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Reductions in Negative Automatic Thoughts in Students Attending Mindfulness Tutorials Predicts Increased Life Satisfaction

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Abstract

University education confronts students with stressful developmental challenges that can lead to mental health problems. Innovative programs must address an increasing prevalence of these problems but are impeded by the high costs involved. In this study, thirty-nine undergraduate students attended weekly one hour mindfulness meditation tutorials during a single (14 week) semester. Tutorials involved 40 minutes of guided meditation, followed by open-ended discussions on mindfulness and related scientific research. Multiple regression analysis tested associations between self-reported changes in mindfulness, in negative automatic thoughts and in satisfaction with life. Reductions in automatic thoughts accounted for a significant proportion of variance in life satisfaction and decreases in automatic thoughts were associated with an increased life satisfaction. This finding suggests guided

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meditation tutorials merit consideration in promoting student mental health on university campuses.

Keywords: Mindfulness, meditation, students, university education, well-being.

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Las Reducciones en Pensamientos Automáticos Negativos en Estudiantes que Asisten a Tutorías de Meditación Plena Predice un Incremento en la Satisfacción de Vida

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Resumen

La educación universitaria requiere que los estudiantes se enfrenten a desafíos significativos del desarrollo que pueden conducir estrés y problemas de salud mental. Los programas innovadores necesitan responder a la creciente prevalencia de estos problemas pero se bloquean por sus costes elevados. En este estudio, treinta y nueve estudiantes asistieron a una hora semanal de tutorías de meditación de conciencia plena durante un semestre (14 semanas). Las tutorías consistían en sesiones de 40 minutos seguidas de discusiones abiertas sobre la conciencia plena e investigaciones científicas relacionadas. El análisis a través de regresiones múltiples destacó asociaciones entre los cambios auto-identifiados en relación a la conciencia plena, los pensamientos negativos automáticos, y la satisfacción con la vida. Este resultado sugiere que las tutorías de meditación guiada merecen una consideración en la promoción de la salud mental estudiantil en los campus universitarios.

Palabras clave: Conciencia plena, meditación, estudiantes, educación universitaria, bienestar

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In recent years, increasing attention has focused on mental health promotion on university campuses due to an alarmingly elevated prevalence of mental health problems. According to current estimates, almost one third of university students experience symptoms of depressed and anxious mood (Eisenberg, Gollust, Golberstein, & Hefner, 2007) and nearly one quarter display maladaptive perfectionist tendencies (Radhu et al., 2012). As many students are engaging in developmental transitions to adulthood that include coping with new academic, interpersonal, and financial demands (Archer & Lamnin, 1985; Abouserie, 1994), mental health promotion can equip students with adaptive coping resources specific to the stressors confronted.

Although counseling services within universities are well established, the dilemma in higher education concerns the costs and inefficiencies of traditional counseling. According to a recent report on counseling services in Ontario colleges (Lees & Dietsche, 2012), the growth of student enrolment in Ontario universities increased 26 percent between 2007-2012, while budget allocations for counseling resources rose only 4.6 percent. As a result, student-to-counselor ratios range from 1300-1500 students per counselor. Given these proportions, the development of group-based and autonomously practiced mental health promotion practices are an important alternative.

In searching for such approaches, mindfulness meditation has shown significant potential in terms of cost-effectiveness. Mindfulness-Based Stress Reduction (MBSR) (Kabat-Zinn, 1982) has become a widely adopted therapeutic program in North America and Europe, introducing a secularized attention regulation practice that fosters moment-to-moment awareness (Kabat-Zinn, 2003; Kabat-Zinn, 2011). Ultimately, it promotes more objective perceptions less impeded by cognitive distortions and ruminations over past regrets and future uncertainties (Kabat-Zinn, 2003; Kabat-Zinn, 2011). During mindfulness sessions, participants are instructed to focus

attention on breathing sensations as they observe cognitions with an accepting and non-avoidant attitude (Bishop et al., 2004).

Mindfulness meditation has been used in clinical and non-clinical settings to help individuals manage adverse health conditions, counteract anxiety & depression, and prevent depressive relapses (Davidson et al., 2003; Fjorback, Arendt, Ørnbøl, Fink, & Walach, 2011; Kabat-Zinn, 1982; Kabat-Zinn et al., 1998; Ledesma & Kumano, 2009; Sipe & Eisendrath, 2012; Teasdale et al., 2000). Specific outcomes of participation include increased positive affect (Jain et al., 2007; Schroevers & Brandsma, 2010), increased self compassion (Chiesa & Serretti, 2009; Keng, Smoski, Robins, Ekblad, & Brantley, 2012), decreased rumination (Jain et al., 2007) and decreased perceived stress (Lane, Seskevich, & Pieper, 2007; Oman, Shapiro, Thoresen, Plante, & Flinders, 2008). In addition to psychometric outcome research, neuroscientific evidence has linked mindfulness practice to improved attentional stability (Lutz et al., 2009), cortical inhibition (Guglietti, Daskalakis, Radhu, Fitzgerald, & Ritvo, 2013), better working memory capacity, and reduced mind wandering, evidenced by associated improvements on academic tests like the Graduate Record Exam (GRE) (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013). Given these favourable outcomes, mindfulness programs are beginning to be applied in educational environments (Broderick & Metz, 2009; Napoli, Krech, & Holley, 2005).

Taken together, these observations prompted the study aim of assessing the effectiveness of a university-based weekly mindfulness tutorial program. In assessing variables associated with program participation, we were guided by a Cognitive Behaviour Therapy-based model that identifies negative automatic thoughts as an important therapeutic target. Since mindfulness training entails non-judgmental awareness of cognitions, coupled with a reorientation to present-awareness, the negative impacts of automatic thoughts can be reduced, even if cognitive content is not directly modified.

We additionally assessed satisfaction with life as a global measure of mental health in this largely asymptomatic population given its importance as an outcome in university attendees. Overall, it was hypothesized that attendance in weekly mindfulness meditation sessions would improve student's mental health as indicated by reductions in negative automatic thinking and improvements in satisfaction with life.

Methods

Participants

N = 39 participants, [11] males and [28] females, 17 years of age or older, currently enrolled at a university as part-or full-time students were recruited through postings on campus and in-class announcements including informational hand-outs. Recruitment took place in September 2012 with baseline measures administered in September and October, 2012 (T1) and follow-up measures administered during the later part of the semester (November-December) (T2).

Intervention

The tutorials involved mindfulness meditation with instructions for 40 minutes of meditation combined with brief talks about the practice and related research, altogether extending for ~ 60 minutes Participants could attend tutorial sessions convenient to class schedules and were encouraged to attend via related email correspondence. Meditation tutorials were offered at two campus locations for one hour on Mondays and Wednesdays, and at two separate hours on Tuesday (four hours in total) led by a faculty member and/or graduate students who were experienced practitioners of mindfulness. Tutorial attendance was recorded at each session.

Outcome Variables

The demographics questionnaire focused on undergraduate study major, age, year of schooling, ethnicity, prior meditation experience (hours and frequency of practice), psychological disorders (current or past), psychological counseling (current or past) and use of psychotropic prescription medication (current or past). The psychometric questionnaires assessed anxiety and depression-related cognitions and satisfaction with life.

Anxiety and depression - related cognitions

Automatic thoughts questionnaire (ATQ). The ATQ was developed to evaluate four dimensions of automatic or frequently occurring negative self-statements: a) personal maladjustment and desire for change; b) negative self-concepts and negative expectations; c) low self-esteem; d) helplessness (Hollon & Kendall, 1980).

Positive and negative affect scale (PNAS). The PNAS assesses two important mood dimensions with subscales consisting of 10 items each (Watson, Clark, & Tellegen, 1988). Respondents' rate how they feel in a temporally graduated manner, i.e. right now, today, during the past few days, during the past week, during the past few weeks, during the past year and generally. For this study we chose to ask respondents to indicate how they feel right now, at the present moment. Internal consistency alpha rating for the positive affect portion is .88 and .87 for the negative affect portion of the scale.

Mindfulness attention and awareness scale (MAAS). The MAAS is a 15-item scale designed to examine a core characteristic of mindfulness defined as an open or receptive awareness and attention to what is taking place in the present moment (Brown & Ryan, 2003). The MAAS was found to have

good internal consistency, with alphas ranging of .82 and .87 in student and adult samples respectively and demonstrates convergent and discriminant correlations in the expected direction (Brown & Ryan, 2003).

Satisfaction with Life

Satisfaction with life scale (SWLS). The SWLS assesses a respondents' satisfaction with life (Diener, Emmons, Larsen, & Griffin, 1985). employing five items where each one is rated on a 7-point scale from *strongly disagree* (1) to *strongly agree* (7). SWLS has a two-month test-retest correlation coefficient of .82, and a good internal consistency alpha coefficient of .87 (Diener et al., 1985).

Statistical Analyses

Multiple regression analysis was employed to test associations between changes in mindfulness and automatic thoughts, and the outcome of changes in satisfaction with life. The baseline variables were included as predictors rendering the interpretation of all posttest variables as the amount of change from pretest to posttest (Rausch, Maxwell & Kelley, 2003).

Results

Pre-Post Means for the Psychological Outcomes

Before conducting statistical analyses, all distributions were checked for normality and distributions were found to be normally distributed except for the Automatic Thoughts Questionnaire. The distribution for the latter was normalized with a logarithmic transformation. One participant did not complete the mindfulness measure at outcome, reducing the sample size for this variable to N = 39 (Table 1).

Table 1
Pre-Post Means for the Psychological Outcomes

Variable	Pre Mean (SD[a])	Post Mean (SD)	Paired Sample t-Test
ATQ[b]	54.00 (22.62)	48.85 (21.15	t(39) = 2.74, p = .009
SWL[c]	21.32 (6.43)	22.42 (7.05)	t(39) = -1.88, p = .067
Mindfulness	62.33 (13.79)	65.05 (10.84)	t(38) = -1.63, p = .110

Notes: [a]SD – Standard Deviation; [b]ATQ – Automatic Thoughts Questionnaire; [c]SWL – Satisfaction with Life

Study results suggest attendance at a mindfulness meditation tutorial was associated with reductions in negative automatic thoughts (Automatic Thoughts Questionnaire), which, in turn, predicted increased Satisfaction with Life, as assessed during the latter part of the 3-month semester. In other words, there was observed a significant reduction in negative automatic thoughts (ATQ, Hollon and Kendall, 1980) that was associated with a trend for improvement in Satisfaction with Life (SWLS, Diener, Emmons, Larsen & Griffin, 1985). This observation addressed the principal study prediction, notably that reductions in negative automatic thoughts would be associated with increases in satisfaction with life (SWLS, Diener et al., 1985). A multiple regression analysis tested those associations and used changes in mindfulness and automatic thoughts as predictors of changes in satisfaction with life. Table 2 summarizes the regression analyses. The overall model was significant ($F(5, 38) = 23.997$, $p < .0001$) but the only predictor variable that accounted for a significant amount of the variance in satisfaction with life at outcome was automatic thoughts whereby a greater decrease (i.e., improvement) in negative automatic thoughts was associated with a greater increase (i.e., improvement) in satisfaction with life ,t (38) = -2.64, p = .013. Mindfulness assessed as a separate variable was not predictive.

Table 2
Regression Analysis for Satisfaction with Life Outcomes

Predictor Variable	Unstandardized Beta	Std.[a] error	Standardized Beta	p value
Mindfulness	-.129	.077	-.200	.101
ATQ[b]	-17.62	6.68	-.364	.013

Notes: [a]Std. – Standard Error; [b]ATQ – Automatic Thoughts Questionnaire; Outcome variable was Satisfaction with Life

Discussion

Study results suggest attendance at a mindfulness meditation tutorial was associated with reductions in negative automatic thoughts (Automatic Thoughts Questionnaire) that predicted increased Satisfaction with Life. This finding follows the hypothesis that the mindfulness tutorial, fundamentally consisting of meditation practice, would help reduce tendencies to engage in nonproductive, self-pejorative cognitions that reduce well-being.

We did not find specific associations between tutorial attendance (more vs. less attendance) and changes in automatic thoughts or satisfaction with life. This could be because the amounts of mindfulness practice likely varied from estimates based on tutorial attendance, as subjects indicated they independently engaged in varying practice levels. Nonetheless, tutorial provision demonstrated a cost-effective way of engaging students in a mental health promoting practice. The attendance of N = 39 students could have readily been scaled up to N = 80 students or N = 160 students without staffing changes. While results don't directly indicate the effectiveness of the mindfulness tutorial process, they indicate a positive adjustment process featuring the attenuation of negative automatic thoughts. While reductions in negative automatic thoughts might seem an intuitive intervention target, findings suggest systematic reductions were statistically associated with a

desirable outcome, i.e. satisfaction with life in the academic context. Future studies of longer duration and careful cost accounting will be useful in analyzing the effect sizes of benefits, their association with the intervention and costs expended per obtained benefits.

Interestingly, although the tutorials were a focus, the Mindfulness Attention and Awareness Scale scores were not correlated with identified benefits. One explanation is the first impact of mindfulness practice is a sensitization effect that can be self-critical in nature such that individuals do not necessarily identify themselves as more mindful. Rather than more directly experiencing the self acceptance that can lead to more positive mood-related self report, their experience of negative mental states occur without the spiraling phenomena whereby pejorative reactions to negative observations are more injurious than the observations themselves.

Mindfulness activates the prefrontal cortex with subsequently increased production/delivery of glutamate (Cheramy & Romo, 1987) stimulating the thalamus to increase secretions of gamma-aminobutyric acid (GABA) into the lateral posterior and geniculate nuclei (Armony & LeDoux, 2000; Cornwall & Phillipson, 1988). Increased GABA is hypothesized to selectively inhibit the visual cortex (Andrews, Halpern, & Purves, 1997) and posterior superior parietal area (Bucci, Conley, & Gallagher, 1999) permitting meditators to more selectively target stimuli, leading to enhanced focal attention (Newburg & Iversen, 2003). Evidence has demonstrated decreased $GABA_B$ receptor activity in individuals with neuropsychiatric diagnoses compared to healthy controls (Barnow et al., 2009; Cryan & Kaupmann, 2005; Daskalakis et al., 2002; Daskalakis et al., 2008; Fatemi, Folsom, & Thuras, 2011; Ghose, Winter, McCarson, Tamminga, & Enna, 2011; Greenberg et al., 2000; Ishikawa, Mizukami, Iwakiri, & Asada, 2005; Klempan et al., 2009; Levinson et al., 2010; Levinson, Young, Fitzgerald, & Daskalakis, 2007; Liu, Fitzgerald, Daigle, Chen, & Daskalakis, 2009; Mizukami et al., 2002; Mizukami et al., 2000; Oblak, Gibbs, & Blatt, 2010; Sequeira et al., 2009; Zai, King, Wong, Barr, & Kennedy, 2005) and,

conversely, increased $GABA_B$-mediated inhibition associated with clinical improvements attributed to cognitive behavioral therapy (Rhadu et al, 2012), electroconvulsive therapy (Bajbouj et al., 2006), repetitive TMS (Daskalakis et al., 2006) and with clozapine treatment in schizophrenia (Liu et al., 2009; Wu et al., 2011).

Limitations of the current study are largely related to modest sample size, a brief (3 month) intervention and psychometric self-report. In future studies, more advanced designs will be implemented, including randomly allocated comparison groups, longer intervention and follow up periods and neurophysiological measures in combination with psychometric self-report.

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