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Engagement in Mindfulness Exercises during Large Lectures and Students' Writing Self-Efficacy

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Abstract
The purpose of this study was to examine the association between greater engagement (i.e., number of times participated) in mindfulness exercises administered in large university lectures and students' writing self-efficacy. For eight weeks, a breathing exercise was administered to students in one lecture section, and a progressive muscle relaxation (PMR) exercise was administered to students in another lecture section of the same course. Participants (n = 147) completed measures of writing self-efficacy before (T1) and after (T2) the eight-week exercise period. Engagement was greater in the breathing exercise than in the PMR exercise ($p < .05$). Writing self-efficacy was marginally greater ($p = .08$) at T2 for those administered the breathing exercise than for those administered the PMR exercise. Correlational analyses further showed that engagement in the breathing exercise was associated with writing self-efficacy at T2 ($p < .01$), but engagement in the PMR exercise was not ($p = .21$). We conclude with implications for course instructors using mindfulness exercises to enhance desirable writing outcomes.

L'objectif de cette étude était d'examiner le lien entre une participation accrue (c.-à-d. le nombre de fois qu'une personne a participé) à des exercices de pleine conscience administrés lors de cours magistraux dans de grandes classes d'université et l'auto-efficacité des étudiants et des étudiantes en matière d'écriture. Pendant huit semaines, un exercice de respiration a été administré aux étudiants et aux étudiantes d'une section particulière alors qu'un exercice de relaxation musculaire progressive a été administré aux étudiants et aux étudiantes d'une autre section du même cours. Les participants et les participantes (n = 147) ont complété les mesures d'auto-efficacité en matière d'écriture avant (T1) et après (T2) la période d'exercices de huit semaines. La participation était plus importante parmi le groupe qui avait fait les exercices de respiration que parmi le groupe qui avait fait les exercices de relaxation musculaire progressive ($p < .05$). L'auto-efficacité en matière d'écriture était marginalement plus importante ($p = .08$) en T2 pour ceux et celles à qui on avait administré les exercices de respiration que pour ceux et celles à qui ont avait administré les exercices de relaxation musculaire progressive. Les analyses corrélationnelles ont également montré que la participation aux exercices de respiration était liée à l'auto-efficacité en matière d'écriture en T2 ($p < 0.1$) mais la participation aux exercices de relaxation musculaire progressive ne l'était pas ($p = .21$). Nous concluons en présentant aux instructeurs et aux instructrices les implications qu'il y a à utiliser des exercices de pleine conscience pour améliorer les résultats désirables en matière d'écriture.

Keywords
writing, breathing, progressive muscle relaxation, student engagement, correlations; écriture, respiration, relaxation musculaire progressive, participation des étudiants et des étudiantes, corrélation

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The ability to write well is associated with academic success (Mascle, 2013) and is desired by employers (Rios et al., 2020). Writing self-efficacy is a critical determinant of such ability. Writing self-efficacy is a belief in one's own capability to perform well on a given writing task, such as writing an essay (Pajares et al., 2006). Greater writing self-efficacy is associated with greater performance in writing tasks because confidence in one's ability motivates effort, persistence, and high performance (Hidi & Boscolo, 2008; MacArthur et al., 2015; Pajares & Valiante, 2006). Surprisingly, little research has examined the antecedents of writing self-efficacy. Identifying strategies for enhancing writing self-efficacy is central to supporting students' writing success. In this paper, we contend that mindfulness exercises could fulfill this objective.

Mindfulness Exercises

Mindfulness exercises are forms of meditation that encourage an awareness of the present, including what one is sensing and feeling in the moment (Kabat-Zinn, 1994). Examples of such exercises include breathing exercises, guided imagery, and other relaxation practices. These exercises are believed to promote relaxation and direct attention away from negative thoughts (Kabat-Zinn, 1994). More than that, studies show that mindfulness exercises can produce desirable changes in brain function and behaviour (Fox et al., 2014; Hölzel et al., 2011). Following negative experiences in particular, practicing mindfulness can lower heart and respiratory rates, blood pressure, and muscle tension, all of which are associated with greater health and well-being (Chiesa & Serretti, 2010; Lumma et al., 2015).

Mindfulness exercises have been administered in the context of higher education and research has shown that they have positive outcomes for students. The practice of mindfulness exercises has been associated with greater student well-being (Baer, 2003; Baer et al., 2006; Halladay et al., 2018; Huppert & Johnson, 2010), reduced exam stress (Beddoe & Murphy, 2004), and improved classroom attention (Xu et al., 2017). This suggests that students may realize several benefits from engaging in mindfulness.

An emerging line of research further suggests that mindfulness exercises may also have desirable effects on students' thoughts and feelings about writing. Participants in a recent study (Britt et al., 2018) were randomly assigned to a mindfulness exercise or a control condition. That mindfulness exercise involved a focus on breathing which the authors suggest "[…] redirects the mind's attention from discursive thoughts to the inhaling and exhaling of breath" (Britt et al., 2018, p. 695). The study found that participants in the mindful breathing condition reported lower apprehension about writing tasks than did those in the control condition. This area of research appears promising for improving students' thoughts and feelings about writing in a post-secondary context.

Writing Self-Efficacy

While reducing apprehension about writing is important, improving writing self-efficacy can also promote writing success (Pajares & Valiante, 2006; Sanders-Reio et al., 2014). To have high writing self-efficacy is to be certain of one's ability to succeed during writing tasks (e.g., doing well on an essay). Belief in one's own ability is considered to be one of the most general predictors of success in post-secondary settings (Honicke & Broadbent, 2016), perhaps because a lack of confidence inhibits performance.

Bandura's (1997) social cognitive theory has been a cornerstone of understanding self-efficacy across various domains. The theory suggests that four factors influence self-efficacy: past performances, vicarious experiences, social persuasion, and physiological or affective states. Self-efficacy is enhanced when individuals have had previous successes or at least learned from previous failures (past performances), observe and learn from influential others' successes and failures (vicarious experience), receive encouragement from others (social persuasion), and experience more positive sensations in association with a given activity (physiological or affective states). The focus of this study is the latter of these factors, that of managing one's physiological and affective states.

Anxiety, apprehension, and negative affect are negatively associated with self-efficacy. When individuals feel nervous about performing, their confidence in performing is diminished (Hanton et al., 2008). Similarly, when individuals' mental states are more relaxed and positive, they are more confident in their abilities (Hanton et al., 2008). This association has been observed in the context of writing. The more negative and apprehensive students are about writing, the lower their writing self-efficacy, and in turn the less likely they are to produce successful work (Mascle, 2013; O'Neill & Gravois, 2017).

When faced with a challenging task, such as writing, mindfulness exercises may reduce students' negative thoughts and feelings. Kabat-Zinn (1994) suggests that mindfulness practice encourages a psychological presence which deepens engagement in one's present tasks. This presence and deeper engagement can reduce negative affect and increase positive affect. Consistent with Bandura's (1997) model, this is posited to increase writing self-efficacy.

Research in the context of writing has provided some support for this. In one study (Stewart et al., 2015), students who self-regulated their thoughts and emotions more (versus less) also reported lower (versus higher) writing apprehension and higher (versus lower) writing self-efficacy. In another study, Britt et al. (2018) found that college students who participated in a mindful breathing intervention showed a significant decrease in writing anxiety compared to students who did not participate in the intervention. These students also demonstrated fewer writing errors in a writing task. These studies suggest that mindfulness exercises have the potential to enhance writing self-efficacy.

Engagement in the Exercise

The assumption in previous research (e.g., Britt et al., 2018; Xu, et al., 2017) is that students are engaged in mindfulness exercises when those exercises are administered. In turn, because of that engagement, mindfulness exercises are believed to enhance desirable writing-related outcomes. We define engagement as the number of times over the course of an intervention that students participate in the administered exercise. Students who are more (versus less) engaged are present in class, and their attention is devoted to tasks presented by instructors (Fredricks et al., 2004). This is consistent with previous definitions of student engagement that emphasize active involvement in classroom activities (e.g., Sinatra et al., 2015).

We note that such engagement is not guaranteed during a mindfulness exercise. While engagement might be more likely in small group settings (e.g., tutorials) where educators can monitor students closely, engagement in larger classrooms may vary greatly. It is no surprise that large lecture settings can create an experience of anonymity and distraction which can lead to disengagement (Fenollar et al., 2007). Consequently, some students will likely lose interest and attend elsewhere (e.g., start looking at their phones and other devices). Even when instructors

deliver rich content, some students engage more in class exercises and others engage less (Shernoff et al., 2017).

This observation poses a challenge for those who seek to administer mindfulness exercises to enhance writing self-efficacy in large classroom settings. Without student engagement, it is unlikely that such exercises will generate the desired outcomes. Fitness research demonstrates the problem of ignoring engagement. It notes that exercise programs are clearly effective for improving physical health, but only among those who adhere to such programs over time (Sperandei et al., 2016). Likewise, the depth of students' engagement in mindfulness exercises may be central to understanding how those exercises enhance writing self-efficacy. Unfortunately, as Britt et al. (2018) remarked, mindfulness exercises "in educational research continue to be controversial" (p. 704) and many students have adverse attitudes towards such exercises.

The Present Study

The literature suggests that engagement in mindfulness exercises may be related to students' writing self-efficacy. However, we know little about which mindfulness exercises students find most engaging. The purpose of this study was to examine the relationship between engagement in mindfulness exercises and students' writing self-efficacy. We presented students with one of two mindfulness exercises over the course of a semester and tracked their engagement in these exercises. We then examined whether deeper engagement was associated with students' writing self-efficacy at the end of the study. The study is novel in two ways. First, it compares engagement in a mindfulness breathing exercise to engagement in a progressive muscle relaxation (PMR) exercise. Both exercises fit within Bandura's (1997) assertion that relaxing the body and mind should improve self-efficacy. Yet, it is unclear whether students find one more engaging than the other and how differences in engagement might be associated with greater writing self-efficacy. Second, whereas previous research (Britt et al., 2018) has assumed students' engagement in mindfulness exercises, we measure students' engagement and examine its relationship to post-exercise outcomes.

Method

Study Design

The study was conducted in the context of a large multidisciplinary and writing-intensive course at a research-intensive university in Canada. Students in this course were first-year students studying applied health sciences (e.g., kinesiology, health studies, leisure studies). The course was delivered in two sections with approximately 350 students in each. We administered one of two types of mindfulness exercises to each section for eight weeks. A breathing exercise was administered to students in one lecture section, and a PMR exercise was administered to students in another lecture section. The study ran for eight weeks because the effects of mindfulness may require multiple exercises (Halladay et al., 2018) and because we aimed to replicate the timeline used in similar research (e.g., Britt et al., 2018). The study was approved by the institutional research ethics board (project # 22382).

Procedure

Participants completed a questionnaire in the first week of the term. The questionnaire assessed students' demographic characteristics in addition to the study's target variable, that of writing self-efficacy. Participants took approximately 20 minutes to complete the questionnaire. Mindfulness exercises were then introduced in the second week of the course and continued for eight classes (one exercise per week). At the beginning of each class, a research assistant played the same audio recording such that one section always received a breathing exercise and the other section always received a PMR exercise. The audio recordings were played through the classroom audio equipment to ensure proper volume. The lights were also dimmed to ensure an appropriate ambiance. Students were instructed to put away all electronic devices. They were reminded that participation was voluntary and that those who chose not to participate should refrain from distracting those who did choose to participate.

Participants completed a second questionnaire after the eight weeks of mindfulness exercises. This questionnaire was identical to the first questionnaire except that demographic questions were removed and items regarding students' engagement in the exercises were included. None of the personnel associated with the course (i.e., course instructor, teaching assistants) were present for any part of students' participation in the study. In appreciation for their time, participants could enter a draw for one of several nominal gift cards to a campus retail store.

Mindfulness Exercises

A breathing exercise was administered to one section of the course. This exercise was based on a previously developed mindful breathing script (Stone, 2011). Students were instructed to sit quietly as they listened to the audio recording of that script, which was approximately 8-minutes long. An example sentence from this script is "When the mind wanders, bring your attention back to the breath, knowing that you can always use the awareness of your breath to refocus your attention, to return to the present" (p. 2). This script was appealing because it was consistent with the core tenets of mindfulness (e.g., recognizing but then letting go of distractions) (Kabat-Zinn, 1994).

Students in the other section of the course listened to a PMR script (Williams, 2010). The PMR script was virtually identical in length to the breathing exercise script. The PMR script instructed students to tense and relax muscles in their body to recognize the difference in those two feelings in order to induce physiological relaxation. An excerpt of the script is as follows:

> Tense the muscles of the dominant upper arm by pushing your elbow down against the floor or back of the chair. Feel the tension in the biceps without involving the muscles in the lower arm and hand…Okay, release the tension all at once (p. 254).

Measures

Two measures were of interest. The first was writing self-efficacy. Writing self-efficacy was measured with a modified version of the Writing Self-Efficacy Index (WSI; Sanders-Reio, 2010). We selected 32 of the original 60 items, specifically those pertaining to self-regulation of writing, substantive writing issues, and mechanical writing issues. An example item is "I can start writing without difficulty." These items were selected because they best represented writing self-

efficacy in relation to the demands of the course writing assignments. Bandura (1997) suggested that self-efficacy measures should closely represent the task at hand. Participants were instructed to rate how confident they were to perform tasks described in each item from 0 (complete lack of confidence) to 100 (total confidence). A mean score was calculated for the entire scale as an overall measure of writing self-efficacy. This measure was identical on the pre-intervention questionnaire and post-intervention questionnaire. Reliability was acceptable for both questionnaires (pre-intervention: $\alpha = .94$; post-intervention: $\alpha = .97$).

The second measure of interest was student engagement. On the post-intervention questionnaire, participants indicated the number of times during the mindfulness exercise period that they had participated in their assigned mindfulness exercise (from 0 to 8).

Results

We first examined between-condition differences in writing self-efficacy prior to the mindfulness exercises (T1) and again after the mindfulness exercises (T2), and whether writing self-efficacy improved from T1 to T2 for participants in each condition. As expected, independent samples t-tests showed that there was no difference in T1 writing self-efficacy between participants in the breathing exercise condition ($M = 7.37$, $SD = 1.41$) and those in the PMR exercise condition ($M = 7.23$, $SD = 1.30$), $t(146) = .64$, $p = .52$. There was a significant increase in writing self-efficacy for participants in both conditions. A paired samples t-test showed that there was a significant change in writing self-efficacy from T1 ($M = 7.37$, $SD = 1.41$) to T2 $M = 8.10$, $SD = 1.10$ for those in the breathing exercise condition, $t(66) = 6.89$, $p < .001$. Similarly, there was a significant change in writing self-efficacy from T1 ($M = 7.23$, $SD = 1.30$) to T2 ($M = 7.73$, $SD = 1.46$) for those in the PMR condition, $t(79) = 3.07$, $p < .01$. This is expected given that participants took part in a writing-intensive course, which can improve students' writing self-efficacy (Pajares, 2003).

Results also show that there was a marginally significant difference in T2 writing self-efficacy between the two conditions. Participants in the breathing exercise condition ($M = 8.10$, $SD = 1.10$) had marginally greater writing self-efficacy at T2 compared to the participants in PMR exercise condition ($M = 7.73$, $SD = 1.46$), $t(146) = 1.74$, $p = .08$. These results suggest that writing self-efficacy was similar for participants in both conditions at the beginning of the course, and that participants in both conditions reported increased writing self-efficacy, but that increase was marginally greater for those administered the breathing exercise than for those administered the PMR exercise.

The Role of Engagement

One explanation for the results above is that engagement differed between the exercises. We expected that the more engaging an exercise is (i.e., the greater students' participation in that exercise), the greater participants' writing self-efficacy at the end of the intervention period. An independent samples t-test showed that engagement was greater for participants in the breathing exercise condition ($M = 4.09$, $SD = 2.33$) than for those in the PMR exercise condition ($M = 3.29$, $SD = 2.37$), $t(145) = 2.06$, $p < .05$. This result suggests that engagement was 24% greater in the breathing exercise condition, or the equivalent of one additional mindfulness session.

Given that engagement was higher for those in the breathing exercise condition, and that T2 writing self-efficacy was also higher in that condition, it was plausible that engagement and T2 writing self-efficacy were related. Indeed, correlational analyses support this assertion. The

relationship between engagement and T2 writing self-efficacy was significant among those administered the breathing exercise, $r(146) = .37$, $p = .004$. However, the relationship between engagement and T2 writing self-efficacy was not significant among those in the PMR exercise condition, $r(146) = .15$, $p = .21$.

Discussion

Mindfulness exercises have typically been administered in small group settings such as tutorials to develop students' writing self-efficacy (e.g., Britt et al., 2018). Within those settings, it is intuited that student engagement in mindfulness exercises is high. However, introductory courses that may include writing tasks may be delivered in large lecture formats. This setting may not be conducive to engagement in class activities (Fenollar et al., 2007), including mindfulness exercises. Indeed, we found that participants in our study joined in only half (four of eight) of the mindfulness breathing exercise sessions on average, and even fewer (roughly three of eight sessions, on average) sessions of the PMR exercise. This finding is consistent with Britt et al.'s (2018) assertion that students may be hesitant to take part in mindfulness exercises. It is also consistent with student engagement literature (e.g., Fenollar et al., 2007) which suggests that any number of factors (e.g., smart phones, other students, uncomfortable chairs) can conspire against educators and distract students from in-class activities. Insights from our study offer recommendations for maximizing students' engagement in mindfulness exercises to enhance writing self-efficacy.

Critically, improvements in writing self-efficacy were marginally greater among those in the breathing exercise condition than those in the PMR exercise condition. This improvement was associated with differences in engagement between the two conditions. Engagement was greater among those administered the breathing exercise than those offered the PMR exercise, and greater engagement in the breathing exercise (but not PMR exercise) was associated with increased writing self-efficacy. This is consistent with research on the benefits of mindful breathing. Britt et al. (2018) demonstrated that participation in mindfulness exercises in small group settings decreases writing apprehension and increases writing self-efficacy relative to those in a control condition. Participants in our study also demonstrated an appreciable increase in writing self-efficacy after a breathing exercise relative to those who did not participate in that exercise.

Conversely, our results suggest that the PMR exercise had less potential to enhance students' writing self-efficacy. Students' engagement was lower in the PMR exercise than breathing exercise, and engagement in the PMR exercise was not associated with greater writing self-efficacy at the end of the semester. Bandura (1997) theorized that physiological and affective states are important determinants of self-efficacy. PMR involves the regulation of physiological muscle tension and so could act as a determinant of self-efficacy. However, this was not the case in the present study. Instead, students' mental states (e.g., relaxation, psychological presence) influenced by the breathing exercise but not PMR exercise may play a more important role in building students' writing self-efficacy (Sanders-Reio et al., 2014).

Collectively, our results provide two important insights. First, not all mindfulness exercises are made equal. There is an overwhelming number of mindfulness exercises available to course instructors. Yet, there is little guidance regarding which exercises are appropriate for improving writing self-efficacy in classroom settings. Some may have greater potential to positively influence students' writing self-efficacy than others. Our study demonstrates that a mindfulness breathing

exercise might have strong potential to enhance writing self-efficacy whereas a PMR exercise may not.

Second, our findings extend the literature on mindfulness and writing self-efficacy (Britt et al., 2018) by demonstrating that engagement in the appropriate mindfulness exercise may be central to understanding how mindfulness exercises generate desirable writing outcomes. The student engagement literature provides a clear explanation for this result. Students who are engaged in a class activity will more deeply encode information compared to students who are not engaged in the activity (Baddeley et al., 1984; Hake, 1998). When it comes to engaging in the mindful breathing exercise, students in our study were actively focusing on their breathing and learning how to direct their attention away from distracting or stressful thoughts (Kabat-Zinn, 1994). Learning how to focus one's thoughts and emotions is a form of self-regulation, which has been posited to play an important role in student engagement (Kahu, 2013). We speculate then that deeper engagement in the breathing exercise promoted psychological states (e.g., relaxation) that were conducive to building students' writing self-efficacy over the course of the semester.

Implications for Course Instructors

As Lane and Harris (2015) suggest, it is important for instructors of large classes to engage students more deeply in the learning process. Our study suggests that this is also important in the context of improving writing self-efficacy. Consistent with practitioner recommendations for offering mindfulness exercises in classrooms (Roy, 2019), we argue that the challenge for instructors begins with generating buy-in from students. Below, we provide four recommendations regarding how instructors can generate that buy-in: presenting the case for mindfulness, connecting mindfulness to aspirational others, offering compassion, and modeling mindfulness.

Presenting the Case for Mindfulness

Course instructors might first present their case for mindfulness exercises. This could include a review research on mindfulness (Roy, 2019). The benefits of mindfulness are well-established in the literature (Davis & Hayes, 2011). There is also a wealth of literature regarding how researchers and/or administrators might teach mindfulness exercises to instructors (e.g., Emerson et al., 2017). This literature is relevant to instructors' ability to communicate about mindfulness to their students. As instructors become more knowledgeable about mindfulness, they are likely to be more confident in their own ability to discuss mindfulness with students. As they become more confident, instructors might better persuade students to try out mindfulness exercises.

Connecting Mindfulness to Aspirational Others

Second, course instructors might position mindfulness exercises as something done by those whom students aspire to be. Associating these exercises with prominent others positions mindfulness as something normal and acceptable, which others (Britt et al., 2018) have noted is an essential step in offering mindfulness exercises. This is of course a pillar of Bandura's (1997) theory in which positive reinforcement from others is posited to inspire confidence and thus to nudge students toward participation. In our own practice, which involves students in a first year Faculty of Health course, we note that stories about professional athletes' use of mindfulness are

compelling. There are countless other business moguls and famous titans of industry who use mindfulness exercises and to whom students may aspire. These could be highlighted to encourage engagement in mindfulness exercises.

Offering Compassion

Third, it is crucial that course instructors approach mindfulness and students with compassion (Roy, 2019). The popular wisdom is that mindfulness exercises are easy because they involve very few basic actions (e.g., sitting still and breathing). However, there are varying degrees of successful participation in mindfulness exercises. Moreover, many students might be apprehensive about mindfulness exercises and how to perform them well. Compassion could help address these anxieties. Course instructors could remind students that mindfulness is an individual activity and that students can "go at their own pace." They could also dedicate class time (e.g., 5 to 7 minutes) for discussions of mindfulness. Within those discussions, students can share their experiences and expectations of mindfulness as well as their hesitations about engaging in it. These are important steps toward sowing compassion and crating a "safe space" in which students can feel comfortable practicing mindfulness. Similarly, course instructors should remind students to be self-compassionate as they engage in mindfulness exercises. Students can do this by using positive and motivational self-talk and managing their expectations by setting small and realistic goals. For example, they could set out to engage in mindfulness for 30 seconds, 3 times per week, outside of classroom activities.

Modeling Mindfulness

Finally, course instructors should model participation in mindfulness exercises. Bandura (1997) notes that modelling behaviour can increase others' active participation through vicarious experience. More than that, students often look to course instructors as leaders (Balwant et al., 2014) and look to them for behavioural cues. Research on student-teacher dynamics (Bakker, 2005) also suggests that instructors' deeper engagement in mindfulness may spillover unto students' own engagement. These perspectives all suggest that when course instructors practice mindfulness themselves, they demonstrate to students that such practice is normal, acceptable, and appropriate. Students may then mimic that behaviour.

Limitations and Future Directions

The design of the present study did not include a control condition. As such, it is not possible to rule out alternative explanations for differences in writing self-efficacy between the conditions at the end of the semester. While it seems most plausible that deeper engagement in the breathing exercise was responsible for the present results, other explanations are possible. We cannot be certain that factors such as students' engagement in the morning versus the afternoon are not relevant. Additional research with more rigorous controls would allow us to make clearer conclusions about the role of mindfulness exercises in enhancing desirable writing outcomes.

While the results suggest that writing self-efficacy improved over the course of the semester, it is not clear whether such improvement persists. Future research might track the long-term implications of students' engagement in mindfulness activities. For example, would deeper engagement in a breathing exercise in one semester generate appreciably higher writing self-

efficacy in the following semester? Research that addresses this question would clarify the role of mindfulness exercises at a curriculum level, beyond a specific course.

Perhaps most important, further research is needed to understand the antecedents of students' engagement in mindfulness exercises. Our results show that engagement in such exercises varies between students. The exercise offered may influence engagement, but other factors may be important, too. What are those factors? We speculate that an array of students' own traits and characteristics, social conditions within the classroom, and instructor attitudes and behaviours influence student engagement in mindfulness exercises. This is consistent with Britt et al.'s (2018) assertion that student attitudes towards such exercises may be relevant to their engagement. A better understanding of potential antecedents would inform strategies that increase the efficacy of mindfulness interventions in relation to writing self-efficacy.

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