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Taking time to be healthy: Predicting health behaviors with delay discounting and time perspective

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ABSTRACT

Delay discounting, a willingness to postpone receiving an immediate reward in order to gain additional benefits in the future, is conceptually related to time perspective, the cognitive processes which filter temporal information and influence behavior. One measure of delay discounting (Money Choice Questionnaire) and two measures of time perspective (Consideration of Future Consequences Scale and Zimbardo Time Perspective Inventory) were compared in this study to each other and to self-reported health behaviors with 467 undergraduates. Delay discounting and time perspective significantly improved the incremental prediction of tobacco, alcohol, and drug use, exercise frequency, eating breakfast, wearing a safety belt, estimated longevity, health concerns, and sociosexual orientation above and beyond sex and Big Five traits. These results further suggest that delay discounting and time perspective are indeed similar but also non-redundant constructs that are not reducible to global personality.

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1. Introduction

Several different approaches have been used to predict and understand the decisions people make when faced with immediate and delayed outcomes. In social personality psychology, the terms delay of gratification (Mischel & Ebbesen, 1970), impulsivity (Ainslie, 1975), and time perspective (Zimbardo & Boyd, 1999) are used. In cognitive psychology and behavioral economics, the terms delay discounting (Kirby & Maraković, 1996), temporal discounting (Read, Frederick, Orsel, & Rahman, 2005), and intertemporal choice (Berns, Laibson, & Loewenstein, 2007) are used relatively interchangeably. Attempts to compare and contrast these seemingly overlapping constructs are limited or non-existent (see Steinberg et al., 2009 for a recent exception), thus leading to a strong possibility that these similar phenomena which are studied from different perspectives are partially or entirely redundant concepts. To address this problem and mitigate the ambiguity between delay discounting and time perspective, this study will assess the convergent, discriminate, and incremental validity of three related measures while explaining variation in health behaviors. Additionally, this study will determine how these measures relate to Big Five traits and whether delay discounting and time perspective

provide additional predictive validity beyond current conceptualizations of global personality.

2. Delay discounting

Research has shown that present rewards are generally preferred over later rewards; a phenomenon referred to as *delay discounting* (Kirby & Maraković, 1996). Additionally, the amount of future incentives necessary to match the value of immediate rewards is an individual difference influenced by the amount of delay prior to receiving a reward. One can assess this by providing choices between immediate rewards and greater future rewards (Kirby & Maraković, 1996). An individual's discounting rate is calculated by determining an indifference point: the value a future reward must assume, at a given delay, to make it equal in value to a present reward. "Steep" discounting rates suggest that the value of future rewards depreciate quickly and only large additional future rewards offset the value of present rewards. "Shallow" discounting rates suggest that the value of future rewards depreciate slowly and only small additional future rewards are necessary to offset the value of present rewards.

Social psychologists have also studied the decision making process between present and future rewards. In Mischel and Ebbesen's (1970) delay of gratification paradigm, participants are given the choice between an immediate, but less desired reward versus a delayed, more desired reward. The goal of this research was to

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explore how situational factors influence ego- or self-control, but extensions of this research have also demonstrated that personality and individual differences are important determinants of delaying gratification (Bembenutty, 2009; Funder, Block, & Block, 1983). Because the delay of gratification paradigm is highly sensitive to situational manipulations (e.g., Mischel, Ebbesen, & Zeiss, 1972), it alone is a less than optimal predictor of behavior and general tendencies (Bem & Funder, 1978).

3. Time perspective

Due to the limitations of measuring delay of gratification, attempts have been made to measure personality and individual differences that influence choices between the present and future (Ray & Najman, 1986). Two self-report measures related to delay of gratification and delay discounting are the Consideration of Future Consequences Scale (CFCS), which measures the degree to which individuals contemplate the immediate and future consequences of their behaviors (Strathman, Gleicher, Boninger, & Edwards, 1994) and the Zimbardo Time Perspective Inventory (ZTPI) which measures the degree to which temporal information about the present and future influences behavior (Zimbardo & Boyd, 1999). Both the CFCS and ZTPI assess *time perspective*, or the cognitive processes which filter temporal information and influence behavior (Keough, Zimbardo, & Boyd, 1999), but from different theoretical perspectives. The CFCS measures time perspective on a single continuum between present- and future-mindedness. The ZTPI measures time perspective with two present-mindedness scales and one future-mindedness scale (these scales are moderately correlated with each other). Although previous research has found that the CFCS and ZTPI scales share moderate to strong correlations with each other (Ferguson, 2007; Zimbardo & Boyd, 1999) previous studies have not directly compared the CFCS and ZTPI in a way which allows each to concurrently explain variance in dependent variables. Using hierarchical regressions, this study explored the concurrent validity of the CFCS and ZTPI while predicting health-related behaviors.

4. Current study

Delay discounting and time perspective both relate to how an individual perceives tradeoffs between the present and future, however, little previous research has compared these constructs. The idea of delay discounting inherently invokes present and future time perspective – an individual must decide between rewards now (i.e. in the present) or rewards later (i.e. in the future). Steep delay discounting, or preferring immediate rewards over delayed rewards, is analogous to choosing immediate pleasures over long-term rewards and thinking primarily of immediate consequences (present-mindedness). Shallow delay discounting – stronger preference for larger, future benefits over immediate rewards – is analogous to being future-minded and focusing on the long-term consequences of one's behavior. Given these connections between delay discounting and time perspective, it is important to identify how these two constructs overlap.

Based on previous research, it was predicted that the CFCS and ZTPI scales would correlate at least moderately. Given that both time perspective measures are self-reports of beliefs and behavior, whereas delay discounting is a performance-based measure, it was expected that the relationship between the delay discounting and the time perspective scales would be attenuated by the *hetero-method convergence problem* (Bornstein, 2002; i.e., the tendency for dissimilar measures of the same construct to correlate less strongly than similar measures). The occurrence of this issue is common in research utilizing implicit and explicit motives (Fin-

eman, 1977), implicit and explicit attitudes (Greenwald et al., 2002), and self-report and behavioral measures of impulsivity (Reynolds, Ortengren, Richards, & de Wit, 2006). Despite the hetero-method convergence problem, delay discounting should exhibit significant relationships with time perspective.

With general consensus around the idea that global personality can be portrayed with five general traits (Costa & McCrae, 1992a), it is also important to determine that delay discounting and time perspective are separate constructs from the Big Five. Strong correlations with one or more factors of the Big Five would suggest that delay discounting and time perspective are simply facets of global personality. It was predicted the delay discounting and time perspective would be moderately correlated with Conscientiousness and Extraversion because these traits contain elements of deliberate planning (future-mindedness) and thrill seeking (present-mindedness), respectively (Costa & McCrae, 1992b). Given this expectation, it is important to demonstrate that delay discounting and time perspective are not simply reducible to more global personality traits. This study addressed this issue by controlling for Big Five personality traits in a series of hierarchical regressions.

In this study we argue that time perspective and delay discounting are similar constructs as both pertain to the extent to which an individual is willing to postpone receiving an immediate reward in order to gain benefits in the future. An important application of delay discounting and time perspective is to health-related behaviors, because often the impacts of health behaviors only become apparent in the future. For example, smoking a cigarette alleviates an immediate craving, but leads to cancer later in life; overeating satisfies hunger, but increases obesity, diabetes, and heart disease risks later; sunbathing leads to a desired tan, but promotes future melanomas. Thus, in order to realize healthier outcomes one must be able to forego immediate pleasurable activities (smoking, feasting, and sunbathing) in favor of greater future rewards (decreased chance of cancer and disease). This study was interested in determining the concurrent and discriminant validity of delay discounting and time perspective for a broad range of general health issues. Hierarchical regressions, with delay discounting and time perspective measures entered into the same step, allow the predictive ability of these constructs to be directly compared. Given that health behaviors were collected using the same method as the time perspective measures (namely, self-report), it was predicted that the time perspective measures would demonstrate a slight advantage in predictive ability over delay discounting (Motivation research suggests that self-reports better predict belief and value outcomes in the present, whereas performance measures better predict behavior over long periods of time (i.e., McClelland, Koestner, & Weinberger, 1989)).

5. Method

5.1. Participants

A total of 467 undergraduates were recruited from Introduction to Psychology courses and received partial credit toward a research requirement. Ninety percent of the sample self-identified as Caucasian, 3% African American, 3% other, 2% Hispanic, and 2% Asian. Due to a programming error, ethnicity data is missing for 68 participants. Data from 399 participants with available ethnicity information suggests that this sample is representative of the university as a whole. The average age of participants was 18.99 ($SD = 1.54$), and 293 were females.

5.2. Measures

5.2.1. Delay discounting measure

Participants completed the Money Choice Questionnaire (MCQ, Kirby & Maraković, 1996) which proposes 27 hypothetical choices

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