An assessment of mindfulness intervention as a regular subject in Ecuadorian higher education

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ABSTRACT

The current project hypothesized that mindfulness practice should improve the academic performance of undergraduate students. However, no significant relationships were found between mindfulness practices neither with FFMQ nor MAAS scores. Two distinct groups of university students were evaluated by the Five Facet Mindfulness Questionnaire (FFMQ) and the Mindful Attention Awareness Scale (MAAS). The descriptive analysis of our groups showed positive changes in academic outcomes thanks to the mindfulness practice. In the first trial, adverse changes in FFMQ, MAAS and academic averages findings were observed. Meanwhile, positive differences in FFMQ, MAAS and academic averages outcomes were found in the second trial. Results from the current study suggest that either mindfulness stage is not affected by mindfulness practices on the first scenario and, the second sample represent an ideal experience of mindfulness group. The FFMQ and MAAS may need adaptation for specific groups like engineering or science students.

Introduction

Recent years have witnessed a growing portion of students experiencing social, emotional, and behavioral problems that interfere with their academic success, and their potential to become competent professionals and productive citizens (Greenberg, Domitrovich, & Bumbarger, 2000). In academic environments, educators successfully address the management, teaching, and emotional challenges of the classroom and school environments and they need a high degree of social and emotional competence (Jennings & Greenberg, 2009). Researchers suggest there is a need for programs to help educators respond calmly to unsettling and provocative student behavior, in that sense, it is recommended the mindfulness practice as an efficient way to improve students' skills to concentrate (Burrows, 2015; Day, 2004; Jennings & Greenberg, 2009).

Our approach understands the mindfulness, as a state in which an individual can be fully aware of the set of situations that surround him. Although scholars in industrial-organizational psychology and organizational behavior have begun to conduct research on mindfulness meditation (Long & Christian, 2015; Lye & Hirschberg, 2012) and other mindfulness concepts (Weick & Putnam, 2006; Weick & Sutcliffe,
the quick adoption of mindfulness practices is outpacing the research on the topic, where college academic environments need more significant consideration.

Mindfulness-based interventions in schools have become increasingly popular, for example, Zenner, Herrnleben-Kurz, and Walach (2014) examined 24 studies that included a mindfulness intervention; in total 1348 students were instructed in mindfulness and 876 served as the comparison group. Grades and ages of the students ranged from 1 to 12, and 6 to 19, respectively. Using a meta-analysis of data, they concluded that mindfulness-based interventions in school settings hold promise, particularly about improving cognitive performance and resilience to stress.

There is limited literature on the practice of mindfulness and its effects on higher education environments, where the emotional load produced by the upper margin of desertion is assumed, and causing severe impacts on students' academic performance. However, the evidence supports the hypothesis that benefits of mindfulness training interventions in adult populations is relatively strong, with research showing multiple benefits, including improvements in attention and awareness, reductions in health problems and stress-related medical conditions, and enhanced positive emotions and well-being (Davidson et al., 2003; Greeson, 2009; Grossman, Niemann, Schmidt, & Walach, 2004; Jha et al., 2015). University students show a very high rate of stress, anxiety, and depression. For instance, at the University of Michigan, the estimated prevalence of a depressive or anxiety disorder was 15.6% for undergraduates and 13% for graduate students (de Bruin, Meppelink, & Bögels, 2015).

It is reported that through the practice of mindfulness students have the potential to develop reflexivity, as well as skills to help them manage stress and subsequently support their engagement in highly demanding professional training following graduation. However, despite the current evidence, mindfulness practices have yet to be fully integrated within the undergraduate and graduate curricula at most higher education institutions (Schwind et al., 2017). To quantify the variations produced in each by practicing mindfulness, several questionnaires have been developed to operationalize the concept of mindfulness for scientific purposes (Baer, Smith, & Allen, 2004; Brown & Ryan, 2003; van den Hurk et al., 2011; Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006). In these questionnaires, different mindfulness factors/skills have been defined, such as act-with-awareness (to fully engage in a current activity with undivided attention) and accept-without-judgment (to be non-evaluative about one's experiences in the present moment).

Unfortunately, in Ecuador, there is no information about mindfulness in any context, although it is a problem that the dropout margins are approximately 3.4% of the total number of students enrolled annually in all educational regimes, in which the existence of stress in the students have a significant impact (Sánchez, 2015). The existing reviews of mindfulness interventions (Burke, 2010) and sitting meditation practices (Black, Milam, & Sussman, 2009) indicate that mindfulness programs have potential for promoting positive changes, we propose this experiment with pre-and post-treatment controls in university students.

First, this study will review previous mindfulness research and detail works with meditations scales generated by FFMQ and MAAS approaches. Second, this study will present a quantitative model that traces to support and prove our hypothesis. Third, this study will present the results and findings. Taken together, this study deepens our understanding of mindfulness and its influence in higher education at Ecuador focused on our limitations and ways to improve.

Review of literature

The recent years an upsurge in the use of mindfulness-based interventions that teach mindfulness skills to promote psychological health and well-being has been implemented in different fields. Mindfulness is a particular way of paying attention, described as the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience (Kabat-Zinn, 2006). To contribute in this area, interventions and research have been undertaken in adult populations, and there is now increasing interest in applications with children and adolescents. However, a small body of research literature emerging about college students and their behavior haven't been studied.
The application of mindfulness-based interventions (MBI) in school settings has excellent potential for improving educational and psychosocial outcomes for today’s youth because MBI is a feasible and acceptable modality of intervention to apply in school settings (Felver, Celis-de Hoyos, Tezanos, & Singh, 2016). Under this premise, there are several works focused on demonstrating the significant and practical effects in different environments (Baugher & Bach, 2015). In that sense, contemplative practices have become increasingly common in school settings (White Santangelo, 2009), and there has been a corresponding increase in applied research exploring the benefits of mindfulness- and yoga-based interventions in education contexts (Jennings, 2008; Noggle, Steiner, Minami, & Khalsa, 2012; Purser, Forbes, & Burke, 2016; Rempel, 2012).

Regarding research methodology, it could be argued that research on mindfulness with multidimensional instruments like the FFMQ and MAAS could produce new and exciting information by focusing on patterns of scores on their scales (Lilja, Lundh, Josefsson, & Falkenström, 2013). The consistency of these measurement scales has been widely discussed in existing literature, so our research focuses on taking these tests scores as a variable to establish causal relationships. Several statistical techniques have been used to analyze the relationships between the mindfulness practice and different determinants, for example, Manuel, Somohano, and Bowen (2017) used multiple linear regression analyses to assess whether mindfulness practice over the course of the 8-week intervention predicted FFMQ scores at post-course. They hypothesized formal and informal mindfulness practices, frequency, and duration of mindfulness practice would be related to the total FFMQ score and subscales. For determine whether post-course FFMQ subscale and total scores were predicted by the number of days of informal practice, the number of days of formal training, and the number of minutes of casual exercise they used several multiple linear regression analyses. Baseline FFMQ scores and age were covaried in all analyses. However, their findings showed that neither the frequency of informal nor formal meditation practice was predictive of neither post course individual subscales nor total FFMQ score and the entire duration of formal meditation practice did not significantly predict post course FFMQ subscales or total scores. Catak (2012) investigated the psychometric properties of the MAAS in the Turkish population and explored the relationships of mindfulness with other related psychological constructs. His results showed that the Turkish version of MAAS possesses good psychometric qualities and good internal consistency. Using factor analysis, one-way ANOVA, correlational analysis, reliability analysis, and t-test found that test-retest coefficients indicated that Turkish MAAS possesses good test-retest reliability and thus the temporal reliability of the scale was confirmed.

Josefsson, Lindwall, and Broberg (2014) employed a randomized controlled trial to study the effects of a short mindfulness-based intervention (MBI) in a working population. Using one-way ANOVA to examine if demographic characteristics and background variables differed between the groups and one-way analyses of covariance (ANCOVAs), to explore post-test differences between the three conditions on the Stroop variables, the FFMQ scales, decentering, the psychological well-being (PWB) total scale, the HAD scales, and the cope scales, they compared mindfulness meditation with both an active control group (relaxation training) as well as an inactive wait-list group. They were hypothesized that the mindfulness group would increase significantly in mindfulness and the relaxation group would show substantially more significant improvements than the wait-list group in depression, anxiety, and PWB. However, in the mindfulness group, they hypothesized that mindfulness changes would correlate positively with decentering change and that both mindfulness changes, as well as the decentering change, would be positively related to PWB change. Andrei, Vesely, and Siegling (2016) examined the concurrent and incremental validity of the Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al., 2008), the Toronto Mindfulness Scale (TMS; Davis et al., 2011), the Five-Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), and the Langer Mindfulness Scale (LMS; Pirson et al., 2012) considering that each questionnaire allows for the assessment of mindfulness in individuals without meditation experience and provides a measure of dispositional mindfulness. Two different samples completed all mindfulness measures. In order to test concurrent validity, regression analyses, with the higher level of each mindfulness measure as the only predictor, were performed.
and they concluded that PHLMS remained a stronger predictor when compared with measures with a broader theoretical domain, such as the FFMQ.

In the educational field, Ergas (2014) explored mindfulness in education by describing how mindfulness has entered education through the door of healing and how science embraced it. Brief mindfulness intervention, such as this has been found to reduce anxiety and increase wellbeing in students (Hassed & Chambers, 2014; Smalley & Winston, 2010). Research into the effectiveness of mindfulness in education has expanded dramatically over the past dozen years (Baughner & Bach, 2015; Biegel et al., 2010; Ergas, 2016) and shows that mindfulness practice enhances the wellbeing of the practicing students, increasing their capacity for reflexivity, learning, patience, kindness, and compassion.

Schwind et al. (2017) undertook a qualitative exploratory pilot study to discover how students in a faculty of community services of an urban university experienced brief instructor-guided mindfulness practices conducted at the start and the end of each week’s class. Participants were recruited during week three of a twelve-week academic term. Their study findings indicate that undergraduate and graduate students, who participated in a brief mindfulness practice in the classroom, self-reported decreased anxiety, and stress. Despite the critical literature on mindfulness and its relationship with education, there is an existing void in which to establish the relationship between mindfulness and academic performance, considering the context of higher education and its application in a developing country. Consequently, we undertook a quantitative exploratory pilot study to learn about the impact of introducing mindfulness practices within the classroom in a higher education setting and its influence on academic performance.

**Method**

**Participants**

One hundred and forty-five students with no prior mindfulness experience were voluntarily inscribed from several classes in ESPOL Polytechnic University, Faculty of Social Sciences and Humanities, the city of Guayaquil. The total number of students was divided into two groups because the experiment was carried out in two-semester periods. Specifically, the groups were made up of 52 students from the second-semester 2015–2016 (A) and 93 students from the first-semester 2016–2017 (B).

The sample would be randomized into two groups (given voluntary enrollment in mindfulness classes), and individuals were evaluated before and after treatment but despite a great interest at the outset, the number of individuals who finally finished the assessment were fewer than expected, however the number of participants who efficiently completed the treatment allows us to perform the relationships we consider essential for our findings, as well as the consistency in statistical terms proportionate to the number of individuals included in the sample. Consequently, resulted in a total sample of 133 participants: 40(18 men and 22 women) from group A and 93 (46 men and 47 women) from group B.

Table 1 shows the characteristics of the samples according to the faculty where respondents are students. Both samples have a heterogeneous group of students from different faculties, however in group B is possible to notice the significant increases in the number of enrolled faculties like the FCNM and the FIEC, mainly because the diffusion of this practice as a regular subject to become part of all ESPOL as an optional subject, in that sense the dissemination and knowledge took to this initiative to be formalized for all faculties.

**Measures**

Two tests were used to measure the mindfulness level of study participants, the Five Facet Mindfulness Questionnaire (FFMQ) and the Mindful Attention Awareness Scale (MAAS) were used to analyze the relationship.
The FFMQ (Baer et al., 2006) is a 39-item, 5-point Likert-type scale, where 1 = ‘Never or rarely true’, 2 = ‘Rarely true’, 3 = ‘Sometimes true’, 4 = ‘Often true’, and 5 = ‘Very often or always true’. The FFMQ comprises five subscales. The ‘Observing’ subscale measures the extent to which an individual can notice or attend to internal and external stimuli, and contains items such as ‘I notice the smells and aromas of Things.’ The ‘Describing’ subscale measures the extent to which an individual can label internal experiences with words and contains items such as ‘I am good at finding words to describe my feelings.’ The ‘Acting with awareness’ subscale captures the extent to which an individual can attend to activities in the present moment vs. acting automatically without paying attention. This subscale contains items such as ‘I find myself doing things without paying attention.’ The ‘Non-judging’ subscale captures the extent to which an individual evaluates their inner experience and contains items such as ‘I criticize myself for having irrational or inappropriate emotions.’ Finally, the ‘Non-reactivity’ subscale measures the extent to which an individual can allow thoughts and feelings to arise and pass without becoming attached to them. This subscale contains items such as ‘I perceive my feelings and emotions without having to react to them.’

MAAS consists of 15 items which are rated on a six-point Likert scale from 1 (almost always) to 6 (always never). The total score of the MAAS is obtained by calculating the mean of the responses from the 15 items. Higher scores on the scale suggest higher levels of mindfulness. Good internal consistency was found for the original MAAS in a student’s sample (Brown & Ryan, 2003).

**Data analyses**

Linear regression analyses were conducted to assess whether mindfulness practice over the course of a semester intervention produced better academic scores at post-course. Individually, separate regression analyses were performed to determine whether post-course academic scores improve with variations in FFMQ scale and MAAS for both groups in the sample. Considering the different number of subscales for each questionnaire (i.e. one for the FFMQ and MAAS), multiple regression coefficients were used to compare concurrent criterion validity among pre- and post-treatment measures and check the incremental validity of each mindfulness measure in relation with academic average. Multiple regression coefficients allow for the adjustment of the number of degrees of freedom across regression models. Additionally, one-way ANOVAs were performed to examine if FFMQ scores, MAAS scores, and academic averages differed between the pre- and post-treatment groups of each semester.

**Results**

The present study aimed to investigate the relationship between mindfulness practice and academic performance, trying to prove that mindfulness practice improves academic performance. Our hypothesis
proposes a positive correlation between the use of the test scores FFMQ and MAAS (as a proxy variable) and the academic averages, trying to prove that mindfulness practice efficiently improves the performance of the students included in the sample in Ecuadorian academic context.

It should be pointed out that, although in both groups the objective is that through mindfulness practice the students improve their academic average, measured from the descriptive point of view of the sample, notwithstanding the measures of improvement in mindfulness through of the FFMQ and MAAS tests reflect undesirable results in group A, which may be subject to transition and conformation group affections. Based on a descriptive analysis focused on investigating the variations in the FFMQ, MAAS and academic grade, we found two opposite scenarios. The A group presents a higher percentage of individuals with adverse changes in their scores' tests, however, presents a large proportion of students with improvements in their academic averages which contradicts the hypothesis that we propose (see Table 2). The B group, on the other hand, shows a higher percentage of individuals' improvements in scores' tests, and improvements in the academic average, which is in line with our hypothesis and the existing literature regarding mindfulness practice and its effects on academic performance.

Tables 3 and 4 show the regression results using the MAAS scores as a dependent variable, which support and verify the success mindfulness practice in the sample of the first semester 2016, specifically in the sample of the second term 2015 the relation is negative for post-treatment, with a $\beta$ of $-0.02$ which indicates that the relationship between the effect of practicing mindfulness on academic achievement has a negative impact, which is the opposite in the analysis of the first half of 2016, where the relationship is positive ($\beta = 0.036$).

Tables 5 and 6 show the regression results using the FFMQ scores as a dependent variable, with an analysis similar to the previous one, our results support and verify the success mindfulness practice in the sample of the first semester 2016, specifically in the sample of the second term 2015 the relation is

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### Table 2. Score's sample variation.

| Characteristics | (A) 2015-2 ($N = 40$) | (B) 2016-1 ($N = 93$) | (B/A) Variation |
|-----------------|------------------------|-----------------------|-----------------|
|                 | $N$ | %   | $N$ | %   | $N$  | %   |
| **FFMQ-test**   |     |     |     |     |      |     |
| Positive        | 14  | 35  | 50  | 54  | 36   | 68  |
| Negative        | 26  | 65  | 43  | 46  | 17   | 32  |
| **MAAS-test**   |     |     |     |     |      |     |
| Positive        | 14  | 35  | 71  | 76  | 57   | 108 |
| Negative        | 26  | 65  | 22  | 24  | −4   | −8  |
| **Academic average** |     |     |     |     |      |     |
| Positive        | 28  | 70  | 66  | 71  | 38   | 72  |
| Negative        | 12  | 30  | 27  | 29  | 15   | 28  |

### Table 3. Regression coefficients 2015-2 (A) MAAS.

| Variables       | $\beta$ | SE($\beta$) | $t$   | Sig.(p) |
|-----------------|---------|-------------|-------|---------|
| Before treatment| Score   | .008        | .006  | 1.27    | .213    |
|                 | Constant| 7.264       | .329  | 22.1    | .000    |
| After treatment | Score   | −.002       | .004  | −.510   | .612    |
|                 | Constant| 7.847       | .242  | 32.5    | .000    |

### Table 4. Regression coefficients 2016-1 (A) MAAS.

| Variables       | $\beta$ | SE($\beta$) | $t$   | Sig.(p) |
|-----------------|---------|-------------|-------|---------|
| Before treatment| Score   | .0027       | .004  | .64     | .521    |
|                 | Constant| 7.270       | .311  | 23.38   | .000    |
| After treatment | Score   | .0036       | .003  | 1.17    | .246    |
|                 | Constant| 7.369       | .199  | 36.94   | .000    |
negative for post-treatment, with a $\beta$ of $-0.0537$ which indicates that the relationship between the effect of practicing mindfulness on academic achievement has a negative impact, which is the opposite in the analysis of the first half of 2016, where the relationship is positive ($\beta = 0.0092$).

**Discussion**

In the current study, we hypothesized the relationship between mindfulness practice and academic performance, trying to prove that mindfulness practice improves academic performance. However, two scenarios were found in each of the measures that were considered to conclude. Nonetheless, in the original trial from which these data were drawn, negatives changes in FFMQ and MAAS outcomes were observed in relationship with academic averages vs. the positives changes in FFMQ and MAAS outcomes were found in relation with academic averages in the second trial (Bowen & Enkema, 2014); however, significant associations in FFMQ and MAAS in relationship with academic averages were not reported in each case.

Thanks to the growing number of research on mindfulness, we can mention studies do suggest an association between mindfulness practice and clinical outcomes (Elwafi, Witkiewitz, Mallik, IV, & Brewer, 2013), yet the relationship of FFMQ scores to both practice and findings is inconsistent. Lilja et al. (2013) considered FFMQ scores could not differentiate between participants who attended a mindfulness meditation retreat vs. a control group, yet there was a noticeable increase in well-being for the meditation condition. Studies assessing the relationship between mindfulness practice and FFMQ also yield mixed results, for example, (Morgan et al., 2014) found limited relationships between practice frequency and FFMQ subscale scores in a sample of 27 people. In contrast, another study found that rate of mindfulness practice associated with an MBI was related to differences in scores on the FFMQ (Woods & Proeve, 2014). And the present study, which presents evidence of positive changes in the relationship between mindfulness practice in universities through improvements in the academic performance of the students involved, in a contrast between two groups and despite the limitations in the practical implementation, hoping to be able to establish an effective modality in the area for future applications both in the national context where the experiment was applied and in the near latitudes.

In related research, Soler et al. (2014) found that frequency and lifetime mindfulness practice were significantly related to higher FFMQ scores, but practice session length and type of mindfulness practice were not. In this same study, a new measure labeled the MINDSENS index was created, based on FFMQ subscales. There are several explanations for results from the current research, as well as the others discussed here. The literature regarding the limitations of the FFMQ is extensive, so we consider that corrections should be made per the type of individuals included in the study, the determination of a specific time for the duration of each session and the individual characteristics of each person or student for confirmation of each group. The considerable heterogeneity of those included in our study
groups may be a factor influencing the limited positive and negative variations evidenced in the scores of our individuals studied.

We considered our relationships robust given the equality of signs of the FFMQ and MAAS tests, even though we included the MAAS test in order to be able to infer in the case of differences between the signs that could be resulted from the estimates with both tests, as a measure of variation in the mindfulness’ level. Even considering that the measure was designed based on concepts and measurement considerations from Dialectical Behavior Therapy literature is the MAAS (Brown & Ryan, 2003) into the facet ‘Acting with Awareness’ (Grossman et al., 2004; Van Dam, Earleywine, & Danoff-Burg, 2009). It was not originally designed to capture changes in mindfulness practice, yet the measure is often used to examine mindfulness in several studies. Regrettably, the FFMQ has shown differential item functioning between different context (Bowen & Enkema, 2014), frequency and duration of practice (Soler et al., 2012) and years of meditation experience (Grossman & Van Dam, 2011).

All our considerations are distinctly crucial for those will develop and will assess mindfulness-based interventions, in which an increase in mindfulness is assumed to be the mechanism of positives academic changes. While earlier studies showed significant relationships between self-report mindfulness measures such as the FFMQ and primary psychosocial outcome variables in nonclinical samples (Leigh, Bowen, & Marlatt, 2005), as the field progresses and these relationships underwent complex analysis and assessed in increasingly diverse populations, the picture may not be so clear in heterogeneous groups. Given the reliability of the FFMQ and MAAS in the samples on which it was validated, it has been shown that these measures may capture the construct of mindfulness in specific demographics. This suggests that the FFMQ and MAAS may not be generalizable to all samples and that more research needs to be done on the validity and utility of the FFMQ and MAAS for specific students’ samples although our results are doubly supported.

Note

1. For ease of readability, β coefficients for regression models are not discussed in detail because in our analysis we consider the signs expected for conclusions However, they are available upon request from the corresponding author.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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