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Conclusions: Identifying students with limited resilience and providing them with appropriate supportive services may help them to manage stress and prevent depressive symptoms.
Stress and Depression in University Students: The Mediating Role of Resilience

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Keywords: resilience, depression, stress, student
Stress and Depression in University Students: The Mediating Role of Resilience

The National College Health Assessment (NCHA), sponsored by the American College Health Association, has collected data about students’ health status, behavior, and attitudes since 2000. The participation has increased annually and in 2007 more than 90,000 students from about 150 postsecondary institutions completed the survey (up-to-date survey participation rates are available at: [http://www.acha-ncha.org/partic_history.html](http://www.acha-ncha.org/partic_history.html)). Topics covered via the approximately 300 questions include: risk and protective behavior, health information access, injury and violence prevention, tobacco, alcohol and other substance use, sexual health, nutrition, and mental health.

Concerns about students’ mental health status have arisen as a result of the mental health assessments completed by the NCHA. The percentage of students that reported having ever been diagnosed with depression appears to be increasing: 10.3% and 11.8% in the spring surveys of 2000 and 2001, respectively, and 15.3% and 14.9% in spring 2007 and 2008 ([The American College Health Association, 2001, 2008, 2009]). Of the many risk factors for depression, the experience of stress by students is of particular concern to many college health professionals involved in health promotion and counseling services. For example, the most frequently reported impediment to academic performance is stress, which outranks viral infections, sleep disturbances, concerns about family members and friends, and relationship problems ([The American College Health Association, 2003, 2009]).

Given the evidence indicating that an association exists between the experience of stress and subsequent risk for major depressive episodes in adults ([Hammen, 2005; Kendler, Karkowski, & Prescott, 1999; Kessler, 1997]), researchers have sought to examine the causes and consequences of stress experienced by university students. Stress has been identified as a...
common experience for many students. For example, they must manage the transition from
adolescence to adulthood, adapt to a new environment, establish new social networks,
independently manage the demands of daily life, and meet their personal goals. Although these
potentially stressful transitions are expected, they can be associated with symptoms of depression
(Morrison-Beedy, Carey, Seibold-Simpson, Xia, & Tu, 2009).

Whereas reducing the number and intensity of stressors experienced by students might
initially be viewed as the most efficient means of improving the mental health of students, recent
research about resilience indicates that the experience and successful management of stress
represent a critical component of adolescent development (Campbell-Sills, Cohan, & Stein,
2006; Haglund et al., 2009; Nrugham, Holen, & Sund, 2010; Steinhardt & Dolbier, 2008). The
scientific literature contains several definitions of resilience offered by researchers working in a
wide variety of socio-cultural settings and with populations ranging from adult Holocaust
survivors to children living in extreme poverty. For example, in their research on the
development of competence in children and adolescents, Masten and Coatsworth (1998) defined
resilience as “manifested competence in the context of significant challenges to adaptation or
development” (p. 206). Similarly, resilience has been defined as “the positive counterpart[s] to
both vulnerability, which denotes an individual’s susceptibility to a disorder, and risk factors”
(Werner & Smith, 1992, p. 3), and as “a dynamic process wherein individuals display positive
adaptation despite experiences of significant adversity or trauma” (Luthar, Cicchetti, & Becker,
2000, p. 543). Luthar et al. elaborated that there are “two critical conditions: (1) exposure to
significant threat or severe adversity; and (2) the achievement of positive adaptation despite
major assaults on the developmental process” (Luthar et al., 2000, p. 543). In summary, we adopt
the conceptualization of resilience as a process and something that can be developed over time
and in response to the exposure to stressors or other threats (sometimes referred to as the “steeling effect”) (Rutter, 2006).

The experience and successful management of stress play an important role in the development of both the real and perceived ability to cope with stress. Students with limited resilience are vulnerable to adverse psychological outcomes such as depression. The purpose of this investigation was to examine the extent to which the relationship between stress and depression can be attributed to differences in perceived resilience, such that resilience mediates the relationship.

**Method**

**Participants**

The data were taken from one Canadian university’s spring 2006 and 2008 NCHA surveys at two campuses. Students were randomly selected within three strata: (a) undergraduate students at Campus I, (b) graduate students at Campus I, and (c) undergraduate and graduate students combined at Campus II. In addition, all international students and students living in residence at Campus I were invited to complete the questionnaire. All analyses were first conducted with the 2006 data and subsequently validated with the 2008 data. The results presented here are for 2006 data unless otherwise stated.

Ethical approval was provided by the university’s Behavioural Research Ethics Board. The students at the two university campuses were invited via email to participate in the web-based survey. Invited students received information about the purpose and content of the survey, the expected time required, how privacy would be protected, and referrals to health services. They were informed that by linking to the survey website their consent to participate was inferred.
Measures

The NCHA questionnaire includes seven items measuring depressive symptoms and suicidal ideation and attempts. The respondents were asked to indicate the number of times, within the last school year, they had: (a) “felt things were hopeless,” (b) “felt overwhelmed by all you had to do,” (c) “felt exhausted (not from physical activity),” (d) “felt very sad,” (e) “felt so depressed that it was difficult to function,” (f) “seriously considered attempting suicide,” and (g) “attempted suicide.” The response options were: (a) “never,” (b) “1-2 times,” (c) “3-4 times,” (d) “5-6 times,” (e) “7-8 times,” (f) “9-10 times,” and (g) “11 or more times” (coded as 1 to 7, respectively). Researchers have used these items as an index to compare levels of depressive symptomology across groups of students (e.g., men vs. women, younger vs. older students, on-campus vs. off-campus residents, fraternity/sorority members vs. not) (Office for Survey Research, 2007). However, the construct validity of these items as a unidimensional measure of depression has not been shown. Other researchers have used only some of the items to measure depression. For example, Adams, Moore, and Dye (2007) conducted a principal components analysis of five of the indicators (items a-e) and produced a 3-item scale (items a, d, and e).

Considering the limited evidence of measurement validity, we conducted a psychometric analysis with the 2006 data to determine whether the 7 depression items could be represented by a single factor. We found support for a model with 4 items (a, d, e, f), which was validated via a multi-group CFA, using the 2008 data, with the loadings, thresholds and variances constrained to be equal across the two study periods (further described in the Results).

The degree of stress experienced was inferred from one of the 25 potential impediments to academic performance enumerated in the NCHA questionnaire. The respondents were prompted to select one of the following five options to indicate whether stress had affected their academic
performance: (a) “this did not happen to me/not applicable,” (b) “I have experienced this issue but my academics have not been affected,” (c) “received a lower grade on an exam or important project,” (d) “received a lower grade in the course,” and (e) “received an incomplete or dropped the course.” Response options (d) and (e) were collapsed and response option (a) served as the referent in the dummy variable. We assumed that the more serious consequences were the result of more severe stress.

The resilience indicators were developed by one of the authors (CW), a registered psychologist and director of university counselling services. The following four items were presented to the students: “Please indicate the degree to which the following statements are true: (a) I believe I have the ability to cope with the demands of my life, (b) I know when I’m starting to experience too much stress, (c) I know how to cope with stress when it comes, and (d) I am usually able to successfully deal with my stress levels.” Responses were labeled: “agree strongly,” “agree somewhat,” “disagree somewhat,” or “disagree strongly” (coded as 1 to 4, respectively). These items were reverse coded in the statistical models such that a higher score was indicative of more resilience. A one-factor CFA was conducted to examine the measurement validity of these items with the 2006 data, and a validation assessment was carried out using the 2008 data (see Results for further information).

**Analytical Approaches**

Frequency distributions were produced for each of the observed variables. A latent variable mediation model (Mackinnon, 2008) was specified to examine the relationships among stress, depressive symptoms, and resilience as shown in Figure 1. The MPlus 5.2 software (Muthén & Muthén, 2008) was used to conduct exploratory and confirmatory factor analyses and structural equation modeling (SEM). Two-group SEM (Schumacker & Lomax, 2010) was conducted with
the 2006 and 2008 data to validate the consistency of the models across the two years. We applied mean and variance adjusted weighted least squares estimation (WLSMV) to accommodate the ordered categorical data (Finney & DiStefano, 2006). Model fit was assessed by scrutinizing the residual correlations and the model fit indices. Indicators suggestive of acceptable fit included: a root mean square error of approximation (RMSEA) of less than .06 and a comparative fit index (CFI) greater than .95 (Beauducel & Herzberg, 2006).

Results

Sample Description

Of 11,781 randomly sampled undergraduate and graduate students registered at the two campuses, 2,147 (18.2%) completed the questionnaire in 2006. Other demographic characteristics are provided in Table 1. The frequency distributions of the 7 depression items and 4 resilience items are provided in Figure 2 and Figure 3, respectively. Almost all students responded to the stress item \( n = 2,103 \): 38% reported experiencing stress that affected their academic performance (25% reported a lower grade on an exam/project and 13% reported a lower course grade or an incomplete/dropped course); 44% experienced stress that did not affect their academic performance; and 16% reported experiencing no stress.

Psychometric Analyses

In establishing the measurement structure for the 7 depression items, we first excluded “item g” (attempted suicide) because only 1.3% of the respondents answered affirmatively. The remaining 6 items were included as ordinal variables in a one-factor CFA. This model did not fit well (WLSMV \( \chi^2(6) = 589.8 \), RMSEA = .216, CFI = .955). The results of a subsequent EFA indicated that a two-factor solution would provide better fit to the data. We then conducted a two-factor CFA with items a, d, e, and f loading on factor 1 (these items were interpreted as...
indicative of depressive symptoms) and items b and c loading on factor 2 (overwhelmed or exhausted). The fit of this model was significantly better than the one-factor CFA model (ΔWLSMV $\chi^2(1) = 311.6$, WLSMV $\chi^2(6) = 72.3$, RMSEA = .073, CFI = .995). Factor 2 was omitted from further analyses because of its non-specificity. The one-factor CFA of the remaining four items (a, d, e, f) resulted in good model fit (WLSMV $\chi^2(2) = 15.5$, RMSEA = .057, CFI = .999). The ordinal alpha coefficient of reliability (Zumbo, Gadermann, & Zeisser, 2007) for the 4 items was .92, with standardized factor loadings ranging from .78 to .91. The validation of this model (with 2008 data) provided evidence of parameter invariance across the two study periods (WLSMV $\chi^2(8) = 29.7$, RMSEA = .035, CFI = .999).

A 1-factor CFA of the 4 resilience items resulted in a well-fitting model (WLSMV $\chi^2(2) = 17.8$, RMSEA = .061, CFI = .999). The standardized factor loadings ranged from .43 for item b (I know when I’m starting to experience too much stress) to .92 for item d (I am usually able to successfully deal with my stress levels). The ordinal alpha coefficient was .86. Evidence of parameter invariance was shown in the validation assessment with the 2008 data, when the parameters were constrained to be equal across the two years (WLSMV $\chi^2(8) = 12.6$, RMSEA = .016, CFI = 1.000).

**Structural Equation Model**

The mediation model as shown in Figure 1 resulted in acceptable fit (WLSMV $\chi^2(32) = 248.3$, RMSEA = .057, CFI = .982). Similar results were obtained when the model was validated with the 2008 data by constraining the measurement model parameters (loadings and thresholds) and the structural parameters to be equivalent across the two study periods (WLSMV $\chi^2(60) = 409.59$, RMSEA = .052, CFI = .986). The 2006 model explained 40% of the variance in depressive symptoms and 23% of the variance in resilience. The effect of stress on depressive
symptoms varied depending on the severity of the stress; stress with significant academic consequences was more strongly predictive of depressive symptoms. The degree to which stress influenced depressive symptoms could be partially attributed to the respondents’ reported resilience, which was also influenced by the severity of the stress experienced. The percentage of mediation observed is reported in Table 2.

To aid in the interpretation of the model, we provide examples of student profiles and their corresponding predicted depressive symptom scores in Figure 4. The figure illustrates the protective mediating effect of resilience: greater resilience is associated with lower depressive symptom scores for students whose stress impedes their academic performance, irrespective of their sex and age. Stress that impedes academic performance is associated with lower levels of resilience (i.e., perceived ability to cope), which increases the potential for depressive symptoms.

**Discussion**

The mediation model presented here was found to be a plausible explanation of the relationships among the variables of interest. Similar to other published literature, we found that the stress students experience is directly related to increased levels of depressive symptoms. In addition, we found that a substantial portion of this relationship appears to be mediated through students’ perceived ability to manage their stress (i.e., their resilience) when the stress is an impediment to academic performance. Approximately one half of the relationship between stress and depressive symptoms was mediated through the resilience of students whose stress affected their academic performance. The model implies that students’ perceived ability to manage their stress could significantly reduce the impact of that stress on depressive symptoms.

The latent variable approach used for the measurement of depression and resilience is both a strength and limitation of this study. We undertook a rigorous psychometric evaluation of the
items with particular attention paid to the ordinal nature of the response options thereby
counting for some sources of measurement error. The results of the psychometric analyses of
the depression items suggest that significant error would have been unaccounted for if an index
of depression were to be used based on the summed responses to these items. We recommend
that researchers use a relatively sophisticated data analytic approach based on a latent variable
single factor structure of the four relevant items identified in our analyses. With respect to the
resilience items, it is acknowledged that they have not been used or examined in other studies so
far, and therefore require further examination of their validity. A further limitation arises from
the cross-sectional nature of the survey data; any implied causal inferences must be interpreted
with caution and other plausible models exist. In addition, the low response rate raises concerns
about the representativeness of the sample. Nevertheless, many of these limitations are partially
mitigated by having replicated the analyses in another sample (i.e., in two time periods). The
field would be further advanced by the availability of prospective studies about resilience
development in students.

The finding of the substantial mediating effect of resilience is congruent with the work of
others in the field. Although not examined in the current study, it is hypothesized that, through
the development of resilience, students could learn to effectively cope with the many stressors
that they encounter and which may predispose them to depressive symptoms (Schaefer & Moos,
1992). Resilience development refers to the notion that low to moderate levels of stress exposure
provide students with the opportunity to practice coping skills (Fergus & Zimmerman, 2005).
Conversely, the inability to cope with even low to moderate levels of stress could impair the
development of resilience and thereby increase vulnerability to depression. An important
Implication relevant for health professionals involved in college health promotion is that interventions focused on developing resilience may reduce the risk of depression.

Stress is ubiquitous and many students may require support in developing resilience.

Rather than focussing all efforts on removing stressors, programs designed to enhance students’ ability to cope are needed. For example, research has shown that active coping (seeking social support, reframing stressors in a positive light) is associated with improved well-being, fewer psychological symptoms, and the ability to manage stressful circumstances (Valentiner, Holahan, & Moos, 1994). Promising programs have been developed for both school-aged children and university or college students to develop their ability to cope with stress (Gillham, Hamilton, Freres, Patton, & Gallop, 2006; Steinhardt & Dolbier, 2008). Identifying students with limited resilience and providing them with appropriate supportive services may help them to manage stress and thus prevent it from impeding their academic performance.
References


Table 1

Sample Description

<table>
<thead>
<tr>
<th>Variable</th>
<th>2006</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N = 2,147)</td>
<td>(N = 2,292)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1,429 (67%)</td>
<td>1,532 (67%)</td>
</tr>
<tr>
<td>Male</td>
<td>681 (32%)</td>
<td>732 (32%)</td>
</tr>
<tr>
<td>Missing</td>
<td>37 (2%)</td>
<td>28 (1%)</td>
</tr>
<tr>
<td>Full time students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1,975 (92%)</td>
<td>2,025 (88%)</td>
</tr>
<tr>
<td>No</td>
<td>129 (6%)</td>
<td>237 (10%)</td>
</tr>
<tr>
<td>Missing</td>
<td>43 (2%)</td>
<td>30 (1%)</td>
</tr>
<tr>
<td>Year in school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st year undergrad</td>
<td>340 (16%)</td>
<td>356 (16%)</td>
</tr>
<tr>
<td>2nd year under</td>
<td>318 (15%)</td>
<td>341 (15%)</td>
</tr>
<tr>
<td>3rd year under</td>
<td>333 (16%)</td>
<td>351 (15%)</td>
</tr>
<tr>
<td>4th year under</td>
<td>230 (11%)</td>
<td>246 (11%)</td>
</tr>
<tr>
<td>5th year or more under</td>
<td>100 (5%)</td>
<td>131 (6%)</td>
</tr>
<tr>
<td>graduate</td>
<td>732 (34%)</td>
<td>779 (34%)</td>
</tr>
<tr>
<td>adult special / other</td>
<td>28 (1%)</td>
<td>46 (2%)</td>
</tr>
<tr>
<td>Missing</td>
<td>66 (3%)</td>
<td>42 (2%)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 - 20</td>
<td>708 (33%)</td>
<td>740 (32%)</td>
</tr>
<tr>
<td>21 - 29</td>
<td>994 (46%)</td>
<td>1,095 (48%)</td>
</tr>
<tr>
<td>30 - 68</td>
<td>410 (19%)</td>
<td>436 (19%)</td>
</tr>
<tr>
<td>Missing</td>
<td>35 (2%)</td>
<td>21 (1%)</td>
</tr>
</tbody>
</table>
Table 2

Percent of Mediation and Unstandardized Effects

<table>
<thead>
<tr>
<th>Stress</th>
<th>Direct Effects</th>
<th>Indirect Effect&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Total Effect&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Mediation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B (SE)</td>
<td>B (SE)</td>
<td>B (SE)</td>
</tr>
<tr>
<td>Stress →</td>
<td>Stress → Resilience →</td>
<td>Depression</td>
<td>Resilience</td>
<td>Depression</td>
</tr>
<tr>
<td>Stress 1</td>
<td>.22 (.05)</td>
<td>-.23 (.06)</td>
<td>-.55 (.03)</td>
<td>.13 (.03)</td>
</tr>
<tr>
<td>Stress 2</td>
<td>.35 (.06)</td>
<td>-.78 (.06)</td>
<td>-.55 (.03)</td>
<td>.43 (.04)</td>
</tr>
<tr>
<td>Stress 3</td>
<td>.64 (.08)</td>
<td>-1.21 (.07)</td>
<td>-.55 (.03)</td>
<td>.66 (.05)</td>
</tr>
</tbody>
</table>

Note. Unstandardized coefficients are reported here. The corresponding standardized coefficients are found in Figure 1. All coefficients are adjusted for sex and age.

<sup>a</sup> At each level of stress, the indirect effect is the product of the effects of stress on resilience and resilience on depression (i.e., mediated through resilience).

<sup>b</sup> At each level of stress, the total effect is the sum of the indirect effect (mediated through resilience) and the direct effect of stress on depression.
Figure 1. Structural Equation Model

Figure 1. Model fit: WLSMV $\chi^2(32) = 248.3$, RMSEA = .057, CFI = .982 ($N = 2,044$). All coefficients are standardized. Regressions on resilience and stress are adjusted for age and sex (these parameters are not shown here). $S_1$: Stress that does not affect academic performance versus no stress (referent), $S_2$: Stress resulting in a lower grade on an assignment or project versus no stress, $S_3$: Stress resulting in a lower or incomplete course grade versus no stress.
Figure 2. Frequency Distributions for Depression Items (Prior to Collapsing)
Figure 3. Frequency Distributions for Resilience Items

**I believe I have the ability to cope with the demands of my life**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Agree Strongly</th>
<th>Agree Somewhat</th>
<th>Disagree Somewhat</th>
<th>Disagree Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>52</td>
<td>41</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2008</td>
<td>51</td>
<td>43</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

**I know when I'm starting to experience too much stress**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Agree Strongly</th>
<th>Agree Somewhat</th>
<th>Disagree Somewhat</th>
<th>Disagree Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>52</td>
<td>53</td>
<td>42</td>
<td>40</td>
</tr>
<tr>
<td>2008</td>
<td>53</td>
<td>40</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**I know how to cope with stress when it comes**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Agree Strongly</th>
<th>Agree Somewhat</th>
<th>Disagree Somewhat</th>
<th>Disagree Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>25</td>
<td>53</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2008</td>
<td>26</td>
<td>53</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

**I am usually able to successfully deal with my stress levels**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Agree Strongly</th>
<th>Agree Somewhat</th>
<th>Disagree Somewhat</th>
<th>Disagree Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>31</td>
<td>50</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>2008</td>
<td>33</td>
<td>49</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

*Figure 3. These items were reverse coded in the statistical models.*
Figure 4. Predicted Depressive Symptom Scores

- Stress resulting in a lower course grade or an incomplete/dropped course, 18-20 yrs, women
- Stress resulting in a lower course grade or an incomplete/dropped course, 30-68 yrs, men
- Stress resulting in a lower grade on an exam/project, 30-68 yrs, women
- Stress resulting in a lower grade on an exam/project, 21-29 yrs, men
- Stress with no academic impact, 18-20 yrs, women
- Stress with no academic impact, 30-68 yrs, men