$ gamblers) and Experiment 2 ($N = 202$ drinkers), participants were exposed to a self-discontinuity manipulation and completed a nostalgia measure. One month later, participants were asked whether they had attempted to quit in the past 30 days. As hypothesized, discontinuity-induced nostalgia predicted self-reported attempts to quit, but only when addiction severity was high (i.e., disordered gamblers, problem drinkers). A moderated-serial mediation conducted with the aggregate of data from Experiments 1 and 2 showed that, when addictive behavior severity was high (but not when it was low), self-discontinuity increased the odds of a self-reported change attempt via nostalgia and ensuing readiness to change. The findings suggest that discontinuity-induced nostalgia may be a viability means to facilitate behavior change among people living with addiction.

1. Introduction

People find comfort in the belief that the self—at its core—remains stable despite life events and change (i.e., holding a sense of self-continuity; Chandler, 1994; Sani, 2008). In this light, it has been argued that self-continuity should be cultivated to improve health and well-being (Dunkel, 2005; Lampinen, Odegard, & Leding, 2004) and, conversely, self-discontinuity (i.e., a sense of disconnect between the past and present self) should be avoided (Chandler & Proulx, 2008; Milligan, 2003). However, people can and do undergo radical change—change that may not be for the betterment of the self. For example, addictive behaviors can yield fundamental negative psychological as well as physiological changes to the self (Shaffer & Albanese, 2005; Shinohara et al., 1999). In this context, a sense that the self has remained unchanged by an addictive behavior may be an impediment to change: why should the individual change if the self is unaffected by the addictive behavior? Conversely, the belief that an addictive behavior has resulted in fundamental negative self-change may motivate a desire to reclaim the favorable past self—reclamation that may be achieved through behavior change.

To be sure, behavior change is hard. Most people who make resolutions to change their problematic behaviors fail to produce a single change attempt (DiClemente et al., 1991). Miller and Rollnick (2002), for example, reported that only 15% of people take the necessary steps to remove a problematic behavior from their behavioral repertoire. This rate remains low despite the array of negative consequences associated with potentially problematic behaviors such as gambling or drinking (e.g., physical, psychological, and interpersonal problems; Amato & Rogers, 1997; Hall & Solowij, 1998; Lesieur & Custer, 1984). Thus, it is important to explore ways to facilitate behavior change among people engaged in addictive behaviors, and particularly among those living with addiction.

We put forth the supposition that people who feel their behavior has negatively altered their sense of self will become motivated to reclaim

the more positive past version of the self. Specifically, we explore the possibility that eliciting the sense that one's behavior has caused self-discontinuity will motivate self-reported behavior change. This idea is based on findings that people who perceive self-discontinuity experience nostalgia for the past self (Sedikides, Wildschut, Routledge, & Arndt, 2015). Nostalgia not only yields psychological benefits (Abeyta & Routledge, 2016; Vess, Arndt, Routledge, Sedikides, & Wildschut, 2012; Wildschut, Sedikides, Arndt, & Routledge, 2006), but also motivates a desire to reclaim the past self (i.e., the self that is free from addiction; Kim & Wohl, 2015). There is, of course, a fundamental difference between being ready to change and taking action to change (DiClemente et al., 1991): most people who are motivated to change do not act on their readiness. Moreover, there is a paucity of research that has identified means to help people overcome barriers to behavior change.

We tested the idea that discontinuity-induced nostalgia manifests in an attempt at behavior change over time. We restrict this contention, however, to those whose behavior has reached a problematic level (i.e., those high in addiction severity). People who do not engage in addictive behavior at a problematic level should not be swayed by a message that addictive behavior leads to self-discontinuity, because this message is less applicable to them. To assess the validity of the proposed moderated-mediation model of behavior change, we conducted two longitudinal experiments: one with a community sample of gamblers (Experiment 1) and one with a community sample of drinkers (Experiment 2). In doing so, we sought to extend current understanding about the benefits of self-discontinuity and nostalgia by demonstrating that these variables can influence self-reported behavior change.

1.1. Self-discontinuity as motivator for change

People experience self-discontinuity when they sense that there has been fundamental self-change (Chandler, 1994; Iyer & Jetten, 2011; Vignoles, 2011). Such a self-perception creates instability, confusion, and inconsistencies in morals and values (Dunkel, 2005; Lampinen et al., 2004; Milligan, 2003; Sani, 2008), as well as discontent with the self (Davis, 1979; Sedikides, Wildschut, Gaertner, Routledge, & Arndt, 2008). Moreover, people who experience self-discontinuity are more likely to engage in self-harm (e.g., suicide; Chandler, Lalonde, Sokol, Hallett, & Marcia, 2003). Perhaps unsurprisingly, self-discontinuity is typically framed as a psychological state that should be averted (Chandler & Proulx, 2008; Milligan, 2003).

Within clinical psychology, however, some popular schools of therapeutic thought (e.g., Motivational Interviewing; Miller & Rollnick, 2002) maintain that clients should be assisted in working through their unwillingness to change. The therapist helps the client to detect possible contradictions between their current actions and their personal standards or goals. The purpose of focusing the client on such self-relevant discrepancies is to heighten their motivation to engage in behavior change (Fredrickson, 2000). Put differently, the treatment provider leverages the experience of self-discontinuity to motivate clients to change (Miller & Rollnick, 2013).

Indeed, there is growing understanding in the addiction literature that people living with addiction can come to see that their identity (i.e., one's sense of self) has been fundamentally altered by their addictive behavior (Best et al., 2016; Dingle, Cruwys, & Frings, 2015; Frings & Albery, 2015; Hughes, 2007; McIntosh & McKeganey, 2000; Waldorf & Biernacki, 1981). Importantly, their addictive behavior comes to represent an identity loss or spoilage—the addiction is framed as undermining their sense of self in terms of, for example, a father, an accountant, or a hockey player (Dingle et al., 2015). The desire to repair their spoiled identity (i.e., reduce self-discontinuity) creates motivation for behavior change (Hughes, 2007; Waldorf & Biernacki, 1981).

Providing anecdotal support for the benefits of self-discontinuity for behavior change, Nuske and Hing (2013) found that clients in treatment for disordered gambling were more likely to initiate behavior

change when they became cognizant of the discontinuity between their past, non-addicted self and their present, addicted self. Crucially, Kim and Wohl (2015) subsequently demonstrated that a self-discontinuity induction increased readiness to change among problem gamblers (Experiment 1) and problem drinkers (Experiment 2). In particular, these researchers focused participants' attention on how the self has changed (or remained unchanged) as a result of their addictive behavior. When participants' attention was focused on how the self changed (compared to remaining unchanged) due to their addictive behavior, they were more likely to contemplate behavior change. Additionally, Kim, Wohl, Salmon, and Santesso (2017) found that self-reported self-discontinuity motivated people toward change even when controlling for known barriers to change (i.e., shame, guilt, self-stigma about engaging in the addictive behavior). Thus, making salient and amplifying discontinuities within the self builds momentum toward change. Unknown, however, are the mechanism that builds this momentum for change and the downstream consequences for behavior change (i.e., an attempt to rid the self of the addictive behavior).

1.2. The power of nostalgia

Why might self-discontinuity motivate behavior change? There is a growing body of evidence that self-discontinuity elicits nostalgic reverie (i.e., a sentimental longing) for an earlier self (Best & Nelson, 1985; Milligan, 2003; Sedikides et al., 2016). Sedikides et al. (2015), for example, found that people who experienced negative life events (e.g., relocation, layoff) felt nostalgic for their life prior to the occurrence of the negative event. Importantly, nostalgia also engenders approach motivation (Abeyta, Routledge, & Juhl, 2015; Sedikides et al., in press; Sedikides & Wildschut, 2016; Stephan et al., 2014), thus readying oneself for behavior change.

According to Berg and Miller (1992), people living with addiction who seek behavior change via therapy refer to their past nostalgically when asked to describe a future without the addiction. Such *looking back* is encouraged within the Motivational Interviewing framework to help the client build momentum for change (Miller & Rollnick, 2002)—a contention supported by empirical work. Specifically, Kim and Wohl (2015) found that nostalgia was the mechanism by which a sense of self-discontinuity (compared to self-continuity) increased readiness to change among people living with addiction, thus providing preliminary support for the idea that self-discontinuity facilitates behavior change via nostalgia. Put otherwise, nostalgic reverie for a past without addiction may help prepare the self for change.

Still, there is often a large chasm between recognizing that behavior change is needed and making a change attempt (Ajzen & Fishbein, 1977; DiClemente & Prochaska, 1982; Prochaska & DiClemente, 1983). Indeed, a defining characteristic of addiction is the failure to change despite understanding that change is both possible and in one's best interest (American Psychiatric Association, 2013). As DiClemente (2006, p. 4) stated, "change is the antithesis of addiction." Yet, people who engage in addictive behaviors can and sometimes do change for the better. Unfortunately, little is known about the process that moves people from thinking about taking action to attempting behavior change.

We contend that discontinuity-induced nostalgia may facilitate behavior change, but only to the extent that the person engages in the behavior at a problematic level. Let us consider the case of gambling, a common form of entertainment practiced in a controlled manner by the majority of the population (Wiebe, Single, & Falkowski-Ham, 2001). Despite its recreational appeal, a minority fail to limit their involvement, and in turn experience adverse psychological, social, and physical health consequences (Burge, Pietrzak, Molina, & Petry, 2004). These disordered gamblers are likely to feel that gambling has fundamentally altered their sense of self, and will thus experience nostalgic reverie for the self that existed before gambling became problematic. This nostalgic reverie for the pre-addicted self should lead to actions aimed at

reclaiming this pre-addicted self (i.e., action to quit gambling). Put another way, when disordered gamblers are provided with information that gambling creates self-discontinuity, the ways gambling has negatively affected their own life should come to the fore. The emotional outcome of this process will be nostalgia for the pre-addicted self, which should motivate behavior change. Conversely, gamblers who play recreationally (i.e., those low in problem gambling severity) should be unaffected by information suggesting that self-discontinuity is a product of severe gambling, because that information does not apply (i.e., their gambling behavior is not in need of change). As such, they will not experience nostalgia for their life prior to gambling, and hence they will not instigate behavior change.

2. Overview

In two longitudinal experiments, we tested a novel avenue for motivating self-reported behavior change: discontinuity-induced nostalgia. We manipulated self-discontinuity among a community sample of gamblers (Experiment 1) and drinkers (Experiment 2). Specifically, we instructed participants that gambling (Experiment 1) or drinking (Experiment 2) either fundamentally alters one's sense of self or that it does not change one's sense of self. Thereafter, we measured nostalgia for the self that existed before the behavior entered their life. One month later, we re-contacted participants to assess whether they had made an attempt to quit in the intervening 30 days. Importantly, we hypothesized that self-discontinuity would only facilitate self-reported behavior change (via nostalgia) among people who show symptoms of addiction (i.e., those who engage in the behavior at a severe level). For people not living with addiction, there is no problematic behavior to change (and thus nostalgia for a past without the behavior in their repertoire would be low).

We report all measures, manipulations, and exclusions in these studies and the supplementary materials.

3. Experiment 1: Motivating change in gambling

Experiment 1, conducted with a sample of gamblers, constituted the first test of our hypothesis that self-discontinuity will enable self-reported behavior change (through nostalgia) among persons high, but not low, on addiction severity.

3.1. Method

3.1.1. Participants

Participants were 180 community gamblers (112 males, 65 females, 3 unreported) recruited from Amazon.com's Mechanical Turk (MTurk). MTurk provides a reliable and diverse participant pool that behaves in ways consistent with known effects in psychology (Crump, McDonnell, & Gureckis, 2013). Moreover, MTurk is a reliable and valid means to recruit gamblers, cannabis users, and drinkers (Kim & Hodgins, 2017; Mishra & Carleton, 2017).

Participants ranged in age from 18 to 67 years ($M = 35.82$, $SD = 11.08$, 11 unreported). Participation was limited to those who engaged in gambling activities (e.g., slot machines, poker, blackjack, roulette, sports betting) and had done so within the past 12 months. Given that we focused on gamblers who had yet to take action toward behavior change, we excluded those who had already taken such action (i.e., gamblers in treatment for disordered gambling or who had previously sought treatment for disordered gambling).

We aimed for a sample size (in Experiments 1 and 2) that provided sufficient power (0.80) for detecting a moderate effect size, $d = 0.5$ ($p < .05$, two-tailed; Cohen, 1992). We determined that the number of participants per condition should be 64, and thus the total sample size should be 128. 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, we decided that the optimal sample size for the initial session be 180.

At recruitment, we stated that we would seek permission for a brief follow-up session that would occur one month after the day of participation. We informed participants that they would earn $0.75 for the initial session (approximately 15 min in duration) and an additional $1.00 for the follow-up session.

We re-contacted all participants from the initial session 30 days later to take part in the follow-up session. A total of 115 gamblers (70 males, 43 females, 2 unreported) completed the follow-up survey. These participants ranged in age from 21 to 66 years ($M = 36.37$, $SD = 11.33$).

3.1.2. Procedure and measured variables

After signing the consent form, participants indicated their age and gender. They then completed the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). The PGSI is a continuous 9-item measure ($\alpha = 0.86$) that assesses problem gambling behavior (e.g., "Have you bet more than you could really afford to lose?") and the consequences of gambling (e.g., "Has gambling caused you any health problems, including stress or anxiety?"). Responses were anchored at 0 (*never*) and 3 (*almost always*), with possible scores ranging from 0 to 27. According to Ferris and Wynne (2001), a total score of 3 or higher is indicative of a moderate to severe level of problem gambling, leading to negative consequences and a possible loss of control.

We then randomly assigned participants to either a self-discontinuity or a self-continuity condition (adapted from Iyer & Jetten, 2011; see also Kim & Wohl, 2015). In the self-discontinuity condition, participants read a short article that summarized the ostensible results of recent research published in a top-tier academic journal. Participants learned that "along with the potential negative consequences associated with heavy gambling (e.g., financial, interpersonal problems), heavy gambling can also result in losing your sense of self." The article explained that people who gambled heavily reported that their behavior and mood had fundamentally worsened, and that their gambling had led them to dislike the person they had become compared to the person they were before engaging in gambling activities. To increase the impact of the manipulation, participants were asked to "take a moment to reflect" on what they read and then briefly write how gambling has changed their behaviors, moods, attitudes, and sense of self.

Conversely, participants in the self-continuity condition read that "despite heavy gambling leading to an array of negative consequences (e.g., financial and interpersonal problems), gambling does not change people's personalities and behaviors." The article explained that people who gamble heavily reported that they are the same person today compared to the person they were before engaging in gambling activities. Like those in the self-discontinuity condition, participants were asked to "take a moment to reflect" on what they read and then briefly write how they are the same person today as they were before they started gambling. All participants gave a response.

As an initial check on the manipulation, participants were asked whether the report is best summarized as one that argued that (1) "Frequent gambling has been associated with fundamental changes to people's personalities" or (2) "Frequent gambling has no effect on people's personalities and behaviors." As a secondary check on the manipulation, participants completed the following item: "Right now, I feel like my gambling has changed who I am" (1 = *strongly disagree*, 7 = *strongly agree*). They then filled out a 3-item measure of nostalgia ($\alpha = 0.73$; adapted from Iyer & Jetten, 2011). These items were: "I sometimes feel nostalgic for the life I had before I started gambling," "I never miss the life I had before I started gambling" (reverse-coded), and "I sometimes long for the life I had before gambling" (1 = *strongly disagree*, 7 = *strongly agree*). We created an index by averaging the three items, with higher scores representing greater nostalgic reverie.

Lastly, participants completed Biener and Abrams' (1991) single-item pictorial contemplation ladder, adapted for disordered gambling.

This continuous readiness to change measure is anchored at 0 (*no thought of changing*) and 10 (*taking action to change*). A score of 0 to 3 corresponded with DiClemente et al.' (1991) pre-contemplation stage of change (i.e., not thinking about change), a score of 4 to 6 corresponded with the contemplation stage (i.e., thinking about change), a score of 7 or 8 corresponded with the preparation stage of change (i.e., preparing to change within the next 30 days), and a score of 9 or 10 was indicative of the action and maintenance stages, respectively (i.e., actively modifying unhealthy behavior).

We collected several other measures, following the variables of interest, for exploratory purposes (i.e., as a basis for new lines of research). These measures assessed: self-regard (e.g., "I feel good about myself"), exploration of the self (e.g., "I want to more deeply explore who I really am"), meaning in life (e.g., "I feel life is meaningful"), self-forgiveness (e.g., "I forgive myself for gambling"), guilt and shame (e.g., "I feel ashamed about my gambling behavior"), desire for self-continuity (e.g., "I feel a need to re-connect with my past life"), method of self-reported change if change was to be undertaken (e.g., "formal treatment," "self-help"), and self-clarity (e.g., "When thinking about the person you were before starting to gamble, how clearly can you picture this person?").

To test for inattention, we scattered five attention check items throughout the questionnaire asking participants to refrain from a provided response (i.e., "Please leave this item blank"). These items are typically included in research on MTurk to test whether participants were attentive and honest (Paolacci, Chandler, & Ipeirotis, 2010). We decided, a priori (and in accordance with our laboratory's established practice) that the data of any participant who failed more than one of the five attention check items be removed from analyses.

Subsequently, we asked participants for their consent to be re-contacted in 30 days 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.

One month after the initial session, we emailed participants a link to the follow-up session. If participants did not complete the study within 24 h, we sent a second invitation. If they did not complete the study within 24 h of the second invitation, we sent a third and final invitation. We directed participants who accepted the invitation to a consent form and asked them: "Have you made an attempt to quit or cut down on your gambling in the last month?" Response options were "*yes*" or "*no*."

Next, we asked permission to link their information collected in the follow-up session to their initial session with their MTurk Worker ID number. Participants granted permission by providing their ID number. Finally, we fully debriefed them and asked permission to use their data. All participants complied with both of these requests.[1]

3.2. Results

3.2.1. Preliminary analysis

From the original sample of 180 participants, 20 participants did not complete the session and thus did not give us permission to use their data. One participant did not have their condition recorded. We excluded them from all analyses. No participants failed more than one of the five attention checks, and thus we excluded none on this basis. Eight participants failed to identify correctly the content of the report, and we excluded them. Removal of these participants did not influence the overall pattern of results. The final sample consisted of 151 gamblers (94 males, 55 females, 2 unreported) who ranged in age from 18 to 66 years ($M = 35.68$, $SD = 10.92$).

Of the 115 gamblers who completed the follow-up session, five had failed the manipulation check (i.e., did not identify the content of the article). We allowed them to complete the follow-up session due to ethical considerations, but we did not include them in the analyses. Importantly, there were no differences in attrition by condition, $\chi^2(1) = 0.05$, $p = .82$. Additionally, we found no significant differences between those who did and those who did not complete the follow-up session on any of the measured variables, all $ps > 0.11$. Thus, it is unlikely that attrition accounts for the observed results.

Of note, the mean on the PGSI (i.e., the measure of problem gambling severity) was greater than three in the self-continuity condition ($M = 3.78$, $SD = 3.97$) as well as the self-discontinuity condition ($M = 3.59$, $SD = 3.56$). Thus, on average, gamblers in both conditions reported a moderate level of problem gambling leading to negative consequences.

To test whether the manipulation was successful, and whether the manipulation's effectiveness was moderated by problem gambling severity, we used Hayes' (2013) PROCESS macro V.2 (Model 1) for SPSS version 21, bootstrapped with 5000 iterations to obtain bias corrected 95% confidence intervals (CIs; Fig. S1, available online as Supplemental Material). In particular, we entered the self-discontinuity manipulation (coded 0 = *self-continuity*, 1 = *self-discontinuity*) and problem gambling severity (mean-centered) into a regression analysis with the manipulation check item that assessed whether they felt gambling had negatively changed their sense of self. As predicted, there was a main effect of the manipulation, $b = 1.07$, $SE = 0.17$, $p < .001$, 95% CI [0.74, 1.41], and of problem gambling severity, $b = 0.19$, $SE = 0.02$, $p < .001$, 95% CI [0.14, 0.23]. These main effects were qualified by a significant interaction between condition and problem gambling severity, $b = 0.17$, $SE = 0.05$, $p < .001$, 95% CI [0.08, 0.26]. Simple slopes analyses showed that the self-discontinuity manipulation significantly increased participants' perceptions that their gambling changed their sense of self at 1 SD above the mean of problem gambling severity, $b = 1.72$, $SE = 0.24$, 95% CI [1.25, 2.20], but not at 1 SD below the mean of problem gambling severity, $b = 0.44$, $SE = 0.24$, 95% CI [−0.03, 0.91]. Thus, the self-discontinuity manipulation was effective for those whose behavior was most likely to have yielded significant negative self-change, but not for those who gamble recreationally (which likely yields little to no negative self-change).

3.3. Main analyses

In Table 1, we present the correlations between measured variables. In Table 2, we display the mean and standard deviation for each measured variable by condition.

3.3.1. Readiness to change

We first tested the hypothesized moderated-mediation model in which self-discontinuity (the predictor variable; 0 = *self-continuity*, 1 = *self-discontinuity*) increases readiness to change (the outcome variable) via nostalgia (the mediating variable; mean-centered), but only for those who report high problem gambling severity (the moderating variable; mean-centered). We did so by relying on Hayes' (2013) PROCESS macro V.2 (Model 7) for SPSS version 21 (Fig. 1). We used bootstrapping with 5000 iterations to obtain bias corrected 95% CIs. The index of moderated-mediation was significant, *index* = 0.17, $SE = 0.07$, 95% CI [0.03, 0.31]. Self-discontinuity significantly increased readiness to change via nostalgia when problem gambling severity was high (+ 1 SD), $b = 1.08$, $SE = 0.38$, 95% CI [0.36, 1.07], but not when problem gambling severity was low (− 1 SD), $b = -0.16$, $SE = 0.25$, 95% CI [−0.66, 0.32]. A post-hoc power analysis using Monte Carlo simulation in Mplus revealed that this analysis was sufficiently powered (93%).

3.3.2. Attempted change

We then proceeded to test the central hypothesis: self-discontinuity

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Table 1
Correlations between Measured Variables: Experiment 1.

	1.	2.	3.	4.
1. Problem gambling severity	–			
2. Nostalgia	0.53**	–		
3. Readiness to change	0.57**	0.59**	–	
4. Attempted change[a]	0.41**	0.28**	0.33**	–

Note. [a]No = 0; Yes = 1; **$p < .01$.

Table 2
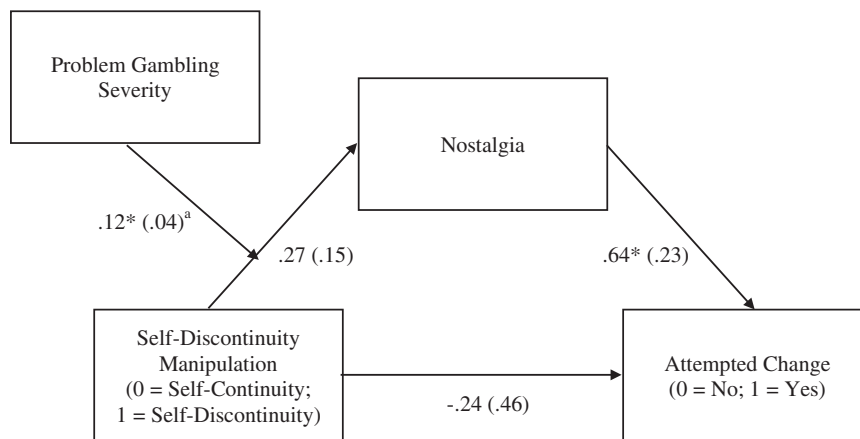Means and Standard Deviations of Dependent Measures by Condition and Collapsed Across Conditions: Experiment 1.

	Self-discontinuity		Self-continuity		Collapsed	
	M	SD	M	SD	M	SD
Problem gambling severity	3.59	3.56	3.79	3.97	3.69	3.77
Nostalgia	2.87	1.02	2.58	0.87	2.72	0.95
Readiness to change	1.80	2.59	1.18	2.01	1.48	2.33
Attempted change	0.26	0.44	0.27	0.45	0.27	0.44

Note. No between-condition effects were significant. All ps > 0.05. Problem gambling severity ranges from 0 to 27; Nostalgia ranges from 1 to 7; Readiness to change ranges from 0 to 10; attempted change was coded 0 = No and 1 = Yes.
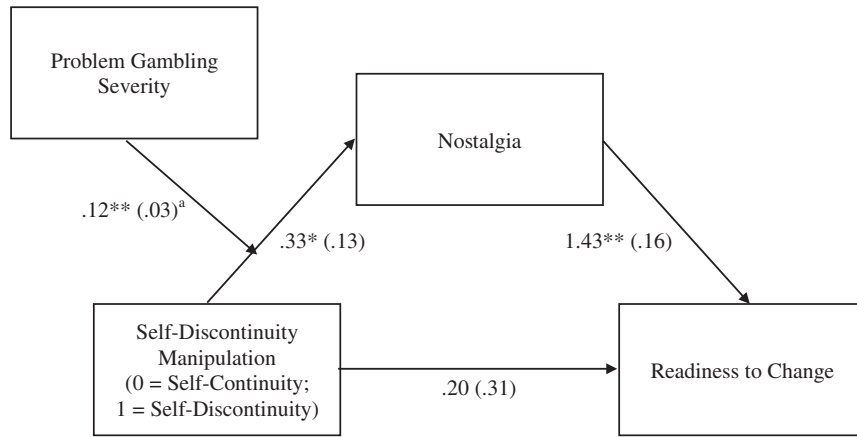
Fig. 1. Moderated-Mediation Model on Readiness to Change: Experiment 1
Note. Unstandardized regression coefficients and associated standard errors (in parentheses) are for the full moderated-mediation model.
*$p < .05$; **$p < .001$; [a] = Interaction between the self-discontinuity manipulation and problem gambling severity.

Fig. 2. Moderated-Mediation Model on (Self-Reported) Attempted Change: Experiment 1
Note. Unstandardized regression coefficients and associated standard errors (in parentheses) are for the full moderated-mediation model.
*$p < .05$; **$p < .001$; [a] = Interaction between the self-discontinuity manipulation and problem gambling severity.

5000 bootstraps) for SPSS version 21 (Fig. 2). This version of PROCESS implements logistic regression analysis for dichotomous dependent variables. As with readiness to change, the index of moderated mediation was significant, *index* = 0.07, *SE* = 0.04, 95% CI [0.004, 0.19]. Consistent with the hypothesis, self-discontinuity significantly increased the odds that participants made a (self-reported) change attempt via nostalgia when problem gambling severity was high (+ 1 *SD*), *b* = 0.46, *SE* = 0.26, 95% CI [0.06, 1.11], but not when problem gambling severity was low (− 1 *SD*), *b* = − 0.10, *SE* = 0.14, 95% CI [− 0.46, 0.13]. A post-hoc power analysis using Monte Carlo simulation in Mplus revealed that this analysis was under powered (58%). As such, we re-tested the moderated-mediation model after conducting a missing data analysis using maximum likelihood estimation (power = 79%). The pattern of results was similar (Supplemental Materials).

3.4. Discussion

Experiment 1 provided strong support for our hypothesis that a person's readiness to change and the subsequent odds of attempting to quit (self-reported) can be increased by highlighting the self-discontinuity (compared to the self-continuity) caused by their addictive behavior (i.e., gambling)—an effect that was mediated by nostalgia for the pre-addicted self. Importantly, and as hypothesized, this media-

(the predictor variable; 0 = *self-continuity*, 1 = *self-discontinuity*) increases the odds of a self-reported change attempt (the outcome variable; coded 0 = *no attempted change*, 1 = *attempted change*) via nostalgia (the mediating variable; mean-centered), but only for those who report high problem gambling severity (the moderating variable; mean-centered). Again, we used Hayes' (2013) PROCESS macro V.2 (Model 7,

tional model only held among people high in problem gambling severity. This result makes intuitive sense because people who report symptoms of disordered gambling also tend to report an array of physical, psychological, financial, and interpersonal problems (Lesieur & Custer, 1984; Petry, 2004). Hence, only those who are experiencing problems related to their gambling should experience nostalgia for the

self that existed before gambling entered their behavioral repertoire.

The results of Experiment 1 are of importance on two fronts. First, to our knowledge, this is the first study to demonstrate that self-discontinuity (by way of nostalgia) influences self-reported behavior change among people living with addiction. Second, given the alarmingly low rate of behavior change, particularly among people who engage in addictive behaviors at a problematic level (Miller & Rollnick, 2002), finding a way to facilitate such change is encouraging. Indeed, as we mentioned above, the majority of people living with addiction fail even to contemplate taking action to change (DiClemente et al., 1991). We showed one means by which the rate of change can be augmented among people with high problem gambling severity: discontinuity-induced nostalgia for the pre-addicted self.

4. Experiment 2: Motivating change in problem drinking

The purpose of Experiment 2 was to assess the replicability of the findings observed in Experiment 1 and extend those findings to a different type of addiction: problem drinking. We chose problem drinking because the prevalence of this behavior at a problematic level is similar to disordered gambling (1–3%; Grant et al., 2004). Drinking and gambling also lead to a similar array of financial, psychological, and interpersonal harms (Fong, 2005; Gregoire & Burke, 2004; Jayne, Valentine, & Gould, 2012). Lastly, there is paucity of research on possible means to motivate change among problem drinkers.

One limitation of Experiment 1 was the reliance on participants' self-reported attempt to change behavior. However, there is no reason to believe that participants provided inaccurate responses. Compensation, for example, was not contingent on the response provided. Nonetheless, in Experiment 2, we made an effort to verify whether participants attempted to change their behavior. Specifically, we asked them to provide us with contact information of a close other, who is knowledgeable about their drinking. This close other served as a collateral for participants' self-reports. In a meta-analytic review, Borsari and Muellerleile (2009) established that collateral estimates of participant drinking are an effective means for verifying participant self-report.

4.1. Method

4.1.1. Participants

Participants were 200 community drinkers (101 females, 97 males, 2 unreported) recruited from MTurk. They ranged in age from 21 to 77 years (M = 33.19, SD = 10.49). Participation was limited to persons 21 years or older (the legal drinking age in the United States), who consume alcoholic beverages. Given that we focused on drinkers who had yet to take action to change, we excluded those who reported that they had already taken action to change (i.e., those in treatment for problem drinking or those who had previously sought treatment for problem drinking). We determined the sample size for Experiment 2 in the same way as for Experiment 1. However, we collected data from more participants than estimated by our power analysis—which suggested a sample of 180—to buttress against attrition for reasons observed in Experiment 1 (e.g., participants not completing the survey or failing to identify the content of the report).

We informed participants that they would earn $0.75 for the initial session (approximately 15 min in duration) and an additional $1.00 for the follow-up session. We re-contacted all of them 30 days after the initial session to take part in the follow-up session. A total of 114 drinkers (63 females, 50 males, 1 unreported) completed the follow-up survey (57.0% of the sample from the initial session). These participants ranged in age from 21 to 69 years (M = 34.12, SD = 10.14).

4.1.2. Procedure

We followed the same procedure as in Experiment 1 with a few exceptions. First, instead of the PGSI, participants completed the 10-item (α = 0.86) Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993), which served as an assessment of problem drinking severity. The AUDIT measures the frequency of alcohol consumption (e.g., "How often do you have six or more drinks on one occasion?") and the consequences of drinking (e.g., "Have you or someone else been injured as a result of your drinking?"). Items were anchored from 0 to 4, with higher scores indicating greater problem drinking severity. A score of 8 and above is used to denote hazardous and harmful drinking.

Second, the ostensible news article that served as the self-discontinuity manipulation replaced reference to "heavy gambling" with "heavy drinking". For example, the article noted that "along with the potential negative consequences associated with heavy drinking (e.g., financial, interpersonal problems), heavy drinking can also result in losing your sense of self." We used the Experiment 1 measures for assessing nostalgia (α = 0.78), readiness to change, and (self-reported) attempted change in Experiment 2, but we replaced "gambling" with "drinking".

Lastly, to obtain collateral information about whether participants attempted change between the first and second session, we asked them for permission to contact a family member or close friend who knew about their drinking activities. In particular, we asked them to provide this person's name and email address. We assured participants that the data would remain confidential and that their responses would not be shared with the identified person.

We contacted collaterals via email and mentioned that their name and contact information were provided by the participant (name given) in a study on drinking. Moreover, we informed collaterals that the participant had given us permission to ask them questions about his/her drinking activities. We assured collaterals that their responses would be confidential (i.e., would not be shared with the participant). We also stated that, as a reward, they would be entered into a draw for one of five $20 multi-purpose Amazon.com gift cards. We then provided collaterals with a link to the online questionnaire. After obtaining consent, we asked collaterals to "write the name of the person who granted us permission to contact you." (All collaterals correctly identified the participant.) Subsequently, we asked collaterals to indicate how frequently they interacted with the participant (1 = *not often*, 7 = *a lot*), and how well they knew the participant's drinking activities (1 = *not well*, 7 = *extremely well*). Importantly, we also asked them whether the participant "made an attempt to quit or cut down on their drinking in the last month" ("*Yes*," "*No*," or "*I don't know*").[2]

4.2. Results

4.2.1. Preliminary analysis

From the original sample of 200, 12 participants failed more than one of the five attention checks throughout the experiment, and were excluded. In addition, 13 participants failed to correctly identify the content of the report, and were also excluded. Removal of these participants did not influence the overall pattern of results. The final sample consisted of 175 drinkers (89 females, 84 males, 2 unreported) who ranged in age from 21 to 77 years (M = 33.58, SD = 10.45).

Of the 114 drinkers who completed the follow-up session, nine failed the initial manipulation check (i.e., failed to identify the content of the report). We allowed them to complete the follow-up session due to ethical considerations, but excluded them from analyses. Importantly, there were no differences in attrition by condition, $\chi^2(1)$ = 0.31, p = .58. Additionally, there were no significant differences between those who did and those who did not complete the follow-up

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[2] For the sake of transparency, collaterals completed a few other measures (e.g., the AUDIT in relation to target and probing items about the target's behavior). We included these items for exploratory purposes. Materials for Experiment 2 can be downloaded from Open Science Framework (OSF) at https://osf.io/qq9ag/

session on any of the measured variables, all *ps* > 0.50. Thus, it is unlikely that attrition accounts for the observed results.

Of note, the mean on the AUDIT (i.e., the measure of problem drinking severity) was just below the cut-off denoting hazardous and harmful drinking in the self-continuity condition (M = 5.98, SD = 5.33), and at the cut-off in the self-discontinuity condition (M = 8.16, SD = 6.19). Thus, on average, drinkers in both conditions can be considered at-risk problem drinkers.

We tested whether the manipulation was successful as well as whether the manipulation's effectiveness was moderated by problem drinking severity. As before, we used Hayes' (2013) PROCESS macro V.2 (Model 1) for SPSS version 21, bootstrapped with 5000 iterations to obtain bias corrected 95% CIs (Fig. S2, available online as Supplemental Material). We entered the self-discontinuity manipulation (coded 0 = *self-continuity*, 1 = *self-discontinuity*) and problem drinking severity (mean-centered) into a regression analysis with the manipulation check item that assessed whether they felt drinking had negatively changed their sense of self. As intended, there was a main effect of the manipulation, b = 0.93, SE = 0.21, p < .001, 95% CI [0.50, 1.36], and of problem drinking severity, b = 0.12, SE = 0.02, p < .001, 95% CI [0.08, 0.15]. Unlike Experiment 1, these main effects were not qualified by an interaction between condition and problem drinking severity, b = 0.06, SE = 0.04, p = .30, 95% CI [−0.02, 0.13]. Simple slopes analyses showed that the self-discontinuity manipulation significantly increased participants' perceptions that their drinking changed their sense of self at 1 SD above the mean of problem drinking severity, b = 1.26, SE = 0.31, 95% CI [0.64, 1.88]. However, the effect was not significant at 1 SD below the mean of problem drinking severity, b = 0.60, SE = 0.31, 95% CI [−0.0008, 1.21].

4.3. Main analyses

In Table 3, we present the correlations between measured variables. In Table 4, we present the mean and standard deviation for each measured variable by condition.

4.3.1. Readiness to change

We first tested the hypothesized moderated-mediation model in which self-discontinuity (the predictor variable; 0 = *self-continuity*, 1 = *self-discontinuity*) increases readiness to change (the outcome variable) via nostalgia (the mediating variable; mean-centered), but only for those who report high problem drinking severity (the moderating variable; mean-centered). Once again, we relied on Hayes' (2013) PROCESS macro V.2 (Model 7) for SPSS version 21 (Fig. 3). We used bootstrapping with 5000 iterations to obtain bias corrected 95% Cis. The index of moderated-mediation was significant, *index* = 0.11, SE = 0.04, 95% CI [0.05, 0.19]. Self-discontinuity significantly increased readiness to change via nostalgia when problem drinking severity was high (+ 1 SD), b = 0.79, SE = 0.33, 95% CI [0.20, 1.50], but decreased readiness to change via nostalgia when problem drinking was low (− 1 SD), b = −0.53, SE = 0.27, 95% CI [−1.08, −0.02]. The results were consistent with the hypothesized moderated-mediation model. A post-hoc power analysis using Monte Carlo simulation in Mplus revealed that this analysis was sufficiently powered (84.2%).

Table 3
Correlations between Measured Variables: Experiment 2.

	1.	2.	3.	4.
1.Problem drinking severity	–			
2.Nostalgia	0.31**	–		
3.Readiness to change	0.39**	0.54**	–	
4.Attempted change[a]	0.43**	0.38**	0.61**	–

Note. [a] No = 0, Yes = 1; *p < .05; **p < .01.

Table 4
Means and Standard Deviations of Dependent Measures by Condition and Collapsed Across Conditions: Experiment 2.

	Self-discontinuity		Self-continuity		Collapsed	
	M	SD	M	SD	M	SD
Problem drinking severity*	8.16	6.19	5.98	5.33	7.06	5.86
Nostalgia	3.08	1.34	2.87	0.87	2.97	1.13
Readiness to change*	2.15	3.10	1.27	2.30	1.71	2.76
Attempted change	0.27	0.45	0.19	0.39	0.23	0.42

Note. *Problem drinking severity significantly differed between conditions (p = .01), as did readiness to change (p = .04). No other between-condition effects were significant (ps > 0.05). Problem gambling severity ranges from 0 to 27; Nostalgia ranges from 1 to 7; Readiness to change ranges from 0 to 10; Attempted change was coded 0 = No and 1 = Yes.

4.3.2. Attempted change

We then proceeded to test the central hypothesis: self-discontinuity (the predictor variable; 0 = *self-continuity*, 1 = *self-discontinuity*) increases the odds of a self-reported change attempt (the outcome variable) via nostalgia (the mediating variable; mean-centered), but only for those who report high problem drinking severity (the moderating variable; mean-centered). Again, we used Hayes' (2013) PROCESS macro V.2 (Model 7, 5000 bootstraps) for SPSS version 21 (Fig. 4). As with readiness to change, the index of moderated mediation was significant, *index* = 0.056, SE = 0.04, 95% [0.0004, 0.14]. Although self-discontinuity did not significantly increase the odds that participants made a self-reported change attempt via nostalgia when problem drinking severity was low (− 1 SD), b = −0.31, SE = 0.26, 95% CI [−0.92, 0.09], or when problem drinking severity was high (+ 1 SD), b = 0.32, SE = 0.29, 95% CI [−0.13, 0.97], the significant index of moderated-mediation establishes support for our hypothesized model (Hayes, 2015).[3] A post-hoc power analysis using Monte Carlo simulation in Mplus revealed that this analysis was under powered (43.7%). As such, we re-tested the moderated-mediation model after conducting a missing data analysis using maximum likelihood estimation (power = 84%). The pattern of results was similar (Supplemental Materials).

4.3.3. Collateral agreement

Of the 105 participants whose data were retained for the follow-up session, 40 provided consent to contact a family member or friend familiar with their drinking activities. This low rate was anticipated given most problem drinking is hidden from friends and family (Roman, 1991; Rubington, 1972). Recruited collaterals (N = 18; 9 per condition) knew the participants well. On a 7-point scale, they reported interacting frequently with the participant (M = 6.56, SD = 0.78), being close to the participant (M = 6.44, SD = 0.78), and being confident in their knowledge about the participant's recent (i.e., last 30 days') drinking activities (M = 5.78, SD = 1.48). All means were significantly above the mid-point of the scale, ps < 0.001. Collateral agreement with the participant in question about whether a change attempt was made was remarkably high (88.89%; n = 16), $\chi^2(2)$ = 15.11, p < .001. However, the response rate from collaterals was very low. As such, the convergence should be interpreted with caution.

4.4. Discussion

The objective of Experiment 2 was to test the generalizability of the hypothesized moderated-mediation model with a sample of problem

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[3] A test of specific indirect effects is not necessary to establish that the indirect effect is moderated. According to Hayes (2015), all that is required to establish moderated mediation is a significant index of moderated mediation.
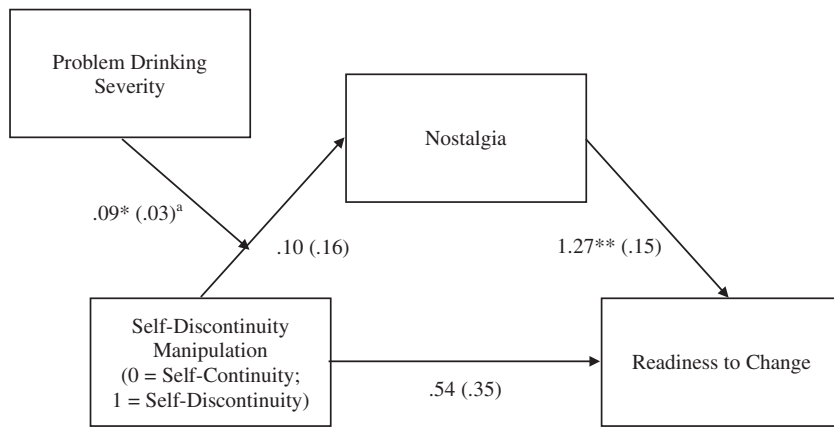
Fig. 3. Moderated-Mediation Model on Readiness to Change: Experiment 2
Note. Unstandardized regression coefficients and associated standard errors (in parentheses) are for the full moderated-mediation model. *p < .05; **p < .001; [a] = Interaction between the self-discontinuity manipulation and problem gambling severity.

drinkers. As in Experiment 1, self-discontinuity significantly increased readiness to change via nostalgia when problem drinking severity was high, but not when it was low. In fact, readiness to change decreased among people low in problem drinking severity. It is possible that among those low in problem drinking severity, the self-discontinuity manipulation reinforced that their drinking is acceptable (and not in need of change). The net effect would be a decrease in any desire to change, should such a desire have been present.

Importantly, there was again a downstream consequence on self-reported behavior. Drinkers were more likely to engage in self-reported behavior change over a one-month span when induced to experience self-discontinuity (compared to self-continuity)—an effect mediated by nostalgia for the self that existed prior to drinking. This mediated effect was only observed among persons who reported symptoms of problematic drinking behavior. Thus, the manipulation had a positive effect on persons who, objectively, have the greatest need for behavior change: those who drink at a problematic level.

Problem drinking varied as a function of experimental condition. As such, the difference by condition might have been the result of variables related to drinking (e.g., motivation to drink), which were not assessed. It is known, for example, that people who drink to escape negative life events are likely to report an increase in drinking behavior and symptoms of problem drinking over time (Holahan, Moos, Holahan, Cronkite, & Randall, 2001; O'Hare, Shen, & Sherrer, 2010). For such people, a self-discontinuity manipulation may invoke defensive cognitions that drinking serves to protect against, thus undermining the benefits of the manipulation. In Experiment 2, however, AUDIT scores were higher in the self-discontinuity condition (compared to the self-continuity condition). As such, the results may have been stronger if the AUDIT score were lower in the self-discontinuity condition. Conversely, it could be argued that there was more motivation to change among

people in the self-discontinuity condition because their drinking was more severe prior to the manipulation. That said, when results of Experiment 2 are combined with those observed in Experiment 1, as well as other published work (Kim & Wohl, 2015), we argue there should be some confidence in the utility of a self-discontinuity manipulation on readiness to change as well as self-reported behavior change.

Supporting the validity of the aforementioned results, we confirmed participants' reports of a change attempt via collaterals (i.e., a close other). Indeed, there was extremely high convergence in reports of a change attempt between participants and collaterals. However, because the response rate from collaterals was very low this convergence should be interpreted with caution.

5. Moderated-serial mediation and integrative data analysis

In both experiments, we hypothesized and found evidence for a moderated-mediation model. When addictive behavior severity was high, self-discontinuity increased nostalgia. Nostalgia, in turn, predicted increased readiness to change and self-reported change attempts, respectively. We assumed that readiness to change is a key antecedent of change attempts. This assumption implies an extended mediational chain; when addiction severity is high, self-discontinuity should increase the odds of a change attempt via nostalgia and ensuing readiness to change. We tested this sequence using Hayes' (2013) PROCESS V.2 macro. Whereas PROCESS allows for testing serial mediation models (Model 6), it does not include a canned option for specifying a moderator in serial mediation models. We circumvented this constraint by conducting two serial mediation analyses, conditional on low and high addiction severity, respectively (Aiken & West, 1991; Cohen & Cohen, 1983).

We ran these analyses on the aggregated sample from both
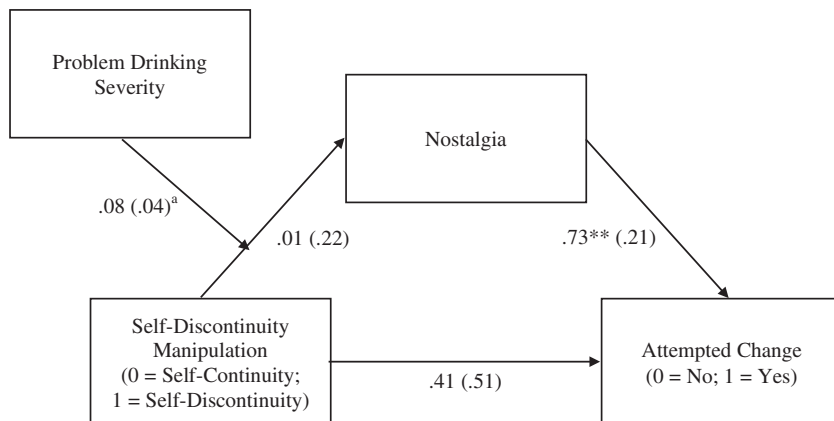
Fig. 4. Moderated-Mediation Model on (Self-Reported) Attempted Change: Experiment 2
Note. Unstandardized regression coefficients and associated standard errors (in parentheses) are for the full moderated-mediation model. *p < .05; **p < .001; [a] = Interaction between the self-discontinuity manipulation and problem gambling severity.

experiments, using integrative data analysis (IDA; Curran & Hussong, 2009). In IDA, one combines the raw data from a set of relevant studies and estimates effects in the aggregated sample. This approach has a number of advantages over traditional meta-analysis, including increased statistical power (Lambert, Sutton, Abrams, & Jones, 2002). We used fixed-effects IDA (rather than random-effects IDA), because the number of experiments was insufficient to allow for the reliable estimation of random effects. In fixed-effects IDA, study membership is simply included as a fixed characteristic of each observation in the aggregated sample. In the PROCESS V.2 macro, this fixed-effects approach to clustering can be implemented via the 'cluster' option.

Before combining the experiments, we first standardized (z scores) the continuous variables within each experiment, to create a shared metric across experiments. We then tested the serial mediation models, conditional on low (in the first analysis) or high (in the second analysis) addictive behavior severity. When addictive behavior severity was low, the serial indirect effect of self-discontinuity on change attempt via nostalgia and readiness to change was not significant, $b = -0.07$, $SE = 0.05$, 95% CI [−0.19, 0.01]. When addictive behavior severity was high, however, this serial indirect effect was significant, $b = 0.12$, $SE = 0.07$, 95% CI [0.02, 0.30]. These findings support the hypothesized moderated serial mediation model. When addictive behavior severity was high (but not when it was low), self-discontinuity increased the odds of a self-reported change attempt via nostalgia and ensuing readiness to change. (We provide a full report of these analyses in Supplemental Material.)

6. General discussion

Self-discontinuity has traditionally been considered maladaptive (Chandler, 1994). Indeed, the experience of self-discontinuity has been associated with negative affect, a weakened sense of the self, lower self-esteem, and an inability to cope after negative life events such as job loss (Diehl, Jacobs, & Hastings, 2006; Sadeh & Karniol, 2012). Nevertheless, recent research (Kim et al., 2017; Kim & Wohl, 2015; Nuske & Hing, 2013) suggests a bright side to experiencing self-discontinuity among those in need of behavior change (e.g., people living with addiction). This research indicates that self-discontinuity heightens nostalgic reverie for the pre-addicted self—a process that readies them for change. However, to date, no research has examined whether discontinuity-induced nostalgia influences self-reported behavior change directly.

We tested the hypothesis that heightened self-discontinuity would motivate people living with addiction to attempt behavior change. We proposed that the process by which self-discontinuity influences change is nostalgia for one's past self-a self that existed prior to engaging in the addictive behavior. In two experiments, we found evidence for this proposition among people with elevated symptoms of problem gambling (Experiment 1) and problem drinking (Experiment 2). Specifically, self-discontinuity predicted a heightened readiness to change among those with the greatest need for change by way of nostalgia for the pre-addicted self. Critically, as hypothesized, experimentally-induced self-discontinuity (compared to self-continuity) increased the odds that people high in problem gambling or drinking severity made a self-reported change attempt—an effect mediated by nostalgia for the pre-addicted self. Among drinkers, we were also able to verify whether change had been attempted via collateral information, thus supporting the veracity of participants' self-reports.

We note the interaction between the self-discontinuity manipulation and problem gambling severity on the manipulation check item (which assessed the extent to which participants felt that engagement in the behavior altered their sense of self) in Experiment 1, but the absence of such an interaction in Experiment 2 when drinking was the target addictive behavior. These divergent patterns can be explained by variation in public perceptions about the two behaviors. In a large nationwide survey, Azmier (2000) found that gambling is perceived as a less

problematic behavior than several other behaviors, including alcohol consumption. Indeed, most adults regard gambling as an unimportant issue compared to other risky behaviors like alcohol consumption (Campbell, Derevensky, Meerkamper, & Cutajar, 2011). The risks associated with gambling only become clear once problems surface, likely due to gambling being an invisible addiction (i.e., it is not physically apparent; Stansbury, Beecher, Schumacher, Martin, & Clute, 2015). As such, people who gamble recreationally may not be in tune with how gambling can fundamentally alter one sense of self, which is not the case with heavy drinking.

Critically, we conducted an IDA on the aggregated sample to test whether readiness to change (via the self-discontinuity manipulation and the nostalgia it elicits) is the more proximal predictor of attempted change among people high in addiction severity. Results supported this supposition. When addictive behavior severity was high (but not when it was low), self-discontinuity increased the odds of a change attempt via nostalgia and ensuing readiness to change. Thus, discontinuity-induced nostalgic reverie increases the odds of self-reported behavior change because it readies those with elevated addiction severity for change.

6.1. Implications

Our findings have both basic and applied relevance for two literatures. To begin, the social psychological literature on self-discontinuity and nostalgia has theorized about behavioral consequences (Best & Nelson, 1985; Davis, 1979; Milligan, 2003; Sedikides et al., 2016, 2008), but it has not examined whether discontinuity-induced nostalgia manifests in self-reported behavior change. Our experiments represent a foray in that direction.

Also, motivating people who engage in addictive behaviors (e.g., cigarette smoking, problem drinking, problem gambling) to quit or cut back has posed a virtually insurmountable challenge. Indeed, those living with addiction are hard to reach and engage (DiClemente, 1993). One would expect people living with addiction and the associated negative consequences to be highly motivated to change their behavior. However, they do not readily engage in behavior change, despite the consequential harm (e.g., physical, psychological, interpersonal; Amato & Rogers, 1997; Hall & Solowij, 1998; Lesieur & Custer, 1984).

Indeed, only 15% of persons living with addiction are estimated to take the necessary steps for changing their problematic behaviors (Prochaska, DiClemente, & Norcross, 1992). Researchers and treatment providers alike have searched for effective means to motivate these persons to attempt change. Within the Motivational Interviewing framework (MI; Miller & Rollnick, 2002, 2013), a fundamental means to build momentum toward change is to make salient and amplify self-relevant inconsistencies or discontinuities. We found that heightening a sense that the addictive behavior evokes discontinuity between the current and past self motivates change. Crucially, self-discontinuity precipitates change by virtue of its capacity to elicit nostalgia for the self that existed before the addictive behavior entered one's life. As such, MI-based treatments may motivate greater behavior change by invoking nostalgic reverie for the past, non-addicted self via highlighting the discontinuity that the addictive behavior has created.

This work also adds to a growing literature that suggests some people living with addiction feel an "identity loss" or "identity spoilage" as a result of their addictive behavior (Best et al., 2016; Dingle et al., 2015; Frings & Albery, 2015; Hughes, 2007; McIntosh & McKeganey, 2000; Waldorf & Biernacki, 1981). Our findings add to this literature by explicating the psychological variable (self-discontinuity) that is at the heart of the experience of identity loss or spoilage as well as the emotion (nostalgic reverie for the pre-addicted self) that motivates behavior change.

6.2. Limitations and future directions

Although we did our best to contact every participant from the initial session of both studies, the rate of attrition was moderately high. As such, it is possible that those who did not complete the follow-up session differed in unknown ways that contributed to the observed effects. For example, participants may have felt guilt or shame about their continued gambling (Experiment 1) or drinking (Experiment 2) behavior. If so, they may have been reluctant to complete a follow-up survey in which they would have to inform researchers that their behavior remains problematic (Wohl & Sztainert, 2011). However, both studies showed there were no significant differences on the assessed variables at Time 1. Additionally, there was no difference in the rate of attrition by condition. Thus, we have confidence in the findings and their generalizations. Furthermore, we took attrition into account when determining our sample size. That is, both studies were sufficiently powered to detect the predicted effects.

The direct effect of the self-discontinuity manipulation on the odds of a self-reported change attempt was present in the sample of gamblers, but not in the sample of drinkers. This is similar to Kim and Wohl (2015), who found self-discontinuity directly heightened readiness to change among problem gamblers, but indirectly among problem drinkers (via nostalgia). According to Kenny and Judd (2014), however, the power to detect a direct effect can be dramatically smaller than the power to detect the indirect effect. On this basis, they proposed that it can be informative to test the indirect effect, even when the direct effect is not significant, such as when one has an efficacious randomized intervention and a good understanding of the underlying mechanism. Our research fits these criteria: there was a randomized intervention to assess the behavior change utility of a self-discontinuity manipulation and there is a good understanding in the literature that self-discontinuity elicits nostalgia. Moreover, according to Hayes (2013), a direct effect of the independent variable on the dependent variable is not needed in a mediation model when the model specifies that the relationship is indirect. The significant index of moderated-mediation in both studies provides evidence for hypothesized indirect effect and thus the psychological process at the center of this research.

Participants in both studies were recruited from MTurk. As such, it could be argued that a sample of gamblers and drinkers recruited from a different forum may respond to the manipulation differently. As previously noted, however, Kim & Hodgins, 2017 found that MTurk is a reliable and valid means to recruit gamblers, cannabis users, and drinkers. That is, the self-report data provided on MTurk are of high quality and associations between constructs related to addiction are consistent with those in the extant literature. The results of Kim and Hodgins (2017) as well as Mishra and Carleton (2017) are in line with other research showing that participants provide more honest and less socially desirable responses to sensitive matters when completing online surveys (Evans, Garcia, Garcia, & Baron, 2003). In all, MTurk may be an ideal venue to conduct research on addictive behaviors and self-reported behavior change.

Although the self-discontinuity manipulation increased the odds of a self-reported quit attempt, we do not know if the attempt resulted in sustained behavior change. Future investigations could follow participants for an extended time period (perhaps with booster sessions) to observe whether discontinuity-induced nostalgia has long-term benefits. Also, we do not know what events transpired in the days and weeks that followed the initial session (and before the follow-up session). It is possible that the self-discontinuity manipulation influenced other attitudes or behaviors that we did not assess, which contributed to the between-group difference in reported change attempts. In this light, it may be prudent to conduct a daily diary study to examine more fully the longitudinal impact of the self-discontinuity manipulation. Lastly, we were only able to recruit a small number of collaterals. Yet, the high degree of participant-collateral alignment attests to the validity of participants' self-reports.

6.3. Concluding remarks

Traditionally, psychologists have framed both self-discontinuity and the nostalgia it produces as unhealthy (for reviews, see: Batcho, 2013; Sedikides, Wildschut, & Baden, 2004). These conceptualizations, however, have begun to shift with burgeoning evidence suggesting that discontinuity-induced nostalgia serves a positive, approach-motivating function (Kim & Wohl, 2015; Sedikides et al., 2015). That is, self-discontinuity, via nostalgia, motivates individuals to recapture the positive past on which they reflect. Self-discontinuity, via nostalgia, emboldens people living with addiction toward attempts for behavior change. Nostalgia is an emotion that could be nurtured (via experienced self-discontinuity) to engender favorable outcomes among people living with addiction.

Appendix A. Supplementary Material

Supplementary material for this article can be found online at https://doi.org/10.1016/j.jesp.2017.11.011.

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