



Does a future-oriented temporal perspective relate to body mass index, eating, and exercise? A meta-analysis



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ABSTRACT

Objective: The present study aimed to quantify the magnitude of the association between future temporal perspective and Body Mass Index (BMI), diet, and exercise, respectively, and to clarify whether subjective future-focus scales or delay-discounting tasks are a more robust predictor of health behaviors.

Methods: A systematic search was conducted for studies that included a dispositional measure of future temporal perspective and a measure of BMI, eating, and/or exercise behavior. Effect sizes for BMI, eating, and exercise were calculated using a random-effects model.

Results: The aggregate effect sizes for BMI ($r = 0.14$, $k = 36$, 95% $CI = 0.10 - 0.18$, $p < 0.001$), eating ($r = 0.16$, $k = 18$, 95% $CI = 0.12 - 0.21$, $p < 0.001$), and exercise ($r = 0.12$, $k = 18$, 95% $CI = 0.09 - 0.14$, $p < 0.001$) were significant and small in magnitude. Neither the type of future temporal perspective task (delay-discounting vs. subjective future-focus scale) nor the percentage of obese participants moderated the effect of temporal perspective on BMI, eating, or exercise.

Conclusions: Although small in magnitude, the association between temporal perspective and health outcomes is comparable to other individual differences, such as personality and temperament. Future research is needed to examine how increasing the value placed on future outcomes can be integrated into long-term health behavior change interventions.

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Despite numerous efforts to encourage people to maintain a healthy diet and to engage in regular physical activity, few people do. In the United States, it is estimated that approximately 79% of adults do not engage in sufficient daily physical activity, and 91% of adults do not eat a sufficient number of vegetables (CDC, 2016; Moore & Thomson, 2015). Relatedly, according to the World Health Organization (WHO, 2015), the rate of obesity has more than doubled since 1980, resulting in over 600 million people having body mass indexes that qualify them as obese. One promising approach to understanding when and why people engage in health-promoting behaviors involves examining how people think about and value future outcomes (Hall & Fong, 2007).

Many health behaviors require people to forgo immediate pleasures to attain distant-future benefits (Fuchs, 1980). Thus, when people engage in health-promoting behaviors, such as maintaining a healthy diet, they must place some value on future

outcomes. The tendency to think about and value future outcomes varies between individuals (Mischel, Shoda, & Rodriguez, 1989; Strathman, Gleicher, Boninger, & Edwards, 1994; Zimbardo & Boyd, 1999). Relative to people who are oriented toward immediacy, studies have shown people with a greater future temporal perspective are more likely to engage in various health-promoting behaviors including eating a healthy diet, engaging in regular physical activity, and maintaining a lower body mass index (Adams & Nettle, 2009; Bickel, Jarmolowicz, Mueller, Koffarnus, & Gatchalian, 2012; Hall, Fong, & Cheng, 2012; Henson, Carey, Carey, & Maisto, 2006; Weller, Cook, Avsar & Cox, 2008).

Such studies typically measure people's future temporal perspective through one of two ways. One prominent approach involves asking people to reflect on their general behavioral tendencies, including scales such as the Consideration of Future Consequences scale (CFCS; Strathman et al., 1994), the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999), and the Time Perspective Questionnaire (TPQ; Hall & Fong, 2003). A sample item from the CFCS is, "I only act to satisfy immediate concerns, figuring the future will take care of itself." Rather than leading people to

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introspect on their general tendencies to prioritize immediate versus delayed outcomes, a second prominent approach involves leading people to make a series of decisions between a smaller, immediate monetary reward and a larger, delayed monetary reward (Kirby & Maraković, 1996). By observing decisions across numerous trials varying in reward magnitude and temporal delay, delay-discounting tasks index the tendency for rewards to decrease in subjective value as the time until obtaining the reward increases. An individual's discount rate reflects how quickly a reward loses value as it becomes farther away in time.

Although both delay-discounting and subjective future-focus measures of temporal perspective predict health-related behaviors, these two types of measures may assess distinct aspects of future temporal orientation. Supporting this prediction, delay-discounting and subjective future-focus scales predict different behavioral outcomes (Fellows & Farah, 2005; MacKillop, Anderson, Castelda, Mattson, & Donovan, 2006). For example, MacKillop et al. (2006) found that pathological gambling relates to delay-discounting, but not to subjective future-focus measures of temporal perspective (e.g., the ZTPI). Whereas traditional delay-discounting measures assess how people value monetary rewards across varying temporal delays, subjective future-focus measures require participants to decide both how much they value future rewards and to assess their general behavioral tendency to be future- or present-focused. To the extent that these two measures recruit different cognitive processes, it is feasible that the measures may differentially predict associations with health behaviors.

Successfully pursuing health-related behaviors could be a function of a general tendency to value greater future rewards over smaller present rewards (assessed with delay-discounting measures) or could be a function of a more subjective tendency to think about future consequences and rewards in reference to one's own behavior and preferences of immediate versus future actions (assessed by subjective future-focus measures). To date, relatively few studies of health-related behaviors have directly compared the association between delay-discounting vs. subjective future-focus scales. Among the few studies that have assessed both types of measures, such studies have tended to reveal significant but small associations between measures of delay-discounting and subjective future-focus scales (e.g., $r < 0.20$; Daugherty & Brase, 2010; Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008). In summary, there are several approaches to measuring future temporal orientation, and such measures may tap into separate aspects of temporal orientation; however, it remains an open question whether any one method for measuring future temporal perspective is a more robust predictor of health-related behaviors.

1. The current review

A systematic review and meta-analysis of studies assessing future temporal perspective, eating behavior, exercise, and body mass index (BMI) is timely for three reasons. First, the magnitude of the association between future temporal perspective and diet, exercise, and BMI remains unclear. There has been a narrative review of the relationship between delay-discounting and health behaviors (Bickel et al., 2012) and a summary of studies examining the relationship between future temporal perspective and health behaviors (Hall, Fong, & Sansone, 2015). Additionally, a recent meta-analysis (Amlung, Petker, Jackson, Balodis, & MacKillop, 2016) found that steep discounting of food and money had a moderate effect on obesity. The present meta-analysis extends past reviews by assessing the magnitude of the association between future temporal perspective and additional health outcomes (exercise, diet) and by incorporating both subjective future-focus and delay-discounting measures of future temporal perspective. In

addition to correlational evidence supporting a positive association between future temporal perspective and health behaviors, there is experimental evidence that causally links adopting a future-oriented perspective with changes in health-promoting behaviors (Daniel, Stanton, & Epstein, 2013a; Daniel, Stanton, & Epstein, 2013b; Dassen, Jansen, Nederkoorn, & Houben, 2016; Hall & Fong, 2003). Establishing the magnitude of the association between temporal perspective and health-promoting behaviors is a critical step for establishing the utility of future temporal orientation as a useful construct for future health-behavior change research.

Second, no review has compared directly the predictive utility of self-report measures of people's subjective future-focus and delay-discounting tasks. Both types of measures have strengths and limitations. Measures of people's subjective future focus require people to introspect accurately on their general personal tendencies. Delay-discounting tasks require numerous trials, and, as a result, are repetitive and somewhat artificial in nature. Although both types of measures assess future temporal perspective, it remains an open question, which approach to measuring future temporal perspective is a more robust predictor of health behaviors. Third, although past research generally supports the prediction that a future temporal perspective relates to higher levels of exercise, a healthier diet, and lower BMI, some studies have reported nonsignificant associations between these outcomes (e.g., Nederkoorn, Smulders, Havermans, Roefs, & Jansen, 2006). A meta-analysis may help to clarify these inconsistencies.

The present review seeks to establish: (1) the magnitude of the association between future temporal perspective and BMI, eating, and exercise; (2) whether self-report scales of subjective future-focus and delay-discounting tasks have an association of similar magnitude with BMI, eating, and exercise; and (3) the conditions under which a greater future temporal perspective is most likely to relate to BMI, eating, and exercise. Regarding the latter aim, two a priori moderators were examined.

2. Primary moderators

2.1. Percentage of obese participants

The relationship between delay-discounting and BMI among overweight or obese individuals has yielded inconsistent findings, with some studies finding a significant negative association (e.g., Weller et al., 2008) and others finding a lack of association (e.g., Daniel et al., 2013a). The present review aims to clarify whether the effect of future temporal perspective on exercise, diet, and BMI is moderated by the extent to which the sample consists of obese participants.

2.2. Type of future temporal perspective task

There are several approaches to measuring temporal perspective, but few studies have directly tested the predictive utility of these various approaches. One exception is Daugherty and Brase (2010), who found that the ZTPI-Future subscale uniquely predicted more health behaviors than the CFCS or a monetary delay-discounting task. The present review seeks to clarify whether self-report scales of subjective future focus or delay-discounting tasks are more strongly associated with health behaviors, and whether any specific measure (e.g., ZTPI-Future vs. CFCS) is more strongly associated with BMI, eating, and exercise.

2.3. Secondary moderators

Additionally, whether eating was coded in terms being healthy or unhealthy, the method for calculating the discounting metric (k

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