



Using implicit attitudes of exercise importance to predict explicit exercise dependence symptoms and exercise behaviors



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ABSTRACT

Objectives: “Fast” (i.e., implicit) processing is relatively automatic; “slow” (i.e., explicit) processing is relatively controlled and can override automatic processing. These different processing types often produce different responses that uniquely predict behaviors. In the present study, we tested if explicit, self-reported symptoms of exercise dependence and an implicit association of exercise as important predicted exercise behaviors and change in problematic exercise attitudes.

Design: We assessed implicit attitudes of exercise importance and self-reported symptoms of exercise dependence at Time 1. Participants reported daily exercise behaviors for approximately one month, and then completed a Time 2 assessment of self-reported exercise dependence symptoms.

Method: Undergraduate males and females (Time 1, N = 93; Time 2, N = 74) tracked daily exercise behaviors for one month and completed an Implicit Association Test assessing implicit exercise importance and subscales of the Exercise Dependence Questionnaire (EDQ) assessing exercise dependence symptoms.

Results: Implicit attitudes of exercise importance and Time 1 EDQ scores predicted Time 2 EDQ scores. Further, implicit exercise importance and Time 1 EDQ scores predicted daily exercise intensity while Time 1 EDQ scores predicted the amount of days exercised.

Conclusion: Implicit and explicit processing appear to uniquely predict exercise behaviors and attitudes. Given that different implicit and explicit processes may drive certain exercise factors (e.g., intensity and frequency, respectively), these behaviors may contribute to different aspects of exercise dependence.

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Introduction

Physical activity is a central component to leading a healthy lifestyle. The benefits of regular, moderate physical activity range from decreasing the risk of cancer (Brown, Winters-Stone, Lee, & Schmitz, 2012) to improving cognition (Hogan, Mata, & Carstensen, 2013; Karr, Areshenkoff, Rast, & Garcia-Barrera, 2014) and improving outcomes for treatment-resistant major depression (Stanton & Reaburn, 2014). However, not all amounts and types of physical activity confer health benefits. In fact, engaging in excessive and compulsive exercise has been associated with dangerous conditions like cardiomyopathy (O’Keefe et al., 2012; Williams & Thompson, 2014) and eating disorders (Mond, Hay, Rodgers, Owen, & Beumont, 2004).

Many terms have been used to describe the qualities of excessive exercise that might be harmful, with each term implying a slightly different conceptualization. “Exercise dependence” is generally the preferred term, and refers to a preoccupation with exercise that is so *intense* it becomes problematic (Bamber, Cockerill, Rodgers, & Carroll, 2003). Holland, Brown, and Keel (2014) state that defining how exercise behaviors can be unhealthy requires the examination of both quantitative (e.g., duration, intensity, amount) and attitudinal (e.g., importance, compulsiveness) elements, as each component can predict negative mental health consequences, like exercise dependence and eating disorder pathology (Mond et al., 2004; Taranis & Meyer, 2011). However, there is a lack of understanding with regard to the quantitative and attitudinal elements that lead exercise to transition from being normative to excessive. Congruent with a developmental psychopathology approach of identifying when normative processes become abnormal, the purpose of the current project was to examine one factor that may differentiate

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individuals who engage in normative exercise versus dependent exercise behavior—implicit attitudes about exercise. Specifically, we examined whether implicit attitudes about the importance of exercise predicted change in explicit, self-reported exercise dependence symptoms.

Dual-process theories: implicit and explicit processing

Assessing implicit and explicit attitudes about exercise allows for a comprehensive examination of attitude–behavior interplay. Dual-process theories posit that there are two ‘systems’ of thinking and processing (for reviews, see [Evans, 2008](#); [Kahneman, 2011](#)). The first system (i.e., implicit) operates automatically and with speed relative to the second system (i.e., explicit), which operates through slower and more controlled, reflective processing (e.g., [Evans, 2008](#)). [Kahneman \(2011\)](#) described these systems’ processing as “fast” and “slow,” respectively. Given the quick processing speed of the first system, the thoughts and responses stemming from its processing are relatively automatic—in other words, “fast” thinking often produces a person’s gut reactions (e.g., [Evans, 2008](#); [Kahneman, 2011](#)). On the other hand, given the deliberate and thoughtful processing involved in the second system, a person’s automatic processing may be reflected upon and potentially overcome according to one’s critical thinking (e.g., [Evans, 2008](#); [Kahneman, 2011](#)). For instance, a person trying to increase fiber intake may inherently enjoy eating potato chips but knows that eating an apple instead is more nutritive. When deciding between these two food choices, a person’s “fast” thinking may produce a response to eat the chips, whereas a person’s “slow” and critical thinking may produce a response to eat the apple. Thus, the responses generated via relatively automatic (i.e., implicit) versus controlled (i.e., explicit) processes may conflict with or differ from one another in alignment, valence, or strength.

Implicit and explicit attitudes toward health-related stimuli

Implicit and explicit processes may align in the overall prediction of health-related behaviors, but these processes may uniquely predict particular types of health-related behaviors (see discussion in [Teachman, Cody, & Clerkin, 2010](#); [Wiers et al., 2010](#)). For example, one study testing implicit versus explicit (i.e., self-reported, thereby self-reflected) attitudes in the prediction of food consumption found that implicit attitudes predicted impulsive eating behavior whereas explicit attitudes predicted consciously controlled eating behavior ([Frieze, Hofmann, & Wänke, 2008](#)). In regard to exercise behaviors, [Calitri, Lowe, Eves, and Bennett \(2009\)](#) demonstrated in a sample of university students that both explicit reports and implicit associations between stimuli for “physical activity” and positive versus negative words were associated with self-reported, retrospective physical activity. In this study, implicit attitudes accounted for variability in exercise behavior above and beyond the effects explained by explicit attitudes. In another study, [Conroy, Hyde, Doerksen, and Ribeiro \(2010\)](#) found that implicit associations between stimuli for “good” (versus “bad”) and “physical activity” predicted seven-day physical activity; this relation was independent of the effects accounted for by explicit measures of exercise self-efficacy and outcome-expectancies. Physical activity was calculated by pedometer-measured daily step counts; though type, intensity, and duration of physical activities were not measured. Similar to findings from [Calitri et al. \(2009\)](#), [Conroy et al. \(2010\)](#) found that implicit and explicit responses aligned in valence, but there were differences in the strength of the associations. Consistent with dual-process theories that predict a potential difference between relatively automatic (i.e., implicit) versus relatively controlled (i.e., explicit) processes in response to health-

relevant stimuli, these studies demonstrate that implicit, quickly processed attitudes toward physical activity may be uniquely predictive of certain exercise behaviors (i.e., quantitative) even when controlling for the effects accounted for by explicit, self-report measures.

In addition to implicit versus explicit assessments independently predicting exercise behaviors, implicit and explicit assessments also capture different underlying processes, which drive different action tendencies. Examining different action tendencies may inform how normative behavior (e.g., regular exercise) may become non-normative (e.g., exhibiting exercise dependence symptoms). Namely, research suggests that implicit assessments, which capture impulsive, “fast” processes, capture an action tendency to approach (see [Strack & Deutsch, 2004](#); discussion in [Lindgren et al., 2013](#)). Research in the addictions field demonstrates that one’s implicit drinking identity (automatic associations between “drinker” and “me”) is a robust predictor of alcohol consumption, alcohol problems, and alcohol cravings ([Lindgren et al., 2013](#)). Similarly, it is possible that one’s implicit attitudes toward exercise may predispose someone to continue “approaching” exercise to a potentially exercise dependent degree, such as exercising so much that it interferes with work or family life, or so much that being unable to exercise produces feelings of irritability. Thus, implicit and explicit assessments of attitudes toward exercise may not only predict different health behaviors, but may also clarify the relation between normative exercise versus dependent exercise behaviors.

Attitudinal importance of exercise

Previous investigations provide an important foundation for studying implicit associations of exercise and corresponding behaviors; however, research has yet to test implicit attitudes regarding the importance of exercise. Attitudinal importance provides information about attitude intensity and behavioral intentions ([Boninger, Krosnick, Berent, & Fabrigar, 1995](#)). Decades of research suggest that assigning significant import to a belief fuels the development of more resolute attitudes toward that belief ([Boninger et al., 1995](#); for a review, please see [Petty & Krosnick, 1995](#)). Not surprisingly, more resolute attitudes then influence consequent behaviors ([Fishbein & Azjen, 1975](#)). According to the components model of behavioral addictions, exercise dependence is thought to be developed, in part, if exercise becomes so important that it takes precedence over other key areas of functioning (e.g., social or occupational activities; [Griffiths, 2005](#); [Terry, Szabo, & Griffiths, 2004](#)). For example, if one finds exercise to be moderately important, one may be more likely to regularly engage in exercise than someone with more ambivalent attitudes toward exercise. But if one finds exercise to be extremely important, one may “approach” exercise more frequently or more intensely than someone exhibiting moderate exercise importance, and may thus exhibit more exercise dependent behaviors and symptoms. When applying this logic to the empirical study of implicit and explicit attitudes toward exercise, examining implicit attitudinal associations of the *importance* of exercise—instead of classifying exercise as good/positive or bad/negative—may be particularly informative in prospectively predicting exercise behaviors, and potentially exercise dependence symptoms.

Present study

In the present study we tested a novel Implicit Association Test (IAT) to (1) examine whether implicit attitudes of exercise importance predicted change in explicit, self-reported exercise dependence symptoms and (2) test how implicit exercise importance and

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