Examining the Impact Mindfulness Meditation on Measures of Mindfulness, Academic Self-Efficacy, and GPA in Online and On-Ground Learning Environments

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Abstract

Within this study, the researcher explored the relationship between mindfulness, learning strategies, and GPA by designing and administering a mindfulness meditation (MM) program. There were two versions of the MM program. One version was delivered in an online learning format, where the researcher did not interact with students. The other version was delivered in an on-ground learning format, where the researcher did interact with students. The results indicated significant differences between scores on baseline and follow-up measures of mindfulness, with some differences emerging between participants in the different versions of the intervention. The results also indicated significant differences in learning strategies such as test anxiety, critical thinking, and metacognitive self-regulation between baseline and follow-up. Lastly, the results indicated that academic self-efficacy (ASE) mediated the relationship between Effort Regulation (ER) and GPA for those who participated in the online version of the MM program. Implications pertaining to the results and recommendations for future research are provided in the article.

Keywords: Mindfulness, meditation, anxiety, online learning, stress

Introduction

The literature on mindfulness for students in schools is growing (Black & Fernando, 2014) and beginning to emerge for college students (Ramsburg & Youmans, 2014). Mindfulness meditation (MM) is considered a process where one consciously attends to their moment-to-moment experience without judgment, through anchoring on the breath (Brown, Ryan, & Creswell, 2007). Academic self-efficacy (ASE) is considered a variable that influences factors related to, and personal engagement with, the learning process (Schunk & Hanson, 1985; Schunk, Hanson, & Cox, 1987). Within the literature, researchers reported positively predictive relationships between mindfulness and various forms of self-efficacy (SE) (Bishop, 2002; Bowen et. al., 2009; Grossman, Niemann, Schmidt, & Walach, 2004). Within this study, the researcher will explore the relationship between mindfulness, ASE, and GPA.

Statement of the Problem

As stated, there is little research pertaining to mindfulness interventions among college students (Ramsburg & Youmans, 2014). Additionally, literature is clear that ASE influences the learning process and important academic outcomes, such as GPA. The literature is also clear in that there is evidence that suggested a relationship exists between mindfulness and various forms of SE. However, to date there is no published literature where researchers explored the relationship between mindfulness, ASE, and GPA through the implementation of an MM intervention in collegiate learning environments. Additional research is needed as MM could offer a wealth of possibility in terms of potential impacts for the well-

being of college students, their academic performance, and matters pertaining to the transformation of the learning process.

Purpose of the Study

The purpose of this study was to examine the impact of an MM intervention, hosted in online and on-ground learning environments, on measures of mindfulness, learning strategies, and GPA for students enrolled in undergraduate and graduate psychology classes at a small state school in the central United States. The research questions are provided below.

Research questions. The researcher used the following research questions to guide the analysis:

- Are there differences between students who received in person and online MM interventions on measures of mindfulness over time?
- Are there differences between students who received in person and online MM interventions on measures of learning strategies over time?
- Are there differences in the meditational effects of ASE on the relationship between effort regulation (ER) and GPA between participants in the online and on-ground MM groups?

Relevant Literature

Bean and Eaton (2000) identified three psychological processes that affected integration in a collegiate environment. Those processes are SE, behavioral coping mechanisms, and locus of control. They argued that these processes govern a student's ability to foster academic and social integration with an academic institution. As such, interventions that are able to impact positive changes in these processes could transform the learning process.

Regarding SE, Bandura (1977) initially argued that there were systemic and iterative interactions between the environment, behavior, and cognitions within his framework on social-cognitive theory. One factor that allows an individual to influence these interactions is SE. Bandura (1977, 2001) defined SE as one's capability to organize and execute behavioral strategies to achieve specific goals. Researchers also argued that SE should be measured at a level specific to the outcome domain (Bandura, 1986; Pajares, 1996). There is a great deal of research on SE and the relationship the construct has with other variables related to transformative learning.

Early research on SE and academic motivation indicated that SE influenced student levels of effort (Schunk & Hanson, 1985; Schunk, Hanson, & Cox, 1987) and persistence (Schunk, 1989). SE correlated with major choice, success in course work, and perseverance (Hackett & Betz, 1989; Lent, Brown, & Larkin, 1984). Researchers also presented information to suggest that SE provided motivation to learn through self-regulatory processes (Zimmerman, Bandura, & Martinez-Pons, 1992), self-monitoring (Bouffard-Bouchard, Parent, & Larivee, 1991), self-evaluation (Zimmerman & Bandura, 1994), and strategy use (Zimmerman & Martinez-Pons, 1990). The most interesting finding in each of these research endeavors was that SE aided in predicting standard measures of ability and prior performance within specific academic subjects, such as GPA. Specifically, meta-analytic work indicated ASE to be a better predictor of academic outcomes compared to general measures of SE (Multon, Brown, and Lent, 1991).

A literature search identified several prominent measures of ASE and resulted in the identification of the Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ aligned well with the social-cognitive model identified by Bandura (1977). The authors developed the MSLQ, "using a social-cognitive view of motivation and learning strategies, with a student represented as an active processor of information whose beliefs and cognitions mediated important instructional input and task characteristics" (Duncan & McKeachie, 2005, p. 117). Practitioners and adherents of the social-cognitive theoretical framework maintain that motivation and learning are not fixed traits; instead, motivation and learning are thought to be dynamic, pliable, contextually bound, and capable of being controlled by the student (Duncan & McKeachie, 2005); a position also supported by Bandura (1977) and his theories on the matter.

Regarding literature, there are a great deal of studies focused on the relationship between ASE, as measured by the MSLQ, and various variables, issues, and outcomes pertaining to transformative learning. ASE negatively predicted victimization and bullying in school situations (Andreou & Metallidou, 2004). Additionally, achievement goals predicted self-reported strategy use, SE, and test anxiety (Bandalos, Finney, & Geske, 2003). General SE is different, conceptually and empirically, from self-esteem and ASE uniquely predicted task performance (Chen, Gully, & Eden, 2004). Interventions helped move the needle on increased mastery orientation and ASE for learning, valuing of course, changes in cognitive strategy use, and reduction in test anxiety (Hofer & Yu, 2003). As such, ASE is a variable that reaches and influences many aspects of academic success and performance that could transform learning. ASE was a focal point within this research project.

For this study, Mindfulness Meditation is considered a process where one consciously attends to their moment-to-moment experience (Brown, Ryan, & Creswell, 2007), becomes aware of their experience (not avoiding or distracting), and does not attach to their experience (Strauss, Cavanaugh, Oliver, & Pettman, 2014). Why mindfulness? Researchers and practitioners of MM, "integrated the practice into Western medicine and psychology by demonstrating the efficacy of several MT programs to reduce stress and distress in healthy people" (Carmody, 2016, p. 64). The literature indicated that people suffering from a multitude of medical and psychological conditions reported improvements in their conditions and functioning after undergoing a mindfulness training protocol, specifically mindfulness-based stress reduction (MBSR). The setting of this document does not allow for an exhaustive review of the MM literature. However, this document does provide the space necessary to discuss the relationships between MM and SE, a factor pertinent to the learning environment.

From the outset, researchers theorized that MBSR and MM could help improve SE and control (Bishop, 2002; Bowen et. al., 2009; Grossman et al., 2004). Researchers explored the interaction of MM and several different, context specific forms, of SE. In general, findings in the literature indicated a positive and predictive relationship between a meditative practice and SE (Chang et. al., 2004). The literature contained reports of differences in SE for meditators in Thailand compared to those who did not meditate (Charoensukmongkol, 2014). Researchers explored the combined predictive quality of mindfulness, self-compassion, and SE on depression, anxiety, stress, and well-being and determined that mindfulness positively impacted both SE and the issues pertaining to mental health listed above (Soysa & Wilcomb, 2013). Mindfulness significantly and positively correlated with higher levels of counseling SE (Greason & Cashwell, 2009). The definition of counseling SE is very similar to academic SE; both are context dependent and regard individual beliefs regarding performance within the domain. Findings in the literature also suggested that mindfulness could mediate the relationship between SE and various outcome variables.

Specifically, multiple mediation analyses indicated mindfulness, as influenced by a meditation protocol, to be a significant predictor of counseling SE. (Greason & Cashwell, 2009). Coping SE mediated the relationship between mindfulness and emotion regulation (Luberto, Cotton, McLeish, Mingione, & O'Bryan, 2014). Mindfulness significantly correlated with perceived level of coping SE and coping SE found to fully mediate relationship between dispositional mindfulness and NSSI (Heath, Joly, & Carsley, 2016). Coping SE partially meditated relationship between mindfulness and FLA (Fallah, 2017). These findings suggested that the relationship between mindfulness, SE, and outcome variables is not always direct and can be measured in the context of mediation and moderation.

The literature on mindfulness meditation for students in schools is growing (Black & Fernando, 2014) and beginning to emerge for college students (Ramsburg & Youmans, 2014). Additional research is needed as MM could offer a wealth of possibility in terms of potential impacts for the well-being of college students, their academic performance, and matters relating to student retention.

In this study, the researcher explored the impact of in person and virtual mindfulness interventions for students in on ground and online psychology classes on measures of mindfulness, strategies for learning, and measures of GPA. The researcher is a practitioner of MM, regularly teaches meditation classes, and is currently pursuing a certification to teach mindfulness-based stress reduction (MBSR) through the University of Massachusetts Medical School.

Theoretical Framework

The transformative learning framework was chosen for this research project. Transformative learning is considered an integrative process that allows students to be active and reflect on their learning experience. Transformative learning asks students to enhance their skills above those taught within their chosen discipline. Additionally, they are given the opportunity to broaden their perspective of their relationship with themselves, others, their community, and their environment.

To promote transformative learning, instructors must assist their students in developing awareness of their own and other's perspectives. Students need experience identifying their own perspectives and to reframe problems to obtain a new point of view. Students also need support to sufficiently engage in active discussion. Communication is essential to affirm perceptions and to come to a decision about a belief. Here, active discussion becomes intrinsic in making meaning (Mezirow, 1997, p. 10).

For example, professor Moira Martin, PhD (2018) endeavored to help her students become aware of their internal processes so they would become open to others in the classroom. She generated a transformative learning experience for her students by introducing brief mindfulness meditation practices at the beginning of her classes. Additionally, she had her students discuss their MM experiences with other students. As a result, her students were better able to participate in transformative learning. They were now able to connect with each other, enabling them to engage in open discussion (Martin, 2018). This endeavor provides a fitting foundation, which suggested that MM is a practice and tool through which learning can be explored and transformed.

Methodology

The researcher employed a quasi-experimental quantitative method within this exploratory study. Specifically, the researcher sought to examine the impact of a MM program on measures of: mindfulness, learning strategies, and GPA between students enrolled in online and on-ground psychology classes at a small state university in the central United States. There were two versions of the MM program. One version designed specifically for the online classes and another version designed for the on-ground classes.

Participants

One hundred undergraduate and graduate students, recruited from classes where the researcher was the instructor, enrolled and participated in the study. The age of participants ranged from 18 to 57 ($M = 25.32$, $SD = 8.94$). The majority of respondents were female (62%). The ethnicity of participants reflected enrollment numbers within the institution, with the majority of participants identifying as Caucasian (64%), Native American (16%), or African American (10%). The participants were nearly evenly divided between freshmen (24%), sophomores (14%), juniors (19%), seniors (28%), and graduate students (15%). Nearly half of participants were first generation college students (43%). The majority of participants were traditional college students having started college immediately after graduating from high school (77%).

Procedure

Participants were invited and recruited to participate through both undergraduate and graduate psychology courses, taught by the researcher. Students were given extra credit points for participation in the research. Extra credit points were only assigned if students completed both the baseline and follow-up measures. The invitation and recruitment process consisted of the researcher introducing students to the concept of MM, the purpose of the research, and inviting them to begin participation by completing the consent form and baseline measures for the project through an online survey. Students were instructed to meditate as often as their schedules would allow during the eight weeks that elapsed between the baseline and follow-up measures.

As stated, the researcher designed two different MM programs for evaluation within the research project. The researcher targeted the online version of the MM program toward students enrolled in online classes. The researcher did not physically interact with these students. Instead, the researcher sent an email with an introductory note and a link to a video explaining the research to invite and recruit these participants. Within the online MM program, the researcher recorded and provided videos orienting students to the practice of MM. Additionally, the researcher provided students access to guided meditations, hosted online, and recorded by the researcher. Both sitting and lying down meditations were provided to participants. The participants in the online MM program were encouraged to meditate as often as their schedule allowed.

The on-ground version of the MM program was slightly different than the online version. Participants enrolled in the on-ground version received the same introductory videos and recordings of guided meditations as the students in the online version. The difference is that the researcher did interact with these participants. Furthermore, the researcher led participants through brief, guided meditations before beginning each class. Students not participating in the research were allowed to do what they wished during this time. The researcher also instructed students on general topics related to mindfulness and meditation in class lectures during the duration of the program. As stated, the researcher provided recorded guided meditations, hosted online, for students to continue their practice at home. Students in the on-ground version of the program were instructed to meditate as often as their schedule allowed.

Measures

The researcher administered selected measures for the study before releasing the content for the respective MM programs, baseline, to the students and then again administered the measures eight weeks after baseline, referred to as follow-up. The researcher employed the Five Facets of Mindfulness Questionnaire (FFMQ) to measure facets of mindfulness (Baer et al., 2006; Baer et al., 2008). The researcher also elected to administer the Motivated Strategies for Learning Questionnaire (MSLQ) to assess various learning strategies (Duncan & McKeachie, 2005).

The FFMQ is a widely used measure in research regarding mindfulness and MM (Baer et al., 2006; Baer et al., 2008; Carmody, Baer, Lykins, & Olendzki, 2009; Keng, Smoski, & Robins, 2011). The measure assessed five facets of mindfulness related to observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. The FFMQ contained 39 items, with seven to eight items for each of the five facets. The scales for each item ranged from 1 (Never or very rarely true) to 5 (Very often or always true). Each of the scales had adequate to excellent internal consistency for both the baseline ($\alpha = .76–.95$) and follow-up ($\alpha = .70–.93$).

As stated, the researcher also elected to use the MSLQ to assess various learning strategies (Duncan & McKeachie, 2005). Researchers developed the MSLQ, "using a social-cognitive view of motivation and learning strategies, with a student represented as an active processor of information whose beliefs and cognitions mediated important instructional input and task characteristics" (Duncan & McKeachie, 2005, p. 117). Practitioners and adherents of the social-cognitive theoretical framework maintain that motivation and learning are not fixed traits; instead, motivation and learning are thought to be dynamic, pliable, contextually bound, and capable of being controlled by the student (Duncan & McKeachie, 2005); a position also supported by Bandura (1977) and his theories on the matter. To this point, the researcher believed the theoretical foundations of the measure aligned well with the theoretical foundations of transformative learning.

The MSLQ contains three sections. One section, containing 31 of the 81 items, focused on motivation, assessed beliefs regarding a course, academic self-efficacy, and test anxiety (TA) in the course. The second section, containing 31 of the 81 items, focused on learning strategies and assessed student use of cognitive and metacognitive strategies, specifically metacognitive self-regulation (MCSR). The last section focused on learning strategies, containing 19 of 81 items, and assessed how students manage different resources, specifically effort regulation (ER).

All items in the measure utilized a seven-point Likert-type scale and scale scores were calculated by averaging the scores for items within the scale. Researchers are allowed to select which scales to use

as the authors developed the measure so that the scales can be used interchangeably (Duncan & McKeachie, 2005). For the purposes of this research, the researcher elected to focus on measures related to ASE, TA, critical thinking (CT), MCSR, and ER. The researcher assessed the internal consistency of each of these measures at both baseline and follow-up (see Table 1). Both the CT and ER scales had slightly lower than acceptable levels of internal consistency at the baseline measurement. Lower levels of internal consistency are not uncommon in measures with so few items. The researcher elected to keep the measures given that these levels of internal consistency were in line with the internal consistencies published in the original measures and given the acceptable levels of internal consistency at the follow-up.

Table 1

Internal Consistency of MSLQ Measures Baseline & Follow-up

| | Baseline | | Follow-Up | |
	α	No. of Items	α	No. of Items
ASE	.86	8	.91	8
TA	.85	5	.84	5
CT	.68	5	.86	5
MCSR	.79	12	.77	12
ER	.68	4	.78	4

The researcher also assessed participant perceptions of meditation at the follow-up. Specifically, the researcher assessed participant enjoyment of meditation using a single item. The scale for the enjoyment of meditation item ranged from 1 (did not enjoy meditating) to 5 (very much enjoyed meditating). Participants were also asked to report the frequency of their meditation practice. The scale for the item pertaining to frequency of practice ranged from 1 (Struggled to consistently meditate) to 5 (Daily meditated). Participants were also asked to estimate the amount of time they meditated each week in minutes, their preferred form of meditation, the length of meditation they most preferred, and the likelihood that they would develop a daily mediation practice in the future.

Results

Regarding meditation, participants completed several measures assessing their attitudinal perspectives and behaviors associated with their meditation practices during the eight-week program. Regarding the enjoyment of meditation, there were no significant mean differences between participants in the online ($M = 4.00$, $SD = 1.07$) and on-ground ($M = 4.32$, $SD = .89$) versions of the MM programs (see Table 2). They both enjoyed meditating. There were no significant mean differences in measures pertaining to the weekly frequency of meditation between participants in the online ($M = 3.18$, $SD = 1.34$) and on-ground ($M = 3.04$, $SD = 1.07$) versions of the MM programs. Participants in both groups reported meditating just over an hour each week ($M = 72.25$, $SD = 10.67$), with no significant differences emerging between the groups regarding time spent meditating. Participants in the on-ground version of the program were significantly more likely to prefer the lying down body scan meditation ($M = 1.30$, $SD = .46$) compared to participants in the online version of the program ($M = 1.11$, $SD = .32$); $t(78) = 2.11$, $p = .04$. The size of the effect was medium ($\eta^2 = 0.05$). Participants in both programs preferred short meditations, lasting between seven to twelve minutes. Lastly, participants in both programs reported realistically seeing themselves developing at least a weekly meditation practice because of the research.

Table 2

Online & On-Ground Perspectives on Meditation and t-*test results*

| | Online | | On-Ground | | | | |
	M	*SD*	*M*	*SD*	*t*	*df*	*p*
Enjoy	4.00	1.07	4.32	.89	1.48	78	.14
Frequency	3.17	1.34	3.04	1.37	-.44	78	.66
Time	73.13	12.56	71.02	8.78	-.14	78	.88
Form	1.11	.32	1.30	.46	2.11	78	.04
Length	2.18	.76	2.35	.79	.97	78	.33
Likelihood	2.08	.79	2.08	.66	-.01	78	.99

Research Question No. 1

Regarding the first research question, are there differences between students who received in person and online MM interventions on measures of mindfulness over time? The researcher used a repeated measures multivariate analysis of variance (RM-MANOVA) to assess for differences on measures of mindfulness between the groups over time. The researcher chose the MANOVA given the theoretical linkages between the measures of mindfulness. The dependent measures used within the analysis were the five measures of mindfulness assessed in the FFMQ. Those measures were observing, describing, acting with awareness, non-judgment, and non-reactivity. The independent variables within the analyses were the groups, online vs. on-ground, and time, baseline vs. follow-up. The researcher checked preliminary assumptions regarding normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, multicollinearity, and no serious violations were noted.

The results of the analysis indicated that there were no significant interaction effects between the independent variables of intervention group and time: $\lambda = .887$, $F (5, 64) = 1.637$, $p = .16$. The lack of a significant interaction effect provided the necessary support to interpret the main effects within the analysis. The results indicated a significant main effect for time: $\lambda = .539$, $F (5, 64) = 10.940$, $p < .001$. The size of the effect was large ($\eta^2 = 0.46$). Additionally, the results also indicated a significant main effect regarding differences between the groups: $\lambda = .770$, $F (5, 64) = 3.822$, $p < .01$. The size of the effect was large ($\eta^2 = 0.23$). Taken together, these significant main effects for time and group suggested that there were changes over time, from baseline to follow-up, and between the groups, online vs. on-ground, on a linear combination of scores across the five measures of mindfulness.

Furthermore, the results also indicated that there were significant differences on several measures of mindfulness from baseline to follow-up (see Table 3). There were significant differences on measure of observation, acting with awareness, non-judgment, and non-reactivity. There were no significant differences on measures of describing. The size of the effect for each of the significant differences was large. These results demonstrated that the MM programs had an impact on most all measures of mindfulness assessed within the FFMQ
(Baer, et al., 2006).

Table 3

Differences in Measures of Mindfulness Over Time

| | Baseline | | Follow-Up | | *F* | *p* | η^2 |
	M	*SD*	*M*	*SD*			
Observe	26.82	6.50	29.87	5.59	29.411	.000	0.30
Describe	26.79	7.97	26.94	8.22	2.001	.162	0.02
Acting with Awareness	22.82	7.09	24.29	6.82	7.387	.008	0.10
Non-judgment	21.03	8.38	23.08	7.89	15.117	.000	0.18

Table 3 Continued

| Non-reactivity | 20.10 | 5.40 | 22.79 | 5.72 | 34.249 | .000 | 0.34 |

The results also indicated that there were significant differences between participants in the online and on-ground versions of the MM programs on measures of mindfulness. Specifically, there were no significant differences between participants in the groups on measures of observation [$F(1, 68) = 0.029$, $p = .865$], acting with awareness [$F(1, 68) = 2.139$, $p = .148$], and on measures of non-reactivity [$F(1, 68) = 0.940$, $p = .336$]. However, there were significant differences between the groups on measures of describing and non-judgment (see Table 4).

Table 4

Differences in Measures of Mindfulness between Groups

		Baseline *M*	Follow-Up *M*	*F*	*p*	η^2
Describing	Online	29.14	30.49	9.009	.004	0.12
	On-ground	24.05	24.82			
Non-judgment	Online	22.21	27.10	8.991	.004	0.12
	On-ground	18.90	20.51			

Specifically, those participants in the online version of the programs had significant increases on scores on measures of describing and measures of non-judgment from baseline to follow-up. These results suggested that there may have been an effect that could be attributed to participants in the online program that could not be attributed to those in the on-ground. These results provided enough evidence to answer the research question in that there were changes in scores on measures of mindfulness over time and between the groups. The MM programs likely drove these overall changes.

Research Question No. 2

Regarding the second research question, were there differences between students who received in person and online MM interventions on measures of learning strategies over time? The researcher used a mix of and within measures of analysis of variance (ANOVA) to assess for differences on measures of learning strategies. The dependent measures used in these analyses were TA, CT, and MCSR. The independent measures used in these analyses were the groups, online and on-ground, and time, baseline to follow-up. The researcher assessed all relevant assumptions associated with this analytical technique and there were no violations of assumptions. The results of the analyses indicated significant differences on measures of learning strategies related to TA, CT, and MCSR.

Regarding differences on measures of TA between groups and over time, there were significant differences worth noting (See Table 5). The results of the analysis indicated that there were no significant interaction effects between the independent variables of intervention group and time: $\lambda = .950$, $F (1, 75) = 3.918$, $p = .05$. The lack of a significant interaction effect provided the necessary support to interpret the main effects within the analysis. The results indicated a significant main effect for time: $\lambda = .892$, $F (1, 75) = 9.115$, $p < .01$. The size of the effect was large ($\eta^2 = 0.11$). However, the results indicated no main effect regarding differences between the groups: $F (1, 75) = 0.789$, $p = .38$. These results suggested that all participants, regardless of group membership, reported significantly lower scores on measures of TA at the follow-up compared to baseline.

Table 5

Mean differences on measures of Test Anxiety over Time by Group

	Baseline		Follow-Up	
	M	*SD*	*M*	*SD*
Total	4.44	1.57	4.05	1.48
Online	4.77	1.52	4.05	1.56
On-ground	4.20	1.58	4.05	1.43

Regarding differences on measures of CT between groups and over time, there were significant differences worth noting (See Table 6). The results of the analysis indicated that there were no significant interaction effects between the independent variables of intervention group and time: $\lambda = .980$, $F (1, 78) = 1.596$, $p = .21$. The lack of a significant interaction effect provided the necessary support to interpret the main effects within the analysis. The results indicated a significant main effect for time: $\lambda = .946$, $F (1, 78) = 4.443$, $p < .05$. The size of the effect was medium ($\eta^2 = 0.05$). Additionally, the results indicated a significant main effect regarding differences between the groups: $F (1, 78) = 9.289$, $p < .01$. The size of the effect was large ($\eta^2 = 0.11$). These results indicated that in general, participants reported significantly higher scores on measures of CT at follow-up compared to baseline. Additionally, the results indicated that participants in the on-ground MM program had a significantly higher increase in scores on measures of CT, compared to the participants in the online group, from baseline to follow-up.

Table 6

Mean differences on measures of Critical Thinking over Time by Group

	Baseline		Follow-Up	
	M	*SD*	*M*	*SD*
Total	4.03	1.21	4.35	1.37
Online	3.70	1.27	3.82	1.47
On-ground	4.26	1.12	4.74	1.16

Regarding differences on measures of MCSR between groups and over time, there were significant differences worth noting (See Table 7). The results of the analysis indicated that there were no significant interaction effects between the independent variables of intervention group and time: $\lambda = .992$, $F (1, 74) = 0.574$, $p = .45$. The lack of a significant interaction effect provided the necessary support to interpret the main effects within the analysis. The results indicated a significant main effect for time: $\lambda = .898$, $F (1, 74) = 8.447$, $p < .01$. The size of the effect was large ($\eta^2 = 0.10$). However, the results indicated no main effect regarding differences between the groups: $F (1, 74) = 0.332$, $p = .57$. These results indicated that scores on measures of MCSR significantly increased from baseline to follow-up. However, there were no significant differences between the groups. This suggested that the MM program had an effect on scores on measures of MCSR for all participants.

Table 7

Mean differences of Metacognitive Self-Regulation over Time by Group

	Baseline		Follow-Up	
	M	*SD*	*M*	*SD*
Total	4.37	0.97	4.64	0.87
Online	4.26	1.16	4.61	0.96
On-ground	4.44	0.81	4.65	0.80

The results of the analyses associated with the second research questions revealed several pertinent insights. Participants, regardless of group, reported significantly lower scores on TA at follow-up compared to baseline. Second, participants in the on-ground MM program reported significantly higher scores on measures of CT at follow-up compared to baseline. Lastly, participants, regardless of group, reported significantly higher scores on measures of MCSR at follow-up compared to baseline. These significant differences could be attributed to the intervention and effect of MM providing enough support to suggest that MM influenced differences in scores on these measures over time.

Research Question No. 3

Regarding the third research question, are there differences in the meditational effects of ASE on the relationship between ER and GPA between participants in the online and on-ground MM groups? The researcher used regression analysis and the Process macro to investigate this research question. Overall, the results indicated that ER was a significant predictor of GPA: $F (1, 78) = 13.18, p < .001, R^2 = .14$ (see Figure 1). This suggests that higher levels of ER are predictive of higher GPAs: $b = .27, t (78) = 3.63, p < .001$. The results also indicated that ER significantly predicted ASE: $F (1, 78) = 25.83, p < .001, R^2 = .25$. These results suggest that EF had an impact on ASE: $b = .44, t (78) = 5.08, p < .001$. The results also indicated that ASE significantly predicted GPA: $F (2, 77) = 11.23, p < .001, R^2 = .23$. These results suggest higher scores on ASE are predictive of GPA: $b = .26, t (77) = 2.84, p < .001$.

Finally, results indicated that ER did not significantly predict GPA when controlling for ASE: $F (2, 77) = 11.23, p < .001, R^2 = .23$. This result is not statistically significant from zero, indicating that there is no relationship between ER and GPA after controlling for ASE: $b = .15, t (77) = 1.87, p = .07$. These results fulfilled the criteria in Baron and Kenney's (1986) model for mediation in that there is no effect of ER on GPA after controlling for ASE. These results confirmed that ASE mediates the relationship between ER and GPA in the total respondents within the sample. After running the mediation model on the total sample, the researcher elected to run the same model on the online and on-ground participants separately.
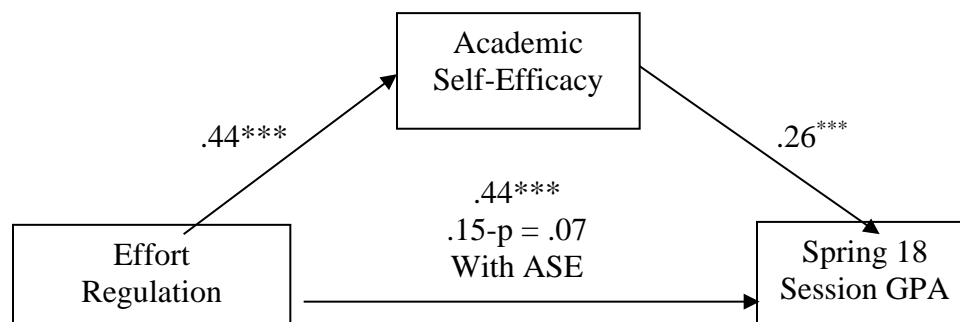

Figure 1. Note. * $p < .05$, ** $p < .01$, *** $p < .001$

The researcher used regression analysis and the Process macro to investigate this research question for participants in the online MM program. Overall, the results indicated that ER was a significant predictor of GPA: $F (1, 30) = 6.84, p < .05, R^2 = .19$ (See Figure 2). This suggested that higher levels of ER are predictive of higher GPAs among participants in the online MM group: $b = .16, t (78) = 2.62, p < .05$. The results also indicated that ER significantly predicted ASE: $F (1, 30) = 9.76, p < .01, R^2 = .25$. EF had an impact on ASE amongst participants in the online MM group: $b = .45, t (30) = 3.12, p < .01$. The results indicated that ASE significantly predicted GPA: $F (2, 29) = 5.89, p < .01, R^2 = .29$. Higher scores on ASE are predictive of GPA amongst respondents in the online MM group: $b = .16, t (30) = 2.05, p < .05$. Finally, results also indicated that ER did not significantly predict GPA when controlling for ASE: $F (2, 29) = 5.89, p < .01, R^2 = .29$. This result is not statistically significant from zero, indicating that there is no significant relationship between ER and GPA after controlling for ASE amongst participants in the online MM: $b = .09, t (29) = 1.37, p = .18$. These results fulfilled the criteria in Baron

and Kenney's (1986) model for mediation in that there is no effect of ER on GPA after controlling for ASE amongst participants in the online MM group.
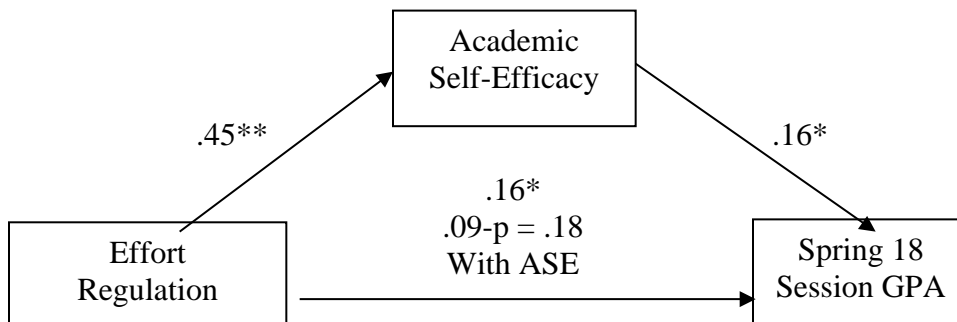

Figure 2. Note. * $p < .05$, ** p < .01, *** p < .001

The researcher used regression analysis and the Process macro to investigate this research question for participants in the on-ground MM program. Overall, the results did not indicate that ER was a significant predictor of GPA: $F (1, 40) = 1.83$, $p = .18$, $R^2 = .04$ (See Figure 3). This suggests that higher levels of ER are not predictive of higher GPAs among participants in the on-ground MM group: $b = .17$, $t (40) = 1.35$, $p = .18$. The results indicated that ER significantly predicted ASE: $F(1, 40) = 14.32$, $p < .001$, $R^2 = .26$. These results suggested that EF had an impact on ASE amongst participants in the on-ground MM group: $b = .45$, $t (40) = 3.78$, $p < .001$. Results did not indicate that ASE significantly predicted GPA: $F (2, 39) = 2.39$, $p = .10$, $R^2 = .11$. Higher scores on ASE were not predictive of GPA amongst respondents in the on-ground MM group: $b = .29$, $t (40) = 1.69$, $p = .10$. Finally, results also indicated that ER did not significantly predict GPA when controlling for ASE: $F (2, 39) = 2.39$, $p = .10$, $R^2 = .11$. There is no significant relationship between ER and GPA after controlling for ASE amongst participants in the on-ground MM: $b = .04$, $t (39) = 0.32$, $p = .75$. These results did not fulfill the criteria in Baron and Kenney's (1986) model for mediation in that ASE did not mediate the relationship between ER and GPA amongst respondents within the on-ground MM program.
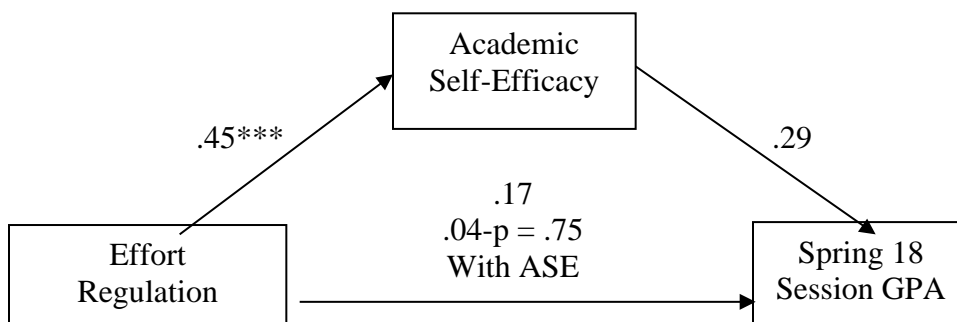

Figure 3. Note. * $p < .05$, ** p < .01, *** p < .001

When examined together, these results suggested that self-efficacy, related to academic matters, mediated the relationship between a student's attempts to regulate their academic efforts and GPA, an important academic outcome. This mediation effect held true amongst total participants in the sample. However, this mediation effect differed between the groups. Specifically, the mediation effect remained intact amongst participants in the online MM group and did not for participants in the on-ground MM group. These results helped to answer this research question, in that there are differences between MM groups pertaining to the meditational effects of ASE on the relationship between ER and GPA. It should be noted, that there were no significant differences between online ($M = 5.67$ $SD = 1.04$) and on-ground ($M = 5.78$, $SD = 0.84$) participants on measures of ASE; $t (76) = .471$, $p = .639$.

Discussion

Regarding attitudinal perspectives and behavioral adoption of MM, participants enjoyed meditating. In fact, participants were asked to report what they liked about meditating. One participant stated, "It gave me time to just focus on myself and how I was feeling and take some time out of a normal hectic day." Another participant noted, "It gave me time to focus on me and not worry about finals or the future." One participant noted the timeliness of the research project:

> I like the timing of this research project being during the end of the semester projects because it calmed me down and made me less stressed. I also think it improved my ability to complete my projects and tests because I was less stressed.

These results suggested that students are willing to adopt MM as a practice. Additionally, these results suggested that MM has a place in transforming learning by affecting the health and wellness of students given that students specifically sensed and discussed the impact of MM on their stress during traditionally hectic times during a semester. Additionally, these results further supported the notion that MM transformed learning in that MM provided students tools to remain centered in their own active and reflective learning experience.

The results suggested that students participating in either the online or the on-ground version became more mindful due to changes in scores on measures of mindfulness. These results provided additional support to suggest that MM intervention are effective amongst college students. Additionally, these results suggest that MM has a place within the learning environment of college students. While preliminary, the significant changes in scores on mindfulness measures suggests that MM could continue to be an effective tool for coping and management of the self during stressful times in learning environment.

There were significant differences on measures of learning strategies. Participants reported lower scores on measures of TA and higher scores on measures of CT and MCSR at follow-up compared to baseline. There were no real notable differences between the groups, one MM program did not seem to influence more or less change in scores on these measures. Taken together, MM could be a unique intervention for transforming learning given that the practice allows students to recognize how they individually influence the learning process through increased critical thinking and self-regulation, two factors critical to seeing new things and seeing old things differently. Most importantly, these data further supported the notion that MM physiologically affects the self-perceptions of anxiety related to tests. This result alone provides support that MM can indeed transform learning for college students.

Academic self-efficacy, the idea that a student believes that they will be successful and that they have the ability to be successful, mediated the relationship between effort-regulation and GPA for students in the online MM program, not for those students in the on-ground MM program. These results should be interpreted and discussed in light of other results within the research. Specifically, participants in the MM group has significantly higher scores on measures of non-judgment compared to participants in the on-ground MM group. Interestingly enough, non-judgment was the one facet of mindfulness to significantly correlate with effort-regulation ($r = 0.23$, $n = 87$, $p < 0.05$). Taken together, these results may suggest that the MM intervention for online students helped reduce their overall judgment of attempts to regulate their efforts toward academic success and in turn, the reduction in judgment may have affected their belief in their ability to be successful in an online course.

Recommendations

Given the lack of empirical attention of MM interventions among college students and in light of the relatively successful adoption of the MM intervention in this endeavor, researchers should most assuredly continue exploring the relationship and impact of MM interventions on college students in

various learning environments. Specifically, the complex relationship between individual student factors, the learning environment, and the learning process need additional attention in light of MM interventions.

One such context fitting for continued exploration is the context of the online learning environment. The online learning environment in higher education seems here to stay. The disconnect that emerges in this learning environment between professors and students, due to lack of interpersonal interaction, could be mediated by a MM intervention. Students in this endeavor, who were in the online MM program, remarked that the MM gave them a tool to manage their anxiety for tough, math heavy, classes that were hosted online. As a result, researcher should continue exploring the effect of MM in the online learning environment.

The results from this study should be taken into context given that the strategies for learning were measured in the context of undergraduate and graduate psychology courses. Students in general psychology are completing a general studies course. Other students were completing upper level courses within the psychology program. Students majoring in psychology are likely to be more engaged with the content and could see courses as less challenging due to their engagement. As such, the researcher recommends further exploration of the relationship between mindfulness, strategies for learning, and GPA within the context of courses perceived as being more difficult (e.g., college algebra).

During this endeavor, the researcher carried out both on-ground and online MM interventions. No clear evidence emerged suggesting one was more successful or fruitful than the other. Both seemed to work in terms of changes in mindfulness scores over time. However, after having facilitated both the online and on-ground versions of the MM programs and having taught mindfulness classes outside the context of a collegiate learning environment, the researcher believes MM to be successful in a collegiate learning environment more thought needs to be devoted to the design and execution of a MM within a collegiate learning environment. Specifically, a program needs to be designed and tailored directly to college students for a MM intervention to be most successful.

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