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A Theory of Goal Maintenance: A Distinct and Vivid Pre-Goal Self Predicts Post-Goal Maintenance Motivation

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A Distinct and Vivid Pre-Goal Self Predicts Post-Goal Maintenance Motivation

A dissertation submitted in partial satisfaction of the

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in Management

by

Elicia Marie John

2020

ABSTRACT OF THE DISSERTATION

A Theory of Goal Maintenance:
A Distinct and Vivid Pre-Goal Self Predicts Post-Goal Maintenance Motivation

by

Elicia Marie John

Doctor of Philosophy in Management

University of California, Los Angeles, 2020

Professor Hal Ersner Hershfield, Co-Chair

Professor Suzanne Bliven Shu, Co-Chair

I develop and test a theory of goal maintenance which posits that individuals who achieve a life-changing goal – such as getting out of debt, becoming sober, or losing a substantial amount of weight – are more likely to maintain the progress achieved during goal pursuit if they psychologically distance themselves from the pre-goal self and routinely engage in activities that activate memories of the past, less flattering self. This theory of goal maintenance builds on prior research in identity appraisal (Wilson & Ross, 2001), vividness and intertemporal choice (Hershfield et al., 2011), and self-discrepancy (Higgins, 1987), as it relates intertemporal discrepancies in self-state representation to motivation and behavior. I applied this theory of goal maintenance to weight loss maintenance. Through a series of six studies, I provide evidence that goal maintenance is a distinct psychological phenomenon from goal pursuit along the dimensions of past self salience and psychological distance; and I also show that activating memories of a past, overweight self and feeling more psychologically distant from this self lead

to implicit goal maintenance behavior, such as a higher willingness to pay for healthy versus unhealthy items and greater interest in learning about healthy behaviors and topics. Additionally, I provide evidence across studies that past self salience is more associated with a prevention regulatory focus (i.e. preventing unhealthy behaviors) whereas psychological distance is more associated with a promotion regulatory focus (i.e. promoting healthy behaviors). Further, a longitudinal study of a small sample of individuals examined whether the positive effects of salience and psychological distance on weight maintenance behaviors may persist over time and outside of a laboratory environment.

The dissertation of Elicia Marie John is approved.

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2020

I dedicate this dissertation to my mother, Yvonne J. John, who has been with me through every step of this journey and all the journeys I have faced in life. The world can sometimes be cruel and unjust – but it is no match for a mother's love.

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In acknowledgment…

The greatest success a person can achieve in life is learning to be kind and selfless and thereafter practicing these disciplines. I acknowledge and honor God for revealing this truth to me during this journey. I am grateful for my amazing family and friends who provided me with so much support. Their prayers, phone calls, cards, letters, visits and text messages gave me strength. I extend my thanks to the New Beginnings Leadership Center and the PhD Project: both amazing organizations. I thank my dissertation committee for their guidance and the faculty, staff, and students at Anderson who supported me throughout the years.

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John, E. M., Hershfield, H.E., Shu, S.B. (2018). A Theory of Goal Maintenance: A Distinct and Vivid Pre-Goal Self Predicts Post-Goal Maintenance Behavior. Paper presented at the Society for Consumer Psychology Conference, Dallas, TX.

Introduction: Proposed Theory of Goal Maintenance

During the course of our lives, we set many short and long-term goals. From completing the day's chores to making the final payment on a mortgage loan – no matter how consequential, the pursuit and hopeful achievement of goals serve as a significant source of human motivation. However, goals that require a high degree of personal investment of one's self – as measured in time, effort, and emotional expenditure during goal pursuit – are distinguishable from the morass of more pedestrian goals we accomplish on a day-to-day basis. What happens after these high-effort goals are achieved? I argue that some high-effort goals require maintenance of the progress achieved after a goal has been successfully accomplished – particularly goals that require behavioral changes to enable success. Weight loss is one example of a high-effort goal where post-goal maintenance is important and a challenge.

America has an obesity problem. America is the most obese country in the world with a 40% obesity rate, defined as the percentage of persons 15 years of age or older with a Body Mass Index (BMI) of 30 or higher.[1] Annual medical costs associated with the obesity epidemic are approximately $147 billion.[2] In fact, Americans have become more overweight and obese throughout the years: The percentage of Americans considered overweight or obese has risen almost 30 percentage points from 1970 to present day.[3]

Even when successful weight loss is achieved, maintaining weight loss appears to be a more formidable challenge as only about 17% of Americans maintain a 10% body weight loss

[1] CDC, Adult Obesity Facts, https://www.cdc.gov/obesity/data/adult.html;
OECD, Obesity Update, https://www.oecd.org/health/obesity-update.htm.
[2] https://www.cdc.gov/obesity/data/adult.html
[3] The Fattening of America: Obesity Rates Hit Record High, www.zerohedge.com.

for longer than one year – and fewer Americans maintain when the percentage of initial weight loss is higher (Kraschnewski, 2010; Montesi et al., 2016; Wing & Phelan, 2005). Over 50% of individuals undergoing obesity treatment who successfully lost an average of 10% of their body weight regained the weight within 3 to 5 years (Niemeier, Phelan, Fava, & Wing, 2006). Literature defines weight maintenance as a multifaceted endeavor. Those who are successful in weight maintenance exhibit certain behaviors, including high rates of physical activity, dieting, and monitoring of weight and caloric intake; these successful weight maintainers exhibit low extrinsic and intrinsic disinhibition and are less novelty seeking (Klem et al., 1997; Montesi et al., 2016). However, little insight is provided on the underlying mechanisms that motivate successful weight losers to sustain these behaviors after their weight loss goals have been achieved (i.e. what are the cognitive drivers of these healthy behaviors?). How can we help these individuals better maintain their goal after it has been achieved?

I propose a theory of goal maintenance which posits that individuals who achieve a "personal transformative goal" – such as losing a substantial amount of weight – are more likely to maintain the progress achieved during goal pursuit if they psychologically distance themselves from the pre-goal self and routinely engage in activities that activate memories of the past, less flattering self. Salience of the past, pre-goal self and psychological distance from this self serve as motivation to maintain the progress achieved by the current, post-goal self. In this paper, I test this theory on weight loss maintenance. I investigate how past self salience and psychological distance independently and interactively contribute to an increased likelihood of goal maintenance for an individual who has met a weight loss, personal transformative goal.

Goal Pursuit and Goal Maintenance: Distinct Processes

Much of the goals literature describes goal pursuit as an effort to reach a desired end state, whereby motivation during goal pursuit varies relative to one's proximal distance to this desired end state (Kivetz et al., 2006; Nunes & Drèze, 2006; Heath, Larrick & Wu, 1999; Koo & Fishbach, 2012; Bonezzi et al., 2011; Hull, 1932). In consumer research, the endowed progress effect and the illusionary progress effect – both of which assert that endowing a consumer with an illusion of progress increases motivation to complete a goal – presuppose that motivation to achieve a goal monotonically increases from start to end state and hence follows the goal gradient hypothesis (Nunes & Drèze, 2006; Kivetz, Urminsky, & Zheng, 2006). More recent models, such as the theory of psychophysics of goal pursuit and the small-area hypothesis, suggest a bell-shaped motivational path for goal pursuit as measured by initial state and end state reference points (Bonezzi et al., 2011; Koo & Fishbach, 2012). Thus, consistently in literature, motivation to accomplish a goal is associated with progress from some reference point or starting point to an end state where the goal is accomplished. However, little theory exists that elucidates the mechanism by which individuals find motivation to maintain the progress achieved during goal pursuit after a goal is accomplished where proximal distance to an end state is no longer relevant.

The burgeoning goal maintenance literature makes a clear distinction between goal pursuit and goal maintenance (Stamatogiannakis et al., 2018, Yang et al., 2015, Ecker & Gilead, 2018). Ecker and Gilead (2018) argue that goal pursuit and goal maintenance involve two distinct mental processes. They argue that goal maintenance, defined as goal-directed allostasis (GDA), is a process by which individuals actively seek to prevent disturbances from their current state of being, and goal-directed progress (GDP) is the process of closing the gap between one's

current state and a desired state (Ecker & Gilead, 2018). Although the authors argue that GDA may be associated with a prevention regulatory focus (Brodscholl, Kober, & Higgins, 2007) and GDP to a promotion focus, they assert that neither goal type is exclusively associated with a regulatory focus, as any goal – whether maintenance or pursuit – can be construed as promoting positive outcomes (i.e. promotion orientation) or preventing negative outcomes (i.e. prevention orientation) (Ecker & Gilead, 2018). Further, the authors argue that GDA requires more prospection, or future thinking, as individuals attempting to maintain a current state must anticipate potential stumbling blocks and avoid behaviors that might disrupt their current static state. Ecker & Gilead's (2018) assertions are theoretical, as they have not provided substantive empirical evidence to substantiate their theories of GDA and GDP.

Empirical evidence exists that demonstrates differences in processing between goal pursuit and goal maintenance. Stamatogiannakis et al. (2018) posits that current state-desired state discrepancy receives more processing while one monitors progress for an attainment goal (i.e. GDP or a pursuit goal), whereas situational or environmental influences receive more processing for maintenance goals (i.e. GDA). In one of their studies, participants were assigned to a maintenance or an attainment goal condition and were asked to determine the difficulty of a list of goals they were presented and to explain their judgments in open text responses. Participants in the maintenance goal condition provided justifications with more goal context related information whereas participants in the attainment condition referenced more goal discrepancies (Stamatogiannakis et al., 2018). Yang et al. (2015) provided evidence that individuals with a more independent self-construal, determined by a measure of the number of their social relationships, have a higher level of motivation to succeed in goal attainment versus goal maintenance. Those with an interdependent self-construal were more motivated when

presented with a maintenance goal. These effects persisted even when self-construal was manipulated instead of measured.

When arguing that goal maintenance and goal pursuit are distinct processes, the goals literature asserts that the motive force of discrepancy between states is not as relevant during the maintenance stage of a goal (Brodscholl, Kober, & Higgins, 2007; Stamatogiannakis et al., 2018). However, I wondered whether discrepancy could still motivate goal conducive behavior after a goal is achieved: not discrepancy between the present self and a desired future self, but discrepancy between the past, pre-goal self and the present self. During goal pursuit, a reference point along the goal pursuit path from current to desired state is salient and movement away or toward this reference point (i.e. closing the discrepancy between states) is motivational to the goal pursuer (Hull, 1932; Bonezzi et al., 2011; Fishbach & Koo, 2012; Heath et al., 1999). I argue that during maintenance of personal transformative goals the reference point is the past self (i.e. before the goal is met) and maintaining psychological distance from the past self (i.e. maintaining the discrepancy between states) motivates goal conducive behavior. In this paper, I build an empirical case for the impact that identity salience and distancing have on goal maintenance behavior. Specifically, for a personal transformative goal, I hypothesize:

> *Hypothesis 1 (H1):* Goal maintenance and goal pursuit are distinct psychological phenomena, as goal processing differs between these phenomena along the dimensions of salience of the past, pre-goal self and psychological distance from this self.

This notion that psychological distance impacts current perceptions of the self and subsequently present-day behavior is demonstrated in identity and self-appraisal literature (Wilson & Ross, 2000, 2001) and vividness, intertemporal choice, and self-continuity literature (Ersner-Hershfield et al., 2009; Hershfield et al., 2011; Kim & Wohl, 2015). Wilson and Ross

(2000) demonstrate that self-appraisals between one's past and present selves are more frequent than social comparisons with peers. These self-appraisals tend to be more relevant to the current self, vice comparing to one's peers, and tend to be more beneficial, as they are more likely downward comparisons between an improved present self and an inferior past self (Wilson and Ross, 2001; Conway & Ross, 1984) . According to temporal self-appraisal theory, psychological closeness to the past self predicts the nature of the comparison (i.e. whether flattering or unfavorable), and perceived (not actual) temporal distance determines feelings of closeness, where accessibility of the past impacts perception of experienced time (Wilson & Ross, 2001).

Hershfield et al. (2011) found that vivid depictions of a future self at retirement age, through virtual imagery, can induce greater psychological closeness to that future self, less temporal discounting, and consequently, greater savings and investment behavior. Empirical research in psychology leverages these insights to incent behavior change in other domains – specifically, weight loss. Accordingly, vividness research in the weight loss domain has demonstrated that interconnected but disassociated selves based on weight identity can incent healthy decision making in the short run. Kuo et al. (2016) recruited subjects who had indicated that they were interested in losing weight to participate in a laboratory study. Across two conditions, the authors manipulated the depiction of participants in a virtual dressing room mirror where participants in the experimental condition saw an image of a weight-reduced self in the mirror and participants in the control condition viewed their current self. Participants in the experimental condition decided to eat less ice cream in a subsequent taste testing task than participants in the control condition. The authors found that temporal discounting mediated the relationship between condition and consumption in the taste test. Rutchick et al. (2018) demonstrated that virtual technology is not needed to elicit a vivid image of one's future self.

The authors assigned participants to two conditions and asked participants to write a letter to their near-future self (i.e. 3 months away) or distant-future self (i.e. 20 years away) based on condition. The authors posited that writing a letter to the distant future self increases connectedness to one's future self and consequently increases motivation to make healthier decisions in the present. The authors found that participants in the distant-future self condition, who imagined themselves 20 years older, were more likely to exercise during the days following the experiment than subjects in the near-future self condition. These studies indicate that vividly imagining a representation of one's future self can motivate healthier decisions in the present, specifically relevant to the weight loss and maintenance domain.

In these cases, psychological closeness to a desired ideal future self motivated healthy present-day behaviors. Literature also suggests that discontinuity with a past self can motivate healthier present-day judgments. Specifically, Kim and Wohl (2015) found that inducing a sense of self-discontinuity made problem gamblers more nostalgic about their more ideal, pre-addicted past self and increased their intent to change their addictive behavior.

Personal Transformative Goals and Identity Disassociation

The aforementioned studies leverage insights from behavioral science to incentivize healthy behaviors that improve long-term wellbeing. Similarly, my research focuses on goals aimed at improving wellbeing. There are several different types of goals: short-term, task-oriented goals, such as getting up on time to go to work or school, or long-term goals, like getting a major promotion at work or graduating from high school or college. These goals are not the focus of my research. Once they are achieved, they are recorded in one's personal history. No further action is required to maintain them. When analyzing goal maintenance, I focus on a

particular type of goal that I define as a personal transformative goal. Personal transformative goals require maintenance of the progress achieved during goal pursuit after a goal is successfully met.

Drawing on self-discrepancy theory (Higgins, 1987), I define a personal transformative goal as one in which individuals seek to close the gap between their self-concept (i.e. their current or actual identity) and their dominant self-guide (i.e. the identity they believe they ought to be or ideally should be). I believe these goals often focus on achieving some tipping-point identity attribute that signals the transformation of one's actual self to his ought-to-be or ideal self. During the process of goal pursuit for a personal transformative goal, behavioral changes are needed to enable successful goal achievement. Subsequently, these same behavioral changes must be sustained to maintain the goal. As another important point of distinction, a personal transformation goal involves a transformation of a self-important and relevant identity attribute, which therefore, strongly informs one's self-concept, judgments and decision making (Reed, 2004). These goals are therefore distinct from other goal types, such as relationship goals and performance goals, which also benefit from post-achievement maintenance (Stamatogiannakis et al., 2018, Ecker & Gilead, 2018). Examples of personal transformative goals include getting out of debt (i.e. transformation from debt-laden self to debt-free self), breaking a substance/behavioral addiction (i.e. transformation from substance-abuser self to sober-self), and the focus of this paper: losing weight (i.e. transformation from over-weight-self to thinner-self).

Literature in marketing, social psychology, and philosophy suggests that accomplishment of a life changing goal may serve as a temporal landmark, leading to a disassociation of one's pre-goal, inferior self from the post-goal, ought-to-be or ideal self. Many factors can contribute to the categorization of distinct past selves, including temporal landmarks (Peetz & Wilson,

2013; Dai, Milkman, & Riis, 2015). Temporal landmarks, such as significant life events, can lead to a cognitive separation of one's past and less flattering self from one's present self and can lead to goal conducive behaviors (Parfit, 1971; Wilson & Ross, 2001; Dai et al., 2015). Achieving a significant goal (i.e. a personal transformative goal) may lead to the psychological separation of the past from the current representation of self where the present self may be motivated to pursue goal conducive behaviors when using the past as a reference point (Peetz & Wilson, 2013, 2014; Dai et al., 2015). Prior literature shows that how one thinks about a disassociated past or future self can incent healthy behaviors (Hershfield et al., 2011; Kim & Wohl, 2015; Fox & Bailenson, 2009). I argue that these thoughts can manifest in three important ways that motivate goal maintenance: (1) salience of the past self, (2) psychological distance from the past self, and (3) the combination of salience and psychological distance.

Two Motivating Constructs: Salience and Psychological Distance

Our personal histories are comprised of the identities, experiences, hopes, and dreams of a series of interconnected past selves, disassociated by time and emotional connection (Parfit, 1971; Ersner-Hershfield et al., 2009; Hershfield et al., 2011; Peetz & Wilson, 2013, 2014). Reflecting on a particular past self or comparing the present with the past using a past self as a reference point can influence our judgments and impact our behaviors (Kim & Wohl, 2015; Loewenstein & Elster, 1992; Strack et al., 1985; Peetz & Wilson, 2012; Wilson & Ross, 2001, 2002; Trope & Liberman, 2004). Whether we access a concrete representation of the past self or perceive psychological distance between our present selves and a reference past self determines whether we assimilate (i.e. feel connected or similar) or contrast (i.e. feel disassociated or dissimilar) to the contemplated past self – its identity, experiences, hopes, and dreams (Sherif,

Taub & Hovland, 1958; Strack et al., 1985; Trope & Liberman, 2004; Pronin & Olivia, 2008; Peetz & Wilson, 2013; Loewenstein & Elster, 1992). Vivid cognitions of a negative past or psychological distance from a negative past self impact whether we assimilate or contrast from our past and subsequently impact our appraisal of our present self (Wilson & Ross, 2001, 2002; Loewenstein & Elster, 1992; Herr, Sherman & Fazio, 1983) and influence our behaviors (Peetz & Wilson, 2013, 2014). Given these relationships, my goal maintenance theory posits that an individual who keeps his past self salient or distinguishes his present self from his past self (i.e. psychological distance) is more likely to maintain his current, post-goal identity.

Salience of the Past Self

I conceptualize a salient past self as an easily accessible and vivid cognition of one's past self before the goal pursuit process began (i.e. one's perception of the pre-goal identity). An accessible cognition is 'top of mind': It is frequently activated and entrenched in memory (Bjork, 2011; Lang, Craske, & Bjork, 1999; Higgins, 1987), and a vivid cognition is easily visualized or imagined (Loewenstein & Elster, 1992; Hershfield, John, & Reiff, 2018). An accessible and vivid cognition of a past self can elicit emotions that impact intentions and behaviors of the present self (Hershfield et al., 2018; Ersner-Hershfield et al., 2009; Hershfield et al., 2011; Kim & Wohl, 2015). More specifically, this concrete (i.e. lower level) construal of the past self can enable greater humanization and connection with the past self (Bartels & Rips, 2010; Haslam & Bain, 2007; Trope & Liberman, 2010); Subsequently, the salient cognition of the past self may evoke empathy for this past self (Ersner-Hershfield et al., 2009; Hershfield et al., 2011; Hershfield et al., 2018). Additionally, salience of a negative past, in the absence of distance from this past, may lead to feelings of pain and discomfort as one's current self-concept or identity assimilates with the past identity (Loewenstein & Elster, 1992; Strack et al., 1985;

Wilson & Ross, 2001). The bevy of negative emotions evoked from associating one's self concept with less flattering identity attributes producing tension that may motivate healthy behaviors as this perceived tension can lead to mitigating actions (Lewin, 1951).

I assert that salience of this negative image of the past self leads to goal maintenance conducive behavior. Assimilating with the pre-goal identity may activate memories of one's past experiences (Mussweiler, 2003) and thus activate cognitions of the prior self-discrepancy. This can motivate behaviors consistent with maintaining the current, improved identity. When a self-discrepancy is active, the cognition of the inferior self evokes negative emotions – such as guilt, self-contempt, and uneasiness – that motivate goal conducive behaviors (Higgins, 1987; Peetz & Wilson, 2013). As an example, Fox and Bailenson (2009) used immersive virtual environment technology (IVET) in a laboratory study to evaluate the impact that vivid depictions of participants gaining weight or losing weight during an exercise task had on motivation to exercise. IVET is designed to increase the perception of similarity between an actual self and a virtual image of the self performing activities during laboratories studies to make the experiences feel more authentic to participants (Bailenson, Blascovich, & Guadagno, 2008; Fox & Bailenson, 2009). The authors found that seeing a vivid image of one's self either gaining or losing weight in a prior exercise task increased the amount of exercise observed in a subsequent task. Additionally, the authors found that visualizing a less flattering self (i.e. gaining weight) was just as motivating as visualizing a more ideal self (i.e. losing weight) – both conditions leading to statistically equivalent amounts of exercise (Fox & Bailenson, 2009). Further, the authors found that the observed effects were significantly greater when seeing a virtual image that resembled one's actual self instead of seeing a virtual image of an unknown person of similar age and gender (i.e. an 'other'). This work supports my contention that visualizing a less flattering image

of one's self can motivate healthy behaviors – specifically a vivid image of a psychologically closer self. Thus, I hypothesize:

> *Hypothesis 2 (H2a):* Salience of a past, pre-goal self, in the absence of psychological distance, is independently sufficient to drive goal maintenance conducive judgments and behavior.

Distance from the Past Self

Psychological distance between two objects is perceived when one object is immediately present and the other feels absent from the present – either temporally, spatially, socially or hypothetically (Liberman, Trope, & Stephan, 2004; Pronin & Olivola, 2008). I focus my investigation on psychological distance between two representations of the self: the past, pre-goal self before the goal pursuit process began and the present, post-goal self after the goal was successfully achieved. The social distance perceived between these selves (i.e. the past self versus the present self) is evaluated as a measure of (dis)similarity along important identity attributes. This conceptualization is consistent with research in (1) self-continuity that measures emotional distance between one's past and future selves along dimensions of emotional closeness (i.e. personality, temperament, major likes and dislikes, beliefs, values, ambitions, life goals, and ideals) (Ersner-Hershfield et al., 2009; Hershfield et al., 2011); (2) self-discrepancy theory's assertion that self discrepancies arise from perceived distinctions in one's self-concept and relevant self guide – specifically, the number of mismatches in relevant identity attributes between self-states determines the magnitude of these discrepancies (Higgins, 1987); and (3) temporal self-appraisal theory's assertion that appraisals of one's present relevant to one's past

self are generated through evaluation of distinctions between selves along salient and relevant identity attributes (Wilson & Ross, 2000, 2001).

Perceiving greater psychological distance between one's past, pre-goal self and one's present, post-goal self can motivate goal conducive behaviors consistent with one's present self-concept. Perceived dissimilarity between selves can lead to contrast effects where one embodies attributes and subsequently expresses intentions that are distinctly in contrast to the prior self (Mussweiler, 2003; Hanko, Crusius, & Mussweiler, 2009; Libby & Eibach, 2002). Wilson and Ross (2001) assert that a critical perspective of a past self, particularly along salient identity attributes can be motivational to the current self: "An inferior past self can serve as a downward comparison that helps people appreciate their current achievement (p. 573)," and this perspective can direct goal conducive behaviors in contrast to the former self (Peetz & Wilson, 2008, 2013, 2014). Further, Peetz & Wilson (2013) found that greater perceived distance along dimensions of health and fitness between two disassociated perceptions of the self (i.e. a present self and a future self) led to greater self-reported motivation to improve present health and fitness behaviors.

Additionally, distancing from a past, less flattering self can provide an impression of a new or fresh start and motivate behaviors distinct from those of the past self (Peetz & Wilson, 2013, 2014; Dai et al., 2015). These behaviors are likely to align with attributes associated with one's present, post-goal identity given that this distancing makes the post-goal identity more relevant to one's self concept (Wilson & Ross, 2000; Reed et al., 2012). Consistent with this view, in a small study, Libby & Eibach (2002) found that when perceptions of social distance are increased (i.e. the past self is recalled from a third-person perspective and thus considered an 'other') study participants who remembered instances of overindulgent eating reported intentions

to eat less indulgently in an upcoming Thanksgiving dinner. Accordingly, I posit that a disassociated post-goal self from a pre-goal self will be motivated to engage in healthier behaviors that are in contrast to those of the prior, less flattering self. I hypothesize:

> *Hypothesis 2 (H2b):* Psychological distance from the past, pre-goal self is independently sufficient to motivate goal maintenance conducive judgments and behavior.

Salience and Distance from the Past Self

Can salience of the past self and psychological distance from the past self co-exist? If so, how might heightening both constructs impact goal maintenance conducive behavior? Inherent with psychological distancing is an abstraction or high-level construal of the past, distal self – more global or broader attributes are associated with the categorization of a more distal self relative to a more proximal self, which holds a more concrete representation in memory (Liberman et al., 2004; Trope & Liberman, 2010). This abstraction of a distal, past self makes one less attentive to experiences of the past self (Pronin & Olivola, 2008), suggesting that psychological distancing from a past self makes the past self appear less vivid and detailed. Additionally, a more vividly imagined and humanized past self can feel less psychologically distant from the present self (Ersner-Hershfield et al., 2009; Hershfield et al., 2011; Hershfield et al., 2018). In this view, salience of the past self and psychological distance from the past self appear to be opposing forces: Heightening both constructs simultaneously may attenuate effects observed when the constructs are heightened independently.

However, dependent on how the constructs are framed, I posit that heightened salience of the past self and distance from the past self together can more effectively drive goal maintenance conducive behavior through more pronounced contrast effects than those obtainable from

heightened distance alone. Salience of the past state along relevant identity attributes can amplify the perception of distance between states, and subsequently, the combination of the two constructs can lead to a greater likelihood of goal maintenance conducive behavior than heightening the two constructs independently. In this view, salience may moderate the effects of distance. This contention is supported by the premise that perceptions of psychological distance from the past are malleable dependent on the framing of past events, present motivations, and information presented during processing of the past relative to the present (Haslam & Bain, 2007; Peetz & Wilson, 2008; Trope & Liberman, 2010).

A more salient cognition of the past self may enable greater discernment of dimensions relevant for comparison between the past self and the present self – subsequently increasing perception of distance between the past and present. Drawing on the similarity judgment literature, geometric models of similarity indicate that perceived distance between two objects increases with increasing dimensions of comparison between the two objects (Goldstone & Son, 2012) and subsequently can lead to more distinct mental categories between the objects (Murphy & Hoffman, 2012). In accordance with this view, developing distinct mental categories between objects can lead to a greater perception of distance between these objects (Dai et al., 2015; Burris & Branscombe, 2005). Additionally, when comparing the past to the present, the past is likely to be perceived as less similar to the present if the cognition of the past is more salient. Consistent with contrast and asymmetric similarity models (Tversky, 1977; Holyoak & Gordon, 1983; Codol, Jarymowicz, Kaminska-Feldman & Szuster-Zbrojewic, 1989), the more prominent an object, the more likely it can be perceived as dissimilar to a target object as it is associated with less global and more specific attributes used to distinguish it from other objects (Trope & Liberman, 2010). In accordance with these views, I assert that more pronounced contrast effects

may result from the interaction of heightened salience and heightened distance as salience can moderate the effects of distance.

As an alternative perspective, in the absence of a statistically significant and positive interaction between salience and distance, a greater likelihood of goal maintenance conducive judgments and behavior is achievable through additive main effects of salience and distance when both are heightened. However, in practice, these two constructs are not completely orthogonal. Accessing the past self can inherently lead to psychological distancing depending on how the construct is operationalized, and psychological distancing requires some memory representation of the past self. Because of the close relationship between these constructs, there may be a ceiling on the effectiveness of both constructs driving maintenance outcomes (i.e. there may be a negative interaction at high levels of each construct). Further, heightened salience and distance may lead to 'resting in one's laurels' where perceived success in maintenance leads to a relaxation in goal conducive behaviors (Fishbach & Dhar, 2005; Amir & Ariely, 2008). This latter perspective may lead to a negative interaction between the two constructs. Nonetheless, when intentionally engaging both constructs in processing, I believe goal maintenance motivation will increase. In this view, I hypothesize:

> *Hypothesis 3 (H3):* Salience of the past self and distance from the past self heightened together lead to a greater likelihood of goal maintenance conducive judgments and behavior than either construct heightened independently.

To satisfy Hypothesis 3, the effects of heightening both salience and distance (through additive main effects and their interaction, if applicable) should be greater than the main effect of distance and the main effect of salience. Hence, the mean weight maintenance outcome of heightening both distance and salience (M_B) is predicted to be greater than the mean outcomes of heightening

salience-only and distance-only: $M_B > \max(M_S, M_D)$. Difference in mean tests are used to evaluate Hypothesis 3 throughout the paper.

Study Roadmap

Applying my theory of goal maintenance to weight loss, I evaluate three hypotheses using eight studies. Overall, I seek to provide evidence that an individual who met a weight loss goal will likely be more successful in maintaining his weight loss if he (1) frequently activates his past, overweight identity (i.e. past self salience) and (2) makes comparisons with his current, thinner self and uses this current-to-past-self identity discrepancy (i.e. psychological distance) as motivation to sustain the healthy behaviors that originally enabled weight loss success. To evaluate H1, Study 1, a text and sentiment analysis of Reddit data, tests whether posts associated with individuals seeking to maintain their weight loss (i.e. weight loss maintainers) use more past focused, discrepancy, and comparison language than posts associated with individuals seeking to lose weight (i.e. weight loss pursuers). Study 2 evaluates H2a and H2b through a correlational analysis of judgments and behaviors of successful weight loss maintainers compared to unsuccessful weight loss maintainers. Testing hypotheses two and three, studies 3a – 3c evaluate whether manipulating the two goal maintenance constructs impacts judgments using willingness to pay (WTP) tasks for healthy and unhealthy products and services. Studies 4 and 5 also test H2 and H3 but evaluate how manipulating salience and distance impacts observable, weight maintenance conducive behaviors using reading comprehension and video game tasks, respectively. Finally, Study 6 tests whether the observed effects of salience and psychological distance persistence over time and outside of a laboratory setting using a longitudinal study of participants who met a significant weight loss goal one year prior to the twelve-week study.

Study 1: Reddit Text and Sentiment Analysis

Study 1 was designed to evaluate how the thoughts of individuals actively pursuing a weight loss goal differed from those maintaining a weight loss goal to gauge whether there were distinctions in motivation during these phases of an individual's weight loss journey. To make this assessment, I analyzed the sentiment expressed in posts from the Loseit Subreddit – a community of nearly two million members who share ideas on healthy weight management strategies.[4] Through this analysis, I sought to provide evidence that motivation to maintain weight is psychologically distinct from motivation to lose weight with respect to the two factors that comprise the goal maintenance theory: salience of the past self and psychological distance from the past self. I hypothesized that posts from weight loss maintainers would use more salience and distance-related language than posts from weight loss pursuers. I preregistered the hypothesis, methods, and analyses for this study.[5]

Method

I scraped over 50,000 text posts from Reddit's 'Loseit' community from September 1, 2017 to September 1, 2018 – including tags that provide descriptive information on the poster (e.g. weight goals, age, and gender). Tags were parsed to identify current weight, starting weight, and goal weight data, and the text was evaluated using the Linguistic Inquiry and Word Count (LIWC) text and sentiment analysis software. An example of a 'Loseit' post is provided in Appendix A. For each text post, scores were generated for cognitive processes of differentiation and discrepancy, comparison language, verb tense (i.e. past, present, and future

[4] "Loseit – Lose the Fat", https://www.reddit.com/r/loseit/wiki/faq.
[5] https://aspredicted.org/yk3d4.pdf

focus), and expressed emotions (i.e. positive emotion, negative emotion, anxiety, sadness, and anger).

The cognitive process and verb tense LIWC scores served as independent variables (IV's) in this analysis. The LIWC scores for the cognitive process of discrepancy and differentiation as well as comparison were used as proxies for psychological distance. I predicted that discrepancy would be the better proxy because it measures tension between states (e.g. words such as would and should).[6] Comparison language (e.g. words such as greater, best, and after) and differentiation language (e.g. words such as hasn't, but, and else) were also evaluated because they express identified mismatches between two or more objects.[7] The LIWC scores for verb tense were used to measure temporal differences – particularly whether posts were focused on the past, present, or future. The past focused score served as a proxy for salience of one's past self.

The emotions were evaluated as mediators and IV's. According to self-discrepancy theory, the emotions evoked when attending to a self-discrepancy drive motivation (Higgins, 1987). Hence, I explored whether these emotions were associated with psychological distancing (as evaluated through differentiation, difference and comparison language), salience (past focus), and subsequently weight outcomes.

The dependent variables (DV's) were weight outcomes - including percentage to goal weight, weight loss to date, and maintaining weight (binary variable: yes or no). Percentage to goal weight was determined by the member's weight profile (starting weight minus current

[6,8] Pennebaker, J.W., Boyd, R.L., Jordan, K., & Blackburn, K. (2015).
The development and psychometric properties of LIWC2015. Austin, TX: University of Texas at Austin.

weight divided by starting weight minus goal weight). Weight loss was the proportion of weight loss at the time of posting (current weight divided by starting weight). Maintaining weight was determined by a value of 100% or greater for percentage to goal weight or a "goal" or "maintaining" tag in the member's Reddit submission.

The methods used in this analysis do not perfectly adhere to the preregistered protocol. Notably, no minimum weight loss cutoff was used to filter the data. In lieu of this, the poster's weight loss goal was included as a control variable in regression analyses. Additionally, emotions were evaluated as covariates in regression analyses (not preregistered) and separately as mediators (preregistered). Further, comparison language was included in the analysis as a proxy for psychological distance because this metric aligns with my conceptualization of psychological distance; however, this variable was not preregistered.

Results

I performed regression analyses to evaluate the effects of emotions, psychological distance, past salience, and temporal focus variables on the outcome variables of interest, including the binary maintenance variable, weight-loss-to-goal variable, and general weight loss variable. There were 2,755 distinct posters that posted 5,512 posts used in the analysis. These posts included weight profile information that could be parsed. I clustered standard errors at the poster-level using the Huber-White method to estimate unbiased regression coefficients. The goal weight loss (the poster's goal weight divided by the poster's starting weight) served as a control variable.[8] As shown in the logistic regression results in Table 1,[9] Column (1), I evaluated differences in sentiment between Reddit users maintaining weight (i.e. "maintainers") and users

[8] The effects in Table 1 persist even without controlling for the poster's weight loss goal.
[9] All regression tables were created using the Stargazer package in R (Hlavac, 2018).

still pursuing a weight loss goal (i.e. "pursuers") based on their weight profile data. Maintainers were significantly more likely to use language associated with psychological distance and salience than pursuers given significant effects of discrepancy language when past-focused language is zero (β=0.33, $p<0.05$), comparison language (β=0.13, $p<0.05$), and past-focused language when discrepancy language is zero (β=0.12, $p<0.01$). The interaction between distance (discrepancy) language and past focused (salience) language is negative (β= -0.043, $p<0.05$), indicating that total effects from these factors depend on levels of the other factor.

Table 1. Reddit Study: Sentiment Regression Analysis

	(1) Maintain	(2) To Go	(3) Weight Loss
Weight loss goal	0.006***	0.00001**	0.00000*
	(0.002)	(0.00000)	(0.00000)
Distance (Comparison) Language	0.126*	0.038	0.003
	(0.055)	(0.039)	(0.006)
Positive Emotions	-0.072	0.022+	0.007**
	(0.044)	(0.013)	(0.002)
Negative Emotions	-0.026	-0.007	-0.004
	(0.064)	(0.006)	(0.003)
Distance (Difference) Language	0.010	-0.028	-0.006
	(0.057)	(0.030)	(0.004)
Distance (Discrepancy) Language	0.327*	-0.041	-0.009
	(0.122)	(0.040)	(0.007)
Salience (Past Focused)	0.120**	-0.028	-0.001
	(0.045)	(0.038)	(0.005)
Present Focused	-0.058*	0.002	0.002
	(0.028)	(0.005)	(0.002)
Future Focused	-0.069	0.0002	0.001
	(0.070)	(0.008)	(0.002)
Discrepancy*Salience	-0.043*	0.015	0.002
	(0.020)	(0.017)	(0.002)
Constant	-3.584***	0.445***	0.125***
	(0.229)	(0.036)	(0.007)

Note: Reddit Analysis (Study 1) regression models using clustered standard errors. Standard errors in parentheses. Comparison, Difference and Discrepancy language served as proxies for psychological distance.
+ p<0.10; * p<0.05; ** p<0.01; *** p<0.001

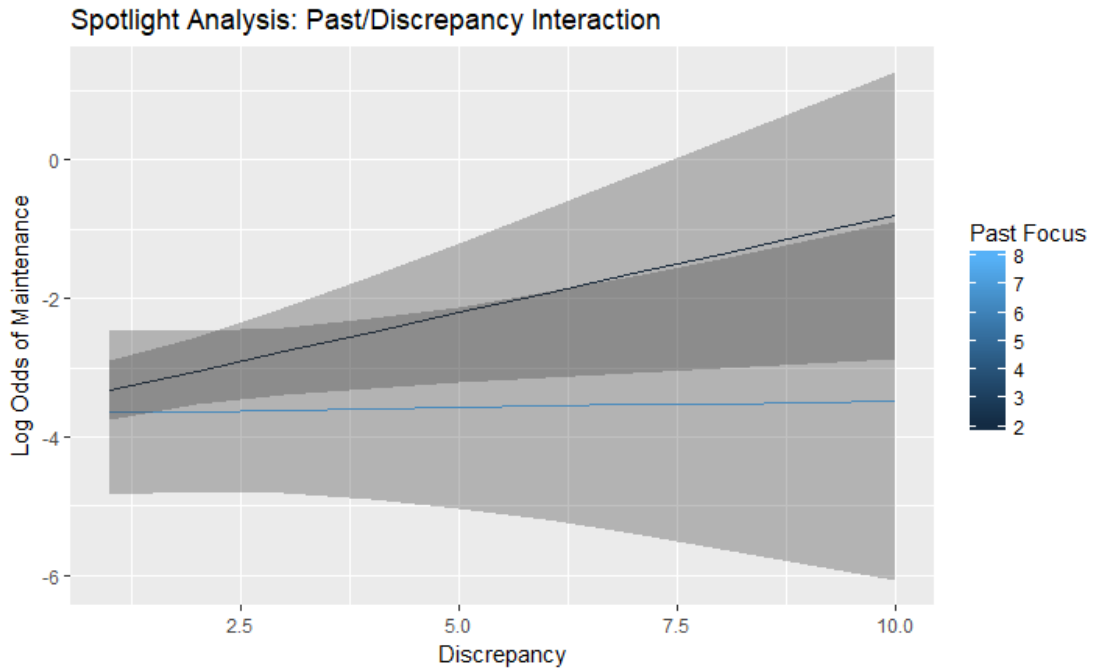
Next, I evaluated whether the relationships between psychological distance, past salience, and other temporal focus variables were specific to maintainers versus pursuers or whether they were more broadly generalizable to weight-loss-to-goal (Table 1, Column 2) or just weight loss in general (Table 1, Column 3). None of the relationships observed for weight maintainers versus pursuers in Column 1 were associated with the other DV's. Additional regression results – including examining the psychological distance and salience constructs without the interactions, with additional interactions, and mean centered – are included in Appendix B.

I took a closer look at the significant and negative coefficient for the interaction variable of distance (i.e. discrepancy) and past focus (i.e. salience) language in the spotlight analysis illustrated in Figure 1. This analysis depicts the contribution of the discrepancy, past focus, and interaction variables on the likelihood that the post is from a maintainer, using coefficients from the regression in Table 1, excluding the clustered standard errors and using a specified range of each variable (method adapted from Spiller et al. 2012). Because of the exclusion of clustered standard errors, these estimated contributions are biased, but provide an approximation of the impact of the construct variables (i.e. discrepancy, past focus, and their interaction) on the likelihood of being a maintainer. This analysis is particularly interesting because of the significant and positive main effects of psychological distance (i.e. discrepancy) and past self salience but negative and significant interaction. Therefore, it provides an estimate of the comprehensive effects of both psychological distance and past self salience.

The analysis in Figure 1 suggests that at high levels of past focus language, more than one standard deviation above the mean, increasing amounts of discrepancy language does not

change the likelihood of maintenance. However, at low levels of past focused language, more than one standard deviation below the mean, maintenance likelihood increases substantially with increased discrepancy language. Therefore, the effect of discrepancy language on maintenance likelihood is much greater when past focused language is low and vice versa.

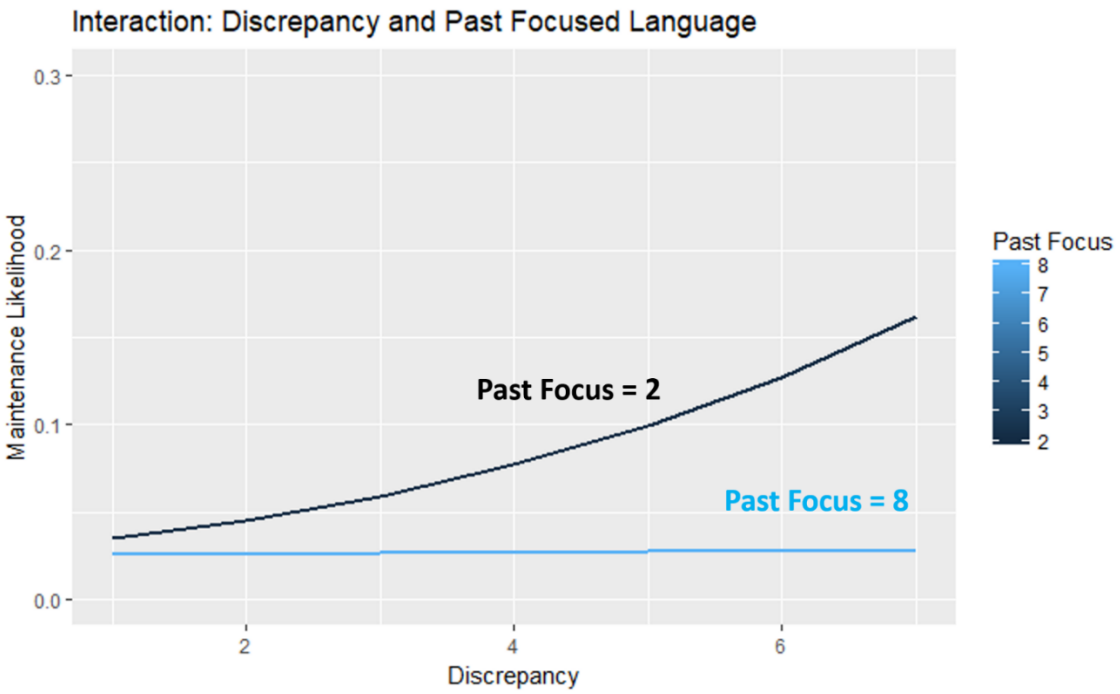
Figure 1. Reddit Study: Spotlight Analysis



Note: Charts include 95% confidence intervals in the shaded regions.

As discrepancy language is a proxy of psychological distance and past focused language is a proxy for past self salience, I interpret the spotlight analysis as an indication that both psychological distance and past self salience are associated with a greater likelihood of being a maintainer. The two constructs independently drive effects, but these effects are not additive as there is a dampening or ceiling effect on the degree to which these constructs combined predict maintenance likelihood. The exponentiated maintenance estimates with a 0 to 1 support are provided in Figure 2.

Figure 2. Reddit Study: Interaction Analysis



Note: Analysis of the impact of discrepancy language on the likelihood of goal maintenance at different levels of past focused language: more than one standard deviation above the mean (i.e. the past focus score is 8) and more than one standard deviation below the mean (i.e. the past focus score is 2).

I also tested whether emotional sentiment expressed in the text posts (i.e. LIWC scores for positive and negative emotions as well as anxiety, anger, and sadness) mediated the relationship between discrepancy and maintenance likelihood using the Zhao et al. (2010) bootstrap method with 1,000 resamples. Each emotion score was tested as a mediator independently. However, none of the indirect effects were significant at the 5% significance level.

Discussion

The Reddit natural language processing analysis provided evidence that goal maintenance is distinct from goal pursuit, specifically along the dimensions of past self salience and psychological distance. Successful weight maintainers were more likely to focus on the past (i.e. past focused language) and use language associated with psychological distancing (i.e.

comparison and discrepancy language) than pursuers, providing support for Hypothesis 1. The effects of past salience and psychological distance are unique to maintenance and are not associated with weight-loss-to-goal or weight loss in general, consistent with Hypothesis 1.

Study 1 is an observational analysis and susceptible to selection biases, specifically survival bias, where observed posts are not representative of sentiment across the general Loseit Subreddit population of nearly two million users but are systematically selected among those who are more successful in meeting their weight loss goals and more apt to share. Study 2 addresses some of the deficiencies in Study 1 and analyzes the behaviors of both successful and unsuccessful weight loss maintainers to provide evidence that behaviors that make the past self more salient and make the past self appear more psychological distant are more associated with individuals who are successfully maintaining weight versus those who are not successful.

Study 2: Weight Maintenance Behavior Analysis

Study 2 aimed to test whether behaviors that involve thinking about the past and comparing the past to the present differed among individuals who were successful versus those who were unsuccessful in maintaining weight after meeting a substantial weight loss goal. I predicted that individuals who were maintaining their weight loss were more likely to engage in behaviors that activate memories of their past self (i.e. past self salience) and that highlight the differences between their past, pre-goal self and their current self (i.e. psychological distance).

Methods

I recruited participants from the Amazon Mechanical Turk (i.e. Mturk) subject pool who were at least 18 years of age and who reported to have met a goal of at least 10% body weight loss or more within three years prior to the date of the study. I asked these participants to

complete a survey describing their behaviors since meeting their respective weight loss goals. Participants may have regained weight or maintained their weight loss. The 10% weight loss eligibility criterion coincides with medical definitions of significant weight loss (Montesi et al., 2016; Wing & Phelan, 2005).

The questions asked in the study aimed to determine what judgments and behaviors were associated with sustained weight loss maintenance – specifically those that evoked images of the past self and perceptions of psychological distance from the past self. Motivational behaviors (e.g. such as looking at before weight loss pictures, thinking about what life was like being overweight, and keeping items associated with the overweight past self) served as explanatory variables and proxies for past self salience. Perceptions of psychological distance were measured using two methods: (1) the Euler circle method to gauge perceived overlap between the past self and current self (Hershfield et al., 2011) – hereafter referred to as the "Circle Measure" and (2) a measure on a 7-point Likert scale of how "totally different" the participant felt to their past self, anchored by "Strongly Agree" and "Strongly Disagree". Other judgments and behaviors measured related to both past self salience and psychological distance – including chronicling weight loss on social media, looking at before-and-after weight loss pictures, and feeling motivated when thinking about regaining weight. The latter perception is an application of self-discrepancy theory and mental time travel. Thinking about regaining weight relates to mental time travel because memories of the past, overweight self inform prospects of the future self, such as cognitions of a hypothetical, overweight future self (Christensen et al., 2018; Schacter & Tulving, 1994). A history of struggling with weight management served as a proxy for the myriad of idiosyncratic factors, both behavioral or physiological, that could make weight maintenance more challenging but were not included in the survey, and this variable served as a

control in the regression analyses. The study questions are included in Appendix C. The dependent variables used in the regression analyses were whether participants maintained the weight they lost, the months that the weight loss had been maintained, and the amount and percentage of regained weight if applicable.

Among the 400 observations collected, 36 observations were excluded from analysis because participants' responses failed to pass data attention filters. These filters, provided in Appendix C, eliminated observations whose weight specifications were mathematically inaccurate or physically impossible.

Results

Regression analyses were performed on the survey data set to determine what, if any, judgments and behaviors consistent with my proposed theory explained weight loss outcomes when controlling for demographic factors – such as age, race, education level (i.e. college-educated or not) and gender. The regression results are provided in Tables 2, 3 and 4. The Circle Measure evaluates psychological closeness. Hence, lower values indicate greater psychological distance. This measure was significantly but not highly correlated with the "totally different person" measure (Pearson coefficient of -0.46, $p<0.001$), but it was more predictive of self-reported outcomes and hence was reverse coded and used exclusively to evaluate the effects of distance in this study.

Table 2. Behaviors Study: Maintenance Measures Regression Analysis

	(1) Percent Weight Loss	(2) Maintain Weight (1/0)	(3) Months Maintained	(4) Pounds Regained	(5) Proportion Weight Regained
Struggle with weight	9.301**	-0.309	-1.523	2.753+	-0.000525
	(2.838)	(0.241)	(1.159)	(1.416)	(0.0436)
Combined Salience and Distance (Look at before/after pictures)	13.48**	0.597+	2.624+	-3.015	-0.164**
	(3.670)	(0.325)	(1.488)	(1.834)	(0.0564)
Distance[10]	0.135	0.182**	0.636*	-0.810*	-0.0313**
	(0.733)	(0.064)	(0.298)	(0.365)	(0.0112)
Number pounds regained	0.305**				
	(0.109)				
Motivated when thinking about weight regain	3.430	0.570*	3.350**	-5.137**	-0.141**
	(2.810)	(0.238)	(1.153)	(1.382)	(0.0425)
Negative Emotions[11]	11.58**	-0.211	-1.643	4.044+	0.0228
	(4.149)	(0.257)	(1.238)	(2.070)	(0.0637)
Age	0.601	-0.063	0.231	0.318	0.000572
	(0.704)	(0.061)	(0.285)	(0.353)	(0.0109)
Aged Squared	-0.00617	0.001	-0.003	-0.00445	-3.98e-05
	(0.00817)	(0.001)	(0.003)	(0.00409)	(0.000126)
Gender (male)	11.09**	-0.107	-1.081	0.776	-0.0481
	(2.747)	(0.233)	(1.1271)	(1.378)	(0.0424)
Education level	-7.134*	0.173	1.364	-0.844	0.0197
	(3.067)	(0.257)	(1.246)	(1.538)	(0.0473)
Observations	347	347	347	347	347
R-squared	0.155		0.076	0.098	0.095

Note: Regression models of weight loss outcomes. All regressions are OLS with the exception of Column 2, which is a logistic regression model. Missing values reduced the number of observations to 347. Standard errors in parentheses. + p<0.10; * p<0.05; ** p<0.01; *** p<0.001

[10] Reverse coded Euler "Circle Measure" to evaluate distance (not closeness).
[11] Emotions include agitated, uneasy, and disgusted when thinking about regaining weight.

The first regression results in Table 2, Columns 2-5 show distinctions in behaviors of those who maintained their weight loss compared to those who regained weight. Specific to the two goal maintenance constructs, looking at before-and-after pictures of oneself (i.e. a proxy for both salience of the past self and distance from the past self) was positively associated with maintenance outcomes (i.e. maintaining weight and months weight is maintained: $\beta = 0.60$ and $\beta = 2.62$, respectively; both $p<0.10$) and negatively associated with non-maintenance outcomes (i.e. pounds regained and proportion of pounds regained: $\beta = -3.02$, p=NS and $\beta = -0.164$, $p<0.01$, respectively). Also, the direct psychological distance measure was positively associated with maintenance outcomes (i.e. maintained weight and months weight maintained: $\beta = 0.18$, $p<0.01$ and $\beta = 0.64$, $p<0.05$, respectively) and negatively associated with non-maintenance outcomes (i.e. pounds regained and proportion weight regained: $\beta = -0.81$, $p<0.05$ and $\beta = -0.031$, $p<0.01$, respectively), indicating that weight maintenance outcomes are correlated with feeling more distant to one's past, pre-goal self. Feeling motivated when thinking about regaining weight, a yes or no binary variable, was positively associated with maintenance outcomes (i.e. maintained weight and months weight maintained: $\beta = 0.57$, $p<0.05$ and $\beta = 3.35$, $p<0.01$, respectively) and negatively associated with non-maintenance outcomes (i.e. pounds regained and percent weight regained: $\beta = -5.14$, $p<0.01$ and $\beta = -0.14$, $p<0.01$, respectively).

The next regression analysis examined main effects of past self salience and psychological distance on the likelihood of maintaining weight using more specific proxies for past self salience alone (i.e. looking just at before pictures and thinking about the past, overweight self) along with the Circle Measure for psychological distance. Table 2 regressions examined behaviors that heightened both salience and distance (i.e. feeling motivated when

thinking about regaining weight and looking at before and after pictures), but not past self salience alone.

Tables 3 and 4 examine the main and indirect effects, respectively, of looking at before pictures and psychological distance on likelihood of successful weight maintenance. In Table 3, Column 1, looking at before pictures of oneself (i.e. a proxy for salience of the past self only) (β= 0.15, $p<0.05$) and psychological distance from the past self (β= 0.20, $p<0.01$) were both positively associated with maintaining weight. In Table 4, Column 1, the before picture and psychological distance variables were mean centered to enable interpretable coefficients when including their interaction in the regression because the range of responses for these variables does not include zero. The interaction between looking at before pictures (i.e. past self salience) and psychological distance was not significant.

Columns 2 in Tables 3 and 4 examine the effects of thinking about the past, overweight self and psychological distance on the likelihood of successful weight maintenance. In Table 3, Column 2, thinking about the past self was not associated with maintaining weight (β= -0.04, p=NS), and psychological distance from the past self was positively associated with maintenance (β= 0.20, $p<0.01$). In Table 4, Column 2, the thinking about the past self and psychological distance variables were both mean centered, enabling more interpretable coefficients. The interaction between thinking about the past self and psychological distance yields a marginally significant and negative likelihood of maintenance (β= -0.06, $p<0.10$) with significant main effects of psychological distance (β= 0.21, $p<0.01$) but not thinking about the past self. However, the interaction variables in Table 4 provide limited insight as the meaning behind the interaction of these self-reported variables is ambiguous: Salience and distance may not be heightened simultaneously. Across all regressions in Table 3 and 4, feeling motivated when

thinking about regaining weight continues to be a significant and robust predictor of maintenance success. Regressions excluding the "Struggle with weight" and "Motivated when thinking about weight regain" are included in Appendix C and are consistent with the Table 4 regressions.

Table 3. Behaviors Study: Regression Analysis of Additional Salience Variables

	Maintain (1/0)	
	(1)	(2)
Struggle with weight	-0.429^{+}	-0.254
	(0.247)	(0.245)
Motivated when thinking about weight regain	0.479*	0.588*
	(0.240)	(0.240)
Salience (Looking at before pictures)	0.148*	
	(0.069)	
Salience (Thinking about the past self)		-0.043
		(0.064)
Distance[12]	0.201**	0.203**
	(0.064)	(0.063)
Negative Emotions	-0.293	-0.189
	(0.260)	(0.259)
Age	-0.051	-0.064
	(0.061)	(0.061)
Age Squared	0.001	0.001
	(0.001)	(0.001)
Male	-0.176	-0.137
	(0.235)	(0.232)
Education Level	0.126	0.145
	(0.259)	(0.254)
Constant	2.019	2.652*
	(1.262)	(1.248)
Observations	345	346
Log Likelihood	-218.614	-222.754
Akaike Inf. Crit.	457.228	465.508

Note: Regression models of dummy-coded weight maintenance (1/0). Standard errors in parentheses.
+ p<0.10; * p<0.05; ** p<0.01; ***p<0.001

[12] Reverse coded Euler "Circle Measure" to evaluate distance (not closeness).

Table 4. Behaviors Study: Regression Analysis of Additional Salience Variables, Interactions

	Maintain (1/0)	
	(1)	(2)
Struggle with weight	-0.429^{+}	-0.255
	(0.247)	(0.247)
Motivated when thinking about weight regain	0.479*	0.620*
	(0.240)	(0.242)
Salience (Looking at before pictures $_{\text{Centered}}$)	0.148*	
	(0.070)	
Salience (Thinking about the past self $_{\text{Centered}}$)		-0.065
		(0.066)
Distance$^{12}{}_{\text{Centered}}$	0.201**	0.206**
	(0.064)	(0.065)
Negative Emotions	-0.293	-0.205
	(0.260)	(0.260)
Age	-0.051	-0.062
	(0.062)	(0.062)
Age Squared	0.001	0.001
	(0.001)	(0.001)
Male	-0.177	-0.153
	(0.236)	(0.233)
Education Level	0.126	0.111
	(0.259)	(0.257)
(Before Pictures*Distance)$_{\text{Centered}}$	0.002	
	(0.037)	
(Think*Distance)$_{\text{Centered}}$		-0.063^{+}
		(0.032)
Constant	1.506	1.556
	(1.226)	(1.238)
Observations	345	346
Log Likelihood	-218.613	-220.842
Akaike Inf. Crit.	459.226	463.684

Note: Regression models of dummy-coded weight maintenance (1/0). The psychological distance measure is the reverse coded Euler "Circle Measure" to evaluate distance (not closeness). Standard errors in parentheses.
+p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Discussion

Study 2 provides evidence that past self salience and psychological distance are associated with weight maintenance outcomes and therefore provides support for Hypothesis 2a, 2b and 3. However, the observed relationships are correlational. First, Hypothesis 2 asserts that past self salience and psychological distance are independently sufficient to drive greater weight maintenance outcomes. In support of this hypothesis, I found that looking at pictures of one's past, overweight self and perceiving greater psychological distance from this self independently increased the likelihood of greater weight maintenance. Main effects from Table 3 suggest that each incremental increase in the frequency of looking at before pictures is associated with a 16% increase in the likelihood of successful maintenance, and separately, an incremental increase in perception of psychological distance is associated with a 22% increase in the likelihood of successful maintenance. The other past self salience variable, thinking about the past, overweight self, was not significant. Differences in the degree of vividness between looking at a picture of the past and just thinking about the past serve as a possible explanation for this seemingly inconsistent result. Looking at a before picture provides a much more concrete and easily imagined cognition of the overweight past self and is therefore more consistent with my conceptualization of past self salience for my goal maintenance theory. Thinking about the past overweight self is more ambiguous and may result in a much more abstract representation of the past. Thus, it may not inherently evoke a salient image of the past.

Additionally, Study 2 provides support for Hypothesis 3. Hypothesis 3 asserts that heightening both salience and psychological distance lead to a greater likelihood of maintenance than the constructs heightened independently. Looking at before-and-after weight loss pictures heightens salience of the past self and also emphasizes the dissimilarities between the past pre-

goal self and the post-goal self, which serves to increase perception of psychological distance. Therefore, this measure is a good proxy for heightened salience and psychological distance together – much more so than the interaction variables of the constructs in Table 4 whose interpretation is somewhat ambiguous – even though looking at before-and-after pictures was only marginally significant. Heightening both distance and salience by looking at one's respective before-and-after weight loss pictures on social media (a binary, yes or no variable) is associated with an 82% increase in likelihood of maintaining weight and about two and a half months of additional weight loss maintenance based on Table 2 regressions. This increase is over and above increases in likelihood from psychological distance alone. Furthermore, Table 3 and 4 regressions show significant effects of the salience measure (i.e. before pictures) and the distance measure when controlling for each other. Given the non-significant interaction between salience (i.e. before pictures) and distance, this suggests that additive effects of looking at before pictures and perceiving greater psychological distance lead to an increased likelihood of maintenance than either construct heightened independently.

Furthermore, feeling motivated when thinking about regaining weight may also serve to heighten both salience and psychological distance as prospection of a future state requires accessing memories of the past (Christensen et al., Schacter & Tulving, 1994). Across regressions in Table 2, 3, and 4, the feeling motivated variable (a binary, yes or no variable) was significantly associated with a greater likelihood of maintaining weight, between 73% to 86%. Although these effects are substantial, this variable's relationship to heightened salience and distance is somewhat ambiguous as mental representations of the past self may be abstract or concrete and perceptions of psychological distance from a hypothetical future state may be close or far (Trope & Liberman, 2010).

The regression analyses indicate that there are robust associations between the goal maintenance constructs and maintenance outcomes; however, no causal relationships can be inferred. Some variables may not serve as good proxies for past self salience and psychological distance – such as the feeling motivated variable and the interaction variables. Reverse causality is a concern among other variables that more precisely capture the constructs – such as the picture variables and the Circle Measure. To address these shortcomings, Study 3 aims to more precisely operationalize the two constructs using randomized controlled experiments to provide causal evidence for the effects of past self salience and distance from the past self on weight maintenance conducive judgments and behaviors.

Study 3: Weight Maintenance and Willingness to Pay

Study 2 provided correlational evidence that salience of the past, overweight self and psychological distance from the past self are more associated with successful weight maintenance than unsuccessful maintenance. To evaluate the potential causal relationship between these constructs and weight loss maintenance, Study 3 explored whether manipulating salience of the past, overweight self and distance from this self activates implicit goal maintenance behavior, reflected by reported willingness to pay (WTP) for healthy and unhealthy products and services. Study 3 consists of four independent studies that evaluated WTP for products and services, using different methods to operationalize the goal maintenance constructs and different populations in randomized controlled experiments. Three of the WTP studies are discussed in this section and are representative of the process underwent to progressively improve the salience and distance manipulations and test their effectiveness in driving weight maintenance conducive judgments. Additional details on all four studies are included in the Appendix.

WTP and Goal Motivation

Levels of motivation to pursue a goal influence the evaluation of goal-related objects; hence, motivation to pursue a goal may be reflected by how favorably objects related to the goal are evaluated (Ferguson & Bargh, 2004; Toure-Tillery & Fishbach, 2014). One of these measures of evaluation is WTP for healthy and unhealthy items. Applied to weight loss maintenance, I hypothesized that activating memories of the overweight, past self (i.e. making the past self salient) and increasing the perception of psychological distance between the past self and the current self increase levels of motivation to maintain weight loss. Increased levels of motivation may be measured by a higher WTP for goods and services closely associated with the reference goal and a lower WTP for goods and services that conflict with the reference goal. Accordingly, I hypothesized that heightening salience of the past self and psychological distance from this past self will result in a lower WTP for products and services contrary to a healthy and fit lifestyle and a higher WTP for products and services conducive to living a healthy and fit lifestyle.

Study 3a: WTP – Weight Loss Population

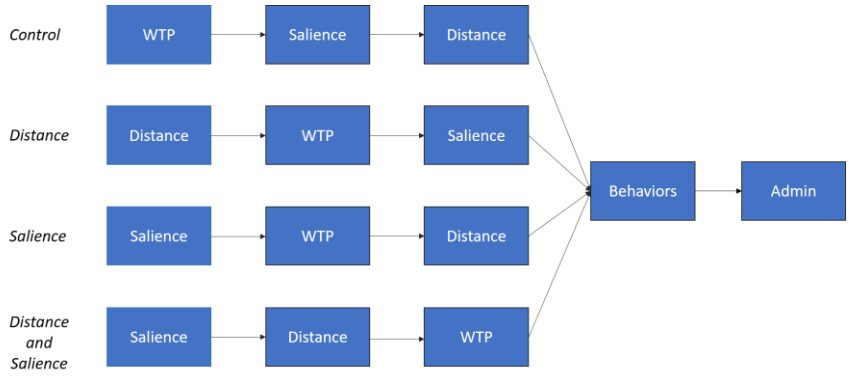
In Study 3a, I recruited 346 participants from the UCLA Anderson Behavioral Lab subject pool, who reportedly met a weight loss goal losing at least 10% of their body weight within three years of the study's date. Participants may have maintained or regained the weight they reportedly lost. The hypothesis, methods, and analyses for this study were pre-registered.[13]

[13] https://aspredicted.org/vi5xn.pdf

Method

Study participants were randomly assigned to four conditions: (1) a control condition, where the past self and distance were not made salient, (2) a salience condition, where the past self was made salient, (3) a distance condition, where the differences between the past self and the current self were highlighted, and (4) a distance and salience condition, where the past self and distance from the past self were both heightened. Participants were subsequently asked to complete multiple tasks in differing orders dependent on their assigned condition: (1) a WTP task, where they were asked to evaluate their WTP for five products and services, (2) a salience task, where they were asked to answer questions about their past self right before they lost weight including questions about prior weight, clothing size, and eating and exercise habits, (3) a distance task, where they were asked questions about their current self and asked to evaluate closeness between their current self and past self, right before they lost weight, along several different dimensions including personality and moral values, 4) a weight-loss behavior task, (5) a self-control task, and (6) an administrative/demographic task. The study questions are included in Appendix D. Figure 3 below provides a depiction of the ordering of tasks for each condition.

Figure 3. Study 2 Order of Tasks



Note: Order of tasks across conditions in Study 3a

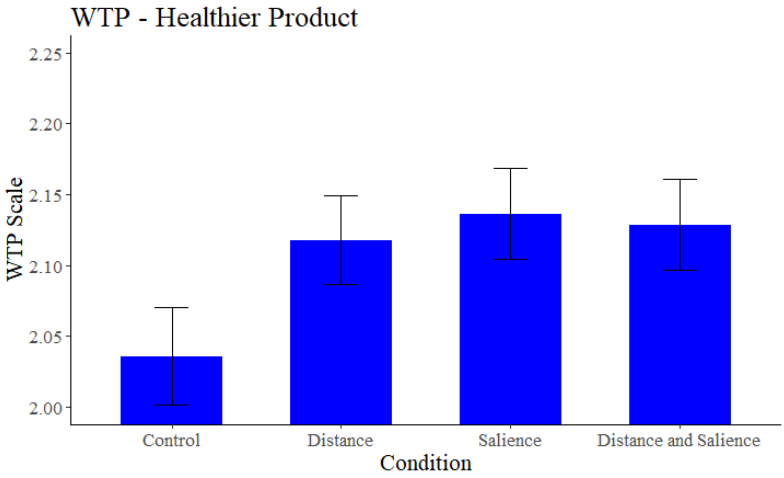
In the WTP task, participants were asked to choose their highest WTP for five products and services. Participants selected one of four price ranges from a multiple-choice list for each product. Because reasonable market rates for these goods and services vary, different price ranges were provided for each product. Consumption of the following products and services were considered associated with goal maintenance (i.e. healthy): tennis lessons, personal training sessions, and grapes. Consumption of the following products and services were considered contrary to successful goal maintenance (i.e. unhealthy): all-you-can-eat buffet and cake.

Results

I used all data from the 346 eligible participants in this analysis. From the 346 participants, 84 were randomly assigned to the control condition, 85 to the salience condition, 90 to the distance condition, and 87 to the combined distance and salience condition. I averaged WTP values (coded 1 through 4 for each multiple-choice answer, where 1 was the lowest WTP and 4 was the highest for healthy things and reverse coded for unhealthy things) for each participant where the average WTP score on the 1-4 point scale represented WTP for healthier products associated with goal maintenance.

The mean WTP for the control condition was 2.04. The mean WTP for the three treatment conditions (e.g. salience, distance, and distance and salience) were all either significantly or marginally significantly different than the control condition ($M=2.14$ and $p=0.034$; $M=2.12$ and $p=0.079$; $M=2.13$ and $p=0.049$, respectively). However, the differences between these conditions were not significant. Mean WTP levels with standard error bars are illustrated in Figure 4. These effects were replicated using a three-condition design of a different sample of Anderson Behavioral Lab subjects who met a 10% weight loss goal (see Appendix E).

Figure 4. Study 3a: WTP by Condition



Note: Average WTP across products with standard error bars in Study 3a. Difference in Means vs. Control: Salience and Combined condition ($p<0.05$); Distance ($p<0.10$).

Discussion

Study 3a provides support for Hypothesis 2 as the salience condition and distance condition each independently led to a significantly higher WTP for healthier items than the control condition. However, the effects of distance were just marginally significant, suggesting that distance is not as robust a predictor of better weight maintenance intentions as salience. Study 3a provided no support for Hypothesis 3 as the average WTP in the combined distance and salience condition was statistically equivalent to the salience-only and distance-only conditions.

Each treatment condition providing similar effects suggests that more precise operationalizations of the distance and salience constructs are needed to more effectively test whether the effects of one construct are distinct from the other. The manipulations for each construct in Study 3a were not pretested to ensure only salience was heightened in the salience condition and only distance was heightened in the distance condition. It is possible that no differences in effects were observed between conditions because both constructs were equivalently heightened across each condition or only one construct was heightened across all conditions given the current manipulations. To address this ambiguity, future studies use

pretested manipulations and post-study manipulation checks to evaluate how effectively each manipulation heightened its respective construct(s).

Study 3b: Design One – Imagined Weight Loss Goal

Study 3b was conceptually the same as the prior WTP study but was designed to address Study 3a's shortcomings. I manipulated salience and distance of the past self and evaluated the causal relationship between these constructs and implicit goal maintenance behavior, measured by WTP for healthy and unhealthy things. However, I used manipulations for distance and salience that were pretested to more effectively isolate each construct, resulting in a 2x2 design with high and low salience crossed with high and low distance with the intent to better separate the effects of each manipulation and examine whether an interaction exists between the two constructs. Unlike Study 3a, I used an Mturk subject pool and did not require participants to have previously met a weight loss goal, thus seeking to test whether the effects of salience and distance were broadly generalizable and could be generated even when participants imagined meeting a goal.

Study Summary

I recruited 800 Mturk workers who were at least 18 years of age or older to participate in Study 3b. Participants were asked to imagine that they recently met a weight loss goal by reading narratives that discussed their imagined weight loss journey. The scenario participants read was based on random assignment to one of four conditions: a control condition, distance condition, salience condition, and a combined distance and salience condition. After reading their assigned weight loss scenario, participants answered 18 multiple-choice WTP questions and then completed a post-study survey that included salience and distance manipulation check

questions. Analysis of the manipulation check results revealed that the manipulation for distance was unsuccessful, and therefore, no inferences could be made from the results of the study. A detailed account of the pre-registered methods, manipulation check and subsequent study analysis is provided in Appendix F.[14]

Although Study 3b was not successful, it did yield a key insight used to inform subsequent study designs: The results suggest that participants may be more prevention-focused when a goal maintenance mindset is activated. Although the constructs were confounded, the observed effects on WTP for unhealthy things (i.e. lower valuation of bad things or preventing consumption of bad things) were more robust than the effects observed effects on WTP for healthy things (i.e. higher valuation of good things or promoting consumption of good things). Although Ecker & Gilead (2018) assert that goal maintenance can be construed as promoting a positive outcome or preventing a negative outcome, Study 3b suggests that the prevention motivation may dominate. Hence, in addition to redesigning the distance manipulation, subsequent studies explored whether salience of the past, pre-goal self or psychological distance from this self leads to more prevention-associated (i.e. loss/no loss) judgments and behaviors or more promotion-associated (i.e. gain/no gain) judgments and behaviors (Higgins, 1997, 1998; Sekścińska & Trzcińska, 2016).

Study 3c: Design Two – Imagined Weight Loss Goal

Study 3c sought to address the shortcomings in Study 3b, primarily updating the manipulations to more clearly isolate the salience construct from the distance construct and secondarily to investigate how regulatory focus (Higgins, 1997, 1998; Sekścińska & Trzcińska,

[14] https://aspredicted.org/blind.php?x=hy9vi9

2016) may explain some of the observed effects. In addition to evaluating the effects of salience of the past self and psychological distance from the past self on WTP for products and services and regulatory focus, Study 3c explored whether perceived importance of body weight to one's self-concept mediated the main effects between the constructs and weight maintenance outcomes, as how important an identity attribute is to one's self-concept plays a key role in determining whether one's judgments and behaviors will be consistent with the respective identity attribute (Reed, 2004; Reed et al., 2012; Wilson & Ross, 2001). I preregistered the hypothesis, methods, and analyses for this study.[15]

Method

Study 3c builds on the previous WTP studies, using the same salience manipulation as in Study 3b but with an updated distance manipulation in a 2 (Salient – Pallid, Salient – Vivid) x 2 (Distance, No Distance) design. I recruited 800 Mturk workers who were at least 18 years old. Participants were randomly assigned to one of the four conditions: the control condition (Salient – Pallid, No Distance), the salience condition (Salient – Vivid, No Distance), the distance condition (Salient – Pallid, Distance), the distance and salience condition (Salient – Vivid, Distance). As in Study 3b, participants were asked to imagine they had met a weight loss goal. Therefore, meeting a weight loss goal in real life was not a requirement for participation. The narratives they read were based on their randomly assigned condition.

The salience manipulation heightened salience of an imagined past self who recalled a day in 2018 after a doctor's visit where the doctor informed the individual that he needed to lose weight. In the Salient – Pallid description, the individual recalls no other information germane to his weight, but random occurrences that happened during that day in 2018. In the Salient –

[15] https://aspredicted.org/xi8xi.pdf

Vivid description, the individual recalls specific facts about his weight, particularly difficulties from being an overweight person. The vivid description is anticipated to elicit more emotion associated with the past than the pallid description (Strack et al., 1985).

Through short narratives, the new distance manipulation told participants who were imagining that they just met a 30-pound weight loss goal that many aspects of who they are as people has not changed (i.e. the No Distance condition) or has changed significantly (i.e. the Distance condition). In the No Distance condition, the narratives included identity-related characteristics that were not anticipated to change substantially after a 30-pound weight loss goal was met, including personality, likes and dislikes, and ideals. In the distance condition, the narratives included dimensions of comparison that were anticipated to change substantially after a 30-pound weight loss goal was met, including clothing size, fitness level, and general health (i.e. blood pressure and cholesterol). The salience and distance manipulations are included in Appendix G.

After reading their respective narratives, participants answered the same 18 WTP questions for products and services used in Study 3b. The 18 products and services included 9 healthy items (i.e. grapes, health and fitness magazines, a stationary bike, apples, a protein shake, a gym membership, an entrée salad, a personal training session, a yoga class) and nine unhealthy items (i.e. a burger and fries, a slice of cheesecake, an all-you-can-eat buffet, an ice cream sundae, a bag of jelly beans, an unlimited movie concession voucher, a slice of apple pie, a latte with whipped cream). These items were pretested using a different Mturk sample to ensure healthy things were viewed as healthy and unhealthy things were viewed as unhealthy.

Thereafter, participants answered three post-study questions: one question to gauge perceived importance of the body weight identity attribute ("Based on the scenario you read,

how important do you think your weight is to your current identity (i.e. 'how you view yourself as a person'")) using a 7-point Likert scale anchored by "Not Important at All" and "Extremely Important") and two questions to evaluate regulatory focus during the study. The two regulatory focus questions evaluated whether the participant viewed weight maintenance as preventing weight gain (i.e. not losing the weight loss progress achieved) or a promoting a lifestyle conducive to maintaining weight (i.e. gaining a healthy lifestyle). Thus, I assume that a prevention focused approach to goal pursuit evaluates success in terms of no losses versus losses whereas a promotion focused approach evaluates success in terms of no gains versus gains (Sekścińska & Trzcińska, 2016). Participants were asked what they thought was more important for maintaining weight ("avoiding unhealthy behaviors or pursuing a healthy and fit lifestyle" – the prevention and promotion-focused approach, respectively). Participants were also asked how they would describe weight maintenance ("not losing the progress achieved when they met their weight loss goal or gaining a healthier and more fit lifestyle" – the prevention and promotion-focused approach, respectively). Both questions had binary choice answers. Finally, as in Study 3b, participants were asked the salience and distance manipulation check questions and whether they had ever met a 10% weight loss goal in real life. After attention and comprehension checks, 586 Mturk participant responses were analyzed.

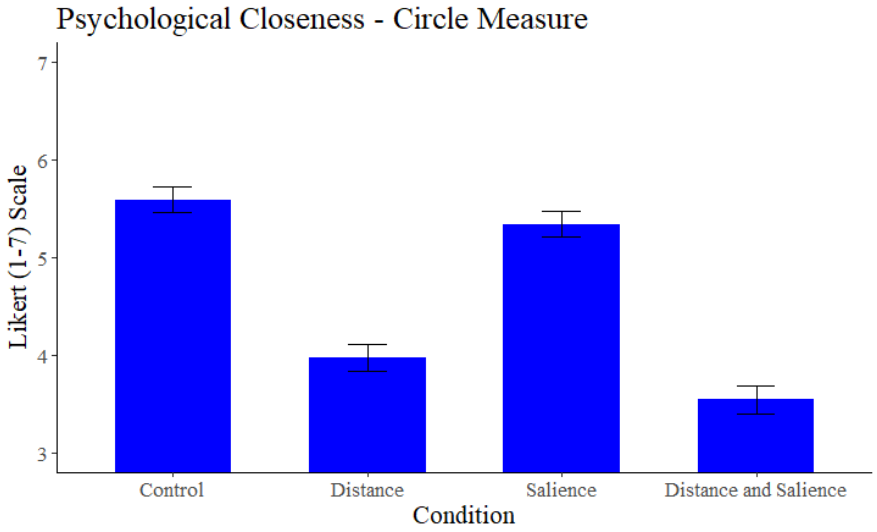
Results

Manipulation Check

First, I evaluated whether the distance and salience manipulations were more effective in the updated design. Using the Circle Measure to evaluate perceived distance from the past self, participants perceived significantly less similarity/closeness between their past, overweight self in the combined distance and salience condition compared to the control condition with a mean score of 3.55 on the 7-point scale compared to 5.59 for the control condition ($p<0.001$) where a

lower score means greater psychological distance. Additionally, participants perceived significantly more psychological distance in the combined distance and salience condition compared to the distance-only condition ($p<0.05$), which had a mean score of 3.98. The differences in perceived distance between the salience-only condition (M=5.34) and the control condition were not significant. Hence, the updated distance manipulation appears to more effectively heighten perception of distance more so than the salience manipulation, which did not heighten perception of distance relative to the control.

Figure 5. Study 3c: Distance Manipulation Check

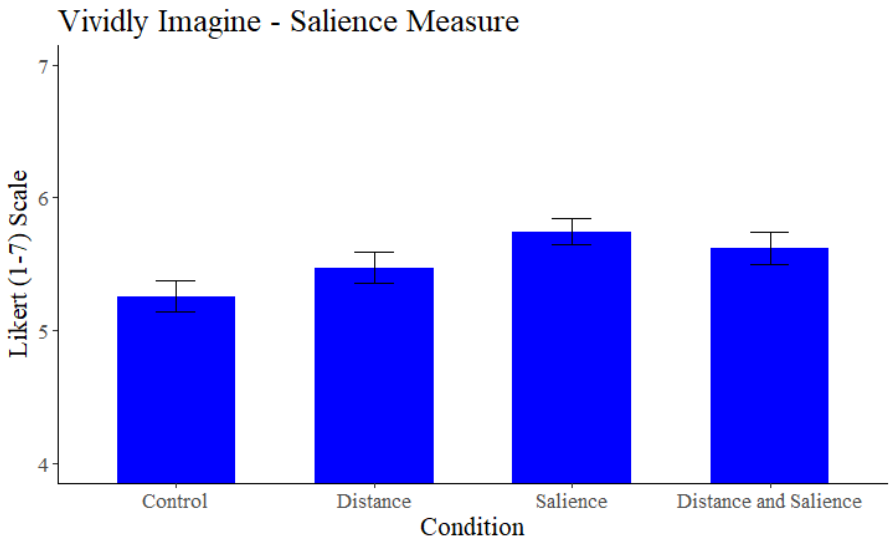


Note: Psychological closeness (distance) manipulation evaluation in Study 3c with standard error bars.

The salience manipulation was also consistent with predictions. For degree of salience, participants were asked how vividly they could imagine their past self before weight loss – including their struggles and concerns with weight – using a 7-point Likert scale anchored with "Not vividly at all" and "Extremely vividly." Participants in the salience condition (M=5.75) reported imagining the past self significantly more than participants in the control condition (M=5.26, $p<0.01$) and marginally significantly more than participants in the distance condition (M=5.48, $p<0.10$). Participants in the combined distance and salience condition (M=5.62) also

imagined a more vivid past self than those in the control condition ($p<0.05$). The difference in means between the distance condition and the control condition was not significant.

Figure 6. Study 3c: Salience Manipulation Check



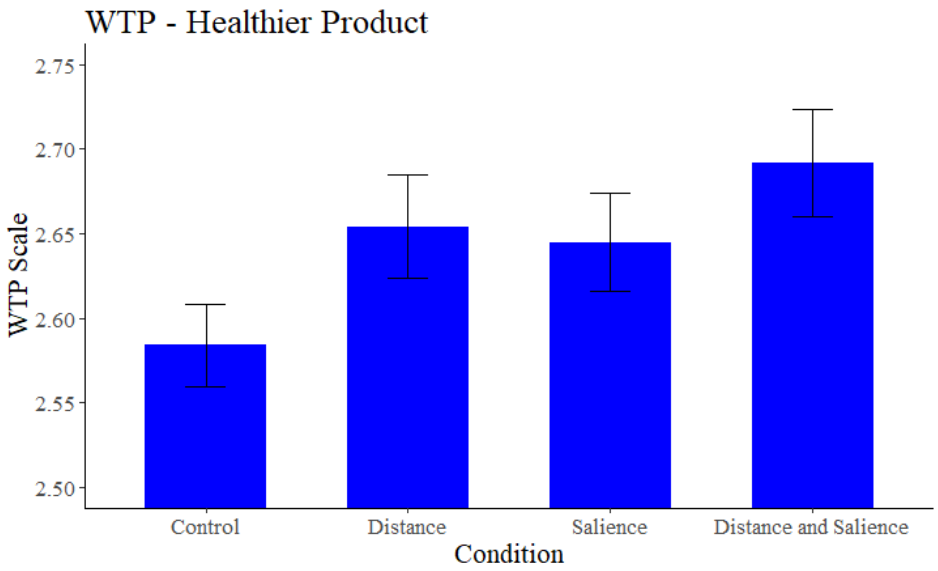
Note: Past self salience manipulation evaluation in Study 3c with standard error bars.

Dependent Variables

Next, I evaluated the differences in WTP across the four conditions. I averaged WTP levels across the 18 products categories (coded 1 through 4, where 1 is the lowest WTP and 4 is the highest for healthy things based on the multiple-choice option selected and reverse coded for unhealthy things) per participant to get a total WTP score. I created average WTP scores for the 9 healthy products and the 9 unhealthy products per participant as well – yielding three scores: average total WTP for all products with reverse coding, average WTP for healthy products only, and average WTP for unhealthy products only. Participants assigned to the distance condition had a higher average total WTP for healthier products and services ($M=2.654$) than those assigned to the control condition ($M=2.58$) with the differences in means being marginally significant ($p<0.10$). Those assigned to the salience condition had a total WTP for healthier items of 2.645, but the mean was not significantly different from the control condition ($p=0.11$).

Finally, those assigned to the combined distance and salience condition had a significantly higher average WTP for healthier products and services (M=2.69) relative to the control condition ($p<0.01$) as illustrated in Figure 7.

Figure 7. Study 3c: Total WTP by Condition



Note: Average WTP across products per condition with standard error bars using four conditions and a Mturk population with an imagined goal and pretested manipulations. Difference in Means vs. Control: Combined ($p<0.01$); Distance ($p<0.10$); Salience ($p=0.11$).

I ran a series of regressions, coding the salience construct (1: salience heightened/-1: salience not heightened) and the distance construct (1: distance heightened/-1: distance not heightened) as shown in Table 5. Taking a closer look at the constructs through this regression analysis, there was a marginally statistically significant main effect of salience on the total WTP measure ($\beta= 0.025$, $p<0.10$) and a statistically significant main effect of distance on the total WTP measure ($\beta= 0.029$, $p<0.05$) as shown in Table 5. When breaking down the total WTP measure to a WTP for unhealthy products only (i.e. the average WTP for the 9 unhealthy items), heightened salience of the past, overweight self relative to control and distance-only conditions was associated with a lower WTP for unhealthy products ($\beta= -0.038$, $p<0.05$). There was no

main effect of distance on the WTP for unhealthy things. Additionally, the interaction between salience and distance did not significantly affect the WTP for unhealthy things**.** When analyzing the WTP for healthy products only (i.e. the average WTP for the 9 healthy items), there were no main effects of salience of the past self or distance from the past self, and there was not a significant interaction between the two.

Table 5. Study 3c: WTP Regression Analysis

	(1) Total WTP	(2) WTP Unhealthy Foods	(3) WTP Healthy Foods
Salience	0.025^{+}	-0.038*	-0.001
	(0.015)	(0.019)	(0.023)
Distance	0.029*	-0.030	0.033
	(0.015)	(0.019)	(0.023)
Salience*Distance	-0.006	0.018	-0.012
	(0.015)	(0.019)	(0.023)
Constant	2.644***	1.687***	1.941***
	(0.015)	(0.019)	(0.023)
Observations	586	586	586
R^2	0.012	0.013	0.004
Adjusted R^2	0.007	0.008	-0.001
Residual Std. Error (df = 582)	0.350	0.450	0.558
F Statistic (df = 3; 582)	2.346*	2.592*	0.766

Note: Regression analysis for WTP outcomes in Study 3c. IV's binary coded (1/-1). Standard errors in parentheses. +p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Other Variable

Participants assigned to the distance condition (M=5.73, p<0.10) and the combined distance and salience condition (M=5.82, p<0.01) on average considered body weight a more important identity attribute than participants assigned to the control condition (M=4.72) on the 7-point scale. There were not significant differences between importance of body weight between the control and the salience condition (M=4.96). This identity importance measure was not a significant mediator of the relationship between salience of the past self or psychological

distance from the past self and the total WTP measure (using the Zhao et al., 2010 method with 10,000 resamples).

Regulatory Focus

Regarding regulatory focus, 73% of participants assigned to the combined distance and salience condition described their weight maintenance as "gaining a healthier and more fit lifestyle" instead of "not losing the progress achieved during weight loss", which was significantly more than the 60% of participants assigned to the control condition and 60% assigned to the salience condition who selected the former choice (χ^2: both $p<0.05$). There were not significant differences between the control and the salience condition and the distance condition, which had 64% of participants selecting the fit lifestyle choice. There were not significant differences in perceptions of what was more important when maintaining weight: avoiding unhealthy habits or pursuing a healthy lifestyle. In the control condition, 70% of participants selected pursuing a healthy lifestyle compared to 73% for the combined distance and salience condition, 71% for the distance condition, and 73% for the salience condition.

Discussion

Study 3c demonstrates that heightening both salience of the past, pre-goal self and psychological distance from this past self together can lead to a higher total WTP for healthier products and services compared to unhealthy products and services. Regarding Hypothesis 2, the mean differences between the distance-only condition and the control condition as well as the salience-only condition and the control condition did not reach conventional levels of statistical significance. Therefore, Study 3c does not provide support for Hypothesis 2. However, the main effects of the salience and distance constructs were marginally significant and significant, respectively, in the regression analysis, suggesting that salience and distance contribute to

improved WTP judgments. Nonetheless, this result does not provide strong evidence for Hypothesis 2 given the failure of the distance-only and salience-only conditions to significantly improve healthy intentions relative to the control condition.

Regarding Hypothesis 3, even though the mean total WTP in the combined distance and salience condition was significantly higher than the control condition, the mean WTP in the combined condition was not statistically different than the means of the distance-only or salience-only conditions. Therefore, Study 3c does not provide support for Hypothesis 3. Additionally, there is no evidence that salience moderated the effects of distance on WTP judgments as shown in the Table 6 regressions. Therefore, the observed effects of combined distance and salience appear to be generated from independent contributions from salience and distance that are not additive.

Furthermore, Study 3c suggests that salience leads to a greater prevention focus. Salience was a significant predictor of a lower WTP for unhealthy products and services (i.e. preventing eating unhealthy things that are not conducive to weight maintenance). This significant main effect was not observed with heightened distance alone. More specifically regarding regulatory focus, participants on average appeared to approach goal maintenance with a promotion focus (i.e. gaining a healthy lifestyle). Base rates for the binary-choice regulatory focus question demonstrate that on average participants see goal maintenance as gaining a healthy lifestyle (60%), which they believe is more important than preventing unhealthy habits.

Building on Study 3, subsequent studies will explore whether salience of the past self and psychological distance from the past self influence observable behaviors and weight maintenance outcomes – not just weight maintenance conducive judgments. Although Study 3c provides some evidence that heightened salience leads to more of a prevention regulatory focus, Study 4

more explicitly evaluates whether the salience and distance constructs impact situational regulatory focus.

Study 4: Article Study Examining Observable Behavior

Study 4 aimed to build on the prior studies by testing whether salience of the past, overweight self and psychological distance from this self impact observable behavior, reflected by motivation to learn about topics related to maintaining weight. Additionally, Study 4 further evaluates whether heightened salience leads to greater prevention behavior and whether heightened distance leads to greater promotion behavior. I predicted that making the past self salient and psychological distance from the past self appear far would lead to greater interest in topics related to healthy habits and a healthy lifestyle compared to other topics of similar general interest based on pretests. I also predicted that prevention-oriented stimuli will be more attractive to participants when salience is heightened, and promotion-oriented stimuli will be more attractive to participants when distance is heightened. I preregistered this study.[16]

Method

I recruited 800 Amazon Mturk workers and randomly assigned them to one of four conditions in the 2 (Salient – Pallid, Salient – Vivid) x 2 (No Distance, Distance) design using the same manipulations as in Study 3c. As in Study 3c, the Salient – Pallid, No Distance condition represented the control condition. The Salient – Pallid, Distance condition represented the distance-only condition. The Salient – Vivid, No Distance condition represented the salience-only condition. Lastly, the Salient – Vivid, Distance condition represented the combined distance and salience condition. After reading their respective narratives based on

[16] https://aspredicted.org/ki84n.pdf

their randomly assigned condition, participants were provided a list of six article topics and asked to choose the articles (each 150-200 words long) that they would like to read. Participants were told that they must select one article, and to incentivize them to only select articles they were motivated to read, participants were told that they would be asked comprehension questions after each article they decided to read.

The article topics included: "Preventing Bad Habits", "Promoting a Healthy Lifestyle", "Best Cities to Live in the U.S.", "Summer 2019 Movies", "Best Jobs in the U.S.", and "Pollution from Plastics". These topics were pretested to ensure comparable general interest in the absence of any manipulations. "Preventing Unhealthy Habits" and "Promoting a Healthy Lifestyle" served as the "healthy articles". The "Preventing Unhealthy Habits" article served as the prevention-focused article, and the "Promoting a Healthy Lifestyle" article served as the promotion-focused article. More information about the narratives is provided in Appendix H. After reading their narratives, participants answered a reading comprehension question about the narrative they read. They then completed the same manipulation check and weight loss history questions used in prior studies to conclude Study 4. After excluding observations from participants who did not pass the attention and comprehension checks, 659 observations remained.

Results

Manipulation Checks

First, I evaluated whether the distance and salience manipulations were successful. Using the Circle Measure to evaluate perceived distance from the past self, participants perceived significantly less similarity/closeness between their past, overweight self in the combined distance and salience condition (M=3.84) and the distance condition (M=4.10) compared to the

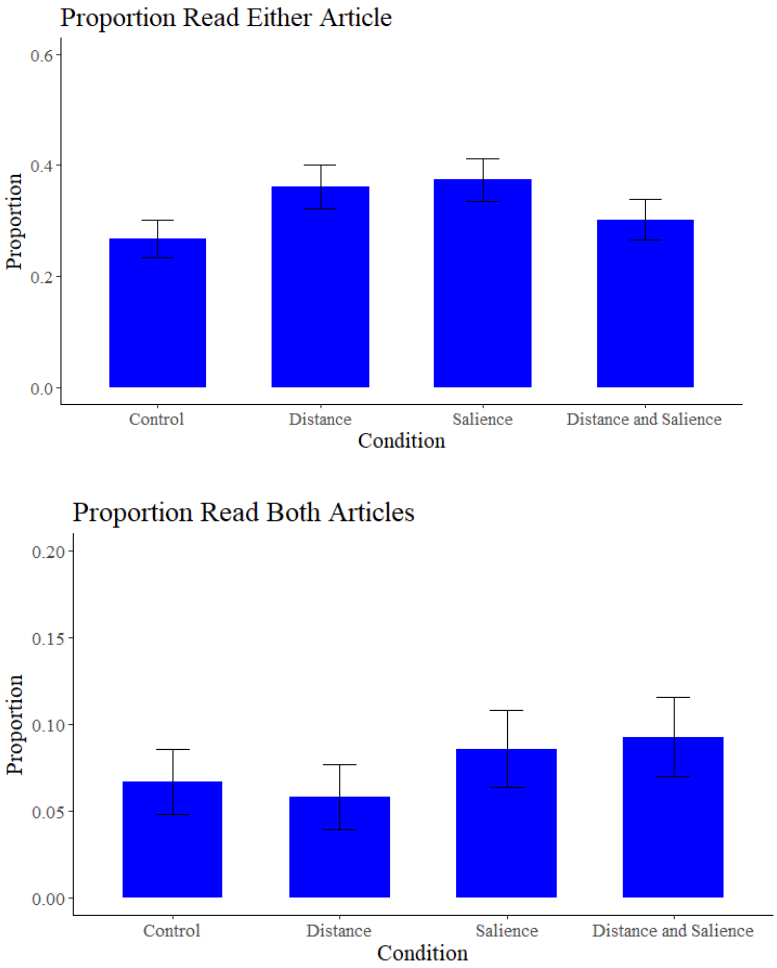
control condition (M=5.70, both $p<0.001$) and the salience condition (M=5.16, both $p<0.001$) on the 7-point scale where a lower score means greater psychological distance. Thus, the distance manipulation was successful. In the salience manipulation check, participants were asked how vividly they could imagine their past self before weight loss – including their struggles and concerns with weight – using a 7-point Likert scale anchored with "Not vividly at all" and "Extremely vividly." Participants in the salience condition (M=5.44) reported imagining the past self as vividly as those in the control condition (M=5.30), combined distance and salience condition (M=5.60), and the distance condition (M=5.41). None of these differences were statistically significant – possibly attributable to the study design. Participants read lengthy articles prior to answering the manipulation check questions during the post-study survey; thus, the details of their imagined past self may have been harder to retrieve in memory. Hence, the null result may not be an indication that the salience manipulation was unsuccessful.

Dependent Variables

Next, I analyzed the primary DV's. I evaluated (1) the proportion of participants across each condition who chose at least one of the healthy articles and (2) the proportion of participants across each condition who chose both healthy articles. Of the 659 participants, 214 participants chose at least one of the healthy articles and answered the respective comprehension check question correctly. As illustrated in Figure 8, increasing the perceived distance from the past self results in a greater likelihood of reading at least one healthy article where 36% of participants assigned to the distance condition chose at least one healthy article and answered the associated comprehension question correctly compared to 27% assigned to the control condition (χ^2: $p<0.10$). Similarly, 37% of participants assigned to the salience condition chose at least one healthy article and correctly answered the associated comprehension question, which was

significantly greater than the control condition (χ^2: $p<0.05$). However, the 30% of participants in the combined distance and salience condition who chose at least one healthy article and correctly answered the comprehension question was not significantly different than the percentage in the control condition.

Figure 8. Article Study: Healthy Articles Read by Condition



Note: Proportion of participants reading target articles in Study 4, the Article Study. With the "Either Article" DV, Difference in Means vs. Control: Salience ($p<0.05$); Distance ($p<0.10$). There were not significant differences between the control and treatment conditions with the "Both Articles" DV. Standard error bars are included.

Nine percent of participants in the salience-only condition and also 9% in the combined distance and salience condition read and successfully comprehended both of the healthy articles,

but this proportion was not statistically different than the control condition (7%) or the distance condition (6%).

To further examine the effects of the distance and salience constructs, I ran a series of logistic regressions, coding the salience construct (1/-1) and the distance construct (1/-1) shown in Table 6. Column 1 provides the likelihood estimates of each construct being associated with either healthy article being read while controlling for the other construct. As illustrated in Figure 8 and evidenced by the negative interaction term (β=-0.19, $p<0.05$), heightening the distance condition, in the absence of salience, is associated with a significantly higher likelihood of reading at least one healthy article. Similarly, the salience condition, in the absence of distance, is associated with a significantly higher likelihood of reading at least one healthy article. Heightened distance and salience, however, is associated with a lower likelihood of reading at least one healthy article.

Table 6. Article Study: Regression Analysis

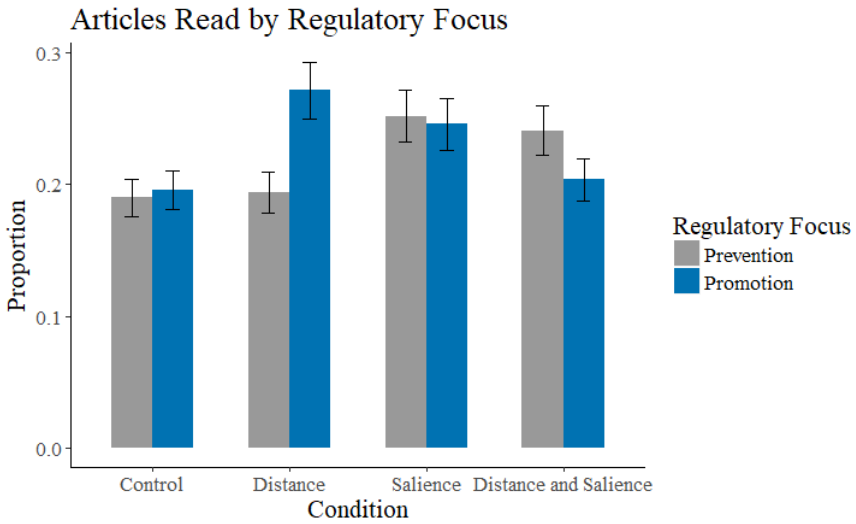
	(1) Either Article	(2) Both Articles	(3) Prevention Article	(4) Promotion Article
Salience	0.056	0.193	0.200*	-0.020
	(0.084)	(0.150)	(0.102)	(0.095)
Distance	0.028	-0.018	-0.060	0.081
	(0.084)	(0.150)	(0.102)	(0.095)
Salience*Distance	-0.189*	0.059	-0.008	-0.206*
	(0.084)	(0.150)	(0.102)	(0.095)
Constant	-0.731***	-2.517***	-1.495***	-1.296***
	(0.084)	(0.150)	(0.102)	(0.095)
Observations	659	659	659	659
Log Likelihood	-412.535	-176.090	-313.576	-340.655
Akaike Inf. Crit.	833.070	360.181	635.151	689.310

Note: Regression analysis for Study 4. DV's are binary coded (1/0). IV's are binary coded (1/-1). Standard errors in parentheses. +p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Regulatory Focus

As exploratory analysis (not preregistered), I analyzed whether salience was associated with a greater prevention focus, evidenced by a higher likelihood to choose the 'Prevent Bad Habits' article and whether distance was associated with a greater promotion focus, evidenced by a higher likelihood to choose the 'Promoting a Healthy Lifestyle' article. Column 3 shows that heightened salience increases the likelihood of only choosing the 'Prevent Bad Habits' article ($\beta=0.2$, $p<0.05$). Similar to the interaction in the Column 1 regression, Column 4 shows that distance in the absence of salience increases the likelihood of choosing the 'Promoting a Healthy Lifestyle' article (interaction coefficient: $\beta=-0.21$, $p<0.05$). Twenty-seven percent of the participants in the distance condition read the 'Promoting a Healthy Lifestyle' article, which was significantly more than the 17% of participants who read the same article in the control condition ($p<0.05$). The percentage in the distance condition who read the promotion article was also significantly more than the 15% of participants in the same condition who read the 'Prevent Bad Habits' article ($p<0.01$). Additionally, the 23% of participants in the salience condition who read the prevention-focused article is greater than the 15% who read the same article in the distance condition ($p<0.10$). The relationships between regulatory focus and assigned condition are illustrated in Figure 9.

Figure 9. Article Study: Prevention vs. Promotion Articles by Condition



Note: Proportion of participants that read the prevention articles and the promotion articles across conditions with standard error bars in Study 4.

Discussion

In Study 4, a prevention-focused article and a promotion-focused article were included in the design to evaluate (1) whether salience of the past self and distance from the past self independently led to goal conducive behavior and (2) whether heightened salience made the prevention-oriented article more attractive to read and heighted distance made the promotion-oriented article more attractive. Consistent with Hypothesis 2a and 2b, respectively, in Study 4, participants in the salience-only and distance-only conditions were more likely to learn about healthy behaviors that are conducive to maintaining weight. However, the effects of distance were only marginally significant suggesting that distance is not as robust a predictor of better weight maintenance behaviors. Furthermore, participants who imagined a salient image of the past self (either in the salience-only condition or the combined distance and salience condition) were significantly more likely to read the prevention article, suggesting that salience of the past self evokes a situational prevention focus. Additionally, participants in the distance condition were more likely to read the promotion article compared to the prevention article, suggesting that

psychological distance evokes a situational promotion focus. These results provide further evidence that heightened salience and heightened distance independently drive greater weight maintenance behavior, but they operate differently when driving these effects.

The independent effects observed in the distance-only and salience-only conditions were attenuated when both constructs were heightened (i.e. the combined distance and salience condition). This result is inconsistent with Hypothesis 3. Prior studies demonstrate that the two constructs are not additive, but Study 4 suggests that heightening both constructs can lead to a reversal of effects. Although there is a directional reversal in effects in the combined distance and salience condition, the likelihood of reading a healthy article in this condition is still not statistically different from the likelihood of reading a healthy article in any of the other conditions. Therefore, this could be consistent with the non-additive, attenuation of effects observed in the WTP studies. On the other hand, this could indicate that too much distance and salience can lead to resting in one's laurels (Amir & Ariely, 2008). As another explanation for the attenuated effect observed in the distance and salience condition – for participants assigned to this condition, the prevention-focused and promotion-focused stimuli may have lessened motivation to read either article. Without motivation to focus exclusively on prevention or promotion, participants may have been less driven to choose either article.

Study 5: Video Game Study Examining Observable Behavior

Building on the prior study, the Video Game Study aimed to evaluate the effect of salience and distance on actual behavior, using a novel task: a video game that simulated the goal maintenance process. I predicted that goal maintenance motivation (as measured by the number of times the video game was played) would be highest in the condition where both the

past self and psychological distance were heightened, followed by the salience-only condition and the distance-only condition, and least in the control condition (where neither the past self nor psychological distance were heightened).

Method

I recruited 1,000 participants from Amazon's Mturk and asked them to imagine that they met a weight loss goal using the same narratives as those used in Study 3c and Study 4. In Task 1, participants were assigned to one of four conditions (i.e. control, salience, distance, combined distance and salience) and read their respective weight loss scenario based on condition. For each of the treatment conditions, pictures of the imaged overweight past self were embedded in the weight loss narratives using two sets of photographs: one male and one female. This included the "before" weight loss picture in the salience-only condition, the "after" weight loss picture in the distance-only condition, and the "before-and-after" weight loss picture in the combined distance and salience condition.

In Task 2, participants worked to maintain the weight loss goal they read in their narratives by playing a video game. In the game, participants used a button, "Accelerate", to maneuver their game pieces around obstacles in the game course.[17] Each round of the game ended when a participant's game piece ran into an obstacle. When participants crashed into an obstacle, they received different prompts dependent on condition. In all conditions, participants were instructed to: "Click 'Play Again' to continue maintaining weight or 'Exit' to the completion survey." In the control condition, participants received no additional guidance. In the distance condition, this base message was preceded with "Remember how much you have

[17] I designed the game using code snippets from the www.w3schools.com HTML game module and additional code I developed.

changed!". In the salience condition, this base message was preceded with "Remember the old you!". In the combined distance and salience condition, this base message was preceded with "Remember the old you and how much you have changed!". In addition to receiving the prompt when the game piece crashed into an obstacle (i.e. at the end of a round), the "before" weight loss picture appeared on the computer screen in the salience condition. The "after" weight loss picture appeared in the distance condition, and the "before-and-after" weight loss pictures appeared in the combined distance and salience condition. The game pieces in all conditions were images of the present self (i.e. the "after" picture).

Participants were instructed that they could play as many rounds in the game as they would like and each 15 seconds they played in the game was equivalent to one month of successful weight maintenance. Performance in the game (i.e. the number of rounds played) was associated with weight maintenance motivation. Other game metrics, such as the average score of all rounds played and the highest score obtained across rounds, were also captured. A screenshot of the video game web application is included in Appendix I. When participants decided they no longer wanted to play the game, they selected the 'Exit' button and proceeded to Task 3.

In Task 3, participants completed a post-game survey where they answered manipulation check questions and regulatory focus (i.e. prevention or promotion) questions as in prior studies. Participants were also asked how often they played video games similar to the one in Task 2 (7-point Likert scale anchored by 'Not Often at All' and 'Extremely Often'). They finally completed the study after answering the same weight loss history questions as in prior studies. I reran the control condition nine days after the original study because of a technical issue with the game piece in the original control condition. I ran the control exactly as previously with the

corrected game piece. After replacement of the original control condition and removal of observations that did not meet attention filters, 745 observations remained for analysis.

Results

Manipulation Checks

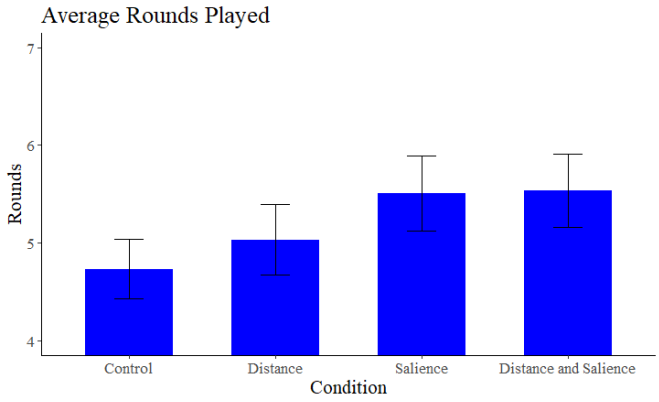
First, I evaluated whether the distance and salience manipulations were successful. Using the Circle Measure to evaluate perceived distance from the past self, participants perceived significantly less similarity/closeness between their past, overweight self in the combined distance and salience condition (M=3.56) and the distance condition (M=3.71) compared to the control condition (M=5.51, both $p<0.001$) and the salience condition (M=5.33, both $p<0.001$) on the 7-point scale where a lower score means greater psychological distance. Thus, the distance manipulation was successful: Heightening distance led to less perceived closeness between the past and present selves. For the salience manipulation check, participants in the combined distance and salience condition (M=6.04) and the salience condition (M=5.98) reported imagining the past self significantly more vividly than those in the control condition (M=5.59, both $p<0.001$) and the distance condition (M=5.49, both $p<0.001$). Thus, the salience manipulation was also successful: Heightening salience of the past self made it easier to vividly imagine the past self.

Dependent Variables

Next, I analyzed the DV's: number of rounds played, average score across rounds, and highest score achieved. Participants in the combined distance and salience condition on average played 5.54 rounds, followed by the salience-only condition (M=5.51), distance-only condition (M=5.03) and the control condition (M=4.74) as shown in Figure 10. The difference in average games played between the combined distance and salience condition and the control condition

was marginally significant ($p<0.10$), and the other differences were not statistically different than the control.

Figure 10. Game Study: Rounds Played by Condition



Note: Average number of rounds played per condition with standard error bars in Study 4, the Video Game Study.

In addition to the motivational metric (i.e. number of rounds played), I captured the average score obtained across all rounds a participant played and their highest score. There were not significant differences across conditions in the average score of rounds played (M=9.34 seconds, all conditions). For the highest score, participants in the distance-only condition (M=13.81) and the distance and salience condition (M=13.94) had high scores that were significantly less (both $p<0.05$) than those in the salience condition (M=15.72). The two conditions where distance was heightened were also marginally significantly less than the control condition (M=15.62, both $p<0.10$).

Isolating the individual constructs using regression analyses provides a clearer perspective of the effects of distance on the average number of rounds played and the highest score. I ran a series of regressions, coding the salience construct (1/-1) and the distance construct (1/-1) as shown in Table 7. Although these metrics were captured to evaluate level of effort playing the game, they are also directly related to expertise playing the game and therefore the

self-reported experience level playing similar games was used as a control variable. In Column 1, heightening salience was associated with a marginally significant increase in motivation to play more rounds of the game (β=0.32, $p<0.10$) than in the absence of salience. The amount of experience participants had playing similar video games was not a significant predictor of performance when included as an independent variable in the Column 1 regression. In Column 2, even when controlling for gaming skill level, the main effect of heightened distance was associated with a lower high score in the game task (β = -0.86, $p<0.01$). It is important to note that the gaming experience level variable was captured after the game task and therefore, participant's self-report on experience may have been biased by their performance in the game.

Table 7. Game Study: Game Performance Regression Analysis

	(1) Number Rounds Played	(2) Highest Score	(3) Average Score
Salience	0.318^{+}	0.078	-0.019
	(0.179)	(0.328)	(0.180)
Distance	0.082	-0.858**	-0.283
	(0.179)	(0.328)	(0.180)
Game Experience	-0.016	0.402*	0.175^{+}
	(0.105)	(0.193)	(0.106)
Salience * Distance	-0.065	-0.008	-0.010
	(0.179)	(0.328)	(0.180)
Constant	5.247***	13.711***	8.870***
	(0.330)	(0.606)	(0.333)
Observations	739	739	739
R^2	0.005	0.016	0.007
Adjusted R^2	-0.001	0.011	0.002
Residual Std. Error (df = 734)	4.850	8.901	4.889
F Statistic (df = 4; 734)	0.879	2.979*	1.382

Note: Regression analysis of video game performance metrics. IV's are binary coded (1/-1). Standard errors in parentheses. +p<0.10; * p<0.01; ** p<0.05; ***p<0.001

Regulatory Focus

Finally, I analyzed the regulatory focus questions participants completed in the exit survey. To investigate whether the salience and distance manipulations evoked a situational prevention or promotion focus, in Task 3 participants answered questions to elucidate how they perceived the weight maintenance process, including: (1) "What do you think is more important when trying to lose weight" – either "avoiding unhealthy behaviors" (i.e. prevention) or "pursuing a healthy lifestyle" (i.e. promotion), and (2) "How would you describe weight maintenance" – either "not losing progress achieved when you met your weight loss goal" (i.e. prevention) or "gaining a healthier and more fit lifestyle" (i.e. promotion). In the regression table, Table 8, question (1) is represented in Column 1, "Prevention Focus", where the prevention response is coded as 1 and the promotion response is coded as 0. In Table 8, question (2) is represented in Column 2, "Promotion Focus", where the promotion response is coded as 1 and the prevention response is coded as 0. As shown in Column 2, heightening salience relative to no salience was associated with less of a promotion focus: gaining a healthier and more fit lifestyle (β= -0.20, $p<0.05$). Heightening distance relative to no distance, on the other hand, was associated with less of a prevention focus and more of a promotion-focus: avoiding unhealthy behaviors (β= -0.28, $p<0.001$) in Column 1 and gaining a healthier and more fit lifestyle (β=0.24, $p<0.01$) in Column 2.

Table 8. Game Study: Regulatory Focus Regression Analysis

	(1) Prevention Focus	(2) Promotion Focus
	logistic	*logistic*
Salience	0.003	-0.195*
	(0.082)	(0.082)
Distance	-0.284***	0.244**
	(0.082)	(0.082)
Salience*Distance	0.054	0.020
	(0.082)	(0.082)
Constant	-0.902***	0.912***
	(0.082)	(0.082)
Observations	745	745
Log Likelihood	-443.023	-440.070
Akaike Inf. Crit.	894.046	888.140

Note: Regression analysis of participant's regulatory focus. The IV's are binary coded (1/-1). Standard errors in parentheses. +p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Discussion

Study 5 used a different approach to measure weight loss motivation through observed behavior and provided mixed evidence supporting the goal maintenance theory. Distance and salience independently did not lead to a statistically greater number of rounds played in the game than the control condition. Therefore, this study does not provide support for Hypothesis 2. The combination of distance and salience – although not additive as in prior studies – led to a marginal increase in motivation relative to the control condition ($p<0.10$). Although this result is theoretically interesting, it does not support Hypothesis 3 as the differences in means between the construct-only and combined conditions were not significant. The non-robust results may be an artifact of the game task itself as variance in participant's interest in playing video games and game skill level could be much higher than variance in the other tasks used to measure goal maintenance motivation (e.g. reading a lower and upper-bounded set of articles and choosing among lower and upper-bounded WTP price levels). The data was not winsorized to remove outliers. Even though the sample size was larger than those used in the other experimental

studies (n=1,000), an even larger sample size is likely needed to yield more statistically robust differences in means across conditions.

Contrary to Study 3c and 4, which used the same manipulations – in Study 5, heightened salience-only was a predictor of more maintenance motivation ($p<0.10$) whereas heightened distance-only had no effect based on the regression analysis. As a possible explanation, in Study 5, pictures were embedded in the narratives and throughout the game task. Although pretests of the salience and distance narratives with embedded pictures yielded similar patterns to pretests without the pictures, the use of the "before" picture during the game session in both of the salience conditions may have heightened the effects of salience relative to distance.

Although the effects on motivation to play more rounds were not particularly robust, especially for the distance construct, in-game performance appeared to vary based on condition where heightened distance led to a significantly lower high score. This is not necessarily an indication of lower effort expended (i.e. resting in one's laurels), as the number of rounds played in both conditions where distance was heightened was not statistically different than the other conditions. However, this could support the underlining premise of the regulatory focus proposition that distance and salience may operate differently. Heightened distance may have led to a different strategy than heightened salience-only: Such strategies may have included playing several rounds as quickly as possible or showing more persistence even when performance was not exemplary.

Providing additional evidence for the regulatory theory proposition, Study 5 also showed that perspectives of the weight maintenance process differed when distance was heightened relative to when salience was heightened. Based on reports of their perspective of the weight

maintenance process in the post-game survey, when psychological distance was heightened participants tend to be more promotion-focused (i.e. promoting a healthy lifestyle) and less prevention-focused (i.e. avoiding unhealthy behaviors) than when salience of the past self was heightened.

Study 6: Preliminary Longitudinal Weight Maintenance Analysis

The purpose of Study 6 was to test whether the effects of past self salience and psychological distance on weight maintenance motivation observed in prior studies would persist over time and outside of a laboratory environment. I evaluated whether reminders of the past self and psychological distance from the past through digital media led to long-term weight maintenance outcomes among individuals who recently met a weight loss goal. I predicted that participants who received frequent reminders of the past pre-goal self (i.e. keeping the past self salient) and a heightened sense of distance from the past, pre-goal self would be more likely to maintain weight over a longer time period. Because of the small sample size in this study, the findings were considered preliminary and will ideally be used to inform future study designs.

Method

In Study 6, I recruited 49 subjects from the UCLA Anderson Behavioral Lab subject pool who met a weight loss goal in 2017, losing at least 10% of their body weight and who had reported that they maintained their weight loss.[18] Participants were at least 18 years old and were required to submit a "before" picture (i.e. a picture of themselves before they lost weight)

[18] Four participants whose weight loss was less than 10% (i.e. 5%, 6%, 8%, 9%, respectively) were allowed to remain in the study.

and an "after" picture (i.e. a picture of themselves currently). These pictures served as verification of their weight loss and stimuli for the study.

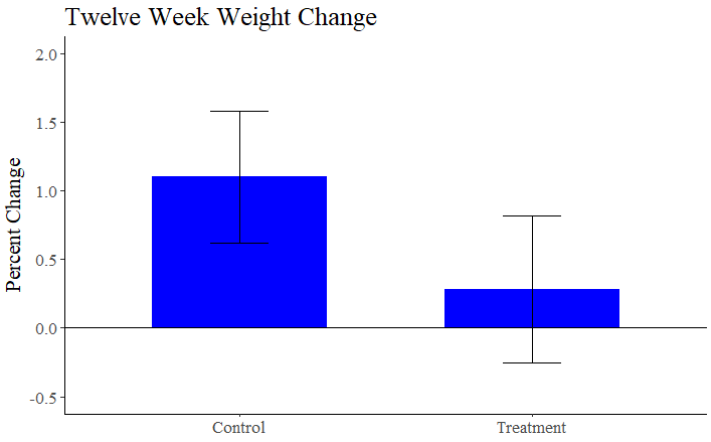
Participants were randomly assigned to two conditions: a control and a treatment condition. All participants received two email messages each week throughout the twelve-week study. Participants in the control condition received an email with an informational message. Examples of the messages are provided in Appendix J. Participants accessed their weekly messages using a web link, and I was able to verify whether each message was accessed. Participants in the treatment condition received an email with an informational message and their respective "before-and-after" pictures. Participants in both conditions were required to weigh-in without shoes or jackets at the UCLA Anderson Behavioral Lab using the same digital scale throughout the study. Participants were weighed three times: (1) one week before the study began, (2) week five of the study, and (3) one week after the study ended. Unbeknownst to them, before or during the study, participants were invited to complete a "surprise" follow-up weigh-in approximately 6 weeks after the formal conclusion of the study (i.e. about 18 weeks after the study initially began).

In this study, past self salience and psychological distance were both operationalized using the before-and-after pictures. I hypothesized that participants in the treatment condition – who received weekly reminders of their past self, coupled with a vivid comparison of their past and present selves via the before-and-after pictures – would be more motivated to sustain healthy behaviors conducive to weight maintenance. Consequently, I expected that participants in the treatment condition would have a lower average weight gain compared to the control condition.

Summary of Findings

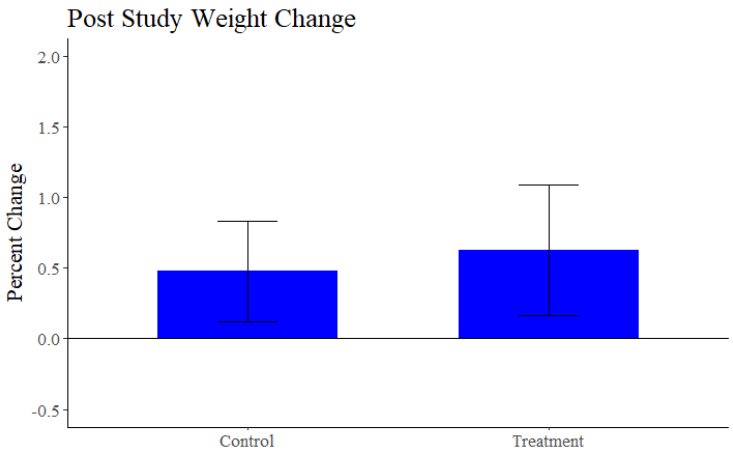
Forty-six participants met the requirements to complete the study. As shown in Figure 11, on average participants assigned to the treatment condition, who received weekly messages with personal photos, gained 0.3% weight, and those assigned to the control condition gained 1.1% weight on average after 12 weeks. The difference in means was not statistically significant. Subsequently, I followed up with participants about six weeks after the study ended to observe whether there were any differences in weight change between the treatment and control groups post-study. Thirty-four participants responded and were reweighed. As illustrated in Figure 12, there were still not statistically significant differences in percentage weight change with 0.62% weight gain on average for participants who had been assigned to the treatment condition and 0.48% gain on average for those who had been assigned to the control condition. Although an interesting design, Study 6 did not provide conclusive evidence for or against my proposed theory because the results after 12 weeks of intervention were not statistically robust. This could possibly be attributable to the study's small sample size. Future work may include replicating this study with a larger sample size.

Figure 11. Message Study: Twelve-Week Results



Note: Average percentage weight change in Study 6 after 12 weeks (i.e. the third weigh-in) with standard error bars.

Figure 12. Message Study: Post-Study Results



Note: Average percentage weight change in Study 6 of the 34 participants who consented to a post-study weigh-in approximately six weeks after the end of the study. Standard error bars included.

General Discussion

The diversity of methods and contexts used to test my theory of goal maintenance is a particular strength of this project. Through several studies, I found that thinking about the past, before a significant weight loss goal was met, and disassociating from that past less flattering self motivate goal maintenance conducive judgments and behaviors. I sought evidence that these two factors are associated with greater weight maintenance motivation by examining posts on social media, online surveys, and multiple experiments using WTP measures, internet articles, video games, and before-and-after pictures as stimuli. Effects were observed among different groups, including student, Amazon's Mturk, and Reddit populations comprised of participants who met a weight loss goal or just imagined that they met a weight loss goal.

Using this multi-methods approach, I found evidence that salience of the past self and distance from the past, overweight self are associated with healthier judgments and behaviors. Study 1, a test of Hypothesis 1, provided observational evidence that goal maintenance is psychologically distinct from goal pursuit as measured by sentiment analysis of past-focused,

discrepancy, and comparison language. However, this study did not provide conclusive evidence indicating whether salience and distance lead to better outcomes as independent actors or when in combination with each other. The remaining studies all evaluated Hypothesis 2, whether salience and distance work independently, and Hypothesis 3, whether salience and distance interact or are additive.

When comparing individuals who were successful maintaining weight loss to those who were less successful, Study 2 provided correlational evidence that weight maintenance outcomes were positively associated with psychological distance of the past, overweight self and salience of the past, overweight self – which was generated by looking at pictures. Measures of salience and distance independently contributed to a greater likelihood of weight maintenance, and there was no strong empirical evidence of an interaction between the two. Among individuals who met a weight loss goal, Study 3 demonstrated that activating memories of the past self (i.e. salience) and contemplating the differences between the past self and the present self (i.e. distance) can lead to goal maintenance conducive behavior as measured by WTP for healthy versus unhealthy products and services. This study also demonstrated that even when imagining a weight loss goal was met, heightening both salience of the past self and distance from this imagined past self together can increase goal maintenance conducive judgments relative to heightening neither construct.

Study 4 demonstrated that increasing perceptions of distance between a pre-goal self and a post-goal self, and separately, increasing salience of the past self, increase motivation to learn about healthy topics. Notably in contrast to Hypothesis 3, in Study 4, the effects of heightening both distance and salience resulted in an attenuation of the effects when distance and salience

were heightened independently. This study suggests that the constructs work more effectively when heightened independently. However, the attenuated effect observed in the combined distance and salience condition was not statistically robust. Given the results of prior studies, the attenuation observed in Study 4 is likely attributable to an aberrant statistical sample.

Using innovative study designs, Study 5 and 6 evaluated whether heightening distance and salience can lead to more goal conducive behaviors and outcomes with an imagined weight loss goal in Study 5 and after accomplishing a real weight loss goal in Study 6. Using multi-media, like video games and pictures as stimuli, was an effort to engage study participants and induce a more "real world" experience. Unfortunately, in both studies statistically robust differences in weight maintenance behaviors and outcomes between treatment and control conditions were not observed, possibly because these studies were underpowered.

In addition to suggesting that heightened salience and distance can each independently lead to more goal maintenance conducive motivation, analysis across studies suggests that these constructs operate differently. Specifically, heightening salience appears to lead to a greater prevention focus and more prevention related behavior, such as lower motivation to consume unhealthy things. On the other hand, heightening distance appears to lead to a greater promotion focus and more promotion related behavior, like reading material focused on pursuing healthy behaviors significantly more than material focused on preventing unhealthy behaviors.

These apparent operational differences can have a significant impact on designing behavioral interventions to improve the likelihood of successful goal maintenance. Specifically, for weight loss: An individual, who recently met a weight loss goal but still primarily struggles with eating unhealthy foods, may be more successful with a prevention-based intervention (e.g.

picture of his past, pre-goal self on the refrigerator) to motivate goal conducive eating habits. On the other hand, an individual, who recently met a weight loss goal but doesn't want to invest in a gym membership, may be more successful with a promotion-based intervention (e.g. weekly journaling about how much of a new person he has become since losing weight) to motivate a goal conducive fitness regimen.

A summary of the results across studies is provided in Table 9. Results across all studies were not completely consistent. As a possible explanation for the differences observed: Generally, effects were more robust when tested on populations who actually realized the weight loss goal (i.e. the Reddit population, Mturk populations of successful versus unsuccessful weight loss maintainers, and Behavioral Lab populations in the WTP studies). This was the case even though sample sizes were larger in studies where participants only imagined meeting a weight loss goal. This suggests that the ability to connect to the imagined scenarios and subsequently respond as if one actually experienced the described scenario may vary substantially among Mturk workers who may have not met a weight loss goal. Using designs that asked participants to imagine meeting a weight loss goal was a necessity as the population of successful weight loss maintainers is sparse and a challenge to recruit.

Table 9. Summary of Study Designs and Results

		Maintenance Effects		
Study/ Population	Design	Salience	Distance	Distance and Salience
Reddit: Study 1 (General population: maintainers and pursuers)	*Salience*: Past focused language *Distance*: Discrepancy and Comparison language	+/s main effect	+/s main effect of discrepancy and comparison language	-/s interaction
Mturk Survey: Study 2 (Met weight loss goal)	*Salience*: Looking at before-and-after pictures, before pictures, thinking about the past self *Distance*: Euler "Circle Measure"	+/s main effect of before pictures	+/s main effect of Circle Measure (reverse coded)	+/ms main effect of before/after pictures

WTP: Study 3a (Met weight loss goal)	*Salience:* Past self questions including weight, clothing size, exercise and eating habits before weight loss *Distance*: Current self questions including weight, clothing size, exercise/eating habits. Circle Measure (aggregated and disaggregated)	+/s difference between the salience-only and control conditions	+/ms difference between the distance-only and control conditions	+/s difference between combined distance and salience condition and control condition
WTP: Study 3b (Imagined a weight loss scenario)	2 (Salient Pallid vs Salient Vivid) x 2 (Distance Close vs Distance Far)	Confounded constructs – inconclusive results		
WTP: Study 3c (Imagined a weight loss scenario)	2 (Salient Pallid vs Salient Vivid) x 2 (No Distance vs Distance)	NS difference between the salience-only and control conditions	+/ms difference between the distance-only and control conditions	+/s difference between combined distance and salience condition and control condition
Articles: Study 4 (Imagined a weight loss scenario)	2 (Salient Pallid vs Salient Vivid) x 2 (No Distance vs Distance)	+/s difference between salience-only and control *(proportion chose either article)*	+/ms difference between distance-only and control *(proportion chose either article)*	NS
Video Game: Study 5 (Imagined met a weight loss scenario)	2 (Salient Pallid vs Salient Vivid) x 2 (No Distance vs Distance)	NS	NS	+/ms difference between combined distance and salience condition and control condition
12-week: Study 6 (Met a weight loss goal)	Control (no reminders of the past self) vs. Treatment (before-and-after picture reminders)	N/A	N/A	NS difference between control and treatment conditions

Note: +/- denotes positive or negative effect; s/ms denotes significant or marginally significant; NS denotes not significant.

The Three Hypotheses

Even though the diversity of contexts and populations used to test my theory of goal maintenance is a strength of this paper, these aspects also present challenges when interpreting the results across different study designs. When evaluating each hypothesis, results of each study should not be equivalently weighed. The strengths, shortcomings, and robustness of each study – including internal and external validity – need to be considered when determining

whether there is substantive evidence to support each hypothesis. Table 10 illustrates whether the findings across studies support each hypothesis.

The Reddit Study was the explicit test of Hypothesis 1: whether the goal maintenance and goal pursuit processes are distinct along the dimensions of past self salience and psychological distance. The average effects of salience and distance observed in the posts only materialized when examining relationships between maintainers and pursuers. Hence, the salience and distance proxies were not associated with the proportion of weight loss or proportion of weight loss toward one's goal – the other dependent variables analyzed. The constructs were only significantly associated with the maintenance versus goal pursuit dependent variable. Therefore, the Reddit Study provides substantive evidence for Hypothesis 1.

The remaining studies test Hypothesis 2 and 3. Hypothesis 2a and 2b purport that heightened salience alone and distance alone, respectively, lead to greater goal maintenance conducive judgments and behavior. There is substantive evidence to support Hypothesis 2a. Salience was a significant predictor of weight maintenance motivation across most experiments as outlined in Table 9 and as visualized in Table 10. In the two cases where the salience-only condition was not significantly different than the control, regression analyses indicated that main effects of heightening salience were marginally associated with goal maintenance conducive motivation ($p<0.10$).

The evidence for Hypothesis 2b is a bit more mixed. The distance-only condition was marginally statistically different than the control condition across all of the WTP studies and the Article Study. However, in the WTP Study, 3c, and the Article Study, main effects of heightening distance were significantly associated with goal maintenance conducive motivation in the regression analyses ($p<0.05$). Furthermore, in the Behaviors Study (Study 2), the

psychological distance measure, when controlling for salience, was associated with successful weight maintenance ($p<0.01$), but these relationships were correlational. The strength of evidence in support of Hypothesis 2b comes from the confluence of suggestive, albeit at times marginal, evidence across studies.

I did not find evidence to support Hypothesis 3, which posits that combined distance and salience lead to greater goal maintenance conducive judgments and behavior than either construct heightened independently. Except for Study 2, effects from heightening both distance and salience were not statistically different than effects from heightening distance alone or salience alone. Nonetheless, in many cases, combining distance and salience led to greater weight maintenance motivation than the control condition, suggesting that behavioral interventions that incorporate salient reminders of the past, pre-goal self and distance from this self could effectively enable better goal maintenance.

Table 10. Evidence Supporting the Three Hypotheses

Study	H1	H2a	H2b	H3	*Combined different than control?*
Study 1	✓				
Study 2		✓	✓	✓	✓
Study 3a		✓	✓	**NS**	✓
Study 3b		Confounded constructs – inconclusive results			
Study 3c		**NS**	✓	**NS**	✓
Study 4		✓	✓	**NS**	**NS**
Study 5		**NS**	**NS**	**NS**	✓
Study 6				**NS**	**NS**

Note: Green check marks denote statistically significant evidence found supporting the hypothesis. Yellow check marks denote marginally significant evidence. NS is an abbreviation for "Non-significant".

Conclusion

In this paper, I explored psychological mechanisms that I believe lead to successful weight loss maintenance for personal transformative goals, particularly weight loss. My theory of goal maintenance posits that salience of the past self and psychological distance from the past self motivate continued healthy behavior that enables sustained weight loss after a weight loss goal was met. In this paper, I demonstrated that when attempting to maintain goal progress, after a transformative goal is achieved, frequently reminding oneself of the past self and the progress achieved (i.e. discrepancy between the past, pre-goal self and the current, post-goal self) may serve as an effective cognitive strategy to sustain motivation and maintain goal progress.

I found evidence to support two of my three hypotheses. First (Hypothesis 1), goal maintenance is a different process than goal pursuit. Specifically, motivation to successfully maintain a goal is not identical to motivation to pursue a goal. I found evidence that individuals who are actively maintaining a goal think more about the past and use more discrepancy and comparison language in their thoughts than those pursing a goal. Second (Hypothesis 2), I found that having an accessible and vivid image of one's pre-goal self (i.e. past self salience) influences judgments and behaviors such that they more closely align with goal maintenance objectives. Similarly, focusing on the distinctions between the current self and the pre-goal self (i.e. psychological distance from the past self), particularly along important identity attributes, has a similar effect. Therefore, these two factors can independently contribute to successful goal maintenance. The former factor, salience, likely leads to judgments and behaviors aimed at preventing a lapse in weight maintenance where the latter factor, distance, likely leads to intentions and actions focused on promoting the new identity. Finally (Hypothesis 3), I did not find evidence that heightening salience of the past self and psychological distance from the past

self in combination leads to an even greater likelihood of goal maintenance than either factor heightened alone. However, combined distance and salience still leads to increased goal maintenance conducive intentions and behaviors than in their absence.

These findings add to existing literature in several ways. This paper defines a specific type of maintenance goal (i.e. personal transformative goal) and demonstrates that discrepancy between pre-goal and post-goal states remains motivational even during the maintenance stage of a personal transformative goal. However, the discrepancy is not between the present self and some future self, but it is between the present self and the past, pre-goal self: a finding that contrasts with the existing goal maintenance literature. Additionally, this project adds to the weight maintenance literature by addressing psychological factors that drive maintenance conducive behaviors for personal transformative goals: a current gap in existing literature. Existing medical and public health literature largely focuses on behaviors and dispositional traits that are associated with sustained weight loss maintenance, including dieting and exercising, but does not provide substantial insight on the psychological factors that drive these sustained healthy behaviors. Therefore, the findings presented in this paper can be applied to weight management programs and used to design products and services that help improve the chances of successful weight maintenance. I applied my theory of goal maintenance to weight loss maintenance, but it can also be applied to other areas of public health, such as sobriety maintenance, or other domains, including debt management.

Future Work

In addition to applying the goal maintenance theory to other domains, future work may also explore temporal boundary conditions of the theory. Specifically, do the effects of salience and psychological distance from the past self dissipate as the time from goal attainment increases? If an individual maintains weight for a substantial period of time, and therefore strongly associates with the post-goal identity, will temporal self-appraisals still be motivational?

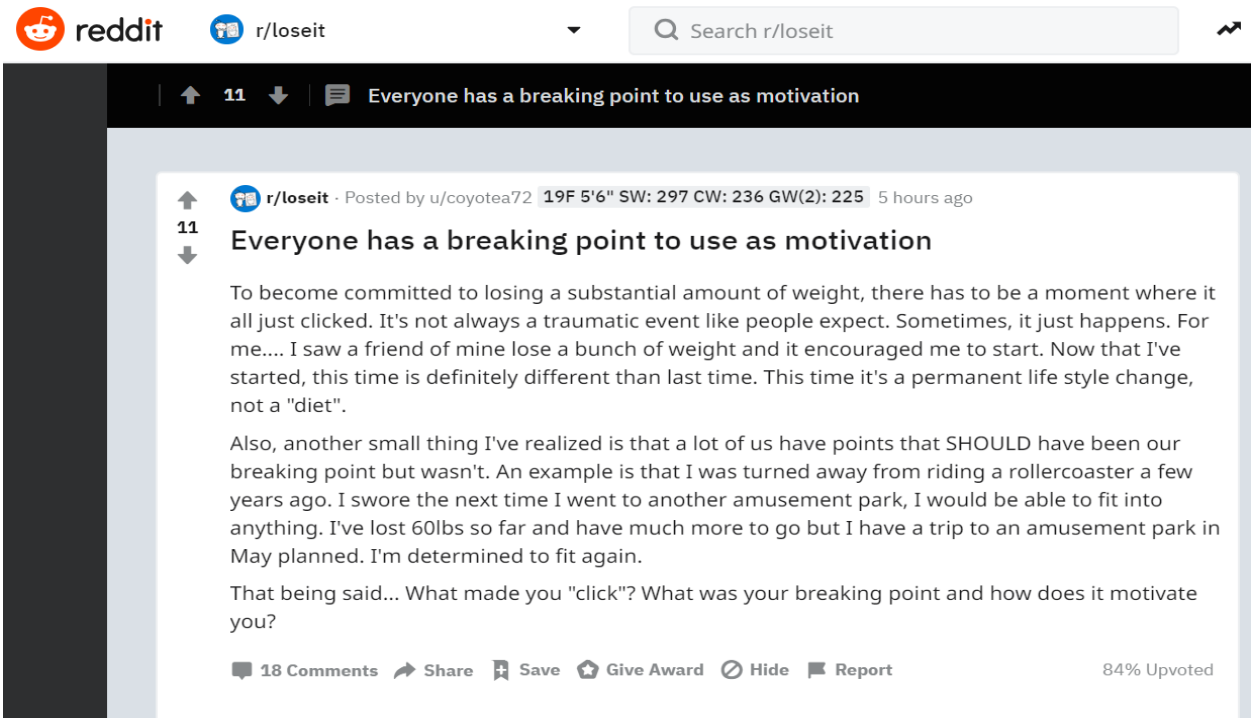
This goal maintenance work motivates additional research related to intertemporal perceptions of the self and behavior. One such research question that is of interest to examine is whether thinking about the past self as predicted by my theory of goal maintenance is more motivational than visualizing one's future, ideal self. Hershfield et al. (2011) found that vivid depictions of a future self at retirement age, through virtual imagery, can induce greater psychological closeness to that future self, less temporal discounting, and consequently, greater savings and investment behavior. Empirical research in psychology leverages these insights to incent behavior change in other domains – specifically, weight loss. Accordingly, vividness research in the weight loss domain has demonstrated that interconnected but disassociated selves based on weight identity can incent healthy decision making in the short run (Kuo et al., 2016). Additional inquiry on the conditions that explain when thinking about the past is better than imagining the future would add to this literature.

A second question, related to the temporal boundary conditions of the theory of goal maintenance, is when and how does effective goal maintenance lead to habit formation where sustained behavior changes are automatic and no longer depend on motivational strategies such as accessing the past self and perceiving distance. Wood and Neal (2007) propose a model of habits that incorporates a habit-goal interface that posits that associations between specific

environmental contexts and goal conducive behaviors develop during goal pursuit. If these "habitual sequences" are learned, goal conducive behaviors will persist even in the absence of a mediating goal. Adopting cognitive strategies, such as keeping the past self salient and distancing the past from the present, may enable long-term goal maintenance by bridging the gap between goal attainment and sustained behavioral change through habit formation.

Appendices

Appendix A. Example of a ‘LoseIt’ Reddit Post



URL:
www.reddit.com/r/loseit/comments/ajd4n1/everyone_has_a_breaking_point_to_use_as_motivation/

Appendix B. Reddit Study: Additional Regressions

Table B1. Reddit Study: Sentiment Regressions – Main Effects Only

	(1) Maintain (1/0)	(2) To Go	(3) Weight loss
Weight loss goal	0.006***	0.00001***	0.00000*
	(0.002)	(0.00000)	(0.00000)
Comparison words	0.132*	0.036	0.003
	(0.055)	(0.037)	(0.006)
Positive Emotions	-0.063	0.019+	0.006**
	(0.044)	(0.011)	(0.002)
Negative Emotions	-0.023	-0.009	-0.004
	(0.065)	(0.007)	(0.003)
Difference Language	0.016	-0.030	-0.006
	(0.056)	(0.033)	(0.005)
Discrepancy Language	0.140*	0.021	-0.001
	(0.069)	(0.029)	(0.005)
Focused Past	0.063+	-0.008	0.002
	(0.034)	(0.016)	(0.002)
Focused Present	-0.048+	-0.001	0.001
	(0.029)	(0.003)	(0.002)
Focused Future	-0.060	-0.002	0.001
	(0.072)	(0.008)	(0.002)
Constant	-3.522***	0.428***	0.123***
	(0.216)	(0.021)	(0.006)

Note: Study 1, the Reddit Study, regression analysis without interactions. Standard errors in parentheses.
+ p<0.10; * p<0.05; ** p<0.01; ***p<0.001

Table B2. Reddit Study: Sentiment Regressions – Additional Interactions

	(1) Maintain (1/0)	(2) To Go	(3) Weight loss
Weight loss goal	0.006***	0.00001**	0.00000*
	(0.002)	(0.00000)	(0.00000)
Comparison words	0.213**	-0.010	-0.003
	(0.081)	(0.017)	(0.004)
Positive Emotions	-0.076+	0.023	0.007**
	(0.044)	(0.014)	(0.002)
Negative Emotions	-0.027	-0.006	-0.004
	(0.064)	(0.006)	(0.003)
Difference Language	0.007	-0.026	-0.006
	(0.057)	(0.028)	(0.004)
Discrepancy Language	0.305*	-0.032	-0.008
	(0.131)	(0.031)	(0.006)
Focused Past	0.159***	-0.049	-0.004
	(0.045)	(0.060)	(0.008)
Focused Present	-0.064*	0.006	0.002
	(0.029)	(0.008)	(0.002)
Focused Future	-0.073	0.001	0.002
	(0.071)	(0.009)	(0.002)
Discrepancy*Focus Past	-0.039+	0.014	0.002
	(0.021)	(0.015)	(0.002)
Comparison*Focus Past	-0.020+	0.012	0.002
	(0.011)	(0.013)	(0.002)
Constant	-3.632***	0.465***	0.128***
	(0.232)	(0.057)	(0.009)

Note: Study 1, the Reddit Study, regression analysis with additional interaction variables. Standard errors in parentheses. + p<0.10; * p<0.05; ** p<0.01; ***p<0.001

Table B3. Reddit Study: Sentiment Regressions – Mean Centered Variables

	(1) Maintain (1/0)	(2) To Go	(3) Weight loss
Weight loss goal	0.006***	0.00001**	0.00000*
	(0.002)	(0.00000)	(0.00000)
Comparison words	0.126*	0.038	0.003
	(0.055)	(0.039)	(0.006)
Positive Emotions	-0.072	0.022+	0.007**
	(0.044)	(0.013)	(0.002)
Negative Emotions	-0.026	-0.007	-0.004
	(0.064)	(0.006)	(0.003)
Difference Language	0.010	-0.028	-0.006
	(0.057)	(0.030)	(0.004)
Distance (Discrepancy Language$_{centered}$)	0.506*	-0.104	-0.018
	(0.197)	(0.110)	(0.016)
Salience (Past Focused Language$_{Centered}$)	0.061+	-0.007	0.002
	(0.033)	(0.015)	(0.002)
Present Focused Language	-0.058*	0.002	0.002
	(0.028)	(0.005)	(0.002)
Future Focused Language	-0.069	0.0002	0.001
	(0.070)	(0.008)	(0.002)
Distance*Salience	-0.043*	0.015	0.002
	(0.020)	(0.017)	(0.002)
Constant	-3.387***	0.418***	0.105***
	(0.305)	(0.049)	(0.014)

Note: Study 1, the Reddit Study, regression analysis with mean centered variables. Standard errors in parentheses.
+ p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Appendix C. Study 2 Supplemental Information

Filters for Study 2 data:

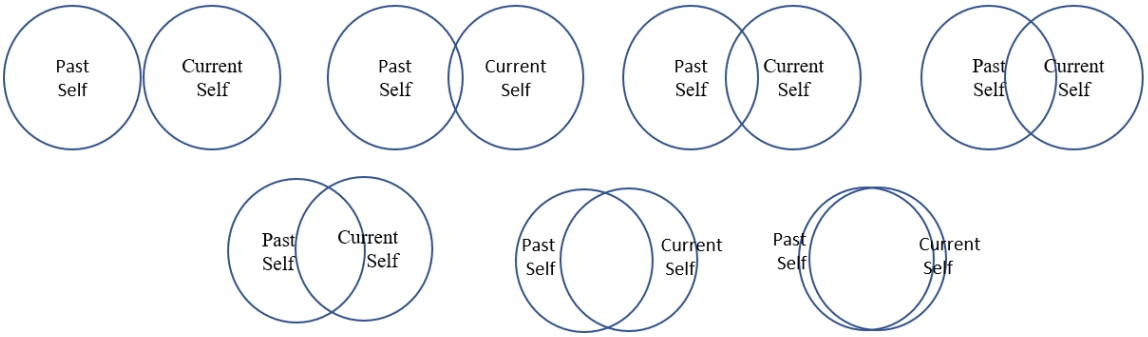
- Filter to remove individuals whose weight loss estimates were inconsistent, meaning the weight they said they lost and regained was 10% higher or lower than what they stated their current weight was: filter1=1 if (check1>1.1*Current Weight | check1<0.9*Current Weight).
- Filter to remove individuals who reported a starting weight less than 100 pounds: filter2=1 if (Starting Weight <100).
- Filter to remove individuals who took less than one minute to complete the survey: filter3=1 if (Survey Completion Time <1).
- Filter to remove individuals who reported they maintained their weight, but also listed that they gained more than 10 pounds: filter4=1 if (Maintain Weight==’Yes’ & Regained Pounds>10).
- Filter to remove individuals who were actively still losing weight (hence, they had not already met their weight loss goal): filter5=1 if (Maintain Weight==’Yes’ & Number of Months Maintained Weight==0).

Behavioral Questions for Study 2:

- When you lost weight, how often did you look at your “before pictures” (i.e. pictures of yourself before you lost weight)?
- Have you used social media to chronicle your weight loss?
- Have you posted before-and-after pictures of your weight loss on social media?
- How much would you agree with this statement: "When I lost weight, I became a totally different person."
- After you lost weight, did you keep certain items around to remind you of yourself when you were overweight (e.g. pictures, journals, clothes, etc.)?
- How often do you think about how your life was when you were overweight (i.e. right before you lost weight)?

Figure C1. Euler Circle Method ("Circle Measure")

Below, please click on the picture that best describes how **similar** you feel to your past self before you lost weight [(from 3 years ago), in terms of personality, temperament, major likes and dislikes, beliefs, values, ambitions, life goals, ideals, etc.]*



*The bracketed ([]) phrase was only included in Study 2.

Table C1. Behaviors Study: Additional Regression Analysis

	Maintain (1/0)	
	(1)	(2)
Salience (Before Pictures$_{Centered}$)	0.136**	
	(0.067)	
Salience (Thinking about past self$_{Centered}$)		-0.064
		(0.062)
Distance$_{Centered}$	0.186***	0.197***
	(0.062)	(0.062)
Age	-0.058	-0.067
	(0.060)	(0.060)
Age Squared	0.001	0.001
	(0.001)	(0.001)
Male	-0.056	-0.065
	(0.227)	(0.226)
Education Level	0.151	0.173
	(0.253)	(0.251)
(Before*Distance)$_{Centered}$	0.003	
	(0.036)	
(Thinking*Distance)$_{Centered}$		-0.054*
		(0.031)
Constant	1.325	1.549
	(1.173)	(1.178)
Observations	345	346
Log Likelihood	-224.276	-226.303
Akaike Inf. Crit.	464.551	468.607

Note: Standard errors in parentheses. +p<0.10; *p<0.05; **p<0.01; ***p<0.001

Appendix D. Study 3a manipulation and WTP questions

Past self

Think about yourself right before you started losing weight. How much did you weigh in pounds?

What was your pants size (i.e. waist size in inches)?

Did you exercise regularly?

Did you eat healthy food regularly?

What is your height in feet and inches (i.e. "X feet" and "Y inches")?

Current self

Think about yourself now. How much do you currently weigh in pounds?

What is your current pants size (waist in inches)?

Do you currently eat healthy food on a regular basis?

Do you currently exercise on a regular basis?

WTP Questions

How much are you willing to pay for a one-on-one personal training session?

How much are you willing to pay for a pound of grapes?

How much are you willing to pay for a slice of cheesecake?

How much are you willing to pay for an average all-you-can-eat lunch buffet?

How much are you willing to pay for a one-hour tennis lesson?

Closeness

How similar do you feel to your past self (before you lost weight 3 years ago) and your current self now

In terms of the following (each evaluated separately on 1-7 point Likert scale):

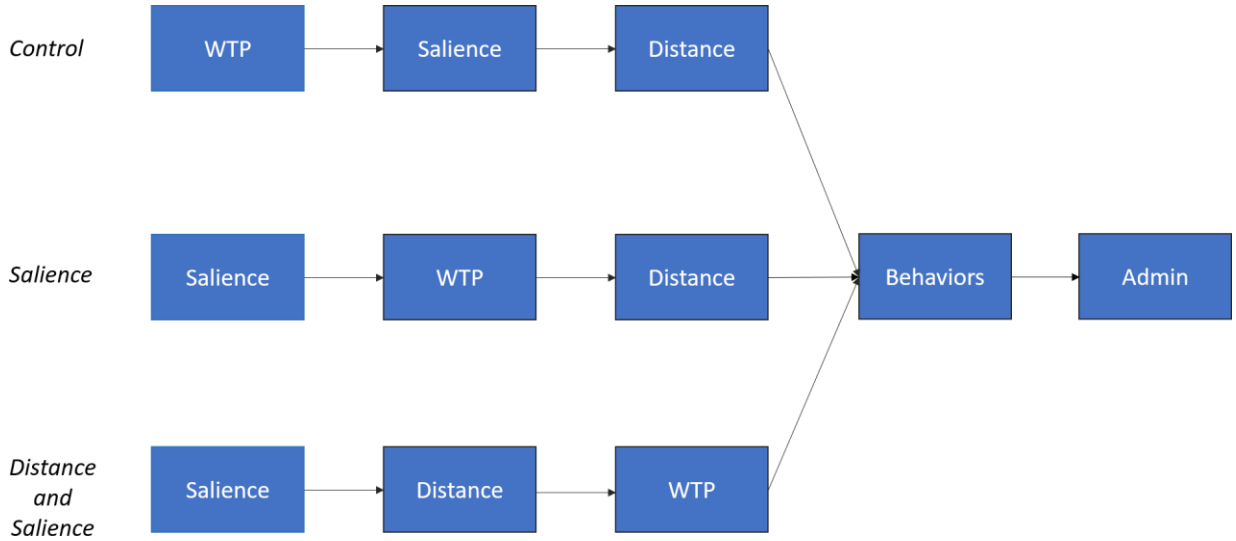
- Personality
- Temperament
- Major likes and dislikes
- Beliefs
- Values
- Ambitions
- Life goals
- Ideals

Appendix E. Pre-WTP Study

Pre-WTP Study

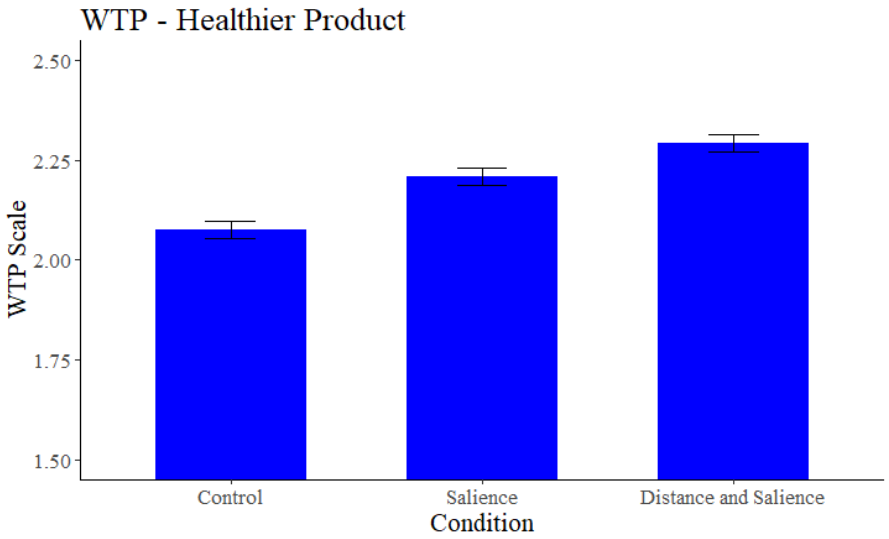
Prior to running Study 3a, I ran a WTP study that used the same design as Study 3a but with three of the conditions: control, salience, and combined distance and salience. The design is illustrated in Figure E1.

Figure E1. Pre-WTP Study: Order of Tasks



The pre-WTP study results were similar to Study 3a results. Participant motivation levels to maintain weight loss increased when the past self was made salient ($M=2.21$, $p<0.05$) and increased when the past self and psychological distance from the past self were made salient before the WTP task ($M=2.29$, $p<0.001$), as compared to the baseline condition ($M=2.08$). However, the difference between the salience condition and the combined distance and salience condition did not reach conventional levels of statistical significance ($p=0.12$).

Figure E2. Pre-WTP Study: Total WTP by Condition



Note: Average WTP across conditions with standard error bars in the pre-WTP study. Difference in Means vs. Control: Distance ($p<0.05$); Distance and Salience ($p<0.10$).

Appendix F. Study 3b Details

Study 3b Manipulations

The salience manipulation heightened salience of an imagined past self who recalled a day in 2018 after a doctor's visit where the doctor informed the individual that he needed to lose weight. In the Salient – Pallid description, the individual recalls no other information germane to his weight, but random occurrences that happened during that day in 2018. In the Salient – Vivid description, the individual recalls specific facts about his weight, particularly difficulties from being an overweight person. The vivid description is anticipated to elicit more affect associated with the past than the pallid description (Strack et al., 1985).

The distance manipulation asked participants to evaluate how much they think they have changed since meeting their imagined weight loss goal of 30 pounds in a six-month period. In the Distance – Far condition, participants were asked how much they changed along dimensions anticipated to change substantially given the amount of weight lost, including clothing size, eating habits, fitness level, exercise habits, and general health. In the Distance – Close condition, participants were asked how much they changed along dimensions anticipated to remain essentially constant even with substantial weight loss, including personality, temperament, beliefs, values, and ideals. This design draws on self-discrepancy theory: Higgins (1987) purports that the intensity of the affective response associated with a discrepancy between two states is greater when one perceives high levels of mismatches along relevant attributes. Also, heightening a sense of dissimilarity between two states (i.e. a current and a past self) is associated with increasing the perception of psychological distance between these two states, particularly an increased sense of self-discontinuity, such that the time disassociated self is perceived as an 'other' (Mussweiler, 2003; Hanka, Crusius & Mussweiler, 2009; Libby &

Eibach, 2002). Hence, I predicted a greater perception of distance in the Distance – Far condition.

Study 3b Methods

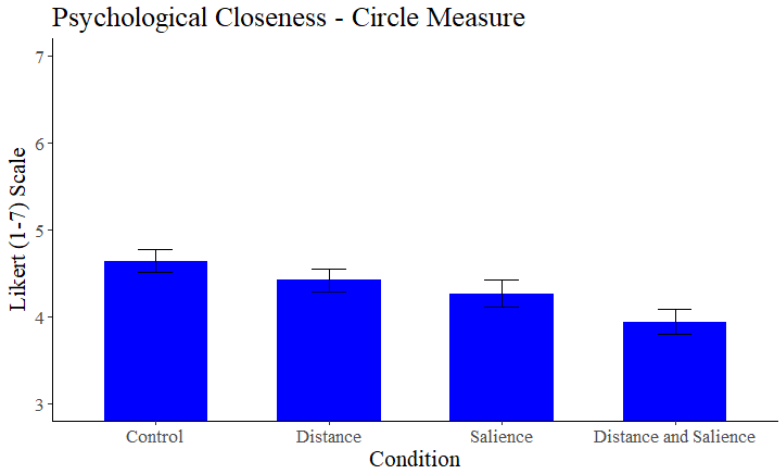
I recruited 800 Mturk workers who were at least 18 years of age to participate in Study 3b. Participants were asked to imagine that they recently met a weight loss goal. They were randomly assigned to one of the four conditions in the 2 (Salient – Pallid, Salient – Vivid) x 2 (Distance – Far, Distance – Close) design. This resulted in four conditions: the control condition (Salient – Pallid, Distance – Close), the salience condition (Salient – Vivid, Distance – Close), the distance condition (Salient – Pallid, Distance – Far), the combined distance and salience condition (Salient – Vivid, Distance – Far). These manipulations are listed in Appendix G. After reading their assigned weight loss scenario, participants answered 18 multiple-choice WTP questions. Similar to Study 3a, each question included 4 multiple choice price ranges of which the participant was to choose the price range he was most WTP for the product or service. The 18 products and services included 9 healthy items (i.e. grapes, health and fitness magazines, a stationary bike, apples, a protein shake, a gym membership, an entrée salad, a personal training session, a yoga class) and nine unhealthy items (i.e. a burger and fries, a slice of cheesecake, an all-you-can-eat buffet, an ice cream sundae, a bag of jelly beans, an unlimited movie concession voucher, a slice of apple pie, a latte with whipped cream). These items were pretested using a different Mturk sample to ensure healthy things were viewed as healthy and unhealthy things were viewed as unhealthy. After completing the WTP questions, participants completed three exploratory questions to gauge whether assignment to condition impacted daily caloric intake, weekly exercise, and appropriate food portion size judgments. Finally, participants were asked the salience and distance manipulation check questions and whether they had ever met a 10%

weight loss goal in real life. Participants' responses were excluded from analysis if they did not correctly answer attention and comprehension checks, leaving 622 observations.

Study 3b Results

First, I analyzed whether the distance and salience manipulations were successful. The perception of distance and degree of salience questions, both asked on a 7-point Likert scale, served as manipulation checks and participants were asked these questions after they answered the 18 WTP questions. For perception of distance, participants were asked how similar they felt to their past self using the Circle Measure. For degree of salience, participants were asked how vividly they could imagine their past self before weight loss – including their struggles and concerns with weight – using a 7-point Likert scale anchored with "Not vividly at all" and "Extremely vividly". Analysis of the perception of psychological distance revealed that those assigned to the salience-only condition statistically felt just as psychologically close to their imaged past self as those assigned to the distance-only condition ($M=4.26$ and $M=4.42$, respectively; $p=0.44$) as illustrated in Figure F1 where higher numbers indicate more psychological closeness (i.e. less distance). The salience-only condition was marginally significantly different than the control condition ($M=4.64$, $p<0.10$), and the distance and salience condition was the only condition with a statistically lower perception of psychological closeness than the control condition ($M=3.94$, $p<0.001$). Hence, the manipulation check suggests that the salience and distance constructs were not effectively isolated in the Study 3b design.

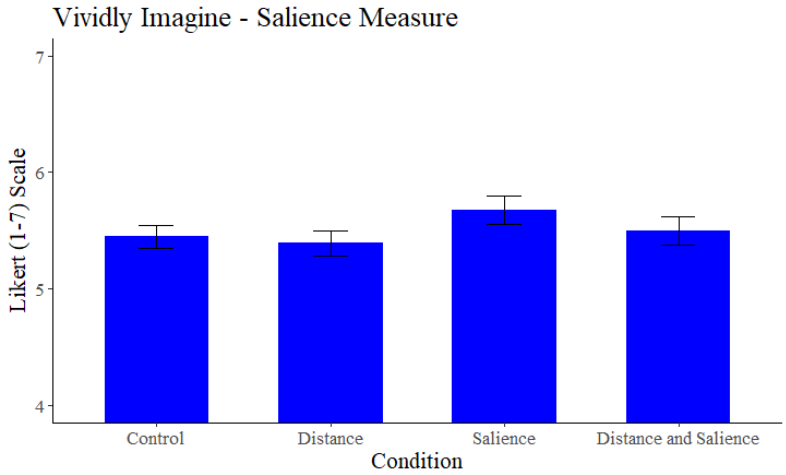
Figure F1. Study 3b: Distance Manipulation Check



Note: Psychological closeness (distance) manipulation evaluation in Study 3b. Standard error bars included.

With respect to the salience manipulation check, there were not statistically significant differences between any of the treated conditions and the control condition in the ability to imagine the past self as illustrated in Figure F2. However, the salience-only condition (M=5.68) and the distance-only condition (M=5.39) were marginally statistically different ($p<0.10$).

Figure F2. Study 3b: Salience Manipulation Check



Note: Imaging the past self (salience) manipulation evaluation in Study 3b. Standard error bars included.

In Study 3b, even though the constructs were not successfully isolated, I still evaluated WTP across each of the conditions. I averaged WTP levels across the 18 product categories

(coded 1 through 4, where 1 is the lowest WTP and 4 is the highest for healthy things based on the multiple-choice option selected and reverse coded for unhealthy things) per participant to get a total WTP score. I created average WTP scores for the 9 healthy products and the 9 unhealthy products per participant as well – yielding three scores (i.e. average WTP for all products with reverse coding, average WTP for healthy products, and average WTP for unhealthy products).

Table F1 provides the output of the OLS regression analyses of the four WTP outcome variables regressed on the salience and distance constructs and their interaction. Imagining a salient, overweight past self through assignment to one of the salience conditions was associated with a higher overall total motivation to consume healthy products and services (β=0.59, $p<0.05$) and less motivation to consume unhealthy things (β= -0.37, $p<0.05$). There is no significant interaction between salience and distance.

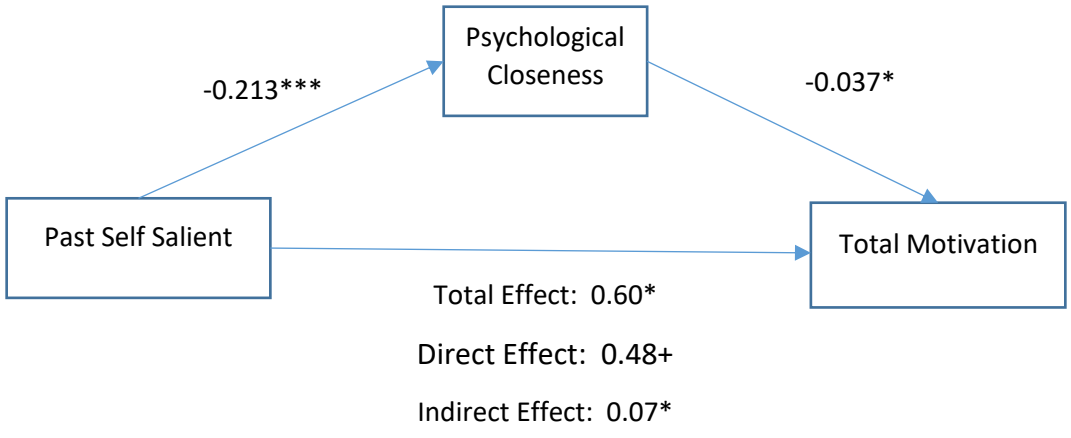
Table F1. Study 3b: WTP Regression Analysis

	Total WTP (1)	WTP Unhealthy (2)	WTP Healthy (3)
Salience	0.590*	-0.372*	0.326
	(0.273)	(0.174)	(0.212)
Distance	0.081	-0.156	-0.141
	(0.273)	(0.174)	(0.212)
Salience*Distance	-0.018	0.101	0.228
	(0.273)	(0.174)	(0.212)
Constant	47.075***	15.254***	17.208***
	(0.273)	(0.174)	(0.212)
Observations	622	622	622
R2	0.008	0.009	0.007
Adjusted R2	0.003	0.005	0.002
Residual Std. Error (df = 618)	6.775	4.328	5.263
F Statistic (df = 3; 618)	1.594	1.936	1.364

Note: Regression analysis on WTP outcomes in Study 3b. Salience and distance are coded 1/-1. Standard errors in parentheses. +p<0.10; * p<0.05; ** p<0.01; *** p<0.001

Next, I examined whether perception of distance or degree of salience mediated the relationship between heightened salience of the past self and WTP judgments using Zhao et al. (2010) mediation method with 10,000 resamples. The extent that the participant could image their past weight struggles and concerns was not a mediator between assignment to the salience condition and WTP judgments; however, the extent of perceived dissimilarity between the past self and the current self partially mediated these observed relationships shown in Figure F3 (Indirect effect: $\beta = 0.07$, $p<0.05$). According to Zhao et al. (2010), manipulation checks are not appropriately used to evaluate mediation because the manipulation check is "not conceptually different than the independent variable (p. 205)." However, given the conflation of the salience and distance constructs in the Study 3b design, this analysis was performed as a diagnostic tool to confirm the deficiency in the current design and, therefore, not an effort to evaluate causal mechanisms. The salience manipulation should not be conceptually similar to the psychological closeness measure. However, the mediation analysis shows that there was an unintended relationship between the salience manipulation and perception of distance.

Figure F3. Study 3b: Mediation Analysis



Note: +p<0.10; *p<0.05; **p<0.01; ***p<0.001

Regarding the exploratory variables, there were not significant differences across conditions in judgments about appropriate daily caloric intake, ideal number of days to workout per week, or appropriate portion size for a snack.

Study 3b Discussion

No conclusions were made from Study 3b because the salience and distance constructs were confounded. Psychological distance, measured using the Circle Measure, was a partial mediator between salience and WTP indicating the salience manipulation also impacted perceptions of psychological distance. This could be the result of deficiencies in the design of the distance manipulation. As discussed in Appendix G, pretests of the Study 3b manipulations indicate that the distance manipulation was not ideal. Subsequent study designs update the distance manipulation to address this shortcoming.

Although no effects of salience and distance were independently discerned, Study 3b suggests that participants may be more prevention-focused when a goal maintenance mindset is activated. The effects observed on WTP for unhealthy things (i.e. lower valuation of bad things or preventing consumption of bad things) were more robust than the effects of the salience manipulation on WTP for healthy things (i.e. higher valuation of good things or promoting consumption of good things). Although Ecker & Gilead (2018) assert that goal maintenance can be construed as promoting a positive outcome or preventing a negative outcome, Study 3b suggests that the prevention motivation may dominate. Hence, in addition to redesigning the distance manipulation, subsequent studies will further explore whether salience of the past, pre-goal self or psychological distance from this self leads to more prevention-associated (i.e. loss/no loss) judgments and behaviors or more promotion-associated (i.e. gain/no gain) judgments and behaviors (Higgins, 1997 & 1998; Sekścińska & Trzcińska, 2016).

Appendix G. Study 3b, 3c, 4, and 5 manipulations

Salient Vivid

Imagine that you just met a weight loss goal in 2019, and you are remembering an interesting day in 2018 before you met this goal. Imagine on that day in 2018 you remember that you had a doctor's appointment for a routine physical. You started to feel a bit anxious because you knew you would have to get on the scale. You went to your doctor's appointment, and your doctor informed you that you were overweight.

You began to reflect: Year after year, your weight had crept up to the point that you started avoiding weighing yourself. You hated shopping for clothes because you were not able to find the clothes you wanted in your size. But buying new clothes was inevitable, as your current clothes would go from being too tight to completely unwearable because they had gotten too small.

Your weight started impacting your social life. Your friends would go hiking, but you always avoided going. You were often out of breath walking long distances. You also always had an excuse to miss pool parties or beach trips because you didn't want to wear swimwear. You were embarrassed when you went to a baseball game and struggled to fit comfortably in the stadium seat.

Salient Pallid

Imagine that you just met a weight loss goal in 2019, and you are remembering an interesting day in 2018 before you met this goal. Imagine on that day in 2018 that you got up and remembered that you had a doctor's appointment for a routine physical. You went to your doctor's appointment, and your doctor informed you that you were overweight.

Later on that day, you turned on the television to watch your favorite news program. You remember the expected high temperature that day was 70 degrees – partly sunny skies with an afternoon chance of rain. You also remember three news segments. There was a story about pet adoption. A local animal rescue center was featured, and they had several cats and dogs up for adoption. The adoption fees were about $100 per animal.

After that, there was a news segment on financial savings plans – specifically how to invest in bonds and stocks and different types of retirement savings options. The financial analyst indicated that people generally overinvest in bonds. Then there was a story on the dangers of over exposure to the sun. A public health specialist discussed the importance of using sunscreen and the different types of sunscreen on the market.

Distance Far

Now imagine that after that day in 2018 you set a goal to lose 30 pounds. And today, 6 months later, you met your weight loss goal. You lost 30 pounds. Congratulations!

Given your weight loss, how much do you think you have changed compared to your past self (before you met your 30 pound weight loss goal). Evaluate how much you think you have changed based on the following factors:

	Not at all						Completely changed
Clothing Size	○	○	○	○	○	○	○
Eating Habits	○	○	○	○	○	○	○
Fitness Level	○	○	○	○	○	○	○
Exercise Habits	○	○	○	○	○	○	○
General Health	○	○	○	○	○	○	○

Distance Close

Now imagine that after that day in 2018 you set a goal to lose 30 pounds. And today, 6 months later, you met your weight loss goal. You lost 30 pounds. Congratulations!

Given your weight loss, how much do you think you have changed compared to your past self (before you met your 30 pound weight loss goal). Evaluate how much you think you have changed based on the following factors:

	Not at all						Completely changed
Personality	○	○	○	○	○	○	○
Temperament	○	○	○	○	○	○	○
Beliefs	○	○	○	○	○	○	○
Values	○	○	○	○	○	○	○
Ideals	○	○	○	○	○	○	○

No Distance

Now imagine that after that day in 2018 you set a goal to lose 30 pounds. And today, 6 months later, you met your weight loss goal. You lost 30 pounds. Congratulations!

Your weight has changed but many aspects of who you are as a person remain the same. Your personality is essentially the same - including your basic likes and dislikes. What you value most in life has not changed - including your moral values. Your beliefs about what is important in life, like family and friends, are the same. And your ideals, including your long-term hopes and dreams for yourself and the world around you, have not changed either.

Your weight loss is still a tremendous accomplishment even though you have not really changed that much as a person.

Distance

Now imagine that after that day in 2018 you set a goal to lose 30 pounds. And today, 6 months later, you met your weight loss goal. You lost 30 pounds. Congratulations!

Your life has changed significantly since you lost weight. You can enjoy shopping for new clothes feeling confident that you can find clothes in your size and in the styles you want. You feel a tremendous sense of pride when glancing at yourself in the mirror. Your improved fitness level has enabled you to participate in so many more activities including hiking and jogging in the park. Your blood pressure and cholesterol level have improved. Your friends and family have been showering you with compliments on your successful weight loss.

No more fears of the scale and struggles buttoning clothes: You are fully embracing the new you!

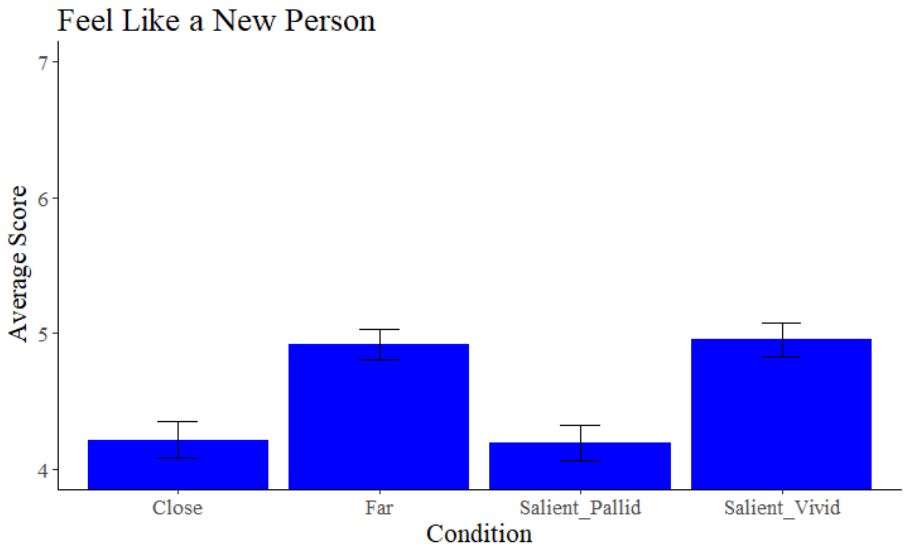
Discussion of Manipulation Pretest Results

In Study 3b, I used the Distance Far versus Distance Close manipulation. This study did not yield significant main effects of distance on goal conducive judgments but demonstrated significant effects of salience, which were partially mediated by perception of distance. The salience and distance manipulation pretests (using Mturk subject pools) explain these results. To test the distance manipulation, two questions were asked:

- How much do you agree with this statement: Since I met my weight loss goal, I am a new person (7-point Likert scale). (New Person Manipulation Check)
- Please click on the picture that best describes how similar you believe you are to your past self before you lost weight in 2018 (7 Euler circles). (Similarity Manipulation Check)

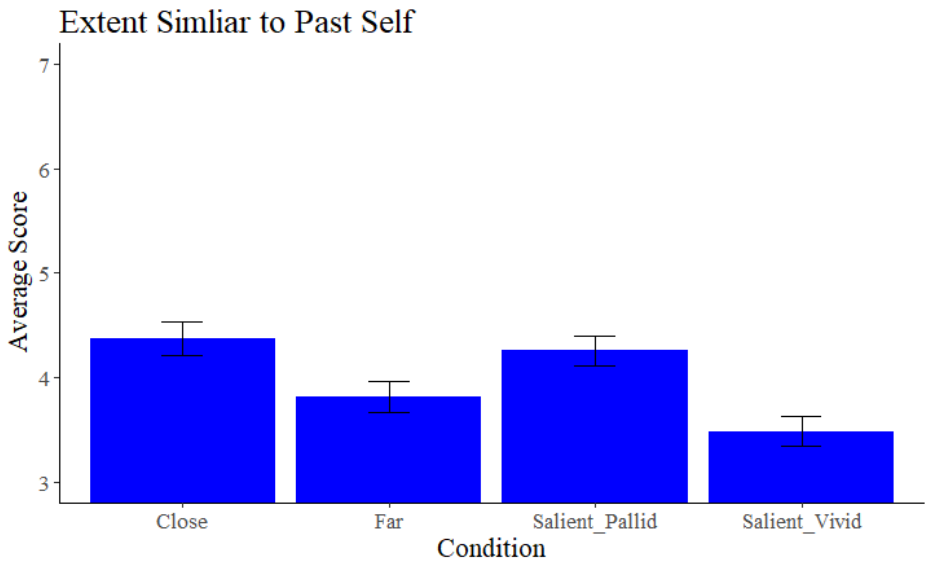
As Figures G1 and G2 demonstrate, the salience manipulation increased the perception of distance just as much as the distance manipulation. To correct this shortcoming, I designed the Distance versus No Distance manipulations used in studies 3c, 4 and 5. As Figures G3 and G4 demonstrate, the distance manipulation increased the perception of distance significantly more than the salience manipulation. Hence, the latter distance manipulation is more effective in measuring the individual contributions of salience and distance on goal conducive motivation. *Note*: In the first pretest (Figures G1 and G2), the four conditions were randomly assigned in a 4x1 design (Distance Far, Distance Close, Salient Vivid, and Salient Pallid). In the second pretest (Figures G3 and G4), the four conditions were randomly assigned using a 2x2 design (Distance: No, Yes vs Salience: Pallid, Vivid). The salience manipulation performed as expected in pretests (see Figure G5), so no adjustments were made in this manipulation. Pretests evaluating the updated salience manipulation compared to the distance manipulation are provided in Figure G6.

Figure G1. Study 3b: Distance Manipulation Pretest



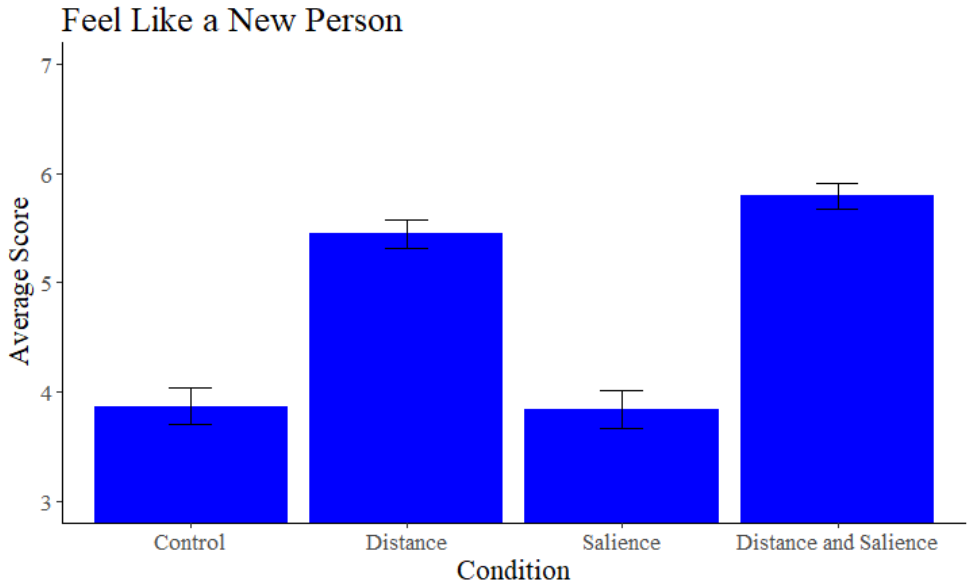
Note: New Person Manipulation Check Results (Distance Far vs. Distance Close) from Study 3b. The salience manipulation (i.e. 'Salient_Vivid') led to an equivalent perception of distance as the distance manipulation (i.e. 'Far') with a mean of 4.95 compared to 4.91, respectively (p=NS). Standard error bars included.

Figure G2. Study 3b: Distance (Circle Measure) Manipulation Pretest



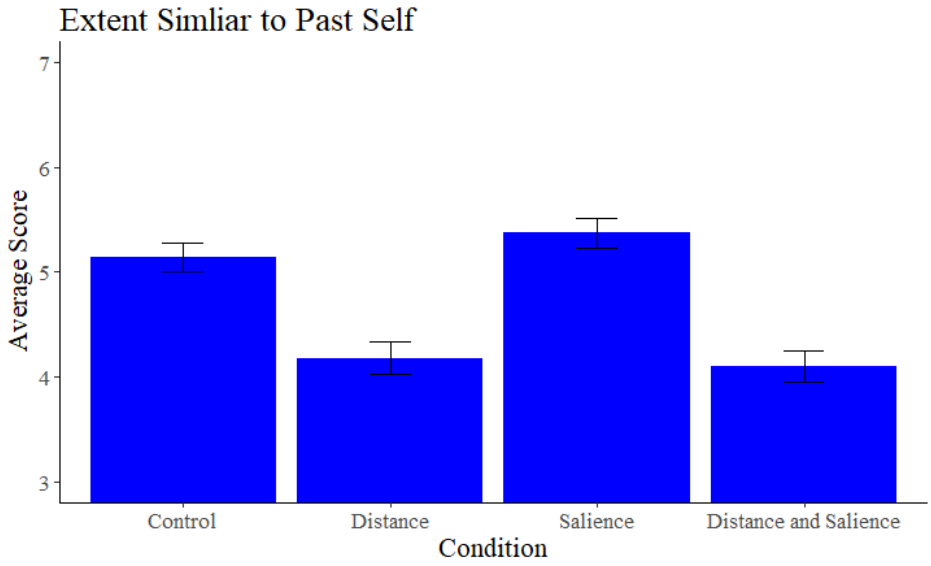
Note: Similarity Manipulation Check Results (Distance Far vs. Distance Close) for Study 3b. The salience manipulation (i.e. 'Salient_Vivid') led to an equivalent perception of psychological distance as the distance manipulation (i.e. Far) with a mean of 3.49 and 3.82, respectively, where lower values indicate greater distance (p=0.101). Standard error bars included.

Figure G3. Study 3c: Distance Manipulation Pretest



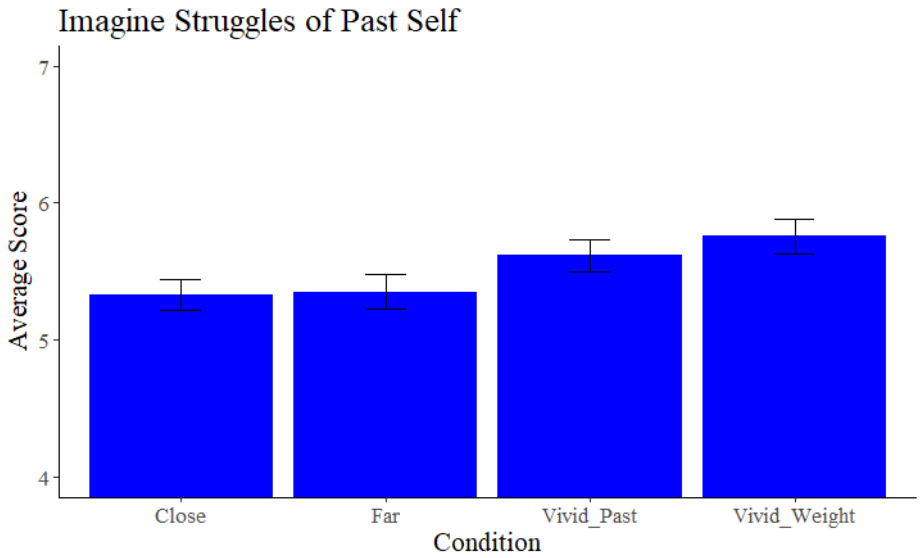
Note: New Person Manipulation Check Results (No Distance vs. Distance) from Study 3c. The distance manipulation led to a significantly greater perception of distance (M=5.61) than the salience manipulation (M=3.77), p<0.001. Standard error bars included.

Figure G4. Study 3c: Distance (Circle Measure) Manipulation Pretest



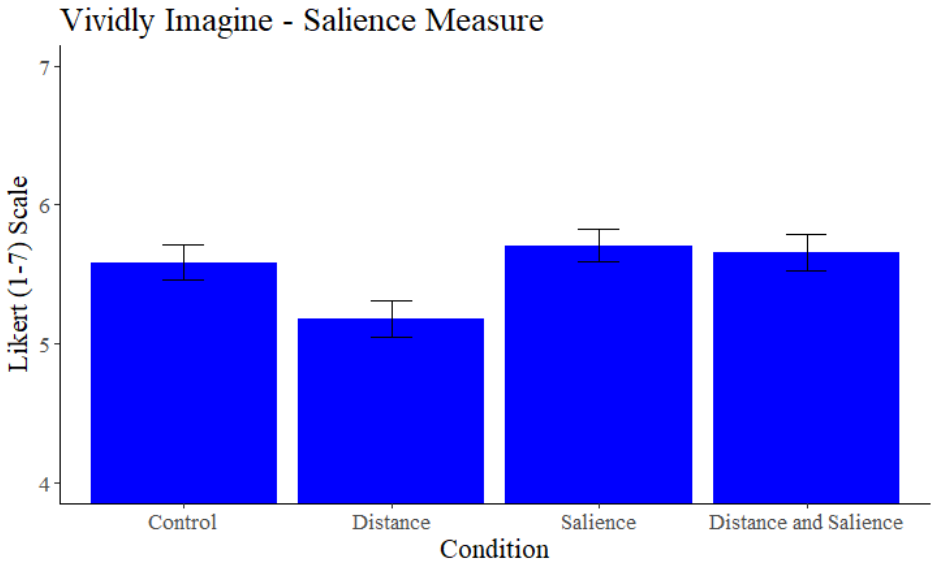
Note: Similarity Manipulation Check Results (No Distance vs. Distance) for Study 3c. The distance manipulation led to a significantly greater perception of distance (M=4.17) than the salience manipulation (M=5.14), p<0.001 where lower values indicate greater distance. Standard error bars included.

Figure G5. Study 3b: Salience Manipulation Pretest



Note: The pretest results for the salience manipulation for the Study 3b design, representing how much the participant could imagine the concerns and struggles of being overweight based on a 7-point Likert scale. The salience manipulation (i.e. Vivid_Weight) evoked a significantly greater perception of salience (M=5.75) than the distance manipulation (i.e. Far) with M=5.35, $p<0.05$. Standard error bars included.

Figure G6. Study 3c: Salience Manipulation Pretest



Note: The pretest results for the salience manipulation for the Study 3c design, representing how much the participant could imagine the concerns and struggles of being overweight based on a 7-point Likert scale. The salience manipulation (M=5.71) evoked a significantly greater perception of salience than the distance manipulation (M=5.18), $p<0.01$. Standard error bars included.

Appendix H. List of Article Study Articles

- "Avoid Unhealthy Eating Habits," WebMD.com
- "Four Steps to a Healthy Lifestyle," WebMD.com
- "These are the 10 best places to live in the US in 2019," CNBC.com
- "Summer Movie Calendar 2019," RottenTomatoes.com
- "The 50 Best Jobs in America – And How Much They Pay," Money.com
- "Planet or Plastics: We Depend on It. Now We're Drowning in It," NationalGeographic.com

Appendix I. Video Game Study Screenshot

Code adapted and further developed from W3schools HTML code snippets.[19]
Image: https://www.istockphoto.com/vector/weight-loss-running-man-gm610138478-104670083

[19] https://www.w3schools.com/graphics/game_intro.asp

Appendix J. Study 6 Supplemental Information

Examples of Informational Quotes for Study 6

1) "If it doesn't challenge you, it doesn't change you." - Fred Devito
2) "With the new day comes new strength and new thoughts." - Eleanor Roosevelt
3) "Challenges are what make life interesting and overcoming them is what makes life meaningful." - Joshua J. Marine
4) "Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time." - Thomas Edison

Examples of Email Messages for Study 6

Control:
Stay encouraged this week! "Our greatest weakness lies in giving up. The most certain way to succeed is to try just one more time." – Thomas Edison.

Treatment Condition:
Stay encouraged this week! "Our greatest weakness lies in giving up. The most certain way to succeed is to try just one more time." – Thomas Edison.

(Photos for illustrative purposes only and were not used to complete the study).[20]

[20] Image: https://www.flickr.com/photos/sharpchick/2041409554

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