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BRIEF REPORT



Trait mindfulness and intrinsic exercise motivation uniquely contribute to exercise self-efficacy

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ABSTRACT

Objective: Traditional views of exercise motivation emphasize the long-term health benefits of exercise. We investigated whether mindfulness, present-moment awareness, is associated with greater exercise motivation and exercise self-efficacy in college students. Exercise self-efficacy reflects how confident individuals are that they can persist in exercising despite obstacles. **Participants:** Undergraduate students ($N=188$) were recruited from the psychology participant pool in Fall 2017. **Methods:** Participants completed an online survey assessing trait mindfulness, exercise motivation, exercise self-efficacy, and demographic information. **Results:** Hierarchical regression analyses revealed positive associations between intrinsic and extrinsic exercise motivation and exercise self-efficacy, mindfulness and intrinsic exercise motivation, and mindfulness and exercise self-efficacy. The latter relationship was partially mediated by intrinsic exercise motivation. Extrinsic exercise motivation was not associated with mindfulness. **Conclusions:** Both mindfulness and intrinsic exercise motivation independently predict exercise self-efficacy, suggesting that mindfulness may uniquely contribute to positive health behaviors in college students.

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Introduction

Traditional theories of exercise motivation emphasize the role of rational decision-making processes.¹ Specifically, traditional theories suggest that individuals are more likely to engage in exercise and physical activity when the benefits of exercise (ie improved mental and physical health) and risks of not exercising (ie increased risk of cardiovascular disease) are emphasized.² However, such extrinsic incentives do not appear to be sufficient in motivating college students to engage in exercise.³

Despite well-documented positive health effects of physical activity, fewer than half of US college students exercise sufficiently to meet minimal criteria for health protective from the American College of Sports Medicine guidelines for physical activity,⁴ a pattern evident in the population at large.⁵ These startling statistics raise the question of why college students are not motivated to exercise, despite its benefits. Our research examined the relative contribution of mindfulness to exercise motivation and exercise self-efficacy.

Mindfulness is defined as an awareness that comes from paying attention in the present moment, as opposed to thinking about the future or ruminating over the past, and being nonjudgmental to the unfolding of each experience moment by moment.⁶ Mindfulness is one of several attributes articulated in early Buddhist philosophy associated with the nature of *suffering* (stress, conflict, distress) and its cessation.⁷ A common cause of suffering, according to this perspective, is dissatisfaction with one's current circumstances

due to idealized memories of the past and/or preoccupation with future expectations. Applied to exercise, mindfulness may be an antidote to discouragement and impatience that arises when one is overly focused on future outcomes (such as losing weight or getting in shape) that often reflect extrinsic motivational pressures, rather than any enjoyment or personal satisfaction with the present-moment experience of being physically active.^{3,8}

However, to date little attention has been given to the role of mindfulness in encouraging physical activity, although initial results are promising. Murphy, Mermelstein, Edwards, and Gidycz⁹ and Roberts and Danoff-Burg¹⁰ showed positive associations between mindfulness and several health parameters (healthy eating, sleep quality, physical health), but neither study included exercise. Dutton¹¹ found that mindful awareness and acceptance of thoughts, emotions, and physical sensations were associated with heightened awareness of the importance of positive health behaviors, including exercise (healthy eating, exercising regularly, and sufficient sleep). Gilbert and Waltz¹² reported a positive association between mindfulness and physical activity level (minutes per week), as well as between mindfulness and exercise self-efficacy in undergraduates. Ulmer, Stetson, and Salmon¹³ determined that greater mindfulness among exercisers promotes increased exercise maintenance.

The current study builds on these results and others,¹⁴⁻¹⁶ by examining the relationship between mindfulness and self-efficacy as well as exercise motivation. *Exercise self-efficacy*

gauges the extent to which individuals believe they are capable of being physically active and able to remain so despite various challenges, including fatigue, boredom, and environmental conditions.¹⁷ The term extends from the self-efficacy literature. *Self-efficacy* more generally refers to self-confidence in a specific situation – the extent to which individuals believe they can perform a specific behavior, given their capabilities in a particular situation.¹⁸ Self-efficacy influences whether a behavior is initiated, how much effort is expended, and how long it is sustained in the face of obstacles or aversive experiences.¹⁹ Exercise self-efficacy has a positive relationship not only with physical activity but also *exercise motivation* – motivation to be physically active.^{20,21}

Exercise motivation has been widely studied. For example, research using self-determination theory has shown that exercise contexts that support individuals' autonomy lead to greater persistence in exercise behaviors.²² Self-determination theory explains how fundamental needs drive persistence and well-being, and differentiates between intrinsic and extrinsic subtypes of exercise motivation.^{23,24} *Intrinsic motivation* reflects inner-directed, personally valued behavior, whereas *extrinsic motivation* is driven primarily by external reinforcement and pressure.²⁵ When individuals are intrinsically motivated, interest and enjoyment are increased, and they are less easily deterred or distracted from working on the task.²⁰ Intrinsic motivation is associated with long-term adherence to exercise, whereas extrinsic motivation is not.²⁶

We propose that mindfulness is most strongly associated with intrinsic motivation and that both mindfulness and intrinsic motivation are related to exercise self-efficacy. Mindfulness heightens awareness of internal, present-moment sensations (ie breathing rate, sense of exertion).³ This internal focus of attention likely increases intrinsic motivation, but it may have additional effects as well.

Previous research has demonstrated that mindfulness and intrinsic motivation considered separately have positive associations with physical activity for college students.²⁷ Our study examines both the independent and joint impacts of these two variables on confidence in persisting in physical activity (ie exercise self-efficacy). Specifically, we examined four hypotheses: (1) Mindfulness will be positively associated with intrinsic exercise motivation, but not extrinsic exercise motivation; (2) mindfulness will be positively associated with exercise self-efficacy; (3) intrinsic exercise motivation will be positively associated with exercise self-efficacy; and (4) the relationship between mindfulness and exercise self-efficacy will be partially mediated by intrinsic exercise motivation. These findings would demonstrate that mindfulness and intrinsic exercise motivation have facilitative effects on self-efficacy, both separately and combined.

Methods

Participants

Undergraduates ($N = 188$; 84% women; age $M = 19.83$ years, $SD = 2.62$) received credit for research participation in psychology courses in Fall 2017. The majority identified as Caucasian (72.9%), with the remainder African-American

(13.3%), Hispanic or Latino (2.7%), Asian (2.1%), or other (8.5%). Ten additional participants were excluded for failing all three attention check questions interspersed throughout the survey (eg “If you are reading this, select 3”). Participants accessed the online survey through the university's psychology research study Web site. They were directed to this Web site from psychology courses that offered credit for research participation.

Measures

This study was conducted as part of a larger survey study assessing separate research questions about the role of mindfulness in exercise motivation; three measures were relevant to the current research questions.

Self-efficacy in exercise scale (SEE)

The SEE is a nine-item self-report measure of exercise self-efficacy (average Cronbach's $\alpha = .92$).¹⁷ The questionnaire uses the stem, “How confident are you right now that you could exercise three times per week for 20 minutes if...” Then, nine conditions are posed (eg “if the weather was bothering you”; “you felt tired”). This study employed a 10-point Likert scale, ranging from 1 (not confident) to 10 (very confident). Total scores summed responses to each of the questions (range 9–90), with higher scores indicating greater exercise self-efficacy.

Mindful attention awareness scale (MAAS)

The MAAS is a 15-item self-report measure assessing trait mindfulness (Cronbach's $\alpha = .80-.90$).²⁸ Using a six-point Likert scale, ranging from 1 (almost always) to 6 (almost never), the MAAS measures the frequency of everyday experiences, focusing on attention and awareness (eg “I find myself preoccupied with the future or the past”). Scores average the 15 items (maximum 6), with higher scores reflecting greater mindfulness. The MAAS has been validated for use with college students and community adults.²⁸

Exercise motivation inventory (EMI-2)

The EMI-2 is a 51-item self-report measure of motivations to participate in physical activity (Cronbach's $\alpha = .63-.90$).²⁹ The EMI-2 is comprised of 14 scales assessing motives for physical activity. The 14 EMI-2 subscales are further divided into three motivation categories: intrinsic, extrinsic, and “other.” The first two were relevant to this study. The intrinsic category consists of five subscales: stress management, revitalization, enjoyment, challenge, and positive health. The extrinsic category consists of five subscales: social recognition, affiliation, competition, weight loss, and appearance.

Procedure

Order of the questionnaires and items within the questionnaires were randomized for each participant. The study began with a description of procedures, followed by the

Table 1. Correlations between intrinsic and extrinsic exercise motivation subscales and mindfulness and exercise self-efficacy.

	Mindfulness	Exercise self-efficacy
Intrinsic subscale		
Stress management	.20	.45***
Revitalization	.20**	.55***
Enjoyment	.18*	.53***
Challenge	.17*	.47***
Positive health	.14 [†]	.35***
Extrinsic subscale		
Social recognition	-.15*	.23**
Affiliation	.05	.21**
Competition	.08	.33***
Weight management	-.08	.14
Appearance	-.02	.20**

Note: [†] $p < .06$, * $p < .05$, ** $p < .01$, *** $p < .001$.

informed consent form approved by the Institutional Review Board (IRB) at the authors' university (IRB Protocol #17.0910). Participants who provided consent clicked "I agree" to continue the questionnaires. The full study took approximately 20–30 minutes to complete.

Results

Although our primary hypotheses for exercise motivation included the composite intrinsic and extrinsic exercise motivation subscales, we first conducted exploratory correlational analyses to examine the relationship between mindfulness and each of the EMI-2 facets composing these subscales (Table 1). Mindfulness was significantly positively correlated with three of the five intrinsic facets (revitalization, enjoyment, and challenge). Mindfulness was only significantly correlated (negatively) with one of the five extrinsic facets (social recognition). We also examined how these facets correlated with exercise self-efficacy. Exercise self-efficacy was significantly positively correlated with all five intrinsic facets and four of the five extrinsic facets (Table 1).

Hierarchical regressions using theoretically derived control variables (age, sex, and minority status [dichotomized]) were used to determine the relationships between mindfulness (MAAS), exercise motivation (intrinsic and extrinsic motivation subscales of the EMI-2), and exercise self-efficacy (SEE). As shown in Figure 1, mindfulness ($M = 3.39$, $SD = 0.75$) positively predicted intrinsic exercise motivation ($M = 71.01$, $SD = 9.52$; $\beta = .19$, $p = .013$), but not extrinsic exercise motivation ($M = 71.81$, $SD = 16.56$; $\beta = .06$, $p = .592$). Mindfulness also positively predicted exercise self-efficacy ($M = 48.37$, $SD = 19.00$; $\beta = .23$, $p < .002$). Intrinsic exercise motivation positively predicted exercise self-efficacy ($\beta = .517$, $p < .001$), whereas extrinsic exercise motivation did not ($\beta = .20$, $p = .078$).

A mediation analysis was conducted by including both mindfulness and intrinsic exercise motivation in the model predicting exercise self-efficacy.³⁰ The relationship between mindfulness and exercise self-efficacy was reduced, but remained statistically significant ($\beta = .14$, $p = .041$; Figure 1). This result indicates that intrinsic exercise motivation partially mediated the relationship between mindfulness and exercise self-efficacy. The relationship between intrinsic

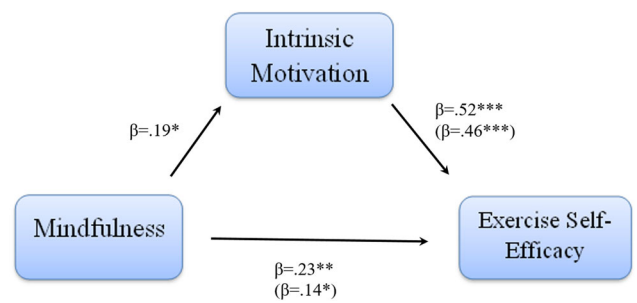


Figure 1. Mediation analyses. Model shows regression results from hypothesized relationships between mindfulness, intrinsic motivation, and exercise self-efficacy. Significant regression coefficients (β) are presented. * $p < .05$; ** $p < .01$; *** $p < .001$. Parentheses indicate regression model with intrinsic motivation as a mediator.

exercise motivation and exercise self-efficacy also remained significant ($\beta = .46$, $p < .001$). Thus, mindfulness and intrinsic exercise motivation had both independent and joint effects on exercise self-efficacy.

Comment

Although research has established a relationship between exercise motivation and exercise self-efficacy,²¹ the impact of mindfulness on this relationship has not been previously investigated. We found a significant positive effect of mindfulness on exercise self-efficacy. Intrinsic exercise motivation partially accounted for this effect, but mindfulness carried an additional, separate impact. These findings suggest that, although mindfulness impacts exercise self-efficacy by increasing intrinsic exercise motivation, mindfulness also contributes something to exercise self-efficacy that intrinsic motivation does not.

These findings are consistent with theory addressing the importance of mindfulness and intrinsic motivation to overcoming exercise failure.³ These findings also suggest that mindfulness training interventions may be important for college students who are struggling to maintain physical activity. Fewer than half of college students – and an even smaller percentage of the general US population (5%) – get the recommended amount of physical activity.^{4,5} Current methods of motivating individuals toward health goals, with a focus on long-term, often extrinsic, motivators, seem to fall short. Mindfulness training offers a promising method to address this problem.

Specifically, mindfulness is associated with awareness of present-moment sensations and thought. Mindfulness is viewed as both a trait and state factor and can be increased with practice. Interestingly, of the five intrinsic exercise motivation subscales measured, mindfulness was significantly correlated with three of these: revitalization, enjoyment, and challenge. These three subscales are arguably more associated with present-moment attention, whereas the other two facets are focused on longer-term goals (stress management, positive health). Mindfulness was also not associated with the extrinsic facets, except for a negative correlation with social recognition. The extrinsic goals

are also centered on long-term goals (eg weight management, appearance).

Limitations

The current findings suggest that mindfulness may increase students' confidence in their ability to exercise despite obstacles. However, these correlational analyses limit our ability to know whether mindfulness causes changes in exercise self-efficacy. Mindfulness interventions offer a feasible method to determine causality in future research. In addition, the order of factors in our mediation model was derived from a theoretical stance that trait factors (ie mindfulness) impact the state-based factors (ie intrinsic exercise motivation), and subsequently attitudes or behavior (ie exercise self-efficacy). However, it remains possible that the direction of these relationships is reversed (eg trait mindfulness may be determined by intrinsic motivation). Finally, we selected exercise self-efficacy as our outcome variable because it is known to be a precursor and closely related to exercise behavior. However, future work is needed to establish that the tested model also extends to exercise behaviors.

Conclusion

Research examining mindfulness has grown exponentially, demonstrating benefits to stress reduction and even academic performance in college students.^{31–34} However, much less research has examined the impact of mindfulness on exercise attitudes. Our findings demonstrate that mindfulness is associated with positive impacts on intrinsic motivation and self-efficacy for exercise. These results add to theory on factors that increase exercise behaviors, as well as suggest a potentially fruitful method (ie mindfulness training) to improve healthy behaviors for college students.

Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of the United States and received approval from the Institutional Review Board of University of Louisville.

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