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Altering Impulsive Decision Making With an Acceptance-Based Procedure

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Delay discounting is one facet of impulsive decision making and involves subjectively devaluing a delayed outcome. Steeply discounting delayed rewards is correlated with substance abuse and other problematic behaviors. To the extent that steep delay discounting underlies these clinical disorders, it would be advantageous to find psychosocial avenues for reducing delay discounting. Acceptance-based interventions may prove useful as they may help to decrease the distress that arises while waiting for a delayed outcome. The current study was conducted to determine if a 60–90 minute acceptance-based training would change delay discounting rates among 30 undergraduate university students in comparison to a waitlist control. Measures given at pre- and posttraining included a hypothetical monetary delay discounting task, the Acceptance and Action Questionnaire-II (AAQ-II), and the Distress Tolerance Scale. Those assigned to the treatment group decreased their discounting of delayed money, but not distress intolerance or psychological inflexibility when compared to the waitlist control group. After the waiting period, the control group received the intervention. Combining all participants' pre- to posttreatment data, the acceptance-based treatment significantly decreased discounting of monetary rewards and increased distress tolerance. The difference in AAQ-II approached significance. Acceptance-based treatments may be a worthwhile option for decreasing delay discounting rates and, consequently, affecting the choices that underlie addiction and other problematic behaviors.

Keywords: ACT; acceptance; impulsivity; delay discounting; distress tolerance

IMPULSIVITY HAS MANY DEFINITIONS, ASPECTS, AND POSSIBLE MECHANISMS to its expression (Evenden, 1999) and is evident in many forms of problematic behavior (e.g., substance use, compulsive gambling, self-injurious behavior, aggression). One aspect of impulsivity is impulsive choice—preference for a smaller-sooner reward (SSR) over a larger-later reward (LLR). Selecting the SSR suggests that the subjective value of the LLR is discounted below the objective value of the SSR (e.g., Ainslie, 1975). Such devaluation is referred to as delay discounting, a behavioral process that has received considerable attention both with human and nonhuman subjects (e.g., Madden & Bickel, 2010), in part, because individuals diagnosed with antisocial personality disorder (Petry, 2002), pathological gambling (Dixon, Marley, & Jacobs, 2003; Petry & Casarella, 1999; Petry, 2001), obesity (Davis, Patte, Curtis, & Reid, 2010; Rasmussen, Lawyer, & Reilly, 2010), problematic pornography viewing (Lawyer, 2008), and substance use (MacKillop et al., 2011; Odum, Madden, Badger, & Bickel, 2000) tend to discount the value of delayed outcomes at a high rate.

Substance use is related to delay discounting in both preclinical and clinical studies. In the nonhuman

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laboratory, rats that steeply discount delayed food rewards are more likely to learn to press a lever to self-administer an infusion of cocaine (Anker, Perry, Gliddon, & Carroll, 2009; Perry, Larson, German, Madden, & Carroll, 2005). These high-impulsive rats are also more likely to press the lever many times to earn a drug reward when the effort required to obtain that reward is escalated (Diergaarde et al., 2008; Koffarnus & Woods, 2013). Among humans, a limited number of longitudinal studies suggest that steeply discounting monetary rewards is predictive of adolescent cigarette smoking (Audrain-McGovern et al., 2009) and alcohol use (Khurana et al., 2013). Several studies have reported that steeply discounting delayed rewards is predictive of poor outcomes either during or after substance-abuse treatment (e.g., Yoon et al., 2007).

Because steep delay discounting appears to precede and predict substance abuse, research has begun to explore ways in which to produce lasting reductions in delay discounting (e.g., Bickel, Yi, Landes, Hill, & Baxter, 2011; Black & Rosen, 2011; Stein et al., 2013). One strategy that has received relatively little attention is to focus on the aversive properties of the delay (Paglieri, 2013; Scheres, Tontsch, & Thoeny, 2013). Such a strategy is implied if one presumes that a mechanism of delay discounting is that selection of the SSR represents avoidance of the aversive properties of the delay to the LLR. For example, the abstaining cigarette smoker must endure nicotine withdrawal and cue-induced craving while waiting for the delayed benefits of smoking abstinence (i.e., the LLR). If these delay-related aversive events are intolerable, then the smoker will escape/avoid these events by relapsing to smoking (i.e., selecting the SSR). More generally, individuals who demonstrate low distress tolerance may be more likely to avoid delay-related aversive events (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996; Simons & Gaher, 2005). Consistent with this analysis, Dennhardt and Murphy (2011) reported that individuals with low tolerance for distressing events tended to steeply discount delayed consequences.

Distress intolerance and psychological inflexibility are related constructs and describe a general unwillingness to stay in contact with uncomfortable inner experiences, which can lead to regulatory actions (through escape or avoidance of those inner experiences) often resulting in negative effects on functioning (Hayes et al., 1996; Simons & Gaher, 2005). Treatments that target these constructs increase access to more powerful, delayed rewards by decreasing attempts to control and/or avoid internal states through acceptance and mindfulness practices (Hayes, Strosahl, & Wilson, 2012; Linehan, 1993). There are promising effects of acceptance-based procedures for a myriad of problematic, impulsive behaviors such as substance use (Gifford et al., 2004; Hernández-López, Luciano, Bricker, Roales-Nieto, & Montesinos, 2009; Petersen & Zettle, 2009), problematic pornography viewing (Twohig & Crosby, 2010), obesity (Forman, Butryn, Hoffman, & Herbert, 2009; Niemeier, Leahey, Reed, Brown, & Wing, 2012), and problematic gambling (Nastally & Dixon, 2012), problems that correlate with high rates of delay discounting.

Given the good theoretical and empirical fit between therapies that target distress tolerance and psychological flexibility, the present study explored a novel strategy for decreasing delay discounting—using a brief acceptance-based intervention designed to increase willingness to experience discomfort. Because other brief acceptance-based trainings have proven effective in changing target behaviors (e.g., Levin, Hildebrandt, Lillis, & Hayes, 2012), we predicted that our training would decrease delay discounting when compared to a waitlist control group. Additionally, we expected the training to increase psychological flexibility and distress tolerance.

Method

PARTICIPANTS

Eligibility Screening

Participants were recruited from the student body at Utah State University through announcements in psychology courses, on-campus fliers, and campus web resources. Participants received credit toward their psychology courses for participation (as determined by their instructor). Eligible participants were at least 18 years of age and could read and communicate in English.

In the initial stage of participation, students gave informed consent and completed a monetary delay-discounting task online. In the task, participants made a series of choices between two hypothetical monetary rewards: one smaller reward was described as delivered immediately (SSR) and the other larger reward after a delay (LLR). (This task is described in greater detail in the Measures section.) Participants were eligible for further participation if their pattern of choices reflected steep discounting of the value of the LLRs. To quantify delay discounting, an indifference point was obtained at a series of delays to the LLR. The indifference point was derived from participant choices and reflected the value of the SSR at which indifference between the SSR and the LLR was predicted to occur. The area under the indifference points across the range of delays to the LLR served as the quantitative measure of delay discounting. Area under the curve (AUC; Green & Myerson, 2010) values range from 0–1, where 0