Should I Stay or Should I Go? Ambivalence and the Opposing Forces of Nostalgia and Optimism in Recovery from Addiction

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Abstract

Research has shown that nostalgia prepares individuals with addiction for change, however, the current thesis examines nostalgia’s negative impact on those in recovery. Three studies were conducted: the first included (N=304) individuals recovering from disordered gambling, the second included (N=604) individuals recovering from alcohol use disorder, and the third included (N=167) individuals recovering from alcohol use disorder over two time points. Participants' addiction-related nostalgia (ARN), optimism, and ambivalence about recovery were measured. Results support the hypothesis that ARN during recovery tempts individuals back to addictive behaviors. Nostalgia hampers recovery, even at high levels of optimism about the future, leading to ambivalence. In Study 3, ambivalence and ARN correlate with higher relapse risk over time. Findings emphasize the need to reduce ARN and foster optimism to promote successful recovery. Future research should explore these effects in clinical populations and among individuals recovering from other addictions or harmful behaviors.
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Should I Stay or Should I Go? Ambivalence and the Opposing Forces of Nostalgia and Optimism in Recovery from Addiction

Ambivalence (i.e., the state of being torn between conflicting attitudes or behaviors related to a specific issue; Thompson et al., 1995) is common among people in recovery from a harmful behaviour (see Cioe et al., 2018; Dahal et al., 2021; Menninga et al., 2011; Rance et al., 2017; Radunz & Wade, 2023). Individuals in recovery from an alcohol use disorder, for instance, often find themselves craving the perceived benefits of alcohol consumption (e.g., induced relaxation and enhance social interactions; Marlatt & Gordon, 1985; Pickard, 2017) while also being aware of its association with various life-threatening illnesses. Such ambivalence can be viewed as a temporary psychological state, but one that is known to hinder the recovery process (Bell, 2013; Bjornestad et al., 2019; Kaplan, 1997; O’Brien & McLellan, 1996; Smith et al., 2020; Williams & Reid, 2010). A considerable amount of research supports the notion that recovery from addiction is a challenging and ongoing process (see Marlatt & George, 1984; Bahl et al., 2023; du Plessis et al., 2020; Puille et al., 2022; Snoek et al., 2021), with many returning to the addictive behaviour, in part, because of ambivalence about the recovery process (Menninga et al., 2011). In fact, ambivalence is among the most challenging problems faced by clinicians and practitioners in the struggle to help people remain abstinent (Cioe et al., 2018; Mendelson & Mello, 1996; Toneatto, 2005). To reduce the risk of relapse among people in recovery from an addiction, it is imperative to identify factors that contribute to ambivalence.

In the current research, I tested the novel idea that nostalgic reverie (i.e., sentimental longing) for the (perceived) benefits of the addictive behaviour heightens ambivalence. Whilst a growing body of work has shown nostalgia for the pre-addicted self is positively associated with behaviour change (see Salmon et al., 2018; Wohl & Kim, 2015; for a review see Wohl et al., 2023, I hypothesized that nostalgia for the perceived benefits of the addictive behaviour (i.e.,
addiction-related nostalgia; ARN) would psychologically draw people back to the addictive behaviour, resulting in greater ambivalence about staying on the path to recovery. I also examined whether this nostalgia-induced ambivalence would be heightened among those who are high (relative to low) in optimism (i.e., a positive emotion that encourages people to be hopeful about the future; Scheier et al., 1994) about their recovery. Specifically, despite optimism being a known facilitator of recovery (Provost et al., 2022), when experienced in tandem with ARN, people in recovery should feel even greater uncertainty about their recovery. I tested these novel ideas across three studies (two correlational and one prospective) and two addictive behaviours (gambling and alcohol use).

The Recovery Process: Ambivalence in the Face of Change

Recovery from addiction is a complex and challenging process, requiring a significant commitment of time, effort, and resources (McLellan et al., 2007; White, 2007). Indeed, individuals not only need to abstain from the addictive behaviour they must develop healthy coping strategies, build and repair supportive relationships, pursue other goals and avoid triggers that could induce cravings for the addictive behaviour (Yamashita & Yoshioka, 2022; Yildiz, 2017). Despite these complexities, people can and do recover from addiction. That is, people can cease engaging in that addictive behaviour and sustain their abstinence. The path of recovery, however, is not straightforward (but literally and figuratively). Individuals experience an array of challenges (e.g., stress about their inability to engage in the addictive behaviour; see Nuske & Hing, 2013; coping with drug cravings and cues; see Vafaie & Kober, 2022) that hinders sustained recovery (Sliedrecht et al., 2019).

The challenges and setbacks in recovery echo the challenges that people experience before engaging in behaviour change. According to the Transtheoretical Model of behaviour
change (TTM; Prochaska et al., 1992), modification of any long-standing behaviour is marked by
discrete stages of increasing motivation for change that are based on temporally placed intentions
towards change (e.g., planning to quit smoking within the month) and previous attempts at
changing (i.e., number of attempts at quitting in the last year). Although individuals are expected
to pass through a succession of stages as they approach the achievement of long-term change, the
pattern of transition is not expected to be linear. Rather, the change process is expected to be
marked by several cycles of progression and regression between the action stage (where
cessation of the behaviour has occurred) and other previous stages that involve readying the self
for behaviour change. Central to the cycles of progression is consideration or weighing of
advantages and disadvantages of engaging in the behaviour (i.e., the pros and cons of the
behaviour; Schumann 2005; Sobell et al., 1993)—an exercise that is referred to as decisional
balance (Miller, 1999; Velicer et al., 1985).

A supposition of the TTM is that people in recovery weigh the cons of returning to the
behaviour more heavily than the pros of re-initiating the behaviour, and this decisional balance
drives cessation (Prochaska & DiClemente, 1983, 1984). However, weighing the pros and cons
does not stop at a successful quit attempt; it is an ongoing process that influences whether an
individual stays in recovery or relapses (West, 2005). Indeed, recovery maintenance requires
continued action in the form of weighing of the pros and cons (in favour of recovery) and people
in recovery from addiction may find themselves feeling pulled by both the pros of re-engagement
in the addictive behaviour and the pros of sustained recovery. Put differently, people in recovery
may experience attitudinal ambivalence about staying on the recovery path (see Miller &
Often misunderstood as an attitude of indifference (Kaplan, 1972; Klopfer & Madden, 1980), ambivalence is an internal conflict stemming from coexisting opposing feelings (Foster et al., 2014). This manifests among those in recovery from an addictive behaviour as a psychological tug-of-war between maintaining abstinence and relapse (i.e., the return to the addictive behaviour; Foster, 2014; van Harreveld et al., 2009). An ambivalent individual in recovery from disordered gambling, for instance, may recognize the advantages of recovery (e.g., improved physical, mental, social and financial wellbeing) yet still yearn for the (perceived) benefits they reaped from gambling (e.g., the excitement they felt when wagering). In other words, people can hold both negative and positive beliefs about the addictive behaviour (e.g., gambling, see Kim & Kim, 2020).

Ambivalence is a common experience among individuals who are in recovery from an addictive behaviour (see Menninga et al., 2010; Snoek et al., 2016). On the one hand, they may recognize the negative impact that their addiction has had on their life and feel motivated to make positive changes (Kim & Wohl, 2018; Salmon & Wohl, 2020; Wohl et al., 2019). On the other hand, they may experience mixed feelings about the recovery process, such as fear of change, uncertainty about their ability to succeed, and nostalgia for their past behaviour (Bottorff et al., 2000; Kim & Kim, 2020). Importantly, research has shown that ambivalence about recovery is a normal and expected experience among individuals in recovery. In fact, ambivalence is often viewed as a natural stage of the recovery process, and individuals who are able to work through their ambivalence are more likely to achieve sustained recovery (Prochaska & DiClemente, 1983).

Resolving ambivalence can support recovery by adding weight to the side of the decisional scale that favours recovery. Schumann and colleagues (2005) found that decreases in
the perception of the advantages of smoking (i.e., smoking pros) were accompanied by increases in the perceived advantages of quitting (i.e., smoking cons). However, there is room to expand the research examining factors that contribute to ambivalence. Although it is known, as in the Schumann et al. study, that ambivalence is reduced when the benefits of remaining in recovery outweigh the benefits of returning to the addictive behaviour, greater understanding is needed about factors that predict ambivalence (Menninga et al., 2010). Put differently, research is needed to explicate what tip the scales toward ambivalence given the conflict inherent to ambivalence can make it challenging for individuals to commit to the recovery process fully.

One reason for ambivalence is that the process of recovery often requires individuals to make significant changes to their lifestyle, social relationships, and self-identity (Flora, 2012; Robertson et al., 2021; Wangsteen & Hystad, 2022). These changes can be daunting due to cognitive biases toward the (perceived) benefits of the addictive behaviour. Consequently, people in recovery may reminisce about the past pleasures of the addictive behaviour and find it challenging to wholly embrace the recovery process. Herein, I content that ambivalence may be a product of nostalgic reverie (i.e., sentimental longing or wistful reflection; Sedikides & Wildschut, 2023) for the (perceived) benefits of the addictive behaviour.

**Nostalgic Reverie as a Source of Ambivalence**

Nostalgia is often described as a bittersweet emotion due to its intricate and multifaceted nature (Batcho, 2013; Leunissen et al., 2020). It involves a profound longing or yearning for moments, places, or experiences from the past that hold deep emotional significance (Wildschut et al, 2008). This bittersweet quality can be attributed to two primary factors. Firstly, nostalgia evokes positive memories and emotions associated with those memories (Sedikides et al., 2008). These recollections often carry feelings of warmth, happiness, and a comforting sense of
familiarity. Revisiting these memories can evoke a strong sense of joy and a deep emotional connection to one's personal history (Sedikides et al., 2008, Stephan et al., 2014; van Tilburg et al., 2019). However, the bittersweetness emerges from the fact that these moments reside in the past (as opposed to the present). This contrast between the positive emotions tied to the past and the awareness that those moments do not exist in the present contributed to the complex and somewhat contradictory bittersweet quality of nostalgia (Pourtova, 2013).

In terms of the outcome of nostalgia, traditionally, psychologists conceptualized it as a hinderance to health and well-being (see Boym, 2007). For instance, longing for past experiences has been described as a form of psychosis (Frost, 1938) or a compulsive disorder characterized by mental repression (Fodor, 1950), which can manifest in excessive grief and depressive symptomatology (Castelnuovo-Tedesco, 1980). For this reason, and others, Frijida (1986) suggested that nostalgia is an emotion lacking in functionality. However, from a social psychological perspective has found that nostalgia can serve an important coping function (Sedikides & Wildschut, 2023). Specifically, nostalgizing has been found to enhance a person’s sense of self-worth (Hepper et al., 2012; Vess et al., 2012), augment life meaningfulness (Routledge et al., 2011; van Tilburg et al., 2013), and an increased sense of social connectedness (i.e., feeling protected, supported, loved, and trusting of others; Wildschut et al., 2006; Wildschut et al., 2010). Furthermore, nostalgia has been positively linked to an approach motivation (Sedikides & Wildschut, 2023; Stephan et al., 2014). Put differently, nostalgizing motivates people to bring the longed-for past into the present.

So is nostalgizing good or bad for one’s health? Based on systematic review of the nostalgia literature, Wohl et al. (2023) argued the function of nostalgia may depend on the subject of one’s longing. For example, when people trying to improve their health via a fitness
intervention felt nostalgic about their childhood aspirations of athleticism, nostalgia functioned to remind them of an enjoyable past and inspire them to reclaim that past through sports participation (Sharp et al., 2018). On the other hand, among people separated from their homelands and family after immigrating, feeling nostalgic for enjoyable celebrations and gatherings lead them connect with that past by consuming more alcohol (Lee et al, 2006 and high-caloric food (Viladrich & Tagliaferro, 2016; Parco et al., 2011).

Within the context of addictive behaviours, nostalgizing about one's life prior to addiction has been found to be a catalyst for behavior change (Kim & Wohl, 2015; Salmon & Wohl, 2020; Salmon et al., 2018; Wohl et al., 2018; Sedikides et al., 2015). When individuals experience nostalgia for their pre-addiction existence, their yearning to revert to their former, non-addicted self can initiate the process of behavior change (Kim & Wohl, 2015; Salmon et al., 2018; Wohl et al., 2018). Notably, Kim and Wohl (2015) found that engaging in nostalgic reverie about the self before addiction (both measured and manipulated) fostered motivation for change among individuals living with a gambling disorder. Furthermore, in a longitudinal study, Wohl et al. (2018) observed that indulging in nostalgia regarding the pre-addicted self increased the likelihood of making an attempt to quit. Collectively, nostalgic reverie about the pre-addicted self emerges as a potent predictor of behaviour change. However, it is crucial to examine the consequences of nostalgia among individuals who have already undertaken the necessary steps to discontinue their addictive behaviour.

I contend that just as individuals may yearn for the positive aspects of life prior to addiction, those in recovery may long for the benefits they derived from their addictive behaviour and that such nostalgizing may be counterproductive for the recovery process. Specifically, among those who have already initiated behaviour change, sentimental longing for
the perceived pros or benefits of engaging in the addictive behaviour (e.g., experiencing a high or euphoria, escaping reality, socializing), or addiction-related nostalgia (ARN), may inspire a return to the addiction.

That ARN should create ambivalence builds on research that has shown addictive behaviours are reinforced when people are focused on the (perceived) benefits of participating in the addictive behaviour (Lavery, et al., 1993; Parsons et al., 1997). Importantly, nostalgia has been implicated in this process. Bottorff et al. (2000), for example, found that new mothers who returned to smoking postpartum reported nostalgizing about their life prior to motherhood—a life that had fewer responsibilities. Moreover, the new mothers expressed that they returned to smoking to reclaim this sense of freedom. Likewise, Lee et al. (2006) reported that Latino immigrants from in the United States who felt disconnected from their homeland tended to nostalgize about drinking with separated family. The net effect was increased alcohol consumption. Additionally, people who reported missing the cuisine of their homeland expressed gustatory nostalgia that draws them to overindulge in that cuisine when it is available (Viladrich & Tagliaferro, 2016)—this effect has also been observed among immigrant children (see Parco et al., 2011). Taken together, nostalgia appears to draw people back to old behaviours (for a review see Wohl et al., 2023. Among those in recovery from addiction, this should manifest as ambivalence about the recovery process.

Providing circumstantial evidence for my supposition, Nuske and Hing (2013) reported that people in treatment for disordered gambling often discussed an unease about not being able to gamble in recovery. Specifically, those in recovery noted that they missed the sense of relief and comfort that gambling had provided. Put differently, they longed for the emotions they experienced when gambling. Such nostalgizing about the (perceived) benefits of engaging in the
addictive behaviour are likely not restricted to gambling. People in recovery from an alcohol use disorder, for instance, may long for the feeling of numbness and relief that can accompany intoxication. Those who romanticize the positive aspects of their addictive behaviour while disregarding its negative consequences will likely struggle to fully commit to the recovery process. To test this idea, I assessed the extent to which people in recovery (from a gambling disorder or an alcohol use disorder) report experiencing ARN as well as ambivalence about their recovery.

**Optimism, Recovery, and the Consequences of Nostalgizing**

I also examined a factor known to facilitate the recovery process—optimism about the recovery process (i.e., believing in a better future without the addictive behaviour; see Sheirer & Carver, 1985)—and how nostalgizing influence how people feel staying on their path to recovery. The term ‘optimism’ commonly incorporates two interrelated concepts. The first concept pertains to the tendency to hope, while the second refers more broadly to the belief that we inhabit “the best of all possible worlds” (Scheier & Carver, 1985). Additionally, within the field of health psychology, optimism is widely understood as an emotion that constitutes forward-thinking expectations that good things will happen (Scheier & Carver, 1985; Serrano et al., 2020; Baker, 2007), and a facilitator of adaptive coping and (Kačmár et al., 2022) goal setting (Ramírez-Maestre et al., 2019).

People high (relative to low) in optimism have better treatment attendance and outcomes (Mawdsley, et al., 2022; Parker et al., 2021). For example, Senft-Everson and colleagues showed that among people who smoke, those higher in dispositional optimism had more confidence in quitting and more favourable attitudes about smoking treatment (2022). Further, Provost and colleagues suggest that low optimism could be an important obstacle to motivation to participate in treatment among people with substance use disorders (2022). Consequently,
Snow and Delaney (2006) as well as White (2011) have suggested that recovery is a product of cultivating optimism. This is particularly so among people in recovery from addiction (Krentzman, et al 2022). For instance, among people in recovery from a substance use disorder, those with high (relative to low) optimism tend to report lower anxiety about recovery and higher recovery protection (i.e., intentions to stay on the path of recovery; Provost et al., 2022). Moreover, among people living with a gambling disorder, optimistic beliefs about the future have been associated with greater desire to change (Salmon & Wohl, 2020). Thus, there appears to be behaviour change utility in optimism. But what is the consequence of feeling both optimistic about one’s future without the addictive behaviour in their repertoire and nostalgic about the addictive behaviour they are trying to leave in the past (i.e., ARN)?

Theorists and experimentalists in the field of psychology have argued that people can experience more than one emotion simultaneously, including simultaneously expediting opposing emotions (Cacioppo & Bertson, 1994). For example, in an experimental demonstration, Stanley and Meyer (2009) showed that positive emotions reported while watching 24 evocative film clips were only modestly negatively correlated with reports of negative emotions. These results suggest that some of the films may have elicited more than one emotion (e.g., happiness and sadness). Similarly, people may experience an array of emotions about their recovery. Herein, I argue that people can and do experience optimism about their future without addiction whilst feeling nostalgic about their addictive behaviour.

Importantly, I tested the idea that ARN may undermine the positive influence of optimism about the recovery process. Specifically, I hypothesized that ARN would counteract the ambivalence suppressing effects of optimism. This is because nostalgizing romanticizes and idealizes past experiences, blurring the negative consequences associated with the addictive
behavior (see Bottorf et al., 2000; Lee et al., 2006). The longing for the pleasurable aspects of the addiction overshadows the awareness of the harm it caused, leading individuals to downplay or ignore the detrimental effects that ultimately motivated their recovery. This distorted perception should undermine their resolve to stay on the path of recovery, thus heightening ambivalence even in the face of optimism. Additionally, nostalgia can create a sense of loss or grief for the familiar routine, patterns of behaviour, or people associated with unhealthy behavior (Espinoza-Ortega, 2021; Parco et al., 2011). Even if the behavior was destructive, individuals may find comfort and security in the familiarity of their past habits (Espinoza-Ortega, 2021; Paco et al., 2011; Viladrich & Tagliaferro, 2016). The uncertainty and challenges of a future without addiction should make the nostalgic pull even stronger, perhaps even overwhelming the benefits of optimism.

**Overview of the Current Research**

In the current research, I tested the idea that nostalgic reverie for an addictive behaviour (i.e., ARN) would be associated with the desire to return to the addictive behaviour, which should manifest as ambivalence about one’s recovery process. Conversely, optimism should be associated with reduced (or low levels) of ambivalence. Importantly, the benefits of optimism should be undermined when people in recovery also report experiencing ARN. To test this moderation model, I conducted three studies. In Study 1, I assessed ARN, optimism, and ambivalence in a community sample of people in recovery from a gambling disorder. Study 2, I sought to replicate the observed effects from Study 1 in a community sample of people in recovery from an alcohol use disorder. Lastly, in Study 3, I examined the associations between ARN, optimism, and ambivalence prospectively (i.e., at two time points one month apart). Further, in Study 3, I also examined whether ARN predicted relapse.
Before commencing each study, I conducted an a priori power analysis to determine the required sample size to detect a moderate effect. Further, prior to data analyses, I preregistered my hypotheses online. Preregistrations are available via the Open Science Framework (OSF; https://osf.io/cpexz/?view_only=6e941a7b4e344f21946561a865b3c878) and As Predicted (https://aspredicted.org/NC2_NRJ). This research was reviewed and cleared by the Carleton University Psychology Research Ethics Board (Projects #113260 and #116993).

**Study 1: Nostalgia and Recovery from a Gambling Disorder**

In Study 1, I assessed factors associated with recovery from a gambling disorder. I chose recovery from disordered gambling because although most people who gamble do so in a recreational manner, a small but significant portion of people who gamble develop a gambling disorder (1-5%; Grant et al., 2004). Recovery among people living with a gambling disorder is difficult, with those in recovery frequently reporting ambivalence about their recovery process (Nilsson et al., 2021; Toneatto, 2005). Further, despite the harms associated with disordered gambling, the recovery process among those living with a gambling disorder has received little attention, especially in comparison with other disordered behaviors (e.g., alcohol misuse; Bowden-Jones, 2022; Marotta & Yamagata, 2022).

In the current study assessed the associations among nostalgia for gambling, optimism about a future without gambling, and ambivalence about the recovery process among individuals in recovery from a gambling disorder. I predicted that ARN (measured in terms of both the extent to which a person feels nostalgic and the frequency with which nostalgizing occurs) would be positively associated with ambivalence about recovery (H1) and that optimism would be negatively associated with ambivalence about recovery (H2). Further, I hypothesized that nostalgia and optimism would interact such that the ambivalence reducing utility of optimism
would be undermined when people report high (relative to low) nostalgia for the addictive behaviour (H3).

**Method**

**Participants and Procedure**

Results of an a priori power analysis indicated that a minimum of 309 participants would be needed to detect a two-way interaction effect that accounts for 2% of the variance with 80% power when $\alpha = .05$. In this power analysis, I assumed that the two main effects would collectively account for 20% of the variance. Accordingly, I aimed to collect data from 500 participants because I anticipated excluding the data from 30% of participants due to low data quality.

Participants ($N = 304$) were recruited via Amazon’s CloudResearch, an online tool that allows “workers” to complete small tasks for monetary compensation. According to Buhrmester, Kwang and Gosling (2011), most “workers” participate out of interest or to pass the time, rather than for the sake of the compensation, making these participants a reliable source of data. Despite Cloud Research’s reliability and validity to recruit gamblers (Kim & Hodgins, 2016), online data sets are susceptible to artificial responses and spam. To prevent low-quality responses and to reduce bot created responses, we enforced a data quality protocol based on Hauser, Paolacci and Chandler (2019). This protocol recommends that researchers using online data collection hide the complete eligibility requirements from potential participants (i.e., to prevent people from “faking” eligibility to get into the survey), include ReCAPTCHA software (i.e., to prevent bots from entering the survey), and include open text items (i.e., to identify human versus bot generated responses) among other suggestions.

Eligible participants a) were residents of the U.S., b) were 18 + years old, c) had been diagnosed with a gambling disorder by a clinical psychologist or psychiatrist, d) had access to a
health care provider or treatment provider and e) since being diagnosed, had been in recovery for at least three months (see Appendix C). After providing consent to continue the study, participants completed measures assessing nostalgia for gambling, optimism and ambivalence about their recovery process (see Appendix F).

Recognizing the sensitive nature of the survey, I assessed potential discomfort created by responding to questions about gambling. At the end of the survey, participants completed an item asking if the survey was at all distressing. Participants who reported distress were then redirected to a page with information about local helplines and supportive resources. Participants could also provide feedback (“We would now like to provide you with the opportunity to deliver feedback on how this study made you feel. Responding to this item is optional”) and had an opportunity to describe a positive experience associated with their recovery (“Please briefly describe this positive experience and what you are most proud of using the space provided below”). Participants also indicated the degree to which they provided accurate and honest responses to improve data quality.

Finally, participants were presented with the option to complete a short mindfulness/grounding exercise before exiting the survey. Participants had the option to withdraw from the survey at any point of completion and withdraw instructions were clearly displayed at the bottom of each survey page. Participants were provided with compensation, independent of if they chose to withdraw at any time throughout.

**Measures**

**Addiction Related Nostalgia (Gambling).** Nostalgia for gambling behaviour was assessed across two measures. The four-item nostalgic reverie measure (adapted from Kim & Wohl, 2015) assessed the extent to which people experience nostalgia for gambling. Items were:
“I miss the way I used to feel about myself when I was gambling,” “I feel nostalgic for the thrill of winning,” “I feel nostalgic for the ability to escape into gambling,” and “I feel nostalgic for the connections I had with others while gambling.” Items were anchored at 1 (strongly disagree) and 7 (strongly agree), and scores were obtained by calculating the mean of all items ($\alpha = .89$).

The three-item frequency of nostalgic reverie (created for the research) measure assessed how often people experienced nostalgia: Items were: “How often do you feel nostalgic for your gambling experiences that occurred before you entered recovery?”, “How often do you feel nostalgic for the life of a gambler?” and “How often do you find yourself feeling nostalgic for when you used to gamble?”. Items were anchored at 1 (never) and 7 (all the time), and scores were obtained by calculating the mean of all items ($\alpha = .82$).

**Open-text nostalgia item.** In addition to the quantitative items above, I asked participants that reported feeling nostalgic about the addictive behaviour to describe what they feel nostalgic about. Specifically, the item read “In the space below, please list what you feel most nostalgic about when you think about your past gambling experiences. Please list one or two things.” A summary of responses to this item is available in Table 4.

**Optimism (about a future without gambling).** Five items (adapted from Cheung et al., 2013) assessed optimism about recovery. Items include “How I am handling my gambling problem makes me feel optimistic about my future,” “How I am handling my recovery from gambling makes me feel ready to take on new challenges,” “How I am handling my recovery from gambling gives me a feeling of hope about my future,” “How I am handling my recovery from gambling makes me feel like the sky is the limit,” and “how I am handling my recovery from gambling makes me feel optimistic.” Items were anchored at 1 (strongly
disagree) and 7 (strongly agree), and scores were obtained by calculating the mean of all items (α = .87).

**Ambivalence: Weighing the Pros and Cons of Recovery.** Two items were used to assess feelings of ambivalence by asking participants to indicate both their positive and negative feelings about recovery. These items included a positive item (*at this moment, I feel that the positive aspects of recovery outweigh the negative aspects of recovery*) and a negative item (*at this moment, I feel that the negative aspects of recovery outweigh the positive aspects of recovery*) with anchors of 1 (strongly disagree) and 7 (strongly agree). An ambivalence score was calculated by taking the minimum value of these items (e.g., if the positive item response is 6 and the negative item response is 2, the score is 2). Higher scores represent greater ambivalence (see MIN score for analyzing ambivalence in Leunissen, et al., 2020).

**Results**

**Data Cleaning**

Prior to running the analyses, I removed problematic responders. Specifically, of the total eligible participants (*n* = 497), 96 participants were excluded for incomplete data or chose to withdraw from the study. Further, another 97 participants were excluded from analyses due to inappropriate or extraneous responses. These responses were likely “bot” generated (i.e., AI configured to completed surveys for monetary reward) and were identifiable by reviewing the open-text responses in the survey. Bot generated open-text responses were off topic, non-sensical or repetitive (e.g., copy and pasted the definition of nostalgia from google for each open text item). Responses retained for analyses included on topic, sensical, experiential accounts of nostalgia and recovery (*N* = 303).

**Preliminary Analysis**
Bivariate correlations showed that nostalgic reverie and frequency of nostalgic reverie scores were positively associated with ambivalence scores, \( ps < .01 \), negatively associated with optimism, \( ps < .05 \). Optimism was negatively associated with ambivalence, \( ps < .01 \). See Table 1 for the Mean and Standard Deviation of all measured variables as well as the correlation between variables.

**Main Analyses**

I conducted two moderation analyses, using PROCESS v 4.1; Model 1 (Hayes & Rockwood, 2017) to test the hypothesized interaction of nostalgia and optimism on ambivalence. In the first model, I used nostalgic reverie (i.e., the extent to which people reported ARN) as the predictor variable and optimism as the moderator. In the second model, I used frequency of nostalgic reverie as the predictor variable and optimism as the moderator. All predictors in both models were mean-centered.

In the first moderation model, there was a main effect of nostalgic reverie on ambivalence about the recovery process, \( B = .32, t(299) = 4.7, p < .001, 95\% CI [-.19, .46] \). There was also a significant main effect of optimism, \( B = -.23, t(299) = -2.04, p < .001, 95\% CI [-.45, -.01] \). A significant interaction qualified these results, \( B = .24, t(299) = 3.05, p < .05, 95\% CI [.08, .39] \) (see Figure 1). Simple slope analyses revealed that there was no relation between nostalgia and ambivalence at 1SD below the mean of optimism, \( B = .13, p = .19, 95\% CI [-.06, .34] \), but was significant at 1SD above the mean of optimism, \( B = .51, p < .001, 95\% CI [.35, .67] \). When participants were high (relative to low) in nostalgia for gambling and optimistic about their recovery they reported the greatest amount of ambivalence about their recovery process. To further explore the nature of this interaction, I examined the effect of optimism at 1 SD above and below the mean of nostalgia. There was no significant relation between optimism
and ambivalence at 1SD above the mean of nostalgic reverie, $B = .09$, $t(299) = .60$, $p = .550$, 95% CI [-.21 , .39]. However, there was a significant relationship between optimism and ambivalence at 1SD below the mean of nostalgic reverie, $B = -.55$, $t(299) = -3.5$, $p < .05$, 95% CI [-.85, -.24].

In the second model, there was a main effect of frequency of nostalgic reverie, $B = .37$, $t(299) = 6.1$, $p < .001$, 95% CI [.25, .49]. Likewise, there was a main effect of optimism, $B = -.19$, $t(299) = -1.83$, $p < .001$, 95% CI [-.41, .01]. As predicted, the main effects were qualified by a significant interaction, $B = .27$, $t(299) = 3.91$, $p = .001$, 95% CI [.13, .40] (see Figure 2). There was no significant relation between nostalgia and ambivalence at 1SD below the mean of optimism, however, there was a significant relation between nostalgia and ambivalence at 1SD above the mean of optimism, $B = .59$, $p < .001$, 95% CI [.44, .73]. As in the first model, to further explore the nature of this interaction, I examined the effect of optimism at 1 SD above and below the mean of frequency of nostalgic reverie. There was no significant relation between optimism and ambivalence at 1SD above the mean of frequency of nostalgic reverie, $B = .19$, $t(299) = 1.2$, $p = .20$, 95% CI [-.10, .49]. However, there was a significant relationship between optimism and ambivalence at 1SD below the mean of frequency of nostalgic reverie, $B = -.60$, $t(299) = -4.11$, $p < .001$, 95% CI [-.88, -.31].

**Discussion**

The purpose of Study 1 was to test a novel obstacle to recovery: ARN (i.e., addiction related nostalgia). Further, in Study 1, I assessed the unique and possible interactive effect of ARN and optimism on ambivalence about one’s recovery process. As predicted, nostalgizing about gambling, in terms of both the extent to which a person feels nostalgic and the frequency

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1 I re-ran the moderation models controlling for the time (measured in weeks) participants reported being in recovery. The pattern of results did not change when doing so. For the sake of parsimony, I only report the results of the model without controlling for time in recovery in text. For the results controlling for time, see Appendix J.
with which nostalgizing occurs, was positively associated with ambivalence about recovery (H1). Additionally, as expected, optimism was negatively associated with ambivalence about recovery (H2). In other words, people who felt nostalgic about gambling were more unsure about recovery, while people who were optimistic about a future without recovery were less unsure about recovery. Results also provided initial support for my hypothesized moderation model. Among people living with a gambling disorder, the combination of ARN and optimism about a future without gambling was associated with greater ambivalence about one’s recovery process (H3).

Interestingly, when participants were high (relative to low) in optimism and were low (relative to high) in nostalgia, ambivalence was low. In this case, the beneficial effects of optimism draw people towards recovery. On the other hand, when participants were high (relative to low) in nostalgia and were low (relative to high) in optimism, ambivalence was high. In that case, the enticing pull of ARN may be drawing people back to gambling. Further examination of the model revealed that the beneficial effects of optimism were undermined at high (relative to low) levels of ARN (regardless of how nostalgia was measured). In other words, at high levels of ARN, optimism may be unable to counteract nostalgia’s ambivalence inducing effect.

That ARN undermined optimism (and not vise versa) may be explained by the strength of nostalgia as a motivating emotion (Sedikides & Wildschut, 2023). Specifically, nostalgia connects people to a past they believe has been lost. In so doing, it motivates people to act in ways to bring that past into the present. In the context of recovery, results from Study 1 suggest that some people long for the (perceived) benefits they reaped from gambling. Such nostalgizing was associated with ambivalence about their recovery. Of import, nostalgizing about gambling
undermined the utility of optimism for advancing the recovery process. It is possible that the ability of nostalgia to suppress the benefits of optimism is because, according to Hogarth and Field (2020) as well as Wise and Koob (2014), the expected value of (returning to) the substance is stronger than the expected benefits of remaining abstinent. This is perhaps unsurprising given people in recovery often experience negative mood states, including anxiety, depression and feelings stemming from not being able to engage in the addictive behaviour (Hogarth & Hardy, 2016; Wise & Koob, 2014). Thus, the pull to re-engage with the addictive behaviour (where they perceive they will get relief from the negative affect they are experiencing) overwhelm the push to stay on the recovery path. The net effect is ambivalence about their recovery.

The importance of results from Study 1 are threefold. Not only did the findings confirm the prevalence of experiencing ARN, a novel research variable, they demonstrated that people in recovery from a gambling disorder can and do feel both nostalgic for gambling and optimistic for a future without gambling simultaneously. Finally, the results underscored the risk of ARN, showing that ARN contributes to ambivalence, and critically, at high levels of ARN, the ambivalence dampening effects of optimism are supressed. Given gravity of the research findings, it was important that I assessed the generalizability of the effects.

**Study 2: Nostalgia and Recovery from an Alcohol Use Disorder**

The purpose of Study 2 was to replicate and extend the findings of Study 1 among individuals who were in recovery from a different addictive behaviour. To assess generalizability (i.e., this is not an effect specific to those in recovery from a gambling disorder), I repeated Study 1 with people in recovery from an alcohol use disorder (AUD). I selected to study people in recovery from AUD because problem drinking and problem gambling share similar psychosocial consequences (Grant et al., 2004; Fong, 2005; Rash et al., 2016). Further, existing
research has shown that despite their motivation to recover, people living with an AUD are constantly tempted by old (drinking) behaviours (Parker et al., 2021) and often feel ambivalent about the recovery process (Dahal et al., 2021). As in Study 1, I predicted that ARN (measured again in terms of both the extent to which a person feels nostalgic and the frequency with which nostalgizing occurs) would be positively associated with ambivalence about recovery (H1). I also predicted that optimism would be negatively associated with ambivalence about recovery (H2). Lastly, I hypothesised that nostalgia and optimism would interact such that the ambivalence reducing utility of optimism would be undermined when people report high (relative to low) nostalgia for the addictive behaviour (H3).

Methods

Participants and Procedure

Change to R squared scores ($f^2 = 0.039$) from the moderation model in Study 1 were used in an a priori power analysis to determine the sample size required for the replication of the main moderation model. The results indicated that a minimum of 244 participants were needed to detect a small to moderate effect with at least 80% power. However, an R2 change of .04 is larger than what is commonly found in observational research in psychology. Consequently, I adjusted the power calculation to account for a ($f^2 = .02$ (an effect size more typical in psychological research). This calculation indicated a required sample size of 485. To accomplish this and anticipate for invalid and excluded responses, I aimed to collect data from 631 participants (i.e., an additional 30% to the determined required sample size).

Participants ($N = 604$) were recruited using Amazon’s CloudResearch program. I used the same procedure used in Study 1 to minimize poor quality data and access to the survey by bots. For added protection, in Study 2, I added a CAPTCHA to the survey and limited the pool of potential participants to those who met Amazon’s internal worker quality criteria.
(i.e., CloudResearch-Approved Participants). CloudResearch-Approved Participants are a representative pool of participants who have been identified as providers of quality data, attention, and engagement.

Eligible participants a) were residents of the U.S., b) were 18+ years old, c) had been diagnosed with an alcohol use disorder by a clinical psychologist or psychiatrist, d) had access to a health care provider or treatment provider and e) since being diagnosed, had been in recovery for at least three months. After providing consent to continue the study, participants completed a questionnaire battery that was identical to that used in Study 1, except items referenced problem drinking (as opposed to problem gambling). Additionally, as in Study 1, participants were asked to report any distress, provide feedback to the researchers, and complete a mindfulness exercise.

Measures

The procedure and measures for Study 2 was identical to those used in Study 1 with one notable exception: mention of gambling and feelings about one's recovery from a gambling disorder was replaced with alcohol use and recovery from one's alcohol use disorder.

Results

Data Cleaning

Prior to running the analyses, I cleaned the data set to remove any problematic responders. Specifically, of the total eligible participants (N = 661), 29 participants were excluded for incomplete data or chose to withdraw from the study and 5 were excluded for failing the accuracy and honesty item (i.e., participants indicated that they were not honest in their responses). Further, 23 participants were excluded from analyses due to inappropriate or extraneous responses, thus retaining 604 responses for analyses.

Preliminary Analysis
Bivariate correlations showed that nostalgic reverie and frequency of nostalgic reverie scores were positively associated with ambivalence scores, \(ps < .01\); nostalgic reverie and frequency of nostalgic reverie scores were negatively associated with optimism \(ps < .01\) and optimism was negatively associated with ambivalence \(ps < .05\). See Table 1 for the Mean and Standard Deviation of all measured variables as well as the correlation between variables.

**Main Analyses**

I conducted two moderation analyses, using PROCESS v 4.1; Model 1 (Hayes & Rockwood, 2017), to test the hypothesised interaction of nostalgia and optimism on ambivalence. As in Study 1, in the first model I used nostalgic reverie as the predictor variable and optimism as the moderator and in the second model, I used frequency of nostalgic reverie as the predictor variable and optimism as the moderator. All predictors in both models were mean-centered.

In the first model, there was a main effect of optimism on ambivalence \((B= -1.71, t(600) = -8.45, p =< .001, 95\% CI [-2.11, -1.31])\), further, there was a main effect of nostalgia on ambivalence, \((B= .82, t(600) = 7.91, p <.001, 95\% CI [.61, 1.02])\). However, there was no significant interaction \((B= .16, t(600) = 1.35, p = .174, 95\% CI [-.07, .39])\).

In the second model, there was a main effect of optimism on ambivalence, \(B= -.17, t(600) = -9.08, p <.001, 95\% CI [-2.08, -1.34])\) and a main effect of nostalgia on ambivalence, \(B= 1.1, t(600) = 11.34, p <.001, 95\% CI [.92, 1.3])\). The full model was qualified by a significant interaction, \(B= .23, t(600) = 2.14, p <.05, 95\% CI [.02, .45])\). This interaction was significant at 1SD above and 1SD below the mean of optimism. The effect size, however, was greatest at 1SD above the mean of optimism. Again, to further explore this interaction, I also tested the model using optimism as the predictor variable and frequency of nostalgic reverie as the moderator.
There was a significant relationship between optimism and ambivalence at 1SD above the mean of frequency of nostalgic reverie, $B = -0.22$, $t(600) = -2.7$, $p < .05$, 95% CI [-.38 , -.06]). Additionally, there was a significant relationship between optimism and ambivalence at 1SD below the mean of frequency of nostalgic reverie $B = -0.50$, $t(600) = -5.6 p < .001$, 95% CI [-.68, -.33].

**Discussion**

The results of Study 2 replicated and extended the results of Study 1 by assessing ARN, optimism and ambivalence among people in recovery from an alcohol use disorder. Specifically, in Study 2, nostalgizing about drinking was positively associated with ambivalence about recovery (H1), whilst optimism about a future without the addiction was negatively associated with ambivalence about recovery (H2). Finally, people who felt both nostalgic and optimistic reported feeling ambivalent about recovery and specifically, the ambivalence reducing utility of optimism was undermined when people reported high (relative to low) nostalgia (H3).

Although the results of Studies 1 and 2 showed the power of ARN to undermine the recovery process (by elevating ambivalence), even among those who are optimistic about their recovery, these findings are limited by the correlational design employed. One option to better assess the causal direction of the observed effects would be to manipulate nostalgia. Previous research on the relation between nostalgia and behaviour change has shown that nostalgic reverie can be heightened by way of eliciting self-discontinuity (i.e., disconnection with the past; Kim & Wohl, 2015). However, given the ambivalence inducing effect of nostalgia observed in Studies 1 and 2, and potential determinate effects of undermining optimism, ethical considerations are

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2 I re-ran the moderation models controlling for the time (measured in weeks) participants reported being in recovery. The pattern of results did not change when doing so. For the sake of parsimony, I only report the results of the model without controlling for time in recovery in text. For the results controlling for time, see Appendix L.
required. Consequently, instead of manipulating the variables of interest (ARN, optimism, and ambivalence), in Study 3, I assessed possible changes over time.

**Study 3: Measuring Nostalgia and Ambivalence Over Time**

The purpose of Study 3 was to replicate and extend the research conducted in Studies 1 and 2 by prospectively assessing ARN, optimism, and their combined effect on ambivalence about their recovery process. As in Study 1 and 2, I hypothesized that ARN (measured in terms of both the extent to which a person feels nostalgic and the frequency with which nostalgizing occurs) would be positively associated with ambivalence about recovery (H1) and optimism would be negatively associated with ambivalence about recovery (H2). Lastly, I hypothesised that nostalgia and optimism would interact such that the ambivalence reducing utility of optimism would be undermined when people report high (relative to low) nostalgia for the addictive behaviour (H3).

Importantly, in Study 3, I also tested the potential temporal consequences of ARN, optimism and ambivalence, by measuring relapse at T2. Despite decades of trying to understand and prevent relapse among people in recovery from addictions (including AUD and gambling disorders), relapse is common (Marlatt & George, 1984; Marlatt, 1996; Sliedrecht et al., 2019). Identifying novel antecedents of relapse, such as ARN, contributes to the ongoing relapse prevention research- ultimately protecting people in recovery. In Study 3, I expected there to be a time-lag association between ARN and reports of relapse, where nostalgia at T1 was positively associated with relapse at T2 (H4). In other words, people who experience more ARN should be more likely to report a relapse over time.

**Methods**

**Participants and Procedure**
As with Studies 1 and 2, participants were recruited using Amazon’s CloudResearch program and procedures were in place to minimize invalid quality data entries (i.e., Cloud-Research Approved Participants and CAPTCHA). Participants who had completed either Study 1 or 2 were be excluded from the participant pool. Eligible participants were a) residents of the U.S., b) 18 + years old, c) had been diagnosed with an alcohol use disorder by a clinical psychologist or psychiatrist, d) had access to a health care provider or treatment provider and e) since being diagnosed, had been in recovery for at least three months. Participants completed surveys at two time points, with one-month separating data collection at time one and data collection at time two. Participants’ responses were matched across time points using a unique, anonymized identifier.

Measures

The procedure and measures for Study 3 were identical to those used in Study 1 and 2 but included a new measure to better capture information about relapse.

**Problem behaviour return/ Relapse Scale.** At time two only, a two-item question created for the study measure assessed if participants a) had considered returning to drinking since completing the time one survey, and b) had returned to drinking since completing the time one survey. For both items, responses include: “No never,” “Yes, once,” “Yes, a few times,” “Yes, more than a few times,” or “Yes, completely.”

Results

**Data Cleaning and Attrition**

Using the values from the largest effect size observed in Study 2, I used G*Power to calculate an a priori power analysis to determine the sample size required for the replication of the main moderation model in Study 3. The results indicated that a minimum of 180 participants are needed to detect a small to moderate effect with at least 80% power. To accomplish this and
account for invalid responses and attrition from T1 to T2, I aimed to collect data from 235 participants (i.e., an additional 30% to the determined required sample size).

After T1 data completion had ended, I cleaned the data set ($n = 350$) to remove problematic responders. Responses that were identified as incomplete ($n = 12$), inaccurate ($n = 1$) or bot generated ($n = 58$) were not eligible for the T2 study. In total, 279 participants who passed the data cleaning procedures and provided consent to be recontacted were sent the T2 follow-up survey. Of these, 171 participants completed the T2 survey, and those responses were included in the analyses.

**Preliminary Analysis**

Bivariate correlations showed that nostalgic reverie and frequency of nostalgic reverie scores at T2 were positively associated with ambivalence scores at T2, $ps < .01$; optimism scores at T1 and T2 were negatively associated with ambivalence at T1 and T2, $ps < .01, .05$; ambivalence at T1 was negatively associated with ambivalence at T2, $ps < .01$; ambivalence at T1 was negatively associated with relapse at T2, $ps < .01$; ambivalence at T2 was positively associated with relapse at T2, $ps < .01$; nostalgic reverie and frequency of nostalgic reverie scores at T1 and T2 were positively associated with relapse at T2, $ps < .01$ See Table 3 for the Mean and Standard Deviation of all measured variables as well as the correlation between variables.

**Main Analyses**

I conducted two moderation analyses, using PROCESS v 4.1; Model 1 (Hayes & Rockwood, 2017). In the first model, I assessed whether nostalgic reverie at T1 and optimism at T1 interacted to explain ambivalence at T2. In the second model, I assessed frequency of nostalgic reverie at T1 as the IV instead.
In the first model, there was a significant main effect of nostalgic reverie at T1 on ambivalence at T2 ($B = .19$, $t(167) = 2.29$, $p < .05$, 95% CI [.027 , .356]). However, there was no main effect of optimism at T1 on ambivalence at T2, ($B = -.19$, $t(167) = -1.41$, $p = .16$, 95% CI [-.44, .07]), nor was there a significant interaction, $B = .13$, $t(167) = 1.41$, $p = .16$, 95% CI [-.533, .317]. When testing the model using optimism at T1 as the predictor variable and nostalgic reverie at T1 as the moderator, there was also no a qualifying interaction effect, $B = .13$, $t(167) = 1.4$, $p = .16$, 95% CI [-.05 , .32]).

In the second model, there was a significant main effect of frequency of nostalgic reverie at T1 on ambivalence at T2 ($B = .39$, $t(167) = 5.49$, $p < .001$, 95% CI [.25 , .54]). However, there was no main effect of optimism at T1 on ambivalence at T2, ($B = -.07$, $t(167) = -.62$, $p = .54$, 95% CI [-.31, .16]) nor was there a significant interaction, $B = .07$, $t(167) = .83$, $p = .41$, 95% CI [-.09, .23]. When testing the model using optimism at T1 as the predictor variable and frequency of nostalgic reverie at T1 as the moderator, there was also no qualifying interaction, $B = .07$, $t(167) = .83$, $p = .41$, 95% CI [-.09, .23].

**Relapse as the Outcome Variable.** To test if nostalgia and optimism would have a similar effect on relapse, I entered relapse into the model in the place of ambivalence. In a model with nostalgic reverie at T1 as the predictor variable, there was a significant main effect of nostalgic reverie on relapse at T2, $B = .14$, $t(167) = 1.9$, $p = < .001$, 95% CI [.00, .27], however there was no significant main effect of optimism at T1 on relapse at T2, $B = -.12$, $t(167) = -1.15$, $p = .252$, 95% CI [-.34, .09] nor was there a significant interaction, $B = .03$, $t(167) = .37$, $p = .713$, 95% CI [-.12, .18]. In a second model with frequency of nostalgic reverie at T1 as the predictor

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3 I re-ran the moderation models controlling for the time (measured in weeks) participants reported being in recovery. The pattern of results did not change when doing so. For the sake of parsimony, I only report the results of the model without controlling for time in recovery in text. For the results controlling for time, see Appendix M.
variable, there was a significant main effect of nostalgic reverie on relapse at T2, $B=.29$, $t(167)=.06$, $p = < .001$, 95% CI [.17, .41], however there was no significant main effect of optimism at T1 on relapse at T2, $B = -.04$, $t(167)=-.36$, $p = .722$, 95% CI [-.23, .16], nor was there a significant interaction, $B = -.07$, $t(167)=-.97$, $p = .331$, 95% CI [-.20, .06].

**Exploratory Analyses**

To better understand the associations among variables, at each stage of data collection, I conducted exploratory analyses. Specifically, because optimism at T1 did not predict ambivalence at Time 2, and I did not observe a significant interaction between nostalgia (either measure) at T1 and optimism at Time 1 on ambivalence at Time 2, I tested the hypothesized moderation models with the data from Time 1 and Time 2, separately.

**Time 1.** In the first model, there was a significant main effect of optimism, $B = .69$, $t(167) = 3.61$, $p = < .05$, 95% CI [.31 , 1.07] on ambivalence. However, there was no main effect of nostalgic reverie on ambivalence, ($B = -.02$, $t(167) = -.17$, $p = .86$, 95% CI [-.26 , .21]), nor was there a significant interaction, $B = .01$, $t(167) = .10$, $p = .92$, 95% CI [-.26 , .29].

In the second model, there was a significant main effect of optimism, $B = .66$, $t(167) = 3.44$, $p < .05$, 95% CI [-.33 , .11] on ambivalence. However, there was no main effect of nostalgic reverie on ambivalence, $B = -.11$, $t(167) = -.97$, $p = .33$, 95% CI [-.33 , .11], nor was there a significant interaction, $B = -.03$, $t(167) = -.22$, $p = .83$, 95% CI [-.27 , .22].

**Time 2.** In the first model, there was a significant main effect of optimism, $B = -.41$, $t(167) = -3.21$, $p = < .05$, 95% CI [-.66 , -.16] on ambivalence. There was also a main effect of nostalgic reverie on ambivalence ($B = .24$, $t(167) = 3.06$, $p < .05$, 95% CI [-.26 , .21]), however there was no significant interaction effect, $B = .02$, $t(167) = .30$, $p = .76$, 95% CI [.13 , .18]. In the second model, there was a significant main effect of optimism, $B = -.34$, $t(167) = -3.1$, $p <
.05, 95% CI [-.56, -.12] on ambivalence. There was also a main effect of frequency of nostalgic reverie on ambivalence, $B = .44$, $t(167) = 6.5$, $p < .001$, 95% CI [.31, .57]. However, there was no significant interaction effect, $B = .01$, $t(167) = .18$, $p = .86$, 95% CI [-.13, .15].

**Sensitivity Power Analysis.** Although the sample size was pre-determined using an *a priori* power analysis (suggested $N = 244$), given the null result of each model, I wanted to test the acquired sample size in Study 3. The results of the sensitivity analysis, ran using G*Power revealed that the acquired sample size ($n = 171$) was sufficient to detect a small to medium effect size (i.e., $f^2 = 0.02$–0.15; Cohen, 1992).

**Discussion**

The results of Study 3 replicated two of the three original hypotheses. As with Studies 1 and 2, nostalgia was positively associated with ambivalence about recovery (H1) and optimism was negatively associated with ambivalence about recovery (H2). Unlike Studies 1 and 2 however, the results of Study 3 did not find support for an interaction between nostalgia and optimism on ambivalence over time. That is, nostalgia and optimism at Time 1 did not interact to predict ambivalence at Time 2. Not only was there no temporal interaction (H3), but there were also no significant interaction effects when examining the T1 variables or the T2 variables as independent models. Given that Study 3 was sufficiently powered to detect a small to medium effect size, this raises questions as to why the effects of Study 1 and 2 were not replicated. There may be something unique about this study methodology or sample that explains the lack of interaction of ARN and optimism on ambivalence. For example, this could be a demonstration that the time-lapse model was not an appropriate means of exploring this interaction or that the period between T1 and T2 (i.e., one month) was too brief to capture the true effect. That said, such explanations do not account for the lack of effect at T1 and T2 exclusively. Therefore, an
explanation may lay in sample characteristics that separate this group from the groups in Studies 1 and 2. Interestingly, the mean ambivalence score was higher in Study 3 at T1 ($M_{ambivalence} = 4.39$) than either prior study and decreased by about half at T2 ($M_{ambivalence} = 2.16$). This could suggest that degree to which nostalgia and optimism interact was not captured, because at T1, ambivalence was too high and optimism was overpowered by nostalgia, and at T2, ambivalence had resolved so nostalgia and optimism were no longer co-occurring. Whatever the explanation, the null result of H3 requires some empirical triage.

In an important addition to the finding, however, the results of Study 3 did support the supplemental hypothesis (H4), showing that ARN at T1 was indeed positively associated with relapse at T2. These results indicate that ARN is not only a novel contributor to ambivalence about the recovery process, but also a novel predictor of relapse.

**General Discussion**

Nostalgia idealizes the past (Sedikides et al., 2015), equipping the nostalgic with rose colored glasses. For instance, Kim and Wohl (2015) showed that nostalgic reverie for the pre-addicted self places life lived before the addiction took hold in such a positive light that it motivates people to engage in behaviour change. That is, nostalgia makes people considering recovery want to return to their life before addiction. In this context, nostalgia is functional in that it helps facilitate positive behaviour change. In the current research, I tested the novel idea that people in recovery may also nostalgize, but in such a way that may be harmful. Specially, across three studies, I assessed whether people in recovery from an addictive behaviour (i.e., gambling or alcohol use) nostalgize for the (perceived) benefits of that addictive behaviour. Results suggested that not only do people in recovery experience nostalgic reverie for the perceived benefits of the addictive behaviour (see Table 4 for examples of ARN), ARN was
positively associated with ambivalence about the recovery process. Moreover, for some, this longing was so strong that it overwhelmed the ambivalence suppresing effects of an optimistic outlook—an outlook that is central to successful recovery (Mawdsley, et al., 2022; Parker et al., 2021).

In Study 1, I assessed the roles of ARN, optimism and ambivalence among people in recovery from a gambling disorder. The results of Study 1 showed that ARN was positively associated with ambivalence and negatively associated with optimism. The direction of these relationships make sense. First, longing for the addictive behaviour (i.e., ARN) should make people feel unsure about giving it up (i.e., ambivalent), as they recall “the good times” associated with the past behaviour. Second, the opposing association between nostalgia and optimism underscores the conflicting roles of these two variables. Each variable is pulling the person in recovery in an opposite direction. On one side is nostalgia, pulling towards the return to the addiction. On the opposing side is optimism, pulling towards progress on the path of recovery. As the current research demonstrates, the conflict in the middle of this cognitive tug of war is ambivalence about recovery.

The purpose of Study 2 was to replicate and extend Study 1 with a different addictive behaviour: drinking. The results mirrored those of Study 1 and showed that my original hypotheses were relevant beyond those recovering from a gambling disorder. These results suggest that nostalgia for an addictive/problem behaviour should continue to be tested across other clinical communities.

In the third and final study, I explored the associations between ARN, optimism and ambivalence over time to assess the implications of these variables in relation to one another prospectively (i.e., does ARN lead to greater ambivalence temporally), with the expectation of a
significant time-lapse moderation model where ARN and optimism at T1 explain ambivalence at T2. Interestingly, the model was insignificant and did not show the pattern of effects that had been seen in Study 1 and Study 2. One explanation for this could be that over time, ambivalence tends to resolve instead of amplify. In other words, as time passes, the tug of war between nostalgia and optimism is settled and there is no longer “unsureness” about recovery as one has either followed nostalgia back to the addictive behaviour of followed optimism on the path of recovery.

To get a better sense of these possible outcomes- relapse or recovery, I chose to include a measure of relapse in the Study 3, T2 follow-up survey. One month following the initial survey, over 50% of people had relapsed (for the purposes of the current research, relapse was defined as having had returned to the addictive behaviour (i.e., drinking) at least once in the past month). Critically important, Study 3 showed that in addition to being positively associated with ambivalence about recovery, nostalgia was positively associated with relapse.

**Implications, Applications and Future Research**

A growing body of research has shown that nostalgia can be leveraged to motivate behaviour change (Sedikides & Wildschut, 2023). However, existing research has focused on the application of nostalgia for the past self (pre-addiction) to kickstart recovery. In the current research, I focused on the novel idea that nostalgia for the addictive behaviour (i.e., ARN) may undermine the recovery progress by romanticising the “benefits” of engaging in the addictive behaviour. ARN is a longing or reminiscing of an addictive behaviour (i.e., gambling or drinking), more precisely however, ARN appears to be a longing for the social, emotional and physical experiences that accompanied the addiction (see Table 4 for examples of ARN from Studies 1-3). To my knowledge, although discussions of nostalgia for an addictive behaviour
have surfaced in two qualitative studies (see smoking in Bottorff et al., 2000; problem drinking in Lee et al., 2006), my research is the first to empirically measure, test and define ARN. The lack of existing ARN research reveals a critical gap in the recovery and relapse prevention literature.

Unlike the literature surrounding ARN, the optimism literature is abundant, and my research demonstrates that akin previous findings (Provost, 2022), optimism is a beneficial resource in recovery. Across three studies, I assessed optimism about recovery as an opposing force to ARN and found that optimism moderates the ambivalence increasing effects of ARN. That is, optimism on its own can pull people towards recovery. There is a caveat to this association, however. When ARN is strong (i.e., +1SD above the mean), the ambivalence buffering benefits of optimism are diluted. In other words, there comes a point where optimism cannot counteract the pull of ARN.

This insight should be useful for clinicians and those engaged in treatment planning. Specifically, the findings of my research emphasize that increasing optimism, a suggested tactic in recovery promotion and relapse prevention (Provost et al., 2022; Senft-Everson, 2022; Snow & Delaney, 2006), is not enough. There also needs to be a plan in place to decrease the opposing emotion drawing people back to the addictive behaviour, in this case- ARN. For example, implementation intention interventions (Gollwitzer, 1999) may be a useful tool for people experiencing ARN. Clinicians and clients could identify personalised self-control strategies (see Duckworth et al., 2014) and incorporate those strategies into implementation intentions using “if-then statements,” (e.g., “if I start to feel nostalgic about gambling, then I will remind myself of the bad things about gambling,” or “if I start to feel nostalgic about drinking because I am in a room of people who are drinking, I will leave that room for 20 minutes”). Interestingly, this idea stems from the responses of two participants from Study 1. When asked what about gambling
they felt nostalgic for, one participant said “I miss the thrill of it all, especially the times when I was quite lucky. The luck ended and it started ruining my life. That's what I have to remind myself of,” and the other said “the highs of winning big are something that I miss from time to time. Then I remember all the money I lost and all the times I lost big and that nostalgia quickly dissipates.” Perhaps unknowingly, these participants appear to be coping with ARN by reminding themselves of the harms of gambling. Indeed, implementation intention strategies may be an effective means of “shielding” oneself (Achtziger et al., 2008) from ARN. Employing such strategies could be especially helpful when people in recovery find themselves in vulnerable situations. For example, if people are in an environment that cultivates ARN (e.g., near a casino, at a sports bar), the nostalgized past could become irresistible. Critically important, and warranting further research, establishing strategies to cope with ARN strategies could protect someone from relapsing.

The harms of ARN emerge not only within the current research but have also been raised by people in recovery themselves. For example, people with lived experience of addiction have warned their peers to avoid nostalgizing about drugs and alcohol (see Coping with Nostalgia for Successful Recovery from Addiction, 2022). Further, in the field of eating disorders, researchers and people and recovery have described the difficulty of romanticising or missing the eating disorder (see National Eating Disorder Information Centre (@the_nedic)). Such conversations, initiated by those with lived experience, underscore the importance of continuing the current research. Future research should explore nostalgia among other groups of people who are trying to leave something “good” behind. Related, this line of research could extend to nostalgia for harm causing behaviours more broadly. For example, researchers could talk to people who have left an abusive relationship but are ambivalent about staying away from their old partner. Similar
to those longing for the “good” aspects of addiction, people trying to permanently leave an abusive relationship may long for the “good” parts of being in that relationship.

Knowing that this dangerous side of nostalgia may exist among other populations, however, is not enough. Questions that remain include but are not limited to: How do people weigh the good times of a problem behaviour against the bad times, and how and for whom are the longed-for experiences strong enough to pull someone back to the problem behaviour? These lingering questions should be approached with both qualitative and quantitative measures, to continue building the literature around the content of individuals’ nostalgia and how it influences their behaviour.

Promoting future research, the three data sets I collected for my Master’s thesis retain an abundance of associations to be explored in secondary analysis. For example, to dig deeper into the content of nostalgia and the outcomes of nostalgizing, the extant data could undergo a full qualitative analysis, coding themes within the nostalgia open-text items and observing if themes are associated with stage of recovery or relapse outcomes.

**Limitations**

All three studies in my research used online samples. Despite my confidence in the data due to rigorous screening and the inclusion of unique open-ended qualitative items that required detailed experiential responses to pass as eligible, there are valid concerns surrounding the use of online panel data (see Hauser et al., 2019). To abide these concerns, this research needs to be replicated in an off-line clinical sample.

**Conclusion**

Until now, nostalgia has been categorised as a resource for people living with an addiction (Salmon et al., 2018; Sedikides & Wildschut, 2023). Specifically, nostalgia has been
found to act as catalyst for behaviour change among people considering a quit attempt (Wohl et al., 2018), by reminding them of their lives before addiction. In my thesis, I explored a novel branch of nostalgia research, nostalgia for the addictive behaviour itself. Across three studies, I found that addiction related nostalgia (ARN) was positively associated with ambivalence about the recovery process and even relapse. In addition, I tested optimism for a future without addiction as a counter force to ARN and found that optimism moderates the association between ARN and ambivalence. Importantly, I found that at high levels of ARN, optimism cannot supress ARN’s ambivalence heightening effects. In other words, nostalgia for the past with the addiction overpowered optimism for a future without the addiction. As such, for people in recovery who nostalgize the addictive behaviour, it is not enough to increase optimism, they must also decrease ARN to resolve ambivalence in favour of recovery and prevent relapse.
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SessionId=WW6ZT9ggAVwUGIlfzTHXIYCNtOk7My8%2FnxkOzdTRe%3D
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Table 1
Correlation Matrix, Study 1, Associations Between Nostalgia, Optimism, Ambivalence

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nostalgic reverie</td>
<td>4.38</td>
<td>1.36</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Frequency of nostalgic reverie</td>
<td>4.44</td>
<td>.98</td>
<td>.596**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Optimism</td>
<td>3.90</td>
<td>.80</td>
<td>-.115*</td>
<td>-.009</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. Ambivalence (pros versus cons)</td>
<td>2.55</td>
<td>1.68</td>
<td>.319**</td>
<td>.356**</td>
<td>-.144*</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).
Table 2  
Correlation Matrix, Study 2, Associations Between Nostalgia, Optimism, Ambivalence

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nostalgic reverie</td>
<td>4.09</td>
<td>1.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Frequency of nostalgic reverie</td>
<td>3.70</td>
<td>1.53</td>
<td>.702**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Optimism</td>
<td>3.96</td>
<td>.80</td>
<td>-.319**</td>
<td>-.251**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Ambivalence (pros versus cons)</td>
<td>2.11</td>
<td>1.39</td>
<td>.412**</td>
<td>.471**</td>
<td>-.304**</td>
<td></td>
</tr>
</tbody>
</table>

Note: *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).
Table 3
Correlation Matrix, Study 3, Associations Between Nostalgia, Optimism, Ambivalence at T1 and T2

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nostalgic reverie (T1)</td>
<td>4.54</td>
<td>1.55</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Frequency of nostalgic reverie (T1)</td>
<td>4.08</td>
<td>1.56</td>
<td>.713*</td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Optimism (T1)</td>
<td>3.95</td>
<td>0.88</td>
<td>-.284**</td>
<td>-.284**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Ambivalence (pros versus cons) (T1)</td>
<td>4.39</td>
<td>2.15</td>
<td>-.093</td>
<td>-.162*</td>
<td>.291**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Nostalgic reverie (T2)</td>
<td>4.33</td>
<td>1.53</td>
<td>.648**</td>
<td>.487**</td>
<td>-.195*</td>
<td>-.101*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Frequency of nostalgic reverie (T2)</td>
<td>3.78</td>
<td>1.50</td>
<td>.495**</td>
<td>.631**</td>
<td>-.170*</td>
<td>-.198**</td>
<td>.658**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Optimism (T2)</td>
<td>3.92</td>
<td>0.90</td>
<td>-.215**</td>
<td>-.225**</td>
<td>.628**</td>
<td>.230**</td>
<td>-.353**</td>
<td>-.280**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Ambivalence (pros versus cons) (T2)</td>
<td>2.16</td>
<td>1.47</td>
<td>.286**</td>
<td>.455**</td>
<td>-.161*</td>
<td>-.209**</td>
<td>.344*</td>
<td>.511**</td>
<td>-.335**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>9. Relapse (returned to drinking) (T2)</td>
<td>2.00</td>
<td>1.20</td>
<td>.220**</td>
<td>.368**</td>
<td>-.141</td>
<td>-.210**</td>
<td>.347**</td>
<td>.442**</td>
<td>-.272**</td>
<td>.488**</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: *Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed).
Table 4
Themes of Nostalgia- Summary Coded from Qualitative Open Text Item

<table>
<thead>
<tr>
<th>Theme</th>
<th>Example response from Study 1</th>
<th>Example response from Study 2</th>
<th>Example response from Study 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social (participation, sense of belonging)</td>
<td>“... the feeling that everyone was cheering for you and you were the center of attention is very enticing. That sense of almost family around the craps table is one of the things I think about when I get nostalgic.”</td>
<td>“I feel nostalgic about the social experiences that I had. I was more open and of course more talkative when drinking. Made a lot of friends but I see now it was all temporary.”</td>
<td>“The freedom I felt to be myself, the social connections with others.”</td>
</tr>
<tr>
<td>Emotional (attaining a buzz, escapism, stress reduction)</td>
<td>“I feel nostalgic about the exuberant high of winning. It feels so good to get a big payout, especially after you've been down for a while”</td>
<td>“I miss mostly the way it made me forget about my problems. I miss being able to not be stressed out by my failures in life. When I am drinking, I can just forget about things and be happy and in the moment.”</td>
<td>“The pure escape that it was - how relaxed it made me. also that it made me forget my problems.”</td>
</tr>
<tr>
<td>Sensory/tactile (taste, smells, sounds)</td>
<td>“I feel nostalgic about] “the way I would get a thrill walking into the casino, smelling the stale beer and smoke, knowing that I was about to touch the cards, and put my chips on the table...”</td>
<td>“[I feel nostalgic about] 1. The ambience of the bars I would frequent 2. The taste of good whiskey.”</td>
<td>“Spending time with friends in a bar or lounge atmosphere  Experiencing the taste of a favorite beer or cocktail for the first time.”</td>
</tr>
<tr>
<td>Conflicting desires or attitudes (ambivalence)</td>
<td>“I miss the thrill of it all, especially the times when I was quite lucky. The luck ended and it started ruining my life. That's what I have to remind myself of.”</td>
<td>“Sometimes [I feel nostalgic about] about the way it used to make me feel. I try not to think about it, that's a part of me I don’t want to be part of anymore.”</td>
<td>“I just miss that ability to sit on the couch and relax with a drink or two but I know what that will lead to.”</td>
</tr>
<tr>
<td>The participant does not feel nostalgic</td>
<td>“I do not really feel nostalgic yet. I try not to think about it.”</td>
<td>“I do not feel nostalgic for any drinking experiences, I was never a &quot;drink to have fun&quot; kind of person. All the drinking experiences I remember are bad ones, ones that I'm ashamed of and regret.”</td>
<td>“I do not feel nostalgic. I feel ashamed and now proud of myself. I am more healthy and saving money too without putting myself and my family into danger.”</td>
</tr>
</tbody>
</table>
Figure 1. Plotted interaction between nostalgic reverie and ambivalence at +1 SD above and – 1SD below the mean of the moderator in Study 1.
Figure 2. Plotted interaction between frequency of nostalgic reverie and ambivalence at +1 SD above and –1SD below the mean of the moderator in Study 1.
Figure 3. Plotted interaction between nostalgic reverie and ambivalence at +1 SD above and – 1SD below the mean of the moderator in Study 2.
Figure 4. Plotted interaction between frequency of nostalgic reverie and ambivalence at +1 SD above and −1SD below the mean of the moderator in Study 2.
Figure 5. Plotted interaction between nostalgic reverie (T1) and ambivalence (T2) at +1 SD above and –1SD below the mean of the moderator (T1) in Study 3.
Figure 6. Plotted interaction between frequency of nostalgic reverie (T1) and ambivalence (T2) at +1 SD above and –1SD below the mean of the moderator (T1) in Study 3.
Appendix A:

Recruitment Notice

Exploring Paths to Recovery from an Alcohol Use Disorder

In this study, we will explore how people think and feel about their path to recovery. Specifically, we will ask you a variety of questions that deal with how your thoughts and behaviors relate to the ups and downs of the recovery process.

You will receive a compensation of US$0.90 for your participation in this 10-12 minute survey.

Your participation as well as your responses will be strictly confidential. Only researchers associated with the project will know you participated in the study and no one will know how you responded to the questions asked. Know that information you provide that allows us to re-contact you will be kept separate from your responses. At the end of the study, we will destroy all contact information.

We can anticipate no physical discomfort to you as a result of your participation in this study. You may, however, experience anxiety or distress when thinking about past or current drinking behaviours. In the event you feel anxiety or distress, you may withdraw at any time during the study without penalty. Information will then be provided linking you to appropriate health services in your local area.

Eligibility: All participants must be residents of the United States.

Please note that you will be assessed on your eligibility to participate immediately following this consent form. Only eligible participants will be permitted to participate in the survey and receive compensation.

This study takes about 10-12 minutes, and upon completion you will receive $0.90 for your participation.

This study has received clearance by the Carleton University Research Ethics Board-B (CUREB-B Clearance #113260).
This research is funded by a Carleton University Research Achievement Award to Dr. Michael Wohl
Appendix B:

Informed Consent

The purpose of an informed consent is to ensure that you understand the purpose of the study and the nature of your involvement. The informed consent must provide sufficient information such that you have the opportunity to determine whether you wish to participate in the study.

This study has received clearance by the Carleton University Research Ethics Board-B (CUREB-B Clearance #113260).

This research is funded by a Carleton University Research Achievement Award to Dr. Michael Wohl

Eligibility: All participants must be residents of the United States.

Please note that you will be assessed on your eligibility to participate immediately following this consent form. Only eligible participants will be permitted to participate in the survey and receive compensation.

Present study: Exploring Paths to Recovery from Alcohol Use Disorder

Research personnel: The following people are involved in this study and may be contacted at any time if you have questions or concerns: Mackenzie Dowson (Principal Investigator, Graduate Researcher, mackenziedowson@carleton.ca), Dr. Michael Wohl (Research Supervisor, michael.wohl@carleton.ca, 613-520-2600 ext. 2908), Dr. Nassim Tabri (Research Supervisor, NassimTabri@cunet.carleton.ca), Melissa Salmon (PhD Researcher melissasalmon@carleton.ca), Blake Miller (Research Assistant, blakemiller@cunet.carleton.ca).

Concerns: Should you have any ethical concerns about this research, please contact the REB Chair, Carleton University Research Ethics Board-B (ethics@carleton.ca). For all other questions about the study, please contact the researchers.

Purpose: The purpose of this study is to examine how people think and feel about their recovery process.

Task requirements: You will be asked to fill out several questionnaires about your path to recovery and related experiences.

Benefits/compensation: We are offering eligible participants who complete the study US$0.90. You will still receive compensation for your participation should you choose to withdraw.

Duration and locale: The survey will be administered online and should take approximately 10 minutes to complete. Be assured that your name will not be associated in any way with the research finding.
THE OPPOSING FORCES OF NOSTALGIA AND OPTIMISM

Potential risk/discomfort: We can anticipate no physical discomfort to you as a result of your participation in this study. You may, however, experience some stress when thinking about past behaviors. If you do experience any distress or discomfort, you may wish to contact one of the helplines nearest to your location. A list of helplines can be found at http. A copy of this information will be provided to you in the debriefing sheet following the questionnaires.

Right to Withdraw: Your participation in this study is entirely voluntary. At any point during the study, you have the right not to complete certain questions or to withdraw with no penalty whatsoever. To withdraw at any point during the study, simply click through the survey without responding to any further items.

You will still receive compensation for your participation should you choose to withdraw. Any data you provide before choosing to withdraw during the study will be manually destroyed before data analysis. If you choose to withdraw, it is essential that you read the debriefing form at the end of the survey. This form will provide information on who to contact should you feel distress from the nature of the survey.

Anonymity/Confidentiality: The data collected in this experiment are confidential. MTurk worker IDs will only be collected for the purposes of distributing compensation and will not be associated with survey responses. Furthermore, worker IDs will not be shared with anyone outside of the research team and will be removed from the data set. Although you have been recruited to participate in this study through MTurk, all of your responses and data will be recorded on Qualtrics (and none of your responses will be stored on MTurk). All data on the Qualtrics server is encrypted and protected using multiple layers of security (e.g., encrypted websites and password protected storage). For more information about the security of data on Qualtrics, please see the Qualtrics security and privacy policy, which can be found at the following link: http://www.qualtrics.com/security-statement.

During the study, data will be collected and stored on Qualtrics servers hosted in Canada. Data from Qualtrics servers may only be disclosed via a court order or data breach. In view of this, we cannot absolutely guarantee the full confidentiality and anonymity of your data. After the survey is complete, anonymous survey data will remain accessible indefinitely to the research team and be secured on encrypted computers in Drs. Wohl and Tabri’s laboratory. With your consent to participate in this study, you acknowledge this.

Data Storing and Sharing: The anonymized data will be stored on the computers of the researchers and research assistants involved with this project. As there will be no personal information associated with the data, this dataset will be stored electronically and kept indefinitely. Additionally, we will upload this anonymized dataset to an online data repository called Open Science Framework (http://osf.io/) for research and teaching purposes.
To learn about the ups and downs of recovery, researchers sometimes have to ask questions about past alcohol use and current feelings about recovery and relapse. We understand that for some people, these items may be challenging to answer.

We do not anticipate any distress as a result of taking this survey. This is because we have made every effort to create a survey that is both informative to the researcher and sensitive to the participant. However, if at any time during the survey you feel uncomfortable, please withdraw by following the instructions at the bottom of the page. You will still be compensated for your time.

Your wellbeing is very important to us.

Agree/Disagree Do you agree to participate in the study?
- Yes (1)
- No (2)
Appendix C: Eligibility Items

1. Are you a resident of the United States?
   - Yes (continue)
   - No (not eligible)

2. Are you 18 years of age or older?
   - Yes (continue)
   - No (not eligible)

3. Has a clinical psychologist or psychiatrist ever diagnosed you with an alcohol use disorder?
   - Yes (continue)
   - No (not eligible)

4. Do you have access to a health care or treatment provider to support you during recovery? (i.e., do you have the means to seek assistance if you feel it necessary?)
   - Yes
   - No

5. Since being diagnosed, have you been in recovery for at least 3 months?

*Recovery looks different for everyone. For this item we define “recovery” as a commitment to abstaining from problem drinking to improve wellbeing.

   - Yes
   - No
Appendix D:

Ineligibility Debriefing

Thank you for your interest in this study, however at this time you are not eligible to participate.

If you have any questions or concerns about this, you can contact Mackenzie Dowson at mackenziedowson@email.carleton.ca, Dr. Michael Wohl at michael.wohl@carleton.ca, Dr. Nassim Tabri at NassimTabri@cunet.carleton.ca.
Appendix E:

Demographics and Recovery Items

1. What is your age?
   Drop down menu (18-100)

2. What is your gender?
   - Man
   - Woman
   - Gender-fluid
   - Nonbinary
   - Trans man
   - Trans woman
   - Two-Spirit

3. What stage of recovery do you feel you are in?
   - 1 - Early (i.e., new to recovery) (1)
   - 2 (2)
   - 3 (3)
   - 4 - Middle (4)
   - 5 (5)
   - 6 (6)
   - 7 - Late (i.e., I have been in recovery for some time) (7)

4. Have you ever relapsed?
   - Yes (1)
   - No (2)

   Display This Question:
   If 4. Have you ever relapsed? = Yes

   How many times have you relapsed?
   ▼ 1 (1) ... Prefer not to answer (8)

5. How long have you been in recovery? (Please respond in number of months)
   Drop down menu (1 -24+ months)
Appendix F:

Nostalgia, Optimism, Ambivalence and Relapse Questionnaire

Adapted Nostalgia Inventory Scales (see Kim & Wohl, 2015)

Nostalgia is a sentimental longing for the past. People can feel nostalgic, or reminisce, about various objects including past-selves, places, experiences, and other people.

Using the following scale, please indicate if you disagree or agree with the following statements. Please mark the answer of your choice to each question according to the following scale.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat disagree (3)</th>
<th>Neither agree nor disagree (4)</th>
<th>Somewhat agree (5)</th>
<th>Agree (6)</th>
<th>Strongly agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I miss the way I used to feel about myself when I was drinking.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>2. I feel nostalgic for the &quot;buzz&quot; I experienced when I was drinking.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>3. I feel nostalgic for the connections I had with others while drinking.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>4. I feel nostalgic for the ability to escape into drinking.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>5. Do you feel nostalgic about something that is not on this list? (insert text option)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>
The following items will ask you about the frequency with which you experience the nostalgia mentioned in the previous items. Please mark the answer of your choice to each question according to the following scale.

<table>
<thead>
<tr>
<th></th>
<th>Never 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>All the time 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. How often do you feel nostalgic for your drinking experiences that occurred before you entered recovery?</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>7. Generally speaking, how often do you bring to mind nostalgic experiences related to drinking? (5)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>8. How often do you feel nostalgic for the life of someone who drinks? (6)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>
**IF the participant has NOT responded “Never” to the nostalgia frequency items (page 11) AND, has NOT responded “Strongly disagree” to the Adapted Nostalgia Inventory (page 10) display this question:**

How often do you find yourself feeling nostalgic for when you used to drink?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>1: At least once a day (5)</th>
<th>2: Three to four times a week (4)</th>
<th>3: About once a week (3)</th>
<th>4: Once or twice a month (2)</th>
<th>5: Once every couple of months (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel nostalgic for drinking... (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IF the participant has NOT responded “Never” to the nostalgia frequency items (page 11) AND, has NOT responded “Strongly disagree” to the Adapted Nostalgia Inventory (page 10) display this question:**

When I romanticize about the drinking experiences I had prior to entering recovery, I…

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat Disagree (3)</th>
<th>Neither Agree or Disagree (4)</th>
<th>Somewhat Agree (5)</th>
<th>Agree (6)</th>
<th>Strongly Agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Allow myself a limited amount of time to feel nostalgic.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Find it difficult to stop feeling nostalgic.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Have difficulty getting myself to stop feeling nostalgic.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**IF** the participant has NOT responded “Never” to the nostalgia frequency items (page 11) **AND** has NOT responded “Strongly disagree” to the Adapted Nostalgia Inventory (page 10) **display this question:**

In the space below, please list what you feel most nostalgic about when you think about your past drinking experiences. Please list one or two things.

__________________________
### Adapted Optimism Scale (Cheung et al., 2013)

How I am handling my recovery from drinking...

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes me feel ready to take on new challenges.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Makes me feel optimistic about my future.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Makes me feel like the sky is the limit.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Gives me a feeling of hope about my future.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Makes me feel optimistic.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>
### Ambivalence Towards Recovery Items

Please indicate your **current** feelings about recovery.

<table>
<thead>
<tr>
<th>I do not feel this way at all</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>I feel this way completely</th>
<th>7</th>
</tr>
</thead>
</table>

At this moment, I feel that the **pros** outweigh the cons of recovery.

At this moment, I feel that the **cons** outweigh the pros of recovery.
Relapse Items

*Display This Question ONLY in Phase II or Study 3.*

In the last month (i.e., since completing the initial survey)...

<table>
<thead>
<tr>
<th>No, never (1)</th>
<th>Yes, once (2)</th>
<th>Yes, a few times (3)</th>
<th>Yes, more than a few times (4)</th>
<th>Yes, completely (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have considered returning to drinking.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>I have returned to drinking.</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>
Appendix G:

Accuracy and Honesty Evaluation

The following items ask you about the quality of the data you provided us today. You will receive credit for completing this HIT regardless of your responses.

Accuracy Did you provide good, high quality responses?
   o Yes (1)
   o No (2)

Honesty Did you provide honest responses to all items?
   o Yes (1)
   o No (2)

Time Please estimate how long it took you to complete this survey (in minutes).
   ▼ Less than 5 (1) ... More than 30 (8)

Fair For completing this survey, we are offering participants US$0.90. Given the time and effort it took you to complete this task, do you think this is fair? Please let us know why or why not:

________________________________________________________________
Appendix H:

Distress & Feedback Measure

Please complete the following items.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>How distressing was completing this survey for you on average?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Feedback: We would now like to provide you with the opportunity to deliver feedback on how this study made you feel. Responding to this item is optional.

Display This Question:
If Please complete the following items. = 5
Or Please complete the following items. = 6
Or Please complete the following items. = Very much 7

Based on your responses to the last questionnaire, it would appear that you are in some distress. At the onset of this survey, you noted that you still have access to your health care provider. We encourage you to speak to your health care provider at your earliest convenience. In addition, it may be helpful to visit the following link to learn about additional resources in your area or access an online helpline chat:

A list of resources and treatment providers in your area can be found at:
https://alcoholtreatment.niaaa.nih.gov/helpful-links and

For immediate support, contact a helpline by phone or text at:
https://www.samhsa.gov/find-help/national-helpline
Appendix I:

Positive Mood Prime and Optional Mindfulness Practice

Although we have asked you some difficult questions, we recognize that recovery is an important achievement.

In this part of the study, we would like you to take some time to reflect on a positive experience in your recovery journey. Please briefly describe this positive experience and what you are most proud of using the space provided below.

________________________________________________________________

We would like to provide you with the opportunity to complete a short mindfulness exercise. If you would like to complete these items, please select yes. If you would prefer to skip to the end of the study, please select no.

- Yes (1)
- No (3)

Lastly, we would like to practice a brief grounding exercise. Before starting this exercise, pay attention to your breathing. Slow, deep, long breaths can help you maintain a sense of calm or help you return to a calmer state. Once you find your breath, please answer the questions below:

What are 5 things you can see around you? It could be a pen, a spot on the ceiling, anything in your surroundings.

What are 4 things you can touch around you? It could be your hair, the chair you are sitting on, or the ground under your feet.

What are 3 things you can hear? This could be the whirring of a fan or a car on the street.

What are 2 things you can smell? Maybe you are in your office and smell pencil.

What is 1 thing you can taste? Maybe you can still taste the coffee you had earlier.
Appendix J:

Permission to Recontact

Recontact: With your permission, we may contact you at a later date to see how your recovery process is going. Although we have no plan to do so at the moment, granting us consent to recontact you will make such a follow-up possible.

Anonymity/Confidentiality: The data collected in this experiment and in the context of any follow-up studies are confidential. All information you supply during the research will be held in confidence. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. The data are made available only to the researchers associated with this project. Your data will be labeled with a unique identification code. Any identifying information associated with your code will be confined to a single page that will be separated from your questionnaire, and kept in a separate, secured file by the research investigators, who will keep this information confidential and will only use it in the event of a follow-up study to connect your questionnaires. If you give us permission to contact you again, then your personal information will be kept until the end of the study and then deleted.

Right to withdraw data: You have the right to withdraw this consent to be re-contacted at any time.

Please note that you will still be compensated for your participation in this study even if you do not wish to be recontacted. By checking this box, you agree to the following terms:
  o I would like to be re-contacted to take part in follow-up studies. If at the time of contact I do not wish to take part, I recognize that I’m free to decline at that time.
  o I do not want to be re-contacted to take part in the follow-up studies.

Display This Question:
If: By checking this box, you agree to the following terms: = I would like to be re-contacted to take part in follow-up studies. If at the time of contact I do not wish to take part, I recognize that I’m free to decline at that time.

Thank you for your interest in completing our research! We would like to reiterate that the information you provide is strictly confidential and will not be associated with your responses. If at the time of contact you do not wish to take part, you are free to decline at that time. Please complete the following information:
  o Email: (1) ____________________________________________
  o Worker ID: (2) _________________________________________

Full Debriefing

Thank you for participating in this study! This post-survey information is provided to inform you of the exact nature of the research you just participated in.
Compensation: We will use your Worker ID to grant your reward for completing this study. Please note that this information will not be tied to your responses in any way.

What are we trying to learn in this research?
In this study, we are exploring people’s path to recovery. Our focus is on how nostalgic reverie (i.e., sentimental longing) for drinking may be harmful or helpful in the recovery process.

Why is this important to scientists or the general public?
The results from the current research will advance our understanding of the ups and downs people experience on the path to recovery. Findings may potentially also help health care professionals address psychological factors that may interfere with recovery and help those who have an alcohol use disorder prepare for and maintain behavior change.

Is there anything I can do if I found this experiment to be emotionally upsetting?
Yes. It is normal to feel some distress or anxiety when thinking about your drinking behavior. These emotions are sometimes necessary to research or study relationships between somewhat sensitive variables. If you are feeling distressed from answering questions about this experience and would like to talk to someone about it, please feel free to contact one of the resources nearest to your location.

A list of resources and treatment providers in your area can be found at: https://alcoholtreatment.niaaa.nih.gov/helpful-links and https://alcoholtreatment.niaaa.nih.gov/how-to-find-alcohol-treatment/step-1-search-trusted-sources-to-find-providers

For immediate support, contact a helpline by phone or text at: https://www.samhsa.gov/find-help/national-helpline.

What if I have questions later?
If you have any questions or comments about this research, please feel free to contact one of the research personnel involved in this research:
Mackenzie Dowson: mackenziedowson@cmail.carleton.ca
Dr. Michael Wohl: michael.wohl@carleton.ca
Dr. Nassim Tabri: NassimTabri@cunet.carleton.ca

This study has received clearance by the Carleton University Research Ethics Board-B (CUREB-B Clearance (#116993)).

Should you have any ethical concerns about this research, please contact the REB Chair, Carleton University Research Ethics Board-B (ethics@carleton.ca).

For all other questions about the study, please contact the researchers.
Appendix K:
Study 1: Additional Results (Controlling for Time in Recovery)

To test if the results of the moderation model in Study 1 could be explained by another variable, I entered a covariate into the analysis, and re-ran the analysis, controlling for the time that participants had been in recovery (measured in weeks). Controlling for time did not change the results, however, for the sake of transparency, I have included the results with the covariate here. Note that the degrees of freedom differ from the original models reported in the manuscript, this is due to missing data for the covariate.

Using PROCESS v 4.1; Model 1(Hayes & Rockwood, 2017), I tested the hypothesized interaction of nostalgia and optimism on ambivalence, controlling for time in recovery by entering time into the model as a covariate. In the first model, I used nostalgic reverie (i.e., the extent to which people reported ARN) as the predictor variable and optimism as the moderator. In the second model, I used frequency of nostalgic reverie as the predictor variable and optimism as the moderator. All predictors in both models were mean-centered.

In the first moderation model, there was a main effect of nostalgic reverie on ambivalence about the recovery process, $B = .32$, $t(283) = 4.53$, $p < .001$, 95% CI [.18, .46]. There was also a significant main effect of optimism, $B = -.25$, $t(283) = -2.28$, $p < .05$, 95% CI [-.48, -.03]. A significant interaction qualified these results, $B = .20$, $t(283) = 2.6$, $p < .05$, 95% CI [.05, .36].

In the second model, there was a main effect of nostalgic reverie on ambivalence about the recovery process, $B = .37$, $t(283) = 5.95$, $p < .001$, 95% CI [-.25, .49]. There was also a significant main effect of optimism, $B = -.23$, $t(283) = -2.10$, $p < .05$, 95% CI [-.44, -.01]. A significant interaction qualified these results, $B = .24$, $t(283) = 3.55$, $p < .05$, 95% CI [.11, .38].
Appendix L: Study 2: Additional Results (Controlling for Time in Recovery)

To test if the results of the moderation model in Study 2 could be explained by another variable, I entered a covariate into the analysis, and re-ran the analysis, controlling for the time that participants had been in recovery (measured in weeks). Controlling for time did not change the results, however, for the sake of transparency, I have included the results with the covariate here. Note that the degrees of freedom differ from the original models reported in the manuscript, this is due to missing data for the covariate.

Using PROCESS v 4.1; Model 1(Hayes & Rockwood, 2017), I tested the hypothesized interaction of nostalgia and optimism on ambivalence, controlling for time in recovery by entering time into the model as a covariate. In the first model, I used nostalgic reverie (i.e., the extent to which people reported ARN) as the predictor variable and optimism as the moderator. In the second model, I used frequency of nostalgic reverie as the predictor variable and optimism as the moderator. All predictors in both models were mean-centered.

In the first model, there was a main effect of optimism on ambivalence ($B = -1.68, t(554) = -8.10, p < .001, 95\% \text{ CI } [-2.09, -1.27]$). There was also a main effect of nostalgia on ambivalence, $B = .74, t(554) = 6.7, p < .001, 95\% \text{ CI } [.52, .96]$, however, there was no significant interaction, $B = .12, t(554) = 1.05, p = .2901, 95\% \text{ CI } [-.11, .36]$.

In the second model, there was a significant main effect of optimism on ambivalence (weighing the pros and cons of recovery) ($B = -1.6, t(554) = -8.6, p < .001, 95\% \text{ CI } [-2.07, -1.3]$), there was also a main effect of frequency of nostalgic reverie on ambivalence ($B = 1.01, t(554) = 9.55, p < .001, 95\% \text{ CI } [.08, 1.2]$). The model was qualified by a significant interaction ($B = .25, t(554) = 2.28, p < .05, 95\% \text{ CI } [.03, -.48]$).
Appendix M:
Study 3: Additional Results (Controlling for Time in Recovery)

To test if the results of the moderation model in Study 3 could be explained by another variable, I entered a covariate into the analysis, and re-ran the analysis, controlling for the time that participants had been in recovery (measured in weeks). Controlling for time did not change the results, however, for the sake of transparency, I have included the results with the covariate here. Note that the degrees of freedom differ from the original models reported in the manuscript, this is due to missing data for the covariate.

Using PROCESS v 4.1; Model 1 (Hayes & Rockwood, 2017), I tested the hypothesized interaction of nostalgia and optimism on ambivalence, controlling for time in recovery by entering time into the model as a covariate. In the first model, I used nostalgic reverie (i.e., the extent to which people reported ARN) as the predictor variable and optimism as the moderator. In the second model, I used frequency of nostalgic reverie as the predictor variable and optimism as the moderator. All predictors in both models were mean-centered.

In the first model, there was a main effect of nostalgic reverie at T1 on ambivalence at T2, \( B = .19, t(163) = 2.2, p < .05, 95\% \text{ CI} [.02 , .36] \). However, there was no main effect of optimism at T1 on ambivalence at T2, \( B = -.17, t(163) = -1.30 , p = .192, 95\% \text{ CI} [-.43, .08] \), nor was there a significant interaction, \( B = .10, t(163) = 1.09, p = .275, 95\% \text{ CI} [.27, -.08] \).

In the second model, there was a main effect of frequency of nostalgic reverie at T1 on ambivalence at T2, \( B = .39, t(163) = 5.29, p < .001, 95\% \text{ CI} [.24 , .54] \). However, there was no main effect of optimism at T1 on ambivalence at T2, \( B = -.07, t(163) = -.60 , p = .545, 95\% \text{ CI} [-.31 , .16] \) nor was there a significant interaction, \( B = .05, t(163) = .72, p = .541, 95\% \text{ CI} [-.10, .21] \).