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A longitudinal study investigating bidirectionality among nonsuicidal self-injury, self-criticism, and parental criticism

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ABSTRACT

Previous research has indicated that both self-criticism and parental criticism may be associated with engagement in nonsuicidal self-injury (NSSI). However, much less is known about the temporal sequencing of these relationships (i.e., do self-criticism and parental criticism predict NSSI across time, or does NSSI predict self-criticism and parental criticism across time?). Undergraduate students (N = 1132; 70.5% female; M_{age} = 19.06) from a midsized Canadian university completed measures of NSSI, self-criticism, maternal criticism, and paternal criticism at two time points (one year apart). An autoregressive cross-lagged path analysis revealed that there was a significant unidirectional relationship between NSSI and self-criticism, such that greater NSSI frequency predicted greater self-criticism across time, but self-criticism did not predict greater NSSI frequency across time. In addition, both maternal and paternal criticism were not significantly associated with NSSI frequency when examining either direction of effects. Overall, our results challenge the notion that self-criticism is a risk factor for NSSI engagement, and instead, suggest that it may be a consequence of NSSI engagement. Intervention programs may benefit from recognizing that individuals who engage in NSSI may subsequently criticize themselves.

1. Introduction

Nonsuicidal self-injury (NSSI) refers to the direct and deliberate destruction of bodily tissue (e.g., cutting, burning, and scratching skin) in the absence of suicidal intent (American Psychiatric Association, 2013). Prevalence rates for NSSI vary depending on the population under investigation; however, research has revealed that these problematic behaviors occur frequently among both clinical (e.g., Kaess et al., 2013) and community samples (e.g., Baetens et al., 2015; Yates et al., 2008). Indeed, as many as 15–20% of students report engaging in NSSI at some point during their university years (Hamza and Willoughby, 2014; Swannell et al., 2014; Whitlock et al., 2006; see also meta review by Muehlenkamp et al., 2012 for prevalence rates from predominantly non-university adolescent samples), while almost 40% of individuals who engage in NSSI indicate that the onset of these behaviors is during their time in university (Heath et al., 2008; see Gandhi et al., 2018 for a discussion about onset during early adolescence). Furthermore, as many as 35–72% of current university students with a history of NSSI report engaging in this form of self-harm within the past year (Glenn and Klonsky, 2011; Heath et al., 2009; Klonsky and Olino, 2008; Wilcox et al., 2012). Given these statistics, NSSI has gained the attention of numerous researchers who have identified several of its psychosocial correlates. This study aims to clarify the nature of the relationship between NSSI and two of these correlates, namely, self-criticism and parental criticism.

Several cross-sectional studies have indicated that self-criticism is positively associated with NSSI engagement (Gilbert et al., 2010; Glassman et al., 2007; Xavier et al., 2016). Moreover, in a recent meta-analysis, Zelkowitz and Cole (2018) found that this relationship existed across various samples and various measures of self-criticism and NSSI. Researchers also have shown that individuals who engage in NSSI report significantly greater self-criticism than individuals who engage in other, less direct forms of self-harm (e.g., substance abuse; St. Germain and Hooley, 2012). Similarly, other cross-sectional research has supported the possibility of a relationship between parental criticism and NSSI by showing that individuals with a history of NSSI engagement report significantly greater parental criticism than those without a history of NSSI engagement (Ammerman and Brown, 2018; Hoff and Muehlenkamp, 2009). Additionally, Wedig and Nock (2007) found that higher levels of parental criticism (i.e., measured as negative valence, poorer parent-child relationship, and higher number of critical comments) were associated with greater NSSI engagement among adolescents. One potential explanation for the relationships between NSSI and both self-criticism and parental criticism comes from Nock's

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(2010, 2009) Self-Punishment Hypothesis, which suggests that individuals who are self-critical or who experience criticism from others may use NSSI as a means of punishing themselves for perceived imperfections or wrongdoings. Similarly, a recent theoretical model by Hooley and Franklin (2018) highlighted the role of self-criticism in overcoming the barriers typically associated with inflicting pain upon oneself. This model goes further to suggest that self-criticism may develop from experiences of parental criticism, abuse, and maltreatment. Together, these theories suggest that the direction of effects among these variables is from self-criticism and parental criticism to greater frequency of NSSI over time. However, due to the cross-sectional nature of the aforementioned studies, researchers have been unable to determine the temporal order of these relationships.

Fortunately, some researchers have used longitudinal data to examine the paths from self-criticism and parental criticism to NSSI. In terms of self-criticism, You et al. (2015) discovered that an initial assessment of this variable did not predict NSSI frequency one year later. Likewise, Wang et al. (2017) observed a similar effect when using a latent class growth analysis to identify different groups with varying levels of NSSI engagement throughout adolescence. Wang et al. found that self-criticism scores at the beginning of adolescence did not differentiate between those who later engaged in NSSI compared to those who did not. However, parental criticism scores were significantly higher among those who later engaged in NSSI. Similarly, Yates et al. (2008) found that higher parental criticism scores at the beginning of adolescence were associated with a greater likelihood of NSSI engagement towards the end of adolescence (see also You and Leung, 2012). Taken together, results from these studies seem to indicate that parental criticism, but not self-criticism, may be predictive of NSSI across time. It should be noted that in all of these longitudinal studies, however, the paths from NSSI to self-criticism and parental criticism were not investigated. Moreover, data were obtained from adolescents in each study, making it unclear as to whether these results will generalize to other age groups.

To the best of our knowledge, only one study to date (i.e., You et al., 2017) has examined whether NSSI and self-criticism are bidirectionally related (i.e., does self-criticism predict NSSI across time, and/or does NSSI predict self-criticism across time). You et al. (2017) also examined whether there was a bidirectional relationship between NSSI and adolescents' perceived parental control; however, the measure included other types of parental control beyond just criticism (e.g., "I grab or handle my child roughly"; see the Hostile/Coercive subscale of the Parent Behavior Inventory in Lovejoy et al., 1999). Results from You et al.'s (2017) three-wave longitudinal study indicated that greater frequencies of NSSI were predictive of greater self-criticism and greater parental control over time across all three time points. Moreover, although self-criticism was not a significant predictor of NSSI across time, greater parental control at wave 1 was associated with greater frequencies of NSSI at wave 2 (note: this effect was not found from waves 2 to 3). While self-criticism and certain parenting behaviours (e.g., parental criticism or parental control) are often considered to be risk factors for NSSI engagement, these results indicate that they may in fact be consequences of NSSI engagement. Indeed, engagement in NSSI may lead an individual to develop self-critical thoughts or experience criticism from their parents as a result of engaging in a harmful and often socially unaccepted behavior (see Heath et al., 2011).

While You et al.'s (2017) findings are informative, it is not clear if they are specific to parental control, or if the same pattern of results would be found for parental criticism. While both have been shown to be related to NSSI (e.g., Baetens et al., 2014; Wang et al., 2017), bidirectional relationships with NSSI have only been examined for parental control. In addition, You et al. (2017) did not control for potential "third variables", such as age, sex, and SES (e.g., parental education). Moreover, You et al. (2017) collected their data from a sample of Chinese adolescents, making it unclear as to whether their results would generalize to Western samples. Similarly, of the longitudinal studies reviewed, only one (i.e., Yates et al., 2008) obtained data from a Western sample, although self-criticism was not assessed in this study. Parenting styles found within Eastern and Western cultures may differ such that Eastern parents may consider it more acceptable to criticize their children (Chao and Tseng, 2002). Moreover, previous studies have indicated that the quality of parent-child relationships is more strongly associated with NSSI among Asians than Caucasians (Turner et al., 2015). It is therefore possible that the relationship between parental criticism and NSSI will be less robust in Western samples.

The present 2-wave longitudinal study represents the first test of the bidirectional relationships between self-criticism, parental criticism and NSSI among a Western sample. This study also aims to extend previous research on this topic by examining these relationships among university students. Previous longitudinal studies of these relationships have focused solely on adolescents, despite prevalence rates of NSSI being quite high among university students (see Heath et al., 2008). University may be a particularly stressful time in the lives of many students (Beiter et al., 2015) and thus it is crucial to examine these longitudinal relationships among this population.

Overall, we had two research goals. The first was to examine whether there was a bidirectional relationship between self-criticism and NSSI. Likewise, our second research goal was to determine whether there was a bidirectional relationship between parental criticism and NSSI. Given that there is some evidence to suggest that maternal parenting behaviors may be more strongly related to NSSI engagement than paternal parenting behaviours (Kaess et al., 2013; Tschan et al., 2015), we examined parental criticism separately for maternal and paternal criticism. We also controlled for potential "third variables (i.e., age, sex, whether participants were born in Canada or not, and parental education). Due to the limitations of previous studies as outlined above, our hypotheses were exploratory in nature.

2. Method

2.1. Participants

The participants were 1132 undergraduate students (70.5% female) enrolled at a mid-sized university in southern Ontario, Canada, who were surveyed annually for two consecutive years. At Time 1, all participants were in their first year of university (M_{age} = 19.06, SD = 1.05). The sample was composed of primarily domestic-Canadian students (87.5%). Within this domestic-Canadian group, participants also indicated whether their family belonged to another culture or ethnic background – the most common ethnic groups identified were British (17%), Italian (15%), French (8%), and German (8%), consistent with the broader demographics for the region (Statistics Canada, 2006). The remaining participants were international students (11.8%) who were predominantly from Asia (4%), the European Union (2%), Africa (1%), and the Caribbean (1%). Parental education levels (used as a proxy for socioeconomic status) reported by participants indicated that mean levels of education for mothers and fathers fell between "some college, university, or apprenticeship program" and "completed a college/apprenticeship and/or technical diploma". The retention rate from Time 1 to Time 2 was 72% (if including only students who were still registered at the university at Time 2, the retention rate was 80%).

2.2. Procedure

First-year university students from a broad variety of academic disciplines were invited to complete a survey examining factors related to stress, coping, and adjustment to university by way of posters, classroom announcements, website postings, and visits to on-campus student residences. The sample was generally representative of the university population (i.e., in proportion of males and females, proportion of students in the various academic departments, etc.). The participants were given course credit or monetary compensation for

their participation at Time 1 ($10), and monetary compensation for their participation at Time 2 ($20). At Time 2, all students who participated in the first assessment were invited to participate again (even if they were no longer registered at the university) by way of e-mails, posters, and classroom announcements. At both assessments, surveys were completed during the winter term (end of January to March). Trained research assistants administered the survey in person to groups of students. The study was approved by the University Ethics Board prior to survey administration at both assessments and all participants provided informed active consent prior to participation. Although asking young adults about self-injury does not have iatrogenic effects (Reynolds et al., 2006) or lead to increased distress (Gould et al., 2005), to ensure the safety of our participants a full debriefing was provided at the end of the survey and a list was given of mental health resources and researcher contact information.

2.3. Missing data analysis

Missing data occurred within each assessment time point because some students did not finish the entire questionnaire (average missing data = 3.41% at Time 1, 3.45% at Time 2), and because some students did not complete both waves of the survey (26.9%). A missing data analysis revealed that the missing data were not dependent on the values of the study measures (*ps* > 0.05). Missing data were estimated for all variables using the full information maximum likelihood (FIML) estimation method. FIML retains cases that are missing survey waves, thus avoiding the biased parameter estimates that can occur with pairwise or listwise deletion (Schafer and Graham, 2002).

2.4. Measures

2.4.1. Demographics

Age, sex, whether the participant was born in Canada or not, and parental education (one item per parent, using a scale from 1 = *did not finish high school* to 6 = *professional degree*, which was averaged for participants reporting on both parents) were assessed at Time 1 and used as covariates in the analyses.

2.4.2. Nonsuicidal self-injury (NSSI)

The Inventory of Statements About Self-injury (ISAS; Klonsky and Glenn, 2009) was used at both time points to assess participants' frequency of NSSI engagement. A list of seven self-injurious behaviors that involve tissue damage (i.e., cutting, burning, head banging, biting, severe scratching to the point of bleeding, preventing wounds from healing, and rubbing skin against rough surfaces) was provided. Participants were asked to indicate how many times they had intentionally engaged in each of the behaviors listed, without lethal intent, in their lifetime. A normalized measure of NSSI frequency was created by collapsing participants' responses across the seven behaviors into seven categories: 0 = 0 incidents, 1 = 1 incident, 2 = 2–4 incidents, 3 = 5–10 incidents, 4 = 11–50 incidents, 5 = 51–100 incidents, 6 = more than 100 incidents. The ISAS has been shown to have good reliability and validity in previous research (Klonsky and Glenn, 2009).

2.4.3. Self-criticism

The 2-item Self-Blame subscale of the Brief COPE (B-COPE; Carver, 1997) was used to assess self-criticism at both time points. Participants responded to both items (i.e., "I blame myself for things that have happened" and "I criticize myself") on a 4-point Likert scale ranging from 1 = *I usually don't do this at all* to 4 = *I usually do this a lot*. This subscale of the B-COPE has demonstrated good reliability and validity in previous research (Buckley et al., 2015; Carver, 1997). Correlations between the two items in the present study were 0.60 and 0.65 for Times 1 and 2, respectively. Higher scores indicated higher levels of self-criticism.

2.4.4. Maternal and paternal criticism

At both time points, maternal and paternal criticism were each assessed with 3 items from the Psychological Control Scale-Youth Self-Report (PCS-YSR; Barber, 1996). Participants were asked to respond to each item (i.e., "my mother/father is a person who blames me for other family members' problems", "my mother/father is a person who brings up my past mistakes when she/he criticizes me", and "my mother/father is a person who is always trying to change how I feel or think about things") separately for their mother and father on a 3-point Likert scale ranging from 1 = *not at all like her/him* to 3 = *a lot like her/him*. The PCS-YSR has good reliability and validity (Barber, 1996; Bean and Northrup, 2009). In the present study, Cronbach's alphas were 0.75 and 0.73 for the maternal criticism items (Times 1 and 2, respectively), and 0.80 and 0.75 for the paternal criticism items (Times 1 and 2, respectively). Higher scores were indicative of higher maternal and paternal criticism.

3. Results

3.1. Preliminary analyses

Two separate MANOVAs were conducted in order to determine whether there were sex differences among the study variables measured at both waves. A significant main effect of sex on NSSI was found such that at both waves, males engaged in more NSSI than females (*ps* < 0.01). Results of the MANOVAs also indicated that at Times 1 and 2, females reported significantly more self-criticism than males (*ps* < 0.01). Males also reported greater paternal criticism than females at Time 2 (*p* = 0.040).

3.2. Primary analyses

The means and standard deviations for all study variables can be found in Table 1. Acceptable levels of skewness and kurtosis were demonstrated by all measures. The percentages of participants who reported NSSI use were 38.96% and 43.99% for Times 1 and 2, respectively. Thus, about 5% of participants endorsed NSSI for the first time at Time 2. These rates are similar to other studies using university populations (e.g., Gratz et al., 2002).

The primary statistical analyses were carried out using an auto-regressive cross-lagged path analysis in MPlus 7. The model was comprised of 4 variables measured across 2 years (i.e., NSSI, self-criticism, maternal criticism, and paternal criticism; see Fig. 1), as well as the covariates measured at Time 1 (i.e., age, sex, parental education, and whether participants were born in Canada or not). Across the time periods, we included the following paths: cross-lagged paths among all 4 key study variables, autoregressive paths (i.e., within each variable) for the 4 key study variables, and concurrent associations among the 4 key study variables within each wave. Correlations were specified between the covariates and each variable at Time 1 while paths were estimated between the covariates and each variable at Time 2. Any significant paths, therefore, would be accounting for the correlations

Table 1
Means and standard deviations of all study variables.

Variables	Time 1 *M*(*SD*)	Time 2 *M*(*SD*)
NSSI	1.177(1.790)	1.439(1.948)
Self-criticism	2.202(0.890)	2.165(0.880)
Maternal criticism	1.435(0.546)	1.392(0.512)
Paternal criticism	1.418(0.571)	1.358(0.515)
Age	19.061(0.931)	
Sex (%)	70.5% Female	
Born in Canada	1.118(0.323)	
Parental education	3.655(1.290)	

Note. NSSI = nonsuicidal self-injury.

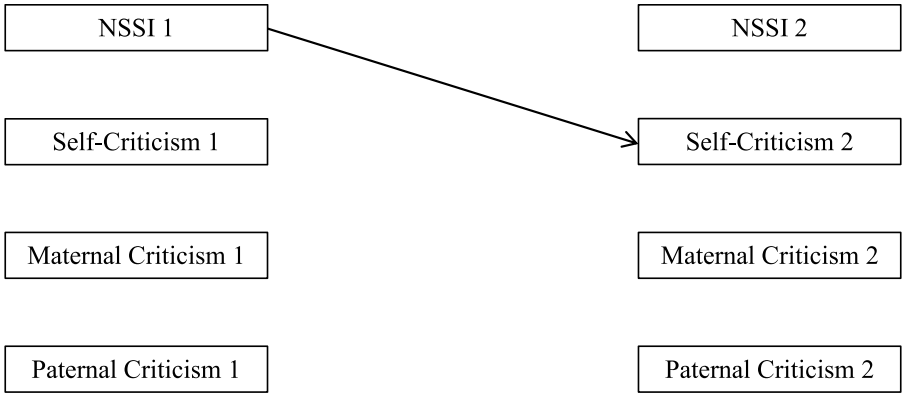

Fig. 1. Significant cross-lagged paths among all key study variables. NSSI = nonsuicidal self-injury. Numbers 1 and 2 indicate Times 1 and 2, respectively. Results for the covariates can be obtained from the first author.

among the variables within a wave, and controlling for previous scores on the outcome variables, covariates, as well as the other predictors in the model.

The model was saturated, thus, global fit statistics were not available. Table 2 shows beta weights for all paths in the model for the four key study variables. The significant paths are depicted in Fig. 1. Results indicated that there was a significant unidirectional relationship between NSSI and self-criticism, such that greater frequencies of NSSI predicted greater self-criticism across time, but self-criticism was not predictive of NSSI frequency across time. In terms of parental criticism, both maternal and paternal criticism were not significantly related to frequency of NSSI when examining both directions of effects for each relationship.

4. Discussion

The current longitudinal study sought to investigate the direction of the relationships between NSSI, self-criticism, and parental criticism among a sample of university students from a Western culture. Although You et al. (2017) examined similar relationships among Chinese adolescents, it was unclear as to whether their results would generalize to other cultures, age groups, and a measure of parental criticism (rather than parental control). Moreover, previous research had not yet examined the relationships between NSSI and parental criticism separately for maternal and paternal criticism. Thus, the present longitudinal study was conducted to address these important gaps in the literature.

Table 2
Autoregressive cross-lagged model results.

	β	95% CI
Self-criticism 1 → self-criticism 2	0.494***	[0.439, 0.548]
Self-criticism 1 → NSSI 2	0.019	[−0.007, 0.046]
Self-criticism 1 → maternal criticism 2	0.044	[−0.018, 0.107]
Self-criticism 1 → paternal criticism 2	0.041	[−0.022, 0.104]
Maternal criticism 1 → maternal criticism 2	0.503***	[0.446, 0.560]
Maternal criticism 1 → NSSI 2	−0.002	[−0.031, 0.026]
Maternal criticism 1 → self-criticism 2	0.004	[−0.060, 0.068]
Maternal criticism 1 → paternal criticism 2	−0.020	[−0.085, 0.046]
Paternal criticism 1 → paternal criticism 2	0.541***	[0.481, 0.600]
Paternal criticism 1 → NSSI 2	0.012	[−0.017, 0.040]
Paternal criticism 1 → self-criticism 2	0.032	[−0.036, 0.100]
Paternal criticism 1 → maternal criticism 2	0.041	[−0.027, 0.110]
NSSI 1 → NSSI 2	0.896***	[0.884, 0.909]
NSSI 1 → self-criticism 2	0.085**	[0.026, 0.145]
NSSI 1 → maternal criticism 2	0.059	[0.000, 0.118]
NSSI 1 → paternal criticism 2	0.042	[−0.019, 0.102]

Note. β = standardized beta weights, CI = standardized confidence intervals. NSSI = nonsuicidal self-injury. Numbers 1 and 2 indicate Times 1 and 2, respectively.

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Our results indicated that there was a unidirectional positive relationship between NSSI and self-criticism, such that higher frequencies of NSSI were predictive of higher levels of self-criticism one year later. Of note, self-criticism was not predictive of NSSI frequency one year later. These findings are inconsistent with the notion that self-criticism is a risk factor for NSSI engagement, as suggested by both Nock's (2010, 2009) Self-Punishment Hypothesis and Hooley and Franklin's (2018) recent theoretical model of NSSI engagement. Instead, our results suggest that self-criticism may in fact be a consequence of NSSI engagement (note that Hooley and Franklin also suggest that NSSI may lead to increased self-criticism). Importantly, our findings also are in line with those of You et al. (2017) who also found support for this unidirectional relationship from NSSI to self-criticism (but not vice-versa). Other researchers that examined whether self-criticism predicted future NSSI engagement (but not if NSSI engagement predicted future self-criticism) similarly did not find support for this direction of effects (Wang et al., 2017; You et al., 2015). At the same time, whether self-criticism predicts NSSI may depend on whether we are assessing the onset or maintenance of NSSI engagement, along with whether we are assessing trait-like self-criticism or self-criticism in response to failure or stressors (see Hooley and Franklin, 2018). Future research should explore these possibilities.

When the results of previous longitudinal research are combined with our results, it appears that across various ages and cultures, more frequent NSSI engagement is predictive of higher levels of self-criticism over time. There are several possible explanations for why this relationship may exist. Perhaps the stigma associated with this form of self-harm (see Kulikowska and Pokorski, 2008) increases the likelihood that individuals who engage in it will become critical or ashamed of themselves. Moreover, some individuals may be unable to refrain from self-harming despite having the desire to stop. As such, engaging in NSSI may produce feelings of self-criticism for these individuals. Nevertheless, it would be beneficial for future research to investigate exactly why more frequent NSSI engagement is associated with higher levels of self-criticism over time.

Our results also revealed non-significant relationships between NSSI and both maternal and paternal criticism over time. The lack of significant relationships between these variables may be partially due to some participants living away from home during their time in university and thus, likely interacting with their parents less. As such, there may have been less potential for them to experience parental criticism and report it during the study. Interestingly, previous longitudinal studies on younger populations have found significant relationships between NSSI and parental criticism (e.g., Wang et al., 2017; Yates

et al., 2008; You and Leung, 2012; You et al., 2017). Furthermore, the majority of these previous studies were based on data collected from Chinese adolescents. Researchers have found stronger associations between parent-child relationship quality and NSSI among Asians compared to Caucasians (Turner et al., 2015). Moreover, it may be the case that Eastern parents consider it more acceptable to criticize their children than Western parents (Chao and Tseng, 2002). Thus, the relationship between parental criticism and NSSI found among Chinese adolescents may not always generalize to Western cultures. Our results appear to support this possibility.

Overall, the findings of this longitudinal study further contribute to our understanding of the relationships between self-criticism, parental criticism, and NSSI. There are multiple strengths of this study, including a large sample size, the inclusion of multiple covariates in our analyses, the use of a longitudinal design, the controlling of potential "third variables" (i.e., age, sex, whether participants were born in Canada or not, and parental education), and the use of separate maternal and paternal criticism measures (as opposed to grouping them into one measure of parental criticism). Nonetheless, the current study is not without limitations. First, the data was collected through the use of self-report questionnaires, and as such, participants' responses may have been affected by social desirability or personal biases. Moreover, our measures of maternal and paternal criticism likely captured participants' subjective perceptions of parental criticism, which may differ from the actual degree to which they have been criticized. Nevertheless, it is important to consider participants' perceptions as they may have the greater influence on behavior. Second, participants were recruited from an undergraduate student population at one university. Thus, it is unclear whether our results will generalize to other university populations or any other population, including clinical samples. Third, our measure of self-criticism was limited to only two items, which may have hampered our ability to fully measure all aspects of this construct. Fourth, it is quite possible that there are other unmeasured extraneous variables (e.g., childhood abuse, depression, self-compassion; see Hooley and Franklin, 2018; Xavier et al., 2016) that may play an important role in the relationships among self-criticism, parental criticism and NSSI. Finally, some of the standardized coefficients were small, however, this is normative for cross-lagged longitudinal models given that these models control for previous scores on each variable, covariates, and correlations among variables within each wave (Adachi and Willoughby, 2015). It should be noted that with the exception of You et al. (2017), the previously mentioned longitudinal studies on the relations between self-criticism, parental criticism, and NSSI did not use such conservative statistical models. This may help to further explain why we failed to find significant relationships that were found in these previous studies (e.g., Wang et al., 2017 found parental criticism was related to future NSSI engagement, but we did not find support for this relationship).

As previously noted, NSSI is prevalent among university students (see Hamza and Willoughby, 2014; Swannell et al., 2014; Whitlock et al., 2006). Thus, it is important to consider the potential risk factors and consequences of these problematic behaviors among this population. Our findings shed new light on the nature of the relationship between self-criticism and NSSI. While self-criticism is often believed to be a risk factor for NSSI engagement, our results suggest that it may in fact be a consequence of NSSI engagement. Importantly, these results have implications for prevention programs and health practitioners. One approach may be to teach individuals safer, more effective coping strategies that do not promote negative self-evaluations.

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