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Delay Discounting as a Function of Emotion Induction and Suppression

by

Charles William Jenks

A dissertation

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RE: Your application dated 10/4/2014 regarding study number 4157: Self-Control and Behavioral Choice Patterns

Dear Mr. Jenks:

Thank you for your response to requests from a prior review of your application for the new study listed above. Your study is eligible for expedited review under FDA and DHHS (OHRP) guidelines.

This is to confirm that your application is now fully approved. The protocol is approved through 10/4/2015.

You are granted permission to conduct your study as most recently described effective immediately. The study is subject to continuing review on or before 10/4/2015, unless closed before that date.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact me (208-282-2179; fax 208-282-4723; email: humsubj@isu.edu) if you have any questions or require further information.

Sincerely,



Tom Bailey
Human Subjects Coordinator

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ABSTRACT

Emotion regulation refers to a number of processes that alter some component of an emotion or cluster of emotions. Theory and evidence suggest that the experience and the regulation of emotions and the experience of emotion itself results in changes in the ability to regulate self-control. However, extant research has utilized a variety of self-control/impulsivity indices that do not have well-established relationships to real world outcomes (e.g., drug use, risky sexual behaviors). This study sought to expand upon previous literature by incorporating one such measure, the delay discounting task. Adult undergraduates (N=179) were exposed to one of three manipulations of affect (i.e., positive, neutral, and negative) using previously validated film clips. Half of these participants were instructed to suppress their emotional responses to the film clips. Following the film clips, all participants completed the delay discounting task. Contrary to our predictions, the experience of emotion itself did not have an effect on discounting rates. Furthermore, rather than increasing levels of impulsivity, as was initially predicted, the use of suppression actually resulted in lower rates of discounting.

Keywords: discounting, delay, suppression, emotion, impulsivity

CHAPTER 1: Literature Review

Current Perspectives on Emotion and Emotion Regulation

Emotion comprises a number of physiological, psychological, and behavioral processes (Gross and Thompson, 2007) that serve the purpose of preparing individuals to react to a given set of environmental circumstances (Lang, 1995). For example, fear in the presence of a predator may prepare an organism to escape the situation. Emotions involve the appraisal of an antecedent, neurophysiological processes, action tendencies, expressive systems (e.g., behavioral responses, facial expressions), and the subjective feeling of the emotion itself (Scherer, 2005). While these processes sometimes occur simultaneously, evidence suggests that they are not as highly coordinated with one another as is commonly theorized (Mauss, et al., 2005) and may only be “weakly probabilistically” coordinated (Bradley & Lang, 2000). The coherence of these processes likely depends on a number of factors including type of emotion, individual differences, and the intensity of the emotion (Mauss et al.). This is important to note due to the possibility of divergence in the measurement of psychological, behavioral, and physiological components of a particular emotion (Rachman, 1978; Rachman & Hodgson, 1974).

Although emotional processes may on occasion occur relatively unaltered at points within their duration (e.g., in a context of an unexpected, surprising stimulus), many emotions occur parallel to attempts at regulating the experience. Emotion regulation refers to any type of emotional, behavioral, or physiological response that alters the duration, intensity, or latency of a specific emotion (Gross & Thompson, 2007). These processes may serve a number of purposes, such as inhibiting an unwanted

behavioral expression of emotion or reducing the momentary intensity of an emotion so that a goal may be reached with greater ease (Webb, Miles, & Sheeran, 2012). For example, a child in an embarrassing situation may use a specific emotion regulation strategy in order to reduce the expression of the emotion with the goal of reducing ridicule. The attempt at regulating emotion can occur in varying forms at different stages of the emotional experience.

The “Process Model” of emotion regulation (Gross, 2009) was designed to increase the measurement and categorical specificity of emotion regulation strategies. This model includes five categories of emotion regulation: *situation selection*, *situation modification*, *attentional deployment*, *cognitive change*, and *response modulation* (Gross, 1998). *Situation selection* involves a behavioral response in which an individual chooses to engage/disengage in a particular environmental setting in order to avoid/experience a particular emotion in the future (e.g., choosing to avoid/expose oneself to a fear-inducing stimulus). In the case of *situation modification*, an individual attempts to restructure some component of the environment so that a negatively or positively valenced emotion is decreased/increased (e.g., wearing headphones while in a crowded space). *Attentional deployment* involves shifting the focus of attention to different environmental stimuli that influence the targeted emotion (e.g., looking at presentation slides rather than looking at the audience during a speech). *Cognitive change* refers to altering the perception of a given situation, which can be done with a variety of cognitive strategies (e.g., cognitive restructuring). Finally, *response modulation* refers to strategies that occur after the emotional experience has started and is aimed at having

immediate, direct influence over the various components of the emotion (e.g., suppressing emotion).

The specific strategies within these categories are not usually labeled as either “adaptive” or “maladaptive,” since the function of any one emotion regulation strategy may differ across the contexts in which it is used. The use of specific strategies is often associated with certain psychological disorders. For example, expressive suppression and rumination are used to a greater degree among individuals diagnosed with Major Depressive Disorder and Social Anxiety Disorder in comparison to controls (D’Avanzato, Joormann, Siemer, & Gotlib, 2013). In the case of Borderline Personality Disorder, thought suppression is linked to the frequency to engage in self-harming behaviors (Chapman, Specht, & Cellucci, 2005). In a study comparing individuals diagnosed with Bipolar Disorder-II (BP-II) and healthy controls, BP-II participants were more likely to utilize the strategies of rumination, self-blame, blaming others, and catastrophizing while the healthy controls used planning, positive reappraisal, and putting things into perspective to a high degree (Fletcher, Parker & Manicavasagar, 2013). Clearly, emotion and emotion regulation processes are associated with a broad range of psychological phenomena, but there are a number of unanswered questions including how these processes may influence (or not) important human behaviors. Specifically, the use of suppression (a response modulation, emotion regulatory strategy) in research has examined its basic effects on emotion as well as how it affects aspects of self-control.

Effects of Suppression

Suppression is an emotion regulation strategy in which the individual attempts to reduce the intensity or duration of emotional experience by modifying his or her behavioral or physiological responses. The most widely studied form of expression is “expressive” suppression which involves inhibiting any behavioral indicators of a particular emotion (e.g., facial expressions, body movements) (Dan-Glauser & Gross, 2011). Although the results are not completely uniform, the majority of research examining the effects of suppression indicates that the long-term use of suppression is related to a variety of negative outcomes (Soto et al., 2011), including decreases in positive emotion, increase in negative emotions (Gross & John, 2003), decreases in overall well-being, and increases in depressed mood (John & Gross, 2004). It should also be noted that thought suppression (e.g., do not think about a white bear) often paradoxically increases the suppressed thought, which may provide some insight regarding these negative effects (Wegner et al., 1987).

The causal mechanism for negative effects of expressive suppression is not well-established. However, some forms of contemporary psychotherapy, such as Acceptance and Commitment Therapy (ACT), specifically target the suppression of emotion to promote positive psychological outcomes (Hayes et al., 2006). According to the theoretical underpinnings of ACT, engaging in attempts to avoid or reduce private events, including emotional experiences, results in an increase in the overall salience of the avoided stimuli by creating a verbal association between the stimuli and its appraisal (Hayes et al.). This idea also is central to the root of exposure therapy in that individuals are required to experience the feared stimulus in order to learn that negative

consequences will not occur. In contrast, when individuals avoid the feared stimuli (and the associated emotional responses), they reduce the number of behavioral responses they can engage in, increase the power of the stimuli, and are unable to learn that the feared consequences of experiencing the stimuli will likely not occur (Bouton, Mineka & Barlow, 2001).

Emotion suppression is most often associated with negative mental health outcomes, but some research indicates that there may be positive outcomes as well. Najmi and Wegner (2008) found that while the use of suppression over the long-term is likely to increase negative emotion, its use in the short-term can decrease negative emotion. Although research is needed to replicate and confirm this, it makes sense that decreasing the intensity or duration of certain emotional experiences in the short-term may actually be adaptive or psychologically healthy (e.g., suppression of intense negative emotions in the immediate context of a crisis situation) depending on the frequency and situation in which the strategy is utilized. These effects may also be culturally dependent. Soto et al. (2011) found that the adverse psychological effects of expressive suppression did not occur in Chinese research participants, indicating these effects are not universal. This differential effect was partially attributed to the use of expressive suppression as more normative within the Chinese culture. Still, the overwhelming majority of evidence suggests that suppression often results in adverse emotional consequences as well as other components of human behavior.

Emotion, Suppression, and Self-Control

A large research literature suggests that emotional suppression may have important effects on self-control. Self-control is an umbrella term that generally refers to

altering “a dominant-response tendency” (de Ridder et al., 2012) related to cognitive, emotional, and behavioral processes. Since self-control is an omnibus construct, it is important for researchers to not assume that each of the possible self-control processes (e.g., behavioral impulsivity versus effective emotion regulation) are inextricably linked/correlated in order to investigate how environmental factors differentially affect these subcategories. However, current research suggests several different factors that affect self-control related behaviors.

Experience of Emotion and Self-Control/Impulsivity

The experience of intense emotional states may lead to an increase in the probability of engaging in impulsive or risky decision-making. Cyders and Smith (2008) theorized that intense emotions result in a shift of focus to the immediate context, which results in irrational decision making processes at the expense of future goals or benefits (Davidson, 2003). Furthermore, Cyders and Smith identified two primary traits that account for individual differences in the tendency for extreme emotions to result in risky, impulsive behaviors. These traits, termed positive and negative urgency, refer to the tendency to engage in risky behaviors during extreme positive mood states (PU) and engaging in risky behaviors during negative mood states (NU). Researchers have examined the relationships between these variables and a number of maladaptive behaviors using cross-sectional, correlational designs. For instance, positive urgency is predictive of problems associated with drinking, risky sexual behaviors, and drug use during the first year of college (Cyders et al., 2007; Zapolski, Cyders, Rainer & Smith, 2009). Negative urgency is predictive of using alcohol as a coping mechanism (Anestis, Selby & Joiner, 2007), compulsive shopping (Billieux, Rochat, Rebetez & Van der

Linden, 2008), and tobacco cravings (Billieux, Van der Linden & Ceschi, 2007).

Diagnostically, there are often high levels of comorbidity between emotional disorders and substance use disorders (Grant et al., 1994) which further suggests a relationship between intense emotions and impulsive behaviors. Additionally, there are relationships with impulsive behaviors among individuals diagnosed with Post-Traumatic Stress Disorder and Borderline Personality Disorder (Leib et al., 2004; Weiss, Tull, Viana, Anestis, & Gratz, 2012). What is unclear within these studies is whether there is a causal link between emotional experiences and self-control related outcomes.

As previously mentioned, research demonstrating a direct causal link between emotional states and self-control outcomes is limited, primarily because most studies use cross-sectional, correlational designs that do not manipulate emotional experiences and assess effects on real-time measures of self-control. Laboratory research that manipulates emotional experiences and their influence on self-control allow such statements, but these studies are relatively few in number. In one study, Nicolai, Daranco, and Moshagen (2016) exposed participants to either a positive or negative mood induction and asked participants to complete the Go/No Go Task, which measures response inhibition. Results indicated that the negative mood induction significantly impaired performance on the Go/No Go Task for individuals reporting high levels of pathological buying problems. Hirsch, Guindon, Morisano, and Peterson (2010) found that a positive mood induction increased rates of delay discounting, but this effect was only present in individuals high in extraversion (also see Vineyard, et al. (2017). In the case of anxiety, research has not indicated a strong, causal relationship with impulsive behaviors or deficits in self-control. Rounds, Beck, and Grant (2007) found no effect on

delay discounting for socially anxious participants in a threat condition but did find that socially anxious participants had higher rates of discounting in the non-threat condition. As a follow up to this study, Jenks and Lawyer (2015) found no effect for any participants who were exposed to a manipulation of social anxiety (*in vivo* public speaking task) or participants within a non-threat condition. Therefore, other factors, in combination with intense emotional experiences may impact self-control behaviors as opposed to emotion on its own.

Resource Models of Self-Control

In a broad sense, resource models of self-control regard self-control as a process that is affected by time, competing responses, attentional, and motivational factors (Inzlicht, Schmeichel, & Macrae, 2014). The Strength Model of Self-Control (Baumeister, Vohs, & Tice, 2007), conceptualizes self-control as a finite resource that is diminished as a function of its use. The model states that any act requiring self-control will result in a reduced ability to effectively engage in additional self-control on other tasks; related or unrelated (Baumeister, Vohs, & Tice). Within this model, the deterioration of self-control resources is coined “ego depletion.”

Empirical tests of the Strength Model typically involve a human participant completing a dual-task paradigm (Baumeister et al., 1998) in which participants in the experimental condition are required to complete two self-control tasks while the control condition only completes the second self-control task. The performance on the second control task is compared between both groups and any differences are attributed to the additional task that the experimental group performed. For example, in one study (Baumeister et al., 1998), the experimental manipulation involved participants being told

to eat radishes while resisting the urge to eat chocolate while the control group was instructed to eat the chocolate instead of eating the radishes. Following this initial manipulation, each group completed a puzzle and performance on this task was compared between the two conditions. According to the Strength Model, the ego depletion effect should extend to all processes within the self-control domain regardless of the specific type of self-control manipulation (e.g., physical self-control, emotional self-control, impulsive eating; Baumeister, Vohs, & Tice, 2007).

Although numerous studies provide supportive evidence of the Strength Model, researchers (e.g., Lurquin et al., 2016) have recently raised a host of significant concerns related to the ego depletion effect. Xu et al. (2014) conducted four different experiments with community and college samples using the dual-task paradigm methodology. All four experiments found no “ego depletion” effect. Hagger et al. (2016) and Lurquin et al. (2016) conducted pre-registered studies (i.e., transparent hypotheses and methods prior to completion of study) and found no evidence for the depletion effect of self-control. These authors argue that the large amount of data in support of the Strength Model may be flawed for several reasons. These reasons include evidence of a file drawer effect stemming from a recent meta-analysis (Hagger et al. 2010), small sample sizes in a majority of the ego-depletion studies, “p-hacking” (i.e., controlling for covariates without sound justification, post-hoc hypotheses), and a lack of a nuanced understanding of moderator variables that may impact results (Lurquin et al.).

In light of this criticism, some researchers have expanded on the Strength Model of self-control to include other factors that account for the “ego depletion” effect other than the idea that self-control is a finite resource. These variations of the original

Strength Model are termed “process models” and attempt to provide a more detailed description of the underlying processes behind the ego depletion effect (Dang, Xiao, & Dewitte, 2014). Within these models, motivation and attention are added to the original Strength Model. Therefore, the strength or presence of any depletion effect occurs in relation to levels of motivation and attention (Inzlicht & Schmeichel, 2012). More recently, “process-models” have also utilized a cognitive adaptation interpretation of the ego-depletion effect. From this perspective, it is theorized that when individuals are able to cognitively adapt via anticipation of subsequent effort or through the formation of an adaptation to high levels of effort, the ego-depletion effect is nullified (Xiao, Dang, Mao, & Liljedahl, 2014). Therefore, the ego depletion-effect is less likely to occur when the two self-control tasks are similar in nature, when there is sufficient time to adapt to the demands of each self-control task regardless of task similarity, and when preparation for each task is manipulated.

Effects of Suppression on Self-Control

Most research examining the effects of suppression on self-control has either utilized expressive suppression of emotion or tasks that involve thought suppression. In regards to emotional suppression, research indicates that attempts at inhibiting emotional responses results in decreased self-control on subsequent tasks. Baumeister (1998) exposed participants to an emotionally charged film clip and asked half of the participants to suppress their emotional responses to the clip. Those who suppressed their emotion exerted force while holding a spring-loaded hand grip for significantly less time than participants that were not asked to suppress their emotion (Baumeister, 1998). Evers, Stok, and de Ridder (2010) induced negative emotion and found that participants

in the emotional suppression condition consumed a higher level of comfort foods in comparison to participants that were instructed to reappraise their emotions.

Alternatively, Dingemans, Martijn, Jansen, and van Furth (2008) found no effect of suppressing negative emotion on overeating behaviors in a sample of individuals with binge-eating disorder. In a study examining the effects of emotional suppression on impulsivity (Joireman et al., 2008), participants that scored high on a questionnaire regarding personal concern for immediate consequences and also suppressed emotion in response to a comedy film displayed higher rates of impulsivity.

In regards to thought suppression, Muraven et al. (1998) found that suppression of thoughts increased the likelihood of a failure to inhibit subsequent behavioral indicators (i.e., laughing and smiling) of emotion during a viewing of a comedy film. Suppression of thoughts also results in an increase in impulsive behaviors such as higher rates of impulsive spending (Vohs & Faber, 2007) and a higher level of alcohol consumption (Muraven, Collins, & Nienhaus, 2002). While suppression of emotional and non-emotional content often result in a decrease in self-control related outcomes, it is important to parse out the effects that emotion itself has on these outcomes as well. At present, it is relatively unclear as to what effect emotional states have on self-control or impulsivity.

Shared mechanisms among models. The Strength Model of Self-Control/resource models (Baumeister et al., 2007) and the Positive/Negative Urgency perspective posited by Cyders and Smith (2008) both identify different conditions under which impulsive behaviors are more likely to occur. The causal variables in each model differ (other acts of self-control vs. intense emotion), however, there are some aspects that overlap. For

example, the Strength Model often examines suppression in the context of emotion. Therefore, emotion itself may be an important factor in ego-depletion research findings. In contrast, suppression may be a process that increases/decreases rash action in the context of intense positive or negative emotion. Research depicts a moderate relationship between depletion sensitivity and positive/negative urgency, however, the way in which these variables interact is unclear (Salmon et al., 2014). Delineating the contributions of both processes is necessary for a more accurate understanding of real-world, impulsive behaviors.

Measurement of Emotion-Related Process on Self-Control

Studies focused on the effects of emotion/emotion regulation on self-control have examined a wide-range of self-control variables (i.e., not eating tasty foods, performance on modified Stroop tasks, time spent exerting force on a loaded spring grip, and inhibiting emotional responses; Hagger, Wood, Stiff, & Chatzisarantis, 2010). Many of these are idiosyncratic and not cross-validated with other self-control outcomes. Furthermore, theories that describe a relationship between intense emotional states and impulsivity (Cyders & Smith, 2008) are largely correlational and do not often demonstrate direct causality. It is vital that the self-control variables are associated with relevant real-world behaviors (e.g., behavioral impulsivity is associated with drug use) so that conclusions are not strictly

imited to the laboratory procedures. In order to address this gap within current self-control literature, variables with adequate construct validity, such as the delay discounting task, need to be examined in a way that identifies causal mechanisms.

Behavioral Impulsivity: Delay Discounting

Delay discounting, an important facet of self-control, refers to the extent to which individuals de-value a reward as a function of the delay to receiving it (Ainslie, 1975). To measure delay discounting, individuals make a series of choices between smaller, immediate monetary rewards and larger, delayed rewards. For example, individuals may be asked “would you prefer \$100 now or \$1000 dollars in one month?” After each choice, the smaller, immediate reward is adjusted until the individual switches preference from the delayed to the immediate outcome. This represents the current subjective value of the large reward at that delay, or the point at which the two rewards are subjectively equal (this is also called the indifference point). As the delay to receive the larger reward increases, the subjective value of that reward tends to decrease. Individuals with “high” discounting rates or those seen as more “impulsive”, prefer smaller, immediate rewards over the larger, delayed rewards at a higher rate in comparison to individuals with lower rates of discounting.

Discounting can be described mathematically using a hyperbolic decay function (Mazur, 1987):

$$V = A/(1+kD)$$

In this equation, the V represents the subjective value of the delayed outcome or reward. A is the amount of the large reward, D represents the delay to the large reward, and k is a free parameter that indicates the rate of discounting. Impulsive choice, as measured by the delay discounting task, is associated with higher k values, which represent a tendency to choose smaller, immediate rewards over larger/delayed ones.

In addition to using the k parameter from the hyperbolic decay function as a

characterization of discounting patterns, area under the curve (AUC; Myerson, Green, & Warusawitharana, 2001) is commonly measured. AUC is a theoretically neutral calculation which measures the area underneath individual or group-median indifference points that ranges from 0.0 to 1.0; an AUC of 0.0 is indicative of the steepest rate of discounting possible while an AUC of 1.0 signifies no discounting (Myerson, Green, & Warusawitharana).

Steep patterns of discounting are associated with a variety of harmful outcomes that often involve deficits in patterns of self-control choices including substance abuse (Bornoalova et al., 2005; Kirby et al., 1999; Madden et al., 1997; Petry, 2001), obesity (Rasmussen, Lawyer, & Reilly, 2010; Saelens & Epstein, 1996) and sexual risk taking (Chesson et al., 2006; Johnson & Bruner, 2012; Lawyer & Mahoney, 2017). Due to the relationship between delay discounting and a variety of different human health problem behaviors, Bickel and Mueller (2009) argue that delay discounting represents a “trans-disease” process. What is not clear is whether discounting (one indicator of self-control) is sensitive to transient emotional states or their suppression. For example, does the suppression of emotional experiences increase the likelihood to engage in behaviors that are associated with delay discounting such as alcohol and drug use?

Clarifying this question may result in clinically relevant applications (e.g., increasing awareness of how specific emotional states, the use of suppression, or other acts of self-control may increase/decrease ability to abstain from substance use). Utilizing the delay discounting procedure in this manner is also important from an experimental standpoint to contribute evidence for or against the deleterious effects of suppression documented in research with dual-task paradigms as well as identifying how

emotion itself affects impulsive behavior. Delay discounting is especially helpful in this endeavor since it is a theoretically valid and well established measure of self-control.

Moreover, due to the recent methodological, statistical, and theoretical concerns regarding the legitimacy of resource-based models (Hagger & Chatzisarantis, 2016; Lurquin et al., 2016; Xu et al., 2014), evidence in either direction of support using the delay discounting task could be a catalyst for refining current models as well as moving towards real-world applications.

Overview and Hypotheses

Based on the examination of emotion regulation, self-control, and impulsivity literature there is a significant experimental gap with regards to the many relationships among the variables. Specifically, emotion regulation difficulties seem to play a crucial role across disorders in addition to contributing to problematic functional outcomes (e.g., impulsivity). Still, it is unclear whether the experience of emotion itself and/or the regulation of emotion (i.e., suppression) are directly related to theoretically-derived self-control measures. While the manipulation of suppression seems to affect performance on a variety of self-control tasks, research on its effects on the delay discounting task is scarce (especially in the case of suppressing *emotional* experience). Due to these limitations, this study sought to determine whether or not there are differences in behavioral impulsivity among individuals exposed to different valences of emotion inductions while manipulating the use of expressive suppression.

This study examined differences in delay discounting rates under six experimental conditions. Three groups were exposed to stand-alone positive, negative, and neutral emotion induction procedures using brief film clips in order to examine the

effects of differing valences of emotion on discounting rates. The other three groups were exposed to the same positive, negative, and neutral emotion inductions but also were instructed to suppress their emotional responses to the film stimuli. Rates of discounting were measured in all groups following the manipulation of emotion or combined emotion/suppression in order to isolate the effects of each combination of emotion/suppression on the discounting rates.

This study had four main hypotheses:

1. Participants in the positive emotion induction conditions were expected to exhibit steeper rates of discounting than participants exposed to the control/neutral condition (without suppression) due to an increase in positive emotion relative to baseline.
2. Participants in the negative emotion induction conditions were expected to exhibit steeper rates of discounting than participants exposed to the neutral/control condition (without suppression) due to an increase in negative emotion relative to baseline.
3. A main effect for manipulation of suppression was hypothesized such that participants instructed to suppress emotions in the neutral, negative, and positive emotion induction conditions were expected to exhibit higher rates of discounting than participants in the emotion induction only conditions (negative, neutral, and positive).
4. A group X condition interaction was hypothesized such that participants exposed to the negative emotion + suppression and positive emotion + suppression manipulations would exhibit the highest rates of discounting

relative to other conditions due to the possibility of a combined effect of the utilization of suppression in the context of emotional experiences.

CHAPTER 2: Method

Participants

Participants included 179 undergraduate students from Idaho State University taking lower-division courses in the Department of Psychology. Participants were predominantly female ($n = 125$, 69%), and ranged in age from 18-50 (mean = 21). The sample was mostly Caucasian ($n = 134$, 75%) with a small number of ethnic minorities (Hispanic, African-American, Native American, and Pacific Islander). Data for eight participants were removed from the statistical analyses due to non-systematic responding on the delay discounting task, leaving a total sample size of 171.

Measures

Self Report Measures

Barratt Impulsiveness Scale (BIS-11) (Patton, Stanford, & Barratt, 1995). The BIS-11 is a widely used, self-report instrument that measures attentional, planning, and motor impulsivity. This scale was used in order to obtain a more detailed description of the sample. The BIS-11 demonstrates adequate reliability and validity (Stanford et al., 2009).

Fagerstrom Test for Nicotine Dependence (Fagerstrom & Schneider, 1989). The FTND is a standard instrument for assessing the intensity of this physical addiction. The FTND has good test-retest reliability, convergent validity, and discriminative validity (Buckley et al. 2005). A score of 3 or above is considered as mild to moderate levels of nicotine dependence. The FTND was used in this study as a means to rule out nicotine dependence as a potential confound.

Drug Abuse Screening Test (DAST)(Skinner, 1982). The 31-item DAST assesses alcohol/drug use and associated functional problems, as well as behaviors, thoughts, and

emotions about one's alcohol/drug use. The DAST has high levels of reliability and validity (Yudko, Lozhkina, & Fouts, 2007).

Depression Anxiety Stress Scales – 21 (Lovibond & Lovibond, 1995). The DASS-21 contains 21 items that measure symptoms of depression, anxiety, and stress. The DASS-21 has good psychometric properties including adequate convergent and discriminant validity (Crawford & Henry, 2003) as well as good reliability (Clara et al., 2001). The DASS-21 was used to provide a more detailed characterization of the sample in order to ensure the groups are similar on dimensions (e.g., anxiety and depression) which may be relevant to impulsivity.

Emotion Regulation Questionnaire – ERQ (Gross & John, 2003). The ERQ is a 10-item questionnaire that measures the self-reported use of cognitive reappraisal and expressive suppression in response to emotions. The ERQ is a commonly used and highly reliable measure of the self-reported use of the two strategies (Balzarotti, John, & Gross, 2010). Data from the ERQ was collected in order to measure whether any pre-existing differences in the use of suppression exist between groups.

Manipulation Checks

Positive and Negative Affect Schedule – PANAS (Watson, Clark, & Tellegen, 1988). The PANAS is a frequently used scale that contains 20 items measuring the intensity of positive and negative affect. The scale has been used to measure current and past subjective reports of affect. The PANAS has excellent reliability and validity (Crawford & Henry, 2004). Participants completed the PANAS at baseline and following exposure to the assigned film clip as a manipulation check on the induction of

positive, negative, or neutral emotion and to determine if the added manipulation of suppression changes self-reported emotion.

Suppression Manipulation Check (Campbell-Sills, Barlow, Brown, & Hofmann, 2006). In order to measure the relative use of suppression during the film clips for each condition, participants responded to the following statement: "I tried to hold back or suppress my emotional reactions". Participants rated their use of suppression on a 0–8 scale (0 = not at all to, 8 = all the time).

Behavioral Measures

Delay Discounting

Participants completed a computerized delay discounting task (Baker et al., 2003). After a standardized script (see script below) was read to the participant, s/he answered series of questions about preferences for relatively small outcomes available immediately (or "for sure") and larger outcomes available after a delay. Participants made a series of choices between a large amount of money (e.g., \$1000) to be received after one of several different delay periods (e.g., 1 day, 1 week, 1 month, 6 months, 1 year, 5 years, and 25 years) and a smaller amount of money (e.g., \$100) available immediately. For example, subjects presented with a question similar to this: "Would you rather have (a) \$100 now or (b) \$1000 in 6 months?" In this task, the larger amount was held constant and the smaller amount of money was adjusted (in \$20 increments) by the program until a value that represented the individual's indifference point was arrived at for each of the delay periods. The indifference point refers to the current "value" of large amount of money after the delay period (e.g., \$1000 in 1 year might have an immediate "value" of \$200).

Delay Discounting/Film Clip Instruction Script (Positive, Neutral, and Negative):

The next phase of the study will involve watching a short film clip and then completing a task regarding decisions about money. It is important that you watch and give your full attention to the video clip. Following the video clip you will complete a computerized task in which I will ask you to make some decisions about which of two rewards you would prefer. One of the rewards will either be available right now and the other will only be available after you have waited for some period. For example, I might ask you to choose between \$100 delivered right now and \$1000 delivered in one month. The choices you make are completely up to you. You will not receive any of the rewards that you choose, but we want you to make your decisions as though you were really going to get the rewards you choose.

Delay Discounting/Film Clip + Suppression Instruction Script (Neutral, Positive, and Negative):

The next phase of the study will involve watching a short film clip and then completing a task regarding decisions about money. It is important that you watch and give your full attention to the video clip. Following the video clip you will complete a computerized task in which I will ask you to make some decisions about which of two rewards you would prefer. One of the rewards will either be available right now or for sure, and the other will only be available after you have waited for some period. For example, I might ask you to choose between \$1 delivered right now and \$10 delivered in one month. The choices you make are completely up to you. You will not receive any of the rewards that you choose, but we want you to make your decisions as though you were really going to get the rewards you choose.

We will now be showing you a short film clip. It is important to us that you watch the film clip carefully. If you have any feelings as you watch the film clip, please try your best not to let those feelings show. In other words, as you watch the film clip, try to behave in such a way that a person watching you would not know you were feeling anything. Watch the film clip carefully, but please try to behave so that someone watching you would not know that you are feeling anything at all (*excerpt taken from: Gross, 1998; Richards & Gross, 2000*).

Film Clips

The film clips for the present study were selected based on studies (Rottenberg, Ray, & Gross, 2007; Schaefer, Nils, Sanchez, & Philippot, 2010) that examined how effective specific film clips were at inducing negative and positive emotions. The film clips were ranked on their effectiveness based on scores from the PANAS. The clips rated as most effective for negative (*American History-X: A neo-nazi kills an African-American man smashing his head on the curb; duration: 1'20''*) and positive (*Forrest Gump: A father and his son are reunited; duration: 2'00''*) mood induction were selected for use in this study. The neutral condition contained a film clip of nature (*Alaska's Wild Denali: duration; 2'16''*). Participants viewed the clips, while wearing headphones, on the same computer that the discounting task and questionnaires were completed.

Procedure

The experiment took place in a windowed room containing a computer surrounded by a cubicle for privacy. The procedure for this experiment utilized methods commonly used in other research that has used film clips to induce emotion and research that has experimentally manipulated expressive suppression (Cools, Schotte, & McNally, 1992; Evers, Stok, & de Ridder, 2010; Kliegel, Jager, & Phillips, 2007; Schaefer et al., 2010;

Rottenberg, Ray, & Gross, 2007). In addition to the mood induction/suppression manipulations, the delay discounting task was administered to assess impulsivity.

Participants were randomly assigned to either the neutral (no suppression), negative (no suppression), positive (no suppression), neutral (suppression), negative (suppression), or positive (suppression) mood induction condition.

Experimental Manipulation

Upon arrival to the laboratory, participants were given a brief orientation to the study and gave their consent (electronically and verbally) to participate in the study. After participants gave their informed consent to participate, they were given a three-minute resting period which was immediately followed by the first administration of the PANAS. This measurement served as a baseline for comparison with the second measurement of the PANAS that was administered after the mood induction (i.e., film clip) in order to assess whether or not the film clips effectively altered the participants' mood (e.g., change in positive and negative mood ratings depending on the film clip viewed).

After the first administration of the PANAS, the research assistant read the film clip/delay discounting task script in order to orient the participants to the subsequent tasks. This orientation was given prior to engaging in the tasks in order to reduce the time delay between the end of the film clip and completion of the delay discounting task. Participants randomly assigned to the suppression conditions were instructed to suppress or inhibit their emotional reactions (script in materials). These instructions were based on literature using similar techniques and are commonly used when experimentally manipulating expressive suppression (Evers, Stok, & de Ridder, 2010; Gross, 1998;

Richards & Gross, 2000). Participants randomly assigned to the non-suppression conditions were not given any instructions regarding their emotional reactions to the film clips.

The film clip for each participant was chosen based on the random assignment to either the positive, negative, or neutral conditions (with or without suppression). The assistant read only the introduction script and did not provide any information regarding the content of the film clip in order to reduce any possibility of demand effects.

When the film clip for each participant concluded, the participants completed the second measurement of the PANAS and then immediately completed the computerized delay discounting task.

Computerized Questionnaires

Following the completion of the delay discounting task, participants completed a series of questionnaires on the laboratory computer. The questionnaires (described in the Materials section) included the BIS-11, DASS-21, FTND, DAST, a question measuring the participants' self-reported perception of expressive suppression (Campbell-Sills, Barlow, Brown, & Hofmann, 2006), and demographic questions.

After the participant completed the questionnaires, the research assistant allowed participants to ask questions regarding the nature of the study and administered course credit for the students' participation.

Data Analysis

Data were analyzed in several stages. First, descriptive statistics for self-report questionnaires (Table 1) and demographics (Table 2) were calculated. There were no significant differences among all six conditions on demographic variables or relevant questionnaires, including the BIS-11, DAST-21, DASS, and FTND. Next, manipulation checks were analyzed in order to determine the effectiveness of the mood induction via the three film clips and to determine whether or not the participants in the suppression conditions self-reported the use of expressive suppression at a higher rate than participants in the non-suppression conditions (see results section).

Nonsystematic response (NSR) patterns were identified using criteria described by Johnson and Bickel (2008). Specifically, nonsystematic responders were defined as (1) having any indifference point, with the exception of the first, that was larger than the previous point by more than \$2 and (2) the final indifference point was not less than the first point by at least \$1. Once NSR patterns were identified, a third, and theoretically more conservative method of including as many of these participants was utilized (Dariosis & Johnson, 2015). Specific non-systematic indifference points in a pattern of discounting were removed and replaced with the average of the two surrounding indifference points (if it was in the middle of the series) or the equivalent of the adjacent indifferent point (if it was the first or last indifference point). For example, if an indifference point of .90 occurred between indifferent points of .50 and .20, the non-systematic datum was removed and replaced with the mean of the adjacent indifferent points (e.g., in this case .35). Discounting data from participants with two or more non-systematic indifference points were excluded from the analysis. This procedure resulted

in eight participants being removed from the primary analyses (AUC and mean log-transformed k -values). This was done since the removal of the data from the highly non-systematic responders resulted in significant results that were not present when these participants were included in the analyses.

Frequencies of non-systemic responders for each condition (following the imputations and removals) were analyzed. Results from chi-square analyses ($\chi^2(5) = 8.728, p = .120$) revealed no significant differences in the number of non-systematic responders between the six conditions, indicating that the manipulation of mood or the manipulation of suppression did not have an impact on non-systematic responding.

CHAPTER 3: Results

Manipulation Checks

Change from baseline self-reported mood using the PANAS (Positive Affect Subscale). A 2 (Suppression/No Suppression) X 3 (Mood Induction) ANOVA was conducted with the dependent variable being change-from-baseline scores on the Positive Affect subscale of the PANAS (see Figure 1 for visual depiction). There was a significant main effect for Manipulation of Suppression ($F(1, 170) = 8.390, p = .004$) and Mood Induction ($F(2, 170) = 24.559, p = .000$). There was no significant main effect for the interaction ($F(2, 169) = .319, p = .727$).

Post hoc-analyses (Tukey HSD; see Table 3 for comparisons among all conditions) indicated that participants exposed to the positive mood induction (both Suppression and No suppression groups) had significantly higher change-from-baseline scores on the Positive Affect subscale of the PANAS than participants in the negative and neutral mood induction condition. Participants exposed to the negative mood induction and No suppression groups had significantly reduced change from baseline scores on the Positive Affect subscale of the PANAS than participants in the positive and neutral mood induction conditions. The significant elevations among the positive mood induction participants and significant reductions among the negative mood induction participants indicate that the manipulation was successful. Additionally, the main effect of suppression indicated a greater reduction in change from baseline (positive affect) scores for participants in the suppression conditions than participants in the no-suppression conditions.

Change from baseline self-reported mood using the PANAS (Negative Affect Subscale). A 2 (Suppression/No Suppression) X 3 (Mood Induction) ANOVA was

conducted with the dependent variable being change-from-baseline scores on the Negative Affect subscale of the PANAS (See Figure 1 for visual depiction). There was a significant main effect for Mood Induction ($F(2, 170) = 66.205, p = .000$), but no significant main effect for Manipulation of Suppression ($F(1, 170) = .456, p = .500$) or the interaction ($F(2, 169) = .329, p = .720$).

Post hoc-analyses (Tukey HSD; see Table 4 for comparisons among all conditions) indicated that participants exposed to the negative mood induction (both Suppression and No Suppression groups) had significantly higher change from baseline scores on the Negative Affect subscale of the PANAS than participants in the positive and neutral mood induction conditions (both Suppression and Non-Suppression groups; see Figure 2). Participants exposed to the positive mood induction (both Suppression and No suppression groups) had significantly reduced change from baseline scores on the Negative Affect subscale of the PANAS than participants in the negative mood induction conditions. As with the positive mood induction, the negative film clip was relatively successful in inducing negative affect in comparison to the other film clips.

Self-reported use of suppression during the film clips. Self-reported emotion suppression during the film clips was measured to determine whether or not participants in the Suppression versus No suppression conditions reported any differences in their use of suppression (see Figure 2 for visual depiction). An independent samples t-test measured this effect and revealed a significant difference between participants in Non-Suppression ($M = 2.66, SD = 2.17$) versus Suppression ($M = 4.60, SD = 2.74$) conditions, $t(169) = -5.118, p < .000$. Results indicated that participants in the

Suppression conditions reported significantly higher levels of engaging in suppression than participants in the Non-Suppression conditions.

Primary Analyses: Area Under the Curve

Figure 3 depicts mean AUC values for participants across the six groups. A 3 (Mood) X 2 (Suppression/No Suppression) ANOVA examined differences among groups on mean AUC data. There was no main effect for Mood ($F(2, 170) = .757, p = .471$) and no significant interaction ($F(2, 170) = .344, p = .709$). However, there was a significant main effect for the Suppression condition ($F(1, 170) = 5.13, p = .025, \eta^2 = .030$), indicating that participants within the suppression groups had significantly higher AUC values ($M = .42, SD = .24$) than participants in the non-suppression groups ($M = .33, SD = .24$).

Note: The significant main effect for the Suppression condition was not present when the data were analyzed prior to the removal of non-systematic response patterns ($F(2, 178) = 3.01, p = .084$). As in the primary analyses, there was no main effect for Mood when all participants were included.

Primary Analyses: Log-Transformed k -values

Figure 4 depicts mean natlog-transformed k -values for each of the six conditions. Figure 5 depicts the median subjective values of the discounting task for each condition as well as their predicted curves based on the hyperbolic decay function. A 3 (Mood Manipulation) X 2 (Suppression/No Suppression) ANOVA examined differences on mean natlog- k values between the groups. In accordance with the AUC analyses, results indicated no significant main effects for Mood ($F(2, 170) = .942, p = .392$) or a significant interaction ($F(2, 170) = .925, p = .399$), but there was a significant main

effect for Suppression ($F(1, 170) = 4.682, p = .032, \eta^2 = .028$). Participants within the suppression groups had significantly smaller natlog- k values ($M = -7.01, SD = 1.89$) than participants in the non-suppression groups ($M = -6.40, SD = 1.99$).

Note: As in AUC analyses, the significant main effect for the Suppression condition was not present when the data were analyzed prior to the removal of non-systematic response patterns ($F(2, 178) = 2.54, p = .113$). Again, there was no main effect for Mood when all participants were included in the analyses.

CHAPTER 4: Discussion

Overview

The emotion regulation strategy of suppression is widely viewed as a maladaptive strategy in response to emotional experiences (e.g., engaging in substance abuse due to an increase in overall negative emotion as a result of suppression). Research consistently demonstrates numerous negative effects associated with emotion suppression including decreases in positive emotion, increases in negative emotion, increased alcohol use, and other deficits in impulse control (Gross & John, 2003; Muraven, Collins & Neinhaus, 2002). Furthermore, the act of suppression is often conceptualized as a form of self-control that decreases the immediately-available and finite reserve of total self-control abilities (Baumeister, Vohs, & Tice, 2007), leading to increases in impulsive behavior. However, it is difficult to state for certain how these effects manifest in real-world behaviors, because (1) many of the studies demonstrating the negative effects of suppression and intense emotional states are correlational and (2) experimental studies examining related processes often use procedures that are not theoretically derived or empirically validated measures of self-control constructs.

Due to the lack of clarity regarding the precise nature of these relationships and related processes that may also affect self-control, such as unregulated experiences of emotion, the current study sought to answer several related questions. The primary questions were whether or not impulsivity would increase due to the experience of emotion and the suppression of emotion using the delay discounting task. The delay discounting paradigm was of particular interest due to its properties as a basic behavioral process of impulsivity and its relationship to a large number of real-world, impulsive behaviors. The manipulation of emotional suppression as the precursor to completing the

delay discounting task was used in part due to the possible clinical ramifications that would be evident if rates of impulsivity were increased. The ability to isolate the effects of several different emotional states on impulsive behavior provided additional rationale for examining emotional suppression. This alone is an important and somewhat neglected question and served as a follow-up to previous research in the current laboratory that previously found no effect for manipulation of emotion in relation to rates of delay discounting (Jenks & Lawyer, 2015).

Effect of Emotion on Delay Discounting

In the current study, emotion did not influence impulsive choice measured with the delay discounting task. This suggests that the experience of *short-term* emotion is not directly related to impulsive choice, at least as measured using the delay discounting task. This finding is consistent with our previous study (Jenks & Lawyer, 2015) in which a public speaking challenge among socially anxious adults yielded no change in delay discounting compared to controls. Overall, the dearth of experimental data demonstrating a causal link between short-term emotion and delay discounting suggests that there is not a strong relationship or that other factors may play a role (e.g., duration, type of emotion). The current results appear, at least at surface level, to be at odds with theoretical notions that intense states of emotion (positive and negative) increase the likelihood of engaging in risky, impulsive behaviors (Cyders & Smith, 2008). Again, this suggests that there are other co-occurring processes/variables that account for a relationship between emotion and impulsivity (e.g., individual differences in trait levels of positive and negative urgency). One possible explanation for the relationship between disorders of emotion and impulse-control disorders (Grant et

al., 2004) is that chronic (rather than short-term) mood states may have a different effect on impulsive behaviors.

Effect of Suppression

The current study failed to find that engaging in suppression of emotion results in increased impulsivity. To the contrary, the suppression of emotion actually resulted in *decreased* impulsivity as measured by the delay discounting task. This author is unaware of any previous studies that demonstrate a reduction in behavioral impulsivity or any theoretically positive/adaptive outcome through the suppression of emotion. If replicated, this finding is of critical importance in understanding how the suppression of emotion influences self-control related behaviors. This represents a divergence from current emotion regulation theory that identifies suppression as a sub-optimal strategy and also provides an opportunity to determine if this effect generalizes to other measures of self-control. This effect is also critically relevant to possible clinical interventions since it suggests that the use of short-term emotional suppression reduces some aspects of behavioral impulsivity.

The finding that suppression decreases impulsivity is consistent with a growing literature (see Hagger et al., 2016; Lurquin et al., 2016; Xu et al., 2014) that suggests that the ego depletion effect may be overstated. Furthermore, some resource model researchers argue that multiple acts of self-control (two or more) actually increase subsequent self-control due to becoming “used to” or “cognitively adapting” to the act of doing so (Xio, Dang, Mao, & Liljedahl, 2014). Converse and DeShon (2009) state that this “adaptation effect” only occurs after multiple attempts at self-regulating, therefore, it is unlikely that the short-term emotion suppression used in this study

corresponds to these “adaptation” phenomena, but the potential for multiple self-control efforts to increase subsequent self-control behaviors is worth further exploration

It seems more likely that the current study is a significant departure from “ego depletion” research since the suppression of emotion decreased impulsivity and since the self-control outcome was a theoretically-derived, well-established index of impulsivity.

Alternative Mechanisms for Reductions in Impulsivity

The hypotheses of this study, partially derived from a resource model of self-control, (Baumeister, Vohs, & Tice, 2007) were not supported and, in fact, our findings were the *opposite* of expectations based on that model. The question now is how to make sense of these findings. One logical explanation for the effect of suppression resulting in relative reductions in impulsivity is that participants in the suppression conditions were actually successful in diminishing some aspect of their emotional experience. If true, this perspective lends support to Cyders and Smith’s (2008) theory that intense emotional states increase rash and impulsive decisions. While the idea is plausible, the manipulation checks indicated variability in the effectiveness of suppression in reducing emotion (i.e., main effect for suppression on the positive affect items of the PANAS but not on the negative affect items). Since emotion is a multifaceted construct and the different components are not always highly coordinated (Mauss, et al., 2005), measuring behavioral indicators of emotion may have revealed a more robust effect for the impact of suppression on emotion. Therefore, it is possible that those instructed to suppress were more effective at reducing the behavioral expression of emotion even though subjective reports (PANAS) varied across conditions. While the assertion that participants in the suppression conditions were

successful in reducing some aspect of their emotional experience (other than subjective reports) is largely conjecture in relation to the current study, we do know that participants in the suppression groups reported significantly greater effort to control their emotions than non-suppression participants (e.g., higher reported use of suppression in the neutral/suppression group than the neutral/no suppression group). Regardless of how this affected changes in emotion itself, the higher self-reported use of suppression in the suppression conditions indicated that these participants were engaging in a fundamentally different process than those in the no-suppression conditions given the difference in discounting rates.

Therefore, another alternative explanation for these findings is that asking someone to alter one response (e.g., suppressing emotion) may result in the inhibition of other responses (e.g., reduced discounting) under some conditions. This assertion is consistent with the finding that the training of executive functioning skills increases performance on other related and non-related executive functioning tasks (Karchach & Kray, 2009). Furthermore, adopting an executive-functioning based theory aligns with the neuroeconomic perspective of decision making (Bickel et al., 2007) that proposes two basic types of decision making processes. This includes an *impulsive decision system* rooted in the limbic system and is linked to immediate reinforcement and an *executive system* that is associated with the prefrontal cortex and deferred reinforcement. These systems are also reflective of Kahneman's (2011) two-systems perspective in which System 1 involves reacting intuitively, emotionally, and automatically while System 2 involves deliberation, problem solving, and reasoning. In the context of delay discounting, choosing a smaller, immediate reward activates the *impulsive decision*

system while choosing the larger, delayed reward activates the *executive system* as measured by fMRI (McLure, Laibson, Loewenstein, & Cohen, 2004). Therefore, engaging in an inhibitory behavior (i.e., suppressing behavioral markers of suppression) may activate components of the *executive system* and increase the likelihood of responding on the delay discounting task in a manner that is also indicative of the same decision making system (choosing larger, delayed rewards).

This explanation is particularly compelling in light of several recent studies that yielded reductions in behavioral indicators of impulsivity after participants received training aimed at reducing impulsive choices. Specifically, the use of mindfulness (Hendrickson & Rasmussen, 2013; 2016), working memory training (Bickel, Yi, Landes, Hill, & Baxter, 2011), and linking behavioral stop-signals to unhealthy food choices (Veling, Aarts, & Stroebe, 2012) result in lower levels of behavioral impulsivity. Furthermore, All of these manipulations implicate executive functioning processes and prefrontal cortex circuitry (response inhibition: Ridderinkhof et al., 2004; working memory: Brunoni & Vanderhasselt, 2014; mindfulness: Creswell et al., 2007) and may provide additional evidence of an *executive system* that is susceptible to the effects of other short-term executive processes.

While this theory and related research are clearly in their nascence, it does appear that engaging in some kinds of activities prior to completing a behavioral choice paradigm reduces impulsivity. In the case of Bickel et al. (2011), working memory training decreased delay discounting rates but did not affect subsequent working memory capacity. As in the current study, this finding suggests that simply engaging in certain behaviors and/or directing participants to change their behavior can reduce delay

discounting even when those behaviors do not have the expected effects on related outcomes (i.e., post-test working memory did not improve; suppression did not significantly reduce or increase negative affect scores on the PANAS). Therefore, a simple change in behavior may reduce delay discounting regardless of whether or not the behavior is associated with executive functioning.

The findings here run contrary to a large literature indicating a relationship between emotion suppression and impulsivity. However, an important distinction between those studies and this one might be the role of chronic versus short-term emotion suppression. It is also possible that specific parameters within these studies are required to reproduce these effects. For instance, the manipulations and the dependent variables occur in close temporal proximity to one another and are brief in nature (i.e., mindfulness training and making food choices, expressive suppression and completing the delay discounting task). This is important to consider, in regards to emotional suppression, given that there are well-documented relationships between the use of *long-term* suppression and difficulties in a wide-range of life domains (e.g., negative social consequences, symptoms of depression; Cutuli, 2014). Therefore, short-term suppression may be beneficial in that it reduces impulsivity in the context of short-term emotion (as in the present study) while long-term use increases the likelihood of negative consequences (Najmi & Wegner, 2008). To illustrate this point, suppressing a negative emotion while driving in traffic (e.g., being angered from being cut-off by another driver) may increase the ability to successfully navigate through traffic as opposed to fully experiencing the anger and losing focus on the primary task of driving. In contrast, suppressing a negative emotional experience over the long-term may result

in impulsive, harmful coping strategies (e.g., substance abuse related to avoidance of a traumatic experience).

Limitations

The manipulations of emotion and suppression were relatively brief which limits possible conclusions in relation to the interplay between the use of suppression and disorders of emotion. Although there was not a significant main effect for manipulation of emotion, it is possible that the duration of the emotional experience was not long enough to impact discounting rates. The manipulation of emotion via film clips may not be high in ecological validity given that most intense emotions in the real-world arise from events or environmental factors that have a direct relationship to the individual or relate to a personal goal. Therefore, there may be a fundamental difference in how an emotionally charged film clip affects impulsivity in comparison to a real-world precipitant of emotion (e.g., a fight between partners). Additionally, the current study did not measure self-reported emotion during the delay discounting task. Therefore, the intensity of the emotion may have reduced while completing the task, resulting in a lack of effect from the emotional experience. The same case can be made for the use of suppression, since many of the maladaptive outcomes associated with suppression occur with habitual levels of its use over relatively long periods of time (Gross & John, 2003). However, these results indicate that there are differential outcomes between relatively short-term and relatively long-term utilization of emotional suppression. In other words, long-term use of suppression may be more strongly linked with negative outcomes while its use in the short-term may have some beneficial effects.

The use of a relatively young, college sample makes it difficult to determine the generalizability of the findings of the present study to other age-groups. This is due to research that indicates that as individuals age, self-control increases and impulsive behaviors decrease (Green, Fry & Myerson, 1994). Given this difference in age-groups, there may be learned, regulatory strategies in older individuals that would negate a between-group effect of instructing to suppress in the context of emotional experiences.

Future directions

The results of the present study suggest that the short-term experience of emotion itself does not influence patterns of impulsive choice, but that the *suppression* of emotion actually decreases impulsive choice patterns. Time-restrained and context-specific use of this strategy may be useful in clinical settings provided future research clarifies the parameters of the current study's effects. Investigating other emotion regulation strategies in a similar manner may provide a more nuanced understanding of how specific strategies impact impulsivity in the context of intense emotion.

Additionally, different components of emotion manipulations should be considered (e.g., differential effects of discrete emotions in comparison to broader categories, time-frame of emotional experience, manipulating personal emotional experiences vs. film/music stimuli) for a more complete analysis of the effects of emotion. To follow, comparing the effects of emotion versus non-emotional controls is needed as well. Although the neutral condition in the current study was meant to serve this purpose, the nature film may not represent a completely non-emotional task (e.g., a video comprised of abstract shapes/designs), especially in light of the fact that significant reductions in self-reported positive and negative emotionality occurred for those in the neutral/suppression group. Given that behavioral tasks purported to measure impulsivity (e.g., Balloon Analog Risk

Task, Go/No Go Task, Probability Discounting) are not highly correlated with one another, (Reynolds et al., 2006) other measures of impulsivity need to be examined in relation to emotion/emotion regulation to isolate which features of impulsivity are affected by extreme emotions and interrelated processes. Furthermore, it is possible that emotional experiences do not affect delay discounting for money but have an impact on domain-specific discounting tasks (i.e., food, sex) that are more generalizable to real-world choices (Lawyer & Schoepflin, 2015; Rasmussen, Lawyer, & Reilly, 2010).

Finally, a research program designed to isolate the effects demonstrated in studies that show a reduction in behavioral impulsivity is required to provide a greater understanding of the mechanisms involved in different tasks. For example, does mindfulness and suppression activate an *executive* system that impacts other executive functioning tasks, or does the simple act of engaging in a behavior (executive functioning-related or not) prior to or during the completion of the delay discounting task reduce behavioral impulsivity? If such a program finds that there are certain interventions that impact impulsivity, the findings may have applicability in creating more effective treatment protocols/strategies for disorders with relationships to impulsive behaviors (e.g., substance use disorders, eating disorders, ADHD, Borderline Personality Disorder).

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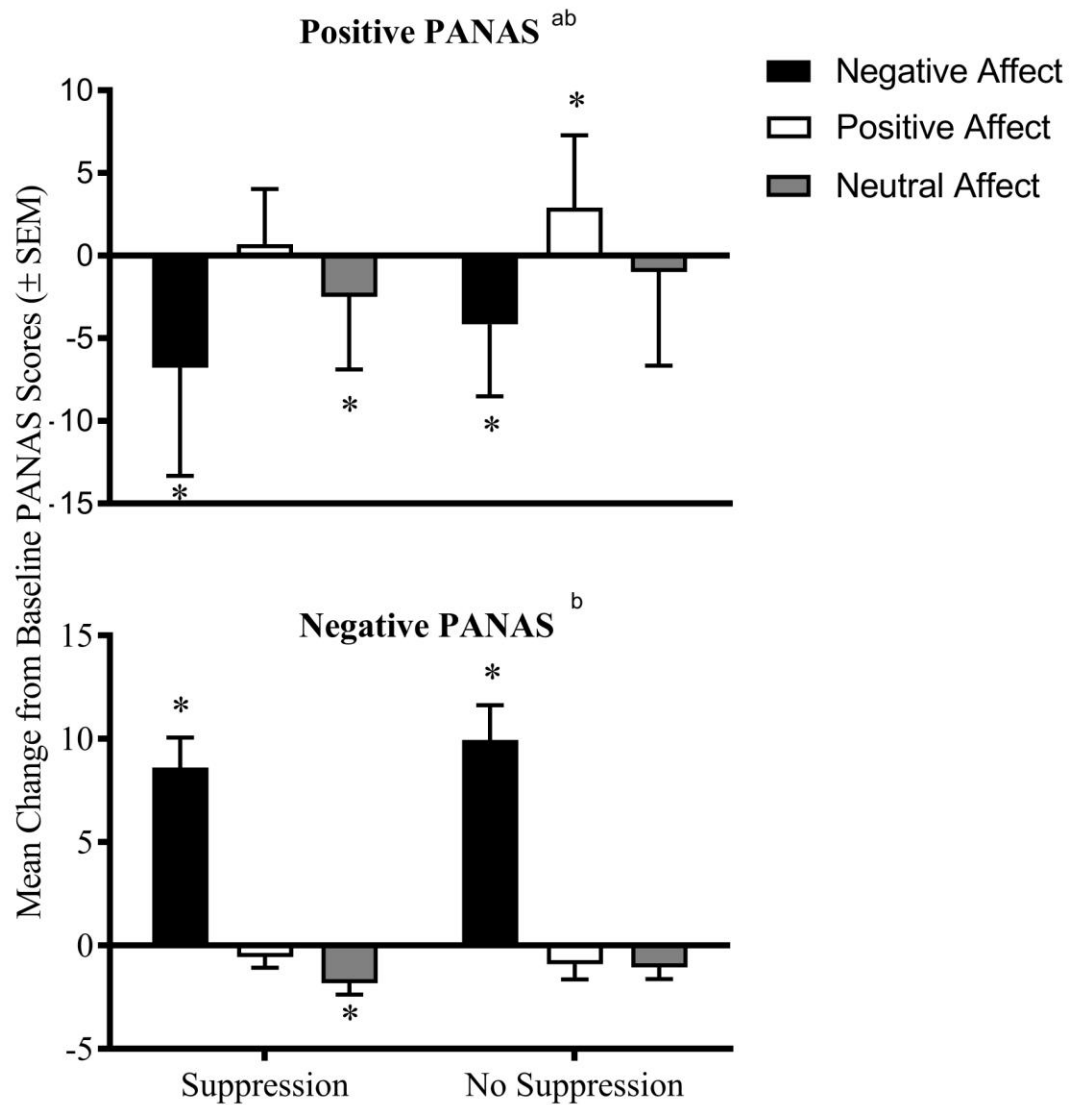


Figure 1. Change from Baseline PANAS Scores (Positive and Negative scales)

*Significant within group increase/decrease in self-reported emotion

^a Significant main effect for manipulation of suppression

^b Significant main effect for manipulation of emotion

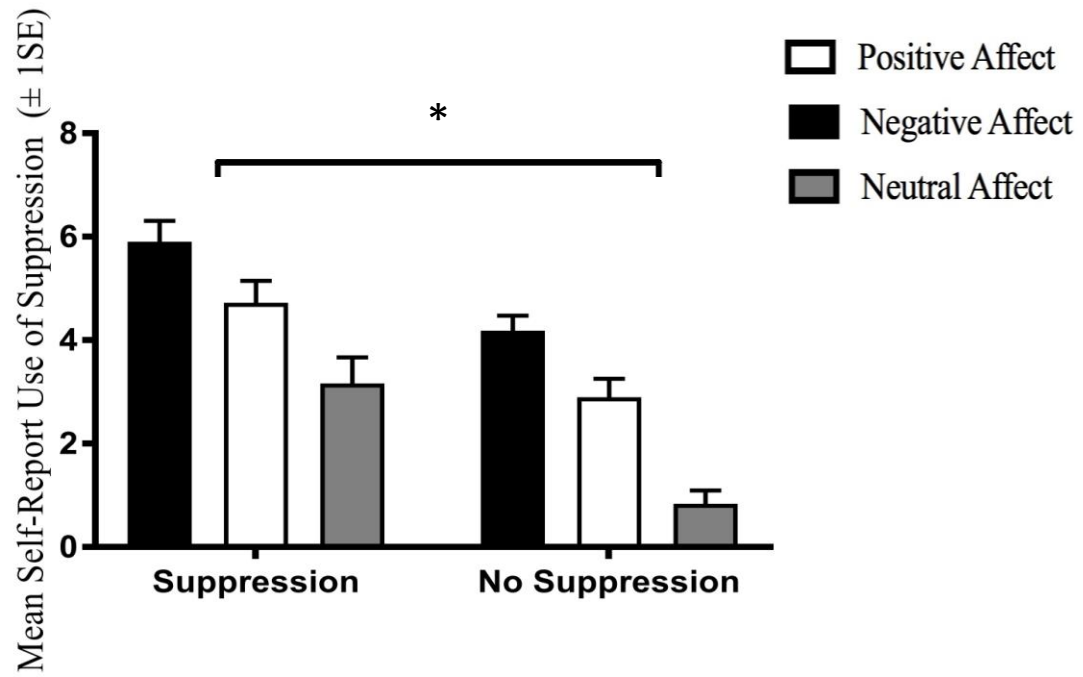


Figure 2. Self-Reported use of Suppression across Conditions

* Significant difference between Suppression and No Suppression conditions

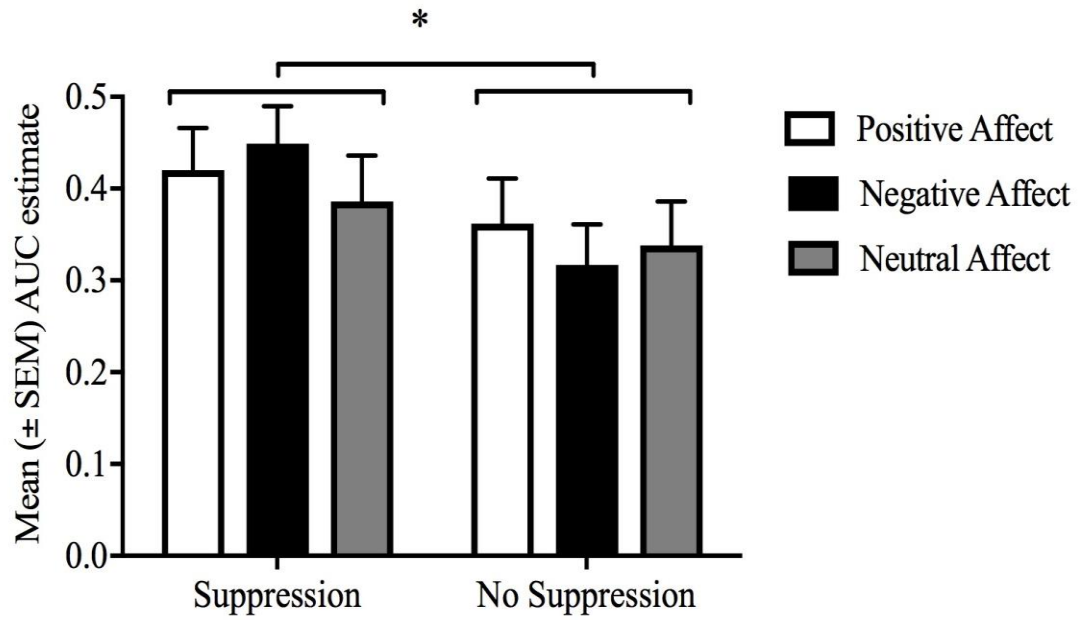


Figure 3. Area Under the Curve (AUC) Comparisons across Conditions

*Significant main effect for manipulation of suppression

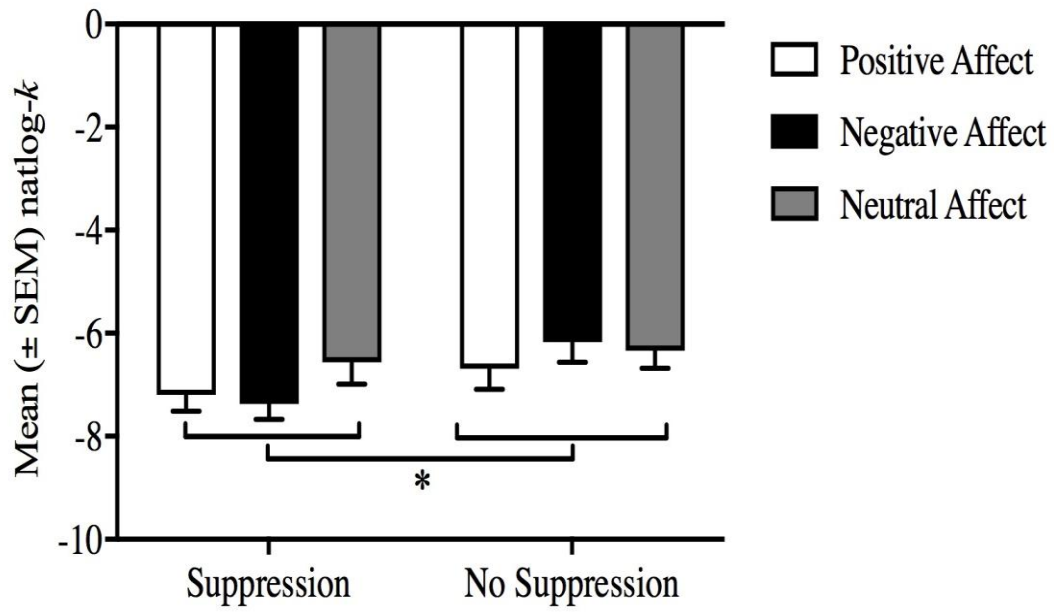


Figure 4. Natlog- k Comparisons across Conditions

*Significant main effect for manipulation of suppression

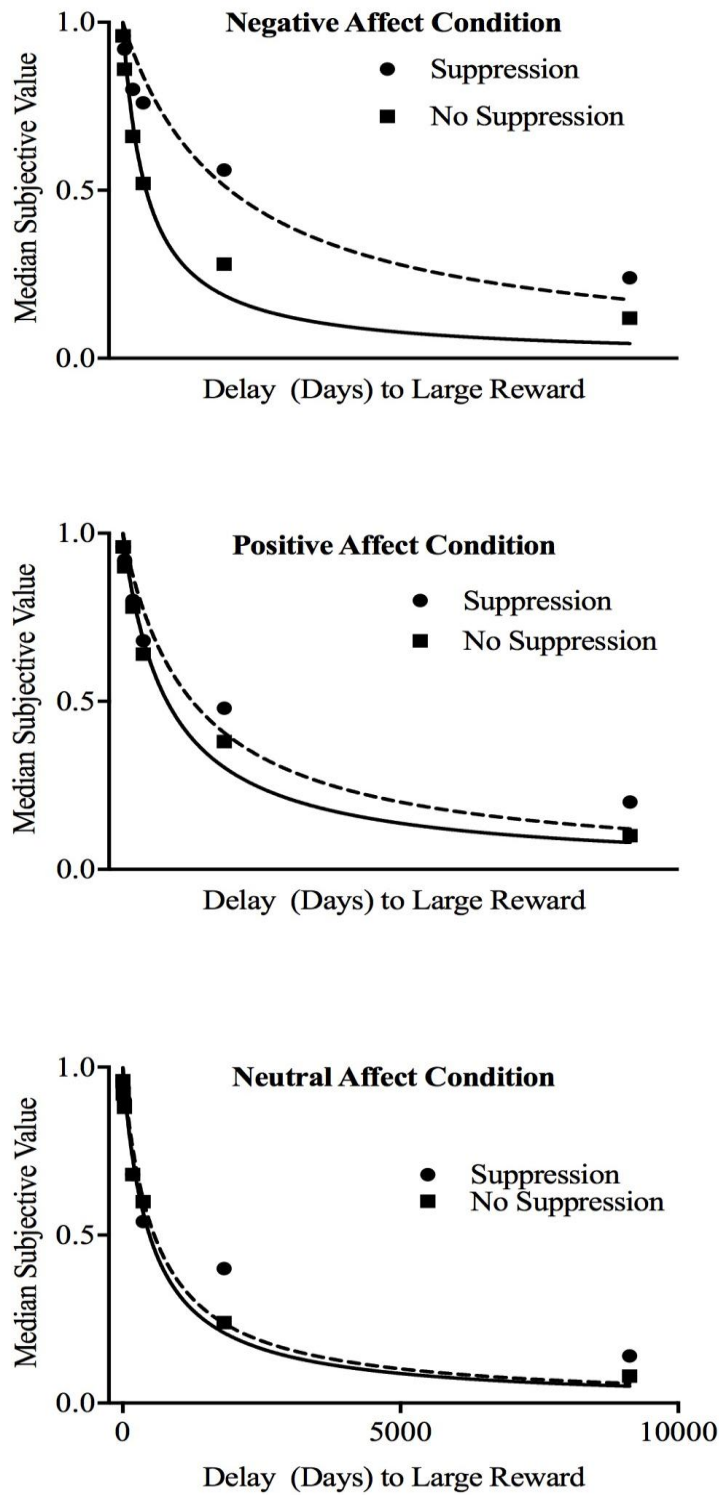


Figure 5. Median subjective value of delayed money (\$1000) within negative, positive, and neutral emotion groups. Lines represent fit of the hyperbolic decay function

Table 1

Group Comparisons of Self-Report Data

	Suppression			No Suppression			F	p
	Negative	Positive	Neutral	Negative	Positive	Neutral		
	n = 29	n = 29	n = 28	n = 26	n = 30	n = 29		
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)		
BIS-11 Total Score	63.48 (9.72)	62.21 (8.76)	64.11 (11.93)	62.42 (8.23)	63.67 (9.96)	61.24 (8.79)	.361 ^a (170)	Ns
DASS-Depression	2.39 (2.88)	2.10 (2.24)	4.01 (4.92)	3.96 (5.50)	4.83 (5.45)	3.62 (5.21)	1.581 ^a (170)	Ns
DASS-Anxiety	3.48 (3.60)	2.72 (2.72)	3.29 (3.43)	4.11 (4.15)	3.80 (3.79)	3.38 (4.58)	.450 ^a (170)	Ns
ERQ-Suppression	14.65 (3.83)	15.17 (4.88)	15.86 (5.82)	14.70 (5.78)	13.67 (5.09)	15.44 (4.95)	.661 ^a (170)	Ns
ERQ-Reappraisal	32.52 (5.67)	32.21 (6.21)	30.43 (5.20)	28.48 (8.62)	31.27 (5.87)	31.03 (5.96)	1.484 ^a (170)	Ns
DAST Total Score	2.19 (2.44)	1.69 (2.17)	2.93 (4.40)	2.33 (3.04)	3.60 (4.30)	2.93 (2.93)	1.221 ^a (170)	Ns
FTND (Nicotine Dependence)							1.147 ^b (5)	Ns

^aOne-Way ANOVA (df) to ensure group similarity on self-report questionnaires^bKruskal Wallis test due to non-normality (df)

Table 2

Demographic Characteristics across Conditions

Condition (n)	Suppression			No Suppression		
	Negative (29)	Positive (29)	Neutral (28)	Negative (26)	Positive (30)	Neutral (29)
Age ^{a*} M (SD)	19.62 (1.72)	21.41 (3.60)	20.32 (3.55)	20.15 (2.94)	23.10 (8.15)	21.75 (5.49)
Gender ^{b*} n (%)						
Female	24 (83)	22 (76)	18 (65)	20 (77)	21 (70)	16 (55)
Male	5 (17)	7 (24)	10 (35)	6 (23)	9 (30)	13 (44)
Ethnicity ^{b*} n (%)						
Caucasian	20 (69)	22 (76)	19 (68)	22 (85)	23 (77)	23 (79)
African American	1 (3)	1 (3)	2 (7)	0	2 (6)	0
Hispanic	6 (20)	4 (14)	4 (14)	0	4 (13)	5 (17)
Native American	0	1 (3)	0	0	0	0
Asian/Pacific Islander	1 (3)	0	1 (3)	1 (3)	0	0
Other	0	1 (3)	2 (7)	3 (12)	0	1 (3)
Unknown	1 (3)	0	0	0	1 (3)	0

^aindependent samples kruskall-wallis test^bfrequency count analyzed using chi square analysis

*no significant differences between conditions

Note: No significant differences on rates of delay discounting between ethnicity (One-Way ANOVA)

Table 3

Post-hoc Comparisons of Change from Baseline Scores (Positive PANAS)

	SN	SP	Sneut	NoSN	NoSP	NoSneut
SN	0	-7.00**	-4.32*	-3.01	-9.13**	-5.83**
SP	7.00**	0	2.67	3.99*	-2.13	1.17
Sneut	4.32*	-2.67	0	1.31	-4.81**	-1.50
NoSN	3.00	-3.99*	-1.31	0	-6.12**	-2.81
NoSP	9.13**	2.13	4.81**	6.12**	0	3.30
NoSneut	5.83**	-1.17	1.50	2.81	-3.30	0

* $p < .01$; ** $p < .05$; SN – Suppression Negative; SP – Suppression Positive; Sneut – Suppression Neutral; NoSN – No Suppression Negative; NoSP – No Suppression Positive; NoSneut – No Suppression Neutral

Note: Tukey's HSD used for multiple comparisons

Table 4

Post-hoc Comparisons of Change from Baseline Scores (Negative PANAS)

	SN	SP	Sneut	NoSN	NoSP	NoSneut
SN	0	9.58*	10.89*	-1.54	9.93*	10.14*
SP	9.58*	0	1.30	-11.13*	.35	.55
Sneut	-10.89*	-1.31*	0	-12.43*	-.95	-.75
NoSN	1.54	11.13*	12.43*	0	11.48*	11.68*
NoSP	-9.93*	-.34	.95	-11.48*	0	.20
NoSneut	-10.14*	-.55	.75	-11.68*	-.20	0

* $p < .01$; SN – Suppression Negative; SP – Suppression Positive; Sneut – Suppression Neutral; NoSN – No Suppression Negative; NoSP – No Suppression Positive; NoSneut – No Suppression Neutral

Note: Tukey's HSD used for multiple comparisons

Table 5

Summary of ANOVA for Positive and Negative PANAS

	SS	df	MS	F	p
Positive PANAS					
Suppression	209.167	1	209.167	8.39*	<.01
Emotion	1224.58	2	612.29	24.55*	<.01
Total	6278.00	171			
Negative PANAS					
Suppression	17.985	1	17.985	.45	ns
Emotion	4441.75	2	2220.87	66.20*	<.01
Total	10834.00	171			

*p < 0.01

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Appendix B – Informed Consent

Appendix C – Discounting/Suppression Instructions

Appendix D – Introduction Script

Appendix E- Fagerstrom Test for Nicotine Dependence (FTND)

Appendix F - Drug Abuse Screening Test (DAST)

Appendix G - The Depression, Anxiety, and Stress Scale – 21 (DASS-21)

Appendix H - Barratt Impulsiveness Scale (BIS-11)

Appendix I - Positive Affect Negative Affect Scale (PANAS)

Appendix A

Introduction

The discipline of psychology is a relatively new scientific field that has a vast, growing body of literature that has focused its efforts on attempting to define, explain, and predict a seemingly endless number of behavioral, physiological, and cognitive phenomena. Within each focal point of study, there is a constant progression of refining and rejecting various components of empirical data and overarching theoretical frameworks. Although the role of emotion is entrenched in discussions within the majority of psychology's sub-disciplines, there is often difficulty in bridging the gaps between behavioral, neuropsychological, and cognitive explanations concerning this role. Such a conundrum is common within the field of psychology due to the inherent complexity of the subject matter. Furthermore, a lack of consensus on the operational definition of a given construct creates problems when attempting to make connections between sets of empirical data.

In the case of emotion, this seems to particularly apply due to the number of underlying processes involved. However, emotion plays a key role in the development and maintenance of maladaptive behaviors associated with psychological disorders. In the past, this role has been restricted to a unique characterization of specific disorders or classes of disorders (e.g., anxiety vs. depression), yet at present there is an increasing demand to identify the similar components of emotion that underlie a majority of psychological processes.

This review and subsequent study will attempt to continue this endeavor in the context of how emotional processes, with particular regards to the ability to regulate emotion and the suppression of emotion, may be a crucial component in impulsive

behaviors. The current conceptualization of emotion and the construct of emotion regulation will be presented along with their relationship to psychopathology.

Additionally, research regarding emotion regulation difficulties and links to impulsive behaviors across a variety of disorders will be discussed. The review will also examine a specific emotion regulation technique, suppression, and explore how this strategy may be a relatively maladaptive response to the experience of emotion as well as a means of reducing self-control. Finally, the theoretical and empirical findings contained will be used to provide a rationale for the current study which will examine emotion regulation abilities in combination with the utilization of emotional suppression and how these constructs relate to discounting, a behavioral measure of impulsive choice, during experiences of positive and negative emotion.

Emotion

The overall concept of emotion is not necessarily an easily and readily identifiable psychological related process that contains a single characterization in which all components of the concept are always included. Rather, emotion encapsulates a series of responses which can vary in duration, intensity, and valence in the context of limitless environmental situations. However, prior to outlining the components involved in emotion, defining the overarching purpose of emotions is a necessary requirement in order to explain the onset of emotional reactions.

While there are slight variations in the theories regarding the purpose of emotions, most researchers subscribe to the idea that they prepare individuals to react to a particular set of environmental stimuli (Lang, 1995). This “particular set of environmental stimuli” is not a random set but is directly related to the goals of the given individual. Frijda’s

(1986) definition of emotion parallels this idea. His definition included three primary components: evaluation of an event as personally relevant, the subsequent emotion results in a readiness for a reaction, and the experience of the particular emotion is distinct from other states. According to Frijda's framework, positive emotions occur when progress is made towards a personally relevant reward while negative emotions arise in response to a failure to progress towards the reward/goal. This basic framework for the genesis of either positive/negative emotion is found across emotional theory.

In Lang's (1995) description, he stated that goals or motivational factors involve two separate and antithetical processes which include appetitive and aversive motivations. Appetitive emotional processes involve mediating positive responses to outcomes while the aversive processes involve mediating negative responses to a particular outcome. For example, the appetitive system responds when an individual meets or moves closer to attaining a personal goal (e.g., getting accepted into graduate school) whereas the aversive system responds when an individual fails to attain a personal goal (e.g., performing poorly on an entrance exam). The associated emotional response then serves the purpose for guiding a particular action (e.g., anxiety resulting in an increase in studying behavior for re-taking the entrance exam).

As with other major domains in psychology, there are differences in the way emotion is examined/operationalized depending on theoretical perspective. From a cognitive perspective, the appraisal and associated thoughts regarding a given situation are a primary focus (Ellsworth & Scherer, 2003; Lazarus, 1991). Behavioral theorists are more likely to view emotion as a learned response via classical and operant conditioning processes (Ledoux, 1992), while neuropsychologists are concerned with brain structures

involved in emotion such as the amygdala and the prefrontal cortex (Ledoux, 2003).

Although the discrepancy in the focal point of emotion among differing perspectives can make the synthesis of empirical data and theoretical frameworks difficult, the majority of these perspectives are unified in that they all seem to view emotion as a general mechanism that drives responses to personally relevant circumstances (Campos, Frankel, & Camras, 2004). The function of emotional responses has a fairly clear conceptualization which is readily applied to the majority of such responses, the actual composition of emotion requires a more elaborate framework.

Gross and Thompson (2007) describe three core features that define emotion that is often referred to as the “modal model of emotion”. The *first* feature of emotion involves paying attention to a set of stimuli which pertain in some way to the subject’s goals. The *second* feature of emotions states that emotional processes involve several different systems including subjective, behavioral, and physiological components. For example, someone experiencing a panic attack may describe feeling like they are going to die (subjective), may remove themselves from the situation (behavioral), and experience an increase in heart rate (physiological). This feature also involves a wide range of behaviors and physiological processes that not only include activity within the central nervous system (e.g., activation of emotion and planning related structures, complementary cognitions) but also within the peripheral nervous system (e.g., changes in blood pressure and heart rate). This idea is highly reflective of the three systems approach (behavioral, cognitive, and physiological) first posited by Lang (1968) and later adopted by Rachman (1978) as a way to understand different patterns of anxiety- and panic-related responding. The *final* feature of emotions states that the entirety of the

associated emotional processes (subjective experience, behaviors, and physiological responses) subject to the influence of the other environmental variables in the immediate context. Frijda (1986) expressed a similar sentiment in that emotions have the ability to interrupt other ongoing processes to influence the organism's reactions. In other words, the expression of emotions can be influenced by other factors in the environment that may require responses that are different than the emotion (Gross & Thompson). As an example, an individual may suppress the behavioral reaction of crying during a film depending on the context (e.g., at home alone vs. in a theatre filled to capacity).

Along with identifying the substrate of emotion, it is also important to make a distinction between emotion and mood, which are often used synonymously. The first distinguishing factor is that mood is relatively long-term and may contain several specific emotional experiences (e.g., sadness and frustration) across its duration while emotion has a shorter time-frame (Rottenberg, 2005). Furthermore, it is difficult to attribute a single event or series of stimuli that produce a particular mood, in comparison to emotion, which is often easily linked with a specific environmental event (Lang, 1995). Stress is another construct which often overlaps with emotional concepts. In this case, the difference is that stress is specific to negative affect and emotion includes both negative and positive affect (Lazarus, 1993). For the purpose of this review and subsequent study, it is important to separate these terms in order to provide as much clarity about the constructs under investigation. For example, the subsequent study will utilize experimental procedures which are often termed "mood induction procedures", however, given the current conceptualization of mood as a longer lasting condition which is not directly tied with a specific event; the inductions will be more in line with the concept of

emotion. Although the emotion induction procedures are not designed to elicit a unique emotion, they are still targeted to elicit a particular valence (e.g., positive or negative). Throughout the rest of the review, emotion will refer to the definition involving the three core features previously discussed and will be used as a backdrop for the way in which individuals can manipulate or regulate such emotions.

Emotion Regulation

Emotion regulation refers to a number of behavioral, cognitive, and physiological processes that alter some component of an emotion or cluster of emotions. The term “regulation” may seem to indicate purposeful intent by the organism manipulating the emotion yet this is not always the case. The regulation of emotion may also occur without intent or without a conscious decision to do so (Gross & Thompson, 2007).

Why are Emotions Regulated?

In Thompson’s (1994) definition of emotion regulation, he argued that the purpose of emotion regulation is to alter some component of the experienced emotion in order to move closer to accomplishing a particular goal.. From a behavioral perspective, individuals may attempt to reduce/increase the intensity of a particular emotion simply based on the aversive/rewarding properties of its components (e.g., consumption of alcohol to reduce saliency of negative emotion) (Thompson, 1994). The regulation of emotion likely differs based on context as well. For example, an individual may attempt to suppress an emotion in an environment where its expression would violate social norms resulting in some sort of punisher (e.g., laughing at a funeral) (Webb, Miles, & Sheeran, 2012). The existing literature on emotion regulation does provide readers with

the ability to draw inferences regarding the purpose of emotion regulation, however, a more explicit report is needed.

Emotion regulation can exert influence over “emotion dynamics” such as latency, magnitude, and duration of emotion (Thompson, 1990). In other words, regulation can delay the onset of an emotion, increase as well as decrease an emotion, and lengthen or shorten the timeframe of a particular emotion. Emotion regulation processes can also impact whether a particular component of an emotion is expressed. For example, a physiological and cognitive component may be expressed while a related behavioral response is inhibited. Therefore, emotion regulation may determine whether there is congruence between a given process (e.g., physiological, behavioral, cognitive) and the experienced emotion. This concept has received empirical and theoretical support in the past through the measurement of anxiety in which behavioral, cognitive, and physiological measures are not always consistent with one another (Rachman, 1978; van Duinen, Schruers, Griez, 2010). In addition to the effects of emotion regulatory processes have on emotion, the extant literature also identifies core features of emotion regulation in a similar manner in which the primary components of “emotion” were identified.

One feature of emotion regulation involves the ability to change not only negative emotion, but positive emotion as well. Although researchers and clinicians likely spend more time examining and targeting emotion regulation processes associated with negative emotions, these processes also occur in the presence of positive emotions (Aldao et al., 2010; Gross & Thompson, 2007; Thompson, 2000). Furthermore, a lack of adaptive emotion regulation strategies may result in undesired consequences in the context of

negative and positive emotions. This idea will be explored in greater detail within the section examining emotion regulation and impulsivity.

Another feature of emotion regulation is that most related strategies are effortful. Although it is quite likely that emotion can be regulated without intent (Masters, 1991), it is difficult to empirically validate such a perspective (Gross & Thompson, 2007). Emotion regulation without intent is also likely to have its roots within an initial effortful process that, over time, may become somewhat reflexive due to reinforcement or punishment of a response (e.g., avoiding triggers for panic attacks) (Mauss, Bunge, & Gross, 2007). For the purpose of the current study, emotion regulation strategies will be viewed as voluntary, operant responses rather than unconscious (reflexive) processes.

Although specific strategies may be associated with more dysfunctional outcomes than others, there is not a universal law that can be used to describe a particular strategy as inherently “good” or “bad” (Gross & Thompson). Instead, the deployment of a strategy may result in either a positive or negative outcome (e.g., increase or decrease of an emotion) depending on the situation in which it is used. For example, while suppressing a negative emotional experience may be beneficial for the immediate circumstance (avoidance cues that are associated with panic attacks), continual avoidance may result in significant negative outcomes (e.g., developing panic disorder). While it is not useful to label a given strategy as “adaptive” or “maladaptive” for an isolated situation, this does not mean that there are not individual differences in the effectiveness with which individuals use emotion regulation strategies. In other terms, it is possible that some individuals may endorse a relatively low rate of using emotion regulatory strategies or may endorse a relatively high rate of negative consequences related to their

implementation of regulatory techniques. Furthermore, research shows that particular clusters of emotion regulatory strategies and the frequency of their use are predictive of different disorders (D'Avanzato, Joormann, Siemer, & Gotlib, 2013). It is also important to view emotion regulation strategies in relation to their function (Thompson, 1994). In other words, a particular strategy can be seen as successful/unsuccessful if it is instrumental in moving the individual towards the desired goal.

There are numerous emotion regulatory strategies that can be classified into broad categories. Most current theoretical perspectives on emotion regulation refer to “process model” which places specific strategies within five distinct categories along the timeline of emotional duration (Gross, 2009). These include *situation selection, situation modification, attentional deployment, cognitive change, and response modulation* (Gross, 1998). While these categories are not necessarily exhaustive or representative of all perspectives regarding emotion regulation, they do encompass a broad characterization and fit a majority of emotion regulation strategies discussed in the corresponding literature. Additionally, while they do refer to types of strategies, they can also be viewed as points along the emotion timeline outlined in the “modal model” of emotion (Gross & Thompson). Prior to introducing the other perspectives, the five categories in this “process model” will be defined. It should be noted that Bosse, Pontier, and Truer (2010) created a much more detailed, statistical version of this model but its use is not as extensive as the original.

The first category, *situation selection*, involves a behavioral response in which an individual chooses to engage/disengage in a particular environmental setting in order to avoid/experience a particular emotion in the future. Within a therapy setting, this may

occur when a client with anxiety intentionally misses a therapy session in order to avoid the experience of emotion during exposure to emotion-eliciting discussion. In the case of *situation modification*, an individual attempts to restructure some component of the environment so that a negatively or positively valenced emotion is decreased/increased.. For example, a socially anxious individual may avoid eye contact during a conversation or while giving a speech to reduce anxiety related to the evaluative component of the situation. While situation selection and situation modification involve actually manipulating the environment, *attentional deployment* does not alter the external circumstances. Instead, it involves shifting the focus of attention to different environmental stimuli that influence the targeted emotion. Therefore, someone with social anxiety may purposefully attend to the content they are delivering to an audience rather than the behavioral reactions of the audience in an attempt to attenuate the anxiety. *Cognitive change* refers to altering the perception of a given situation, which can be done with a variety of cognitive strategies. Cognitive restructuring is a form of *cognitive change* used in several types of psychotherapy and involves a client altering or replacing a maladaptive thought (Beck, 1983). Finally, *response modulation* refers to strategies that occur after the emotional experience has started aimed at having immediate, direct influence over the various components of the emotion. Substance abuse, relaxation procedures, and suppression are common response modulation techniques (Gross & Thompson, 2007; Svaldi, Caffier, & Tuschen-Caffier, 2010). While this framework related to the process model of emotion regulation is useful in clarifying the points at which specific strategies for emotion regulation are utilized, other researchers tend to stress the functional aspect of responding to or regulating emotional experiences.

The previously described sequence of emotion regulation (i.e. the process model) simply focused on the modulation of emotion; however, other components may be necessary to fully encapsulate the construct of emotion regulation (Thompson, 1994) as well as factors that are associated with emotion dysregulation. For instance, Gratz and Roemer (2004) did not reject viewing emotion regulation as merely a set of strategies to alter emotional experience, but integrated several other facets found within extant literature. These factors include “awareness, understanding, and acceptance of emotions, and the ability to act in desired ways regardless of emotional state” (p. 42).

These factors are consistent with contemporary clinical conceptualizations and related targeting of difficulties related to emotion. In particular, the acceptance of emotion and acting in desired ways in the presence of extreme emotions are an integral part of a variety of empirically supported interventions such as Dialectical Behavior Therapy (Linehan et al., 1999) and Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999). In accordance with the perspectives of these treatments, Gratz and Roemer (2004) argue that understanding, being aware of, and accepting emotions is required in order to effectively utilize the specific strategies outlined by Gross and Thompson. Without these pieces and only strategies to change emotion, it is possible that an individual may experience further emotional difficulties since simply altering the experiential component of emotion may not lead to a meaningful resolution of a particular goal or lead to a better understanding of the purpose of the specific emotional experience (Gratz & Roemer). It is evident that the construct of emotion regulation contains a cluster of processes that are not always simultaneously active in response to emotion or necessarily adaptive or maladaptive when taken out of a specific context.

However, it does seem that difficulty with any number of emotion regulation processes contributes to dysfunction across life domains.

Emotion Regulation and Psychological Disorders: A Common Mechanism

Emotion dysregulation, or the use of maladaptive strategies can cause problems (e.g., increase in anxiety when using suppression) for individuals even without any diagnosed psychopathology (Koster, Rassin, Crombez, & Naring, 2002). However, recent research and therapeutic interventions have identified that difficulties in this arena are a common theme across numerous psychological disorders including anxiety disorders, depression, and Borderline Personality Disorder. Furthermore, the presence of emotion regulation difficulties across diagnostic categories has led some researchers to argue that emotion dysregulation may be a mechanism that contributes to the development and maintenance of numerous psychological disorders.

Emotion Regulation and Substance Abuse. Although the behavioral response of engaging in substance use is not necessarily directly related to emotion, there is a fairly clear relationship between difficulties with emotion and substance abuse disorders. For example, recently abstinent participants with alcohol dependence and treatment seeking cocaine users displayed significantly greater levels of emotion regulation difficulties than controls (Fox, Hong, & Sinha, 2008; Fox et al., 2007). Even after extended periods of abstinence, the same participants continued to demonstrate ER difficulties in the domain of “impulse-control” described as difficulty inhibiting behaviors in response to negative emotion. A connection between reduction of emotion dysregulation via therapeutic intervention (DBT) and clinical outcomes supports the validity of the aforementioned relationship within clients with BPD. Axelrod, Perepletchikova, Holtzman, and Sinha

(2011) found that improvements in emotion regulation were linked with a lower frequency of substance abuse.

Berking et al. (2011) found that measurements of deficits in emotion regulation prior to treatment predicted alcohol use during treatment and emotion regulation abilities at termination continued to predict alcohol use at a follow-up session. This suggests that emotion regulation deficits continue to influence alcohol consumption even after intervention. Interactions of specific regulatory techniques are also predictive of certain types of substance abuse. For example, Boden, Gross, Babson, and Miller (2013) found that deficits in the clarity of understanding emotions and a high frequency of using cognitive reappraisal was predictive of marijuana abuse. Not surprisingly, emotion regulation difficulties are common among other disorders highly comorbid with substance use disorders.

Emotion Regulation and Anxiety Disorders. Emotion dysregulation is well-documented among the anxiety disorders (Cisler et al., 2010), particularly in relation to Generalized Anxiety Disorder (GAD) (Amstadter, 2008). Those diagnosed with GAD exhibit strong emotional reactivity to a variety of stimuli, which results in highly intense and rapid emotional responses. In a study examining emotion regulation problems using the Difficulties of Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), GAD participants reported a lack of clarity regarding the nature of their emotions, problems with accepting emotions, difficulty directing behavior towards personal goals during negative emotional experiences, trouble inhibiting impulsive responding in emotional contexts, and a failure to utilize strategies to help with difficult emotions (Salters-Pedneault et al., 2006). Similarly, Mennin, Heimberg, Turk, and Fresco (2005) found that

a clinical sample of GAD participants also had difficulty in understanding emotions, had high levels of negative reactivity to emotions, and were unable to reduce negative emotions in comparison to a non-GAD control sample. Additionally, Mennin et al. found that individuals diagnosed with GAD experienced an increase in worry and distressing physiological symptoms following a negative mood induction procedure relative to controls.

Individuals with Social Anxiety Disorder also display a number of emotion regulation deficits (Turk et al., 2005). In a comparison with GAD, individuals with Social Anxiety Disorder reported a lower level of expression of positive emotions, a lower frequency of attention directed towards their emotions, and greater difficulty in detailing emotional experiences. Mennin, McLaughlin, and Flanagan (2009) conducted a similar study in an effort to unravel the details of emotion regulation deficits in SAD. Their results indicated that a lack of clarity in understanding emotions, as measured by the DERS (Gross & Roemer), was more predictive of SAD than any other factor measured by the DERS.

The implementation of more adaptive strategies can reduce anxiety symptoms in persons with SAD. Goldin and Gross (2010) directed participants to use a mindfulness technique (“breath-focused attention”) in response to negative self-beliefs. In comparison to baseline measures, the implementation of the mindfulness strategy resulted in a reduction of negative emotion. Another study (Kashdan & Steger, 2006) examined the frequency of positive events/emotions in relation to emotion regulation strategies in a SAD sample and found that participants reported the lowest number of daily positive events when higher levels of use of emotional suppression was reported. In contrast,

participants reported the greatest number of daily positive events when they described a greater acceptance of the experience of emotion during the same timeframe.

These findings also generalize to individuals diagnosed with Panic Disorder. A core feature of Panic Disorder is anxiety regarding the experience of physiological arousal and related sensations (DSM-IV-TR; American Psychiatric Association, 2000). This fear predicted experiential avoidance, a deficit in emotional acceptance, and obscurity of emotions at a greater level than other variables related to Panic Disorder (Tull, Rodman, & Roemer, 2008).

Emotion Regulation and Depression. Given the high comorbidity rate between anxiety disorders and depression, it is not surprising that emotion dysregulation is common across both forms of psychopathology. Gross and Munoz (1995) posit that Major Depressive Disorder is inherently a disorder of emotion dysregulation. More specifically, MDD is a disorder in which the duration, intensity, and frequency of negative emotional states are elevated while the same variables related to positive emotions are restricted. Furthermore, individuals exhibiting depressive symptomatology are less likely to select situations in which their behaviors result in positive reinforcement (Lewinsohn & Amenson, 1978). While Lewinsohn and Amenson did not likely view this aspect of depression as a deficit in emotion regulatory abilities, this behavioral pattern is consistent with the “situation selection” strategy associated with the process model of emotion regulation (Gross & Thompson, 2007). At the cognitive level, those diagnosed with MDD may display an abnormally high level of maladaptive self-statements that are characteristic of negative “attentional deployment” within the process model. Research

examining related cognitive emotion regulation strategies is indicative of this theoretical perspective.

In a study with early adolescents, late adolescents, adults, elderly, and psychiatric inpatient samples, Granefski and Kraaij (2006) found a greater use of “maladaptive” regulatory strategies such as rumination, catastrophizing, and lack of positive reappraisal was related to higher levels of psychopathology across all groups. Ehrling et al. (2008) found differences in emotion regulatory abilities among a student sample that reported a history of depression and those who did not report a history of depression. Participants with a past history of depression had significantly higher levels of self-perceived emotion regulation problems and a greater use of maladaptive strategies.

A recent meta-analysis examined the different emotion regulation strategies used in a variety of disorders and found that specific regulatory techniques were linked with depression (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Strategies conceptualized as “adaptive”: *reappraisal*, *acceptance*, and *problem-solving*, were negatively related to depression. The “maladaptive” emotion regulatory strategies including *suppression*, *avoidance*, and *rumination* had a positive relationship with depression. Similar results are found throughout related literature and seem to consistently replicate these findings by displaying that the use of “maladaptive” emotion regulatory strategies results in higher levels of depressive symptomatology regardless of age or gender (Joormann & Gotlib, 2011; Nolen-Hoeksema & Aldao, 2011).

Emotion Regulation and Borderline Personality Disorder. To this point, emotion regulation has been largely discussed in the context of mood disorders, however, related difficulties have been identified as a primary feature within Borderline Personality

Disorder since its formal introduction as a diagnosis in the DSM III (DSM-III; American Psychiatric Association, 1980). The diagnostic criteria of affective instability and the ability to successfully regulate emotions within BPD have been widely documented in research concerning the disorder. For example, Kuo and Linehan (2009) found that physiological emotion responses to highly emotional stimuli were elevated in participants diagnosed with BPD in comparison to healthy controls. Participants with BPD also had a higher level of emotional intensity and negative emotions at baseline. Clearly, there is strong evidence to suggest that difficulties surrounding emotion regulation abilities play a large role across a wide range of psychological disorders. However, it is important to see whether or not these findings also generalize to the non-clinical samples albeit at a likely lower frequency and with less life interference.

Emotion Regulation in the Context of Positive Emotion. The majority of empirical research and theoretical discussion in the realms of emotion and the related concept of emotion regulation focus on negative emotions. This is understandable, especially in regards to clinical psychology, given that “disordered” individuals primarily seek assistance in the reduction of negative emotion among other difficulties in various domains of life. However, extreme positive emotion and the inability to modulate appropriate responses can result in similar, problematic outcomes.

Broadly speaking, positive emotion is often associated with the expectation of or receipt of a given reward (Rolls, 1999). In more specific terms, positive emotion can be broken into “high-approach” or “low-approach” (Gable & Harmon-Jones, 2008). High-approach positive emotions are seen as more approach-oriented and reward-seeking and include emotions such as excitement and desire whereas low-approach emotions are

conceptualized to occur following a reward. The goal of a behavior in this case may not involve a direct goal of achieving the associated reward but rather to appreciate it (Gable & Harmon-Jones). Love, interest, and gratitude are among the low-approach positive emotions.

High-approach positive emotions may be more likely to cause dysfunction since they may be more associated with sensation-seeking, risk-taking, and reward-seeking behaviors such as substance abuse, aggression, and risky sexual behaviors (Gilbert, 2012). Theorists posit that the high frequency of these maladaptive behaviors seen in adolescence is partly due to greater levels of high-approach positive emotions during adolescence than at any other point in human development (Gilbert).

In relation to Gross' model of emotion regulation, some individuals appear to actively select situations to increase positive emotions that may lead to harmful outcomes (Carl, Soskin, Kerns, & Barlow, 2013). In the case of Bipolar Disorder, particularly during the manic phase, extreme levels of positive emotion are widespread (Gruber, 2011). Furthermore, individuals with Bipolar Disorder tend to overuse reappraisal-based ER strategies in order to increase positive emotion (Carl et al., 2013). Along the same lines, the strategy of "upwards generalization", which can be viewed as the tendency to exaggerate positive feedback (e.g., being told you are a fast runner and then deciding you could win a gold medal in track at the Olympics) is a risk factor for hypomania.

Individuals may avoid the experience of positive emotions in addition to actively seeking them out (Carl et al., 2013) and individuals with depression are particularly susceptible to this tendency. A loss of interest or reduction in enjoyable activities is a primary symptom of Major Depressive Disorder (DSM-5, 2013). Research indicates that

symptoms of depression decrease the likelihood for the individual to select situations likely to have rewarding experiences (Pizzagalli et al., 2008). From a cognitive perspective, individuals with depression also have difficulty increasing experienced positive emotions via the use of reappraisal (Heller et al., 2009).

Avoidance of positive experiences occurs in anxiety disorders as well. Those diagnosed with social anxiety intentionally avoid potentially positive social interactions (Kashdan & Steger, 2006), while individuals with agoraphobia avoid a number of situations that likely include the possibility for reward (Morissette, Bitran, & Barlow, 2010). One specific example is that exercise, which is rewarding to a large number of people, is commonly avoided in Panic Disorder due to anxiety about physiological excitement increasing the likelihood of a panic attack.

It is evident that a large portion of research examining positive emotion and associated ER processes lacks generalizability to the general population. However, it is important that future research does not neglect this end of the continuum of emotion to determine whether there are processes/characteristics that underlie maladaptive responses to both extremes of emotional experience.

Emotion Regulation as a Basic Human Process. Researchers investigating topics related to emotion often recruit clinical samples due to the severe disturbances often manifest in these individual's lives. Furthermore, these samples comprise the majority of treatment cases and it is often necessary to focus empirical efforts in this direction in order to facilitate progress in clinical settings. However, if emotion regulation difficulties are indeed a unifying construct that contributes a significant amount of variance across a number of disorders, then the same type of difficulties should be

present in samples without a major disorder in the presence of emotion dysregulation. Although non-clinical samples are not likely to have the chronic patterns of emotion dysregulation seen in clinical samples, when emotion regulation difficulties do happen it would be expected that some type of brief dysfunction would follow.

Underlying mechanism of psychopathology. Previously discussed research (Gross & John, 2003) demonstrates that emotion regulation and related strategies can lead to negative outcomes in individuals without a diagnosed disorder. It is also reasonable to assume that all individuals engage in emotion regulation processes in response to environmental stimuli; however, there may be more maladaptive emotion regulatory responses that are more likely to result in functional problems. For example, in an undergraduate sample, greater utilization of reappraisal strategies, in comparison to suppression, was associated with greater levels of interpersonal functioning, greater levels of positive emotion, and higher levels of overall well-being (Gross & John). Furthermore, Kring and Sloan (2010) argue that emotion regulation difficulties likely play a role in the onset and maintenance of psychological disorders. They suggest that these difficulties occur across disorders rather than in an idiosyncratic fashion for each specific disorder or class of disorders. Although this perspective is largely focused on abnormal patterns of cognitions and behaviors, it is logical to conclude that individuals with emotion regulation difficulties within the general population would be more likely to exhibit maladaptive responses (e.g., impulsive, risky behaviors) to intense emotions depending on the particular regulatory technique utilized.

Emotion Regulation: Suppression

One of the most widely researched ER techniques is suppression. This generally refers to either the behavioral or physiological suppression of emotional experience (Dan-Glauser & Gross, 2011). “Expressive” suppression refers to the behavioral component and is often manipulated in experimental research by instructing participants to withhold any of the common behavioral indicators of experiencing emotion (e.g., facial expressions, body movements) and is the most commonly examined form of suppression. “Physiological” suppression involves suppression of the physiological components of emotion such as respiration and associated cardiovascular processes (Dan-Glauser & Gross). Physiological suppression receives relatively little attention in the literature and will not be the focus for the current study. However, experimental manipulations comparing the effects of the two different types of suppression display similar effects on subsequent emotion (Dan-Glauser & Gross).

With regards to the emotional outcome of the use of suppression techniques, the results often vary depending on the sample being examined (e.g., differences between different disorders) as well as the timeframe in which the effects are measured (Najmi & Wegner, 2008). For instance, some research suggests that suppression can reduce negative and positive emotions in the short-term yet lead to increases in emotion over longer periods of time (Najmi & Wagner). Overall, the use of suppression is regarded as a fairly maladaptive ER strategy that is harmful to those with some sort of psychopathology. For example, the use of suppression in the context of OCD is thought to exaggerate obsessions rather than facilitate their reduction (Najmi & Wegner).

In a clinical setting, a variety of empirically supported treatments are designed to eliminate suppression and other types of experiential-avoidance. Cognitive-Behavioral

Therapy (CBT) attempts to reduce negative emotion through reappraisal strategies (i.e., cognitive restructuring) as well as exposure-based interventions that require clients to experience different facets of negative emotions (e.g., cognitions and physiological responses). Dialectical Behavior Therapy (DBT) and Acceptant and Commitment Therapy (ACT) promote ER strategies incompatible with suppression such as learning to accept and be aware of reactions to emotional stimuli.

Empirical research has demonstrated this effect. In a general sample, Gross (1998) instructed participants to either suppress their emotions or cognitively reappraise their emotions in response to a film. The results indicated that the group that reappraised their emotions experienced less negative emotion. Gross and John (2003) replicated and extended this effect and found that the use of suppression resulted in a decrease in positive emotion, an increase in negative emotion, and greater deficits in social functioning.

Research within the self-control domain of psychological science has also examined the effects of suppression. Although this particular line of research does not focus on suppression as it relates to emotional experience, it is important to consider since it provides a different set of dependent variables to measure the effects. Prior to this discussion, it is important to provide a framework for what constitutes “self-control”.

Self-Control

Numerous operational definitions of self-control have appeared since early researchers like Walter Mischel began to examine the construct. In very broad terms, some researchers (de Ridder et al., 2012) argue that most definitions of self-control include changing a “dominant response-tendency” as well as an ability to regulate

behavioral and emotional responses. This definition's lack of precision and openness to interpretation may be in part responsible for the large number of variables seen as a self-control behavior (risk taking behaviors, substance abuse, delay of gratification, performance on a number of cognitive tasks, etc...). There may be overlap in processes related to these behaviors to some extent, yet researchers should be cautious to not necessarily view these types of variables as a single entity but rather take into account the possibility that self-control is a multidimensional construct.

One of the most prominent theories of self-control defines the concept as the ability to delay the indulgence of a relatively small, immediate reward in favor of a larger, delayed reward (Ainslie, 1975). This definition, also referred to as discounting, built on Mischel's (1974) framework and provided researchers with a more precise mode of examining self-control. The discounting perspective of self-control is not a comprehensive assessment of overall self-control but a specific, behavioral view of impulsivity (one facet of self-control). This perspective is commonly measured in laboratory settings using a delay discounting paradigm.

Delay Discounting

Delay discounting is a well-defined behavioral measure of impulsivity and research indicates that patterns of delay discounting are associated with a plethora of dysfunctional outcomes. This tool may be a useful way in which to examine how extreme emotional states are predictive of impulsive response patterns for individuals with higher levels of emotion dysregulation. Furthermore, since delay discounting is often conceptualized as a measure of self-control (Bickel & Marsch, 2001), its use is

appropriate given that the manipulation of suppression in the current study may not only increase emotionality, but deplete self-control abilities as well.

Delay discounting refers to the extent to which an individual de-values a reward as the time to receiving it increases (Ainslie, 1975). To measure delay discounting, individuals make a series of choices between smaller, immediate monetary rewards and larger, delayed rewards. For example, individuals may be asked “would you prefer \$1 now or \$10 dollars in one month?” After each choice, the smaller, immediate reward is adjusted until the individual switches preference from the delayed to the immediate outcome. This represents the indifference point for that delay and represents the point at which the two rewards are subjectively equal. As the delay to receive the larger reward increases, the subjective value of that reward tends to decrease. Individuals with “high” discounting rates or those seen as more “impulsive”, prefer smaller, immediate rewards over the larger, delayed rewards at a higher rate in comparison to individuals with lower rates of discounting.

Discounting can be described mathematically using a hyperbolic decay function (Mazur, 1987):

$$V = A/(1+kD)$$

In this equation, the V is representative of the subjective value of the delayed outcome or reward. A is associated with the amount of the largest reward, D represents the delay, or time until the outcome is realized, and k is a parameter that indicates the rate of discounting. Impulsive choice, as measured by the delay discounting task, is associated with higher k values, which represent a tendency to choose smaller, immediate outcomes/rewards over larger/delayed ones.

In addition to using the k parameter from the hyperbolic decay function as a characterization of discounting patterns, area under the curve (AUC; Myerson, Green, & Warusawitharana, 2001) is commonly measured. AUC is a theoretically neutral calculation which measures the area underneath individual or group-median indifference points that ranges from 0.0 to 1.0; an AUC of 0.0 is indicative of the steepest rate of discounting possible while an AUC of 1.0 signifies no discounting (Myerson, Green, & Warusawitharana).

Discounting and Impulse Control Disorders

Steep patterns of discounting are associated with a variety of risky or harmful behaviors, including the use and abuse of alcohol (Petry, 2001), heroin (Kirby et al., 1999; Madden et al., 1997), methamphetamines (Hoffman et al., 2006), cocaine (Bornovalova et al., 2005), and nicotine (Mitchell, 1999). Although most commonly used within the substance abuse literature, Bickel and Mueller (2009) suggest that delay discounting represents a trans-disease process (e.g. similarities in discounting rates across different pathologies). Indeed, delay discounting is associated with a variety of other health problems, including obesity (Rasmussen, Lawyer, & Reilly, 2010; Saelens & Epstein, 1996), sexual risk taking (Chesson et al., 2006; Johnson & Bruner, 2012), health care utilization (Tucker & Davison, 2000), and health behavior in general (Simpson & Vuchinich, 2000).

Individuals with impulse control disorders are seemingly more sensitive to or more likely to engage in behaviors that provide immediate positive reinforcement. At the same time, these individuals seem more insensitive to the associated delayed negative consequences of using (e.g., impairment in cognitive functioning, weight gain) as well as

the delayed positive consequences of not using (e.g., reduced dependence on drug, healthy weight). Therefore, the use of the delay-discounting paradigm is an excellent model for measuring a variety of problem behaviors due to research indicating that they are related, in addition to the task's ability to measure related behaviors in a laboratory setting (e.g., choosing immediate versus delayed outcomes).

Clinically, a variety of presentations (e.g., Anger, Borderline Personality Disorder) that often co-occur with difficulties in impulse control, are often targeted through the use of emotion regulation strategies (e.g., deep breathing, mindfulness). However, the precise nature of emotion and emotion regulation strategies (e.g., suppression) has not been established in relation to the occurrence of impulsivity.

Self-Control: Suppression

Emotion regulation processes can be viewed as a form of self-control, but self-control theorists and researchers often take a broader approach to this domain by examining a wide range of self-control related psychological processes. One of the primary frameworks within this domain utilizes the Strength Model of Self-Control (Baumeister, Vohs & Tice). The Strength Model posits that self-control resources are limited and that any act requiring some sort of self-control will result in a reduced ability to utilize additional self control on other tasks; related or unrelated (Baumeister, Vohs, & Tice). Within this model, the deterioration of self-control resources is coined as “Ego Depletion.”

The Strength Model is empirically tested by exposing participants to multiple tasks requiring self-control and is referred to as the “dual-task paradigm” (Baumeister et al., 1998). Within this general paradigm, participants in the experimental condition are

required to complete two self-control tasks while the control condition only completes the second self-control task. The performance on the second control task is compared between both groups and any differences are attributed to the additional task that the experimental group performed.

The use of suppression is commonly used as a manipulation of self-control within related research. For example, experimental participants may be asked to suppress their emotions in response to an emotionally charged video, while control participants are told to freely express their emotions (Baumeister et al., 1998). In one particular study, participants were given the aforementioned instructions depending on their group membership, and were required to exert force on a spring-loaded handgrip until the point of exhaustion (Baumeister et al. 1998). In this case, the experimental group was able to exert the required force for a significantly less time than the control condition. Apart from emotional suppression, manipulation of non-emotional thought suppression (e.g., not thinking about a “white bear” and instructions to avoid using stereotypes) demonstrated that manipulation of suppression results in impairments on subsequent self-control tasks (Gordijn et al., 2004; Muraven et al., 2002). In a set of similar experiments, Muraven et al. (1998) found that suppression of thoughts led participants to give up sooner on a set of puzzles and that suppressing thoughts led to a greater difficulty in inhibiting behavioral indicators of emotion (e.g., laughing) while watching a comedy film.

Although these tasks seem to indicate that engaging in performance on a “self-control” task deteriorates if another task of self-control is administered first, it is difficult to determine if the dependent variables used in these types of studies are actually a

theoretically-derived form of self-control and whether or not they are related to one another. The list of dependent variables measured within research using this model include giving up on solving anagrams, not eating tasty foods, blood-glucose levels, errors in simple math problems, crossing out letters in an array, performance on modified stroop tasks, time spent exerting force on a loaded spring grip, and inhibiting emotional responses (Hagger, Wood, Stiff, & Chatzisarantis, 2010). The large number of non-validated and seemingly different types of variables makes it difficult to generalize the results to other self-control related domains. Therefore, future research needs to work on validating these existing measures of “self-control” in addition to attempting to replicate the findings via measures with well established relationships to other maladaptive behavioral patterns in the literature, such as the delay-discounting task.

Currently, the primary goal of researchers within these two broad areas (i.e., *Emotion Regulation* and *Self-Control* related domains) seems constricted in scope. In other words, these types of research examine suppression simply to gain a better understanding of the emotional effects of suppression or as a means to provide further evidence of a particular model (i.e. Strength Model of Self-Control) rather than extend their findings to other ecologically relevant outcomes. However, due to theoretical overlap between the separate lines of research, the manipulation of suppression may also be a useful tool in examining other dependent variables, such as impulsivity, due to evidence suggesting that it is effective at reducing self-control abilities.

Self-Control, Suppression, and Impulsivity

The Strength Model of Self-Control (Baumeister, Vohs, & Tice) depicts suppression as a process that results in subsequent self-control failures while the emotion

regulation literature largely views suppression as a maladaptive regulatory technique. Operating from either perspective, it is clear that suppression of emotion often increases the likelihood of problematic consequences. Impulsivity is specifically implicated as a related outcome across a number of studies.

In a study examining eating behaviors, Evers, Stok, and de Ridder (2010) induced negative emotion. Prior to the emotion induction, participants were either asked to reappraise their emotions (seen as adaptive) or suppress their emotions (seen as maladaptive). The participants in the suppression condition displayed a relative increase in the consumption of comfort foods in comparison the reappraisal condition. Additionally, those reporting a higher level of suppression in response to emotion on a daily basis also reported a greater amount of food consumption than participants who endorsed less frequent use of suppression (Evers, Stok, & de Ridder). The consumption of food is often viewed as an impulsive behavior due to individual differences in the ability to delay gratification and associated consequences such as obesity (Rasmussen, Lawyer, & Reilly, 2010).

The depletion of self-control seems to affect economic decisions and substance use behaviors as well. Vohs and Faber (2007) found that the manipulation of self-control, including thought suppression, resulted in an increase in impulsive spending behaviors for individuals with higher levels of self-reported, impulsive buying behaviors in comparison to controls. Muraven, Collins, and Nienhaus (2002) found that suppression of thoughts led to an increase in alcohol consumption within a sample of social drinkers in comparison to social drinkers who did not engage in thought suppression. It is evident that more research is needed to determine the effects of suppression on impulsive

behaviors. However, research does seem to suggest that the exertion of self-control in general, as well as in the context of an emotion regulation strategy, may increase levels of impulsivity.

Self-Control and Discounting. Research displays that exerting self-control prior to an additional self-control task results in impairments in performance as well as an increase in behaviors related to impulsivity (Muraven, Collins, & Nienhaus, 1999; Vohs & Faber, 2007). However, these effects have not been widely examined in the context of delay discounting and have not factored in the contribution of emotion regulation difficulties.

In one study (Joireman et al., 2008), participants completed a delay discounting measure following the induction of an ego-depletion manipulation in which participants were asked to suppress their emotions in response to a short comedy film. Results indicated that participants reporting higher levels of concern for immediate consequences exhibited higher rates of discounting than their control counterparts. This interaction was only observed for the participants scoring high on a scale measuring concern for immediate consequences. Generalizability of these data is somewhat difficult due to the lack of a negative emotion induction manipulation as well.

Howlett, Kees, and Kemp (2008), also found that the exertion of self-control leads to discounting of future rewards. In this experiment, participants required to exert self control (crossing out a specific letter in an array) were less likely to endorse that they were going to enroll in a retirement plan than control participants. The dependent variable measured in this experiment is somewhat difficult to extrapolate to delay discounting, however, it can be seen as an analog.

In a study examining the effects of ego-depletion on probability discounting (Clark, Kassman, Derenne, & Weatherly, 2014), often conceptualized as a separate but related process to delay discounting, this effect was not found. The ego-depletion task required participants in the experimental condition to perform an effortful writing task (write for five minutes without using the letters “a” or “n”) while participants in the control condition performed a non-effortful writing task (writing for five minutes without using the letters “x” and “z”). Discounting patterns did not differ between the two groups. It is unclear how the manipulation affected the rates of discounting using k values since these were not reported. Although the effects of self-control on discounting are mixed, the available research does suggest that discounting rates (at least for delay) increase following the exertion of self-control. However, this effect is not well documented in the context of inducing emotions or within samples with differing levels of emotion regulation abilities.

Emotion, Emotion Regulation, and Impulsivity . Emotions that result in behavior directed at reducing or eliminating the presenting problem are seen as adaptive (e.g., generating effective strategies to address the similar problems in the future), however, many individuals engage in maladaptive behaviors to reduce the emotion (e.g., using alcohol to reduce anxiety in social situations) (Anestis, Selby, & Joiner, 2007). The previous discussions regarding emotion regulation difficulties and the relationship with psychopathology focused on broad, empirical data demonstrating how dysregulation can facilitate the severity of negative emotional experiences. However, emotion dysregulation may also predict specific, maladaptive behavioral patterns. Theoretical and some limited

empirical work have implicated that emotion dysregulation may predict several types of impulsive behaviors.

From a theoretical standpoint, intense emotions may lead individuals to overemphasize or shift attention to the immediate context (e.g., engaging in a risky sexual act while disregarding potential negative consequences) (Cyders and Smith, 2008). This often results in irrational decision making processes at the expense of future goals or benefits (Davidson, 2003). In addition to general theories regarding the purpose of emotions, several traits may account for individual differences in the tendency for extreme emotions to result in risky, impulsive behaviors. These traits, termed positive and negative urgency, refer to the tendency to engage in risky behaviors during extreme positive mood states (PU) and engaging in risky behaviors during negative mood states (NU) (Cyders & Smith).

Socially anxious individuals display significant deficits in life functioning along with the inability to effectively interact in social situations. Avoidance and escape can be viewed as maladaptive techniques that are negatively reinforced by the reduction of distressing emotions. This explanation also accounts for data showing a high rate of comorbidity between disorders of emotion and substance use including a 17 percent rate of current co-occurrence between substance use disorders and anxiety disorders (Grant et al., 2004). In other words, individuals experiencing emotional difficulties at a level warranting a diagnosis would be more likely to engage in maladaptive behaviors which provide immediate relief rather than enduring the experience or pursuing more effective long-term solutions.

A study previously presented within the discussion of emotion regulation and anxiety disorders, examined the role of emotion dysregulation and PTSD in relation to impulsivity in a sample of participants with substance use disorders (Weiss, Tull, Viana, Anestis, & Gratz, 2012). Within this study and in accordance with Gratz and Roemer (2004), emotion regulation was defined as a lack of understanding of emotion, difficulty controlling behaviors during extreme emotions, deficits in strategies to effectively cope with duration and severity of emotions, and an unwillingness to experience negative emotion in order to pursue meaningful activities (Weiss et al.). Weiss et al. found that emotion dysregulation fully mediated the relationship between levels of PTSD and impulsive behaviors in participants diagnosed with substance use disorders. This indicates that difficulty with proper emotional regulation accounts for impulsive actions in the context of PTSD.

Although experimental studies designed to examine the relationship between emotional difficulties and impulsiveness are limited, elevated impulsivity is seen among a variety of disorders of emotion. For example, those diagnosed with Borderline Personality Disorder display numerous impulsive behaviors including impulsive aggression towards others and themselves (Lieb, Zanarini, Schmahl, Linehan, & Bohus, 2004). In the case of Bipolar Disorder, individuals presenting with co-morbid anxiety disorders display significantly greater levels of impulsivity than participants without an anxiety disorder (Taylor et al. 2008). This finding suggests an important connection between anxiety (one type of emotional state) and impulsivity above and beyond any relationship with bipolar disorder. Baseline symptoms of anxiety were associated with higher levels of impulsivity nine months following the study, which further emphasizes a

possible relationship between the two (Taylor et al.). Furthermore, Kessler (2005) found that anxiety disorders are highly co-morbid with a variety of impulse control disorders. While generalizing these findings to other emotional states is difficult due to the highly specific samples in these studies, it does warrant further explanation into the role of emotion and its impact on impulsive choice.

Substance use disorders, which are viewed as a form of impulsivity (Richards, Gancarz, & Hawk, 2011), are highly comorbid with a variety of mood and personality disorders (Grant et al., 2004; Welch, 2007). Substance abuse is not necessarily directly perceived as resulting from emotion regulation deficits; however, the high rate of comorbidity with disorders which do commonly occur in conjunction with emotion dysregulation suggests that there is overlap. Substance abuse is often regarded as a maladaptive strategy to reduce negative emotions as well as a way to increase transient positive emotions. Schreiber, Grant, and Odlaug (2012) even theorize that emotion dysregulation during young adulthood may be a risk factor for developing a substance use disorder based on their empirical data which demonstrated that young adults with high emotion dysregulation report greater levels of cognitive impulsivity and impulsive behaviors.

Although the data within the emotion regulation domain of psychology demonstrate that related difficulties are present throughout a majority of mood and personality disorders and that impulsive behaviors are often co-occurring, current research has yet to provide a solid base of evidence displaying that emotion dysregulation is directly involved in impulsive behavior, with particular attention to discounting. To

further complicate this gap, impulsivity often lacks a concise definition and is often only measured using self-report measures.

Emotion, Emotion Regulation, and Discounting. At present, extant literature has produced only a few pieces of information that implicate that extreme emotional states or emotion dysregulation may be a causal mechanism for facilitating impulsive responding on the delay discounting task. Hirsch, Guindon, Morisano, and Peterson (2010) examined how personality traits and mood states interact to affect rates of delay discounting. While extraversion was related to higher rates of discounting in general, the induction of a positive mood state altered responses. For those who were identified as high in extraversion, the induction of positive mood prior to the discounting task resulted in even higher rates of discounting. For individuals with this particular personality trait, it appears that positive mood increases impulsivity as measured by the delay discounting task (Hirsch, Guindon, Morisano, and Peterson).

Mindfulness, described as directing attention to the present and being aware in a non-judgmental manner, is an emotion regulation technique often utilized in the treatment of a variety of mood and personality disorders. Recent research suggests that this ER technique is also effective in changing specific patterns of impulsivity. Hendrickson and Rasmussen (2013) demonstrated that teaching mindfulness decreases discounting for food-related outcomes using delay and probability discounting tasks. Morrison et al. (2014) obtained a similar result in that participants exposed to an acceptance based intervention displayed a reduction in discounting rates for monetary rewards. These results indicate, at least in the case of mindfulness, that the use of certain emotion regulatory techniques reduce rates of discounting.

Rounds, Beck, and Grant (2007) examined the relationship between social anxiety and delay discounting by measuring the difference between rates of discounting in participants with high social anxiety and participants with low social anxiety. Participants were randomly assigned to a threat or non-threat condition to determine if situational anxiety affected rates of discounting as well. In the threat condition, participants imagined giving a public speech prior to receiving the rewards. In the non-threat condition, participants were only given instructions on how to complete the discounting task. Contrary to their hypothesis, which stated that socially anxious participants in the threat condition would have the highest rates of discounting, an effect was actually found in the non-threat condition. Those with high social anxiety in the non-threat condition had significantly higher rates of discounting than those with low social anxiety in the same condition. Given the lack of an effect within the threat condition, this study suggested that rates of discounting are similar among socially anxious and non-anxious individuals when exposed to a hypothetical threat situation.

In a separate study (Jenks & Lawyer, *under review*), a more emotionally intense anxiety induction (*in vivo* public speaking task) was utilized in the experimental design in order to replicate and extend Rounds et al. (2007). It was hypothesized that by increasing the strength of the anxiety induction, participants within this experimental condition would display higher rates of discounting than those in the control condition and that the high anxiety participants in the experimental condition would exhibit the highest rates of discounting overall. Contrary to these hypotheses, no effect was found within any of the conditions. Given these results and the limited amount of research exploring these concepts, the idea that emotion processes are a key component in the behavioral patterns

produced by the discounting task is underwhelming. However, the research available has largely focused on individual types of disorder symptomatology (e.g., social anxiety, depression) rather than pinpoint a particular process which may be mechanism across disorders (e.g., emotion regulation/dysregulation, specific ER strategies) and is likely to result in maladaptive behaviors (e.g., impulsivity).

Present Study

Based on the examination of emotion regulation, self-control, and impulsivity literature, with specific attention to discounting, there is a significant experimental gap with regards to the many relationships among the variables. Specifically, emotion regulation difficulties seem to play a crucial role across disorders in addition to contributing to problematic functional outcomes (e.g., impulsivity). Still, it is unclear whether emotion regulatory strategies are directly related to dysfunctional outcomes in the immediate presence of extreme emotions. Examining specific disorders and their relationship with an outcome such as impulsivity may elucidate this to some degree. However, methodologies designed to examine specific emotion regulatory strategies and their effects on related outcome variables may provide a more nuanced understanding of the relationship between emotion and maladaptive behaviors.

Additionally, there may be specific types of ER strategies that result in an increased level of emotionality which could compound any effects on impulsive behaviors relative to prior levels of emotion regulation abilities. The use of suppression seems to result in such an effect; however, it has also been implicated as a means to deteriorate self-control in general. While the manipulation of suppression seems to affect performance on a variety of self-control tasks, research on its effects on the delay

discounting task is scarce (especially in the case of suppressing emotional experience). Due to these limitations, unanswered questions regarding a specific emotion-regulatory/self-control technique (suppression), and the empirical data regarding emotion regulation as what appears to be a trans-disease process (Bickel & Mueller, 2009), the current study will aim to determine whether or not there are differences in behavioral impulsivity among individuals exposed to different valences of emotion inductions while manipulating the use of expressive suppression. Finally, in contrast to a majority of research utilizing mood induction procedures, positive mood will also be manipulated given theoretical and empirical data suggesting that risky, impulsive behaviors may increase in the presence of positive emotion as well.

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Appendix B

Idaho State University

Human Subjects Committee

Electronic Informed Consent Form for Non-Medical Research

CONSENT TO PARTICIPATE IN RESEARCH

Self-Control and Behavioral Choice Patterns

You are asked to volunteer for a research study conducted by Charles Jenks and Steven R. Lawyer, Ph.D., (208-282-2142), from the Department of Psychology at Idaho State University. You have been asked to participate in this research because you 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 how experiencing emotion impacts decisions people make.

2. PROCEDURES

If you volunteer to participate in this study, we will ask you to do the following things:

- I. Viewing Film Clips with or without using a strategy to affect emotion: You will view either a pleasant, neutral, or unpleasant film clip. You may also be given instructions to act a certain way while viewing your clip.
- II. Self Report Measures: During this session we will ask you to report on your current mood at two separate points. Additionally, you will complete a series of questions related to psychology.
- III. Decision-making tasks: You will complete one decision making task in which you will answer questions about your preference for different outcomes.
- IV. Duration: Participation in the study will involve 30-45 minutes of your time.

3. POTENTIAL RISKS AND DISCOMFORTS

You may experience some discomfort when viewing a video clip, though this potential discomfort is brief and not anticipated to be significant.

4. ANTICIPATED BENEFITS TO SUBJECT

There are no tangible benefits to you for your participation.

5. ANTICIPATED BENEFITS TO SOCIETY

Results of this research will be used to better understand how certain emotions and associated strategies influence decisions we make, which is relevant to the understanding of many different types of psychological problems.

6. ALTERNATIVES TO PARTICIPATION

An alternative is to not participate in the study.

7. PAYMENT FOR PARTICIPATION

You will be rewarded one unit of SONA credit for each half-hour (or part thereof) of participation. If you choose to withdraw your participation for any reason, you will be rewarded for however much time you spent on the study. We anticipate that this study will take approximately 30-45 minutes to complete.

8. FINANCIAL OBLIGATIONS

There are no financial obligations to you in the study.

9. EMERGENCY CARE AND COMPENSATION FOR INJURY

There is no anticipated risk of injury associated with this study. 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, your data is confidential and is only associated with a participant number assigned upon arrival to the laboratory. Your name can never be tied to your responses. Your pen and paper report on your current emotional state will be labeled using your participant number and will be locked in a file cabinet within the research laboratory. Your electronic responses to the decision making task and questionnaires will be stored on a password protected computer in the same locked room as your pen and paper report on your emotional state. The computer and cabinet holding these files is stored in a locked room only accessible to Dr. Steven Lawyer, Charles Jenks and his research assistants.

11. PARTICIPATION AND WITHDRAWAL

Your participation in this study is VOLUNTARY. If you choose not to participate in the study, this will not affect any benefits from ISU 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 contact the investigator

in charge of this study if you decide to do this.

12. WITHDRAWAL OF PARTICIPATION BY THE INVESTIGATOR

The investigator may stop your participation in this study at any time if circumstances arise which warrant doing so. The investigators, Charles Jenks and Steven R. Lawyer, Ph.D., will make the decision and let you know if it is not possible for you to continue. 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 following the investigator's instructions, you will be rewarded with research credits according to the procedures described above.

13. IDENTIFICATION OF INVESTIGATORS

If you have any questions about the research or your participation in the study, please feel free to contact:

Steven R. Lawyer, PhD, Garrison Hall, 921 S. 8th Ave, Stop 8112, Idaho State University, Pocatello, ID 83209-8112, (208) 282-2142

14. RIGHTS OF RESEARCH SUBJECTS

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 Idaho State University Human Subjects Committee at (208) 282-2179.

INDICATION OF CONSENT BY RESEARCH SUBJECT
--

I have read (or someone has read to me) the information provided above. I have been given a chance to ask questions about this research study, and all of my questions have been answered to my satisfaction. I have been offered a copy of this form for my own records.

BY CLICKING ON THE "I AGREE TO PARTICIPATE" BUTTON BELOW, I WILLINGLY AGREE TO PARTICIPATE IN THE RESEARCH IT DESCRIBES.

Appendix C

Discounting/No-Suppression Instructions

The next phase of the study will involve watching a short film clip and then completing a task regarding decisions about money. It is important that you watch and give your full attention to the video clip. Following the video clip you will complete a computerized task in which I will ask you to make some decisions about which of two rewards you would prefer. One of the rewards will be available right now and the other will only be available after you have waited for some period of time. For example, you might be asked to choose between \$100 delivered right now and \$1,000 delivered in one year. The choices you make are completely up to you. You will not receive any of the rewards that you choose, but please make your decisions as though you were really going to get the rewards you choose.

Discounting/WITH-Suppression Instructions

The next phase of the study will involve watching a short film clip and then completing a task regarding decisions about money. It is important that you watch and give your full attention to the video clip. Following the video clip you will complete a computerized task in which I will ask you to make some decisions about which of two rewards you would prefer. One of the rewards will be available right now and the other will only be available after you have waited for some period of time. For example, you might be asked to choose between \$100 delivered right now and \$1,000 delivered in one year. The choices you make are completely up to you. You will not receive any of the rewards that you choose, but please make your decisions as though you were really going to get the rewards you choose.

We will now be showing you a short film clip. It is important to us that you watch the film clip carefully. If you have any feelings as you watch the film clip, please try your best not to let those feelings show. In other words, as you watch the film clip, try to behave in such a way that a person watching you would not know you were feeling anything. Watch the film clip carefully, but please try to behave so that someone watching you would not know that you are feeling anything at all

Appendix D

Introduction Script**READ THE FOLLOWING SCRIPT TO PARTICIPANTS BEFORE GETTING INFORMED CONSENT:**

Welcome to Dr. Steven Lawyer's research lab and thank you for choosing to participate in this research study. The overall purpose of the research conducted in this laboratory is to better understand money-related decision-making patterns and affective states in adults. In this study, we are recruiting students from Idaho State University to examine money decision-making patterns and affective states. There are no tricks or deception associated with this study and your participation is completely voluntary. The data collected here are completely anonymous, and your responses today can never be connected with you. If you have any questions or concerns during any part of the study, please ask me. It is important to us that you are comfortable with all aspects of the study and that you understand what we are asking you to do.

In this study, you will view a short film clip, complete

a computerized decision-making task involving decisions about money, and answer a series of questionnaires. You will also be asked to report on your current emotional state at two points during the procedure. I will give you specific directions regarding those measures in a little while.

For your time, we will give you two SONA credits. We anticipate that this experiment will take no more than one hour to complete.

Do you have any questions so far?

Appendix E

Fagerstrom Test for Nicotine Dependence (FTND)

1. How soon after you wake up do you smoke your first cigarette?
 - ☐ After 60 minutes
 - ☐ 31-60 minutes
 - ☐ 6-30 minutes
 - ☐ Within 5 minutes
2. Do you find it difficult to refrain from smoking in places where it is forbidden?
 - ☐ No
 - ☐ Yes
3. Which cigarette would you hate most to give up?
 - ☐ The first in the morning
 - ☐ Any other
4. How many cigarettes per day do you smoke?
 - ☐ 10 or less
 - ☐ 11-20
 - ☐ 21-30
 - ☐ 31 or more
5. Do you smoke more frequently during the first hours after awakening than during the rest of the day?
 - ☐ No
 - ☐ Yes
6. Do you smoke even if you are so ill that you are in bed most of the day?
 - ☐ No
 - ☐ Yes

Appendix F

Drug Abuse Screening Test (DAST)

1. Have you used drugs other than those prescribed for medical purposes? Yes / No
2. Have you abused prescription drugs? Yes / No
3. Do you abuse more than one drug at a time? Yes / No
4. Can you get through the week without alcohol/drugs (other than those prescribed for medical purposes)? Yes / No
5. Are you always able to stop using drugs/alcohol when you want to? Yes / No
6. Have you ever attended meetings of Alcoholics Anonymous or Narcotics Anonymous? Yes / No
7. Do you try to limit your alcohol/drug use to certain occasions? Yes / No
8. Have you had “blackouts” or “flashbacks” as a result of your drug/alcohol use? Yes / No
9. Do you ever feel bad about your alcohol/drug use? Yes / No
10. Does your spouse (or parent or significant other) ever express concern about your consumption of alcohol/drugs? Yes / No
11. Do your friends or relatives know or suspect you use/abuse drugs or alcohol? Yes / No
12. Has alcohol/drug use ever created problems between you and your spouse/significant other? Yes / No
13. Has any family member ever sought help for problems related to your alcohol/drug use? Yes / No
14. Have you ever lost friends because of your use of alcohol/drugs? Yes / No
15. Have you ever neglected your family or missed work because of your use of alcohol/drugs? Yes / No
16. Have you ever been in trouble at work because of alcohol/drug use? Yes / No

17. Have you ever lost a job because of alcohol/drug use? Yes / No
18. Have you ever gotten into fights when under the influence of alcohol/drugs? Yes / No
19. Have you ever been arrested because of unusual behavior while under the influence of alcohol/drugs? Yes / No
20. Have you ever been arrested for driving while under the influence of alcohol/drugs? Yes / No
21. Have you ever engaged in illegal activities in order to obtain drugs? Yes / No
22. Have you ever been arrested for possession of illegal drugs? Yes / No
23. Have you ever experienced withdrawal symptoms as a result of heavy alcohol/drug intake? Yes / No
24. Have you ever had medical problems as a result of your alcohol/drug use (e.g., memory loss, hepatitis, convulsions, bleeding, etc.)? Yes / No
25. Have you ever been in the hospital for medical problems related to your alcohol/drug use? Yes / No
26. Have you ever been involved in a treatment program specifically related to alcohol/drug use? Yes / No
27. Have you been in treatment as an outpatient for problems related to alcohol/drug use? Yes / No
28. Have you ever thought you should cut down on your alcohol/drug use? Yes / No
29. Have people annoyed you by criticizing your alcohol/drug use? Yes / No
30. Have you ever felt bad or guilty about your alcohol/drug use? Yes / No
31. Has anyone in your family bloodline (grandparents, parents, etc.) ever had a problem with alcohol/drugs? Yes / No

Appendix G

The Depression, Anxiety, and Stress Scale – 21 (DASS-21)

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all - NEVER

1 Applied to me to some degree, or some of the time - SOMETIMES

2 Applied to me to a considerable degree, or a good part of time - OFTEN

3 Applied to me very much, or most of the time - ALMOST ALWAYS

1. I found it hard to wind down 0 1 2 3
2. I was aware of dryness of my mouth 0 1 2 3
3. I couldn't seem to experience any positive feeling at all 0 1 2 3
4. I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion) 0 1 2 3
5. I found it difficult to work up the initiative to do things 0 1 2 3
6. I tended to over-react to situations 0 1 2 3
7. I experienced trembling (eg, in the hands) 0 1 2 3
8. I felt that I was using a lot of nervous energy 0 1 2 3
9. I was worried about situations in which I might panic and make a fool of myself 0 1 2 3
10. I felt that I had nothing to look forward to 0 1 2 3
11. I found myself getting agitated 0 1 2 3
12. I found it difficult to relax 0 1 2 3
13. I felt down-hearted and blue 0 1 2 3
14. I was intolerant of anything that kept me from getting on with what I was doing 0 1 2 3
15. I felt I was close to panic 0 1 2 3
16. I was unable to become enthusiastic about anything 0 1 2 3
17. I felt I wasn't worth much as a person 0 1 2 3
18. I felt that I was rather touchy 0 1 2 3
19. I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat) 0 1 2 3
20. I felt scared without any good reason 0 1 2 3
21. I felt that life was meaningless

Appendix H

Barratt Impulsiveness Scale-11

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and put an X on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

1. Rarely or Never 2. Occasionally 3. Often 4. Always/Almost Always

1. I plan tasks carefully.
2. I do things without thinking.
3. I make-up my mind quickly.
4. I am happy-go-lucky.
5. I don't "pay attention."
6. I have "racing" thoughts.
7. I plan trips well ahead of time.
8. I am self controlled.
9. I concentrate easily.
10. I save regularly.
11. I "squirm" at plays or lectures.
12. I am a careful thinker.
13. I plan for job security.
14. I say things without thinking.
15. I like to think about complex problems.
16. I change jobs.
17. I act "on impulse."
18. I get easily bored when solving thought problems.
19. I act on the spur of the moment.
20. I am a steady thinker.
21. I change residences.
22. I buy things on impulse.
23. I can only think about one thing at a time.
24. I change hobbies.
25. I spend or charge more than I earn.
26. I often have extraneous thoughts when thinking.
27. I am more interested in the present than the future.
28. I am restless at the theater or lectures.
29. I like puzzles.
30. I am future oriented.

Appendix I

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment *OR* indicate the extent you have felt this way over the past week (circle the instructions you followed when taking this measure)**

1	2	3	4	5
Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

_____ 1. Interested	_____ 11. Irritable
_____ 2. Distressed	_____ 12. Alert
_____ 3. Excited	_____ 13. Ashamed
_____ 4. Upset	_____ 14. Inspired
_____ 5. Strong	_____ 15. Nervous
_____ 6. Guilty	_____ 16. Determined
_____ 7. Scared	_____ 17. Attentive
_____ 8. Hostile	_____ 18. Jittery
_____ 9. Enthusiastic	_____ 19. Active
_____ 10. Proud	_____ 20. Afraid