The aim of this multisite randomized controlled trial was to determine whether an intervention based on Acceptance and Commitment Therapy (ACT) was efficacious in improving university students’ psychological flexibility, mental health, and school engagement. Students were recruited in four Canadian universities and randomly assigned to an intervention (n = 72) or a wait-list control group (n = 72). Students in the intervention group took part in four 2.5-hour workshops during a 4-week period and were asked to do exercises at home (e.g., meditation, observation grids). Wait-list students received the intervention soon after the post measurements. MANCOVAs and ANCOVAs revealed that students in the intervention group showed greater psychological flexibility at postintervention than those in the control group. They also reported greater well-being and school engagement, and lower stress, anxiety, and depression symptoms. Taken together, results of this study suggest that an ACT-based intervention offers a valuable way to promote mental health and school engagement in postsecondary settings.

Keywords: acceptance and commitment therapy; psychological flexibility; mental health; school engagement; university students

In Canada, a significant number of college and university students experience mental health problems. According to a survey conducted in 2016 within 48 Canadian postsecondary institutions, 18.4% of students were diagnosed or treated for anxiety within the last 12 months and 14.7% were diagnosed or treated for depression. A sizeable proportion of students reported feeling sad (24.8%), hopeless (23.4%), lonely (22.8%), exhausted (17.1%), and under a tremendous amount of stress (14.4%; American College Health Association, 2016). More important, research suggests that the prevalence of anxiety and depression is slowly rising on campus (Center for Collegiate Mental Health, 2016) and that postsecondary students are more likely to report mental illness symptoms than nonuniversity youth (42% compared with 17%; Ontario College Health Association, 2009).

Mental health problems can have a profound influence on students’ quality of life and have a negative impact on their academic performance, school engagement, and graduation rate. In fact, students report that stress (42.2%), anxiety (32.5%),
sleep difficulties (28.4%), and depression (20.9%) are among the leading factors that affect their learning and academic performance (American College Health Association, 2016). Moreover, students with mental health problems have lower grade point averages and lower rates of graduation than those not suffering from such problems (Byrd & McKinney, 2012).

Many colleges and universities offer counselling services to their students (MacKean, 2011), but the professionals who provide these services (e.g., psychologists, social workers) are often understaffed and overwhelmed by student demands (Jaworska, De Somma, Fonseka, Heck, & MacQueen, 2016). In a survey done within 93 counselling centers in postsecondary institutions, the Center for Collegiate Mental Health (2016) concluded that the demand for counselling center services had significantly increased over the last few years, outpacing the growth of institutional enrollment.

Taken together, these findings emphasize the importance of implementing programs aimed at helping postsecondary students to cope with issues of stress, anxiety, and depression. According to the Canadian Association of College and University Student Services (MacKean, 2011), these programs should be preventive, cost-effective, and easily accessible. They should also enable students to develop a range of skills that could help them maintain good mental health and sustain self-care. Following these recommendations, our team developed an intervention in 2012 based on Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 2012) to promote mental health and school engagement among university students and help them cultivate skills such as psychological flexibility (Grégoire, Lachance, Bouffard, Hontoy, & De Mondehare, 2016). In the next section, ACT is briefly described as well as recent studies assessing its efficacy in college and university institutions. We then describe the multisite randomized controlled trial we have put forward to assess the effects of our intervention.

**WHAT IS ACT?**

ACT is a transdiagnostic psychotherapeutic intervention, based on a theoretical model called Relational Frame Theory (Hayes, Barnes-Holmes, & Roche, 2001). It is a “third wave” cognitive behavioral therapy (CBT) that does not specifically target symptom reduction (e.g., anxiety, negative thoughts) but rather encourages participants to engage in values-based actions regardless of the presence or absence of symptoms. The overall aim of ACT is to increase psychological flexibility, which is the ability to be mindful of experiences in the present moment, in an accepting and nonjudgmental way, while behaving consistently with one’s values, even when one’s thoughts and feelings oppose taking valued action (Levin, Pistorello, Seeley, & Hayes, 2014). To foster psychological flexibility, ACT relies on six interrelated and overlapping processes: acceptance (i.e., willingness to open fully to unwanted experiences such as difficult thoughts, memories, or emotions), contact with the present moment (i.e., being mindful and aware of one’s experiences), self as context (i.e., maintaining perspective about oneself within one’s experiences), cognitive defusion (i.e., being able to step back from unwanted experiences without getting stuck in them), committed action (i.e., engaging in actions that move toward important aspects of life), and values (i.e., staying connected to personal values or areas of life that are important).

Meta-analyses show that ACT is efficacious in promoting both psychological flexibility and mental health (A-Tjak et al., 2015; Ost, 2008, 2014; Powers, Zum Vörde Sive Vörding, & Emmelkamp, 2009; Ruiz, 2012). The most recent meta-analysis included 39 randomized controlled trials and a total of 1,821 patients with mental disorders or somatic health problems (A-Tjak et al., 2015). It shows that ACT outperformed control conditions on both primary (e.g., anxiety, depression) and secondary (e.g., quality of life) outcome measures at posttreatment and follow-up assessments. The authors concluded that ACT is more effective than treatment as usual or placebo, and that it may be as effective as established psychological interventions in treating chronic pain, anxiety disorders, depression, and addiction.

**ACT IN POSTSECONDARY SETTINGS**

Over the last 5 years, ACT has also been offered to college and university students. According to Levin, Haeger, Pierce, and Twohig (2016), the transdiagnostic nature of ACT is particularly well suited to postsecondary settings. Although students may experience specific mental health disorders, many of them struggle with problems (e.g., stress, relationship issues, discrimination) that do not have any specific diagnosis. Levin et al. (2016) claim that ACT can be useful for a diversity of psychological problems that college and university students typically experience and can help them increase their psychological flexibility.

Some of the ACT interventions implemented in postsecondary settings were web-based. For example, Levin et al. (2016) offered a 4-week online intervention to college students in the United States. The results of their randomized controlled trial showed that, compared to those on the wait-list, participants receiving the ACT intervention improved on overall distress, general anxiety, social anxiety, depression, academic concerns, and positive mental health. Räsänen et al. (2016) offered a 7-week online
intervention to university students in Finland and used a randomized controlled trial to measure its efficacy. Those who took part in the intervention reported more well-being and life satisfaction as well as lower stress and depression symptoms compared to the students in the wait-list control group. These benefits were maintained over a 12-month follow-up period. ACT interventions in postsecondary settings have also been offered in self-help book (Muto, Hayes, & Jeffcoat, 2011), class (Moyer, Murrell, Connally, & Steinberg, 2016), workshop formats (Danitz & Orsillo, 2014; Danitz, Suvak, & Orsillo, 2016; Sandoz, Kellum, & Wilson, 2017), or through counselling services. For example, Grégoire et al. (2016) offered a 4-week intervention among university students enrolled in three different universities in Canada. The pretest-posttest switching-replication design used to assess the intervention showed that it had a positive effect on students’ psychological flexibility and mental health.

These results suggest that ACT interventions are effective at helping students deal with stress, anxiety, or depression issues and represent a promising avenue for improving mental health in colleges and universities campus. However, as pointed out by others (Danitz et al., 2016; Rásänen et al., 2016), more studies are needed to better understand the impact of these interventions on mental health. To date, randomized controlled trials based on ACT for college and university populations are rare and the studies are sometimes flawed with methodological limitations. For instance, psychological flexibility is often assessed with either the first or the second version of the Acceptance and Action Questionnaire (AAQ; Bond et al., 2011; Hayes et al., 2004), the validity of which has been questioned by Gámez, Chmielewski, Kotov, Ruggero, and Watson (2011). The authors argue that the number of items in the AAQ (n = 10) is insufficient to adequately measure all six underlying processes of ACT. Gámez et al. (2011) also contend that some of the items are too vague, ambiguous, or difficult to understand. Based on an exploratory factor analysis, Wolgast (2014) found the items of the AAQ-II to be more strongly related to items designed to measure distress than items designed to measure acceptance/nonacceptance with minimal references to functional outcomes.

Additional studies are also needed to examine the impact of ACT interventions on academic variables such as school engagement. Evidence suggests that school engagement is positively correlated to achievement and perseverance among college and university students (Brault-Labbé, & Dubé, 2008; Casuso-Holgado et al., 2013) and helps to protect students from dropping out of school (Fredricks, Blumenfeld, & Paris, 2004). Considering that in Canada, 25% of college students and 16% of university students do not complete their curriculum (Shaiensks, Gluszynski, & Bayard, 2008), it becomes critical to have a better understanding of what can be done to enhance school engagement in postsecondary institutions and improve both achievement and school completion rates. According to Fredricks et al. (2004), school engagement is a multidimensional construct that draws on three dimensions. Behavioural engagement refers to student conduct that is beneficial to psychosocial adjustment and achievement at school. This dimension can be divided into three main axes: positive behaviors, involvement in school-related tasks, and participation in social or extracurricular activities. Emotional engagement refers to feelings, interests, perceptions, and attitudes toward school. It encompasses positive (e.g., happiness) and negative (e.g., boredom) reactions to teachers, classmates, academics, and school and is presumed to create ties to an institution and influence willingness to do the work. Cognitive engagement refers to student psychological investment in learning and the use of self-regulation strategies by students. It incorporates perceptions of competency, willingness to engage in effortful learning activities and establishing task-oriented goals. In a previous study, we showed that ACT could have a positive impact on university students’ level of school engagement (Grégoire et al., 2016). We believe that students who take part in ACT were encouraged to take concrete steps to shape their life in a more meaningful way, focus on their most important values and were therefore more inclined to engage in their school endeavours. Although interesting, these results remain preliminary and need to be replicated with a broader sample and a more robust experimental research design.

THE CURRENT STUDY

The aim of the present study is to extend previous research by (a) conducting an ambitious randomized controlled trial in four distinct universities, (b) exploring the impact of an ACT intervention on school engagement, a variable never considered before to our knowledge, and (c) measuring psychological flexibility in a novel way to capture all six ACT processes. More precisely, its goal was to examine the effect of four workshops based on ACT on the psychological flexibility, mental health, and school engagement of university students. Psychological flexibility was used as a process outcome and four mental health indicators (stress, anxiety, depression, and well-being) were used as primary outcomes. Although the reduction of psychological symptoms is not the primary goal of ACT, stress, anxiety, and depression indicators were chosen as primary outcomes given that they are often targeted...
in mental health studies conducted in postsecondary settings (Conley, Durlak, & Dickson, 2013). School engagement was used as a secondary outcome variable.

The hypotheses of the study are the following:

1. Students in the intervention group will report higher psychological flexibility at the end of the workshops than students in the control group.
2. Students in the intervention group will report fewer symptoms of stress, anxiety and depression and higher well-being at the end of the workshops than students in the control group.
3. Students in the intervention group will report higher school engagement at the end of the workshops than students in the control group.

**Method**

One hundred and forty-four ($n = 144$) students took part in this study during the fall semester of 2014 and the winter semester of 2015. Students were recruited from four universities in Canada (Université du Québec à Montréal = 34.7%; Université de Montréal = 30.6%; Université de Sherbrooke = 12.5%; Hautes Études Commerciales de Montréal = 22.2%). Most of them were women (73.6%) and about 60% of them were enrolled in a bachelor’s degree (59.4%). A third of the students were completing a master’s degree (31.5%) while a minority were doing a doctoral degree (9.1%). Almost half of the students were born in Canada (49.7%) while the rest were born in Europe (16.3%), Africa (19%), South America (10.1%), or other regions of the world (4.9%). Characteristics of the students are presented in Table 1. To be included in the study, participants had to be enrolled in one of the universities mentioned above and speak French. The workshops were free and students received no monetary compensation or other incentive for their participation.

**INTERVENTION**

Students took part in an intervention developed by our team named KORSA (www.korsa.uqam.ca/en/). In Swedish, KORSA means to cross over or to pass through. The intervention is presented to students as a way to go through their studies successfully while maintaining a good quality of life. It comprises four 2.5-hour workshops offered to groups of 8 to 15 students during 4 consecutive weeks. The first workshop focused on values and committed action processes. Students were helped to clarify what was important for them in various life domains (e.g., school, family) and to translate their personal values into concrete goals and actions. By the end of this workshop, they were encouraged to implement small changes in their life that would move them towards their values. The second workshop was based on acceptance and cognitive defusion processes. Students were invited to look at difficult thoughts, emotions, or sensations and see whether they were trying to control or avoid these internal experiences. They were then asked to examine the workability of experiential avoidance strategies in the long term and encouraged to adopt an alternative strategy, namely acceptance. Through experiential exercises and metaphors, participants were also helped to defuse difficult thoughts (e.g., “I’m a loser. I’ll never be able to complete my bachelor’s degree.”) and encouraged to maintain their focus on their values while having these thoughts. In the third workshop, students learned different meditation practices to cultivate mindfulness and help them get in touch with a sense of self that is safe and continuous, and from which they can observe and accept changing experiences. The goal of the fourth workshop was to synthesize all the learning done so far and ensure that it is transferred into the students’ daily life.

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1 The reasons why the mean age is above 30 are twofold. First, in the province of Quebec (where this study was conducted), students usually begin university between 19 and 24 years old. Secondly, 40.6% of the students who took part in this study were enrolled in graduate studies. Graduate students are usually older. According to a report published by the Association of Universities and Colleges of Canada in 2010, 31% of master’s students and 36% of PhD students were 30 years of age or older (Association of Universities and Colleges in Canada, 2011).
The intervention contains various ACT exercises, such as the matrix developed by Polk and Schoendorff (2014) or the Bull’s Eye exercise (Harris & Hayes, 2009), and behavioral activation strategies (Mazzucchelli, Kane, & Rees, 2010). It is based on two documents: the trainer’s guide and the participant’s guide. The former gives a detailed description of how each workshop should run. This guide has been designed to standardize the workshops and ensure that they are delivered on a consistent basis from institution to institution and from one semester to the next. The participant’s guide is given to the students at the beginning of the first workshop. It contains exercises to do during the workshops or at home. In addition, throughout the intervention, participants can obtain copies of the workshop overheads on a website, download various guided meditations for practicing at home, or find suggestions for additional reading. For more information regarding the intervention, the reader can consult the supplementary material to this article.

The KORSA workshops were administered by two doctoral students in psychology (a male and a female) already familiar with ACT and blind to the hypotheses of the study. These students had taken graduate classes on ACT and used the approach in their internships. They were asked to give the workshops to one group under the supervision of the first author of this study and to another group under the supervision of an expert in group counseling not involved in the current study. This procedure was implemented to ensure that the trainers led the workshops in accordance with ACT principles.

RESEARCH DESIGN
To test the hypotheses, a multisite randomized controlled trial was used in each semester (in each research site) and was based on a 2 (intervention vs wait-list control group) × 2 (pre, post) research design. In the intervention group, students took part in the KORSA workshops delivered at their university during a 4-week period and were asked to do exercises at home between workshops (e.g., practice meditation, complete observation grids). In the control group, students were placed on a waiting list for 4 weeks and were then offered the KORSA workshops.

PROCEDURE
Participants were recruited via emails sent through the counselling services’ mailing lists of the four universities mentioned above, an advertisement on the university’s websites, and posters placed around the campuses. All students were targeted, not only the ones seeking help from the counselling services of their university. Students were informed that workshops aimed at helping them deal with stress and anxiety were to be offered within their university and that they were invited to take part in an information session to learn more about it. During this session, general information was provided on the intervention goal and content as well as the current study. By the end of this session, students who were willing to participate in the study were asked to complete the pre-intervention questionnaire. They were then randomly assigned by an independent researcher to the intervention or the wait-list control group with a computer algorithm (www.randomization.com/). Students in the intervention group started their workshops 1 week later, while those in the wait-list control group started the same workshops immediately after the intervention group completed the program. The postintervention questionnaire was completed by all students the same week: those in the intervention group did it at the end of their fourth workshop, and those in the wait-list control group completed it online.

MEASURES
Process and outcomes variables were measured at pre- and postintervention while demographic information was gathered only at pre-intervention. The Cronbach’s alpha values of all the scales are presented in Table 2.

Process Measures
Psychological flexibility. Psychological flexibility was assessed with scales aimed at covering all six ACT processes: (a) the short version of the Five Facet Mindfulness Questionnaire (FFMQ; Bohlmeijer, Ten Klooster, Fledderus, Veehof, & Baer, 2011) translated and validated in French by Heeren, Douilliez, Peschar, Debrauwere, and Philippot (2011); (b) the Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez et al., 2011); and (c) a values questionnaire developed for the purpose of this study. The FFMQ short version (24 items) was used to capture four of the psychological flexibility processes, namely contact with the present moment (e.g., “It seems I’m running on automatic without much awareness of what I’m doing”; inverse item), cognitive defusion (e.g., “When I have distressing thoughts or images, I just notice them and let them go), self as context (e.g., “Usually when I have distressing thoughts or images, I can just notice them without reacting”), and acceptance (e.g., “I think some of my emotions are bad or inappropriate and I shouldn’t feel them”; inverse item). Items of the FFMQ were measured on a 5-point Likert-type scale ranging from 1 (never or very rarely true) to 5 (very often or always true). A global FFMQ score was created based on the mean of all 24 items.
Two subscales of the MEAQ (distress aversion and distress endurance) were used to capture the following psychological flexibility processes: acceptance (e.g., “I wish I could get rid of all of my negative emotions”) and committed actions (e.g., “I am willing to suffer for the things that matter to me”). According to Gámez et al. (2011), these subscales have the most content overlap with the AAQ-II. The distress aversion subscale aimed at measuring whether or not a person has negative attitudes towards his or her distress and if he or she accepts it or not, while the distress endurance subscale aimed at measuring the willingness to behave effectively in the face of distress. The guidelines provided by Brislin (1970) and Vallerand (1989) regarding translation and transcultural validation of psychometric tools were used to translate in French the two subscales of the MEAQ. The items contained in these subscales were measured on a 6-point Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree). A global MEAQ score was computed based on the mean of all 25 items. Scores on the distress aversion subscale of the MEAQ were reversed. A high score indicates that a person tends to accept his or her value (e.g., “I know exactly what my strengths and qualities are and I want to put them forward”). The values coherence subscale (5 items) measures to what extent the person is engaged in actions that are coherent with his or her values (e.g., “Day after day, I feel my actions are aligned and coherent with my values”). The questionnaire was developed to tap into values and committed actions processes. Items were measured on a 6-point Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree) and were averaged to calculate global scores. See footnotes for more information on the validation of the values questionnaire. To assess the construct validity of this novel scale, the items were subjected to an exploratory factor analysis (EFA; maximum likelihood extraction) at pre-intervention. The Bartlett’s test of Sphericity, $X^2 (45) = 561.43, p < .001$, and the Kaiser-Meyer-Olkin value (.84) suggested that the data were suitable for this type of analysis. EFA revealed two factors with eigenvalues greater than 1, and the scree plot indicated a clear break after the third factor. To test this two-factor solution, we used web-based parallel analysis (WPA) using a Monte Carlo simulation developed by Watson (2000). This WPA provided similar results and supported a two-factor solution explaining a total of 64.7% of the variance (Factor 1 = 50.0%, eigenvalue = 5.00; Factor 2 = 14.7%, eigenvalue = 1.47). These factors were then extracted using oblimin rotation. Items that strongly loaded on Factor 1 correspond to the values coherence subscale; those that loaded on Factor 2 correspond to the values
clarity subscale. The correlation between both factors was .51.

Primary Outcome Measures

Mental health. Mental health was assessed with four indicators: stress, psychological well-being, anxiety, and depression. Stress was measured using the French version of the Psychological Stress Measure (PSM-9; Lemyre & Lalande-Markon, 2009; Lemyre & Tessier, 1988). It comprises nine items asking participants to evaluate how often during the last week they had experienced various manifestations of stress (e.g., “I feel rushed; I do not seem to have enough time”) using a 5-point Likert scale ranging from 1 (never) to 5 (always). High scores on the PSM-9 (average of all items) reflect more stress.

Psychological well-being was measured using the 24-item Well-Being Manifestations Measure Scale (WBMMS) originally developed in French by Massé et al. (1998). Here again, participants were asked to evaluate how often during the last week they had experienced different manifestations of well-being (e.g., “I felt good, at peace with myself”) using a 5-point Likert scale ranging from 1 (never) to 5 (always). High scores on the WBMMS (average of all items) reflect more perceived psychological well-being.

Anxiety and depression were measured with the French version of the General Anxiety Disorder Questionnaire (GAD-7; Micoulaud-Franchi et al., 2016; Spitzer, Kroenke, Williams, & Löwe, 2006) and the French version of the Patient Health Questionnaire (PHQ-9; Carballeira et al., 2007; Kroenke & Spitzer, 2002), respectively. The GAD-7 is a brief scale (7 items) aimed at assessing general anxiety disorder symptoms while the PHQ-9 is a 9-item scale used to detect depression symptoms. Participants were asked how often during the last week they were bothered by anxiety (e.g., not being able to stop or control worrying) and depression symptoms (e.g., feeling down, depressed, or hopeless). Both scales were scored on a 4-point Likert-type scale ranging from 1 (never) to 4 (almost every day) and were based on the sum of all their respective items. Both the GAD-7 and PHQ-9 endorse a 4-point Likert-type scale that range from 0 to 3. In the current study, a 1-to-4 scale was chosen to ensure coherence with the rest of the response scales used in the questionnaire. Scores on the GAD-7 range from 7 to 28 while those on the PHQ-9 range from 9 to 36. High scores on these scales reflect greater symptom severity.

Secondary Outcome Measure

School engagement. School engagement was measured with the French version of the Academic Engagement Scale (AES; Brault-Labbé & Dubé, 2008), which contains 14 items and three subscales: school perseverance (e.g., “Despite the difficulties, I persevere in my studies”), enthusiasm towards studies (e.g., “When I perform activities related to school, I’m full of energy”), and positive and negative aspects of school (e.g., “I accept the fact that my studies imply both positive and negative aspects”). These subscales capture the three types of school engagement (behavioral, emotional, and cognitive) described above. Items of the AES were scored on a 6-point Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree). A global AES score was created based on the mean of all 14 items. High scores reflect greater school engagement.

Attrition

The power analysis was designed to compare the mean change between groups in psychological flexibility (H1), mental health indicators (H2), and school engagement (H3) over the intervention period using analyses of covariance (ANCOVAs) controlling for these measures at baseline. The analysis was conducted using an alpha of .05, a power of .80, and a large effect size (f = .40). The desired total sample size was 84. Assuming an attrition rate of 21% based on the systematic review conducted by Öst (2014) on the efficacy of ACT interventions, it was decided to recruit at least 101 participants for the study.

A total of one hundred and sixty students (n = 160) took part in the information sessions that were held in universities and sixteen of them (n = 16) decided not to participate in the workshops after these sessions. One hundred and forty-four (n = 144) were randomly assigned to either the intervention group (n = 72) or the control group (n = 72). In the intervention group, sixty-eight (n = 68) students attended to the first workshop and fifty-seven of them (n = 57) completed more than three workshops (75% of the intervention) and filled out the postintervention questionnaire. In the control group, forty (n = 42) students completed the postintervention questionnaire. Within the intervention group, dropout occurred when students did not attend a minimum of three workshops or did not complete the postintervention questionnaire. Within the control group, dropout occurred when students failed to complete the postintervention questionnaire. Therefore, the attrition rate in this trial is 21% (1 – (57/72)) in the intervention group and 42% (1 – (42/72)) in the control group (see Figure 1 for more details).

Data Analysis

Hypotheses 1, 2, and 3 were tested using multivariate analysis of covariance (MANCOVA) and univariate analysis of covariance (ANCOVA) models in which we examined the effect of randomization on mean
levels of all outcomes measures at postintervention controlling for these measures at baseline. Analysis of covariance is associated with greater statistical power than ANOVA to detect change in randomized designs (Van Breukelen, 2006). MANCOVAs and ANCOVAs were conducted according to the intention-to-treat principles using the last-observation-carried-forward method (Twisk & de Vente, 2002) on the conservative assumption that students who did not complete the workshops experienced no significant change. The analyses were also repeated for those students who completed more than three workshops. It has been argued that the use of both the intention-to-treat and per protocol principles help “ bracket” the likely effects of an intervention under different conditions (Del Re, Maisel, Blodgett, & Finney, 2013). Based on Morris (2008) recommendations, effect sizes were reported using Cohen’s d and calculated with the Carlson and Schmidt (1999) method. According to Cohen (1988), a between-group effect size of .20 is considered small, .50 moderate, and above .80 large.

**Results**

**Preliminary Analysis**

The normality of the data was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The homogeneity of variance-covariance matrices was assessed with Box’s M test. The presence of outliers was also checked (.001 level) using both univariate...
The research sites showed no difference for group, but students differed according to their group and age. An ANOVA was used to examine if the age of students from different research sites were not significantly different in all sites with respect to school degree, study regime and semester in each research site. The results showed that the groups served to examine the comparability of the research sites, groups were compared on demographic variables using the procedure suggested by Roese et al. (2013). First, chi-square statistics and cross-tabulations with adjusted standardized residuals were used to examine the comparability of the intervention vs control with respect to sex, school degree, study regime and semester in each research site. The results showed that the groups were not significantly different in all sites with respect to sociodemographic characteristics and baseline measures, groups were combined across sites.

As previously mentioned, students were assessed at baseline (pre-intervention) prior to randomization. To ensure equivalence between the intervention and control groups following randomization in all research sites, groups were compared on demographic variables using the procedure suggested by Roese et al. (2013). First, chi-square statistics and cross-tabulations with adjusted standardized residuals served to examine the comparability of the groups (intervention vs control) with respect to sex, school degree, study regime and semester in each research site. The results showed that the groups were not significantly different in all sites with respect to sociodemographic variables. Next, analysis of variance (ANOVA) used to examine if the age of students differed according to their group and the research sites showed no difference for group, $F(1, 141) = 1.17, p = .28$. However, Tukey b post-hoc test showed that students from UdS were significantly older than those from the other universities, $F(3, 139) = 6.20, p = .001$.

Group equivalence on all process and outcome measures at baseline was also assessed using univariate ANOVAs with study conditions (intervention vs control group), research sites (UQAM, UdM, UdS, HEC), and their interaction as the between-subject factors. Results showed no main effects of these factors on any of the process and outcome measures. Thus, considering that the intervention and the control groups were generally similar in sociodemographic characteristics and baseline measures, groups were combined across sites.

Additional analyses examined if students who completed 75% of the workshops ($n = 57$) differed from those who dropped out ($n = 15$). Chi-square statistics and cross-tabulations with adjusted standardized residuals revealed no significant difference with regard to research site, study conditions, sex, school degree, study regime, and semester. An ANOVA also showed no age difference between groups. The ANOVAs conducted on process and outcome measures at baseline between students who adhered to the intervention and those who dropped out revealed no significant difference on any of these measures.

**The effects of the intervention on psychological flexibility, mental health and school engagement**

According to our hypotheses, we expected that students in the intervention group would report greater psychological flexibility (H1), mental health (H2), and school engagement (H3) at the end of the workshops than those in the control group. To test these hypotheses, we first ran MANCOVAs to explore the effect of the intervention on mean levels of all psychological flexibility and mental health outcomes measures at postintervention controlling for these measures at baseline. Assumption testing was conducted to check for normality, homogeneity of variance-covariance matrices, and univariate and multivariate outliers, with no serious violations noted. The multivariate analysis revealed a significant group effect for psychological flexibility, $F(3, 137) = 13.43, p = .000$, and mental health, $F(4, 135) = 7.67, p = .000$. A series of univariate ANCOVAs was then conducted to examine the effect of the intervention on each outcome and process measure at postintervention controlling for these measures at baseline.

ANCOVAs results revealed that students in the intervention group reported greater psychological flexibility at postintervention than those in the control group (see Table 2). Their scores on the FFMQ, MEAQ, and values questionnaire were significantly higher than those of students in the control group. Students in the intervention group also reported greater mental health at postintervention than those in the control group. Their scores on the WBMMS (psychological well-being) were higher after controlling for baseline measures and their scores on the PSM-9 (stress), GAD-7 (anxiety), and PHQ-9 (depression) were lower. These students also showed greater school engagement at postintervention than those in the control group.

MANCOVAs and ANCOVAs were repeated with students who completed 75% of the workshops. As the per protocol and intention-to-treat analyses led to similar pattern of results, only the latter are presented in Table 2.
effects were moderate. This is an encouraging result as the primary goal of ACT is to promote psychological flexibility. Studies have shown that psychological flexibility is the cornerstone of healthy personal and social functioning and that this valuable ability helps people adapt to all kinds of situational demands and prevents the development of various mental health problems (Kashdan & Rottenberg, 2010). Postsecondary students experience various difficulties (e.g., academic overload, pressure to succeed, competition with peers, financial burdens, concern for the future, relationship conflicts; MacKean, 2011). Dealing with these difficulties with more psychological flexibility—by being aware of thoughts and emotions related to these difficulties without trying to avoid them, for instance—may help students pursue a rich and meaningful life. They may also be in a better position to tolerate distress, develop an open and compassionate attitude towards emotions, thoughts and sensations, and organize their life around meaningful academic and professional goals.

Students who took part in the KORSA workshops also reported higher well-being at postprogram and lower stress, anxiety, and depression symptoms than those in the control group. These results are consistent with those reported by others (Danitz & Orsillo, 2014; Danitz et al., 2016; Levin, Pistorello, Seeley, & Hayes, 2013; Moyer et al., 2016; Muto et al., 2011; Räsänen et al., 2016) and suggest that ACT is an effective way to promote mental health among postsecondary students and reduce their distress symptoms. The fact that the strongest effect of the intervention was on students’ well-being ($d = .61$ vs .81) is worth mentioning. Indeed, the aim of ACT is not so much to reduce people’s distress symptoms, but to help them build a more meaningful life that provides well-being, vitality, and coherence, regardless of the presence or absence of symptoms.

The intervention also had a positive impact on school engagement and suggests that ACT may help reduce the risk of dropping out. This is an interesting result as a growing number of researchers, educators, and policymakers recognized that student engagement is an important key to address low achievement, student boredom, and high dropout rates (Fredricks et al., 2004). Obviously, these results need to be interpreted with caution as school engagement was measured with a self-report questionnaire that may have been biased by social desirability. In subsequent studies, it would be useful to examine if the results of this research can be replicated with other types of school engagement indicators such as teacher report questionnaires or observation measures. Teacher report questionnaires involve teacher ratings of individual student engagement while observation measures rely on an independent observer assessing students’ on- and off-task in an instructional setting (see Fredricks et al., 2011, for a list of instruments aimed at measuring school engagement).

Based on the CONSORT recommendations (Moher et al., 2010), both the intention-to-treat and per protocol principles were used in this study to allow the readers to correctly interpret the effect of the intervention. In fact, it has been argued that each method allows to answer different yet related research questions, and that both have their pros and cons (Gupta, 2011). While the intention-to-treat method allows us to explore what happens to participants who were allocated to an intervention, the per protocol gives information on what happens to those who completed the intervention without any major deviations from the study protocol. The latter is usually considered preferable as it helps preserve the integrity of the randomization process and provides a more realistic estimate of average treatment effect in the “real world” as it is normal for participants to drop out of an intervention or not adhere to it. The per protocol analyses, on the other hand, provide information on the true efficacy of an intervention when used as directed (Del Re et al., 2013). In this study, both types of analyses led to similar results, although the effect sizes were generally smaller in the intention-to-treat analyses (see Table 2). This is not surprising since the intention-to-treat method usually leads to more conservative conclusions regarding the efficacy of the intervention because of dilution due to noncompliance (Gupta, 2011). The fact that both methods provided similar patterns of results is encouraging. It has been argued that when the intention-to-treat and per protocols analyses come to essentially the same conclusions, confidence in the study results is increased (Gupta, 2011).

Strengths of this study include assessing an intervention using a multisite randomized controlled trial and including variables that have not received much attention so far in the ACT literature (e.g., school engagement). Psychological flexibility was also assessed by combining three questionnaires, which allow covering all six ACT processes and avoid the limits of the AAQ-I and II (Gámez et al., 2011). Although the questionnaires we used provided us with more fine-grained analyses, they were created from different conceptual backgrounds and may have failed to correctly map the ACT processes. Since the launch of this study, significant progress has been made regarding the assessment of psychological flexibility. Indeed, Rolfs, Rogge, and Wilson (2016) published the Multidimensional Psychological Flexibility Inventory (MPFI), a comprehensive scale aimed at assessing flexibility processes (those mentioned above) and inflexibility processes (lack of contact with the present moment, lack of contact...
with values, inaction, self-as-context, fusion, experiential avoidance). This promising scale may allow researchers to examine the benefits of ACT interventions on psychological flexibility more precisely and to better understand their mechanisms of actions.

Despite its strengths, the current study is limited by different factors. First, as we did not compare the intervention with another treatment, we cannot be certain that it was the intervention per se that produced the observed effects. It would have been preferable to use an active rather than a passive control group as comparison to control for nonspecific effects (e.g., group social support processes). Second, no follow-up was included in the study as we did not have the resources to do so. This means we cannot be certain that the observed effects were maintained over time. In future, studies using long-term follow-up or intensive longitudinal designs and multiple times of measurement would be especially valuable to explore how variables such as stress or psychological flexibility evolve across time. Smartphone applications could be used to make ecological momentary assessment and measure these variables in real time, or within daily life, before, during, and after the intervention (Ly, Asplund, & Andersson, 2014). Such applications could also be used to measure process and outcomes measures at each workshop, which would allow testing mediation hypotheses. Third, student compliance to the intervention was not measured in this study so we do not know to what extent they did their homework between workshops (e.g., fill observation grids, eat a meal mindfully) or practiced formal meditation. This may have been a threat to the internal validity of the study. In the future, homework compliance should be measured. Trainers’ adherence to the protocol should also be assessed in subsequent studies. We were not able to monitor how our trainers adhered to the KORSA intervention protocol in this study. Fourth, participant attrition was high, especially in the control group (42%). Students in that group had to wait a month before beginning the intervention, which would allow testing mediation hypotheses. Third, student compliance to the intervention was not measured in this study so we do not know to what extent they did their homework between workshops (e.g., fill observation grids, eat a meal mindfully) or practiced formal meditation. This may have been a threat to the internal validity of the study. In the future, homework compliance should be measured. Trainers’ adherence to the protocol should also be assessed in subsequent studies. We were not able to monitor how our trainers adhered to the KORSA intervention protocol in this study. Fourth, participant attrition was high, especially in the control group (42%). Students in that group had to wait a month before beginning the intervention, they were asked to complete their postintervention questionnaire online, and they received no compensation for being in the control group. All these reasons may explain why many students allocated to the control group dropped out. It also needs to be underlined that the amount of missing data at postintervention and the method used to impute these data may have introduced a bias in the intervention-to-treat analyses. When missing data is high at follow-up, inferences needs to be made with care (Montori & Guyatt, 2001).

In summary, this multisite randomized controlled trial suggests that ACT interventions help promote well-being among university students and reduce their stress, anxiety, and depression symptoms. We believe these transdiagnostic interventions should be disseminated within university campuses, combined with other initiatives aimed at developing and promoting healthy lifestyles, and integrated into systemic efforts to prevent problems. The results of this trial also extend previous studies and suggest that besides their positive impact on mental health, ACT interventions also help increase school engagement among university students. These are preliminary but interesting results and efforts should be put forward to pursue this line of research by using various types of school engagement indicators. Regarding the KORSA intervention presented in this paper, both the trainer’s guide and the participant’s guide should be published to allow practitioners to use these documents and help researchers pursue the evaluation of the workshops.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

References


