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## The effectiveness of a school-based mindfulness intervention (ADOMIND) on adolescents' depressive symptoms: a pilot study

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### ABSTRACT

Adolescence is often considered as a critical developmental period for the emergence of mental health problems. In both research and practice settings, there is growing interest in the potential of school-based mindfulness interventions to promote mental health of adolescents. In this pilot study, 15-year-old adolescents ( $n = 34$ ) were taking part to either an 8-week mindfulness-based intervention (MBI) or an 8-week healthy life skills intervention. Self-reported measures of mindfulness and mental health were administered before and after intervention completion. Results revealed that adolescents from the MBI group showed significantly greater reduction in psychological symptoms and negative affect than adolescents from the control intervention group. Findings suggest that MBIs integrated into regular classroom curricula and conducted by ordinary teachers may offer cost-effective solutions for mental health prevention in adolescents. These encouraging results need to be replicated with a larger sample before their generalizability to the adolescent public can be determined.

**Keywords:** mindfulness; school; adolescence; depression; intervention.

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## RÉSUMÉ

L'adolescence est souvent considérée comme une période du développement d'une importance capitale concernant l'apparition des problèmes de santé mentale. Dans les milieux de la recherche et sur le terrain, on s'intéresse de plus en plus au potentiel des interventions basées sur la pleine conscience en milieu scolaire pour promouvoir la santé mentale des adolescents. Dans cette étude pilote, des adolescents de 15 ans ( $n = 34$ ) ont participé soit à une intervention basée sur la pleine conscience (IBPC), soit à une intervention sur l'hygiène de vie, pendant 8 semaines. Des mesures auto-rapportées de la pleine conscience et de la santé mentale ont été administrées avant et après l'intervention. Les résultats révèlent une réduction significative des symptômes psychologiques et des affects négatifs des adolescents du groupe IBPC en comparaison à ceux du groupe contrôle. Les résultats suggèrent que les IBPCs intégrées dans le programme scolaire et conduites par des enseignants ordinaires peuvent représenter une solution efficace pour la prévention de la santé mentale des adolescents. Ces résultats encourageants doivent être reproduits à plus grande échelle avant de pouvoir statuer quant à leur généralisabilité auprès du public adolescent.

**Mots-clés** : pleine conscience ; école ; adolescence ; dépression ; intervention.

## INTRODUCTION

Adolescence (approximately spanning the ages 10-19) is a period characterized by significant developmental change across domains of cognitive, emotional, social, and biological functioning (for reviews, see Fuhrmann, Knoll, & Blakemore, 2015; Sawyer *et al.*, 2012).

During adolescence, the occurrence of mental disorders is on the rise (e.g., Lee *et al.*, 2014). Indeed, mental disorders typically have onsets in early to middle adolescence (Auerbach *et al.*, 2018) and almost a quarter of adolescents suffer from depression or anxiety disorders (Auerbach *et al.*, 2018; Younger, 2017). In addition, 10% of adolescents report they had attempted suicide and 30% said they had thought about suicide at some point in their lives (Evans, Hawton, Rodham, Deeks, 2005). During this developmental period, such mental health problems can have long-term negative consequences such as impaired academic, work, social and family functioning (Johnson & Greenberg, 2013).

Therefore, adolescence is a decisive period for the implementation of interventions designed to improve mental health and prevent the onset of psychological symptoms. There is growing interest in the potential to promote healthy pathways into adulthood through school-based interventions targeting positive mental health. Researchers have begun to examine mindfulness as a potential school-based intervention for improving adolescent's mental health and well-being.

Mindfulness is defined as “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003). Mindfulness can be conceptualized as a state, in terms of deliberate and intentional practice such as in meditation and as a trait in terms of one's predisposition to be mindful in everyday life. Although trait mindfulness appears to be stable over time (e.g., Brown & Ryan, 2003), repeated meditation practice increase this propensity toward mindfulness in everyday life (Kiken, Garland, Bluth, Palsson, & Gaylord, 2015) and such changes in trait mindfulness contribute to psychological health benefits (Carmody, Reed, Kristeller, & Merriman, 2008). Mindfulness-based interventions (MBIs) are a class of psychological interventions that aim to train people in mindfulness skills and have been shown to have a variety of beneficial effects on adults' mental and physical health (for a meta-analysis, see Khoury *et al.*, 2013). MBIs consist of formal meditation practices such as body scans or breathing awareness meditation (i.e., observing sensations in the nose, throat and chest when breathing) that are thought to cultivate individuals' greater state mindfulness, and of informal practices (e.g., focusing on thoughts, emotions, physical sensations or sensory experiences as they arise, moment after moment, during activities and routines of daily life, such as eating, walking, or interpersonal interactions) that are thought to increase individuals propensity toward mindfulness in everyday life (i.e., trait mindfulness).

The studies examining the effects of MBIs on school-age population in different settings (e.g., outpatient clinics, juvenile detention center, schools) have shown promising results (for a meta-analysis, see Klingbeil *et al.*, 2017). However, few studies have examined MBIs in relation to improving mental health among typically developing youths in ordinary schools. To date these studies suggest beneficial effects of MBIs on adolescents' well-being and mental health such as significant reduction in depression, negative affect, stress, anxiety or rumination and increase in positive affect and emotion regulation (for a review, see Carsley, Khoury, & Heath, 2017; Felver, Celis-de Hoyos, Tezanos, & Singh, 2016; Theurel, Gimbert, Gentaz, 2018).

Although these findings are encouraging, studies on the implementation of MBIs in schools have a number of limitations (for a review, see Felver *et al.*, 2016). More particularly, the lack of active comparison condition in most of the studies make it difficult to draw conclusions on the effect of MBIs on adolescents' mental health. In addition, very few studies reported the pre-post use of measures of mindfulness, leaving unclear the role of mindfulness in improving psychological outcomes among adolescents. Finally, MBIs have most often been taught by external mindfulness instructors. Yet, a meta-analysis suggested that interventions delivered by teachers showed more consistent effects than when they are delivered by other instructors (Waters, Barsky, Ridd, & Allen, 2015). In addition, as they come to present "foreign" activities such as using one's senses to explore food, external instructors can provoke an initial resistance in students toward mindfulness practice (e.g., Himelstein, Saul, Garcia-Romeu, & Pinedo, 2014). Given that school represents a cost-effective solution to prevent adolescent mental health, studies are needed to assess the effectiveness of interventions delivered by ordinary classroom teachers during school hours.

Therefore, the aim of the current research was to address these limitations in assessing the effects of a school-based MBI on a group of 15-year-old adolescents in comparison to an active control intervention. The MBI was conceived to develop present moment awareness through mindful practices, emotion awareness and regulation through emotional learning and mindful practices, and well-being and positive relationship skills by cultivating core concepts of positive psychology such as gratitude, kindness and compassion. The control intervention matched the MBI in terms of length, and type of activities of the sessions. It includes topics such as nutritional information, health and safety information and was presented as an alternative equivalent intervention to improve well-being. Participants were blind to the hypothesis concerning expected results of the two interventions conditions. To better understand the role of mindfulness in improving psychological outcomes among adolescents, the current study includes self-reported measures and a pre-post mindfulness measure. Finally, the current study was designed so that the interventions could be taught by the ordinary teachers and implemented during ordinary school classes.

## METHOD

### Participants

Ethics approval for the research was obtained from The University of Geneva Ethics Committee prior to the beginning of the study. Participation in this study was voluntary and based on informed consent: parents (or caregivers) of the participants were sent information sheets about the study and consent forms, and assent forms were provided to the adolescents taking part in the research. Thirty-eight 15-year-olds enrolled in two classrooms of tenth grade in a Swiss high school were eligible to take part in this research. The two classrooms were equivalent in terms of adolescents' socioeconomic status, general school curricula, learning aptitude and class number. One classroom was randomly allocated (randomization was performed by a simple coin flip) to the MBI; the other took part in the healthy life skills intervention (HLSI). A total of 34 adolescents 15 years of age (21 girls and 13 boys aged 15 years and 11 months on average) completed both assessments prior to and following the eight-week intervention period. This final sample included 16 participants in the MBI (9 girls, 7 boys) and 18 in the HLSI (12 girls, 6 boys). All participants were French native speakers.

### Interventions

The intervention period took place between March and June of 2017. Both interventions consisted of eight weekly group-based sessions of 45 min, plus 5 min meditation (or control content) three times a week. Interventions were delivered during a regular class by the two supervisor teachers of the classrooms and in the presence of one of the study authors. These two experienced teachers had no prior mindfulness experience. Prior to the intervention phase, teachers were provided with a curriculum manual in which sessions objectives and content were explained. Both interventions have been created by the two first authors of the study. Supplementary information can be found here: <https://mfr.osf.io/render?url=https://osf.io/g64fn/?action=download%26mode=render>

**Mindfulness-based intervention: ADOMIND.** This intervention is based on mindfulness, socio-emotional learning and positive psychology

research. It was conceived to cultivate mindfulness skills and includes meditation exercises and the bringing of mindful awareness to daily activities like eating, moving, seeing and listening. This intervention included “value-added” components (socio-emotional learning, kindness, gratitude) in regard to adolescent’s mental health in comparison to classic mindfulness program. Some core components of mindfulness were also developed in these “value-added” themes. For example, the session on emotions was conceived to develop greater emotions awareness and to strengthen student’s capacities to observe their emotions with a nonjudgmental attitude. The core themes and session order of the intervention were based on the MindUp program (Maloney, Lawlor, Schonert-Reichl, & Whitehead, 2016).

ADOMIND includes 8 sessions (one session per week). Each session was taking place on morning, each week on the same day, and included a 10-15 min of guided mindfulness meditation practice (e.g., breathing meditation, mindful movements, mindful eating) and 30 min of didactic material on the brain science behind mindfulness, stress and emotions. Sessions also included group discussion and activities focused on integrating mindfulness concepts (e.g., observing, acting with awareness, non-judgment, non-reactivity) and their practice into everyday life. Adolescents were also asked to practice mindfulness meditation during 5 min, 3 times a week, with an audio-guided meditation. These guided meditations were taking place on morning during a regular class at the beginning of the school day. All meditations have been created and recorded by the study first author.

**Healthy Life Skills Intervention.** The HLSI includes a number of health-promoting topics such as nutrition, physical activity, sleep hygiene, and screen-based media effect. Each session included didactic material on the science behind these topics (e.g., brain nutrition, sleep patterns) and group discussion and activities focused on integrating these wellness concepts into everyday life. To control for the 5-min meditation 3 times a week proposed in the MBI, the adolescents in the HLSI were assigned 5 min of activity on content relating to the material presented in class.

## Measures

Questionnaires to assess mindfulness and mental health in adolescents were administered at two points in time: two weeks before and after the

intervention period. Data were collected by research staff through a packet of questionnaires that were administered in class group at school during a regular school hour.

Larger data were collected for the present study but are not included in the manuscript itself for practical reason. Extended method and results can be found here: <https://mfr.osf.io/render?url=https://osf.io/g64fn/?action=download%26mode=render>

**Mindfulness.** The Mindful Attention Awareness Scale adapted for Children (MAAS-C; Lawlor, Schonert-Reichl, Gadermann, & Zumbo, 2014) consists of 15 items that measure the level of mindfulness. Responses are based on a 6-point scale (1 = almost never; 6 = almost always), where higher scores reflect greater trait mindfulness. Internal consistency of the MAAS-C in the present study was good before ( $\alpha = .82$ ) and following the intervention ( $\alpha = .78$ ).

**Mental health.** The Depression, Anxiety, and Stress Scale-Short form (DASS-21; Lovibond & Lovibond, 1995) consists of three 7-item scales designed to assess depression (DASS-21-D), anxiety (DASS-21-A), and stress symptoms (DASS-21-S). Responses are based on a 4-point Likert scale (0 = “not at all” to 3 = “most of the time”). More severe symptoms are indicated by higher scores. Internal consistency of the DASS-21 in the present study was high, both before ( $\alpha = .86$ ) and following the intervention ( $\alpha = .87$ ).

The youth short version of the Profile Of Mood State-2<sup>nd</sup> Edition (POMS-2; Heuchert & McNair, 2012) consists of a list of 35 adjectives. Respondents indicate the degree to which each adjective describes themselves during the last week using a 5-point Likert scale format (0 = “not at all” to 4 = “extremely”). Standard scoring of the POMS-2 yields scores for six subscales: Anger-Hostility (AH), Confusion-Bewilderment (CB), Depression-Dejection (DD), Fatigue-Inertia (FI), Tension-Anxiety (TA), and Vigor-Activity (VA). In this study, adolescents only responded to the 20 items of the three subscales Anger-Hostility, Depression-Dejection and Tension-Anxiety. Internal consistency of the POMS-2 in the present study was high, both before ( $\alpha = .88$ ) and following the intervention ( $\alpha = .88$ ).



## RESULTS

Descriptive statistics (means and standard deviations) for all measures at pre-intervention and post-intervention for the MBI and HLSI are presented in Table 1.

The MBI and HLSI groups did not significantly differ on mindfulness (MAAS-C;  $F(1,32) < 1$ ) and mental health ( $F(1,32) = 1.04$ ,  $p = .31$  and  $F(1,32) = 1.15$ ,  $p = .29$ , for the DASS-21 and the POMS 2 respectively) outcomes before the beginning of interventions. Preliminary ANOVA with Gender (Girls, Boys) and Intervention (MBI, HLSI) as between-participant factors and Time (Pre-intervention, Post-intervention) as a within-participant factor revealed that Gender was not significant (all  $F_s < 1$ ) and did not interact with Time and Intervention ( $F(1,30) = 1.04$ ,  $p = .31$ ,  $F(1,30) < 1$  and  $F(1,30) = 2.06$ ,  $p = .16$  for the DASS-21, the POMS 2 and the MAAS respectively. Gender factor was then removed from subsequent analyses.

**Table 1.** Descriptive statistics (means and standard deviations) for all measures at pre- and post-intervention for the mindfulness-based (MBI) and the healthy life skills interventions (HLSI).

|                | MBI              |                   | HLSI             |                   |
|----------------|------------------|-------------------|------------------|-------------------|
|                | Pre-intervention | Post-intervention | Pre-intervention | Post-intervention |
| <b>MAAS-C</b>  | 41.44 (9.10)     | 41.13 (6.38)      | 44.65 (9.92)     | 44.18 (9.46)      |
| <b>DASS-21</b> | 61.87 (9.79)     | 51.87 (13.07)     | 57.72 (12.88)    | 53.89 (12.59)     |
| Depression     | 18.38 (3.58)     | 15.94 (5.16)      | 16.11 (5.11)     | 17.06 (5.09)      |
| Anxiety        | 16.06 (4.93)     | 13.69 (5.12)      | 16.33 (4.79)     | 13.83 (4.53)      |
| Stress         | 26.67 (3.77)     | 22.20 (5.17)      | 25.28 (5.02)     | 23.00 (5.94)      |
| <b>POMS</b>    | 43.00 (10.06)    | 34.80 (12.33)     | 38.72 (12.37)    | 36.56 (11.12)     |
| Anger          | 13.94 (3.70)     | 13.38 (4.65)      | 13.65 (4.89)     | 12.65 (5.63)      |
| Depression     | 13.07 (4.73)     | 11.20 (4.11)      | 10.72 (4.40)     | 11.33 (4.21)      |
| Anxiety        | 15.31 (5.11)     | 10.69 (5.07)      | 14.72 (4.81)     | 12.44 (5.15)      |

To test our hypothesis, that adolescents taking part in the MBI would demonstrate significantly greater improvements in self-reported measures than adolescents allocated to the HLSI, ANOVAS were conducted on

scores with Time (Pre-intervention, Post-intervention) as a within-participant factor and Intervention (MBI, HLSI) as a between-participant factor.

Results revealed significant differences between the MBI ( $M = -9.79$ ;  $SD = 7.50$ ) and the HLSI groups ( $M = -3.83$ ;  $SD = 8.77$ ) on DASS-21 changes scores,  $F(1, 32) = 4.47$ ,  $p = .04$ ,  $\eta_p^2 = .12$ . Post hoc analyses with Bonferroni correction for multiple comparisons revealed that the MBI group showed the greatest decreases in depressive symptoms ( $M_{\text{MBI}} = -2.44$ ,  $SD_{\text{MBI}} = 3.74$ ;  $M_{\text{HLSI}} = 0.94$ ,  $SD_{\text{HLSI}} = 3.67$ ;  $p = .01$ ) but that the two groups did not significantly differ on anxiety ( $p = .94$ ) and stress ( $p = .09$ ). Similarly, results revealed significant differences between the MBI ( $M = -7.99$ ;  $SD = 6.63$ ) and the HLSI groups ( $M = -2.17$ ;  $SD = 9.54$ ) on negative affect (POMS 2) changes scores,  $F(1, 32) = 4.17$ ,  $p = .04$ ,  $\eta_p^2 = .11$ . Post hoc analyses revealed that the MBI group showed the greatest decreases in depressive mood ( $M_{\text{MBI}} = -1.78$ ,  $SD_{\text{MBI}} = 2.75$ ;  $M_{\text{HLSI}} = 0.61$ ,  $SD_{\text{HLSI}} = 3.57$ ;  $p = .03$ ) but that the two interventions did not significantly differ on anxiety ( $p = .23$ ) and angry mood ( $p = .71$ ).

However, results did not reveal any significant differences between the MBI and the HLSI groups on mindfulness outcomes (MAAS-C),  $F(1, 32) < 1$ ,  $p = .94$ .

## DISCUSSION

This pilot study examined the effects of a school-based MBI on adolescents' mental health in comparison to an equivalent healthy life skills control intervention in a randomized control trial. This study represents one of the few to compare a school-based MBI to an active control condition, rather than a passive no-treatment condition or waitlist control (Greenberg & Harris, 2012). Similarly, this study is one of the few to test the feasibility of integrating a MBI into the standard classroom curriculum that is taught by the ordinary teacher. However, it should be noted that other authors (Crane, Kuyken, Hastings, Rothwell, & Williams, 2010) emphasized the importance of personal practice to successfully teach such programs. The degree and nature of training required for teachers to deliver efficaciously such programs to their students should be examined in future studies.

Results showed that, in comparison to an active control intervention, an eight-week school-based MBI is effective in reducing depressive symptoms and depressive affect (assessed with two different measures) of 15-year-old adolescents. The results from this study confirm results of the few rigorous trials that have assessed the effect of school-based MBI on the mental health of adolescents (for a review, see Carsley *et al.*, 2017; Felver *et al.*, 2016; Theurel *et al.*, 2018). These preliminary results are encouraging, especially given the prevalence of both suicidal ideation and depression in adolescents (Younger, 2017; Evans *et al.*, 2005). Moreover, youth often do not seek mental health care because of the stigma related to mental health services (Chandra & Minkovitz, 2007; Corrigan, Druss, & Perlick, 2014). Incorporating MBIs directly into the classroom may have indirect beneficial effect in reducing this stigma. However, it should be noted that as our sample was a nonclinical adolescent group, we didn't use a clinical measure of depression in order to identify changes in mental health. Although the DASS 21 has been validated for use in the adolescent population (Tully, Zajac, & Venning, 2009; Willemssen, Markey, Declercq & Vanheule, 2011), there are no cut-off scores for this scale for adolescents. For that reason, our results do not allow us to conclude on the effectiveness of this MBI on clinical depression.

Although promising findings, the results of the current study should be taken with caution given the small sample size and the use of mindfulness (MAAS-C) and affect (POMS 2) measures that have not been validated in French in the adolescent's population. Other scales have been recently validated in French (e.g., Roux *et al.*, 2019) and might have provided more robust and interpretable data. Furthermore given that there were no group differences in measures of mindfulness, it is difficult to conclude that intervention effects were due to mindfulness practice.

A possible explanation of the absence of intervention effect on mindfulness measure could be that the MAAS does not measure mindfulness but rather "mindlessness". Given that mindfulness training make participants aware of how often they are mindless or not aware of the present moment, this awareness may affect their mindfulness scores, which may not necessarily reflect an actual lower state of mindfulness or a lower tendency to exhibit mindful attitudes and behaviors in the context of daily life. Indeed, one study (De Bruin, Zijlstra, van de Weijer-Bergsma & Bögels, 2011) showed that prior meditation/yoga experience was associated with lower scores on the MAAS. Another explanation could be that students were not actively engaged in mindfulness meditation. Self-reports about intervention could have provided interesting information about students' belief in the relevance of the intervention to their lives

and about their engagement in mindfulness meditations (e.g., Britton *et al.*, 2014; Bluth *et al.*, 2016).

Nevertheless, very few studies have reported beneficial effect of school-based MBI on mindfulness measures (for a review, see Theurel *et al.*, 2018). Such findings led researchers to question the validity of self-reported mindfulness measures (Goodman, Madni, & Semple, 2017; Van Dam, Earleywine, & Borders, 2010). Maybe, a potentially more sensitive assessment approach would be the use of ecological momentary assessment (EMA) to assess adolescents' mindful state throughout the day. Furthermore, EMA could also have provided information on adolescents' mental health during intervention with a dynamic point of view such as an assessment of experiences of both positive and negative emotion and their regulation on a daily basis (e.g., Heiy & Cheavens, 2014; Tan *et al.*, 2012). For example, Geschwind, Peeters, Drukker, van Os & Wichers (2011) reported in adults an increased experience of momentary positive emotions and a greater appreciation of pleasant daily-life activities during their mindfulness intervention.

This study then failed to provide support of the concept that “mindfulness” is what mediates improvements and leaves open the question of what mechanisms underlie the effects of this MBI on mental health outcomes (i.e., depression, negative affect). Studies dealing with the notion of mindfulness usually start from the observation that people spend most of their time over engaged in their continuous thoughts and ruminations related to past and future. Consequently, one hypothesis could be to consider rumination as a mediator of the effects of MBIs on depressive symptoms for instance. Indeed, given that higher rates of rumination are associated with greater vulnerability to depression in adulthood (Nolen-Hoeksema, 2000; Spasojević & Alloy, 2001) and adolescence (Abela & Hankin, 2011), it is logical to conclude that reductions in rumination would be protective against later manifestation of depressive symptoms. Also, MBIs have been associated with reductions in rumination in adults (Deyo, Wilson, Ong, & Koopman, 2009) and adolescents (Gould, Dario-tis, Mendelson, & Greenberg, 2012; Mendelson *et al.*, 2010). In addition, a systematic review on the effects of mindfulness-based cognitive therapy on depression (van der Velden *et al.*, 2015) revealed that mindfulness, rumination and worry mediate reduction in post-treatment depressive symptoms and thus could be key contributory factors to the beneficial effects of MBIs in depression. However, given that rumination thinking style was not assessed, this study failed to provide evidence for the mechanisms of change in MBI. Currently, there is a lack of replicated studies that can convey the specific and non-specific mechanisms responsible for

change. Studies that use mediation analysis are needed to identify the potential mechanisms of change in MBIs. In addition, as our intervention integrate mindfulness practices as one component of a multicomponent program, it is difficult to disentangle which components contributed to observed benefits and whether mindfulness training had any effects on its own.

Finally, a follow-up period and longitudinal data would have been helpful in supporting the preventive effect on depression symptoms of the present intervention. Some evidence in the literature suggests that MBIs can have long-term effects. For example, in the study of Kuyken *et al.* (2013), decrease in depressive symptoms was observed both immediately following the intervention and at 3 month follow up. Given that such long-term effects could enable to reduce the economic burden of depression (e.g., Tomonaga *et al.*, 2013), more evidence is needed to determine whether MBIs are effective in providing long-term protection against depression.

In light of the substantial burden of mental health conditions, The World Health Organization has developed the Mental Health Action Plan for 2013-2020. In light of the results of previous studies (e.g., Carsley *et al.*, 2017; Felver *et al.*, 2016) and of the present study, school-based MBI should be considered as a potential action to support the mental health of adolescents and may offer cost-effective solutions for mental health prevention.

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