

***A Count of Coping Strategies: A Longitudinal Study Investigating an Alternative Method to Understanding Coping and Adjustment.***

By

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A thesis  
submitted in partial fulfilment  
of the requirements for the degree  
Master of Arts

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July, 2017

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## Abstract

Coping flexibility – an individual’s ability to modify and change coping strategies depending on the context – may be an important but under-examined aspect of coping. The availability of numerous coping strategies may be an important precursor to coping flexibility, given that flexibility can only be obtained if an individual is able to access and use different coping strategies. Typically, studies examining coping compute means, which assess not only what strategies are used but also how much they are used. This means-based approach fails to differentiate between infrequent use of many strategies and frequent use of one or two strategies. One way to disentangle the effects of these alternative styles of coping is to count the number of strategies that an individual uses without attention to how frequently they use them (i.e., a count-based approach). The present longitudinal study compared a count-based model and a means-based model of coping and adjustment among undergraduates ( $N = 1,132$ ). An autoregressive cross-lagged path analysis revealed that for the count-based approach, using a greater number of positive coping strategies led to more positive adjustment and less suicide ideation over time than using a smaller number of positive coping strategies. Further, engagement in a greater number of negative coping strategies predicted more depressive symptoms and poorer emotion regulation over time. In comparison, the means-based model revealed similar results for negative coping strategies; however, engagement in more frequent positive coping strategies did not predict better positive adjustment over time. Thus, a count-based approach offers a novel way to examine how the number of coping strategies that individuals use can help promote adjustment among university students.

## **Acknowledgements**

First, I would like to thank my supervisor, Dr. Teena Willoughby, for her continuous support and guidance. I am grateful for your enthusiasm, open door policy, and dedication to my development as both a graduate student and researcher. Your ongoing confidence in me has pushed me well beyond what I thought I was capable of and I am excited to see what the next four years hold. I truly couldn't ask for a better mentor. I would also like to thank my committee members, Dr. Angela Evans and Dr. Elizabeth Shulman, for their feedback and willingness to help me in all aspects throughout my Masters.

I want to thank the Adolescent Development Lab for their support and help throughout this entire process. To Thalia and Tina, thank you for the countless hours of listening to my practice talks, editing, brainstorming and overall support over the last two years.

This accomplishment would not have been possible without the amazing support from my family and friends. I want to thank my Mom and Dad for their encouragement and enthusiasm throughout this entire process. Thank you for the much-needed phone calls, for picking me up from school so I could come home when I needed a break, and reminding me that I am capable of facing any challenge that comes my way. To my friends, thank you helping me get through the last two years and for keeping me smiling even when I was stressed out. I am so grateful to be surrounded by such amazing and supportive people.

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## **Introduction**

For many students, attending university can be stressful and challenging (Arnett, 2000; Regehr, Glancy, & Pitts, 2013). Students are faced with many demands, such as moving away from home, developing new social ties among their university peers, adjusting to rigorous academic curriculum, and struggling with financial constraints – often without the close social support of family and friends that they experienced when living at home (Galatzer-Levy, Burton, & Bonanno, 2012; Vaez & Laflamme, 2008). Importantly, accumulation of these daily stressors can impact students’ adjustment (Kadison & DiGeronimo, 2004; Regehr et al., 2013; Sargent, Crocker, & Luhtanen, 2006). Indeed, the rates of suicide ideation and depressive symptoms among university students are alarming. In a study of 16,760 American undergraduates, 36.1% reported feeling so depressed in the past year that it was difficult to function and 10.3% seriously considered suicide – yet many students may not seek out or be aware of appropriate resources that are available to them (American College Health Association, 2015; Garlow et al., 2008). Thus, managing these challenges places a reliance on students’ own ability to come up with coping strategies to deal with stress, such as seeking social support. The current study seeks to investigate how the number of coping strategies that individuals use may be associated with adjustment over time.

According to the transactional theory of coping, coping can be thought of as an evolving process that changes in response to context, in an effort to manage different internal and external demands (Lazarus & Folkman, 1987). Accordingly, the transactional theory of coping presumes that successful coping involves an ability to adjust and change



coping strategies in a way that facilitates positive outcomes. With this in mind, current models of coping have focused on the idea of coping flexibility- a way of studying coping that identifies an individual's ability to modify their coping behavior according to the nature of each stressful situation (see Cheng, Lau, & Chan, 2014).

### **Counts versus Means**

In order to demonstrate flexibility among a variety of coping strategies, individuals must first possess a diverse range of coping strategies that they are able to use when stressed (Bonanno & Burton, 2013). Studies investigating the use of coping strategies typically conduct a means-based analyses whereby they not only investigate what strategies are used, but also how much (i.e., a little, a medium amount, a lot) each is used – a composite score then is computed based on the average frequency of use across all the strategies (Blanchard-Fields & Sulsky, 1991; Finset & Andersson, 2000; Miller Smedema, Catalano, & Ebener, 2010; Riolli & Savicki, 2010). As a result, this approach is unable to differentiate between individuals who use a lot of strategies infrequently and individuals who use only one or two strategies a lot. For example, an individual who uses three coping strategies “a little” (scored as a 2 on the Likert scale) would have an identical mean to someone who indicates using two strategies “not at all” (scored as a 1) and a third strategy “a lot” (scored as a 4); both means would be 2. In other words, when using a means-based analysis, distinct coping patterns may have identical means, limiting the conclusions that can be made regarding the relationship between the number of coping strategies used and adjustment. One way to address this confound is to count the number of strategies that an individual uses when stressed without attention to how frequently they use them (i.e., a count-based approach).

Regardless of approach (count or mean), it also is important to note that some strategies may not be advantageous, despite how well an individual is able to use that specific strategy (Kato, 2012). For instance, consider a person who copes with different situations by blaming themselves, self-medicating through alcohol use, and seeking support; this person would not be expected to have a more favourable outcome compared to if they had just used only one strategy such as seeking support, given that self-blame and alcohol use are unlikely to help. Thus, adaptive coping may require an ability to use coping strategies that are at least relatively positive in nature. While there is inconsistency in the literature about how to separate coping strategies into subscales, it is common for studies to use a factor analysis to inform this decision (Aldwin & Revenson, 1987; Dempsey, 2002; Hasking, Lyvers, & Carlopio, 2011; Seiffge-Krenke, 2000). The current study also used a factor analysis to help guide this decision to separate the negative coping strategies from the positive coping strategies. In doing so, differential associations between adjustment and the count of positive strategies versus the count of negative coping strategies used can be assessed.

### **Coping and Negative Adjustment**

Despite the potential benefits of using multiple strategies to cope with stress, doing this may be difficult for individuals experiencing poor adjustment. Two indicators of poor adjustment that are examined in the current study are depressive symptoms and suicide ideation, given the high rates of both among university students (see above). Importantly, individuals with high levels of depressive symptoms demonstrate a more negative attribution style (i.e., a stable and internalized attitude that unpleasant circumstances will persist) compared to their non-depressed peers (Abramson, Metalsky,

& Alloy, 1989; Hankin et al., 2001, see Hu, Zhang, & Yang, 2015 for a review). Thus, believing that nothing can be done to alter an aversive situation may discourage an individual from seeking out new positive ways to cope with problems.

In line with this idea, concurrent studies using a means-based approach have found that using more frequent negative coping strategies (e.g., self-blame) are associated with higher depressive symptoms (Mahmoud, Staten, Hall, & Lennie, 2012). Further, in a longitudinal investigation, Seiffge-Krenke (2000) found that more frequent engagement in avoidant coping was associated with more depressive symptoms over time, although they only tested one direction - from coping to depressive symptoms over time (see also Lee and colleagues, 2014). Thus, interpretation of these findings generally is that negative coping leads to more depressive symptoms over time. However, a longitudinal study testing bidirectionality is necessary before conclusions about the direction of effects can be ascertained.

Suicide ideation also is associated with how well individuals are able to cope with stress (Horwitz, Hill, & King, 2011; Kim, Han, Trksak, & Lee, 2013; Mirkovic et al., 2015; Yao et al., 2014). For example, findings from concurrent studies indicate that individuals with higher levels of suicide ideation engage in more frequent (calculated by a means-based approach) maladaptive coping strategies (Mirkovic et al., 2015; Yao et al., 2014) and tend to have more trouble problem solving in the face of stress (Schotte & Clum, 1982), compared to individuals with lower levels of suicide ideation. Thus, individuals who engage in more suicide ideation may have more difficulty accessing multiple productive coping strategies when faced with stress. But it also may be that individuals who use more negative coping strategies in the face of stress have higher

suicide ideation over time- a longitudinal study testing both directions of the effects is required to address these hypotheses.

Overall, while there is evidence of a means-based association between coping and negative adjustment, less is known about whether these results are transferable when looking solely at the number of strategies individuals have available to them.

Interestingly, researchers often suggest that one way to help decrease negative adjustment (e.g., depressive symptoms and suicide ideation) may be to reduce the *number* of negative coping strategies that individuals use. Yet, a direct test of this hypothesis has not been conducted. Research using a count-based approach is necessary before concluding that the number of strategies that individuals use is associated with adjustment. In addition, the current study will investigate the direction of effects of these relations over time. For example, it may be that individuals who engage in a greater number of negative coping strategies when stressed report more depressive symptoms and suicide ideation over time than their peers. On the other hand, individuals who report depressive symptoms and suicide ideation at Time 1 may engage in a greater number of negative coping strategies over time. In fact, both possibilities may be true - the effect may be bidirectional. Thus, an important goal of the present study is to investigate the direction of effects of these relations for both positive and negative coping.

### **Coping and Positive Adjustment**

A second objective of the current study is to investigate the relationship between coping and positive adjustment. Coping often is investigated in terms of its ability to decrease negative outcomes. The current study, however, seeks to investigate whether coping can also play an important role in increasing positive outcomes. A long line of

research on positive psychology has been dedicated to uncovering ways to help increase positive adjustment (Seligman, 2002). Coping, in particular, has been implicated as one potential approach to promote well-being (Greenglass & Fiksenbaum, 2009). For example, when an individual feels they have the appropriate resources to deal with problems, they are more likely to view the stressor as a *challenge* as opposed to a *threat* (see Crum, Akinola, Martin, & Fath, 2017). Indeed, having a higher number of positive coping strategies available in the face of stress may provide the individual with more resources to deal with stress. This may allow an individual to manage stress more effectively and be more confident in their ability to deal with problems. There is less research directly investigating coping and positive adjustment than coping and negative adjustment, and the research that has been done generally is concurrent rather than longitudinal.

As adjustment can be examined in a variety of ways, in the present study we will focus on three indicators: emotion regulation, self-esteem and academic achievement. All three are associated with coping (Gross, 1998; Mann, Hosman, Schaalma, & De Vries, 2004; Orth, Robins, & Meier, 2009) and represent particularly important indicators of adjustment among students. One indicator of positive adjustment that is associated with coping is emotion regulation. Emotion regulation is defined as the intrinsic and extrinsic processes responsible for assessing, monitoring, and altering emotion reaction (e.g., intensity) to accomplish a desired goal (Thompson, 1994). According to the broaden-and-build theory (Fredrickson & Joiner, 2002), the experience of positive emotions (e.g., joy) can help facilitate more efficient emotion regulation (particularly of negative emotion; Fredrickson & Tugade, 2000). In turn, this can lead to a broadening of attention and thinking (i.e., increasing openness to new possibilities, big picture focus, etc.), which is

hypothesized to build personal resources, such as adaptive coping strategies (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). In light of this, individuals with better emotion regulation may have a heightened ability to think more broadly, allowing for engagement in a *variety* of positive coping strategies, compared to those who have more narrow thinking. Alternatively, it may be that individuals who engage in a greater number of positive coping strategies may have a greater sense of control, and demonstrate a greater ability to adjust their coping responses and adapt to stress. As a result, these individuals may become more proficient in their ability to regulate their emotions. Fredrickson (2004) posits that both interpretations warrant investigation (i.e., bidirectionality) by emphasizing that experience of positive emotion can elicit better emotion regulation which can help facilitate a broader source of coping, and in turn, more use of positive coping strategies should help improve later experiences of positive emotions—allowing for better emotion regulation.

Another way that coping has been implicated in promotion of positive adjustment is in its association with self-esteem (Lee, Conley, & Holmbeck, 2014). Self-esteem is defined as an evaluation of one's own worth or value (Rosenberg, 1965). Individuals with high self-esteem are thought to have more effective and appropriate coping resources available to deal with stress (e.g., planning and problem solving; Griva & Anagnostopoulos, 2010). With regard to the count of coping strategies used, it could be that individuals with high self-esteem may be more confident in their ability to cope with different stressors (and thus be more likely to engage in a variety of positive coping strategies). It also may be, however, that individuals who are able to use a greater number of positive coping strategies may develop a sense of control and feelings of confidence in

their ability to handle different situations appropriately, thus leading to increased self-esteem.

In addition, academic achievement may be another important factor associated with coping. Academic achievement (i.e., grade point average) typically requires an ability to work well under pressure (e.g., writing exams, oral presentations) as well as an ability to collaborate on group projects (Csikszentmihalyi, 2014). The ability to cope efficiently and employ more frequent positive orientated strategies when under stress/pressure has been found to be associated with better academic achievement, compared to those who rely on less effective coping strategies (MacCann, Fogarty, Zeidner, & Roberts, 2011; Mantzicopoulos, 1990). Further, Zeidner (1995) emphasizes that success on exams is associated with a combined use of multiple strategies (i.e., increase study time, seek support from friends). While associations have been found between academic achievement and use of effective coping strategies, less is known about the longitudinal association between academic achievement and a count of the number of coping strategies used.

The current study seeks to investigate relationships between positive adjustment and the number of coping strategies individuals use. A count-based analysis will help to clarify if having a greater number of positive coping strategies available when stressed will be associated with positive adjustment over time. It also is necessary to use a longitudinal design in order to assess bidirectionality. As an example, interpretations of concurrent studies imply that having better coping strategies *leads* to better academic achievement; it also could be, however, that the ability to succeed in an academic setting may help build confidence and lead to a broadening of focus which could help increase

the use of a variety of coping strategies. The same interpretations can be applied to emotion regulation and self-esteem, thus further longitudinal examination is required.

### **Stress as a Moderator**

While a key goal of the present study is to investigate reciprocal relations between coping and adjustment, it is quite possible that the associations among these variables may differ depending on the individual's level of stress. For instance, coping is generally considered in the context of stress; thus if an individual is experiencing less stress, we might not expect them to apply and use a number of coping strategies compared to individuals who are experiencing more stress (Carver & Connor-Smith, 2010; Fields & Prinz, 1997). Indeed, it may be that individuals who have a lot of different stressors in their life may benefit more from using a variety of strategies, compared to individuals who have few stressors.

### **The Current Study**

There are three main research questions associated with this longitudinal study. First, how is a count-based approach associated with adjustment over time, and are these effects bidirectional? Although research using a means-based approach has provided evidence for associations between coping and adjustment, little work has used a count-based approach or used this approach with a longitudinal design. We predict that using a greater number of positive coping strategies when stressed might be associated with better adjustment (i.e., less depressive symptoms, less suicide ideation, more self-esteem, better emotion regulation and higher academic achievement) over time than using a smaller number of positive coping strategies. We also expect that using a higher number of negative strategies will be associated with poorer adjustment (e.g., greater depressive



symptoms, and higher suicide ideation) than using a smaller number of negative coping strategies. Given the lack of research, it is not clear whether using a greater number of negative coping strategies will be associated with poorer self-esteem, emotion regulation and academic achievement over time. Further, the analyses examining bidirectionality in these associations over time are exploratory.

Second, the current study offers a comparison of a count-based approach and a means-based approach to studying coping and adjustment. Given that a counts-based model does not take into consideration how much individuals use each strategy and only examines the number of coping strategies individuals use, it also would be beneficial to compare this model to a means-based model that takes both of these factors into consideration. In doing so, differential associations between the two models can be compared in order to address the ways in which a count-based approach may be an alternative method to studying coping.

A third purpose of this study is to investigate whether stress is an important moderator of the association between coping (for both the count-based and the means-based methods) and adjustment. Important potential third variables also were included in study (e.g., sex and parental education). For instance, some prior research on coping and stress points to sex differences, whereby girls typically report more perceived stress (Glasscock, Andersen, Labriola, Rasmussen, & Hansen, 2013) and are more likely to use coping strategies that are considered to be emotion focused (e.g., seeking emotional support; Howerton & Van Gundy, 2009). Parental Education was included as a control variable given research suggesting that lower parental education is associated with more perceived stress and a greater tendency to rely on certain coping strategies (e.g., religious

coping strategies; Glasscock et al., 2013; Landolt, Vollrath, & Ribi, 2002). Thus, all analyses controlled for sex and parental education.

## Method

### Participants

The current sample of 1,132 (70.5% female) first-year undergraduate students ( $M_{\text{age}} = 19.06$ ,  $SD = .92$ ) from a mid-sized Canadian university was drawn from a larger longitudinal study examining adjustment in university. In total, 87.5% of the participants were born in Canada. Consistent with the broader demographics for the region; the most common ethnic backgrounds endorsed other than Canadian were British (19%), Italian (16.8%), French (9.5%) and German (9%; Statistics Canada, 2006). Parental education was used as a proxy for socioeconomic status, and averaged between “some college, university or apprenticeship program” and “completed a college/apprenticeship and/or technical diploma.”

Missing data occurred within each assessment time point because some students did not finish the entire questionnaire (average missing data = 1.8%) and because some students did not complete both waves of the data. Out of the original sample that completed the survey at Time 1, 73.1% completed Time 2 of the survey. A MANOVA including all covariates was used to examine whether individuals who were missing at Time 2 were significantly different on any Time 1 variables than those who completed both time points. The overall multivariate test for missingness was significant,  $\Lambda = .941$ ,  $F(9, 1010) = 7.017$ ,  $p < .001$ ,  $\eta^2 = .059$ . Participants who were missing at the second time point were not significantly different from participants who were there at both time points, with two exceptions. Specifically, those who completed both waves of the study

were more likely to be females and to have higher grades compared to those who only completed one wave of the study ( $ps < .001$ ). Missing values were imputed using the expectation–maximization algorithm (EM; iterations = 200) with all study measures included in the analysis, thus avoiding the biased parameter estimates that can occur with pairwise deletion, list-wise deletion or means substitution (Schafer & Graham, 2002).

### **Procedure**

First-year university students were invited to participate in the survey examining factors related to stress and adjustment in the past year (unless otherwise specified). The study was advertised by way of posters, emails, classroom announcements, website posting, and residence visits. Students could participate regardless of academic major, and were given monetary compensation or course credit for their participation. Only students who completed the first wave were invited (by email and/or phone) to participate again in the second wave. The Social Science Research Ethics Board approved the study (Ethics Approval Number: 09-118) and all participants provided informed written consent. Both Time 1 and Time 2 assessments were completed during the winter term one year apart (Time 2 measures were administered in the same order). Trained research assistants administered the survey in person – they were not privy to the student responses during the administration. The survey was administered at the university and took approximately one hour to complete. To ensure the safety of our participants a full debriefing was provided at the end of the survey and a list was given of both available mental health resources and researcher contact information. Participants also were given the opportunity during the survey to provide their contact information so that they could be contacted by a mental health professional if they were experiencing any distress.

## Measures

**Demographics.** Sex and parental education (one item per parent, scale ranged from 1 (*did not finish high school*) to 6 (*professional degree*), averaged for participants reporting on two parents;  $r = .40$ ) were assessed at Time 1.

**Coping.** Coping was assessed using a shortened version of the Brief Coping (15 items) at Time 1 and then again one year later at Time 2 (Carver, 1997). Given time limitations when conducting the larger longitudinal study, we were not able to include the full 28-item Brief Coping. The Brief Coping includes positive and negative coping strategies. In order to differentiate between these positive and negative coping strategies, a principal components factor analysis with direct oblimin rotation was conducted. Four components emerged with eigenvalues  $> 1$ . Factor 2 was comprised of four negative coping items—self-blame, self-criticism, alcohol use, and giving up (eigenvalue = 2.73)—with factor loadings ranging from 0.63 to 0.77. These items were therefore included in the count of negative coping strategies. The three remaining factors reflected different subtypes of positive coping strategies such as religion (e.g., I pray or meditate), seeking support (e.g., I get emotional support from others), and reframing/humor (e.g., I look for something good in what is happening). As the focus of this study was to investigate how many strategies individuals have access to using (regardless of the subtype of positive strategies), the items from the three remaining factors were combined in order to create the count of positive coping strategies (see Table 1 for more information on the factors).

Table 1. Exploratory Factor Analysis Results (Pattern Matrix) For Coping Items Using Principle Components and Oblique (Oblimin) Rotation

Items	Loadings			
	F1	F2	F3	F4
1. I make fun of the situation	0.84	0.11	0.13	-0.04
2. I look for something good in what is happening	0.72	-0.13	-0.09	0.25
3. I make jokes about it	0.84	0.05	0.05	-0.07
4. I try to see it in a different light, to make it seem more positive	0.71	-0.21	-0.09	0.12
5. I blame myself for things that have happened	-0.20	<b>0.77</b>	-0.16	0.04
6. I use alcohol or other drugs to make myself feel better	0.19	<b>0.63</b>	0.23	-0.01
7. I criticize myself	-0.16	<b>0.70</b>	-0.15	0.15
8. I give up on trying to deal with it	0.03	<b>0.73</b>	0.11	-0.01
9. I try to get advice or help from other people about what to do	-0.01	0.05	-0.87	-0.01
10. I get comfort and understanding from someone	-0.03	0.03	-0.79	0.12
11. I get emotional support from others	0.00	-0.02	-0.86	-0.01
12. I try to find comfort in my religious or spiritual beliefs	0.05	0.06	-0.05	0.90
13. I pray or meditate	0.07	0.08	0.03	0.91
14. I turn to work or other activities to take my mind off things	0.35	0.02	-0.34	-0.03
15. I do something to think about it less, such as going to the movies, watch TV, read, daydream, sleep	0.30	0.30	-0.23	-0.16
Eigenvalue	3.36	2.27	2.00	1.56
% of variance	22.43	15.15	13.33	10.37

When filling out the coping measure, participants were asked to indicate what they do when under a lot of stress on a scale ranging from 1 (*I usually don't do this at all*) to 4 (*I usually do this a lot*). In order to create a count of how many strategies individuals use when stressed, the items were recoded such that that 0 represented not using the strategy (i.e., *I usually don't do this at all*), while 1 represented using the strategy to any degree (i.e., *I usually do this a little bit*, *I usually do this a medium amount*, *I usually do this a lot*).

The count of negative coping strategies was created by counting the number of negative strategies individuals use when stressed (e.g., “I blame myself”, “I use alcohol and other drugs to make myself feel better,” etc.). An average of these strategies (based on the original items with the four-point scale) was also created and used in the means-based approach. Cronbach’s alpha was .68 at Time 1 and .72 at Time 2. The count of positive coping strategies was assessed by counting the number of positive strategies individuals use when stressed (e.g., “I get comfort and understanding from someone,” “I look for something good in what is happening” etc.). An average of these strategies (based on the original items with the four-point scale) was also created and used in the means-based approach. Cronbach’s alpha was .76 at Time 1 and .74 at Time 2. The Brief Cope has been shown to have good internal consistency and validity in previous research (Carver, 1997).

**Depressive Symptoms.** Participants completed The Center for Epidemiological Studies Depression Scale at Time 1 and Time 2 in order to assess their level of depressive symptoms in the past 2 weeks (CES-D Scale; (Radloff, 1977); e.g., “I felt lonely” and “My sleep was restless”). Individuals indicated on a scale of 1 (*none of the time*) to 5

(*most of the time*) how often they experienced 20 symptoms associated with depression. Cronbach's alpha in the present study was .91 at Time 1 and .92 at Time 2.

**Suicide Ideation.** Suicide ideation was assessed at Time 1 and Time 2 using a question from the Suicide Behaviors Questionnaire-Revised (SBQR; Osman, 2002); "How often have you thought about killing yourself in the past year?". This item was rated using a 5-point scale that ranged from 1 (*never*) to 5 (*very often*). The SBQR has been shown to have good internal consistency and validity in previous research (Osman, 2002).

**Self Esteem.** Self-esteem was measured at Time 1 and Time 2 using the Rosenberg Self-Esteem Scale (Rosenberg, 1965). The measure included 10 items (e.g., "I take a positive attitude toward myself") that were rated on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha was .904 at Time 1 and .916 at Time 2.

**Academic Achievement.** Academic achievement was measured at both Time 1 and Time 2 using students' academic average among all courses taken for the corresponding year, recorded in percentages (e.g., 70%). Students average was obtained from the University Registrar with the participants' permission.

**Emotion Regulation.** Emotion regulation was assessed at both Time 1 and Time 2 using 6 items from the Difficulties in Emotion Regulation (Gratz & Roemer, 2004; e.g., "When I'm upset or stressed, I have difficulty concentrating"; See Semplonius, Good, & Willoughby, 2014 for use of this measure). The responses were based on a five-point Likert scale ranging from 1 (*almost never*) to 5 (*almost always*). The scale was recoded so that higher scores indicated better emotion regulation. Cronbach's alphas at Time 1 and Time 2 were .73 and .74, respectively.

**Stress.** Stress was measured using The Daily Hassles Scale. Participants indicated how bothered they felt by 25 daily hassles. Hassles related to daily life stressors such as peer conflict, family, school and money (e.g., “Being lonely” and “Not having enough time”). Daily hassles – as opposed to life events – represent a particularly important way of investigating stress, given its ability to assess accumulation of daily problems that may go undetected using a life events scale (Chamberlain & Zika, 1990). Responses were rated on a scale from 1 (*almost never bothers me*) to 3 (*often bothers me*). Cronbach’s alpha for these 25 items was .84.

## **Results**

### **Preliminary Analyses**

The means and standard deviations of all study variables are outlined in Table 2. All variables demonstrated acceptable levels of skewness and kurtosis with the exception of suicide ideation, which was transformed using the log-likelihood method to correct for non-normality. In order to test for sex differences in all study variables, a MANOVA was conducted with sex as the independent variable. There was a significant main effect of sex on positive coping strategies used, with females reporting using a greater number of positive coping strategies and having a higher mean of positive coping strategies than males at both Time 1 and Time 2,  $ps < .004$ . Females also reported more depressive symptoms at both Time 1 and Time 2,  $p < .001$ , more stress at Time 1,  $p < .001$ , and higher academic achievement at Time 2,  $p = .006$ , than males. In contrast, males reported better emotion regulation than females at both Time 1 and Time 2,  $ps < .001$ , and higher self-esteem at Time 1. At Time 2, males were more likely to engage in a greater number of negative coping strategies,  $p = .027$ , and also reported higher suicide ideation,  $p =$



.014, than females.

Table 2. Descriptive Statistics for all Study Variables.

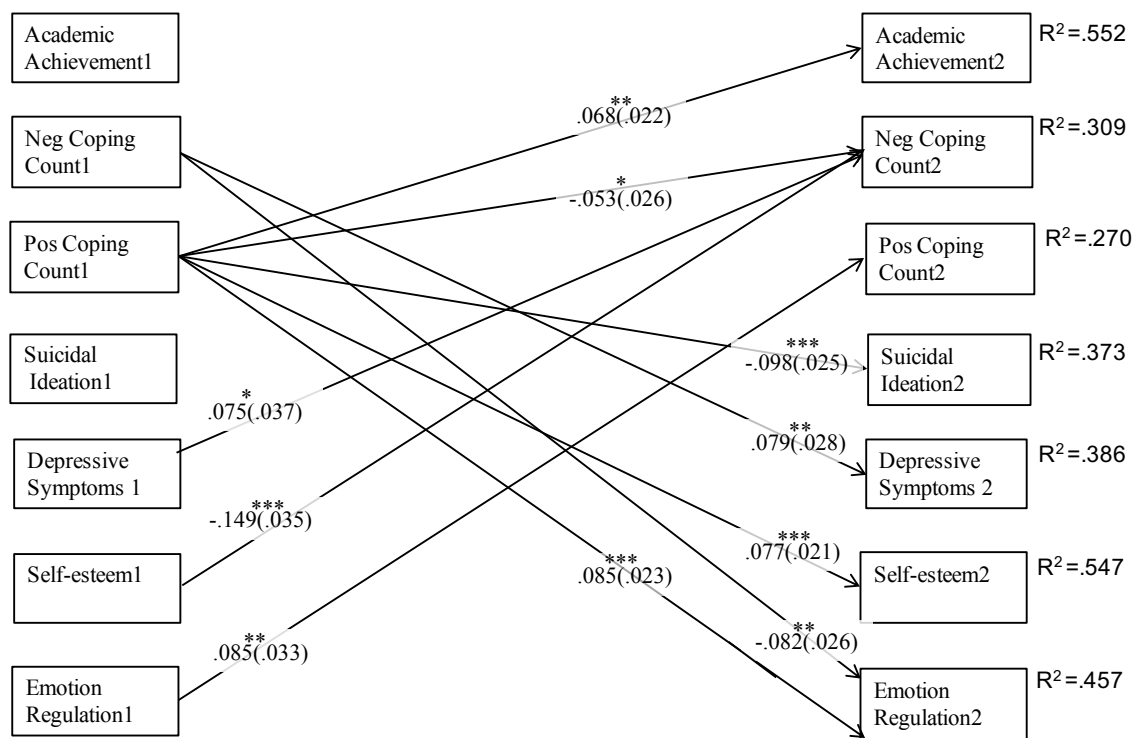
Variables	Time 1			Time 2		
	<i>M (SD)</i>	Min.	Max.	<i>M (SD)</i>	Min.	Max.
PosC (Count)	8.164(2.110)	0	11	8.288(1.813)	0	11
NegC (Count)	2.351(1.259)	0	4	2.342(1.182)	0	4
PosC (Mean)	2.344(0.499)	1	4	2.381(0.431)	1	4
NegC (Mean)	1.939(0.652)	1	4	1.910(0.596)	1	4
Dep	2.115(0.647)	1	5	2.090(0.619)	1	5
SuicId	1.391(0.845)	1	5	1.367(0.726)	1	5
EmoR	3.214(0.733)	1	5	3.148(0.694)	1	5
AA	67.375(11.114)	10	94	68.065(11.425)	6	90
Esteem	3.806(0.688)	1	5	3.811(0.676)	1	5
Stress	1.927(0.319)	1	3			
P.Educ	3.654(1.267)	1	6			
Sex (%)	70.5% Female					

*Note.* PosC= Positive Coping, NegC= Negative coping, Dep= Depressive symptoms, SuicId= Suicide Ideation, EmoR= Emotion Regulation, AA= Academic Achievement, Esteem=Self-esteem, P.Educ = Parental Education.

## Primary Analyses

The primary statistical analyses were carried out using an auto-regressive cross-lagged path analysis in MPlus 7 to simultaneously assess the bidirectional associations between each of the study variables while controlling for previous scores on the measures (Selig and Little 2012). Two models were run, a count-based model and a means-based model. The models were comprised of seven variables measured over 2 years (Time 1 and Time 2 are one year apart): positive coping strategies, negative coping strategies, depressive symptoms, suicide ideation, academic achievement, emotion regulation, and self-esteem (see Figure 1 and 2). Across the two time periods, we included cross-lag paths (i.e., between variables over time) among all seven key study variables, autoregressive paths (i.e., within each variable), and concurrent associations among all variables within each wave. Sex and parental education also were included as covariates, such that correlations were specified between each of the covariates and each variable at Time 1 and Time 2 variables were regressed on the covariates. Any significant cross-lag path, therefore, accounted for the effects of the covariates, previous scores on the outcome variables, correlations among variables within a wave, as well as the effects of any Time 1 variable in the model (i.e., estimating the unique relation between study variables). Significant paths among the seven key study variables for both models (count-based and means-based) are depicted in Figure 1 and Figure 2 (also see  $R^2$ ; and Table 3 and 4 for full results among key variables). Model fit could not be assessed because the models were saturated.

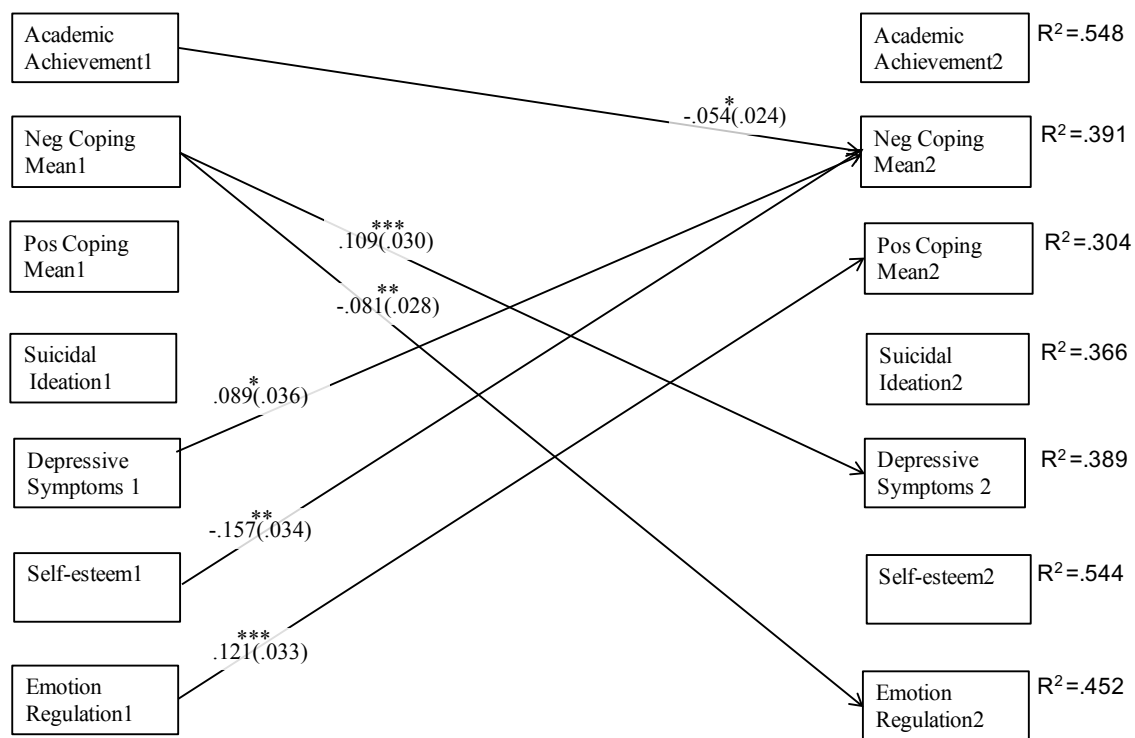
Figure 1. Significant Cross-lagged Paths Associated with Positive and Negative Coping Strategies for the Count-based Model.



Numbers 1 and 2 indicate Time 1 and Time 2, respectively. Values indicate standardized beta weights (standard errors are in parenthesis). Pos=Positive, Neg=Negative.

Results for stability paths for each variable and paths between all study variables can be obtained from Table 3.

Figure 2. Significant Cross-lagged Paths Associated with Positive and Negative Coping Strategies for the Means-based Model.



Numbers 1 and 2 indicate Time 1 and Time 2, respectively. Values indicate standardized beta weights (standard errors are in parenthesis). Pos=Positive, Neg=Negative. Results for stability paths for each variable and paths between all study variables can be obtained from Table 3.

Table 3. Autoregressive Cross-Lagged Results

	Count based model			Mean-based Model		
	B	$\beta$	95% CI	B	$\beta$	95% CI
PosC1→ PosC2	0.411	0.478 ***	[.432, .525]	0.421	0.487 ***	[.440, .533]
PosC1→NegC2	-0.029	-0.053 *	[-.103, -.002]	-0.049	-0.041	[-.090, .008]
PosC1 →Dep2	-0.010	-0.033	[-.081, .015]	-0.003	-0.002	[-.051, .046]
PosC1→SuicId2	-0.008	-0.098 ***	[-.146, -.050]	-0.016	-0.049	[-.099, .000]
PosC1→EmoR2	0.028	0.085 ***	[.040, .130]	0.033	0.024	[-.022, .070]
PosC1→Estm2	0.025	0.077 ***	[.036, .119]	0.047	0.035	[-.007, .077]
PosC1→AA2	0.387	0.068 **	[.024, .112]	0.700	0.029	[-.015, .074]
NegC1→ PosC2	0.035	0.025	[-.035, .084]	0.030	0.046	[-.017, .109]
NegC1→ NegC2	0.389	0.414 ***	[.359, .469]	0.407	0.445 ***	[.390, .500]
NegC1→ Dep2	0.039	0.079 **	[.024, .133]	0.103	0.109 ***	[.050, .167]
NegC1→SuicId2	0.001	0.006	[-.049, .061]	0.001	0.005	[-.054, .065]
NegC1→ EmoR2	-0.045	-0.082 **	[-.133, -.030]	-0.086	-0.081 **	[-.136, -.025]
NegC1→ Estm2	-0.008	-0.014	[-.061, .033]	-0.051	-0.050	[-.100, .001]
NegC1→ AA2	-0.122	-0.013	[-.062, .036]	-0.024	-0.001	[-.055, .052]
Dep1→ PosC2	-0.025	0.009	[-.067, .084]	0.035	0.053	[-.022, .128]
Dep1 → NegC2	0.137	0.075 *	[.002, .148]	0.082	0.089 *	[.019, .159]
Dep1→ Dep2	0.384	0.401 ***	[.334, .467]	0.372	0.388 ***	[.320, .456]
Dep1 → SuicId2	0.049	0.192 ***	[.123, .262]	0.049	0.196 ***	[.125, .267]
Dep1 → EmoR2	-0.055	-0.052	[-.117, .013]	-0.052	-0.048	[-.114, .018]
Dep1 → Estm2	-0.047	-0.045	[-.105, .014]	-0.039	-0.037	[-.098, .023]
Dep1 → AA2	0.007	0.000	[-.062, .063]	-0.031	0.002	[-.066, .062]
SuicId1→ PosC2	0.027	0.003	[-.052, .058]	0.008	0.003	[-.051, .057]
SuicId1→ NegC2	-0.207	-0.032	[-.086, .022]	-0.120	-0.037	[-.087, .014]
SuicId1→ Dep2	0.118	0.035	[-.016, .085]	0.099	0.029	[-.022, .080]
SuicId1→ SuicId2	0.420	0.467 ***	[.420, .514]	0.420	0.468 ***	[.421, .515]
SuicId1→ EmoR2	0.160	0.042	[-.006, .090]	0.176	0.046	[-.002, .094]
SuicId1→ Estm2	-0.022	-0.006	[-.050, .038]	-0.014	-0.004	[-.048, .040]
SuicId1→ AA2	-1.140	-0.017	[-.063, .029]	-1.224	-0.019	[-.065, .028]
EmoR1→ PosC2	0.212	0.085 **	[.020, .150]	0.071	0.121 ***	[.057, .185]
EmoR1→ NegC2	-0.030	-0.019	[-.082, .045]	-0.029	-0.035	[-.096, .025]
EmoR1→ Dep2	-0.040	-0.048	[-.107, .012]	-0.033	-0.039	[-.100, .021]
EmoR1→ SuicId2	0.002	0.110	[-.050, .071]	0.002	0.011	[-.050, .072]
EmoR1 → EmoR2	0.503	0.530 ***	[.478, .582]	0.500	0.528 ***	[.475, .580]
EmoR1 → Estm2	0.056	0.061 *	[.009, .112]	0.050	0.054 *	[.002, .106]
EmoR1→ AA2	0.304	0.018	[-.036, .073]	0.338	0.021	[-.034, .076]
Estm1→ PosC2	-0.037	-0.014	[-.085, .057]	0.033	0.053	[-.019, .124]

Estm1 → NegC2	-0.256	-0.149 ***	[-.218, -.080]	-0.136	-0.157 ***	[-.223, -.090]
Estm1 → Dep2	-0.151	-0.168 ***	[-.232, -.103]	-0.149	-0.165 ***	[-.232, -.099]
Estm1 → SuicId2	-0.006	-0.027	[-.093, .038]	-0.006	-0.026	[-.094, .042]
Estm1 → EmoR2	0.108	0.107 **	[.045, .168]	0.113	0.112 **	[.049, .175]
Estm1 → Estm2	0.639	0.651 ***	[.601, .701]	0.632	0.643 ***	[.591, .695]
Estm1 → AA2	0.216	0.012	[-.047, .071]	0.286	0.016	[-.045, .077]
AA1 → PosC2	0.003	0.020	[-.032, .071]	0.002	0.039	[-.011, .090]
AA1 → NegC2	-0.005	-0.046	[-.096, .004]	-0.003	-0.054 *	[-.101, -.007]
AA1 → Dep2	-0.001	-0.024	[-.071, .024]	-0.001	-0.021	[-.068, .027]
AA1 → SuicId2	0.000	-0.022	[.070, .026]	0.000	-0.024	[.072, .024]
AA1 → EmoR2	0.001	0.019	[-.026, .063]	0.001	0.020	[-.025, .065]
AA1 → Estm2	0.002	0.036	[-.005, .077]	0.002	0.033	[-.007, .074]
AA1 → AA2	0.776	0.716 ***	[.685, .748]	0.778	0.719 ***	[.687, .751]

*Note.*  $\beta$  = standardized beta weights (effect size); B = unstandardized beta weights; CI = standardized confidence intervals. Numbers 1 and 2 indicate Time 1 and Time 2, respectively. PosC= Positive Coping, NegC= Negative coping, Dep= Depressive symptoms, SuicId= Suicide Ideation, EmoR= Emotion Regulation, Estm=Self-esteem, AA= Academic Achievement. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . Results for covariates can be obtained from authors.

The following significant results for the paths related to coping were consistent across both the count-based model and the means-based model (See Figure 1 and 2 as well as Table 3 for specific path results (e.g., for effect sizes see  $\beta$ ), results among adjustment indicators). There was a bidirectional association between the use of negative coping strategies and depressive symptoms. Specifically, using more (as measured by a count and a mean) negative coping strategies at Time 1 was associated with higher depressive symptoms at Time 2, and depressive symptoms at Time 1 were positively associated with more engagement in negative coping strategies at Time 2. There also was a unidirectional association found between the use of negative coping and emotion regulation; specifically, the greater use of less negative coping strategies (as measured by a count and a mean) at Time 1 was associated with worse emotion regulation at Time 2. See Table 3 for non-significant results and results between adjustment indicators.

Critically, some results were not consistent among the two models. For the count-based model, using a greater number of positive coping strategies at Time 1 was associated with less suicide ideation, engagement in fewer negative coping strategies, higher self-esteem, as well as higher academic achievement one year later. There was also a bidirectional association between the number of positive coping strategies used and emotion regulation. Using a greater number of positive coping strategies at Time 1 was associated with better emotion regulation at Time 2, and better emotion regulation at Time 1 was associated with use of a greater number of positive coping strategies at Time 2.

For the means-based analysis, in addition to the overlapping findings among both models, there also was a unidirectional association found between positive coping and



emotion regulation, such that better emotion regulation at Time 1 was associated with more positive coping (means-based) at Time 2. Further, there was a unidirectional association between academic achievement and negative coping. Specifically, higher academic achievement at Time 1 was associated with less negative coping (means-based) at Time 2.

We assessed whether stress was a significant moderator of the pattern of results in both the count-based and means-based models. Stress was categorized into two equal percentiles (50% each) encompassing higher versus lower daily stress. To examine whether stress was a significant moderator, we constrained each cross-lag path to be equal across the two levels of stress and compared that model to an unconstrained model where the paths were left free to vary. A non-significant Chi-Square Difference Test would indicate no difference in fit between the constrained and unconstrained models, suggesting that stress was not a significant moderator of the pattern of effects. The Chi-Square Difference Test of Relative Fit was not significant for either the count model,  $\chi^2_{\text{diff}}(42) = 45.516, p = .292$ , or the means-based model  $\chi^2_{\text{diff}}(42) = 42.727, p = .439$ , indicating that the pattern of associations for both models was not different between people with lower stress compared to people with higher stress. We also assessed whether stress might be a significant moderator if we only included individuals who scored at the more extreme ends of stress (bottom 33% vs top 33%). Consistent with the previous result, the Chi-Square Difference Test of Relative Fit was not significant for either the count-based model,  $\chi^2_{\text{diff}}(42) = 25.439, p = .980$  or for the means-based model  $\chi^2_{\text{diff}}(42) = 27.275, p = .961$ . Overall, these results reveal that stress does not appear to be a moderator of the pattern of results between coping and adjustment.

## Discussion

A large volume of research has been conducted on coping, stress, and adjustment (Frydenberg, 2014) – yet the number of coping strategies that individuals use over time has received little attention. In line with the transactional theory of coping, coping flexibility is an important way of studying coping that accounts for an individual's ability to adjust and change coping styles in response to different internal and external demands (Lazarus & Folkman, 1987). Importantly, the availability of numerous coping strategies may be an important precursor to coping flexibility, given that flexibility may only be obtained if an individual is able to access and use different coping strategies (Bonanno & Burton, 2013). Studies that have investigated the use of coping strategies, however, typically compute a means-based analysis - an approach that does not allow for differentiation between individuals who use a lot of strategies infrequently and individuals who use only one or two strategies a lot. In order to address this limitation, the current study created a count-based measure of coping, whereby the number of strategies that an individual uses was counted without attention to how frequently they use them.

The aim of the present study was to investigate the relationship between a count-based approach to coping and adjustment. Critically, using a greater number of positive coping strategies was associated with better adjustment (e.g., less suicide ideation, using a fewer number of negative coping strategies, higher self-esteem and better academic achievement) over time. Of note, this finding was not consistent across the means-based analysis – engagement in more frequent positive coping strategies did not predict better adjustment over time. This is an important finding as it suggests that encouraging

students to use a greater number of positive coping strategies can both help to decrease negative adjustment and aid in promoting positive adjustment. Further, using a greater number of negative coping strategies was associated with poorer emotion regulation. Perhaps when individuals rely on a greater number of negative coping strategies they may have ineffective coping strategies for dealing with stress and thus have a hard time regulating their emotions when they are upset.

There also was a reciprocal relationship between using a greater number of negative coping strategies and more depressive symptoms. This finding is in line with the research suggesting that individuals with depression may have a more negative attribution style (i.e., a stable and internalized attitude that unpleasant circumstances will persist) and thus may be more likely to use strategies such as giving up. Additionally, using these types of negative coping strategies predicted more depressive symptoms over time. In line with the broaden-and-build theory, a bidirectional association also was found between emotion regulation and the number of positive coping strategies used when stressed. Our results suggest that emotion regulation may be a distinct way to help broaden an individual's positive coping resources when stressed, and in turn, individuals who use a greater amount of positive coping strategies when stressed may be better able to regulate their emotions in a more positive manner.

Another goal of the current study was to compare a mean-based approach to a count-based approach. Overall, it appears that the count-based approach offers similar findings to the means-based approach in terms of negative coping. This finding may suggest that when individuals use negative coping strategies to any degree (e.g., at a high frequency or count), they may have more trouble dealing with stress and thus have poorer

adjustment outcomes.

Notably, although both models explain similar amounts of variance in the outcome variables, they convey some different information nonetheless. The count-based approach, however, provided additional findings that suggest that using a greater number of positive coping strategies may be distinctly important for promoting positive adjustment as well as decreasing negative adjustment. Further research is needed to investigate why using a greater number of positive coping strategies may be adaptive. For instance, it could be that having more resources available or alternative ways to deal with stress allows individuals to deal with problems more effectively. It also is important for future research to identify other factors that lead some individuals to use more coping strategies than their peers (e.g., access to role models, higher executive functioning and planning skills, openness to experience, etc.). In addition, future research would benefit from identifying if there are differences between the number of strategies individuals think they might use in a situation (e.g., using hypothetical scenarios) compared to the number of strategies that they actually use when faced with stress. This would help identify whether individuals have certain strategies *available* but do not use them. Studies addressing these issues could help inform interventions aimed at teaching individuals how to use a variety of positive coping strategies as a way to promote better adjustment.

The current study also found no evidence that stress was a significant moderator of the relation between coping strategies and adjustment. Thus, even if an individual does not have a lot of stress in their life, it is still beneficial to have a greater number of positive coping strategies available to deal with problems effectively. Although we were expecting that using a greater number of coping strategies would be most beneficial for

individuals under a lot of stress, there are two caveats that may have limited this finding. First, the measure of stress comes from a self-report questionnaire of daily hassles. This measure is targeting more minor daily stressors, compared to major or severe stressors. It is worth noting, however, that research findings emphasize the importance of cumulative daily stress/hassles in the role of negative adjustment (Parrish, Cohen, & Laurenceau, 2011; Vinkers et al., 2014). Nonetheless, future research may benefit from investigating if the relationship between the number of coping strategies used and adjustment is more prominent among individuals facing major stressors. Second, the Brief Cope identifies what strategies individuals use when under *a lot of stress*. Thus, this measure may limit our ability to find an effect of stress as a moderator as students responded to the questions while thinking about stressful situations.

This study has important strengths, including a large sample, multiple indicators of adjustment, as well as being the first longitudinal study to offer a comparison between a means-based approach and a count-based approach to coping and adjustment. At the same time, the study has several limitations. First, the majority of participants were born in Canada and of Caucasian ethnicity; thus the scope and generalizability of this study across culture and geographical regions is limited. Second, our sample was a representative group of students from our university (e.g., they were enrolled in various disciplines), but generalizability to college students or non-students may be limited. It is unlikely, however, that the pattern of results found in this study is unique to university students as innovative ways to cope with stress and foster positive adjustment would likely be relevant to all individuals. Future research should address this idea by investigating whether using a higher number of positive coping strategies is a beneficial

way to deal with stress among other populations (e.g., clinical or occupational setting). Second, some of the coefficients in this study were considered small in magnitude. However, small effect sizes are common in cross-lag models when accounting for stability, correlations within a wave, and other predictors in the model (Adachi & Willoughby, 2014). Thus, in this case small effects would be expected. Another limitation of the current study is that coping was assessed via retrospective reports without indication of the different context that each coping strategy was used in. Thus, It would be valuable for future research to assess these constructs in real time through techniques such as ecological moment sampling (e.g., daily diaries).

### **Conclusion**

In conclusion, the present study helps to elucidate the associations between adjustment and two methods of investigating coping over time. Understanding coping behaviours over time can help researchers and practitioners implement programs to improve coping efficiency and adjustment. Studies that investigate only a means-based approach are unable to differentiate between individuals who use one or two strategies a lot as opposed to those who use multiple strategies infrequently. Thus, a count-based method offers an innovative and practical way to implement interventions that could focus on teaching individuals to use a larger variety of coping strategies. Indeed, using a greater number of positive coping strategies is associated with less use of negative coping strategies, less suicide ideation, as well as higher self-esteem, emotion regulation, and academic achievement over time. Further, decreasing the ways in which individuals use negative coping strategies (average and count), can help to decrease depressive symptoms as well as increase emotion regulation over time. Given that university students report

alarming rates of depressive symptoms and suicide ideation (American College Health Association, 2015), there is a strong need for research investigating ways to decrease mental health problems as well as promote more positive adjustment.

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Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1.PosC Ctl	-																					
2.PosC Ctl2	.498**	-																				
3.NegC Ctl1	.157**	.076*	-																			
4.NegC Ctl2	-.021	.099**	.511**	-																		
5.PosC Mn1	.769**	.366**	.059*	.050	-																	
6.PosC Mn2	.451**	.706**	.021	.014	.522**	-																
7.NegC Mn1	.059*	-.004	.832**	.485**	.073 *	.024	-															
8.NegC Mn2	-.094**	-.005	.465**	.834**	-.066 *	.006	.583**	-														
9.EmoR1	.031	.041	-.368**	-.261**	.063 *	.085**	-.439**	-.337**	-													
10.EmoR2	.099**	.086**	-.327**	-.403**	.075 *	.101**	-.382**	-.490**	.652**	-												
11.SE1	.117**	.055	-.438**	-.375**	.231**	.153**	-.504**	-.448**	.524**	.455**	-											
12.SE2	.161**	.145**	-.337**	-.501**	.192**	.210**	-.422**	-.598**	.432**	.566**	.730**	-										
13.AA1	.047	.060*	-.162**	-.142**	.039	.070*	-.177**	-.165**	.075*	.085**	.083**	.108**	-									
14.AA2	.092**	.100**	-.132**	-.175**	.071**	.112**	-.142**	-.174**	.058	.103**	.087**	.149**	.700**	-								
15.Dep1	-.064*	-.028	.437**	.341**	-.099**	-.050	.528**	.427**	-.597**	-.474**	-.665**	-.527**	-.130**	-.104**	-							
16.Dep2	-.071*	-.091**	.351**	.502**	-.077**	-.115**	.427**	.619**	-.414**	-.576**	-.512**	-.713**	-.111**	-.138**	.594**	-						
17.Suicid1	-.040	-.028	.205**	.147**	.057	-.043	.286**	.198**	-.276**	-.180**	-.373**	-.291**	-.037**	-.058	.401**	.290**	-					
18.Suicid2	-.114**	-.145**	.183**	.278**	-.114**	-.148**	.253**	.357**	-.219**	-.260**	-.328**	-.398**	-.085**	-.112**	.383**	.434**	.560**	-				
19.Stress	.013	.088**	.304**	.262**	-.045	.038	.356**	.279**	-.539**	-.423**	-.478**	-.346**	-.030	-.004	.550**	.360**	.180**	.116**	-			
20.Sex	.095**	.176**	.007	-.077**	.103**	.187**	-.004	-.064**	-.266**	-.201**	-.116**	-.057	.071**	.128**	.189**	.093**	-.003	-.098**	.334**	-		
21. P Educ	.007	.004	-.071*	-.032	.011	-.021	-.057	-.039	.094**	.066*	.095**	.079**	.091**	.069*	-.133**	-.093**	-.070*	-.064*	-.102**	-.138**	-	

Note. Numbers 1 and 2 indicate Time 1 and Time 2 respectively. PosC = Positive Coping, Ct= Count, NegC= Negative Coping, Mn=Mean, EmoR= Emotion Regulation, SE= Self-esteem, AA= Academic Achievement, Dep= Depressive Symptoms, Suicid= Suicide Ideation, P Educ= Parental education. Results for the covariates can be obtained from the authors.