
Investigating Stress, Psychological Well-Being, Mental Health Functioning, and Self-Regulation Capacity Among University Undergraduate Students: Is This Population Optimally Functioning?

Une étude des niveaux de stress, bien-être psychologique,
santé mentale, et capacité d'auto-régulation chez les
étudiants universitaires de premier cycle :
Cette population fonctionne-t-elle de façon optimale?

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ABSTRACT

Two studies were conducted to assess the levels of stress, psychological well-being, mental health functioning, and self-regulation capacity of undergraduate students via an online survey. A total of 469 undergraduate students participated in Study 1 and 647 in Study 2. While the students in both studies exhibited low mental health functioning and moderate to high levels of stress, they concurrently maintained a fairly high level of well-being and moderate capacity to self-regulate. Students' self-regulation capacity significantly predicted their levels of stress, psychological well-being, and mental health functioning. Recommendations to develop this competency through counselling and formal courses are put forth.

RÉSUMÉ

Deux études ont été menées pour déterminer le niveau de stress, bien-être psychologique, santé mentale, et capacité d'auto-régulation d'étudiants universitaires de premier cycle, en se servant d'une enquête en ligne. Un total de 469 étudiants de premier cycle ont participé dans la première étude et 647 dans la deuxième. Alors que les étudiants ont rapporté un niveau bas de fonctionnement quant à la santé mentale et un niveau modéré à élevé de stress dans les deux études, ils ont maintenu en même temps un niveau assez élevé de bien-être psychologique et une capacité moyenne d'auto-régulation. Leur capacité d'auto-régulation a prédit de façon significative leurs niveaux de stress, bien-être psychologique, et santé mentale. Des recommandations pour renforcer cette capacité à travers le counseling et des cours formels sont mis de l'avant.

The mental health and well-being of Canadian undergraduate university students is a growing concern as research indicates that 30% of them are highly distressed, with Ontario students reporting the highest levels (Adlaf, Demers, &

Glikzman, 2005). More worrisome still, university students' levels of distress are reportedly twice as high as those of their nonstudent peers. The front cover of the September 10, 2012, issue of *Maclean's* magazine drew attention to the mental health crisis across Canadian university campuses. The report revealed that "a shocking number of Canadian students feel depressed, even suicidal" and referred to the student body as a "broken generation" (Lunau, 2012). Furthermore, some studies suggest that university students do not possess adequate coping skills to deal with the adversity inherent in postsecondary education (Rawson, Bloomer, & Kendall, 2001). Self-regulation—a skill that helps individuals to proactively plan, control, evaluate, and adapt their thoughts, feelings, and actions in order to achieve their goals in their changing environment (Zimmerman, 2000)—can lead to increased well-being (Hofer, Busch, & Kärtner, 2011) and adjustment (Park, Edmondson, & Lee, 2012) in students, and thus offers an important avenue for research and counselling with this population. The purpose of this research was to assess the levels of stress, psychological well-being, mental health functioning, and self-regulation capacity of two different samples of university undergraduate students. Another aim was to determine if self-regulation capacity could significantly predict students' levels of stress, psychological well-being, and mental health functioning and, accordingly, make recommendations for counselling practice.

Stress

From a psychosocial perspective, stress results from one's perception of imbalance between one's demands and resources, or from pressure that exceeds one's perceived ability to cope (Lazarus & Folkman, 1984). Persistent stress that is not resolved through coping or adaptation leads to distress, which may translate into anxiety, pain, physical suffering, and withdrawal (Selye, 1975). It is alarming that data from 16,123 Ontario university students participating in the Spring 2013 American College Health Association-National College Health Assessment (ACHA-NCHA) survey indicate that mental distress is a significant concern for university students. Specifically, 51% of students reported feeling hopeless, 40% reported feeling so depressed they were not able to function, and 11% seriously considered suicide in the 12 months prior to the questionnaire (ACHA, 2013).

According to national mental health surveys conducted with Canadian undergraduate students in 1998 (Adlaf, Glikzman, Demers, & Newton-Taylor, 2001) and 2004 (Adlaf et al., 2005), approximately one third of students faced elevated psychological distress, with women reporting higher levels than men in the latter study. These findings are consistent with results of another study indicating that although female undergraduate students had more effective time management behaviours, they reported higher levels of academic stress and anxiety and benefited less from leisure activities than their male counterparts (Misra & McKean, 2000). Interestingly, Adlaf and colleagues' (2001) study indicated that distress declined as students progressed through their program of study. However, this finding was not replicated with the 2004 student sample (Adlaf et al., 2005). This decline in stress was also found by Misra and McKean (2000), as well as Rawson et al. (2001), who

reported that sophomore students had higher mean levels of stress than juniors within their college student population. Rawson and colleagues suggested that sophomores' stress levels may be high because students in this cohort "have not yet developed the coping mechanisms used by older students to deal with college stress" (pp. 326–327). Recently, it was highlighted in the Ontario Undergraduate Student Alliance (OUSA) report that while 37% of Ontario undergraduate students have utilized mental health services by their fourth year of study, roughly three out of four students did so in their first year, suggesting that the initial transition to university may be a challenging time for students (Pin & Martin, 2012).

The findings that university students may not be coping effectively with stress are troublesome, given that stress has been found to have a negative impact on university students' academic performance (Campbell, Svenson, & Jarvis, 1992; Misra, McKean, West, & Russo, 2000; Struthers, Perry, & Menec, 2000). In fact, stress was found to be the most prevalent factor affecting Ontario undergraduate students' academic performance in the ACHA-NCHA survey (MacKean, 2011). Perhaps more importantly, stress also negatively affects university students' mental health (Ontario University & College Health Association [OUCHA], 2009). Specifically, elevated stress among university students has been associated with anxiety and depression (Price, McLeod, Gleich, & Hand, 2006; Ragheb & McKinney, 1993); increased alcohol, drug, and nicotine use (Adlaf et al., 2005); and burnout leading to fatigue, illness, and mood disturbances (Salanova, Schaufeli, Martinez, & Bresó, 2009). Research investigating university students' experiences of stress therefore represents an important facet of a broader understanding of the mental health of this population. Moreover, although there appears to be a disturbing trend in university students' stress levels during the past decade (Adlaf et al., 2005; Misra & McKean, 2000; Sax, 1997), no research has investigated Canadian students' current levels of stress (MacKean, 2011). As articulated by MacKean (2011), there is scant empirical information on the prevalence of student mental health in Canadian postsecondary institutions, which makes it challenging to comprehensively ascertain current rates as well as trends over time. This provided the rationale for conducting the present research.

Well-Being

The World Health Organization (WHO, 2005) defines mental health as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (p. 2). Thus, in order to provide a more comprehensive understanding of the mental health of Ontario university students, it appears relevant to investigate their levels of well-being in addition to their stress. Ryff and Keyes (1995) proposed that psychological well-being consists of six dimensions of positive psychological functioning: (a) having a positive attitude toward oneself and one's past (self-acceptance), (b) possessing quality interpersonal relationships (positive relations with others), (c) feeling a sense of self-determination and personal authority (autonomy), (d) having the

capacity to effectively manage one's environment in order to meet personal needs (environmental mastery), (e) experiencing a sense of meaning in one's efforts (purpose in life), and (f) striving for continued self-improvement and development (personal growth).

In line with Ryff and Keyes's (1995) view of optimal functioning, it is important to note that "well-being is not the absence of mental illness" (Ryan & Deci, 2001, p. 142). This means that well-being is not necessarily experienced when individuals have no illness or stress in their life. It also means that individuals who do experience illness or stress may be able to attain a certain level of well-being (Canadian Mental Health Association [CMHA] Ontario Division, 2006; MacKean, 2011). Adopting a positive psychosocial perspective in the current study was deemed important, given the increased recognition of the relevance of a dual-factor model of mental health based on the work of Keyes (2002), in which mental illness and wellness exist as separate but co-occurring factors that contribute to overall functioning (Westerhof & Keyes, 2010). For example, it was found in a recent study of American university students that 12.8% of those who exhibited high levels of well-being (classified as "flourishing") also reported elevated depression scores (Low, 2011). In a similar study involving Canadian university students, 1.7% of "flourishing" students were found to be simultaneously experiencing symptoms of depression (Peter, Roberts, & Dengate, 2011). Furthermore, roughly half of the 8.7% of Canadian students who were "languishing" (experiencing low levels of well-being) also exhibited depressive symptoms (Peter et al., 2011), and a much higher percentage of "languishing" American students (75% of 428 first-year students) in Low's (2011) study also reported depression. These findings suggest that although low levels of well-being (i.e., languishing) are associated with ill-being symptomology (i.e., depression), it is nonetheless possible for students with a mental illness to also experience high levels of well-being (i.e., flourishing) (CMHA Ontario Division, 2006; Peter et al., 2011). This provides additional support for the argument that well-being and ill-being are likely best conceptualized as separate constructs within the same framework (Westerhof & Keyes, 2010).

In a similar fashion, Eklund, Dowdy, Jones, and Furlong (2011) found evidence of four classifications of mental health and well-being within an American college student sample: (a) "well-adjusted" (high life satisfaction, low clinical symptoms), (b) "at risk" (low life satisfaction, low clinical symptoms), (c) "ambivalent" (high life satisfaction, moderate to high clinical symptoms), and (d) "distressed" (low life satisfaction, moderate to high clinical symptoms). Although the majority of students (78%) were considered "well-adjusted," the "at risk" classification presents further evidence that the absence of mental illness does not imply well-being. Furthermore, the "ambivalent" category indicates that students can experience high levels of satisfaction with life (a key component of subjective well-being; Lucas, Diener, & Suh, 1996) while simultaneously experiencing symptoms of illness. Thus, what is enabling students to be able to maintain a certain level of well-being even while experiencing adverse states? A potential answer lies in the effectiveness of their capacity to self-regulate.

Self-Regulation Capacity

Some researchers consider our capacity to self-regulate to be our most important quality as humans, as it is what has enabled us to survive and flourish (Vohs & Baumeister, 2004; Zimmerman, 2000). From a social-cognitive perspective, self-regulation involves generating thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals in a changing social and physical environment (Zimmerman, 2000). In other words, it refers to the regular exercise of control over oneself in order to adapt (Zimmerman, 2000) and bring oneself in line with preferred standards, that is, how one wants to think, feel, and behave (Carver & Scheier, 1998; Vohs & Baumeister, 2004).

The self-regulation process goes beyond explaining how we cope with adversity and how we strive for optimal functioning; it addresses our dysfunctions as well. Vohs and Baumeister (2004) reported that many issues we face on a daily basis involve an inability to effectively self-regulate. In line with this finding, one can argue that university students who experience mental health and well-being difficulties may not be effectively managing personal behaviours, thoughts, and feelings that are consonant with achieving desired positive outcomes on a consistent basis; in other words, they may possess low and/or ineffective self-regulatory skills. In the same light, it stands to reason that university students who effectively regulate themselves by using adaptive well-being and performance-facilitating strategies on a daily basis may be more likely to maintain adequate levels of mental health and well-being in the face of adversity (e.g., academic and life-related stress).

A recent study by Park and colleagues (2012) lends support to this hypothesis. These authors found that self-regulation skills were significantly related to positive adjustment (e.g., lower depression, anxiety, and stress) among first-year American college students. In a two-part study involving separate samples of high school and university students, Hofer et al. (2011) revealed that students with pronounced self-regulatory capabilities had a stronger sense of identity and thus experienced higher levels of subjective well-being. In another sample of university students, self-control—a key component of self-regulation—predicted better interpersonal relationships and psychological adjustment, which was assessed as low psychopathological symptoms and high self-esteem (Tangney, Baumeister, & Boone, 2004). On the other hand, Hustad, Carey, Carey, and Maisto (2009) reported that a diminished capacity to self-regulate represented a risk factor for experiencing alcohol-related consequences among heavy-drinking college students. As such, the development of self-regulatory skills may be an important protective factor against mental health challenges in university students. By linking students' capacity to self-regulate to their levels of stress, psychological well-being, and mental health functioning, more evidence will be provided to either support or disconfirm the limited findings on the self-regulation competencies of university students. Of importance, it will be more evident whether or not self-regulation may be a potential skill that students could develop to better manage their mental health and well-being; this can have key implications for education and counselling in university contexts.

RESEARCH OBJECTIVES

The data presented in this article were collected as part of two separate studies in which the mental health and well-being of undergraduate students in a Faculty of Health Sciences at a large eastern Canadian university were examined. Specifically, undergraduate students were recruited during the winter semester (Study 1) of one academic year, and the fall semester (Study 2) of the subsequent academic year, which enabled the replication of the findings at two different time points. In both studies, the data were collected during times (February–April in Study 1; October–November in Study 2) when academic demands were deemed moderate to high (e.g., assignments were typically due and students were preparing for exams).

The objectives of these two studies were to (a) assess the levels of stress, psychological well-being, mental health functioning, and self-regulation capacity of two different samples of undergraduate students, and (b) determine if self-regulation capacity could explain a significant proportion of the variance in these students' levels of stress, psychological well-being, and mental health functioning. Given previous findings regarding university students' compromised mental health due to distress (e.g., Adlaf et al., 2005; ACHA-NCHA, 2009, as cited in OUCHA, 2009) and the presumed moderate to high academic demands of students in Study 1 and Study 2, we hypothesized that students would be experiencing a moderate to high level of stress, as well as moderate to low levels of psychological well-being and mental health functioning. Furthermore, based on the results of previous studies regarding self-regulation capacity levels in college students (Carey, Neal, & Collins, 2004; Neal & Carey, 2005), we hypothesized that students would report a moderate level of self-regulation capacity. Finally, based on research demonstrating a significant relationship between self-regulation capacity and stress and well-being (Dubuc-Charbonneau & Durand-Bush, 2015; Gagnon, Durand-Bush, & Young, in press; Park et al., 2012), we hypothesized that self-regulation capacity would significantly predict students' levels of stress, psychological well-being, and mental health functioning.

METHOD

Participants

Participants forming the convenience samples in both studies were recruited from the Faculty of Health Sciences at a large eastern Canadian university. In Study 1, a total of 469 undergraduate students (67 men, 402 women) with a mean age of 21.0 ($SD = 3.31$) participated. Participants were relatively equally distributed across first (23%), second (26%), third (23%), and fourth (25%) year of study, with 3% of the sample registered in their fifth year. In Study 2, a total of 647 undergraduate students (109 men, 538 women) with a mean age of 20.6 ($SD = 3.75$) took part. There was a relatively equal distribution of participants across the first (29%), second (24%), third (22%), and fourth (22%) year of study, and 3% of them were registered in their fifth year.

Overall, the samples represented 12.2% (Study 1) and 16.3% (Study 2) of the Faculty's undergraduate student body. These response rates are comparable to those achieved in similar studies involving Canadian university and college students (e.g., Dietsche, 2012; Palmer & Rodger, 2009; Tremblay et al., 2008), and were deemed suitable for conducting the statistical analyses (Rosnow & Rosenthal, 2008).

Measures

Demographic questionnaire. A brief demographic questionnaire was used to collect general demographic information (e.g., age, gender, year and program of study, student status) in order to generate descriptive statistics and include select data as independent variables in some of the main analyses.

Stress. The 14-item version of the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) was used to assess students' subjective appraisal of stress. The PSS measures global, acute perceived stress by asking respondents how often during the past month they experienced thoughts and feelings of stress, overload, control, and coping. Items are scored using a 5-point Likert scale from *never* (0) to *very often* (4), yielding a total score. Higher scores indicate a greater level of perceived stress. Reliability and validity for the PSS has been demonstrated with the general population (Cohen et al., 1983) and with Canadian university students (Palmer & Rodger, 2009).

Psychological well-being. Psychological well-being was measured using an abbreviated 42-item version of Ryff and Keyes's (1995) Scales of Psychological Well-Being (SPWB). It comprises six 7-item subscales assessing the following dimensions of psychological well-being: (a) autonomy, (b) environmental mastery, (c) personal growth, (d) positive relations with others, (e) purpose in life, and (f) self-acceptance. Respondents rate their agreement with each item statement using a 6-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (6). Items for each subscale are summed to create six separate subscale totals, with higher scores reflecting higher levels of well-being. The 42-item version of the SPWB has sound psychometric properties and has been used as a comprehensive and reliable measure of well-being in several contexts (e.g., Abbott, Ploubidis, Huppert, Kuh, & Croudace, 2010; Steele & Fullagar, 2009), including that which involves a university student population (Mack et al., 2012).

Mental health functioning. In order to assess students' mental health functioning, the 12-item General Health Questionnaire (GHQ-12; Goldberg, 1992) was administered. The GHQ-12 is a widely used mental health screening tool that assesses two key areas: (a) the inability to carry out normal functions, and (b) the emergence of new phenomena that are distressing (Werneke, Goldberg, Yalcin, & Üstün, 2000). A 4-point Likert scale from *less than usual* (0) to *much more than usual* (3) is used to assess the extent to which respondents have experienced a particular symptom or behaviour recently, and yields a total score. Higher scores indicate a higher level of distress, and thus a lower level of mental health functioning. The GHQ-12 is considered to be one of the most thoroughly tested measures for mental health functioning (McDowell & Newell, 1996) and has been used

with Canadian university students in previous studies (Adlaf et al., 2005; Adlaf et al., 2001).

Self-regulation capacity. Participants completed the short version of the Self-Regulation Questionnaire (SSRQ; Carey et al., 2004) to assess their level of self-regulation capacity (Miller & Brown, 1991). Based on the original Self-Regulation Questionnaire (Brown, Miller, & Lawendowski, 1999), the SSRQ is a single-factor 31-item questionnaire scored on a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Items are summed to create a total score, with higher scores indicating higher self-regulation capacity (Neal & Carey, 2005). The SSRQ was shown to be psychometrically sound in a series of studies investigating self-regulation and drinking behaviour in American college students (Carey et al., 2004; Hustad et al., 2009; Neal & Carey, 2005) and in a recent study investigating the self-regulation capacity of Canadian physicians and medical students (Gagnon et al., in press). Items on the SSRQ assess cognitive, affective, behavioural, and social/environmental aspects of self-regulation, as well as both reactive (e.g., responses to adversity) and proactive (e.g., planning and adjusting progress goals) self-regulation processes.

Procedure

With the cooperation of the registrar office, all undergraduate students registered in the Faculty of Health Sciences at the university (3,809 in Study 1, and 3,942 in Study 2) were sent an e-mail invitation with a link to an online survey that was hosted on a secure website. By clicking on the link, students were provided with the consent form outlining the nature of the study, the requirements, and the benefits and risks of participating. Students then had the opportunity to provide their consent or to withdraw before they could gain access to the survey. The survey contained the five aforementioned questionnaires and took approximately 15 minutes to complete. Students who completed at least one of the scales (i.e., PSS, SPWB, GHQ, or SSRQ) were included in the research. Ethical approval was obtained from the ethics review board at the university where the research was conducted.

Data Analysis

The data from the online survey were imported into SPSS Statistics Version 21 for analysis, and preliminary data screening was performed in accordance with Tabachnick and Fidell's (2007) procedures. Missing data were imputed using expectation maximization. Prior to running the analyses, normality was assessed and univariate outliers were transformed. An examination of Mahalanobis distance values revealed three potential multivariate outliers in each study. Given the potential adverse effects of outliers on multivariate analyses (Tabachnick & Fidell, 2007), these cases were removed prior to running the analyses. The internal consistency reliability for each scale/subscale was assessed using Cronbach's (1951) alpha coefficients. Moreover, Pearson product-moment correlation coefficients were used to explore the relationships among all study variables. In order to test

the first hypothesis regarding students' levels of stress, psychological well-being, mental health functioning, and self-regulation capacity, descriptive statistics were computed.

With regards to the second hypothesis, a series of regressions were performed to determine if students' self-regulation capacity could significantly predict their levels of stress, psychological well-being, and mental health functioning. First, however, a 2 (gender) \times 4 (year of study) \times 8 (PSS, SPWB [i.e., environmental mastery, personal growth, positive relations with others, self-acceptance, autonomy], GHQ, SSRQ) between-subjects MANOVA (multivariate analysis of variance) was separately computed for Study 1 and Study 2 in order to investigate and control for the potential influence of gender and year of study on the outcome measures. This was due to previous findings demonstrating that gender and year of study can have an impact on students' mental health (Adlaf et al., 2001) and stress (Dwyer & Cummings, 2001; Misra & McKean, 2000). It is noteworthy that for the variable "year of study," there were only a small number of students in fifth year in both studies; thus these participants were collapsed into the fourth-year group. Also, given the strong positive correlation (0.93) between the SSRQ and the "purpose in life" dimension of the SPWB, the latter was removed from the regression analyses over concerns of multicollinearity.

No significant differences were found regarding the MANOVA performed for Study 1; thus simple linear regressions were conducted with these data. However, the MANOVA carried out for Study 2 was significant; thus two separate hierarchical regressions were performed with that data set to control for the potential effects of gender on perceived stress, and year of study on the environmental mastery dimension of the SPWB. Simple linear regressions were conducted for the remaining outcome variables.

RESULTS

Descriptive Statistics

The data for all measures were normally distributed. Internal consistency reliability coefficients for each scale are presented in Table 1. The alpha levels were in the range $0.74 \leq \alpha \leq 0.92$ across both studies, demonstrating acceptable internal consistencies for all measures (DeVellis, 2012). The correlations between the variables are presented in Table 2 for Study 1, and in Table 3 for Study 2. All correlations were statistically significant ($p < .01$) and in the expected direction.

Descriptive statistics including means and standard deviations for each measure are provided in Table 1. Of note, the differences in sample sizes for each measure reflect the temporal sequence of the measures completed in the online survey in both studies (i.e., some participants exited the survey before responding to all of the measures). Overall, an inspection of the means for the PSS, SPWB, GHQ, and SSRQ in both studies provide partial support for our first hypothesis, which was that students would report a moderate to high level of stress, moderate to low levels of mental health functioning and psychological well-being, and a moderate

level of self-regulation capacity. Specifically, students reported experiencing moderate to moderately high levels of stress in Study 1 and 2, respectively ($M = 26.86$, $SD = 8.43$ in Study 1; $M = 28.78$, $SD = 8.58$ in Study 2). Moreover, means for the GHQ ($M = 18.87$, $SD = 5.87$ in Study 1; $M = 19.34$, $SD = 6.20$ in Study 2) reveal that students in both studies reported experiencing high levels of psychological distress and impairment and thus low levels of mental health functioning. Using the recommended cut-off scores¹ for the original 63-item Self-Regulation Questionnaire (Brown et al., 1999), which is highly correlated with the SSRQ

Table 1
Descriptive Statistics and Reliability Coefficients of Study Measures

| Scale | | Possible range | Observed range | M | SD | α |
|--------------------------------|-----------------------|----------------|----------------|--------|-------|----------|
| GHQ | Study 1 ($n = 466$) | 0–36 | 0–36 | 18.87 | 5.87 | 0.87 |
| | Study 2 ($n = 644$) | | 1–36 | 19.34 | 6.20 | 0.88 |
| SSRQ | Study 1 ($n = 434$) | 31–155 | 67–147 | 112.74 | 14.36 | 0.91 |
| | Study 2 ($n = 586$) | | 62–149 | 112.46 | 14.05 | 0.92 |
| SPWB | | | | | | |
| Environmental mastery | Study 1 ($n = 377$) | 7–42 | 8–42 | 28.82 | 6.00 | 0.81 |
| | Study 2 ($n = 483$) | | 8–40 | 28.00 | 6.15 | 0.82 |
| Personal growth | Study 1 ($n = 377$) | 7–42 | 16–42 | 33.95 | 4.76 | 0.77 |
| | Study 2 ($n = 483$) | | 15–42 | 33.31 | 4.95 | 0.76 |
| Positive relations with others | Study 1 ($n = 376$) | 7–42 | 14–42 | 32.94 | 5.71 | 0.78 |
| | Study 2 ($n = 483$) | | 15–42 | 32.62 | 5.51 | 0.77 |
| Self-acceptance | Study 1 ($n = 376$) | 7–42 | 8–42 | 30.34 | 6.45 | 0.86 |
| | Study 2 ($n = 483$) | | 7–42 | 29.55 | 6.93 | 0.88 |
| Autonomy | Study 1 ($n = 376$) | 7–42 | 11–42 | 28.55 | 5.88 | 0.80 |
| | Study 2 ($n = 483$) | | 11–42 | 28.22 | 5.73 | 0.77 |
| Purpose in life | Study 1 ($n = 376$) | 7–42 | 17–42 | 33.44 | 5.14 | 0.77 |
| | Study 2 ($n = 483$) | | 15–42 | 32.75 | 5.13 | 0.74 |
| PSS | Study 1 ($n = 370$) | 0–56 | 5–49 | 26.86 | 8.43 | 0.88 |
| | Study 2 ($n = 471$) | | 9–53 | 28.78 | 8.58 | 0.88 |

Note. M = mean; SD = standard deviation; α = Cronbach's (1951) internal consistency reliability coefficient; GHQ = General Health Questionnaire (Goldberg, 1992); SSRQ = short version of the Self-Regulation Questionnaire (Carey et al., 2004); SPWB = Scales of Psychological Well-Being (Ryff & Keyes, 1995); PSS = Perceived Stress Scale (Cohen et al., 1983).

($r = .96$; Neal & Carey, 2005), the mean scores for the SSRQ demonstrate that in both Study 1 ($M = 112.74$, $SD = 14.36$) and Study 2 ($M = 112.46$, $SD = 14.05$), students reported moderate levels of self-regulation capacity. With regards to psychological well-being, however, students scored above the midpoints on all

Table 2
Correlation Matrix for Study 1 Variables

| | GHQ | SSRQ | EM | PG | PR | SA | A | P | PSS |
|------|------|--------|--------|--------|--------|--------|--------|--------|--------|
| GHQ | 1.00 | -.41** | -.58** | -.42** | -.38** | -.53** | -.27** | -.35** | .68** |
| SSRQ | | 1.00 | .66** | .57** | .41** | .63** | .49** | .67** | -.47** |
| EM | | | 1.00 | .54** | .60** | .71** | .40** | .57** | -.70** |
| PG | | | | 1.00 | .48** | .59** | .51** | .62** | -.37** |
| PR | | | | | 1.00 | .56** | .36** | .41** | -.46** |
| SA | | | | | | 1.00 | .48** | .59** | -.59** |
| A | | | | | | | 1.00 | .367** | -.32** |
| P | | | | | | | | 1.00 | -.37** |
| PSS | | | | | | | | | 1.00 |

Note. GHQ = General Health Questionnaire (Goldberg, 1992); SSRQ = short version of the Self-Regulation Questionnaire (Carey et al., 2004); EM = environmental mastery; PG = personal growth; PR = positive relations with others; SA = self-acceptance; A = autonomy; P = purpose in life; EM, PG, PR, SA, A, P = Scales of Psychological Well-Being (Ryff & Keyes, 1995); PSS = Perceived Stress Scale (Cohen et al., 1983).

** $p < .01$

Table 3
Correlation Matrix for Study 2 Variables

| | GHQ | SSRQ | EM | PG | PR | SA | A | P | PSS |
|------|------|--------|--------|--------|--------|--------|--------|--------|--------|
| GHQ | 1.00 | -.24** | -.64** | -.32** | -.35** | -.57** | -.24** | -.36** | .70** |
| SSRQ | | 1.00 | .57** | .58** | .37** | .56** | .36** | .93** | -.40** |
| EM | | | 1.00 | .56** | .62** | .79** | .38** | .60** | -.75** |
| PG | | | | 1.00 | .48** | .62** | .42** | .63** | -.43** |
| PR | | | | | 1.00 | .61** | .25** | .41** | -.40** |
| SA | | | | | | 1.00 | .40** | .61** | -.63** |
| A | | | | | | | 1.00 | .28** | -.31** |
| P | | | | | | | | 1.00 | -.42** |
| PSS | | | | | | | | | 1.00 |

Note. GHQ = General Health Questionnaire (Goldberg, 1992); SSRQ = short version of the Self-Regulation Questionnaire (Carey et al., 2004); EM = environmental mastery; PG = personal growth; PR = positive relations with others; SA = self-acceptance; A = autonomy; P = purpose in life; EM, PG, PR, SA, A, P = Scales of Psychological Well-Being (Ryff & Keyes, 1995); PSS = Perceived Stress Scale (Cohen et al., 1983).

** $p < .01$

dimensions of the SPWB, with mean scores ranging from 28.00 ($SD = 6.15$) for environmental mastery in Study 2 to 33.95 ($SD = 4.76$) for personal growth in Study 1, out of a possible score of 42. Contrary to our hypothesis, then, students reported experiencing moderately high levels of psychological well-being in both studies.

MANOVAs

The assumptions for multivariate analyses were all satisfied, including the required number of participants per cell. Nonetheless, due to the unequal sample size between women and men in both studies, Pillai's trace was used to report the multivariate tests, as it is more robust (Tabachnick & Fidell, 2007). No significant main effects were found for Study 1. For Study 2, however, there was a significant main effect of gender, $F(8, 456) = 4.144, p < .001$ (Pillai's trace = .07; $\eta^2 = .07$), and year of study, $F(24, 1374) = 1.605, p < .05$ (Pillai's trace = .08; $\eta^2 = .03$). No significant gender by year of study interaction effect was found. Between-subjects analyses using a Bonferroni adjusted alpha level of .006 revealed a significant gender difference on the PSS, $F(1, 463) = 13.896, p < .001, \eta^2 = .03$, with women reporting significantly higher levels of perceived stress ($M = 29.27, SD = 8.48$) than men ($M = 25.40, SD = 8.45$). A significant univariate effect of year of study was also found for the environmental mastery dimension of the SPWB, $F(3, 463) = 5.049, p = .002, \eta^2 = .03$. Post hoc comparisons using Hochberg's GT2 test (i.e., more robust with unequal sample sizes) revealed that first-year students ($M = 26.49, SD = 7.05$) had significantly lower environmental mastery than third-year ($M = 29.49, SD = 5.35, p < .01$) and fourth-year ($M = 28.90, SD = 5.76, p < .01$) students. In both cases, the effect sizes were small (Cohen, 1988), with only 3% of the variance in perceived stress accounted for by gender, and 3% of the variance in environmental mastery accounted for by year of study.

Regression Analyses

Results of the simple linear regressions for Study 1 are presented in Table 4. As hypothesized, students' self-regulation capacity significantly predicted stress, the five dimensions of psychological well-being, and mental health functioning. Specifically, self-regulation capacity accounted for 22.4% in stress, 42.9% in environmental mastery, 32% in personal growth, 16.7% in positive relations with others, 36.4% in self-acceptance, 23.9% in autonomy, and 17% of the variance in mental health functioning levels.

Results of the simple linear regressions for Study 2 are presented in Table 5. As in Study 1, students' self-regulation capacity significantly predicted all dependent variables; however, it accounted for considerably less variance in mental health functioning (5.8%) and the autonomy dimension of psychological well-being (12.7%). In terms of the remaining dimensions of the SPWB, the amount of variance accounted for by self-regulation capacity was similar to that found in Study 1, that is, 33.4% in personal growth, 13.9% in positive relations with others, and 30.9% in self-acceptance.

In the hierarchical multiple regression model for stress, gender was entered at Step 1, explaining 3.2% of the variance in stress. After the entry of self-regulation capacity at Step 2, the total variance explained by the model as a whole was 19.7%, $F(2, 468) = 57.50, p < .001$. Self-regulation capacity explained an additional 16.6% of the variance in stress, after controlling for gender, $\Delta R^2 = .017, \Delta F(1, 468) = 96.54, p < .001$. In the final model, gender and self-regulation capacity were both statistically significant, but self-regulation capacity made a greater unique contribution to the model ($\beta = -.41, p < .001$) than gender ($\beta = .19, p < .001$). In the hierarchical multiple regression model for environmental mastery, year of study was entered at Step 1, explaining 3% of the variance in the environmental

Table 4
Simple Linear Regression Analyses for Study 1

| Variable | Self-regulation capacity | | | |
|--------------------------------|--------------------------|---------|----------|-----------------------|
| | <i>F</i> | β | <i>t</i> | <i>r</i> ² |
| GHQ | 88.29 | -.41* | -9.40 | .17* |
| SPWB | | | | |
| Environmental mastery | 281.58 | .66* | 16.78 | .43* |
| Personal growth | 176.86 | .57* | 13.30 | .32* |
| Positive relations with others | 74.82 | .41* | 8.65 | .17* |
| Self-acceptance | 213.70 | .60* | 14.62 | .36* |
| Autonomy | 117.42 | .49* | 10.84 | .24* |
| PSS | 106.10 | -.47* | -10.30 | .22* |

Note. GHQ = General Health Questionnaire (Goldberg, 1992); SPWB = Scales of Psychological Well-Being (Ryff & Keyes, 1995); PSS = Perceived Stress Scale (Cohen et al., 1983).

* $p < .001$

Table 5
Simple Linear Regression Analyses for Study 2

| Variable | Self-regulation capacity | | | |
|--------------------------------|--------------------------|---------|----------|-----------------------|
| | <i>F</i> | β | <i>t</i> | <i>r</i> ² |
| GHQ | 36.22 | -.24* | -6.02 | .06* |
| SPWB | | | | |
| Personal growth | 241.52 | .58* | 15.54 | .33* |
| Positive relations with others | 77.46 | .37* | 8.80 | .14* |
| Self-acceptance | 215.01 | .56* | 14.66 | .31* |
| Autonomy | 71.09 | .36* | 8.43 | .13* |

Note. GHQ = General Health Questionnaire (Goldberg, 1992); SPWB = Scales of Psychological Well-Being (Ryff & Keyes, 1995).

* $p < .001$

mastery dimension of psychological well-being. After entry of the SSRQ at Step 2, the total variance explained by the model as a whole was 34.7%, $F(2, 480) = 127.30$, $p < .001$. Self-regulation capacity explained an additional 31.7% of the variance in environmental mastery, after controlling for year of study, $\Delta R^2 = .32$, $\Delta F(1, 480) = 232.75$, $p < .001$. Year of study and self-regulation capacity each made statistically significant unique contributions to the final model ($p < .001$), with self-regulation capacity making a greater contribution ($\beta = .56$) than year of study ($\beta = .14$).

DISCUSSION

The objectives of this research were to conduct two separate studies to (a) assess undergraduate students' levels of stress, psychological well-being, mental health functioning, and self-regulation capacity, and (b) determine if self-regulation capacity could explain a significant proportion of the variance in their levels of stress, psychological well-being, and mental health functioning.

With regards to the first objective, students reported experiencing moderate to high levels of stress and low levels of mental health functioning in both Study 1 and Study 2, as hypothesized. Disconcertingly, however, the students' levels of stress in both studies were higher than those reported in previous studies with university and college students (Cohen et al., 1983; Palmer & Rodger, 2009), while their levels of mental health functioning were lower than those reported in previous studies with postsecondary students (e.g., Cotton, Dollard, & de Jonge, 2002; Masuda, Le, & Cohen, 2014; Moffat, McConnachie, Ross, & Morrison, 2004), including Adlaf and colleagues' (2001) study with Canadian students. This could perhaps be an indication that demands placed on university students are increasing or they have more difficulty coping during peak times in a given semester. Regardless of the contributing factors, these results confirm the growing concern regarding this population's mental health and underscore previous calls put forth to increase resources and support on university campuses (Price et al., 2006).

Other results from the current research that help put indices of impairment or dysfunction into perspective (Keyes, 2002) pertain to self-regulation and psychological well-being. In terms of self-regulation capacity, students in Study 1 and Study 2 reported moderate levels, which supported our hypothesis. Indeed, their level was similar to that found in studies with American college students (Carey et al., 2004; Neal & Carey, 2005) and a recent study with Canadian medical students (Gagnon et al., in press). This is encouraging, given that self-regulation has been associated with positive adjustment (e.g., lower psychopathological symptoms) in college (Park et al., 2012) and university (Tangney et al., 2004) students. With regards to psychological well-being, students in both Study 1 and Study 2 reported moderately high levels of psychological well-being, which was contrary to what we hypothesized. Interestingly, these levels were lower than that of a normative sample of American middle-aged adults. However, they were comparable to the levels reported by Chang (2006), who investigated the well-being of a U.S. col-

lege sample, and by Mack and colleagues (2012), who assessed the relationship between physical activity and psychological well-being in a sample of Canadian female undergraduate students.

Collectively, the fairly consistent results across Studies 1 and 2 appear to support the dual model principle put forth by Keyes (2002). For example, while the students exhibited low mental health functioning and moderate to high levels of stress, they concurrently maintained a fairly high level of well-being and moderate capacity to self-regulate. This could mean that although they experienced distress in the short term, this did not impact their global perceived psychological well-being and ability to function. Referring back to Eklund and colleagues' (2011) classifications of mental health and well-being, it appears that students in the current research were not particularly well-adjusted (i.e., high well-being, low clinical symptoms) like most of the students in their study. Rather, they could be categorized as ambivalent (i.e., high well-being, moderate to high clinical symptoms), which suggests a need to proactively improve their mental health functioning before they become too distressed and experience both low well-being and high clinical symptoms. Of note, contrary to previous studies demonstrating that gender and year of study can have an impact on student outcomes such as mental health (Adlaf et al., 2001) and stress (Dwyer & Cummings, 2001; Misra & McKean, 2000), these results were not replicated in the current research. For example, no main effects were found for gender and year of study in Study 1. In Study 2, although women experienced higher levels of stress than men, and first-year students had a lower level of environmental mastery than third- and fourth-year students, the effect sizes for both were quite small.

In line with the second objective of this study, then, it is possible that students' self-regulation capacity may have acted as a buffer and helped them to maintain higher levels of well-being in spite of their elevated levels of perceived stress and impaired mental health functioning. Indeed, results of the regression analyses demonstrate, as hypothesized, that self-regulation capacity significantly predicted all outcome variables in the anticipated direction. In particular, it accounted for the most variance in three dimensions of psychological well-being: environmental mastery, self-acceptance, and personal growth. Importantly, self-regulation capacity accounted for a significant proportion of the variance in environmental mastery, even after the potential influence of students' year of study was statistically controlled for in the hierarchical regression model in Study 2. Taken together, this suggests that students with high self-regulation competency may be more apt to manage and balance daily tasks, acknowledge and accept the multiple roles and identities they have, maintain a positive attitude, and strive to fulfill their full potential through ongoing learning (Ryff & Keyes, 1995).

Although self-regulation capacity accounted for less variance in students' levels of stress and mental health functioning, results are promising and warrant further investigation. Indeed, in Study 1, self-regulation accounted for a significant proportion of the variance in the students' level of stress and a modest proportion of the variance in their level of mental health functioning. Somewhat surprisingly,

however, self-regulation capacity accounted for less variance in these outcomes in Study 2. Specifically, although self-regulation accounted for a modest proportion of variance in the students' level of stress, it only accounted for a small proportion of the variance in their mental health functioning, after statistically controlling for the potential influence of gender in the hierarchical regression model. Perhaps the semester in which the data were collected had an impact. In Study 2, students were surveyed toward the end of the fall semester whereas in Study 1, they were at the mid to end point of the winter semester. Researchers should further investigate these findings, perhaps using a repeated measures design to track changes in these variables over an academic year, as well as more concrete measures of workload.

Furthermore, given the array of subprocesses implicated in the skill of self-regulation (Bandura, 2005; Zimmerman, 2000), future studies should also focus on discerning which aspects of self-regulation are most understood and used by university students and which ones contribute the most to low levels of stress and high levels of well-being and mental health functioning. For example, self-regulation comprises processes targeting preparation (e.g., self-awareness, goal-setting, strategic planning), execution (e.g., attention focusing, self-instruction, self-recording), and self-reflection (e.g., self-judgement, inferences) (Zimmerman, 2000). In order to shed more light on the significance of these processes, it would be important to develop additional comprehensive measures that would capture the intricacies involved in students' self-regulation. The data gleaned from such measures would be useful not only for researchers but also practitioners interested in developing interventions designed to provide support to university students.

Implications for Professional Practice

Based on the findings of the current research and previous studies (e.g., Park et al., 2012), it appears that self-regulation capacity plays an important role in students' levels of stress, well-being, and mental health functioning. Given that Canadian postsecondary students are reporting high levels of distress (Adlaf et al., 2001; Adlaf et al., 2005) and seeking counselling with increasingly more severe and complex issues (Cairns, Massfeller, & Deeth, 2010), integrating the development of self-regulation skills at the onset of postsecondary education may be one way to alleviate the prevalence and experience of such complex issues. For example, self-regulation training within the university context could possibly help students to proactively or reactively manage their levels of mental health functioning and shift from being ambivalent, at risk, or distressed to being well-adjusted and highly functioning, even in the face of stress and adversity. Such training could be provided through counselling or mentoring services, as well as new or existing university courses or professional development workshops. With a focus on optimal functioning and adaptability, such training could potentially assist students in becoming more resilient to evolving demands inherent in postsecondary education.

The moderate self-regulation capacity reported by the students in the present research suggests that they had already developed a certain level of competency in this area, presumably through past training and experiences. However, self-

regulation capacity can fluctuate across time and situations and requires ongoing self-awareness and self-reflection (Zimmerman, 2000). Moreover, Park and colleagues (2012) did not observe notable maturation in self-regulatory capacity across the academic year in their study of American college students. As such, several strategies and tools could be taught to university students to maximize the effectiveness of their self-regulation and transferability of this skill across time and situations. This may be particularly important, as it was found in a previous study that Canadian postsecondary students exhibited a plateau in their coping methods over the course of the academic year and “were unable to implement more effective ways of coping” (Arthur & Hiebert, 1996, p. 100) despite increasing levels of stress. Developing effective self-regulation capacity, then, might enable students to expand their repertoire of skills and strategies and be proactive in the face of situational demands.

Limitations

As with any research, some limitations must be acknowledged. First, results have to be interpreted with caution, as participants were sampled from one faculty at one large institution in Canada. Future studies should include participants from several universities and geographical locations. Furthermore, significantly more women than men participated in the two studies even though an invitation was sent to all the students within the faculty. Moving forward, it would be important to implement strategies to recruit more men in order to get additional insight into their levels of stress, psychological well-being, mental health functioning, and self-regulation capacity.

In terms of the design and methodology, two cross-sectional studies were conducted with two different samples so we did not assess change over time. It would be valuable to conduct a longitudinal study with a large sample of university students in which variables are measured multiple times throughout an academic year to examine how levels fluctuate across time and workload. With regard to the measures used, there was a high correlation between the Purpose in Life dimension of the SPWB and the SSRQ in Study 2; thus we did not include this dimension in the regression analyses over concerns of multicollinearity. This high correlation was surprising, as it was not found in Study 1 or in two previous studies in which the SPWB and SSRQ were used to measure psychological well-being and self-regulation capacity in physicians (Gagnon et al., in press; Simon & Durand-Bush, 2014). In reviewing the items, we observed that a few of them pertain to “planning” in both the Purpose in Life subscale of the SPWB and the SSRQ, which could be contributing to this high correlation. More attention should be paid to these measures and items if a high correlation is found again in future studies. Finally, although the SSRQ provides insight into individuals’ overall self-regulation capacity, it does not enable researchers to target specific aspects of self-regulation that could be influencing different variables. As such, a more comprehensive measure should be used in the future to distinguish between specific self-regulation processes.

CONCLUDING REMARKS

As university degrees have become today's labour market standard, the competitiveness and overvaluation of academic performance has increased stress in university students and created greater strain on their mental health (Schwartz et al., 2011). The costs associated with this are high, including impaired academic performance and dysfunction. Examining university students' levels of stress, psychological well-being, mental health functioning, and self-regulation capacity in this research provided insight into their level of functioning. Overall, while students reported moderate to high levels of stress and low levels of mental health functioning, they also revealed moderate levels of self-regulation capacity and moderately high levels of psychological well-being. The comparable results across Studies 1 and 2 appear to support Keyes's (2002) dual model principle, suggesting that although the students experienced distress, this did not impact their global perceived psychological well-being and ability to function. Eklund and colleagues' (2011) classifications of mental health and well-being, however, allow us to argue that the students were not entirely well-adjusted and were not optimally functioning. Rather, they could be considered as ambivalent (i.e., high well-being, moderate to high clinical symptoms), which suggests that they should seek to ameliorate their mental health functioning before their distress leads to low levels of well-being and high clinical symptoms. One way to do this could be by enhancing their self-regulation capacity.

Results of this research show that the students' self-regulation capacity significantly accounted for variation in their levels of stress, mental health functioning, and psychological well-being. It is possible that this competency may have acted as a buffer and helped them to maintain higher levels of well-being in spite of their perceived stress and impaired mental health functioning. Providing ongoing self-regulation training to students through counselling and formal courses may be one way to help them remain healthy and successful while completing their studies and when entering the workforce. Furthermore, given the prevalence of mental health issues in this population, the OUCHA (2009) postulated that interventions focused on postsecondary students "would have a great impact on improving mental health in society with significant financial and social cost savings" (p. 6). It is hoped that the results of the current study will serve as a springboard for future research on this topic and eventually lead to recommendations for counselling strategies and frameworks not only to relieve identified mental health concerns reported by the students, but also to prevent such concerns by putting in place appropriate processes and resources to optimize self-regulation skills.

Note

- 1 Scores at or below 104 signify low self-regulation capacity, scores from 105 to 117 represent moderate self-regulation capacity, and scores at or above 118 denote high self-regulation capacity.

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