
Mindfulness and the Intention-Behavior Relationship Within the Theory of Planned Behavior

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The present study examined moderating effects of mindfulness on the intention-behavior relationship within the theory of planned behavior. Mindfulness describes a quality of consciousness characterized by heightened clarity and awareness of present experiences and functioning. Study 1 showed that mindfulness moderated the intention-behavior relationship in a leisure-time physical activity context such that intentions predicted physical activity among mindful individuals and not among less-mindful individuals. Study 2 measured counterintentional habits relating to binge-drinking and found that habitual binge-drinking obstructed the enactment of physical activity intentions among individuals acting less mindfully but not among individuals acting mindfully. Finally, Studies 1 and 2 demonstrated that the effects of mindfulness on physical activity were independent of effects observed for habit and variables contained in the theory of planned behavior. These findings suggest that mindfulness is a useful construct that helps understand the intention-behavior relationship within the theory of planned behavior.

Keywords: *mindfulness; habit; intention-behavior relationship; theory of planned behavior*

The theory of planned behavior is a social cognitive model that explains how deliberative decisions, that is, effortful decisions that involve a consideration of the advantages and disadvantages of the target behavior prior to action (Fazio, 1990), influence performance of social behavior (Ajzen, 1991). The theory posits that

performance of social behavior is a function of three variables: attitudes (positive or negative evaluations regarding behavioral performance), subjective norms (perceived influences that significant others may exert on the execution of behavior), and perceived behavioral control (perceptions of control with respect to the performance of social behavior; Ajzen, 1991). The theory also proposes that the attitudes, subjective norms, and perceived behavioral control influence behavioral engagement indirectly via intentions. Behavioral intentions indicate how hard people are willing to try and how much effort people plan to exert toward performance of behavior (Ajzen, 1991). In addition, Ajzen (1991) proposed that perceived behavioral control also could predict behavior directly when behavior is not under complete volitional control and when perceptions of control are realistic.

Thus far, individual studies and meta-analytic reviews conducted in several domains have supported tenets of the theory of planned behavior (e.g., Armitage & Conner, 2001; Hagger, Chatzisarantis, & Biddle, 2002). Empirical evidence suggests that intentions and perceived behavioral control predict social behavior

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directly, as Ajzen (1991) has originally hypothesized (Armitage & Conner, 2001). In addition, empirical studies have documented that attitudes and perceived behavioral control predict social behavior indirectly via intentions and that subjective norms exert the weakest effects on intentions (Armitage & Conner, 2001). However, it also has been demonstrated that the correlation between intentions and behavior is modest. Meta-analyses have revealed that intentions account for a weighted average of only 30% of the variance in social behavior (Armitage & Conner, 2001; Hagger et al., 2002), mainly because people with strong intentions fail to act on them (Orbell & Sheeran, 1998).

The unsatisfactory levels of prediction obtained by the construct of intentions have stimulated a great deal of research attempting to explain the intention-behavior discrepancy (Sheeran, Milne, Webb, & Gollwitzer, 2005). In a field study, Sheeran and Orbell (1999) have demonstrated that forgetting to initiate action was one of the most prevalent reasons for the intention-behavior discrepancy (Gollwitzer, 1999; Sheeran, Aarts, et al., 2005). To that end, several experimental studies have documented that improving memory of action initiation by planning in advance when, where, and how a behavior should be performed (e.g., by forming implementation intentions) helps people carry out their intentions by strengthening the mental association in memory between representations of situations and action representations (Aarts & Dijksterhuis, 2000; Aarts, Dijksterhuis, & Midden, 1999; Sheeran & Orbell, 1999). Increased accessibility of situational representations in memory has been shown to increase the probability of action opportunities getting noticed (Webb & Sheeran, 2003) and of action initiation occurring in an efficient way (Brandstätter, Lengfelder, & Gollwitzer, 2001), given that mere perception of action opportunities can elicit actions in an immediate and automatic way (Bargh & Chartrand, 1999).

Although memory influences the intention-behavior relationship, it is not the only reason responsible for the intention-behavior discrepancy. A number of experimental and correlation studies have shown that habits and other automatic processes do influence the intention-behavior relationship as well (Aarts, Verplanken, & Knippenberg, 1998; Verplanken, Aarts, van Knippenberg, & Moonen, 1998). According to Bargh (1994), automatic processes can be conceptualized in terms of four components. Awareness refers to the extent to which people are aware of the stimulus triggering a process or of the process itself. Intentionality refers to the extent to which individuals are in control of the instigation or the start up of the process. Controllability refers to the extent to which individuals are able to stop a process or override it, once started.

Efficiency refers to the extent to which a process demands attentional resources.

Habit is a type of automatic behavior that is goal-dependent and, although controlled automatically, it is initiated only with the person's intent or consent (Bargh, 1994). For a habitual response to occur, a goal (i.e., social goal) is required to be consciously processed. However, once the goal is processed, action follows without devoting much conscious thought to the pursuit of the goal or the action (Bargh, 1994). The dependency of the enactment of habitual behaviors on goals develops when behavioral engagement results in the achievement of an expected goal consistently and frequently in the past (Bargh, 1994). When behavior has resulted in the achievement of a goal countless times, situational features become strongly associated in memory with the goal and the activation of that goal representation in memory automatically leads to resultant action without the person devoting much conscious thought to the goal and/or action (Bargh, 1994). Therefore, a defining characteristic of habitual behavior is that goal activation mediates the relationship between situation and behavior (Aarts & Dijksterhuis, 2000). Once the mediating goal is processed, performance of habitual behavior is nonintentional and impulsive (Bargh, 1994), or mindless, in a sense that it is characterized by a diminished awareness of and attention to the goals that direct the behavior or to the behavior itself.

To date, a great deal of evidence suggests that many psychological phenomena, which have been previously thought to be exclusively under the control of mindful-conscious processes (e.g., evaluations, judgments, impressions, motives, and goals), are a function of automatic processes (Bargh & Chartrand, 1999). In addition, several experimental studies have demonstrated that habitual behaviors are automatic in nature and their engagement depends on the activation of a goal (Aarts & Dijksterhuis, 2000; Sheeran et al., 2005). Furthermore, studies dealing with the theory of planned behavior have shown that habits are often better predictors of social behavior than intentions (Armitage & Conner, 2001; Hagger et al., 2002; Ouellette & Wood, 1998). Most important, some studies have corroborated an interaction between intentions and habits such that intentions predict social behavior among individuals who do not act out of habit and not among habitual actors (Aarts et al., 1998; Verplanken et al., 1998). These interactive effects are consistent with habit theory and suggest that when behavior is repeated frequently and becomes habitual, the performance of the behavior is less likely to depend on intentions (Bargh, 1994). However, it is important to stress that previous studies tested the Habit \times Intention interaction using indirect measures of habit (e.g., frequency of past behavior;

Oullette & Wood, 1998) rather than direct measures that assess the automatic qualities of habits (Verplanken & Orbell, 2003). The present studies will extend previous research by utilizing direct measures of habit in examining the Habit \times Intention interaction.

In addition to investigations that have tested habits that are in line with intentions and behavioral engagement, research also has been promulgated that examines the effects of counterintentional habits and thoughts and their utility to influence the intention-behavior relationship (Verplanken & Faes, 1999). In general, counterintentional habits are habits that are contrary to one's intentions. These counterintentional habits can detract people from fulfilling their intentions, especially when they result in the experience of short-term hedonistic enjoyment (Kuhl, 1984). In a field study of healthy eating, Verplanken and Faes (1999) confirmed the deleterious effects of counterintentional habits (e.g., eating fatty foods) on the intention-behavior relationship by demonstrating a negative relationship between counterintentional habits and performance of health behavior. In summary, empirical evidence suggests that performance of social behavior is not always a function of intentional, mindful processes, as the theory of planned behavior implies (Ajzen, 1991). Rather, habitual, less-mindful processes influence performance of social behavior and the intention-behavior relationship.

MINDFULNESS AND THE INTENTION-BEHAVIOR RELATIONSHIP

Although several studies have demonstrated effects of habitual processes on the performance of social behavior, there is a dearth of research examining the role of consciousness in influencing the intention-behavior relationship. According to Westen (1999), consciousness consists of two functions. First, awareness is the quality of consciousness that helps individuals monitor inner experiences and environmental factors. Attention, the second quality of consciousness, helps people focus awareness on a limited range of experiences (Nyanaponika Thera, 1972). Mindfulness is a stable individual difference construct, describing a quality of consciousness characterized by clarity and vividness of current experience and functioning. When mindful, individuals do not ruminate or deliberate about fantasies concerning the future, as in the case of daydreaming, but instead take reality as it is and are open and receptive of what is taking place in the present (Nyanaponika Thera, 1972). In other words, mindfulness describes an enhanced attention to, and awareness of, present reality (Brown & Ryan, 2003).

The construct of mindfulness, as conceptualized in the present study, is similar to other formulations of

mindfulness (e.g., Langer, 1992). According to Langer (1992), mindfulness is a process of drawing active distinctions and creating new social categories that leave individuals open to novelty and sensitive to context. In contrast, when acting less mindfully, individuals rely more on past categories and distinctions. As a consequence, less-mindful individuals become oblivious to novel aspects of the situation. Therefore, Langer's (1992) formulation of mindfulness places emphasis on cognitive operations that explain how people process inputs from the external environment to create new categories and social perspectives. The conceptualization of mindfulness adopted in the present study is more perceptual and emphasizes an open and undivided attention to what is occurring both internally and externally at present rather than cognitive operations and the creation of new social categories (Brown & Ryan, 2003). Yet, empirical evidence suggests that similar to Langer's (1992) conceptualization, the present conceptualization of mindfulness reflects an enhanced awareness of emotions, behavior, and environmental events as well as novelty seeking and novelty producing (Brown & Ryan, 2003).

The construct of mindfulness also is different from personality traits describing receptiveness and openness to experience (Costa & McCrae, 1992). Specifically, Brown and Ryan (2003) demonstrated empirically that mindfulness was only weakly associated with personality traits reflecting open or receptive awareness of ongoing events and experiences. In addition, empirical evidence has shown that imagination and fantasy of past experience were not associated with mindfulness because these experiences detract people from the present (Brown & Ryan, 2003). Furthermore, mindfulness appears different from other self-related constructs that reflect knowledge about the self. For example, Brown and Ryan (2003) have documented that mindfulness is not associated with measures of public self-consciousness, a construct that taps tendencies to be concerned about the self as perceived by others (Fenigstein, Scheier, & Buss, 1975). Furthermore, it has been demonstrated empirically that mindfulness does not reflect a preoccupation with others' opinions but an increased awareness of inner experiences and overt behavior (Brown & Ryan, 2003). Finally, it has been shown that preoccupation with internal states, reflected in the construct of public self-consciousness (Fenigstein et al., 1975), is not a characteristic of mindfulness because mindfulness not only indicates a tendency to be in-tune with emotional states but an ability to alter them.

Most relevant, the construct of mindfulness also can be contrasted with less-mindful states that are under the control of habitual or other automatic processes. One obvious difference between habit and mindfulness is that habit indicates a behavioral regulation that is characterized by diminished awareness of and conscious

attention to what is happening at the present, whereas mindfulness indicates an enhanced attention to and awareness of the present reality (Bargh, 1994; Brown & Ryan, 2003). In addition, mindfulness is different from the Habit \times Intention interaction, a construct that has been utilized in previous research examining the moderating effects of habit on the intention-behavior relationship (Aarts et al., 1998; Verplanken et al., 1998). This is because mindfulness indicates a behavioral regulation that is intentional and controllable (Brown & Ryan, 2003; Langer & Moldoveanu, 2000), whereas the Habit \times Intention interaction indicates a behavioral regulation that is characterized by diminished levels of intentionality and controllability (Bargh, 1994).

Although a number of studies have confirmed the beneficial effects of mindfulness on physical health and psychological well-being, there are no studies examining the moderating effects of mindfulness on the intention-behavior relationship (Brown & Ryan, 2003; Carlson, Speca, Patel, & Goodey, 2003; Jane, Norris, & Bauer-Wu, 2006; Kabat-Zinn, Lipworth, & Burney, 1985; Kabat-Zinn, et al., 1992). This is surprising considering that previous research has shown that mindfulness influences factors affecting the intention-behavior relationship such as memory, motivation, and self-control (Demick, 2000). Therefore, one way that the present study extends previous research on mindfulness is by examining the moderating effects of mindfulness on the intention-behavior relationship. Moreover, the present research tests whether this moderating effect is statistically significant after controlling for the effects of habit (Aarts et al., 1998; Verplanken et al., 1998).

Based on previous research, it can be suggested that enhanced attention to present experiences and events, characterizing mindful individuals, may influence the intention-behavior relationship by strengthening their ability for self-control, that is, the ability to control cognitive and emotional subsystems that run counter to an ongoing intention (e.g., counterintentional habits and thoughts; Kuhl & Fuhrmann, 1998). In contrast, because less-mindful individuals pay attention to a subset of inner experiences and contextual cues, their behavior is more rigid and vulnerable to counterintentional habits and thoughts, thus displaying a not-so-strong intention-behavior relationship. Accordingly, we conducted two studies to examine moderating effects of mindfulness on the intention-behavior relationship within the theory of planned behavior. Our first study (Study 1) examined moderating effects of mindfulness and habit on the intention-behavior relationship. Our second study examined the processes by which mindfulness influences the intention-behavior relationship. Specifically, Study 2 examined the utility of mindfulness

to protect individuals from counterintentional habits and thoughts.

STUDY 1

Study 1 examined moderating effects of mindfulness on the intention-behavior relationship in the context of physical exercise. We hypothesized that the intention-behavior relationship would be stronger among individuals who acted mindfully than among individuals who did not (Hypothesis 1 [H1]). In addition, in accordance with previous research dealing with habit (Verplanken & Orbell, 2003), it was hypothesized that habit would moderate the intention-behavior relationship such that the intention-behavior relationship would be stronger among nonhabitual exercisers than among habitual exercisers (Hypothesis 2 [H2]). Unlike previous research that used predominantly indirect measures of habit (Oullette & Wood, 1998), Study 1 employs direct measures of habit that assess automatic qualities of habitual processes in examining the moderating effects of habit.

Method

Research participants and procedures. Two hundred and twenty-six university students participated in the study ($N = 226$, men = 110, women = 116, M age = 19.23 years, $SD = 1.08$). A prospective design was employed with psychological variables being assessed at two points in time. In the first wave of data collection, a definition of vigorous physical activity performed during leisure time developed by Godin and Shephard (1985) was presented to research participants. This definition specified that vigorous physical activity referred to leisure-time activities performed at a vigorous intensity for at least 40 min at a time, 4 days per week, during the next 5 weeks. To ensure that this definition of physical exercise was understood, we asked research participants to list examples of vigorous physical activities they might do during their leisure time. Next, the questionnaire assessed variables specified by the theory of planned behavior, habit, and mindfulness. After 5 weeks, Godin and Shephard's (1985) definition of vigorous physical activities was provided to participants again and actual participation in physical activities during leisure time was assessed. Prospective responses were matched with baseline responses using dates of birth and gender.

Measures. Participants were instructed to use Godin and Shephard's (1985) definition of physical activity

when responding to items. Physical activity intentions were measured via four items using 7-point Likert-type scales anchored by *agree very strongly* (7) to *disagree very strongly* (1; e.g., “I intend to engage in active sports and/or vigorous physical activities for at least 40 min, 4 days per week, throughout the following 5 weeks, during my leisure time”; Ajzen, 1991). Five 7-point semantic differential items were used to measure attitudes in response to the following statement: “For me, engaging in active sports and/or vigorous physical activities for at least 40 min, 4 days per week, throughout the following 5 weeks, during my leisure time will be . . .” The five adjectives used the following endpoints: *enjoyable-unenjoyable*, *interesting-boring*, *useful-useless*, *harmful-beneficial*, and *good-bad* (Ajzen, 1991). Subjective norms were measured by three items typically used to tap the injunctive norms construct within the theory of planned behavior (e.g., “Most people who are important to me approve my engaging in active sports and/or vigorous physical activities for at least 40 min, 4 days per week, throughout the following 5 weeks, during my leisure time”; Ajzen, 1991). Perceived controllability of physical activity was assessed on three items using 7-point Likert-type scales (e.g., “How much personal control do you think you have over engaging in active sports and/or vigorous physical activities for at least 40 min, 4 days per week, throughout the following 5 weeks, during your leisure time?”) with scale endpoints from *complete control* (7) to *no control at all* (1; Ajzen, 1991).

We used Verplanken and Orbell’s (2003) measure of habit to assess the extent to which physical exercise was automatic. The scale is unidimensional and consists of 12 items measuring the extent to which physical exercise is unintentional, efficient, uncontrollable, and occurs outside of human awareness. An example item measuring habit was, “Engaging in active sports and/or vigorous physical activities during my leisure time is something that I do without having to consciously remember.” All items were measured on 7-point scales ranging from *strongly disagree* (1) to *strongly agree* (7).

We used Brown and Ryan’s (2003) Mindful Attention Awareness Scale (MAAS) to assess individual differences in propensity to experience mindful states. We used the indirect measure of mindfulness, which reflected absence of mindfulness, because mindlessness is more common and accessible to most individuals than mindfulness (Brown & Ryan, 2003). The scale is unidimensional and consists of 15 items distributed across the cognitive, emotional, physical, interpersonal, and general domains. Participants indicated how frequently they experienced the state described in each statement on 6-point scales ranging from *almost always* (1) to *almost never* (6). An example item was, “I could

experience some emotion and not be conscious of it until sometime later.”

At the second wave of data collection, Godin and Shephard’s (1985) definition of vigorous physical activity was provided again to research participants. Self-reported physical activity behavior was assessed on four items. An example item was, “In the last 5 weeks, I engaged in active sports and/or vigorous physical activities for at least 40 min during my leisure time,” with the following scale labels: *none* (1) to *most of the days per week* (7; see Ouellette & Wood, 1998).

Results

Preliminary analysis. Table 1 presents descriptive statistics, internal consistency information, and Pearson’s correlations among the psychological variables. As shown, all variables displayed satisfactory levels of internal consistency given that alpha coefficients were greater than .70. The alpha coefficient of habit was large, a finding that may indicate that the automatic qualities of habit, assessed by Verplanken and Orbell’s (2003) instrument, may overlap to a great extent. However, it is important to recognize that this instrument was not designed to differentiate between automatic aspects of habit. Therefore, there is no way to know, on the basis of the present study, whether the large reliability is due to the instrument used or whether it indicates overlap between different aspects of habitual processes.

In accordance with the theory of planned behavior (Ajzen, 1991), correlations supported positive relationships between intentions and physical activity behavior. Attitudes, subjective norms, and perceived behavioral control were positively associated with intentions. In addition, in accordance with previous research (Verplanken & Orbell, 2003), habit was positively associated with physical activity intentions and behavior. Of interest, correlations indicated that mindfulness was associated with perceived behavioral control and attitudes but not with physical activity behavior. Furthermore, mindfulness was not associated with habit and intentions, a finding that suggests that mindfulness exhibits discriminant validity with these constructs.

Main analysis. We conducted a hierarchical regression analysis to examine initial hypotheses (H1 and H2) of the present study concerning the moderating effects of mindfulness and habit on the intention-behavior relationship. In the hierarchical regression analysis, physical activity participation was the dependent variable. Intentions and perceived control were entered as independent variables in the first step, attitudes and

subjective norms were entered in the second step, habit and the interaction between habit and intentions were entered in the third step, and mindfulness and the interaction between mindfulness and intentions were specified as independent variables in the fourth step. In accordance with Aiken and West's (1992) recommendations, we centered all variables to avoid unnecessary multicollinearity between variables and the product terms (e.g., Habit \times Intention Product Term).

Table 2 presents the findings of the regression analysis. The first step of the analysis revealed that intentions predicted physical activity participation ($F = 11.15$, $p < .05$) but perceived behavioral control did not. The second step revealed that attitudes and subjective norms did not predict physical activity participation, $\Delta F(2) = .26$, $p > .05$. The third step revealed that habit and the interaction between habit and intentions predicted physical activity participation after controlling for the effects of variables contained in the theory of planned behavior, $\Delta F(2) = 2.69$, $p < .05$. In accordance with the initial hypothesis (H2), simple slopes analysis, plotting the interaction at 1 *SD* greater than (habitual exercisers) and less than the mean score of habit (nonhabitual exercisers), revealed that intentions predicted physical activity participation only among nonhabitual exercisers scoring 1 *SD* less than the mean score of habit ($\beta = .82$, $p < .05$) and not among habitual exercisers scoring 1 *SD* greater than the mean score of habit ($\beta = -.22$, $p > .05$). Finally, the fourth step of analysis indicated that mindfulness and the interaction between mindfulness and intentions predicted physical activity participation after controlling for the effects of habit, $\Delta F(2) = 3.42$, $p < .05$. In accordance with the initial hypothesis (H1), simple slopes analysis, plotting the interaction at 1 *SD* greater than and less than the mean score of mindfulness, revealed that intentions predicted physical activity behavior among mindful individuals who scored 1 *SD* greater than the mean score of mindfulness ($\beta = .58$, $p < .05$) and not among less mindful individuals who scored 1 *SD* less than the mean score of mindfulness ($\beta = -.31$, $p > .05$; see Figure 1). Of interest, the effects of the Habit \times Intention and Mindfulness \times Intention interactions on physical activity participation were independent from each other because the beta coefficients for both of these interactions were statistically significant in the fourth step of analysis.

Additional analysis. We also conducted a hierarchical regression analysis to examine whether attitudes, subjective norms, perceived behavioral control (first step), and mindfulness (second step) predicted physical activity intentions. Results of this analysis revealed that although attitudes, subjective norms, and perceived behavioral control predicted intentions ($F = 8.65$,

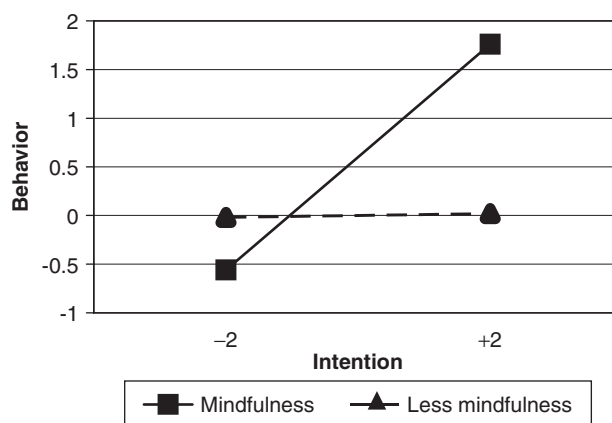


Figure 1 The moderating effects of habit on the intention-behavior relationship (Study 1).

$p < .05$), mindfulness did not contribute to the prediction of intentions, $\Delta F(1) = .03$, $p > .05$.¹

Discussion

Results from Study 1 showed that mindfulness moderated the intention-behavior relationship such that intentions predicted physical activity only among individuals who acted mindfully and not among individuals who did not. These results are consistent with our first hypothesis (H1) and suggest that individuals acting mindfully are more likely to enact their intentions than less-mindful individuals. In addition, in accordance with previous research and our second hypothesis (H2), the hierarchical regression analysis supported an interaction between direct measures of habit and intentions in predicting physical activity (Hagger et al., 2002; Ouellette & Wood, 1998; Verplanken & Orbell, 2003). Analysis of the interaction showed that nonhabitual exercisers were more likely to translate intentions into actions than habitual exercisers. Taken together, results from Study 1 demonstrate that individuals acting mindfully and not habitually are more likely to act on their intentions than are individuals acting habitually and not mindfully.

STUDY 2

Although Study 1 corroborated the moderating effects of mindfulness on the intention-behavior relationship, results from Study 1 did not explain why mindful individuals were more likely to fulfill their intentions than individuals who did not act mindfully. One reason for this may have to do with heightened awareness of behavioral routines and other implicit

constructs that characterize mindful individuals (Brown & Ryan, 2003). That is, because mindful individuals pay greater attention to the activities in which they are engaged, they may have a better grasp of behavioral routines and their efficacy to detract or prevent execution of intentional behavior than less-mindful individuals. As a result, mindful individuals may act on their intentions because they are able to control counterintentional habits successfully. In contrast, individuals not acting mindfully may fail to translate intentions into actions because they are more susceptible to the influences of counterintentional habits and thoughts.

Study 2 will investigate utility of mindfulness in protecting physical activity intentions from counterintentional habits such as binge-drinking. We targeted binge-drinking for two reasons. First, binge-drinking is a behavior relevant to our participants because our sample comprises university students and it is well established that excess alcohol consumption is associated with university life (Norman, Bennett, & Lewis, 1998; Sheeran, Aarts, et al., 2005). Second, binge-drinking is likely to be a powerful barrier to physical activity behavior that is difficult to counteract because of its physical repercussions (e.g., dehydration, hangover). It was hypothesized that mindfulness would moderate the effects of binge-drinking intentions and drinking habits on physical activity behavior such that habitual binge-drinking and binge-drinking intentions would be negatively associated with physical activity behavior only among individuals who did not act mindfully and not among individuals who acted mindfully (H3).

Method

Research participants and procedure. Two hundred and ninety-two university students participated in the study ($N = 292$, men = 142, women = 150, M age = 19.48 years, $SD = 1.23$). The design of Study 2 was similar to the design of Study 1 with the addition of measuring variables related to binge-drinking. To clarify, in the first wave of data collection, participants completed measures of the theory of planned behavior and habit in relation to vigorous physical activity. In addition, a standardized set of instructions, which defined binge-drinking as “drinking five or more standard alcoholic beverages in a single session in the next 5 weeks” was provided for all participants (Johnston & White, 2003). Immediately after these instructions, participants reported binge-drinking habits and binge-drinking intentions. After 5 weeks, we measured the frequency with which participants had engaged in physical activities. Prospective responses were matched with baseline responses using dates of birth and gender as matching indexes.

Measures. As in Study 1, the target physical activity behavior was defined as engaging in active sports and/or vigorous physical activities for at least 40 min, 4 days per week, throughout the following 5 weeks, during leisure time. Because we used the same instruments to measure mindfulness and variables related to physical activity in Study 2 as we did in Study 1, we do not report these measures here.

Intentions to binge-drink were measured via four items using 7-point Likert-type scales anchored by *disagree very strongly* (1) and *agree very strongly* (7; e.g., “I intend to drink five or more standard alcoholic beverages in a single session throughout the next 5 weeks”; Johnston & White, 2003). We also used Verplanken and Orbell’s (2003) measure of habit to assess the extent to which binge-drinking was habitual. An example item measuring habit in relation to binge-drinking was, “Drinking five or more standard alcoholic beverages in a single session is something that I do without having to consciously remember.” Other example items were, “Binge-drinking is something that I do automatically” and “Binge-drinking is something I start doing without realizing I am doing it.” All items were measured on 7-point scales ranging from *strongly disagree* (1) to *strongly agree* (7).

Results

Preliminary analysis. Table 3 presents descriptive statistics, internal consistency information, and Pearson’s correlations for Study 2. As shown, all variables displayed satisfactory levels of internal consistency reliability. In accordance with Study 1, the alpha coefficients for habitual exercising and habitual binge-drinking were large. Correlations supported positive relationships between intentions and physical activity (Ajzen, 1991). In addition, attitudes, subjective norms, and perceived behavioral control were positively associated with intentions (Ajzen, 1991). Furthermore, although habitual exercising was positively associated with physical activity intentions and behavior, habitual binge-drinking was negatively associated with physical activity intentions. Binge-drinking intentions also were negatively associated with physical activity behavior. Finally, mindfulness was positively associated with attitudes and perceptions of control.

Main analysis. We conducted a hierarchical regression analysis to examine the hypothesis concerning the moderating effects of mindfulness on the relationship between habitual binge-drinking and binge-drinking intentions with respect to physical activity behavior (H3). The hierarchical regression analysis was similar to

the regression analysis conducted in Study 1. The only exception was concerned with specification of two additional steps in which we estimated main and interactive effects of habitual binge-drinking, binge-drinking intentions, and mindfulness on physical activity behavior.

As shown in Table 4, the first step of the hierarchical regression analysis indicated that physical activity intentions predicted physical activity participation ($F = 32.21, p < .05$) but perceived behavioral control did not. The second step revealed that physical activity attitudes and subjective norms did not predict physical activity participation, $\Delta F(2) = .85, p > .05$. The third step revealed that habitual exercising and the interaction between exercise habit and physical activity intentions predicted physical activity participation after controlling for the effects of variables contained in the theory of planned behavior, $\Delta F(2) = 2.53, p < .05$. Consistent with the results of Study 1, a simple slopes analysis revealed that the intention-behavior relationship was stronger among nonhabitual exercisers who scored 1 *SD* less than the mean score of habit ($\beta = .86, p < .05$) than among habitual exercisers who scored 1 *SD* greater than the mean score of habit ($\beta = .22, p < .05$). The fourth step of analysis revealed that mindfulness and the interaction between mindfulness and physical activity intentions predicted physical activity participation, $\Delta F(2) = 7.38, p < .05$.² However, the Habit \times Intention interaction was not statistically significant in the fourth step of analysis. In accordance with the results of Study 1, a simple slopes analysis revealed that physical activity intentions predicted physical activity behavior among mindful individuals who scored 1 *SD* greater than the mean score of mindfulness ($\beta = .77, p < .05$) and not among less mindful individuals who scored 1 *SD* less than the mean score of mindfulness ($\beta = .05, p > .05$). These results therefore replicate the relations obtained in Study 1 and suggest that mindful individuals are more likely to enact their intentions than less-mindful individuals.

The fifth step of analysis revealed that habitual binge-drinking and binge-drinking intentions did not predict physical exercise, $\Delta F(2) = .12, p > .05$. However, the sixth step revealed that the two-way interactions between mindfulness and habitual binge-drinking and between mindfulness and binge-drinking intentions were statistically significant, $\Delta F(2) = 5.50, p < .05$. In accordance with the initial hypothesis (H3), a simple slopes analysis revealed that whereas habitual binge-drinking ($\beta = -.54, p < .05$) and binge-drinking intentions ($\beta = -.46, p < .05$) were negatively associated with physical activity among less mindful individuals who scored 1 *SD* less than the mean score of mindfulness, this was not the case for mindful individuals who scored 1 *SD* greater than the mean score of mindfulness. Binge-drinking

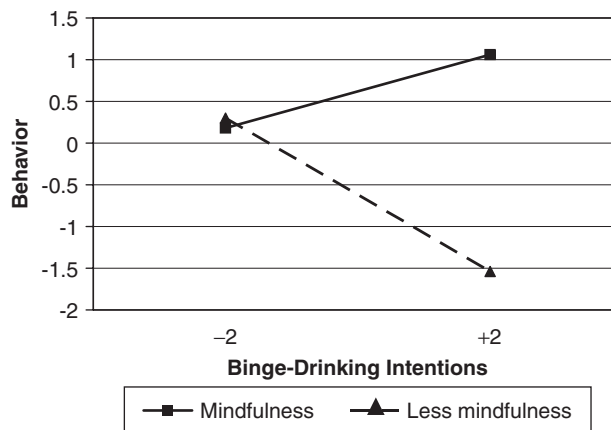


Figure 2a The moderating effects of mindfulness on the relationship between binge-drinking intentions and physical activity behavior (Study 2).

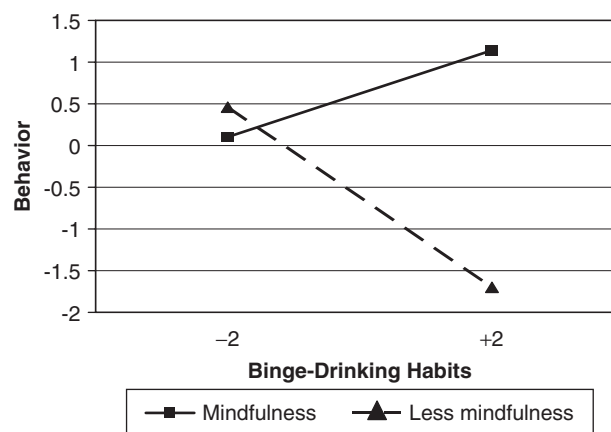


Figure 2b The moderating effects of mindfulness on the relationship between binge-drinking habits and physical activity behavior (Study 2).

intentions ($\beta = .22, p > .05$) and habitual binge-drinking ($\beta = .26, p > .05$) did not have any effects on physical activity behavior among individuals who acted mindfully (see Figures 2a and 2b).

Additional analysis. We also conducted a hierarchical regression analysis to examine whether attitudes, subjective norms, perceived behavioral control (first step), and mindfulness (second step) predicted physical activity intentions. Results of this analysis revealed that whereas attitudes, subjective norms, and perceived behavioral control predicted intentions ($F = 10.61, p < .05$), mindfulness did not contribute to the prediction of intentions, $\Delta F(1) = .23, p > .05$.³

Discussion

The results of Study 2 replicate and extend the results of Study 1 concerning effects of mindfulness on the intention-behavior relationship. Consistent with Study 1, the regression analysis showed that nonhabitual exercisers and individuals who acted mindfully were more likely to carry out their intentions than were habitual exercisers and individuals who did not act mindfully. These results therefore corroborate initial hypotheses of the present study (H1 and H2) and demonstrate that heightened awareness of and attention to environmental cues and inner experiences does help mindful individuals carry out their intentions.

Another important finding raised by Study 2 is concerned with the influences of mindfulness on counterintentional thoughts. The regression analysis clearly showed that counterintentional habits and intentions relating to binge-drinking were negatively associated with physical activity; however, only among less-mindful participants. Among mindful individuals, habitual binge-drinking and binge-drinking intentions did not have any effects on physical activity participation. These results therefore are consistent with initial hypothesis (H3) and corroborate the view that mindful individuals carry out their intentions because they are able to exercise control over the influences that counterintentional habits and thoughts have on social behavior. In contrast, less-mindful individuals do not fulfill their intentions because they do not exercise control over counterintentional habits perhaps due to these individuals' lower attention to and awareness of inner experiences and behavioral routines. Overall, results from Study 2 point out that mindfulness is important in understanding the intention-behavior relationship and facilitates disengagement from counterintentional habits that often detract individuals from enacting on their intentions.

GENERAL DISCUSSION

The purpose of the current investigation was to examine the effects of mindfulness on the intention-behavior relationship within the theory of planned behavior. Studies 1 and 2 clearly show that mindful individuals are more likely to carry out their intentions than are less-mindful individuals (see Tables 2 and 4). Indeed, results from Studies 1 and 2 corroborate this conclusion considering that the regression analysis showed that mindfulness and the interaction between mindfulness and intentions explained an additional 5% of variance on physical activity participation after controlling for the effects of habit. These results are

consistent with initial hypothesis (H1) and suggest that heightened awareness and attention to inner experiences and environmental influences, characterizing mindful individuals, facilitate a successful translation of intentions into actions.

A reason for which mindfulness influences the intention-behavior relationship is that the construct of mindfulness includes a number of qualities that facilitate a strong intention-behavior relationship. As stated in the introduction, one way that a mindful mindset helps individuals fulfill their intentions is by strengthening the ability for self control, that is, the ability to stay focused on the fulfillment of plans and control counterintentional thoughts that often detract people from acting on their intentions (see also Kuhl & Fuhrmann, 1998; Orbell, 2003). In contrast, qualities such as rumination, absorption in the past, and social anxiety that characterize less-mindful individuals (Brown & Ryan, 2003) divide and/or detract attention from a particular plan, thus resulting in a weaker intention-behavior relationship (Kuhl & Fuhrmann, 1998). However, it is important to note that although previous research has demonstrated significant relationships between mindfulness and the psychological factors influencing the intention-behavior relationship (see Brown & Ryan, 2003), the moderating effects of mindfulness on the intention-behavior relationship were not examined. Therefore, the present studies make a unique contribution to the mindfulness literature by demonstrating the moderating effects of mindfulness on the intention-behavior relationship.

Another unique contribution of the present investigation is concerned with effects of habit on social behavior. In accordance with previous research, Study 1 documents moderating effects of habit on the intention-behavior relationship such that the intention-behavior relationship is stronger among nonhabitual exercisers than among habitual exercisers (see also Aarts et al., 1998; Verplanken et al., 1998). Study 2 also reveals a statistically significant Habit \times Intention interaction, however, only in the third step of the regression analysis when the effects of mindfulness are not statistically controlled. These moderating effects of habit are unique because unlike previous research that used indirect measures of habit to test this effect (e.g., past behavior; Oullette & Wood, 1998), the present studies examined these moderating effects by using Verplanken and Orbell's (2003) direct measures that assess the automatic qualities of habitual processes. Therefore, another way that the present study extends previous research is by demonstrating that direct measures of habit moderate the intention-behavior relationship.

Not only do the present studies document moderating effects of habit on the intention-behavior relationship but

they also document statistically significant interactive effects between mindfulness and intentions on physical activity after controlling for effects of habit. These results corroborate the view that the effects of mindfulness are robust and that they cannot be subsumed by habit, a conclusion that is in line with habit theory and with the theoretical definition of mindfulness (see Brown & Ryan, 2003). The constructs of mindfulness, habit, and the Habit \times Intention interaction should be empirically distinct. This distinction is based on the defining features of these two constructs. The essential ingredients of habit are the frequency and consistency of performance of behavior (see also Aarts & Dijksterhuis, 2000; Bargh, 1994; Verplanken et al., 1998), whereas the most important characteristic of mindfulness is that it is a function of the frequency with which individuals deploy attention and awareness (Brown & Ryan, 2003). To illustrate, a person acting mindlessly does not necessarily act habitually unless she or he has performed the behavior frequently and consistently in the past (Bargh, 1994). Likewise, a person not acting habitually does not necessarily act mindfully unless she or he commits attention to the cognitive, emotional, physical, interpersonal, and behavioral states associated with the performance of the behavior in the past (Brown & Ryan, 2003). In line with this reasoning, the statistically non-significant correlation between mindfulness and exercise habit observed in Studies 1 and 2 support the notion that the constructs of habit and mindfulness are orthogonal (see Tables 1 and 3).

In addition to demonstrating the moderating effects of mindfulness on the intention-behavior relationship, the present studies are the first to show that mindful individuals are more likely to exercise control over counterintentional habits than are less-mindful individuals. Specifically, in accordance with the initial hypothesis (H3), Study 2 demonstrates that counterintentional habits relating to binge-drinking are negatively associated with physical exercise, but only among individuals who acted less mindfully. For mindful individuals, habitual binge-drinking and binge-drinking intentions did not have any effect on physical exercise (see Table 4 and Figures 2a and 2b). These results, therefore, corroborate the view that greater awareness of and attention to internal states and behavioral routines helps mindful individuals shield good intentions from unhealthy habits and thus can play a key role in fostering effective self-regulation. In contrast, diminished attention and awareness of counterintentional routines and habits is likely to prevent individuals acting less mindfully from engaging in effective self-regulation, as the negative relationship between habitual binge-drinking and physical exercise suggests (see Figures 2a and 2b). Of importance, the moderating effects of mindfulness

on counterintentional habits are unique because although previous research suggested that greater awareness of implicit thoughts and of counterintentional habits should help mindful individuals fulfill their intentions (Brown & Ryan, 2003; Demick, 2000), the moderating effects of mindfulness on counterintentional habits were not examined by previous studies. Therefore, the present investigation makes a unique contribution to the literature by demonstrating the utility of mindfulness in protecting individuals from counterintentional habits.

Although the present investigations show that mindfulness protects intentions from counterintentional habits and thoughts, a number of mechanisms explaining the effects of mindfulness on the intention-behavior relationship remain untested. Specifically, the hypothesis that mindfulness strengthens the intention-behavior relationship by improving memory of action initiation has not been tested by the current investigations. Memory is a plausible mechanism considering that previous research showed that memory influences the intention-behavior relationship and that mindful individuals display better memory of action opportunities than do less-mindful individuals (Langer & Moldoveanu, 2000; Sheeran & Orbell, 1999). In addition, because enhanced attention to present experiences and contextual features improves motivation, mindfulness may strengthen the intention-behavior relationship by increasing the liking of the behavior (Langer & Moldoveanu, 2000).

Another important implication of the current investigations is concerned with research dealing with habit and other automatic processes. As previously noted, there has been a proliferation of research dealing with automatic processes in recent years (e.g., Bargh & Chartrand, 1999; Sheeran, Aarts, et al., 2005). One conclusion emerging from this research is that traditional persuasive communications that attempt to change habit via the intentional route may not be very effective in changing habits because habitual behavior is not intentional but guided by action representations that are automatically activated by environmental and/or goal representations (Chatzisarantis & Hagger, 2005; Sheeran, Aarts, et al., 2005). Several researchers have therefore proposed that forming implementation intentions is an effective strategy that helps people break bad habits (Gollwitzer, 1999; Sheeran, Aarts, et al., 2005). In general, implementation intentions are a self-regulatory strategy that prompt individuals to predecide when and where to engage in social behavior (Gollwitzer, 1999). Implementation intentions can obstruct undesirable habitual responding because they simulate an automatic, counterhabitual response by strengthening the mental link between the counterhabitual

TABLE 1: Descriptive Statistics and Correlations (Study 1)

	M	SD	α	1	2	3	4	5	6	7
1. Physical activity	3.64	2.09	0.84	1.0						
2. Intentions	5.31	1.14	0.90	0.41	1.0					
3. Perceived behavioral control	5.82	1.28	0.85	0.01	0.24	1.0				
4. Attitudes	5.36	1.07	0.85	0.14	0.45	0.01	1.0			
5. Subjective norms	4.75	1.45	0.74	0.07	0.20	0.02	0.03	1.0		
6. Habit	4.77	1.47	0.95	0.26	0.65	0.10	0.21	0.28	1.0	
7. Mindfulness	3.64	1.74	0.81	0.08	0.04	0.22	0.19	0.03	0.12	1.0

NOTE: Correlations greater than .14 are significant at .05 alpha level.

TABLE 2: Hierarchical Regression Analysis Examining the Effects of Mindfulness on Social Behavior (Study 1)

Steps	R ²	β	t
1	0.18*		
Intentions		0.43	4.60*
Perceived behavioral control		0.00	0.03
2	0.19		
Intentions		0.41	4.30*
Perceived behavioral control		0.01	0.14
Attitudes		0.04	0.46
Subjective norms		0.06	0.61
3	0.21*		
Intentions		0.30	2.23*
Perceived behavioral control		0.02	0.18
Attitudes		0.04	0.38
Subjective norms		0.03	0.28
Habit		0.13	1.02
Habit × Intentions		-0.26	-2.64*
4	0.26*		
Intentions		0.15	1.10
Perceived behavioral control		0.07	0.690
Attitudes		0.07	0.70
Subjective norms		0.02	0.19
Habit		0.11	1.66
Habit × Intentions		-0.19	-2.06*
Mindfulness		0.30	2.17*
Mindfulness × Intentions		0.23	2.10*

* $p < .05$.

TABLE 3: Descriptive Statistics and Correlations (Study 2)

	M	SD	α	1	2	3	4	5	6	7	8	9
1. Physical activity	3.76	1.27	0.81	1.0								
2. Physical activity intentions	5.33	1.30	0.88	0.57	1.0							
3. Perceived behavioral control	5.32	1.15	0.78	0.07	0.22	1.0						
4. Attitudes	5.12	1.18	0.70	0.09	0.35	0.02	1.0					
5. Subjective norms	4.16	1.25	0.72	0.15	0.24	0.04	0.00	1.0				
6. Habitual exercising	4.57	1.40	0.96	0.31	0.66	0.08	0.18	0.29	1.0			
7. Mindfulness	3.87	1.23	0.96	0.06	0.08	0.21	0.16	0.02	0.09	1.0		
8. Habitual binge-drinking	4.61	1.86	0.96	0.02	-0.15	0.12	0.03	0.08	-0.12	-0.23	1.0	
9. Binge-drinking intentions	3.58	1.63	0.91	-0.14	0.00	0.07	0.07	0.10	0.00	0.05	0.72	1.0

NOTE: Correlations greater than .12 are significant at .05 alpha level.

TABLE 4: Hierarchical Regression Analysis Examining Effects of Mindfulness on Counterintentional Behavior (Study 2)

Steps	R ²	β	t
1	0.28*		
Intentions		0.53	8.02*
Perceived behavioral control		-0.03	-0.56
2	0.28		
Intentions		0.52	7.68*
Perceived behavioral control		-0.03	-0.39
Attitudes		0.08	1.24
Subjective norms		-0.03	-0.50
3	0.31*		
Intentions		0.54	5.64*
Perceived behavioral control		-0.02	-0.40
Attitudes		0.07	1.10
Subjective norms		-0.01	-0.17
Habitual exercising		0.08	0.86
Habitual Exercising × Intentions		-0.16	2.04*
4	0.36*		
Intentions		0.41	3.87*
Perceived behavioral control		0.04	0.53
Attitudes		0.12	1.79
Subjective norms		-0.03	-0.46
Habitual exercising		0.16	1.74
Habitual exercising × intentions		-0.12	-1.49
Mindfulness		0.25	3.56*
Mindfulness × Intentions		0.18	2.43*
5	0.36		
Intentions		0.40	3.75*
Perceived behavioral control		0.03	0.49
Attitudes		0.13	1.83
Subjective norms		-0.03	-0.44
Habitual exercising		0.16	1.70
Habitual Exercising × Intentions		-0.11	-1.43
Mindfulness		0.26	3.55*
Mindfulness × Intentions		0.19	2.42*
Habitual binge-drinking		-0.05	-0.48
Binge-drinking intentions		0.04	0.38
6	0.41*		
Intentions		0.42	4.02*
Perceived behavioral control		0.03	0.40
Attitudes		0.11	1.60
Subjective norms		-0.04	-0.65
Habitual exercising		0.12	1.34
Habitual Exercising × Intentions		0.09	1.14
Mindfulness		0.31	4.25*
Mindfulness × Intentions		0.24	3.03*
Habitual drinking		-0.14	-0.40
Binge-drinking intentions		-0.12	-0.16
Mindfulness × Binge-Drinking Intentions		0.17	2.94*
Mindfulness × Habitual Binge-Drinking		0.20	3.17*

* $p < .05$.

response and a particular situation (Aarts et al., 1999). According to this account, a person who strategically decides how to escape competing intentions and habits is likely to overcome these competing habits because she or he will not have to make a decision whether to follow his or her intentions when competing habits arise (Brandstätter et al., 2001). Rather, a person who decides

on a strategy on how to escape competing intentions will seize the opportunity and will automatically act on her or his intentions (Gollwitzer, 1999).

Although previous experimental research has clearly demonstrated the beneficial and automatic effects of implementation intentions on social behavior (Gollwitzer, 1999), the moderating effects of mindfulness observed in

the present study support the notion that strategies helping people reach more mindful states are important as well (see Figures 1 and 2). In fact, strategies enhancing mindfulness and implementation intentions may be differentially beneficial for different individuals. For example, strategies enhancing mindfulness may be effective for people who are high on the need for cognition (Cacioppo, Petty, & Kao, 1984), considering that individuals high in need for cognition engage in and enjoy cognitive endeavors. In contrast, implementation intentions may be effective among individuals who are not high in the need for cognition considering that such people do not usually entertain complex problem solving and intellectual tasks. Future research may usefully compare implementation intention effects and effects of mindfulness on social behavior.

In conclusion, results of the present studies indicate that mindfulness moderates the intention-behavior relationships such that intentions predict social behavior among individuals acting mindfully and not among individuals acting less mindfully. In addition, results demonstrate that mindfulness shields intentions from counterintentional habits. The implications of these findings are that heightened awareness of and attention to present experiences can facilitate an effective translation of intentions into actions.

NOTES

1. Additional analysis indicated that the interaction between mindfulness and habit was not statistically significant, $\Delta F(1) = 1.49, p > .05$. In addition, the three-way interaction between mindfulness, habit, and intentions was not statistically significant, $\Delta F(1) = 2.62, p > .05$.

2. The statistically significant interaction between mindfulness and intentions does not reflect a suppressor effect that is due to other variables contained in the regression analysis (e.g., intentions, attitudes, perceived behavioral control, subjective norms, habit, and Habit \times Intention interactions). This is because a hierarchical regression analysis predicting physical activity from intentions (first step), mindfulness (second step), and Mindfulness \times Intentions interaction (third step) revealed a statistically significant interaction between mindfulness and intentions, $\Delta F(1) = 4.78, p < .05$.

3. Additional analysis supported statistically significant interactions between physical activity intention and binge-drinking intentions, $\Delta F(1) = 20.19, p < .05$, and between habitual exercising and habitual binge-drinking, $\Delta F(1) = 4.59, p < .05$, in the prediction of physical activity behavior. However, the three-way interactions between mindfulness, habitual binge-drinking, and exercise intentions, $\Delta F(1) = .33, p < .05$, and between mindfulness, binge-drinking intentions, and exercise intentions, $\Delta F(1) = 2.25, p < .05$, were not statistically significant. Analysis of the statistically significant interactions revealed that habitual exercising was positively associated with physical activity among individuals who were not habitual binge-drinkers ($\beta = .13, p < .05$). The relationship between habitual exercising and physical activity participation was negative among individuals who were habitual binge-drinkers ($\beta = -.13, p < .05$). Similarly, physical activity intentions were positively associated with physical activity behavior among individuals who did not intend to binge-drink ($\beta = .93, p < .05$), whereas the same relationship was negative among individuals who intended to binge-drink ($\beta = -.17, p < .05$). Finally,

the interactions between binge-drinking intentions and habitual drinking, $\Delta F(1) = .12, p > .05$; between mindfulness and habitual exercise, $\Delta F(1) = .00, p > .05$; between habitual exercising and binge-drinking intentions, $\Delta F(1) = .00, p > .05$; between habitual binge-drinking and physical activity intentions, $\Delta F(1) = .31, p > .05$; and between mindfulness, habitual exercising, and exercise intentions were not statistically significant, $\Delta F(1) = .02, p > .05$.

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