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Effects of Acceptance-Based Training on Delay Discounting for Food

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ACCEPTANCE AND DELAY DISCOUNTING

To the Graduate Faculty

The members of the committee appointed to examine the thesis of Luis R. Rodriguez find it satisfactory and recommend that it be accepted.

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Effects of Acceptance-Based Training on Delay Discounting for Food

Thesis Abstract—Idaho State University (2018)

Delay discounting (DD), a behavioral measure of impulsivity, is a decrease in the current subjective value of a reward as delay to its receipt increases. Research demonstrates that acceptance-based training (ABT) can alter patterns of discounting for monetary rewards, but this had not been tested with food DD. The purpose of the present study was to determine the extent to which an ABT for impulsive food choice would alter DD for food. Twenty-four participants were randomly assigned to ABT or DVD control. Each participant completed baseline, post-test, and a one-week follow-up food and money DD tasks. There was a significant difference between post-test and the 1-week follow-up for food DD, but no differences between ABT and DVD groups. No significant differences were observed for money DD. These results do not replicate previous research that shows ABT decreases delay discounting.

Keywords: food, delay discounting, acceptance and commitment therapy, ACT, food choice questionnaire, FCQ

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Effects of Acceptance-Based Training on Delay Discounting for Food

Approximately 68.5% of adults and 31.8% of youths are either overweight or obese (Ogden, Carroll, Kit, & Flegal, 2014). According to the Center for Disease Control and Prevention (CDCP), obesity is defined as a body mass index [BMI; weight (kg)/height (m²)] greater than 30 (CDCP, 2015). Higher BMIs have been associated with numerous negative health consequences such as type 2 diabetes, cardiac disease (CDCP, 2015), cancer (Bhaskaran et al., 2014), and psychological disorders such as anxiety and depression (Phelan et al., 2015; Scott et al., 2008).

Obese individuals also experience lower quality of life, life satisfaction, and increases in depressive symptoms, though this relation is strongly mediated by perceived weight discrimination (Jackson, Beeken, & Wardle, 2015). Similarly, obese individuals who experience higher levels of personal subtle discrimination (e.g., being treated differently due to obesity status without expressed rejection) tend to report lower levels of subjective well-being (Magallares, Luna, Garriga, Botella-Carretero, & Morales, 2016). The experience of weight-based stigma has been associated with increases in physiological stress, poor psychological health, difficulties in interpersonal relationships, and reductions in self-controlled eating. In addition, weight-based stigma is also associated with lower motivation to escape stigma through maladaptive means (e.g., avoiding physical activity, refusal to diet, increased food intake; Hunger, Major, Blodorn, & Miller, 2015; Puhl & King, 2013).

The high number of obese and overweight individuals and their increased risk for negative health and mental health outcomes indicates the importance of understanding

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underlying mechanisms that may be contributing to unhealthy eating patterns that may underlie the current obesity epidemic. One mechanism that may be associated with obesity is impulsivity.

Impulsivity

Impulsivity is a complex multi-faceted construct that plays a role in a number of psychopathologies such as attention deficit/hyperactivity disorder, substance use disorders, eating disorders, and personality disorders (American Psychiatric Association, 2013). Researchers have proposed different conceptualizations of impulsivity (Evenden, 1999); however, most tend to share characteristics related to response inhibition, mechanisms related to delay of gratification (e.g., delay discounting), sensation-seeking or risk-taking, and inattention to information before responding (Caswell, Bond, Duka, & Morgan, 2015; Evenden, 1999; Whiteside & Lynam, 2001). Due to the complex nature and multiple facets of impulsivity, multiple measures have been established that capture different aspects of the construct (Caswell et al., 2015).

Impulsivity and Obesity

A growing number of studies show that the general construct of impulsivity is positively associated with obesity in both children and adults (Guerrieri, Nederkoorn, & Jansen, 2007; Van den Berg et al., 2011). Van den Berg et al. (2011) found that parent-reported impulsivity significantly predicted BMI in children, with the relationship mediated by overeating. In adult women, those who were classified as highly impulsive demonstrated significantly higher intake of food relative to those who were classified as low impulsive, which can potentially lead to obesity (Guerrieri et al., 2007). In addition, obese children and obese women have demonstrated decreased response inhibition relative to their normal-weight counterparts (Nederkoorn, Braet, Van Eijs, Tanghe, & Jansen, 2006; Nederkoorn, Smulders, Havermans, Roefs, & Jansen, 2006).

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Delay Discounting

Delay discounting is the devaluation of a reward as time to its receipt increases (Ainslie, 1975; Rachlin, Raineri, & Cross, 1991). In a delay discounting paradigm for humans, individuals are presented with a series of choices between a smaller, sooner outcome (e.g., \$3 now) vs. a larger, delayed outcome (e.g., \$10 in 1 day). The amounts and delays are manipulated in a systematic manner. For example, one method of measuring delay discounting in human participants is the adjusting-amount procedure (Madden & Johnson, 2010). In this procedure, when an individual chooses between the smaller, sooner (e.g., \$3 now) over the larger, later option (e.g., \$10 in 1 day), the amount of the smaller, sooner outcome is increased on subsequent trials until a “preference reversal” is observed. For example, when presented with the choice between “\$1 now” and “\$10 in 1 day,” it is likely one would prefer the latter option. Yet, as the smaller, sooner amount increases across trials (e.g., “\$6 now;” “\$7 now”...) and the individual is presented with “\$8 now or \$10 in 1 day,” one would potentially see a *preference reversal* for the larger, later reward. This point of reversal allows researchers to calculate the “indifference point,” which refers to the current subject value of the delayed reward. In the presented example, for an individual who displayed a preference for “\$8 now” and on the previous trial selected “\$10 in 1 day,” his or her “indifference point” would be calculated as the median of the smaller, sooner values of the current and previous trials-- \$7.50. For this individual, then, “\$7.50” is equal to “\$10 in 1 day,” and, when presented with both options, would select either the smaller, sooner or larger, later approximately 50% of the time.

Indifference points are determined across a range of different delays and researchers fit the hyperbolic discounting equation to each individuals’ series of indifference points (Mazur, 1987):

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$$V=A/(1+kD). \quad (1)$$

where V is equal to the indifference point (also called subjective value), A is equal to the amount of the larger, later reward, D is equal to the delay to the larger reward, and k is a free parameter that is an index of one's rate of discounting. Higher k values suggest a relatively higher sensitivity to delay or higher preference for the smaller, sooner outcomes (e.g., an "impulsive" individual) than lower k values, which reflect lower sensitivity to delay and a preference for later, later outcomes (e.g., a "self-controlled" individual).

An alternative to the hyperbolic equation described above is a hyperboloid model (Green, Fry, & Myerson, 1994):

$$V=A/(1+kD)^s. \quad (2)$$

In this equation, the additional parameter, s , represents the scaling factor of the amount and delay (i.e., one's sensitivity to the differences between delays and magnitudes of reward). The additional parameter alters the shape of the hyperbola in that it leads to a leveling of the curve at larger delays. When an s value is equal to 1, the outcome is a simple hyperbola; however, values less than 1 indicate less sensitivity to differences between relatively longer delays (e.g., 5 years and 10 years) or larger magnitude rewards (e.g., \$1,005 and \$1,020) and more sensitivity to differences among relatively shorter delays (e.g., 5 days and 10 days) or smaller magnitude rewards (e.g., \$5 and \$20). Values greater than 1 suggest more sensitivity to relatively longer delays and less sensitivity to differences among relatively shorter delays (Green et al., 1994;

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Green & Myerson, 2010). The inclusion of the second parameter (s) provides a better fit to individual data (Myerson & Green, 1995), although better fit should not be the sole reason for its inclusion.

In addition to k , the inclusion of the s parameter may be useful in discriminating between different populations, such as children and adults (Green et al., 1994). For example, Green and colleagues (1994) showed that the discounting curves of 12-year-old children were substantially steeper at smaller delays (e.g., 1 week, 1 month, 6 months) and leveled off at approximately 5 years, sooner than discounting curves for older adults. Older adult participants demonstrated a shallower curve at the smaller delays. Further, the s values for both of these groups were significantly different with younger children showing values below 1, whereas older adults greater than 1. This suggests that for children (or perhaps individuals who have not had experience with longer delays), the differences between smaller-value delays are relatively larger and have more impact on behavior than those who are older. For instance, for a child, a \$1,000 reward may lose substantially more value between delays of 1 week and 6 months compared to changes in longer delays (e.g., 5 years to 10 years), and their curve would become relatively flatter sooner compared to an adult. In adults, this same reward would show greater losses in value but only between changes in relatively larger delays with the curve flattening at longer delays. Indeed, the inclusion of the additional parameter may provide information on an additional factor that influences discounting patterns (i.e., sensitivity to differences between delays).

Area under the curve. While the hyperbolic equations offer a theoretical conceptualization of delay discounting, these equations have several notable limitations. For example, the curve does not describe all patterns of indifference points and its positively skewed

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distributions may make data difficult to analyze using parametric statistics (Myerson, Green, & Warusawitharana, 2001). Therefore, area under the curve (AUC), offers an alternative, atheoretical approach to index discounting rates. To calculate AUC, one calculates the area beneath the discounting curve by creating trapezoids formed by the area between each successive subjective value and their corresponding delays. The area of each individual trapezoid is calculating using:

$$AUC = (x_2 - x_1)[(y_2 + y_1)/2]. \quad (3)$$

where x refers to the successive delays and y refers to the corresponding subjective values associated with these delays. The discounting rate is the sum of the trapezoid areas and is bound between 0.0 (steepest discounting possible) and 1.0 (no discounting). This alternative method is not bound by theory (i.e., a specific pattern of data, such as the hyperbolic pattern of discounting) and tends to be normally distributed, lending itself more readily to parametric statistics. While both k and AUC both characterize discounting patterns, neither is interchangeable for one another as k values are derived from a theoretical model of discounting (e.g., hyperbolic equations). On the other hand, AUC allows researchers to compare discounting across studies as it is not bound to a particular theoretical model, which may be useful as there is no consensus on the form of the discounting function (Myerson et al., 2001). Researchers use both k and AUC values to measure discounting, and indeed they are inversely related (see Madden, Begotka, Raiff, & Kastern, 2003; Rasmussen, Lawyer, & Reilly, 2010). The k value is essential for measuring discounting, as it describes the theoretical (i.e., hyperbolic) relation between delay and subjective value. Due to the skewness of k , however, statistical analysis can be tricky.

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Therefore, AUC values, which are normally distributed, allow for the secondary measure. Moreover, an alteration to both k and AUC as a function of a particular variable provides robust evidence for its association or effect on individual discounting patterns. However, some measures of discounting (e.g., choice questionnaires, such as Hendrickson, Rasmussen, & Lawyer, 2015; Kirby, 2009; Kirby & Marakovic, 1996; Kirby, Petry, & Bickel, 1999) do not allow for the calculation of AUC because their construction is based upon a theoretical interpretation of discounting (i.e., hyperbolic equation) and use pre-calculated k values.

Choice Questionnaires. Another alternative to estimating individual discounting rates is the Money Choice Questionnaire (Kirby, 2009; Kirby & Marakovic, 1996; Kirby et al., 1999). The MCQ is a 27-item pencil and paper choice questionnaire that estimates individual discounting rates using pre-calculated discounting (k) values assigned to each question. The choice questions are arranged across three different magnitudes of outcomes (low medium, and high—nine questions for each magnitude) and across a number of different outcome amounts and delays. Each question has an associated k value that assumes indifference. For example, consider an item from the MCQ, which presents the individual with a choice between “\$25 now or \$30 in 80 days?” with an assigned discounting rate (i.e., k value) of 0.0025. The assumption is that an individual who has a discounting rate of 0.0025 would be “indifferent” and select the “\$25 now” approximately 50% of the time and the “\$30 in 80 days” approximately 50% of the time. However, in reality, the question is presented as a forced choice trial, and the individual must select between the two options. If the individual were to select the smaller, sooner outcome (e.g. \$25 now), this would indicate their discounting rate is greater than 0.0025. If the individual were to select the larger, later reward (e.g., \$30 in 80 days) this indicates their discounting rate is

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less than 0.0025. The next item in that magnitude would present different choices at another delay with a greater assigned discounting value.

Similar to the previously described discounting tasks, the individual's discounting rate for that magnitude is determined when they demonstrate a preference reversal (or "switch") from the smaller, sooner reward to the larger, later reward. At the switch, the geometric mean of the discounting rates of those two question that bookend the preference reversal represents the discounting rate for that specific magnitude. For instance, if the individual were to select the smaller, sooner reward in the previously discussed example (e.g., \$25 now), this would suggest his or her discounting rate is greater than 0.0025. However, when presented with the next item in the magnitude, "\$19 now or \$25 in 53 days" with the assigned discounting rate of 0.006, the individual selects the larger, later outcome. This choice indicates the individual's discounting rate is less than 0.006. Once this switch occurs, we know his or her discounting rate is between 0.006 and 0.0025 (i.e., $0.006 > k > 0.0025$). In this example, the discounting rate for this individual, at this particular magnitude, would be the geometric mean of the two values, or 0.0039. The discounting rates are established in a similar manner across the remaining magnitudes, so that the individual will have a discounting rate across small, medium, and large magnitudes. The calculation of the three different discounting rates allow for the exploration of the "magnitude effect."

Discounting in humans and nonhumans. Discounting of future outcomes is a common behavioral pattern across human, but it was first demonstrated in a number of non-human species, including rats, pigeons, and a number of primate species (Ainslie & Herrnstein, 1981; Rachlin & Green, 1972; Rodriguez & Logue, 1988; Vanderveldt, Oliveira, & Green, 2016). Non-human studies typically employ an adjusting-delay procedure. Here, the smaller, sooner reward,

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which is often a food reward (e.g., 1 pellet) and the larger, later reward (e.g., 3 pellets) remain constant across trials and the delay is systematically adjusted up or down until behavioral “indifference” (i.e., 50% preference) is reached. Nonhuman procedures use real outcomes, whereas human procedures typically rely on the use of hypothetical outcomes, though hypothetical outcomes tend to be discounted similarly to real outcomes (Madden et al., 2004, 2003; but see Lawyer, Schoepflin, Green, & Jenks, 2011).

In terms of discounting models, the hyperbolic model demonstrates a better fit to both human and nonhuman discounting patterns relative to other proposed models (i.e., exponential; (Aparicio, 2015; Bickel, Odum, & Madden, 1999; Myerson & Green, 1995; Rachlin et al., 1991). The hyperboloid model, which includes the additional parameter s (i.e., the nonlinear scaling factor), has been shown to provide better fit to human data across several populations and rewards (Friedel, DeHart, Madden, & Odum, 2014; Lawyer, Williams, Prihodova, Rollins, & Lester, 2010; Vanderveldt et al., 2016). When comparing the hyperbolic and hyperboloid model in rats, Aparicio, (2015) showed that the two-parameter hyperboloid model provided a better fit to the data relative to the single parameter hyperbola; however, the single parameter hyperbola was more parsimonious. While both human and nonhuman subjects demonstrate similar, hyperbolic discounting patterns, it may be that the two-parameter hyperboloid model better characterizes human data, whereas the single-parameter hyperbolic model better characterizes non-human data (Vanderveldt et al., 2016). However, this may depend upon the procedure used for non-human subjects. For example, the procedure used by Evenden and Ryan (1996) does result in hyperbolic curves, but it is important to look at the delay ranges. Shorter delay values do not necessarily show hyperbolic discounting (e.g., Boomhower & Rasmussen, 2014; Madden, Johnson, Brewer, Pinkston, & Fowler, 2010; Mendez et al., 2010)

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Another difference with human and non-human discounting studies relates to cross-commodity comparison. Nonhuman discounting across reinforcer type (e.g., food, plain water, sucrose, cocaine, etc.) is typically well characterized (Calvert, Green, & Myerson, 2010; Freeman, Nonnemacher, Green, Myerson, & Woolverton, 2012; Huskinson, Woolverton, Green, Myerson, & Freeman, 2015; Woolverton, Myerson, & Green, 2007). Nonhuman subjects have shown similar discounting patterns between qualitatively distinct reinforcers (e.g., 10% sucrose solution versus 20% sucrose solution; Calvert et al., 2010; Freeman et al., 2012). Yet, nonhuman subjects (i.e., rhesus monkeys) have shown steeper discounting for delayed food reinforcers when cocaine was an immediate alternative compared to immediately available food (Huskinson et al., 2015), suggesting some evidence for domain-specific effects. However, there is limited research comparing differences in discounting across commodities besides primary reinforcers (Freeman et al., 2012; Vanderveldt et al., 2016).

This is not the case in humans, which have demonstrated differences in discounting across a range of commodities (e.g., money, food, drugs, and entertainment), although most studies use hypothetical, rather than real outcomes. Comparisons across commodity types have shown money to be discounted less steeply than food (Charlton & Fantino, 2008; Estle, Green, Myerson, & Holt, 2007; Odum & Rainaud, 2003), drugs (Bickel et al., 1999; Friedel et al., 2014; Madden, Petry, Badger, & Bickel, 1997; Odum & Rainaud, 2003), and entertainment (Charlton & Fantino, 2008; Friedel et al., 2014). Indeed, certain characteristics (e.g., fungibility and perishability) may play a role in the observed differences of discounting across commodity domains. For example, items that demonstrated a higher ability to be exchanged for another commodity (i.e., higher fungibility) and lower perishability tend to be discounted at lower rates

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relative to those that are less fungible and more highly perishable (Holt, Glodowski, Smits-Seemann, & Tiry, 2016).

Both human and nonhuman subjects have demonstrated magnitude effects (Boomhower, Rasmussen, & Doherty, 2013; Grace, Sargisson, & White, 2012; Green, Myerson, & Ostraszewski, 1999; Hendrickson et al., 2015; Jarmolowicz, et al., 2014; Kirby et al., 1999; Krebs, Reilly, & Anderson, 2016; Yuki & Okanoya, 2014). The “magnitude effect” refers to a decrease in discounting values as the amount of the larger, later reward increases (Green et al., 1999; Kirby et al., 1999). For example, Green and colleagues (1999) had human participants complete discounting tasks for \$200, \$5,000, and \$100,000, which were all delayed by 1 month, 6 months, 1 year, 3 years, 5 years, and 10 years. Their results revealed the smaller of the larger, later rewards (e.g. \$200) was discounted at a significantly higher rate relatively to the two higher rewards. This effect also has been demonstrated with human participants using commodities such as food (Hendrickson et al., 2015). A similar effect has been in seen in nonhuman subjects (e.g., Boomhower et al., 2013; Krebs et al., 2016); however this effect is demonstrated more consistently in human than nonhuman research (Calvert et al., 2010; Freeman et al., 2012; Huskinson et al., 2015; Vanderveldt et al., 2016). The inconsistency observed in nonhuman subjects may be due to procedural differences across studies (Krebs et al., 2016), such as restriction of range in magnitude differences. Regardless, it appears that reward amount has an effect on discounting rates in both human and nonhuman subjects.

In addition, humans tend to demonstrate discounting over a wider range of time (i.e., minutes, hours, days, years; (Kirby, 2009; Rasmussen et al., 2010; Schlam, Wilson, Shoda, Mischel, & Ayduk, 2013), while nonhumans show discounting over seconds and minutes (e.g., Boomhower et al., 2013). This difference, however, may be confounded by procedural

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differences such as the use of hypothetical versus real rewards, primary versus secondary reinforcers, direct versus indirect contact with the contingencies, and access to alternatives during the delay, as well as life expectancy differences, (i.e., humans have much longer life expectancies than rats and pigeons). Nonetheless, human and nonhumans demonstrate similar hyperbolic patterns of discounting, but show some differences in regards to cross-commodity comparisons and magnitude effects. Overall, discounting appears to be a trans-species process and any observed differences may have evolved due to differences in environmental contingencies, although there appears to be limited research on the matter (Vanderveldt et al., 2016).

Health and Delay Discounting

Higher delay discounting rates have been implicated in a number of negative health outcomes such as substance use (Kirby et al., 1999; Madden et al., 1997; Petry, 2001b). For example, Madden and colleagues (1997) examined the discounting patterns for hypothetical monetary outcomes in opioid-dependent individuals relative to matched non-using controls. Relative to controls, opioid-dependent individuals showed significantly steeper discounting for money. In addition, when opioid-dependent discounted monetary similar amounts of heroin at a much higher rate than monetary outcomes (Madden, Bickel, & Jacobs, 1999; Madden et al., 1997).

Researchers have observed similar results in other substances such as nicotine and alcohol. Current smokers discount monetary awards at significantly higher rates compared to former smokers and people who have never smoked. (Bickel et al., 1999; Reynolds, Richards, Horn, & Karraker, 2004). Similar to opioid-dependent individuals, current smokers discounted cigarettes at a significantly higher rate than money (Bickel et al., 1999). With alcohol, current

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alcoholics and abstinent alcoholics show steeper discounting relative to non-abusing controls (Petry, 2001a). Overall, it appears that delay discounting is associated with the use of different substances and is a predictor of substance use in both humans (Audrain-McGovern et al., 2009; Yoon et al., 2007) and animals (Perry, Larson, German, Madden, & Carroll, 2005; Poulos, Le, & Parker, 1995). However, the direction of causality is unclear, though some studies suggest experience with the drug may partially explain the relation. In these studies, prolonged cocaine exposure led to increased discounting in rats relative to rats exposed only to saline (Mendez et al., 2010; Simon, Mendez, & Setlow, 2007)

In addition to substance use disorders, steep discounting has been observed in other health-related areas. Individuals who demonstrate pathological gambling showed steeper discounting for money relative to controls (Dixon, Marley, & Jacobs, 2003; Petry, 2001b), and substance use has been shown to further exacerbate the steepness of discounting in gambling individuals (Petry, 2001b) suggesting an interaction between disorders. Individuals with attention deficit/hyperactivity disorder (Jackson & MacKillop, 2016), suicidality (Dombrovski et al., 2011), binge eating (Davis, Patte, Curtis, & Reid, 2010), anorexia nervosa (Decker, Figner, & Steinglass, 2015), and obesity (Amlung, Petker, Jackson, Balodis, & MacKillop, 2016) tend to show differences in sensitivity to delay relative to controls.

Obesity and Delay Discounting

Schlam and colleagues (2013) showed a relation between individuals who completed the marshmallow task, a measure of delay of gratification, at four years of age and BMI approximately 30 years later. Children chose between receiving a single marshmallow available immediately or, if they waited after a period of time (e.g., 15 minutes) without eating the first marshmallow, they would receive an additional marshmallow. When researchers followed up 30

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years later (as adults), those who selected to wait for the additional marshmallow (i.e., the more self-controlled choice) had lower BMIs relative to those who chose the marshmallow immediately. This suggests that even a single impulsive choice can be indicative of a pattern of behaviors that can lead to obesity later in life.

Further, obese women have demonstrated more impulsive choice patterns for hypothetical money than healthy-weight (BMI=18.5-24.9) controls (Weller, Cook III, Avsar, & Cox, 2008). Moreover, this effect was found across larger (up to \$50,000) amounts of money and smaller amounts (\$1,000), though the effect was stronger for the higher amount of money. However, both obese and overweight individuals have demonstrated higher rates of monetary discounting compared to those classified as normal and underweight regardless of sex (Jarmolowicz, et al., 2014; Lawyer, Boomhower, & Rasmussen, 2015). In addition, obese adolescent smokers tend to show steeper discounting for money than healthy weight adolescent smokers (Fields, Sabet, Peal, & Reynolds, 2011). The obesity effect with delay discounting has also been shown in large sample sizes (i.e., $N > 1000$; Bickel et al., 2014).

Steeper discounting in obese individuals has been characterized across different commodities such as food. For example, Rasmussen et al. (2010) had participants complete a delay discounting task for hypothetical food outcomes in which they make hypothetical choices between one and ten bites of their favorite food. Individuals with high percent body fat (PBF) demonstrated relatively more impulsive choice patterns for food compared to their low PBF counterparts; however, BMI showed no relation to discounting patterns. Similarly, other studies (e.g., Hendrickson & Rasmussen, 2013; Hendrickson et al., 2015; Hendrickson & Rasmussen, 2016) have replicated that food discounting rates tend to be steeper in individuals with high PBF relative to their low PBF counterparts but have no significant association with BMI. One

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explanation may be that PBF is a more accurate measure of obesity than BMI, as BMI does not account for lean muscle mass (see Nevill, Stewart, Olds, & Holder, 2006). Nonetheless, obese individuals, characterized by PBF or BMI, show steeper discounting patterns, which has been related to increased consumption of food that require little to no preparation (e.g., fast food; Appelhans et al., 2012).

In addition to delay discounting, food reward sensitivity can interact with delay discounting to predict amount of food intake. Appelhans and colleagues (2011) revealed higher rates of delay discounting and higher self-reported sensitivity to environmental food cues predicted amount of food consumed by overweight and obese women. It appears that impulsive choice can interact with other individual difference variables such as sensitivity to food cues to influence consumption, which in turn could influence obesity.

Indeed, it appears delay discounting in humans demonstrates a significant relation to obesity (see review by Amlung et al., 2016; Jarmolowicz, et al., 2014; Rasmussen et al., 2010; Weller et al., 2008). Further, delay discounting may share a stronger association with obesity relative to other facets of impulsivity such as response inhibition or risk-taking (Lawyer et al., 2015). Lawyer and colleagues (2015) had obese and non-obese individuals complete a delay discounting, probability discounting (a measure of risk-aversion), and a stop-signal task (response inhibition). Both the delay and probability discounting tasks showed a significant relation to BMI; however, when controlling for age, sex, and substance use, delay discounting was the only significant predictor of obesity status. These results suggest that although multiple aspects of impulsivity share an association with obesity, an individual's sensitivity to a delayed reward may be a relatively more important fundamental process in its development and maintenance.

Animal models. While researchers have demonstrated higher rates of discounting in obese humans, animal research has exhibited similar findings. Boomhower and colleagues (2013) demonstrated greater impulsive choice patterns for food in genetically obese Zucker rats relative to lean Zuckers. When presented with a 1-second standard delay to one pellet versus an adjusting delay to two pellets, obese Zuckers demonstrated lower delays for the two-pellet option compared to the lean rats. When researchers increased the standard delay to 5 seconds, both obese and lean rats were able to wait longer for the two pellets compared to the 1-sec condition, and there were no differences between groups. However, when the amount of the larger reward increased from two to three pellets, lean rats demonstrated a significantly higher adjusting delay (i.e., more self-control) relative to their obese counterparts.

In another study (Boomhower & Rasmussen, 2014), when injected with rimonabant, a cannabinoid antagonist/inverse agonist, both lean and obese Zucker rats showed changes in impulsive choice patterns that were dose-dependent, but were also directionally different: Lean rats demonstrated an increase in impulsivity while obese rats showed more self-control. These results, in addition to human studies, suggest that higher rates of discounting may be a fundamental process in the acquisition and maintenance of obesity. In addition, underlying genetic influences, specifically with endocannabinoid receptors, may play a role in one's sensitivity to delayed food reward.

In summary, due to the prevalence of steep discounting across multiple health behaviors and disorders in both humans and non-humans, understanding the processes related to delay discounting and behavioral sensitivity to interventions make it an important variable to consider in clinical diagnosis and treatment (Hamilton et al., 2015). More specifically, understanding methods that alter delay discounting may be helpful in reducing obesity rates.

Acceptance and Commitment Therapy

Acceptance and Commitment Therapy (“ACT,” pronounced as one word) is a third-wave cognitive behavioral therapy that encourages psychological flexibility. Psychological flexibility is the process of nonjudgmental acceptance of negative emotional experiences and cognitions as they occur, in addition to the engagement of behavior in line with one’s chosen values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Hayes, Strosahl, & Wilson, 1999, 2012; Twohig, 2012). The foundation of ACT is rooted in behavior analysis (i.e., principles of operant conditioning, such as reinforcement) and relational frame theory (Hayes, Barnes-Holmes, & Roche, 2001; Torneke, 2010).

The Six Core Processes

Psychological Flexibility consists of six core processes: acceptance, defusion, flexible attention to the present moment, self-as-context, values, and committed action (Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013; Hayes et al., 2006, 2012). Each of these processes can be construed on a continuum with flexible processes on one end and an inflexible counterpart on the other such as: experiential avoidance, cognitive fusion (believing a thought as being the truth), inflexible attention, rigid attachment to conceptualized self, disruption of values, and inaction, impulsivity, or persistent avoidance (e.g., “These sensations I am having are bad; therefore, they must be remove in some way [i.e., an impulsive act]”). An individual who behaves psychologically inflexibly would be motivated by rigid verbal contingences that he or she has constructed, which may or may not be accurate to the actual contingencies of the environment. For example, an individual may have derived a verbal rule that approaching authority figures leads to something “bad happening” and would avoid approaching a new

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professor to ask for clarification or help on a difficult assignment even though doing so would be in his or her best interest.

The activation of any one of these six processes tends to promote activation in the remaining processes (Hayes et al., 2012). A person who engages in experiential avoidance is also likely to show cognitive fusion, inflexible attention, non-value driven action, etc. For example, an individual who repeatedly eats sugar in response to a craving may have also report a belief of “always needing to satisfy one’s cravings” even though they report a value of health. Similarly, when one engages in acceptance, they also are more likely to show a defusion from their thoughts, present-focused attention, a more flexible sense of self-identity, and valued action even though these processes were not targeted directly. With the individual who craves sugar, teaching them to take a stance of acceptance towards his or her urge could lead to the inhibition of eating sugar while noticing the thought “always needing to satisfy one’s cravings.”

Acceptance. Acceptance within the ACT model refers to an awareness and willingness to experience private events as they occur without altering the frequency or form of the experience, which is the opposite of experiential avoidance in which one attempts to reduce the frequency or alter the form of the experience (Hayes, 2004; Hayes et al., 2006, 2012). A more technical definition refers to the promotion of an approach response or decrease in an escape response from condition, unconditioned, or derived aversive stimuli (Blackledge & Drake, 2013). For example, an individual who experiences anxiety is taught to fully feel anxiety as it occurs in the present moment without trying change or control the experience, especially when doing so would lead to more psychological harm. This is in opposition to what the person has typically responded, which is to avoid or escape the situation that makes him or her anxious (experiential

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avoidance). In the ACT framework, acceptance is a process of learning that allows the client to be truly open to their experience in the present moment (Hayes et al., 2012).

Defusion. Cognitive defusion is a set of techniques that attempts to alter how an individual interacts with his or her thoughts or other private experiences by altering function over form. This involves the recognition of a thought with no attempts to alter its content. Rather than evaluating or identifying different thoughts to replace or reduce the occurrence of a specific thought, the focus shifts to identifying actions when the thought occurs and determining the most effective action for the client in the moment even if the thought is present. The purpose is to undermine the literal meaning placed on the private verbal events (i.e., cognitive fusion; Hayes et al., 1999) by teaching a discrimination between verbal and nonverbal stimulus functions (Blackledge & Drake, 2013). This allows an individual to detach from the believability of the thought and to view thoughts as they occur (Hayes et al., 2006, 2012). An example of defusion would be labeling the process of thinking (“I am having the thought that this plane is going to crash” in response to some turbulence) as opposed to a more fused behavior of believing the thought to be true (“This plane is going to crash!”). Other ways to promote defusion would be to observe the thoughts by imagining them as leaves floating down a stream or clouds passing by in the sky, rapidly repeating the thought out loud until one habituates to the underlying stimulus function (e.g., physiological sensations, thoughts, or urges), or treat the thought as some external entity with shape, color, or form (e.g., bubbles that can be popped).

Attention to the Present Moment. Being present in the context of ACT refers to attention focused in the here-and-now rather than lost in the content of our thoughts about the past or concern about the future (Harris, 2009; Hayes et al., 2006, 2012). Attending to the present

moment allows an individual direct experience with events as they occur both internally and externally, which allows for more flexible responding in accordance with their chosen values.

Several other treatment approaches have incorporated attending to the present moment to treat emotional and mood disorders (Barlow et al., 2011; Segal, Williams, & Teasdale, 2013), in addition to personality disorders (Linehan, 1993). Engaging in present moment awareness has been linked to several different health outcomes such as decreases in chronic pain (Kabat-Zinn, 1982) and increased cardiovascular health (Loucks et al., 2015). Further, more formalized, repeated practice of present moment awareness has been related to alterations in neural connectivity and structures in the brain that have been associated with improvements in emotion regulation (Gotink, Meijboom, Vernooij, Smits, & Hunink, 2016).

Self-as-Context. Self-as-context refers to a form of perspective-taking that occurs in the I, HERE, and NOW (Hayes et al., 2001) and is a nonjudgmental perspective that develops through interpersonal interactions with other individuals (Hayes, 1984). Its development leads to one's ability to discriminate between their own perspective and the perspective of others (I vs. you) both spatially (here vs. somewhere else) and temporally (now vs. in the past or future; (Blackledge & Barnes-Holmes, 2009). From this perspective, the individual is able to observe thoughts, noticing the constant changing of content and feelings without any particular attachment (Hayes et al., 2006). Targeting self-as-context in a therapeutic context helps individuals to distinguish their perspective from their covert behavior (e.g., thoughts, feelings, physiological sensations)—viewing these constantly changing private events as THERE and THEN, and distinct from a constant, stable sense of self (Foody, Barnes-Holmes, & Barnes-Holmes, 2012). This ability to discriminate between one's perspective of self and his or her own verbal processes may aid in one's ability to more accurately describe the contingencies in the

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environment (Blackledge & Barnes-Holmes, 2009) thus, allowing for more effective action to occur. Recently, researchers observed higher predicted psychological well-being in individuals who engaged in more flexible, defused verbal behavior (e.g., “I noticed I was both angry and sad at the same time”)—a self-as-context perspective—relative to more inflexible, verbal behavior (e.g., “I am an angry person”; Atkins & Styles, 2016). While the current ACT model regards self-as-context as a distinct, individual process, there is limited evidence that distinguishes it from defusion processes (Foody et al., 2012). Indeed, one may view self-as-context as defusion from self-evaluative statements.

Values. Within the ACT model, a value is a process variable that leads to behavior that increases the likelihood of long-term access to intrinsically positive reinforcement (Blackledge & Barnes-Holmes, 2009; Hayes et al., 2012). It is a way of behaving chosen by the individual—not society—that will aid him or her in living a more fulfilling and meaningful life (Hayes et al., 2006, 2012). Behavior is performed in service of an individual’s values in a flexible manner knowing that in some certain contexts her or she must demonstrate willingness to face emotion that may arise when moving in a valued direction (Hayes et al., 2012). Individuals who behave in accordance with a values-oriented self-rule (e.g., “Challenges are important to keep motivated and to keep learning”) report higher well-being (Atkins & Styles, 2016).

Committed Action. Committed action refers to intrinsically reinforcing moment-to-moment behavior performed to create a pattern of behavior linked to a particular value (Hayes et al., 2012). Similarly, commitment within the ACT context may function to increase the likelihood of an individual to engage in behavior that is non-intrinsically reinforcing but necessary to move in a valued direction (Blackledge & Barnes-Holmes, 2009). This means commitment also includes one’s willingness to experience discomfort as they engage in values-

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driven behavior (Hayes et al., 2012). Committed action can be acquired through traditional behavioral interventions such as exposure, skills training, behavioral activation, homework, contingency management, stimulus control strategies, and pharmacotherapy (Hayes et al., 2006, 2012).

Together, these six different processes underlying psychological flexibility have been associated with higher quality of life, behavioral effectiveness, and mental health (Hayes et al., 2006). Additionally, each core process demonstrates medium to large effect sizes on targeted clinical outcomes (e.g., ability to persist in a distressing task, willingness to reengage in a distressing task, believability of distressing thoughts, behavioral outcomes such as academic grades or cigarette smoking) when used alone and in combination when compared to theoretically distinct components (e.g., thought suppression, rumination, attention control; Levin, Hildebrandt, Lillis, & Hayes, 2012). Further, researchers have found engaging in psychologically flexible behavior distinguishes between clinical and non-clinical populations as well as provide incremental validity in predicting outcomes related to panic disorder and social phobia (Gloster, Klotsche, Chaker, Hummel, & Hoyer, 2011).

Efficacy of ACT

ACT is an effective treatment that has demonstrated similar success rates as other empirically-supported therapies, such as cognitive therapy (CT) and traditional cognitive behavior therapy (CBT) across several different types of psychopathology (Hayes et al., 2006; Öst, 2008; 2014). Individuals with depression experience a significant reduction in depressive symptoms following an ACT treatment (Folke, Parling, & Melin, 2012; Forman, Herbert, Moitra, Yeomans, & Geller, 2007; Forman et al., 2012). In addition, ACT has demonstrated a significantly greater reduction in depression symptoms in relation to chronic pain relative to

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other mindfulness-based intervention (Veehof, Trompetter, Bohlmeijer, & Schreurs, 2016); however, studies looking at short-term outcomes between those randomly assigned to ACT or CT revealed no differences between treatments in symptom reduction (Forman et al., 2007). Furthermore, CT showed greater maintained recovery long-term (i.e., 18 month follow-up) relative to ACT (Forman et al., 2012).

For anxiety, and other anxiety related disorders, ACT shows similar results to cognitive behavioral therapy (CBT), and in some instances may be more effective than CBT in individuals with comorbid anxiety difficulties (Swain, Hancock, Hainsworth, & Bowman, 2013) and high behavioral avoidance (Davies, Niles, Pittig, Arch, & Craske, 2015). Similarly, ACT in addition to exposure therapy may be helpful in the reduction of symptoms related to panic disorder (Meuret, Twohig, Rosenfield, Hayes, & Craske, 2012) and conceptualizing exposures within the ACT model may be helpful when using exposure and response prevention as treatment for obsessive-compulsive disorder (Twohig et al., 2015).

For borderline personality disorder (BPD), ACT groups in conjunction with treatment as usual has shown to be effective (Morton, Snowden, Gopold, & Guymmer, 2012). In this study, public mental health services provided treatment as usual that consisted of required contact with a clinician at least once every 2 weeks, medication management, low-key supportive contacts, and in-patient admission and crisis contact if required. When Morton and colleagues (2012) examined the change in overall BPD symptoms and its associated negative behaviors following treatment, participants who underwent an ACT intervention in conjunction with treatment as usual demonstrated clinically significant reductions in BPD symptoms and behaviors relative to those assigned to treatment as usual only with these changes maintained at 3 months post-treatment.

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Likewise, individuals experiencing psychotic symptoms associated with schizophrenia showed lower rates of re-hospitalization at four-month (Bach & Hayes, 2002; Gaudiano & Herbert, 2006) and one-year follow-up (Bach, Hayes, & Gallop, 2012) following four sessions of ACT in addition to treatment as usual (i.e., medication, attendance of psychoeducational groups, and weekly sessions of psychotherapy) relative to the treatment-as-usual group.

In addition to psychopathology, ACT demonstrates utility in terms of health-related behavior change. For example, Butryn, Forman, Hoffman, Shaw, and Juarascio (2011) studied the effectiveness of two 2-hour ACT group sessions on the promotion of short-term physical activity. They were compared to a condition of similar length that provided educational material on safety when engaging in physical activity. Results showed an increase in activity center visits from pre- to post-intervention in the ACT group relative to the education group one week later. In another study, individuals training to maintain weight loss demonstrated a clinically-significant increase in moderate-to-vigorous activity across a 12-week manualized ACT intervention specific to promoting physical activity (Butryn, Kerrigan, Arigo, Raggio, & Forman, 2016). However, this study is limited in its single treatment design with no control group.

ACT has also demonstrated effectiveness in reduction of cigarette smoking. Compared to nicotine replace therapy, which involves psychoeducation and the use of nicotine patches, smokers demonstrated a greater likelihood to remain abstinent from smoking at one-year post intervention follow-up using ACT with avoidance and inflexibility mediating the effect (Gifford et al., 2004). Similarly, smokers who experienced an intervention using ACT, Functional Analytic Psychotherapy (FAP), and a medication for smoking cessation showed higher rates of non-smoking both post and at one-year following treatment than those using medication alone (Gifford et al., 2011). Indeed, it appears ACT may be a more appropriate treatment for drug use

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than traditional cognitive behavioral therapy (Hernández-López, Luciano, Bricker, Roales-Nieto, & Montesinos, 2009; Lanza, García, Lamelas, & González-Menéndez, 2014).

Overall, ACT appears to be as effective as other therapeutic approaches in its treatment of different psychological difficulties and is superior to control conditions (Swain et al., 2013). Further, ACT may be helpful in instances where traditional cognitive behavioral therapy fails (Meuret et al., 2012). Beyond psychopathology, ACT demonstrates utility in the promotion of health behaviors, such as physical activity (Butryn et al., 2011, 2016) and abstinence from smoking (Gifford et al., 2004). Although some consider ACT to be in the early stages of research and call for more randomized control trials (Swain et al., 2013), over 200 studies have been conducted examining the effects of ACT on a variety of different disorders and behaviors (Association for Contextual Behavior Science, 2018).

Obesity and ACT

ACT has demonstrated utility for individuals with obesity. Lillis, Hayes, Bunting, and Masuda (2009) conducted an exploratory study using obese individuals who had previous experience with a structured weight loss program (i.e., regular meetings, dietary education, physical activity goals, and self-monitoring). Researchers randomly assigned individuals to a wait-list control or a one-day 6-hour ACT workshop in which two group leaders taught acceptance, mindfulness, and defusion. In addition, group leaders covered values but did not offer specific advice regarding weight loss. Follow-up assessment completed three months later revealed individuals who underwent the ACT workshop showed greater levels of psychological flexibility (e.g., acceptance, defusion, committed action) relative to controls, which indicated the ACT workshop modified the conceptualized ACT processes. Individuals showed significantly increased quality of life, psychological health, and lowered weight-related stigma. In addition,

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ACT workshop participants demonstrated significantly greater weight loss relative to control even though not a direct target of the workshop, suggesting that targeting changes in experiential avoidance can lead to positive behavior change (Lillis et al., 2009).

In a randomized control trial in which individuals seeking to lose weight assigned to an acceptance-based treatment showed significantly greater weight loss relative to those in standard cognitive behavioral treatment and greater maintenance of weight loss at 6-month follow up when delivered by weight-control experts (Forman et al., 2013). Further, the researchers indicated psychological flexibility surrounding food-related urges mediated the effect (Forman et al., 2013). Other research has shown that changes in psychological flexibility as it pertains to food cravings is a predictor for weight-loss (Forman et al., 2016; Juarascio, Forman, Timko, Butryn, & Goodwin, 2011). In addition, food-cue reactivity showed a moderating effect, such that individuals with high reactivity to environmental food signals demonstrated greater levels of weight loss relative to those who underwent standard behavioral treatment (Forman et al., 2013). Yet, this moderating effect has not been consistently demonstrated (Forman et al., 2016). Indeed, it appears that ACT may be a more effective intervention in promoting and maintaining weight loss long-term relative to other traditional treatments, which may be due to its potential effects on underlying self-regulatory mechanisms (Forman & Butryn, 2015).

Forman and Butryn (2015) developed a conceptual model of weight loss and weight gain built on the notion that individuals perceive unhealthy behavior to be relatively higher in hedonic value and we engage in behaviors to increase or maintain a high hedonic state dependent upon different momentary cues (e.g., food, fatigue, emotion, sedentary cues, labor-saving devices). Furthermore, the authors suggest the development of self-regulatory skills regarding our ability to tolerate stress, engage in values driven behavior, and have awareness of our thought processes

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can aid in weight loss. In addition, they indicate that acceptance-based interventions as a way to develop these psychological skills.

ACT and Delay Discounting

One's ability to tolerate aversive sensations is suggested to play a role in our decision-making patterns. The selection of a smaller reward to avoid aversive internal states associated with the delay to a reward can be conceptualized as a form of experiential avoidance (Hayes & Gifford, 1997; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996; Luhmann, Ishida, & Hajcak, 2011). For example, Paglieri (2013) indicated that the selection of a delayed desired outcome may be associated with distressing experiences such as a loss of ability to engage in alternative activities or the experience of boredom or discomfort while waiting for the delayed reward. Accordingly, individuals who report lower rates of tolerating distressing experiences have shown higher rates of discounting (Dennhardt & Murphy, 2011). Further, individuals who reported higher intolerance for uncertain outcomes demonstrated higher rates of discounting and an avoidance of waiting for delayed but less-risky monetary rewards (Luhmann et al., 2011). If one is indeed selecting the smaller, sooner outcome to avoid distressing internal experiences, acceptance-based procedures may be helpful in altering patterns of discounting.

While there are few studies that test ACT and its mechanisms on discounting, a couple are relevant. Morrison, Madden, Odum, Friedel, and Twohig (2014) recruited participants who showed steep discounting patterns for money. These "impulsive" participants completed a baseline delay discounting task for hypothetical money outcomes, followed by random assignment to either a brief 1-1/2 hour acceptance-based therapy session or a wait-list control. Participants returned after one week and completed a second delay discounting task. The results revealed decreased discounting rates (i.e., greater self-control) in participants who completed the

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acceptance-based procedure relative to those on the wait-list who remained similar to baseline. However, participants did not demonstrate a change in psychological flexibility or distress tolerance from pre- to post-intervention suggesting the intervention did not work on proposed self-regulatory mechanisms. Yet, these results do indicate that aspects of ACT reduces impulsive choice patterns, which may be an underlying behavioral mechanism for its success in weight-loss.

While research has demonstrated ACT to be successful at reducing delay discounting for monetary outcomes, no study to date had explored its effect on delay discounting for food. Yet, previous research (Hendrickson & Rasmussen 2013; 2016) using a brief mindfulness training (a component of ACT) had demonstrated changes to food discounting patterns. Participants who underwent a brief 50-minute mindful eating exercise showed decreases in delay discounting for food but not for money (Hendrickson & Rasmussen, 2013) with similar results also shown in adolescents (Hendrickson & Rasmussen, 2016). While the precise mechanism through which mindfulness affects delay discounting is unknown, conceptualizing it through the ACT model (i.e., a combination of specific core processes of psychological flexibility [attention to the present moment, acceptance, defusion, and self-as-context]; Fletcher & Hayes, 2005) gives researchers opportunities to identify and experimentally test potential mechanisms (i.e., acceptance, values) that underlie this training (Hayes et al., 2006; Hayes & Plumb, 2007).

The purpose of the present study was to explore the extent to which an acceptance-based procedure, with a specific emphasis on acceptance and values, would alter delay discounting for food outcomes. Specifically, we were interested in how impulsive choice patterns for food and money, as measured by delay discounting, changed following exposure to either an acceptance-based procedure directly targeting impulsive food choice or a control condition. In addition, we

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were interested how measures of general psychological flexibility and food-related psychological flexibility changed prior to and following their exposure to the acceptance-based protocol. This would aid in determining to what extent enhanced flexibility is an underlying mechanism in changing delay discounting. The study hypotheses follow:

- 1) We hypothesize individuals assigned to the acceptance-based procedure will show a decrease in delay discounting patterns relative to individuals assigned to the control condition and this change will be specific to delay discounting for food but not money.
- 2) We hypothesize psychological flexibility will increase following acceptance-based training and this increase will be specific to food-related psychological flexibility but not general psychological flexibility.

Methods

Participants

Values for an a priori power analysis were obtained from Morrison et al., (2014). The power analysis was calculated using G*Power 3.1.9.2® for a mixed ANOVA (two between-subjects factors and three within-subjects factors) with a medium effect size ($d=0.5$) and power of 0.95. Power analysis results indicated a total sample size of approximately 44 individuals would be required. Participants were recruited from the Idaho State University undergraduate participant pool via an online participant management software (SONA System). Participants were asked to abstain from eating or drinking two hours prior to their scheduled start time. Participants were not eligible if they had been diagnosed, suspected they had an eating disorder, or were pregnant. Participants were compensated with course credit for their participation. Initially, participants were considered eligible if they selected $\geq 60\%$ of the smaller, sooner

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reward with $\geq 85\%$ consistency on the baseline FCQ. Because recruitment for participants was challenging, this criterion ultimately was removed. In the end, only 24 participants were used for the current study (see Table 1).

Measures

Subjective Hunger Questionnaire (Appendix A). The subjective hunger questionnaire (Hendrickson & Rasmussen, 2017; Hendrickson et al., 2015) is a self-report measure that asks participants to report their last snack and full meal, as well as rate their hunger on a scale of 0 to 100. This was used as a control for hunger-related issues.

Demographic Questionnaire (Appendix B). The demographics questionnaire asked participants about basic demographic variables (age, gender, SES, etc.), nicotine dependence, food security, self-identified or reportedly diagnosed eating disorders, and activity level.

Drug and alcohol screening (Appendix C & D). The Drug Abuse Screening Test (DAST-10; $\alpha=0.92$; Skinner, 1982) and Alcohol Use Disorders Identification Test (AUDIT-C; Bush, Kivlahan, McDonell, Bradley, & the Ambulatory Care Quality Improvement Project [ACQUIP], 1998) are self-report measures that ask individuals questions about their current drug and alcohol use and their consequences. This measure is used to control for excessive drug and alcohol use—two factors that are known to influence discounting rates. The DAST has shown high internal consistency ranging from 0.86 to 0.94, a test-retest at 0.71, 80% sensitivity rate, and 88% specificity rate (see Yudko, Lozhkina, & Fouts, 2007 for a review). Psychometric properties of the AUDIT indicate an internal consistency of 0.72, sensitivity rates of 86% to 98%, and specificity ranging from 60% to 72% (Barry, Chaney, Stellefson, & Dodd, 2015; Bush et al., 1998).

Food Craving Acceptance and Action Questionnaire (Appendix E; F-AAQ; Juarascio et al., 2011). The F-AAQ is a 10-item measure of one's "acceptance" of food-related distressful thoughts and "willingness" to regulate eating behavior in spite of cravings. Together, these two factors measure psychological flexibility of eating-related thoughts and behaviors. Higher scores indicate greater flexibility, whereas lower scores indicate inflexibility. The F-AAQ has demonstrated an internal consistency of 0.93, test-retest ranging from 0.53 to 0.84, and concurrent validity with AAQ-II ($r=0.33$; Juarascio et al., 2011).

Acceptance and Action Questionnaire-II (Appendix F; AAQ-II; Bond et al., 2011). The AAQ-II is a 10-item measure of psychological inflexibility around distressful thoughts and events. Higher scores on the AAQ-II indicate greater psychological inflexibility and scores in the 24-28 range demonstrate a significant relation with different types of psychopathology (e.g., depression, anxiety). Psychometric properties of the AAQ-II indicate high internal consistency ($\alpha=0.84$) and high test-retest reliability ($r=0.79$ to 0.81 ; Bond et al., 2011).

Food Choice Questionnaire (Appendix G; FCQ; Hendrickson et al., 2015). The FCQ is a measure of delay discounting for food, adapted from the Money Choice Questionnaire, which assesses participants choices of different amounts of food available either immediately or after one of several delays across small (8-13 bites), medium (25-35 bites), and large (40-50 bites) magnitudes. Each question has a predetermined discounting value. The choices made by the participant help to narrow the range in which their estimated discounting rate lies, which is determined using the geometric mean. Because the focus of this study was simply to see if an acceptance-based procedure can alter food discounting, only one magnitude (i.e., medium) was used.

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Money Choice Questionnaire (Appendix H; MCQ; Kirby & Marakovic, 1996; Kirby, Petry, & Bickel, 1999). Participants select between smaller, sooner vs. larger, later amounts of hypothetical money over a wide range of delays and small (\$25-\$35), medium (\$50-\$60), and large (\$75-\$80) magnitudes. Predetermined discounting values are calculated for each question and choices made by the participant help to determine their estimated discounting rate. Similar to the FCQ, only the medium magnitude was used.

Dutch Eating Behaviour Questionnaire—External Eating subscale (Appendix I; DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986). The DEBQ is a 33-item self-report measure that assesses 3 different patterns of eating behavior: emotional, external, and restrained eating. Only the external eating subscale will be administered. The external eating subscale measures an individual's sensitivity to food cues in the environment and its effect on their eating patterns. Previous research suggests food cues affected discounting rates (Appelhans et al., 2011) and responsiveness to acceptance-based treatment (Forman et al., 2013).

Biometric information. Participants' height, weight, waist circumference, body fat percentage, and body mass index (BMI) were measured since weight status is robustly related to delay discounting (e.g., Jarmolowicz, et al., 2014). Height and waist circumference were measured using a standard tape. A Tanita® body fat scale was used to measure weight and percent body fat. BMIs was determined by dividing participant's weight in kilograms by height in meters squared (kg/m^2). When measuring waist circumference, participants were asked to face the wall away from the researcher and lift their shirt slightly. For weight and percent body fat, participants stepped onto the scale facing backwards. These procedures were done to help maximize the comfort of the participant as much as possible.

Research Experience Questionnaire (Appendix J). This questionnaire assesses participants' comfort on various aspects of the protocol. This feedback provides information on procedures that may need to be adjusted in order to increase participants' comfort during participation. In addition, contact information (e.g. email address) was collected so that debriefing could take place after the session. This form was kept in a separate file from the data provided by the participant.

Procedure

Participants were asked to abstain from eating food or drinking liquids (including water) two hours prior to their participation. All participants met the deprivation requirement. They completed the informed consent process (Appendix K) and the Subjective Hunger Questionnaire where they reported hours since their last consumption of water and food amount. Then, participants completed the delay discounting tasks (i.e., FCQ and MCQ). These measures were followed by the AUDIT, and DAST, AAQ-II, F-AAQ, DEBQ, which were presented in a random order. Then, biometric information was collected. Afterwards, participants were randomly assigned to either acceptance-based training or a control condition. Twelve participants were assigned to the control condition and twelve participants were assigned to the acceptance-based procedure.

Acceptance-Based training (ABT). Individuals assigned to the ABT condition completed a 60 to 90 min acceptance-based training session led by the experimenter (LR). A licensed clinical psychologist who was familiar with ACT principles provided supervision sessions. In addition, all ABT sessions were recorded and reviewed by an independent coder to ensure treatment fidelity (see Table 2). The brief acceptance-based training for impulsivity used by Morrison and colleagues (2014) was adapted for this study to target instances of experiential

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avoidance surrounding food choices (see Appendix L for protocol). It specifically focused on the promotion of an individual's willingness to experience aversive internal events as they engage in more value-driven health behaviors.

Initially, the ABT protocol focused on the identification of a person's attempt to avoid or escape private behavior (i.e., physiological sensations or thoughts) as it related to their experience with food choices. The long-term and short-term successes in avoiding or escaping private behavior were discussed. After the identification of a target (see Table 3 for targets), the participant discussed the protocol focused on one's "willingness" (i.e., acceptance) to inhibit an avoidance or escape response, or to engage in an approach response in the presence of the distressing private event. Some individuals demonstrated a fear or uncertainty in inhibiting or engaging in an approach response. When this occurred, participants were trained to discriminate private events as stimuli distinct from one's sense of self.

Participants also identified values (i.e., a verbally constructed rule that will motivate a pattern of intrinsically reinforcing behavior; Hayes et al., 1999, 2012) related to their food choices. They also completed the Bull's-Eye Values Survey (Lundgren, Luoma, Dahl, Strosahl, & Melin, 2012) to aid in the identification of a particular value and provide an assessment of their overall engagement in "values-driven behavior" in their daily lives. The participant identified one valuing behavior that could be accomplished throughout the next week. Participants were given a copy of a homework sheet (Appendix L) which tracked their daily engagement in their target behavior and their responses to the private events that occurred across the week. They were asked to return the sheet at the 1-week follow-up session. As an incentive, participants who returned a completed homework sheet were awarded with one additional course credit at the end of the second session. Upon completion of the protocol, participants completed

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a second Subjective Hunger Questionnaire, FCQ, MCQ, F-AAQ, and AAQ-II. They were scheduled for a one-week follow-up session and compensated with course credit.

Control. Individuals assigned to the control condition individually watched a 75-min DVD on nutrition. Watching a video represented a more passive process and was distinctly different from the experimental condition, which was more active. After watching the video, participants completed a second Subjective Hunger Questionnaire, FCQ, MCQ, AAQ-II, and F-AAQ, and were rescheduled to return for a follow-up session one week later.

Follow up. Approximately one week after the baseline session, all participants, regardless of assigned condition, were asked to return and complete similar measures from Session 1 (i.e., Subjective Hunger Questionnaire, FCQ, MCQ, F-AAQ, and AAQ-II), in addition to the Research Experience Questionnaire. Participants assigned to the ABT condition were given an additional handout with referrals to additional psychological services (Appendix M).

Data Analysis

The data were analyzed using IBM SPSS 24 statistic software. Discounting values for both food and money were calculated on the FCQ and MCQ using the method to score choice questionnaires described above (see Kirby et al., 1999; Rodriguez, Hendrickson, & Rasmussen, 2018 for scoring procedures). Due to the skewness of discounting data, which is common among discounting studies (e.g., Bickel et al., 1999; Hendrickson et al., 2015), discounting values were transformed. Square root transformations were used for food discounting data, whereas log10 transformations were used for money discounting data

Consistency in responding to the discounting measures should be noted. An individual was deemed consistent if they demonstrated a single switch (i.e., preference reversal) from larger, later responses to smaller, sooner responses. If the individual demonstrated multiple

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switches, then they are considered an inconsistent responder. Inconsistent responder scores were determined by comparing the inconsistent response pattern to the consistent response patterns that can be yielded from the measure. For example, an individual who selects four larger, later rewards and selects the smaller, sooner amount for the remaining choices would have a discounting value of 0.2532 and is considered consistent. One possible inconsistent pattern would be a second individual who also selects the first four choices as larger, later, the next four as smaller, sooner, and then switches back to the larger, later for the final choice. This inconsistent response pattern closely resembles the first consistent response pattern described and would also be given the discounting value of 0.2532. The geometric mean associated with consistent pattern that closely resembled the inconsistent pattern was used as the discounting value (Hendrickson et al., 2015; Kirby et al., 1999; Rodriguez et al., 2018) . If the inconsistent pattern resembled more than one consistent pattern, the geometric mean of those means was calculated to determine the discounting rate (Kirby et al., 1999).

Independent samples t-tests and chi-square analyses were used to compare differences in demographics variables between individuals assigned to the ABT group and those assigned to the DVD condition. Pearson's *r* correlations were calculated comparing the relation among baseline discounting with health variables, psychological flexibility, food cue reactivity, and consumption variables. Two 2x3 mixed-design ANOVAs were used to determine the main effects of treatment (acceptance-based vs. control as a between-subject factor), and time (baseline vs. post-session vs. 1-week follow-up as a within-subjects) and interactions on FCQ and MCQ scores. FCQ and MCQ scores were not compared statistically as they were qualitatively different measures. Similarly, two 2x3 mixed-design (treatment and time) ANOVAs were used to determine main effects and interactions on F-AAQ and AAQ-II score.

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Twenty-four individuals participated in the study with twelve individuals randomly assigned to the ABT condition and twelve individuals randomly assigned to the DVD condition. Two individuals assigned to the ABT condition and two individuals assigned to the DVD condition dropped out after the first session. Their post-session scores on the FCQ, MCQ, AAQ-II, and F-AAQ were carried forward for follow-up. All individuals' scores were included in all analyses.

Results

Consistency for FCQ and MCQ Measures

On the FCQ, 67% of participants demonstrated consistent responding at baseline, whereas 63% of participants demonstrated consistent responding at post-test and 1-week follow-up. For MCQ baseline scores, 88% of participants were consistent responders. At MCQ post-test, 79% were consistent responders whereas 88% demonstrated consistent responding at the 1-week follow-up. No significant differences were observed between administrations in the number of consistent versus inconsistent response patterns.

Treatment Adherence

Individuals assigned to the ABT condition were video recorded and the videos were reviewed by an independent coder (Table 2). Due to a technical malfunction, one video could not be coded. Out of the 11 available videos to be coded, 9 of the individuals were able to identify a specific food-related behavioral target (e.g., reduce stress eating, increase healthy food choices, cook healthier meals; see Table 3). The remaining two participants denied difficulties related to food and identified reduction in anxiety or increasing studying behavior as a target. Eight of the participants were exposed to creative hopelessness whereas all of the participants were exposed to control as a problem, acceptance, values, and identified a commitment to engage in over the

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week. Six of the participants described some “hesitation” around the acceptance of their emotional states. These participants were exposed to defusion/self-as-context techniques. Of the 12 individuals assigned to the ABT condition, 7 (58%) returned their homework assignment sheet at the second session.

Analyses were conducted with all participants. Additional analyses were conducted in which individuals who did not return their homework or did not experience all aspects of the protocol were removed. Results did not significantly differ. Therefore, analyses including all participants are reported.

Baseline Demographic Variables

Participant demographic characteristics are listed in Table 1. The majority of participants identified of female gender (71%) and of Caucasian ethnicity (71%). Over half of the total sample (54%) were in the normal BMI category. Approximately 13% of the sample reported the use of nicotine by smoking cigarettes, whereas 8% reported the use of a vaporizer. These numbers for nicotine use are slightly below the US population percentage of 14% of adult nicotine users reported by the CDC (Centers for Disease Control and Prevention, 2018). Mean participant scores on the DAST-10 ($M=1.7$, $S.E.=0.2$) and AUDIT-C ($M=2.5$, $S.E.=0.4$) indicate low levels of illicit substance and alcohol use. No participants reported a diagnosis of an eating disorder. When researchers compared demographic variables between the ABT and DVD condition, no statistical differences were found.

Food Discounting and Food-Related Psychological Flexibility

Mean food discounting rates (see Figure 1) were compared across treatment groups at three different time points (baseline, post-test, and 1-week follow-up) using a 2x3 factorial repeated-measures ANOVA. The ANOVA revealed a main effect of time ($F(2,44)=3.63$,

$p=0.04$, partial $\eta^2=0.14$). When controlling for treatment group, food discounting values differed across administration. Bonferroni pairwise comparisons showed baseline food discounting values did not significantly differ from post-test ($p=0.25$) or 1-week follow-up ($p=0.93$). However, post-test was significantly higher than 1-week follow-up ($p=0.03$). There was no main effect of group ($F(1,22)=1.88$, $p=0.18$, partial $\eta^2=0.08$), nor was there a significant interaction effect ($F(1,44)=0.393$, $p=0.68$, partial $\eta^2=0.02$).

Similarly, scores on the F-AAQ (see Figure 2) were compared across group and time using 2x3 factorial repeated-measures ANOVA. Results indicated no significant main effects of group ($F(1,22)=0.10$, $p=0.75$, partial $\eta^2=0.01$), main effect of time ($F(2,44)=1.48$, $p=0.24$, partial $\eta^2=0.06$), or interaction ($F(2,44)=2.17$, $p=0.89$, partial $\eta^2=0.01$).

Money Discounting and Psychological Flexibility

Mean money discounting rates (Figure 3) were compared across group and time using a 2x3 factorial repeated-measures ANOVA. Results revealed no significant effects. There was no significant main effect of group ($F(1,22)=0.28$, $p=0.61$, partial $\eta^2=0.01$), time ($F(2,44)=1.04$, $p=0.36$, partial $\eta^2=0.05$), nor a significant interaction ($F(2,44)=1.72$, $p=0.19$, partial $\eta^2=0.07$).

Scores on the AAQ-II (see Figure 4) were compared also using 2x3 factorial repeated-measures ANOVA. Mauchley's Test of Sphericity was statistically significant ($\chi^2(2)=8.60$, $p=0.01$) indicating the assumption of sphericity had been violated for the main effect of time, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon=0.75$). Results from the ANOVA indicated there was no significant main effect of time ($F(1.50,32.93)=1.07$, $p=0.34$, partial $\eta^2=0.05$) nor a significant main effect of group ($F(1,22)=0.01$, $p=0.91$, partial $\eta^2=0.001$). In addition, there was no significant interaction ($F(1.5,32.93)=0.55$, $p=0.53$, partial $\eta^2=0.03$).

Correlations between Baseline Variables

Pearson's r correlations were conducted between baseline scores on the FCQ, MCQ, AAQ-II, F-AAQ, DEBQ, time since last full meal, time since last snack, and subjective hunger (see Table 5). Results revealed a significant, negative relation between the FCQ and the AAQ-II ($r=-0.52, p=0.009$), which indicated as food discounting scores increased, psychological inflexibility decreased. Furthermore, the FCQ was positively associated with time since last snack ($r=0.49, p=0.02$) and subjective hunger ($r=0.42, p=0.04$).

Additional Pearson's r correlations were calculated between baseline FCQ and MCQ scores and health variables (e.g., PBF, BMI, AUDIT-C, DAST-10, nicotine dependence, and food security; [see Table 4]). The MCQ showed a significant, positive relation with PBF ($r=0.59, p=0.003$) and BMI ($r=0.43, p=0.04$). The MCQ also demonstrated a significant, negative relation with scores on the AUDIT-C ($r=-0.48, p=0.02$), indicating money discounting was inversely associated with alcohol use. In addition, PBF demonstrated a significantly, positive association with food insecurity ($r=0.43, p=0.04$), suggesting that increases in food insecurity led to higher rates of percent body fat. However, food insecurity did not demonstrate a significant association with BMI ($r=0.04, p=0.85$), another measure of obesity status.

Deprivation Variables and Discounting

Given the correlation between baseline subjective hunger and baseline FCQ, additional Pearson's r correlations were calculated between post-test, and follow-up FCQ and subjective hunger scores (see Table 6). Baseline FCQ was positively associated with post-test FCQ ($r=0.53, p=0.008$). The correlations between baseline FCQ and follow-up FCQ ($r=0.10, p=0.64$) and post-test FCQ and follow-up FCQ ($r=0.08, p=0.18$) were not significant. Baseline, post-test, and follow-up subjective hunger demonstrated significant associations with each other ($r=0.55-0.80$,

$p<0.05$). Post-test FCQ demonstrated a significant, positive relation between baseline subjective hunger ($r=0.57$, $p=0.004$) and a relatively stronger, positive association with post-test subjective hunger ($r=0.68$, $p<0.001$). Follow-up FCQ discounting scores showed significant, positive associations with post-test subjective hunger ($r=0.43$, $p=0.04$) and follow-up subjective hunger ($r=0.56$, $p=0.004$).

Table 7 showed Pearson's r correlations amongst MCQ scores and subjective hunger scores at baseline, post-test, and follow-up. MCQ scores were significantly related across all three time periods ($r=0.75-0.80$, $p<0.01$). However, baseline, post-test, and follow-up MCQ scores did not show a significant relation with subjective hunger at any time point.

Mean subjective hunger rates (see Figure 5) were compared across treatment groups at 3 different time points (baseline, post-test, and 1-week follow-up) using a 2x3 factorial repeated-measures ANOVA. Mauchley's Test of Sphericity was statistically significant ($\chi^2(2)=7.63$, $p=0.02$) indicating the assumption of sphericity had been violated for the main effect of time, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\epsilon=0.77$). The ANOVA revealed a main effect of time ($F(1.53,33.72)=10.26$, $p=0.001$, partial $\eta^2=0.32$). When controlling for treatment group, subjective values differed across time. Bonferroni pairwise comparisons revealed baseline subjective hunger significantly differed from post-test subjective hunger ($p<0.001$). The difference between post-test subjective hunger and 1-week follow-up subjective hunger was trending towards significance ($p=0.06$). Baseline subjective hunger and follow-up subjective hunger were not significantly different from one another ($p=0.56$). There was no main effect of group ($F(1,22)=2.43$, $p=0.13$, partial $\eta^2=0.10$), nor was there a significant interaction effect ($F(1,44)=1.38$, $p=0.26$, partial $\eta^2=0.06$).

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Additional Pearson's r correlations examined the relation between time since last full meal, time since last snack, and FCQ and MCQ values. Only follow-up time since last full meal and follow-up MCQ scores showed a significant, positive association ($r=0.45$, $p=0.03$); there were no other significant correlations.

Baseline time since last snack and baseline FCQ showed a significant positive relation ($r=0.49$, $p=0.02$). In addition, post-test time since last snack showed a significant positive relation with baseline food discounting scores ($r=0.51$, $p=0.01$). No significant associations were observed between MCQ and time since last snack at any time point.

When assessing the relation amongst deprivation variables at their respective time points, baseline time since last full meal and baseline time since last snack showed a significant positive association ($r=0.61$, $p=0.002$); however, neither variable demonstrated a significant association with baseline subjective hunger. Similarly, post-test time since last full meal and post-test time since last snack showed a significant positive relation ($r=0.61$, $p=0.002$), but neither were significantly related to post-test subjective hunger. At follow-up, time since last full meal, time since last full snack, and subjective hunger showed no significant association with the other.

Discussion

The purpose of the present study was to determine the extent to which an acceptance-based training would alter delay discounting for food and money compared to a DVD control; we examined this across three different time points: baseline, post-session, and after a 1-week follow-up. First, a significant effect across administrations of the food delay discounting task was found, regardless of group condition, in which post-test food delay discounting was significantly higher than the scores observed at 1-week follow-up. No such effect was found with money at these same times points.

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The increase in food discounting from baseline to post-session may suggest within-subject changes related to food discounting, as these measures were conducted at different time points within the same session. A within-session increase in food discounting may suggest that time or perhaps exposure to an initial food discounting task may play a role in altering processes related to discounting. For example, exposure to the initial food discounting task prior to the second food discounting task within the session could have led to an increase in subjective hunger thereby increasing one's discounting at the second food discounting measure. Indeed, previous research has also shown a relation between subjective hunger and food delay discounting (Hendrickson et al., 2015; Rodriguez et al., 2018). Moreover, a recent study has shown a similar within-subject increase in food discounting (Lee, Rodriguez, Robertson, & Rasmussen, in preparation). In this study, time across session and initial exposure to the first discounting task appeared to both be factors in this change. However, both baseline and post-test food discounting demonstrated a significant positive correlation, which suggests some within session stability. These results—in conjunction with the previously mentioned study (Lee et al., in preparation)—may suggest that while within-values of food discounting are related, they may also change within session in predictable ways.

A small amount of research has been conducted on the test-retest reliability of food discounting across session (Jimura et al., 2011) and the psychometric properties of the FCQ (Hendrickson et al., 2015). Studies that have used a similar measure of discounting (e.g., Hendrickson & Rasmussen, 2017) have shown no significant changes in control groups across administration separated by several days, however correlations between the measures were not conducted. Even though food discounting may not have changed in this study, it is unclear whether the two scores were significantly related to the other.

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Results did not reveal a main effect of acceptance-based treatment on discounting processes. Results also revealed no significant interactions between group and administration on delay discounting measures for food or money. Similarly, food psychological flexibility and general psychological flexibility did not show a significant change from baseline across conditions. Therefore, we failed to reject the null hypotheses. The current study failed to replicate the results of previous research, which indicated mindfulness- and acceptance-based procedures can reduce the amount of delay discounting for food (Hendrickson & Rasmussen, 2013, 2017) and money (Morrison et al., 2014). The null findings could be due to several factors.

First, the null findings could be explained by factors related to adherence to the training protocol (i.e., exposure to all concepts). Adherence to training protocols has not been reported in other studies (e.g., Hendrickson & Rasmussen, 2013; Morrison et al., 2014), however because acceptance-based treatment requires multiple factors, we believed it was important to report it in the current study. In the present study, not all participants experienced all aspects of the current protocol. Only 82% of individuals were able to identify a food-related behavioral target, whereas the remainder denied difficulties with food-related decision. Moreover, only 73% of participants were directly exposed to creative hopelessness, a process that relates to flexibility by bringing awareness to one's response to their internal experience. Creative hopelessness creates a context that begins to undermine verbal processes that lead to a rigid rule following about the removal and control of one's internal experience, thereby opening the possibility of a more flexible approach that includes acceptance (Hayes et al., 1999). The lower exposure to this condition may have minimized the ability to learn acceptance for some individuals. However, results did not significantly differ between analyses that included individuals exposed to all components versus those exposed to some components. Yet, the lack of significant differences on measures of

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psychological flexibility (i.e., F-AAQ or AAQ-II) suggest that the protocol failed to alter the relevant processes, specifically acceptance.

Second, it is possible that the lack of significant effects is due to a lack of statistical power. Morrison et al., (2014) reported a medium to large effect size (i.e., partial $\eta^2=0.152$) for the group x time interaction that indicated the acceptance-based group demonstrated significant reduction in money delay discounting at post-test. The power analysis for the current study indicated approximately 44 individuals would be needed for adequate power; however, because of difficulties in recruitment, approximately half of the recommended total sample size was obtained. Power analyses using effect sizes from other studies that showed a significant reduction in food delay discounting after mindful eating training (Hendrickson & Rasmussen, 2013; $\eta^2=0.06$; Hendrickson & Rasmussen, 2017; $\eta^2=0.07$) suggest sample sizes ranging from 108 to 126. Given the lack of adequate power, any significant associations found among variables in the current study must be interpreted with caution.

Third, procedural differences between the current study and other studies using acceptance- and mindfulness-based studies could have also influenced the current results. The protocol used by the experimenters in Morrison et al. (2014) informed participants they had been selected to participate because it “seem[ed] like impulsive decision making may cause problems for [them]” (Morrison et al., 2014, p. 3). The present study did not mention to the participant his or her individual’s tendency to be relatively more impulsive. Informing participants they were selected based on impulsivity may have primed the individuals to the purpose of the study and influenced their discounting rates (Morrison et al., 2014). In addition, researchers have proposed the reduction in delay discounting observed following the implementation of certain procedures may be due to the participant’s ability to deduce the hypothesis and behaviors expected by the

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researcher (Rung & Madden, 2018). Indeed, the lack of a “priming phrase” in the beginning of the acceptance-based training could be a reason for its failure to influence discounting rates for either commodity.

Fourth, another procedural difference that could have influenced the current results is the lack of direct exposure to food during the training. For example, during the mindful eating training implemented by Hendrickson and Rasmussen (2013), participants were exposed to four different food groups (i.e., cracker, fruit, vegetable, and sweet) and instructed how to experience the process of eating. Results from this study and a later replication (Hendrickson & Rasmussen, 2017) showed decreases in food discounting in both adults and adolescents. The current protocol had the participants imagine a food-related event in which an impulsive decision may have been involved. While discussing a particular event can elicit similar functions as the event itself (see Hayes et al., 2001), the effect may not be as salient as the inclusion of real food cues, which would better replicate the participants actual interoceptive experience outside of the lab and better alter the process of psychological flexibility. Engaging in the acceptance-based training with food present would allow the trainer to focus on the participant’s in the moment process of responding to interoceptive stimuli and thereby better allowing the participant to contact the experience of acceptance in the moment.

A fifth possible explanation for the null results of the current study could be due to the amount of practice the individual experienced with feedback. It may be a single session of exposure to the concept of acceptance is not enough to facilitate self-reported or objective behavior change. Although participants who returned assignments indicated they engaged in acceptance over the previous week, analyses showed no differences between individuals who returned their homework and individuals who did not. Indeed, the skill of being open to one’s

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emotional experience may require repeated guided practice (Bishop et al., 2004). However, it may be possible that psychological flexibility is not a relevant process in altering food discounting patterns, which may be another reason that explains the null findings. Perhaps other processes such as the timing of one's ability to access a reinforcer could account for the changes seen in other studies of mindfulness- and acceptance-based studies (Marshall, Smith, & Kirkpatrick, 2014). More research is necessary.

Deprivation variables

Although the main hypotheses of the study were not supported, there are some findings consistent with the previous literature. Food delay discounting was significantly associated with self-reports of subjective hunger at each of the respective time points (Hendrickson et al., 2015; Rodriguez et al., 2018), but did not show a consistent significant relation with self-reported deprivation variables (i.e., time since last full meal or time since last snack). Indeed, subjective craving for different commodities such as nicotine has been associated with increased money and cigarette delay discounting (Field, Santarcangelo, Sumnall, Goudie, & Cole, 2006). However, prior research has demonstrated short-term deprivation, specifically with nicotine, has led to increases in money and food delay discounting in humans (Field et al., 2006; Mitchell, 2004). These studies utilized objective physiological measures to assess nicotine deprivation levels, whereas the current studied relied on self-reported deprivation.

Given the influence of one's subjective experience on delay discounting rates (Field et al., 2006), the significant change in subjective hunger from baseline to post-test is likely associated with the significant increase in food delay discounting although causality cannot be determined at this time. Further, the association between subjective hunger and food delay discounting indicates that researchers need to develop adequate methodology to control for

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increases in subjective hunger to help determine intervention effects on delay discounting within session.

Obesity and Delay Discounting

Delay discounting for money demonstrated a significant positive association with both PBF and BMI, replicating previous research suggesting that higher rates of impulsivity are associated with higher rates of obesity (Jarmolowicz, et al., 2014; Weller et al., 2008). While previous research has demonstrated an association between food delay discounting and percent body fat (Hendrickson & Rasmussen, 2013, 2017; Hendrickson et al., 2015; Rasmussen et al., 2010), those results were not replicated here. The lack of an effect for food discounting could potentially be due to the inadequate sample size. Studies that have demonstrated this effect typically contain total samples sizes ranging from approximately 50 to 300 total participants (Hendrickson & Rasmussen, 2013; Rasmussen et al., 2010). However, the association between money discounting and obesity continues to add further support that impulsivity, particularly sensitive to delayed rewards, may be an underlying process related to its acquisition and maintenance.

Limitations

There are several limitations to the current study that must be addressed. First and foremost, the study suffered from a lack of adequate power. The lack of an adequate sample size could be responsible for the null findings with the primary hypotheses. Furthermore, any significant findings in this study should be interpreted with caution. Future research should focus on a larger sample size with adequate power.

Second, due to recruitment difficulties, participants were not screened based on impulsivity for food outcomes nor did they initially present with concerns about eating behavior.

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Without these presenting concerns, it may have rendered the protocol ineffective. This is problematic for two reasons: one, the behavioral targets for the treatment may not have directly related to the process of delay discounting. Two, the inclusion of all participants, rather than individuals deemed “impulsive” may have increased the variability in the range of baseline impulsivity, thereby reducing the impact (i.e., restrict the range) for ABT effects. Future research would benefit from applying this protocol with a population that demonstrates difficulties with impulsivity (e.g., Morrison et al., 2014).

Subjective hunger was not constant throughout the session in which food discounting was measured twice, which represents a third limitation. Given that increases in subjective hunger may be related to an increase in delay discounting for food, future studies should attempt to stabilize subjective hunger when measuring food discounting to better ascertain effects of any intervention on changing discounting patterns.

A fourth and final limitation was the lack of significant correlations among all time points of food delay discounting measures. The non-significant relations between follow-up FCQ scores and baseline or post-test FCQ may indicate weak psychometric properties of the measure. In contrast, money delay discounting showed significant correlations across all measurement time points. Additional research could use different food discounting measures or focus on testing the test-retest reliability of the FCQ across several time points to determine if the inconsistencies with food discounting are due to measurement or commodity specific factors.

Conclusion

Impulsivity, specifically delay discounting, appears to be an underlying process related to several different health concerns such as obesity. The trans-disease nature of delay discounting indicates interventions focused on targeting this underlying behavioral pattern could have

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clinical application for several different disorders. Although, acceptance- and mindful-based procedures have been shown to influence delay discounting for food and monetary outcomes, those effects were not replicated here. The null findings reported in this paper are likely due to several limitations and future research should focus on addressing these concerns.

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ACCEPTANCE AND DELAY DISCOUNTING

Table 1

Sample Characteristics and Baseline Information

	Total (N=24)	Acceptance-Based Training (n=12)	DVD (n=12)	
	Mean (S.E.)	Mean (S.E.)	Mean (S.E.)	P
%Female*	71%	75%	67%	0.65
%Caucasian*	71%	67%	75%	0.63
Age	20.4 (0.5)	20.1 (0.7)	20.6 (0.8)	0.70
PBF	27.3 (2.0)	27.1 (2.4)	27.5 (3.2)	0.91
BMI	25.9 (1.4)	24.0 (0.8)	27.9 (2.6)	0.18
BMI Category				0.17
%Normal	54%	58%	50%	
%Overweight	33%	42%	25%	
%Obese	13%	0%	25%	
Weight (kg)	73.8 (4.4)	68.0 (3.5)	79.6 (8.0)	$p=0.20$
Waist (cm)	85.6 (3.1)	82.3 (1.9)	88.4 (5.9)	$p=0.39$
%Smoke	13%	17%	8%	$p=0.54$
%Vape	8%	0%	17%	$p=0.14$
AUDIT-C	2.5 (0.4)	2.6 (0.7)	2.4 (0.5)	$p=0.85$
DAST-10	1.7 (0.2)	1.7 (0.4)	1.8 (0.3)	$p=0.87$
Baseline				
Time Since Last Meal (hours ago)	11.3 (1.3)	13.6 (1.6)	9.0 (2.0)	$p=0.08$
Time Since Last Snack (hours ago)	7.3 (1.1)	8.4 (1.7)	6.3 (1.5)	$p=0.34$
Subjective Hunger	42.1 (4.9)	49.6 (5.8)	34.6 (7.4)	$p=0.13$
Food k -value [sqrt]	0.51 (0.03)	0.52 (0.05)	0.50 (0.05)	$p=0.69$
Money k -value [lg10]	-2.1 (0.1)	-2.1 (0.2)	-2.1 (0.1)	$p=0.83$
AAQ-II	19.5 (1.4)	18.9 (1.5)	20.2 (2.4)	$p=0.67$
F-AAQ	37.4 (1.5)	36.7 (2.4)	38.1 (1.9)	$p=0.64$

Note. *Largest group by percentage

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Table 2

Exposure to Protocol Components

Components	Percentage of Participants
Creative Hopelessness	73%
Control as the Problem	100%
Acceptance	100%
Defusion/Self-as-Context*	55%
Values	100%
Commitment	100%
Homework Returned	58%

Note. *Defusion was only introduced if participant demonstrated hesitancy or fear in accepting their internal experience

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Table 3

Behavioral Targets Identified by Participants

Participant	Behavioral Target for Acceptance-Based Training
1001	Time to eat a healthy meal
1005	Healthier eating
1011	Reduce stress eating
1017	Eating unhealthy food in response to hunger and frustration
1018	Eating regular meals, specifically breakfast
1019	Making more time for studying**
1020	Make a healthy lunch
1021	Reduce anxiety**
1022	Cooking healthier meals
1023	More home cooked meals
1024	Eating healthier meals

**Non-food related target

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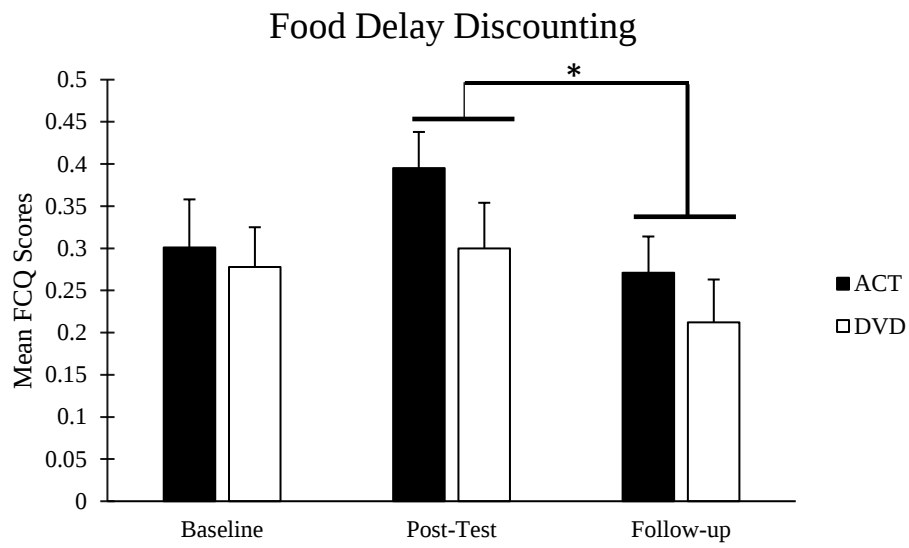


Figure 1. Mean food delay discounting rates as a function of group and time of administration. Error bars represent SEM. $*p < 0.05$

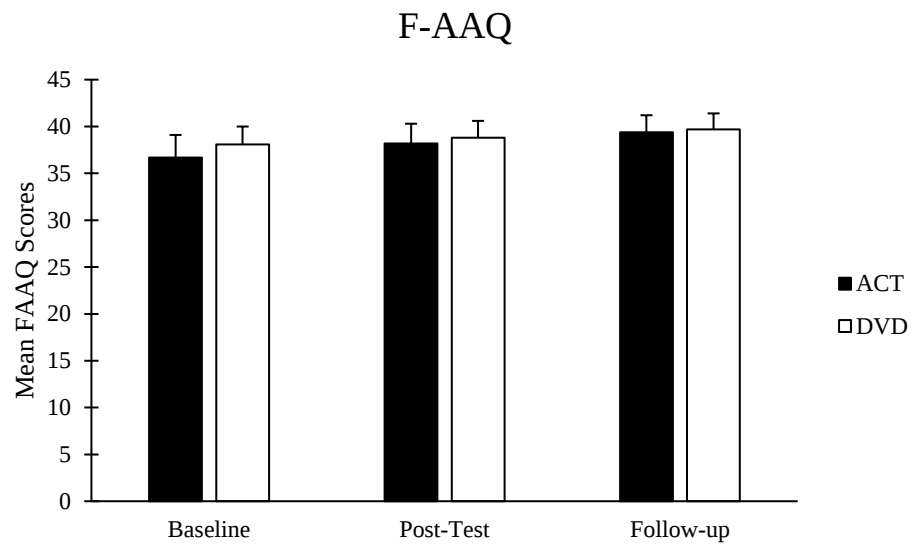


Figure 2. Mean F-AAQ scores as a function of group and time of administration. Error bars represent SEM.

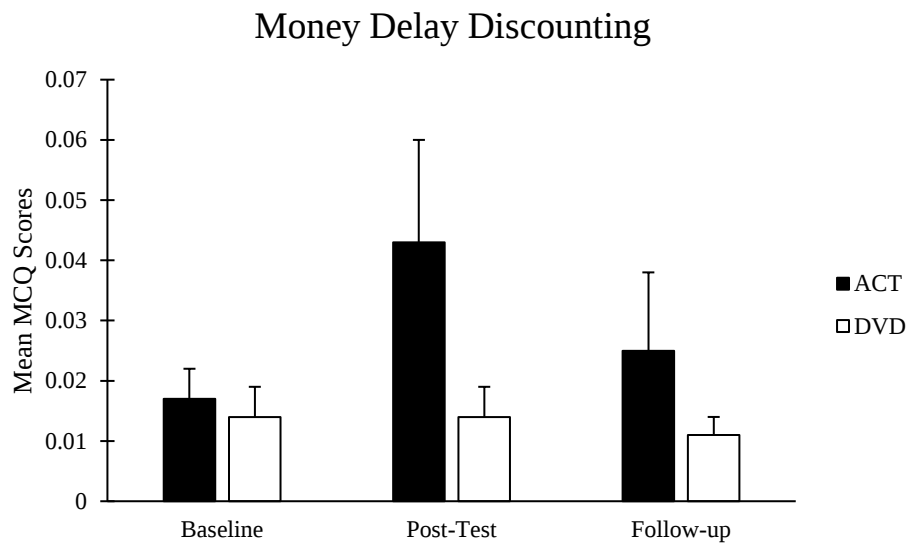


Figure 3. Mean money delay discounting rates as a function of group and time of administration. Error bars represent SEM.

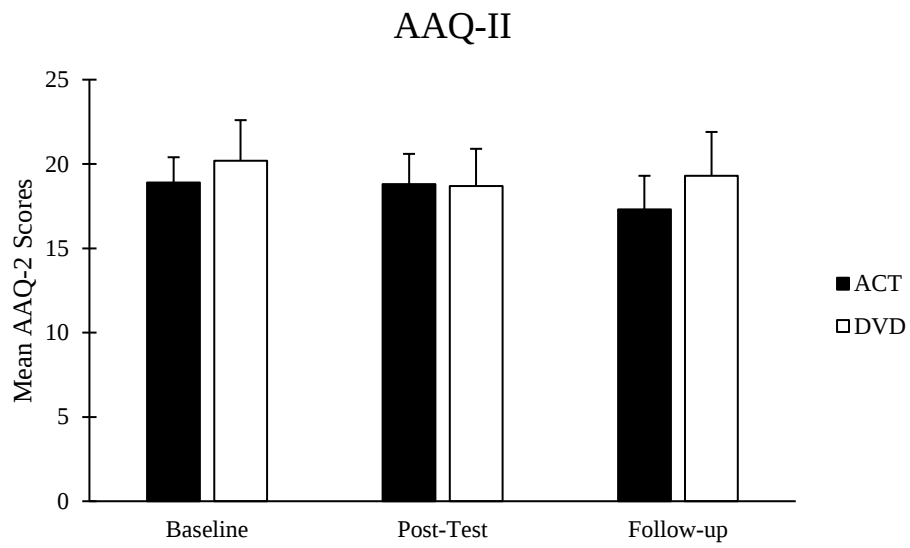


Figure 4. Mean AAQ-2 scores as a function of group and time of administration. Error bars represent SEM.

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Table 4

Correlations between baseline discounting scores, psychological variables, and consumption variables

Variables	1	2	3	4	5	6	7
1. FCQ [sqrt]	-						
2. MCQ [lg10]	0.03	-					
3. AAQ-II	-0.52**	0.19	-				
4. F-AAQ	-0.11	-0.10	0.07	-			
5. DEBQ-Ext.	-0.19	-0.004	0.36	-0.29	-		
6. Time since last full meal	0.25	0.09	-0.26	-0.12	0.12	-	
7. Time since last snack	0.49*	-0.16	-0.34	-0.47*	0.08	0.61**	-
8. Subjective Hunger	0.42*	-0.23	-0.21	0.18	0.22	0.36	0.10

* $p < 0.05$; ** $p < 0.01$

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Table 5

Correlations between baseline discounting scores and health variables

Variables	1	2	3	4	5	6	7	8
1. FCQ [sqrt]	-							
2. MCQ [lg10]	0.03	-						
3. PBF	-0.28	0.59**	-					
4. BMI	-0.11	0.43*	0.60**	-				
5. FTND	0.31	0.17	0.00	-0.06	-			
6. Vape	0.39	0.09	-0.16	0.32	-0.11	-		
7. DAST-10	-0.08	-0.29	-0.26	-0.20	0.26	-0.03	-	
8. AUDIT-C	-0.14	-0.48*	-0.25	0.02	0.06	0.16	0.57**	-
9. Food Insecurity	-0.15	0.14	0.43*	0.04	-0.02	-0.11	0.15	-0.04

* $p < 0.05$; ** $p < 0.01$; FTND=Fagerstrom Test of Nicotine Dependence

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Table 6

Correlations between food delay discounting and subjective hunger

Variables	1	2	3	4	5
1. Baseline FCQ [sqrt]	-				
2. Post-Test FCQ [sqrt]	0.53**	-			
3. Follow-up FCQ [sqrt]	0.10	0.36	-		
4. Baseline Subjective Hunger	0.42*	0.57**	0.40	-	
5. Post-Test Subjective Hunger	0.40	0.68**	0.43*	0.80**	-
6. Follow-up Subjective Hunger	0.08	0.16	0.56**	0.72**	0.55**

* $p < 0.05$, ** $p < 0.01$

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Table 7

Correlations between money delay discounting and subjective hunger

Variables	1	2	3	4	5
1. Baseline MCQ [lg10]	-				
2. Post-Test MCQ [lg10]	0.75**	-			
3. Follow-up MCQ [lg10]	0.80**	0.78**	-		
4. Baseline Subjective Hunger	-0.23	0.04	-0.10	-	
5. Post-Test Subjective Hunger	-0.02	0.17	0.04	0.80**	
6. Follow-up Subjective Hunger	-0.03	0.11	0.13	0.72**	0.55**

* $p < 0.05$, ** $p < 0.01$

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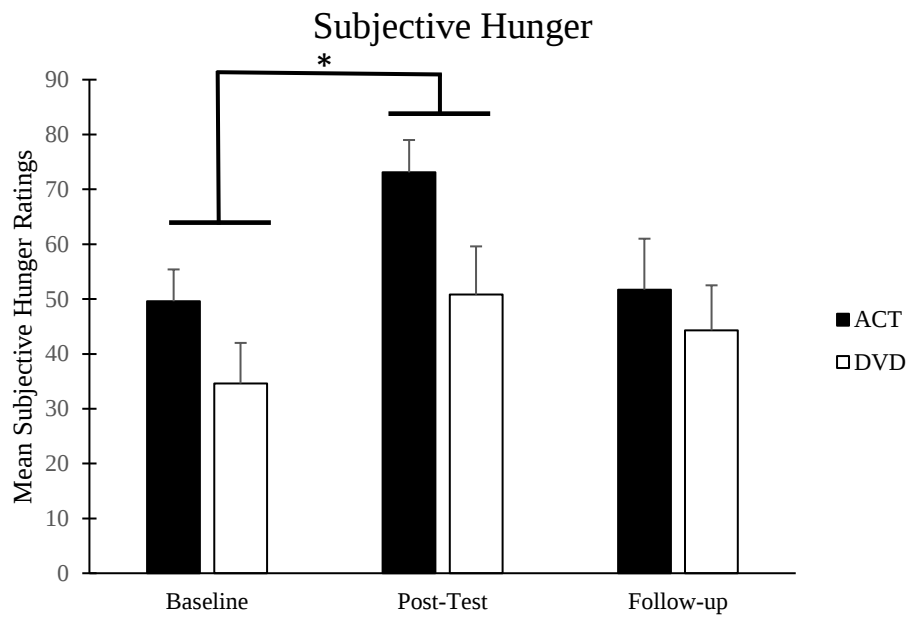


Figure 5. Mean subjective hunger ratings as a function of group and time of administration. Error bars represent SEM. * $p < 0.05$

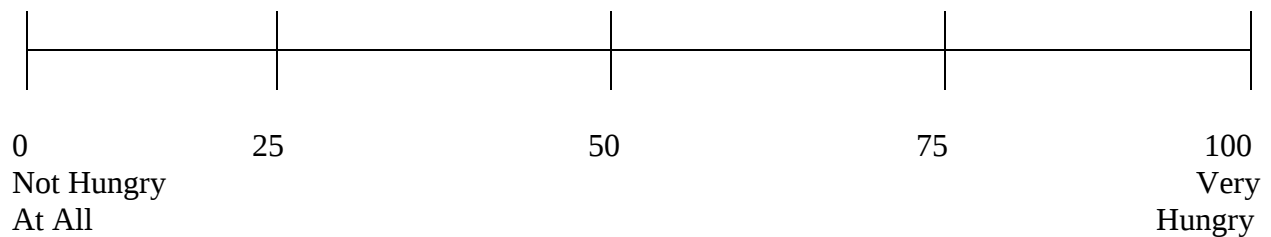
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Appendix A SHQ

Instructions: For the first two questions that ask about how long it has been since you have eaten, please answer in terms of hours since.

1. How long ago was your last full meal? _____ (e.g. 6 hours ago)
2. How long has it been since you had anything at all to eat (e.g., a snack)? _____ (e.g. 6 hours ago)

Using the scale below, how hungry do you feel right now? (If you make your own line, please assign it a number).



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Appendix B

Demographics & Lifestyle Questionnaire

PLEASE CIRCLE RESPONSE OR FILL IN THE BLANK WHERE INDICATED. Remember your answers are anonymous and confidential

1. What is your gender?
 - a. Male
 - b. Female
 - c. Transgender
 - d. Other _____
2. What is your age? _____
3. What is your ethnicity?
 - a. White / Caucasian
 - b. Black / African-American
 - c. Hispanic / Latino
 - d. Asian
 - e. Native-American
 - f. Other
4. What is your religious affiliation? _____
5. Approximately what is your annual family income? (If your parents or other caregivers support you financially, try to estimate and include their income) \$ _____ (in thousands)
6. Do you smoke?
 - a. Yes (continue to question 7)
 - b. No (Skip to question 13)
7. How many cigarettes do you smoke per day?
 - a. 10 or less
 - b. 11 – 20
 - c. 21 – 30
 - d. 31 or more
8. How soon after you wake up do you smoke your first cigarette?
 - a. 0 – 5 minutes
 - b. 30 minutes
 - c. 31 – 60 minutes
 - d. After 60 minutes
9. Do you find it difficult to refrain from smoking in places where smoking is not allowed (e.g., hospitals, government offices, cinemas, libraries, etc.)?
 - a. Yes
 - b. No

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10. Do you smoke more during the first hours after waking than during the rest of the day?
 - a. Yes
 - b. No
11. Which cigarette would you be the most unwilling to give up?
 - a. First in the morning
 - b. Any of the others
12. Do you smoke even when you are ill?
 - a. Yes
 - b. No
13. Do you use a nicotine vaporizer or electronic cigarette?
 - a. Yes (Continue to question 14)
 - b. No (Skip to question 20)
14. What strength of nicotine liquid do you use? _____mg/ml
15. How much nicotine do you vaporize per day?
 - a. 1 ml or less
 - b. 2 – 4 ml
 - c. 5 – 7 ml
 - d. 7 or more ml
16. How soon after you wake do you first use your vaporizer?
 - a. 0 – 5 minutes
 - b. 30 minutes
 - c. 31 – 60 minutes
 - d. After 60 minutes
17. Do you find it difficult to refrain from vaping in places where vaping is not allowed (e.g. hospitals, government offices, cinemas, libraries, etc.)?
 - a. Yes
 - b. No
18. Do you vape more during the first hours after waking than during the rest of the day?
 - a. Yes
 - b. No
19. Do you vape even when you are ill?
 - a. Yes
 - b. No
20. How would you classify your exercise routine for a typical day?
 - a. none
 - b. very light
 - c. light
 - d. moderate
 - e. vigorous

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21. What types of exercise do you typically engage in? _____

22. How long do you engage in this/these exercise(s) per day?

23. Have you restricted your food intake due to an intense fear of gaining weight or becoming fat, even though you were underweight?

- a. Yes
- b. No

24. Have you ever had times when you engaged in eating binges or times when you ate a very large amount of food within a 2-hour period? By very large, we mean an amount that was definitely larger than what most individuals would eat in a similar period of time under similar circumstances.

- a. Yes
- b. No (skip to question 27)

25. If you answered yes to questions 24, did you feel your eating was out of control during these binges?

- a. Yes
- b. No

26. If you answered yes to question 24, did you do anything to compensate for, or to prevent a weight gain from these binges, like vomiting, fasting, exercising or taking laxatives, enemas, diuretics (fluid pills), or other medications?

- a. Yes
- b. No

27. Have you been diagnosed with an eating disorder within the past two years?

- a. Yes
- b. No (skip to question 29)

28. If you answered yes to question 27, please indicate the disorder with which you have been diagnosed.

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- _____Anorexia Nervosa
- _____Bulimia Nervosa
- _____Binge Disorder
- _____Other (please specify)_____

29. Are you currently pregnant, or do you suspect that you are pregnant?

- a. Yes
- b. No
- c. N/A

30. How would you characterize the time it takes for you to complete a meal?

- a. 0 – 5 minutes
- b. 5 – 10 minutes
- c. 10 -15 minutes
- d. 15 – 20 minutes
- e. 20 – 25 minutes
- f. 25 – 30 minutes
- g. 30 – 35 minutes
- h. Don't know

31. Do you currently receive financial assistance for purchasing food (e.g., food stamps/EBT, SNAP, WIC)?

- a. Yes
- b. No

Below are several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for you/your household in the last 12 months.

32. “The food that I/we bought just didn’t last, and I/we didn’t have money to get more.” Was that often, sometimes, or never true for you/your household in the last 12 months?

- a. Often true
- b. Sometimes true
- c. Never true
- d. Don't know / Refused

33. “I/we couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for you/your household in the last 12 months?

- a. Often true
- b. Sometimes true
- c. Never true
- d. Don't know / Refused

34. In the last 12 months, did you/you or other adults in your household ever cut the size of your meals or skip meals because there wasn’t enough money for food?

- a. Yes
- b. No
- c. Don't know

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35. If you answered yes to question 31, how often did this happen—almost every month, some months, but not every month, or in only 1 or 2 months?
- a. Almost every month
 - b. Some months but not every month
 - c. Only 1 or 2 months
 - d. Don't know
36. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
- a. Yes
 - b. No
 - c. Don't know
37. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
- a. Yes
 - b. No
 - c. Don't know

Appendix C

Code _____

Drug Abuse Screening Test, DAST-10

The following questions concern information about your possible involvement with drugs *not including alcoholic beverages* during the past 12 months.

"Drug abuse" refers to (1) the use of prescribed or over-the-counter drugs in excess of the directions, and (2) any nonmedical use of drugs.

The various classes of drugs may include cannabis (marijuana, hashish), solvents (e.g., paint thinner), tranquilizers (e.g., Valium), barbiturates, cocaine, stimulants (e.g., speed), hallucinogens (e.g., LSD) or narcotics (e.g., heroin). Remember that the questions *do not* include alcoholic beverages.

Please answer every question. If you have difficulty with a statement, then choose the response that is mostly right.

In the past 12 months...		Circle	
1.	Have you used drugs other than those required for medical reasons?	Yes	No
2.	Do you abuse more than one drug at a time?	Yes	No
3.	Are you unable to stop abusing drugs when you want to?	Yes	No
4.	Have you ever had blackouts or flashbacks as a result of drug use?	Yes	No
5.	Do you ever feel bad or guilty about your drug use?	Yes	No
6.	Does your spouse (or parents) ever complain about your involvement with drugs?	Yes	No
7.	Have you neglected your family because of your use of drugs?	Yes	No
8.	Have you engaged in illegal activities in order to obtain drugs?	Yes	No
9.	Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?	Yes	No
10.	Have you had medical problems as a result of your drug use (e.g. memory loss, hepatitis, convulsions, bleeding)?	Yes	No

Drug Abuse Screening Test (DAST-10). (Copyright 1982 by the Addiction Research Foundation.)

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Appendix D

Alcohol Use Disorders Identification Test – C (AUDIT-C)

Instructions: For each question, please check the answer that is correct for you.

ONE (1) standard drink equals ONE of the following:



1. How often do you have a drink containing alcohol?

- ☐ Never
- ☐ Monthly or less
- ☐ Two to four times a month
- ☐ Two to three times per week
- ☐ Four or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

- ☐ 0
- ☐ 1 or 2
- ☐ 3 or 4
- ☐ 5 or 6
- ☐ 7 to 9
- ☐ 10 or more

3. How often do you have six or more drinks on one occasion?

- ☐ Never
- ☐ Less than Monthly
- ☐ Monthly
- ☐ Two to three times per week
- ☐ Four or more times a week

Appendix E

F-AAQ

Below you will find a list of statements. Please rate the truth of each statement using the following scale:

	1	2	3	4	5	6
	Very Seldom True					Always True
1. I continue to eat a healthy diet, even when I have the desire to overeat or make poor eating choices.				1	2	3 4 5 6
2. It is OK to experience cravings and urges to overeat, because I do not have to listen to them.				1	2	3 4 5 6
3. It is necessary for me to control my food urges in order to control my eating.*				1	2	3 4 5 6
4. I need to concentrate on getting rid of my urges to eat unhealthy.*				1	2	3 4 5 6
5. I do not have to overeat, even when I feel like I want to overeat.				1	2	3 4 5 6
6. Controlling my urges to eat unhealthy is just as important as controlling my eating.*				1	2	3 4 5 6
7. My thoughts and feelings about food must change before I can make changes in my eating.*				1	2	3 4 5 6
8. Despite my cravings for unhealthy foods, I continue to eat healthily.				1	2	3 4 5 6
9. Before I can make any important dietary changes, I have to get some control over my food urges.*				1	2	3 4 5 6
10. Even if I have the desire to eat something unhealthy, I can still eat healthily.				1	2	3 4 5 6

Appendix F

AAQ-II

Below you will find a list of statements. Please rate the truth of each statement using the following scale:

	1	2	3	4	5	6	7
	Never True	Very Seldom True	Seldom True	Sometimes True	Frequently True	Almost Always True	Always True
1. My painful experiences and memories make it difficult for me to live a life that I would value.	1	2	3	4	5	6	7
2. I'm afraid of my feelings	1	2	3	4	5	6	7
3. I worry about not being able to control my worries and feelings.	1	2	3	4	5	6	7
4. My painful memories prevent me from having a fulfilling life.	1	2	3	4	5	6	7
5. Emotions cause problems in my life.	1	2	3	4	5	6	7
6. It seems like most people are handling their lives better than I am.	1	2	3	4	5	6	7
7. Worries get in the way of my success.	1	2	3	4	5	6	7

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Appendix G Food Choice Questionnaire

In the task that follows, you will have the opportunity to choose between food amounts after different delays. For this task, imagine the block in front of you as 1 standardized bite of your favorite food. Answer the questions as if what you would eat would be your favorite kind of food and as if the only options you would have to choose from would be those in the question. Please take the choices seriously. The reward choices are written on this form. Circle your reward choice for each question and answer every question as though you will actually receive that choice. The choices you make are up to you.

1. Would you prefer **19 bites now** or **30 bites in 23 hours?**
2. Would you prefer **11 bites now** or **25 bites in 15 hours?**
3. Would you prefer **24 bites now** or **35 bites in 1 hour?**
4. Would you prefer **15 bites now** or **30 bites in 5 hours?**
5. Would you prefer **16 bites now** or **25 bites in 1.5 hours**
6. Would you prefer **15 bites now** or **35 bites in 8 hours?**
7. Would you prefer **14 bites now** or **25 bites in 2.5 hours?**
8. Would you prefer **15 bites now** or **35 bites in 10 hours?**
9. Would you prefer **21 bites now** or **30 bites in 0.5 hours?**
10. Would you prefer **11 bites now** or **35 bites now**

ACCEPTANCE AND DELAY DISCOUNTING

Appendix H

PARTICIPANT CODE _____

Now we are going to ask you to make some decisions about which of two rewards you would prefer. You will not receive the rewards that you choose, but we want you to make your decisions as though you were really going to get them. **Please take the choices seriously.** The reward choices are written on this form. Circle your reward choice for each question and answer every question as though you will actually receive that choice. The choices you make are up to you.

1. Would you prefer \$54 now or \$55 in 117 days?
2. Would you prefer \$47 now or \$50 in 160 days?
3. Would you prefer \$25 now or \$60 in 14 days?
4. Would you prefer \$40 now or \$55 in 62 days?
5. Would you prefer \$27 now or \$50 in 21 days?
6. Would you prefer \$49 now or \$60 in 89 days?
7. Would you prefer \$34 now or \$50 in 30 days?
8. Would you prefer \$54 now or \$60 in 111 days?
9. Would you prefer \$20 now or \$55 in 7 days?
10. Would you prefer \$20 now or \$60 now

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Appendix I

DEBQ-Ext.

Please answer the following questions using the following scale below:

	1	2	3	4	5
	Never	Seldom	Sometimes	Often	Very Often
1. If food tastes good to you, do you eat more than usual?	1	2	3	4	5
2. If food smells and looks good, do you eat more than usual?	1	2	3	4	5
3. If you see or smell something delicious to eat, do you have a desire to eat it?	1	2	3	4	5
4. If you have something delicious to eat, do you eat it straight away?	1	2	3	4	5
5. If you walk past the baker do you have the desire to buy something delicious?	1	2	3	4	5
6. If you walk past a snack bar or a café, do you have the desire to buy something delicious?	1	2	3	4	5
7. If you walk past a snack bar or a café, do you have the desire to buy something delicious?	1	2	3	4	5
8. Can you resist eating delicious foods?	1	2	3	4	5
9. Do you eat more than usual, when you see others eating?	1	2	3	4	5
10. When preparing a meal are you inclined to eat something?	1	2	3	4	5

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Appendix J

Research Experience Questionnaire

Please answer these questions about your experience in this research.

Using the scale below, please indicate how comfortable you felt completing the various parts of this study.

1	2	3	4	5
very				very
uncomfortable				comfortable

- | | |
|--|-------|
| 1. Completing the demographic questionnaires | _____ |
| 2. Completing decision-making tasks | _____ |
| 3. Being weighed and measured | _____ |
| 4. Discussing thoughts and feelings about food (if applicable) | _____ |
| 5. Completing Values Bullseye and Homework Sheet (if applicable) | _____ |
| 6. Overall Comfort Level | _____ |

7. Was there anything not listed above that made you feel more than moderately uncomfortable?
Yes (1) No (0)

If yes, then please
explain_____

8. Would you participate in another study like this in the future? (please circle)
Yes (1) No (0)

If no, then why not? _____

9. If you would like to know more about the study, please record your email address below and we will contact you when the study is complete.

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Appendix K

Idaho State University Human Subjects Committee Informed Consent Form for Non-Medical Research

CONSENT TO PARTICIPATE IN RESEARCH

Health Decision-Making Behavior

You have been asked to volunteer for a research study conducted by Luis R. Rodriguez, B.S. and Erin B. Rasmussen, Ph.D. (208-282-5651), from the Department of Psychology at Idaho State University. You have been asked to participate in this research because you are a student at Idaho State University and are at least 18 years old. Your participation in this research is voluntary. You should read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate.

1. PURPOSE OF THE STUDY

The purpose is to examine decision-making patterns regarding monetary and food-related stimuli and to evaluate techniques that may affect decision making for food and money. The goal of this research is to better understand decision-making patterns regarding food and money in adults.

2. PROCEDURES

For this study, you will be asked to sign this consent form and complete several brief self-report measures. You also will be asked to complete measures regarding food or money. Dependent upon your answers, you may or may not be asked to continue the study. The study will consist of two parts. The first part will be completed today and the second part will be completed approximately 1 week later. The first session may or may not be recorded. If you are asked to continue, you will be asked about subject matter that pertains to lifestyle, such as health and exercise habits. In addition, you may or may not be asked about your thoughts, feelings, and behaviors regarding health behaviors and asked to complete a worksheet for 1 week. You will also be weighed and your height, body fat concentration and waist circumference will be measured. You will need to remove your shoes and socks in order to obtain an accurate weight measurement. Also, you will be asked to lift your shirt slightly, exposing no more than your naval, in order to get an accurate measurement of waist circumference. You will be asked to complete questionnaires regarding your behavior for approximately 1 week before returning the lab for your second session. During the second session, you will complete similar questionnaires from the first session regarding food, money, feelings, and lifestyle. In order to measure your body mass adequately, we ask that you do not eat any food or any liquid for 2 hours prior to coming to the experiment. If you do eat or drink within those time ranges, though, we ask that you report it to us. We anticipate this study will take approximately 120 minutes total to complete, with approximately 90 minutes for the first session and 30 minutes for the second session.

3. POTENTIAL RISKS AND DISCOMFORTS

You may experience some slight emotional discomfort from being recorded, answering questions about lifestyle, health, and feelings towards lifestyle and health, and completing physical health measurements, such as your weight. There may also be a risk of an accidental breach of confidentiality. To help reduce discomfort, you may choose to skip any question, be asked to step onto the scale backwards, and have identity code assigned to you to ensure confidentiality.

You may experience some emotional discomfort following the completion of the study. Counseling services can be obtained from the ISU Counseling and Testing Service (208) 282-2130 or the ISU Psychology Clinic (208) 282-2129. Following the completion of the study, the researcher will provide you with a list of local counseling and therapy services available.

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4. ANTICIPATED BENEFITS TO PARTICIPANTS

There are no tangible benefits to you for participating in this study.

5. ANTICIPATED BENEFITS TO SOCIETY

Results of this research will be used to increase our understanding of decision-making behavior.

6. ALTERNATIVES TO PARTICIPATION

An alternative is to not participate in the study.

7. PAYMENT FOR PARTICIPATION

You will receive one (1) credit of extra credit research for each 30-minute block (or part thereof) of time you spend participating in this research. We anticipate that you will receive 1-5 credits for this study. We anticipate 1-3 credits will be earned in the first session and 1 credits will be earned in the second session. If you are given a homework assignment, complete it properly, and return it during the second session, you will receive 1 additional credit. Therefore, you will have the opportunity to earn for up to 5 credits total for completing the entire study.

8. FINANCIAL OBLIGATIONS

There are no financial obligations to you in the study.

9. EMERGENCY CARE AND COMPENSATION FOR INJURY

Idaho State University does not provide any other form of compensation for injury. No other compensation is available.

10. PRIVACY AND CONFIDENTIALITY

To protect your privacy, the questionnaires and tasks you complete will contain a subject code and not your name. Your name and subject code will be located on a master list available only to the researcher. Your video recordings will also be assigned a subject code and kept separate from your questionnaires on a password-protected computer. Your contact information and this consent form will be stored separately from the other information you provide us. No information about you, or provided by you during the research, will be disclosed to others without your written permission, except (a) if necessary to protect your rights or welfare (for example, if you are injured), or (b) if required by law.

When the results of the research are published or discussed in conferences, no information will be included that would reveal your identity. Any paper containing your name will be stored in a locked cabinet in the Principle Investigator's laboratory separate from data collected during the study.

11. PARTICIPATION AND WITHDRAWAL

Your participation in this study is VOLUNTARY. If you choose not to participate in the study, this will not affect your current or future academic status or any benefits to which you are entitled. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time. You should call the investigator in charge of this study if you decide to do this.

12. WITHDRAWAL OF PARTICIPATION BY THE INVESTIGATOR

The investigators and/or the sponsor may stop your participation in this study at any time if circumstances arise which warrant doing so. The investigator, Luis R. Rodriguez, will make the decision and let you know if it is not possible for you to continue. The decision may be made either to protect your health and welfare, or because it is part of the research plan. You may also be forced to withdraw if you do not follow the investigator's instructions.

If you must drop out because the investigator asks you to (rather than because you have decided on your own to withdraw), for any reason other than not complying with the investigator's instructions, you will still receive your research credit.

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13. NEW FINDINGS

During the course of the study, you will be informed of any significant new findings (either good or bad), such as changes in the risks or benefits resulting from participation in the research or new alternatives to participation, which might cause you to change your mind about continuing in the study. If new information is provided to you, your consent to continuing participating in the study will be re-obtained.

14. IDENTIFICATION OF INVESTIGATORS

In the event of a research related injury or if you experience an adverse reaction, please immediately contact the investigator listed below. If you have any questions about the research or your participation in the study, please feel free to contact Luis R. Rodriguez or Erin. B Rasmussen, Ph.D., Garrison Hall, Campus Box 8112, Idaho State University, Pocatello, ID 83209-8112; (208) 282-5651

15. RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have any questions regarding your rights as a research subject, you may contact the Human Subjects Committee office at 282-2179 or by writing to the Human Subjects Committee at Idaho State University, Mail Stop 8046, Pocatello, ID 83209.

SIGNATURE OF RESEARCH PARTICIPANT OR LEGAL REPRESENTATIVE

I have read (or someone has read to me) the information provided above. I have been given an opportunity to ask questions, and all of my questions have been answered to my satisfaction. I have been given a copy of the informed consent form.

BY SIGNING THIS FORM, I WILLINGLY AGREE TO PARTICIPATE IN THE RESEARCH IT DESCRIBES.

Name of Research Participant

Signature of Research Participant

Date

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Appendix L

Brief acceptance and commitment training for impulsivity

Kate L. Morrison
Utah State University

Adapted for food choices by Luis R. Rodriguez

Idaho State University

Additional Resources:

Harris, R. (2009). *ACT Made Simple*

Hayes, S.C., Strosahl, K.D., & Wilson, K.G. (1999). *Acceptance and Commitment Therapy: An Experiential Approach to Behavior Change* (1st ed.).

Hayes, S.C., Strosahl, K.D., & Wilson, K.G. (2012). *Acceptance and Commitment Therapy: The Process and Practice of Mindful Change* (2nd ed.).

Lillis, J., Dahl, J., & Weineland, S.M. (2014). *The Diet Trap*

Stoddard, J.A., & Afari, N., (2014). *The Big Book of Act Metaphors*

This protocol is a one-time, 90 minute training given to individuals who demonstrate impulsive food choices. Before implementing, it is suggested that providers read additional material on Acceptance and Commitment Therapy (ACT) in order to facilitate understanding of the protocol. This protocol is designed to be flexible and serves as a guide that can be altered to fit the needs of the individual. The therapist's knowledge of ACT can further guide what is best for the individual.

Informed Consent

The purpose of informed consent is to prepare the client for the rest of the session and increase engagement in treatment. It is possible the participant will experience some emotional discomfort.

Example: *Thank you for coming in today. You have been selected to participate in this study based on some questionnaires you completed. We are going to be here for about an hour and a half talking about different ways you live your life when it comes to health and eating habits. . As we go through today, we may cover some topics that may be upsetting. It is not that it is overwhelming – I just want you to be prepared, and see if you can let yourself be open and let whatever shows up come up.*

Determine one target for the session

Focus on a specific concern regarding one's relationship with food is necessary for the rest of the session to be effective. Need to ensure we understand the specific (objective, measurable) concern of individual prior to assessing the barriers and different methods they have tried to "fix" the problem.

Example: *When it comes to food, are there ever times when you act based on how you are feeling in the moment? Some examples may be eating fast food instead of a home cooked meal, eating more despite feeling full or not feeling hungry, having a bag chips now even though dinner is almost ready, eating when feeling stressed or wanting to avoid doing something, or choosing an unhealthy option over a healthy option. Have you experienced anything similar?*

Allow sufficient time to narrow in on specific topic related to impulsive food choices.

ACCEPTANCE AND DELAY DISCOUNTING

We have been talking about how you would like to do _____. Let's look at what gets in the way of that. Can you think of a situation where this happened recently? If you are willing, imagine that you are back in that particular moment. You can close your eyes or cast your gaze down at the floor. What kept you from _____? What thoughts do you notice coming to you in that moment? What emotions do you feel? What do you notice in your body? Are there any cravings or urges? What did you do? [Give client a few moments to notice these internal sensations]. Sometimes when we become distressed or focused on our internal experiences such as our cravings, hunger, sadness, frustration, nervousness, we want to act in a way to avoid or get rid of these feelings and thoughts. What are some things that you have tried to avoid or get rid of them?

Brief Creative Hopelessness

The purpose of creative hopelessness is to explore the different strategies the individual has engaged in to alter their internal experiences. Using the individual's experience, explore how effective these control strategies have been in the short- and long-term. What have they tried? How has it been working? What has it cost? Briefly explore the concept with the individual; however, do not move on to the next phase until the individual agrees that their control strategy is not working. If the individual believes they still have the ability to alter their internal experience, then the following skills will not be useful. During this time, we must be careful not to blame the individual for what they have attempted. Approach this portion with an openness and flexibility. Work together with the person to determine the effectiveness of their strategies. It may be that some work while others do not.

*Plumber Metaphor

Example: *When you chose to do _____ [potential avoidance behavior], what happened to _____ [internal experience]? Did it get bigger or smaller? Did it go away? How long? Did it come back? [Explore a couple of other control strategies]. Okay, that's interesting. It seems that when you _____ [behavior] the feeling/thought of _____ doesn't go away. What do you make of this? It seems that if you had a leaky pipe, you would want a plumber to fix the pipe for good. Not for 5 minutes or 1 day. You probably wouldn't hire that plumber again if the pipe kept leaking after it was supposed to have been fixed. It seems like you are continuing to hire Mr. _____ [avoidance behavior] even though he is doing a lousy job of fixing _____ [insert internal experience]. Do you feel like you have tried everything you know of to get rid of _____ [internal experience]? Have you given this your best shot? You seem like an intelligent person. My guess is that you would have figured this out by now if there was something to figure out. What if it isn't you? It is not that you are not creative or smart enough. Maybe we can't control _____ [insert internal experience]. What has your experience told you so far?*

Brief Control as the Problem

In this phase, we explore what happens when we try to regulate our internal experiences. Exercises are done to show that when attempting to get rid of unwanted thoughts, a paradoxical effect occurs such that the thoughts actually increase in frequency.

*Problem-Solving Machine Metaphor

*Chocolate Cake Exercise

Example: *If there was one ability of the human mind that makes us unique, it is our ability to problem solve. Over time, this ability has allowed us to change the face of the planet and even travel outside of it.*

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Overall, problem solving suggests two things: 1) there is a problem—something that is unwanted—and 2) there is a solution to get rid of it, or avoid it. Now in the physical world, problem solving works very well. A failing grade? Avoid or get rid of it by studying or asking the professor for help. A broken car? Get rid of it by taking it to a mechanic or buying a new one. Hair is too long? Get rid of it—cut it. Our mind has evolved to be this problem-solving machine, and it is very good at its job! Since problem solving works so well in the physical world, it only makes sense that our minds try to do the same with the inner world: the world of thoughts, feelings, memories, sensations, urges. Your mind says, “Hey, I see that feeling [insert internal experience] is causing a problem, let’s get rid of it!” Let’s see if that is case. Suppose I tell you right now, I do not want you to think about something. I’m going to tell you very soon. And when I do, don’t think about it even for a second. Here it comes. Remember, don’t think of it. Don’t think of...warm chocolate cake! You know how it smells when it first comes out of the oven...Don’t think of it! The taste of the chocolate icing when you bite into the first warm piece...Don’t think of it! As the warm, moist piece crumbles and crumbs fall on the plate...Don’t think of it! It’s very important; don’t think about any of this! Could you do it? Why (or why not)? It is a problem and we need to get rid of it! It seems that when we try to avoid or get rid of unwanted thoughts or feelings, it doesn’t work. Oddly enough, it seems like the thought became more even more difficult to push away and increased in intensity. Seems like the thought stayed even when you told it not to be there. The moment we say “go away!” it actually shows up more than if we were to say “come on in.”

Acceptance/“Willingness”

Acceptance refers to our ability to be open, receptive, nonjudgmental, and flexible to our internal experience as they occur in that moment. Acceptance refers to a “willingness” to make contact with private experiences without trying to alter them. This is different from tolerance, which suggests, “just getting through” the experience rather than fully experiencing it as it is.

*Dinner Celebration

*Notecard Exercise

Example: *Let’s imagine that you have planned a big celebration dinner and your favorite restaurant is going to throw this dinner for you for free, with all of your favorite foods and beverages, in a private room. You and your guests can stay and celebrate as long you want. There is, however, one catch: everyone you have ever met is invited. Probably, there at least a few people you would rather not see at the celebration. Can you think of some right now? Despite this one drawback, you can’t deny this is a great deal, so you decide to go through with it. As the party begins, you realize this is amazing! You have been given a chance to connect with people you care about. You spend time laughing, telling stories, catching up, but in the back of your mind, you’re really hoping those unwanted guests don’t show up. You spend time watching the doors, and realizing that you haven’t talked with that many people or weren’t as connected to the conversations you did have. Sure enough, one of those guests arrive. You think, “I can’t have them here ruining my party! They can say something embarrassing, make someone uncomfortable, or make me feel bad in some way!” So you decide you are going to keep him out. This guest isn’t easy to make leave, so you find yourself talking only to this one unwanted guest and the celebration goes on without you. Eventually, the unwanted guest leaves, and you return to the party. But, a few minutes later, the unwanted guest returns to the party through a back door you didn’t even know existed! As the party goes on, more of these unwanted guests show up and you spend more of your time fending them off. You miss connecting with family and friends, the stories and the laughs. Had you allowed those guests in, more than likely they would have caused some scene. They might have gotten a little too drunk, been loud and annoying, or spilled their drinks on people. They may have said something*

ACCEPTANCE AND DELAY DISCOUNTING

that made you feel angry, upset, sad, or embarrassed. However, you might have been able to spend part of your time, if not most of it, how you wanted: talking to people you care about and connecting despite the interruptions and distractions. What if your life and your efforts to get rid of [internal experience] related to food are like that celebration dinner? If you can allow [internal experience], you'll find more freedom to [insert desired behavior]. All you need to do say is "come on in."

If you are willing, let's try an exercise where we can see the differences between saying "go away" to those unwanted guests versus saying "come on in." I have notecards here, one for you and one for me. We'll each write down one of those unwanted guest—one of those thoughts, feelings, urges—that we like to push out of the party when it comes to food. Mine is _____ [trainer should use an impulsive food example as well]. What is yours? [pause] Now, I'm going to have you resist this thought as much you can. [Place your hand on one side of the card and the person's hand on the other side. Then begin pushing.] Now don't let this thought touch your body. Don't let it get near you! How are you feeling right now, pushing against this thought, pushing out this unwanted guest? What does your body feel like? [pause] Now, I want you to allow this card to sit on your lap, simply let the guest "come on in." [Set the card on the person's lap]. Just allow it to sit with you. No pushing, no fighting. Just welcome it to sit there and be with you. What is this like for you? How does your body feel right now? The thought is close and it is touching you. Even when you were pushing against it and fighting it, the card was still touching you, touching your hand. In both scenarios, the card—the thought—was touching you. What was different about these scenarios if that thought was touching you in both? How would you prefer to live your life? Fighting the thought of [insert internal experience from beginning] and having it touch you—trying to keep it out of the party—or welcoming it and still having it touch you? Can you imagine what that would like in your life? Is there a way to welcome, with compassion, all the thoughts and feelings that show up for you throughout the day? One way we can try this is to put this card in a pocket or a purse and carry it with us all day. I'm going to put mine in my pocket and if you are willing, you can do the same. We can choose to bring it along with us, because we both know that thought is going to be there whether we want it to or not. The unwanted guests will still show up to the dinner party. So how about we try another way of interacting with the thought. We can't get rid of it. Let's try bringing it in close and gently carrying it throughout the day. What do you think?

Defusion, Self-as-Context, and Mindfulness

****Do this if the participant demonstrates fear or uncertainty about "welcoming" in the thought****

The focus of the next section combines several ACT processes to disentangle the person from the literal quality of thoughts and emotions and to create space between them and the internal experiences they are having. This involves viewing thoughts as thoughts, emotions as emotions, and not becoming involved in the language they present.

Example: *Sometimes our thoughts and feelings seem so intense that welcoming them in seems scary. Do you feel this way about (internal experience)? What about that thought holds meaning for you? If you are willing, I want you to try something, let's sit and notice the thoughts you mind is having. If you mind goes blank, just wait, something will pop up [pause for about 30 seconds]. What popped up for you? Did you get to choose? It seems that random thoughts and feelings just show up. Tell me a few things about who you are. [allow time for a brief description] Now I want you to hold this pencil in your hand [place pencil in person's hand]. Now, are you _____ [insert description individual just gave]? [pause] But you are holding a pencil. How are you not a pencil now? You are a _____ [insert description individual gave] person that holds thoughts about _____ [insert internal experience], just as you are now a _____ [insert description individual gave] person holding a pencil. What if we*

ACCEPTANCE AND DELAY DISCOUNTING

could try treating our thoughts like that pencil? There's nothing inherently good or bad about that pencil. Any value or judgment is only what we as humans with language have given it. It is a pencil. What if thoughts are the same way? Not good, nor bad. They are thoughts and they just are? So next time _____ [insert internal experience] shows up for you, you can say "hello" to it, pat it on the head, invite it to the dinner party or put it in your pocket and bring it along with you as you go throughout your day. What might that be like for you?

Focus on Values

Values provide a context in which an individual may choose to accept their internal experiences and live their life in the manner of their choosing—not because the immediate consequence will relieve the internal experience.

*Walking the Path metaphor

Example: *Today we have talked quite a bit about the ways you would like to live your life when it comes to food. If you are willing, I would like to go through some examples of the type of person you want to be in this area. What is about _____ [Insert impulsive example here] that is important to you? Within our pain we find what matters to us, and in what matters to us we find pain. You experience distress when deciding whether to _____ [e.g. eat healthy, wait until dinner, stopping when full]. The fact you experience distress related to the decision suggests there is something important there for you, not for others, but for you. Let's talk about what that could be. I like to call these "values" or long-term ways of being. Values are different from goals. Values are like traveling west. No matter how many steps you take west—goals you accomplish—you never reach west. You can always go further west from where you are. What is it that you value?*

When it comes to making decision, it is like coming to a fork in the road. Each choice we make moves us closer to the person we want to be and the other takes us further way from that person. Sometimes when we choose what feels best in the moment with food, health, relationships, work, education, or our free time, it is not what is best for us in the long run. When it comes to _____ [impulsive example from above] is your experience similar to this? Is _____ [insert impulsive choice] done to get rid of immediate distress or was it a move towards a valued direction?

Values Bull's Eye Worksheet.

You told me that you find _____ [insert "food" related value here] important to you. That one would typically fall under "health." Would you agree it fits there, or do you feel it falls under another heading? There are three other categories here. What is important to you in these areas? [Complete the Bull's Eye on where they fall in terms of their values].

Like we discussed before, values are like a heading west. We can always go further west from where we are. A goal is like a step in that direction. Let's go through an example. When it comes to _____ [insert "food" related value], what goal could we take today that would move us further west—further to the center of the bulls' eye? It doesn't have to be big or grandiose; will it take us down the path that leads to the person we want to be? What is another goal that could be accomplished over the week?

When we think about doing _____ [insert goals], what comes to mind? Notice how there is a pull to do what is easier in the moment. There is this pull to do what will immediately feel better, to get

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rid of that uncomfortable feeling. Sometimes choosing the path that heads west may be similar to walking on a wild hillside; there is no path to walk on. Every step may be effortful, and deliberate effort is needed to keep taking steps. Then you look over to your right and see a well-worn path. The path not heading west, not heading towards the person you want to be. It looks like it would be easier to walk on than to keep persisting on this unmarked route across tall, overgrown grass. And the thing is, you know where exactly where that well-worn path goes because you've walked it so many times before. [pause] So here we are, walking across a new territory and sometimes it is not so easy. Then, you see the old familiar path...Remember what we talked about at the beginning? What happens when we choose to get rid of that uncomfortable feeling? Right, it stills comes back, sometimes bigger and stronger. Would it be worth bringing the thoughts of _____ [insert internal experience] in order to have a life that is more about _____ [insert food-related value] than removing that uncomfortable feeling? That uncomfortable feeling will be there no matter what. So do you choose to welcome it along and live a life you care about or to spend your days fighting it and going away from things that matter to you?

Behavioral Commitment

The function of this section is to promote value-driven behavior and increase the person's focus on their ability to control their behavior and not their internal experience.

It seems like we agree that your time and effort is best not spent on controlling emotions and thoughts to feel better for a brief moment. What is that we do have control in that situation? Yeah, we can control what we do when those thoughts and feelings show up. When it comes to _____ [insert food value], can you think of a situation that will occur daily over the next week where this might be a struggle for you? Okay, let's write down those situations, and if you are willing, I'd like you to practice the things we've talked about today each day over the week. Remember, this isn't for you me, this isn't for research. This is for you. This is your life. This is so you can continue going west.

Review goals from Bullseye worksheet. It may be that one of them can be a daily goal. Help the client develop a daily goal and write it at the top of the homework sheet.

Homework

I'm going to send you home with a form to complete. I want you to complete it each time you encounter the goal we spoke of before: _____ [restate it for the client]. Each column has to do with what we've talked about today. The first column asks about some situation that you notice a thought or emotion that is pulling you to make a decision. Just write what that thought or emotion was. Then in the second column write what you did with that thought or emotion. Did you push it away? Did you welcome it in? Did you put it in your pocket and bring it along? Did you fight with it? Then write what you did with your body, your behavior. Remember the example with the dinner party? Pushing the guests out or only talking to them would be the behavior; anxiety about them showing up would be the thought/emotion. So write down if you followed that thought/emotion or if you chose based on your values. Then in the next column, write down what happened to the thought or emotion when you did what you did. Did it go away? For how long? Did it get smaller/bigger? Then in the final column write whether that behavior took you closer to or further from the person you want to be. Do you understand each of these columns? Let's go through an example."

Values Bull's Eye Worksheet

Bull's-Eye

The Bull's Eye dartboard (below) is divided into four areas of living that are important in people's lives: work/education, leisure, relationships and personal growth/health.

- 1) Work/Education refers to your career aims, your values about improving your education and knowledge, and generally feeling of use to those close to you or to your community (i.e., volunteering, overseeing your household, etc.)
- 2) Leisure refers to how you play in your life, how you enjoy yourself, your hobbies or other activities that you spend your free time doing (i.e., gardening, sewing, coaching a children's soccer team, fishing, playing sports);
- 3) Relationships refers to intimacy in your life, relationships with your children, your family of origin, your friends and social contacts in the community;
- 4) Health refers to exercise, nutrition, and addressing health risk factors like drinking, drug use, smoking, and weight

In this exercise, you will be asked to look more closely at your personal values in each of these areas and write them out. Then, you will evaluate how close you are to living your life in keeping with your values. You will also take a closer look at the barriers or obstacles in your life that stand between you and the kind of life you want to live.

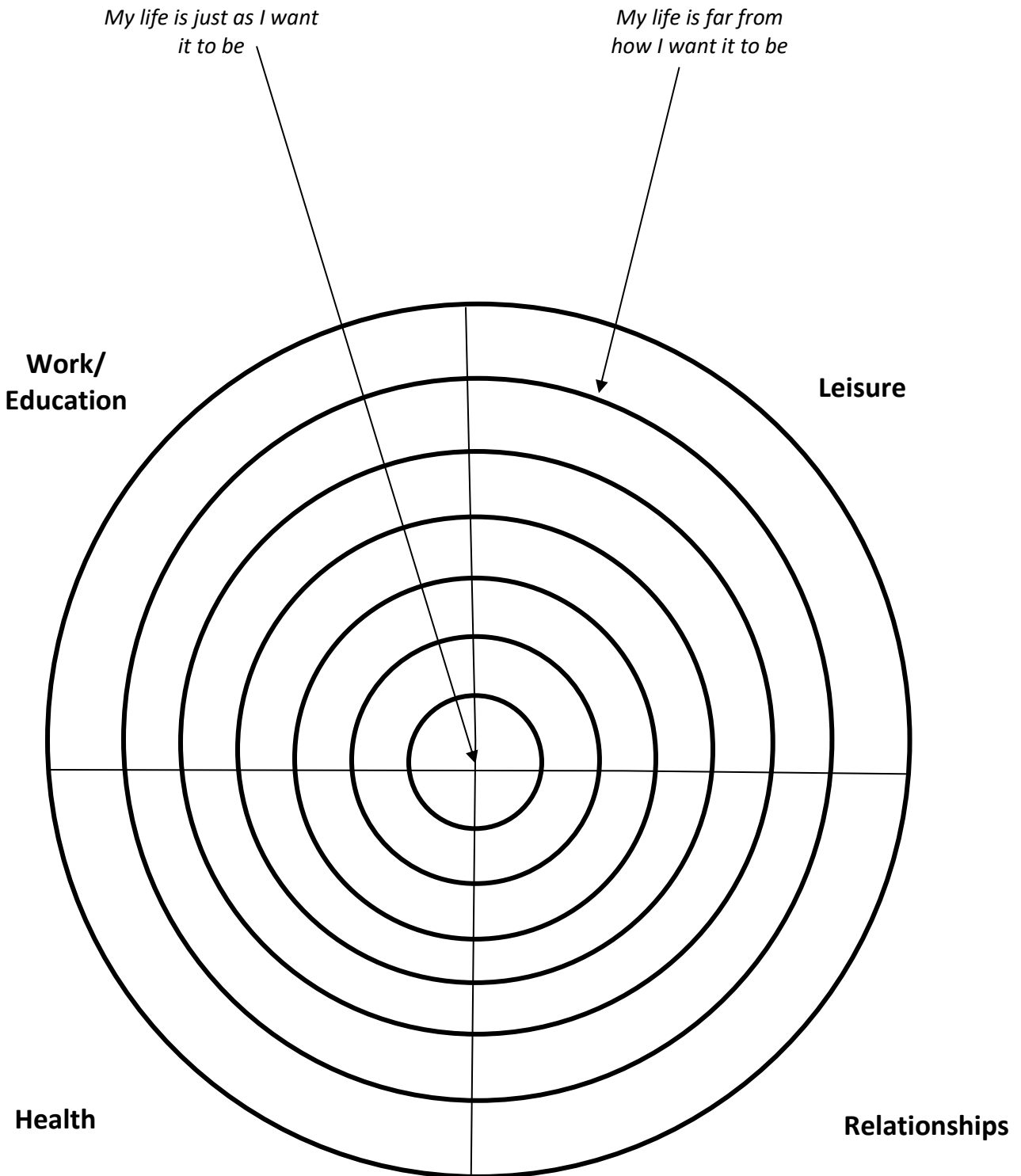
Identify Your Values

Start by describing your *values*. Think about each area in terms of your dreams, like you had the possibility to get your wishes completely fulfilled. What are the qualities that you would like to get out of each area and what are your expectations from these areas of your life? Your value should not be a specific goal but instead reflect a way you would like to live your life over time. For example, getting married might be a goal you have in life, but it just reflects your value of being an affectionate, honest and loving partner. To accompany your son to a baseball game might be a goal; to be an involved and interested parent might be the value. It is ***your*** personal values that are important in this exercise.

Value: _____

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Now, look again at the values you have written above. Think of your value as "Bull's Eye" (the middle of the dart board). Bull's Eye is exactly how you want your life to be, a direct hit, where you are living your life in a way that is consistent with your value. Now, make an X on the dart board in each area that best represents where you stand today. An X in Bull's Eye means that you are living completely in keeping with your value for that area of living. An X far from Bulls Eye means that your life is way off the mark in terms of how you are living your life.



My Valued Action Plan

Think about actions you can take in your daily life that would tell you that you are zeroing in on the bulls-eye in each important area of your life. These actions could be small steps toward a particular goal or they could just be actions that reflect what you want to be about as a person. Usually, taking a valued step includes being willing to encounter the obstacle (s) you identified earlier and to take the action anyway. ***Try to identify at least one value based action you are willing to take in each of the four areas listed below.***

Goals: _____

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Homework Sheet

GOAL: _____

PLEASE COMPLETE AT LEAST ONCE EACH DAY AND BRING IT BACK TO YOUR NEXT APPOINTMENT.

What was the thought or emotional pull?	What did I do with that thought/emotion?	What did I do with my behavior?	What happened to the thought/emotion?	Did that behavior take me closer or further from my values?

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Appendix M

<u>Clinic Name</u>	<u>Address</u>	<u>Phone Number</u>
ISU Psychology Clinic	1400 East Terry St. Pocatello, ID 83209	(208) 282-2129
ISU Counseling & Testing Center	1001 S 8 th St. Pocatello, ID 83209-8027	(208) 282-2130
Health West – ISU	465 Memorial Dr. Pocatello, ID 83201	(208) 234-4700
Portneuf Health Partners – Behavioral Health Services (Outpatient)	500 S 11 th Ave. Pocatello, ID 83201	(208) 239-1710
Eastern Idaho Regional Medical Center	2860 Channing Way, Suite 225 Idaho Falls, Idaho 83404	(208) 402-6093
Creekside Counseling	550 W Sunnyside, Suite 1 Idaho Falls, Idaho 83402	(208) 529-5777

Additional Resources:

Binge Eating Disorder Association - <http://bedaonline.com/>

National Association of Anorexia Nervosa and Associated Disorders - www.anad.org/

National Eating Disorder Association - <https://www.nationaleatingdisorders.org/>

Eating Disorders – American Psychological Association (APA) -

<http://www.apa.org/helpcenter/eating.aspx>