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# Project PAN: Relationship between physical health, psychiatric correlates, and engagement in non-suicidal self-injury

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**PROJECT PAN: RELATIONSHIP BETWEEN PHYSICAL HEALTH,  
PSYCHIATRIC CORRELATES, AND ENGAGEMENT IN NON-SUICIDAL  
SELF-INJURY**

by

Alexander Jaffe

A Thesis

Submitted to the  
Department of Psychology  
College of Science and Mathematics  
In partial fulfillment of the requirement  
For the degree of  
Master of Arts in Clinical Psychology  
at  
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Thesis Chair: Dr. Georita M. Frierson, Ph.D

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## **Dedications**

I would like to dedicate this manuscript to my ever supportive and loving father and mother.

## **Acknowledgments**

I would like to show my appreciation to my advisor / mentor, Dr. Georita M. Frierson, for her continued support and patience. In addition, I'd like to thank my committee members, Dr. Lisa Farkas and Dr. Dustin Fife, for their support and guidance throughout this process, as well as their ability to share their knowledge. I look forward to learning and working with all of you in the future.

## **Abstract**

Alexander Jaffe

PROJECT PAN: RELATIONSHIP BETWEEN PHYSICAL HEALTH, PSYCHIATRIC  
CORRELATES, AND ENGAGEMENT IN NON-SUICIDAL SELF-INJURY

2017-2018

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Master of Arts in Clinical Psychology

Background: There is an abundance of research on undergraduate students and mental health. The collegiate environment has been found to increase students' stress levels. Coping among this population is done in different ways. Non-Suicidal self-injury (NSSI), a negative coping mechanism, is an intentional act of harming oneself without suicidal intent. Cutting and burning are common ways that individuals self-injure. There's a paucity of literature on the examination as to how predictive a combination of physical and mental health is of engagement in NSSI. Methods: Undergraduates (n=281) completed a self-report questionnaire. Results: Two hierarchical logistic regressions yielded significant relationships between the mood variables (emotion regulation and affectivity) and engagement in NSSI (OR for emotion regulation = 1.02, OR for positive affect = 0.992, OR for negative affect = 1.05), and the regulation variables (emotion regulation and physical health) and engagement in NSSI (OR for physical health = 0.974, OR for emotion regulation = 1.03). Conclusions: The presence of mood disturbances is significantly predictive of engagement in NSSI, as is being less regulated. The mood variables are less predictive of engagement in NSSI than the regulation variables. Implications: The results allow for the potential implementation of a screener across college wellness centers and clinical offices to stop or prevent this type of behavior.

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# Chapter 1

## Introduction

### Background

As evidenced by the literature, there is an abundance of research on undergraduate students and their mental health (Whitlock, Eckenrode, & Silverman, 2006; Whitlock, Muehlenkamp, & Eckenrode, 2008; Xavier, Gouveia, & Cunha, 2016). One reason for this is due to the collegiate environment, which has previously been found to increase students' stress levels (Brougham et al., 2009). When undergraduate students experience these increased levels of stress, they cope with the stress in different ways. Some students increase engagement in positive coping styles; examples include exercise and talking with people (Stowell et al., 2001; Rutledge et al., 2016). Other students, however, partake in negative coping styles; drinking alcohol, smoking, and non-suicidal self-injury being examples (Hunter et al., 2016).

Negative coping styles are disconcerting because they can cause harm to the individual. Non-suicidal self-injury (NSSI), one way in which students negatively cope, is an intentional act of harming oneself without suicidal intent (Barnes, Eisenberg, & Resnick, 2010; Favazza, 1998; Muehlenkamp, 2006; Pattison & Kahan, 1983). Cutting, burning, hitting oneself, and severe scratching are common ways that individuals self-injure. In clinical samples, cutting is the most common method, whereas a combination of methods of self-injurious behavior have been analyzed in non-clinical samples, including hitting one's self on purpose and burning one's skin (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007;

Whitlock, Muehlenkamp, & Eckenrode, 2008). An explanation as to why individuals partake in this type of behavior has been previously researched.

These behaviors can be explained through specific theoretical frameworks used in this field of research. An example of this is the Experiential Avoidance Model of Deliberate Self-Harm (Chapman, Gratz, Brown, 2006; Jutengren, Kerr, & Stattin, 2011). This theoretical framework explains that non-suicidal self-injury is maintained through negative reinforcement of unwanted emotional expressions (Chapman, Gratz, Brown, 2006; Jutengren, Kerr, & Stattin, 2011). When an individual is faced with a negative stimulus, he will have a negative emotional response (i.e., anger, shame). These emotions make the individual avoid the situation. In order to not feel these feelings and achieve temporary relief, the individual will engage in non-suicidal self-injury. The Experiential Avoidance Model of Deliberate Self-Harm can also be applied to various age groups.

The gender and age group of individuals who engage in non-suicidal self-injury has been perviously considered. In terms of gender, research has generally shown that females engage in this behavior more than males (Andover *et al.*, 2010; Gratz *et al.*, 2006; Guertin *et al.*, 2001; Whitlock *et al.*, 2006; Klonsky & Glenn, 2009). Various age groups have been found to engage in non-suicidal self-injury (Briere & Gil., 1998; Swannell *et al.*, 2014). Specifically, rates of self-injurious behavior are greater in young adults (18-35 years old) than in older adults (36 and older), with rates being 13.4% and 6%, respectively (Swannell *et al.*, 2014; Briere & Gil, 1998). These percentages are even greater among traditional undergraduate samples (18-22 years old), with rates as high as 35% (Gratz & Gunderson, 2006; Laye-Gindhu & Schonert-Reichl, 2005; Whitlock, Muehlenkamp, & Eckenrode, 2008). These rates could be attributed to the new

environment the students are introduced to, as well as acclimating to living alone. Other predictors for engagement in this type of behavior have also been researched.

The relationship between emotion regulation and engagement in NSSI has been considered previously. Emotion regulation is considered to be how well an individual can control their emotions in various situations (Beiter et al., 2015; Gratz & Roemer, 2004). In this manner, if an individual is stressed, having negative thoughts, or is emotional, s/he might engage in NSSI in order to relieve these unwanted feelings. The literature has confirmed this; individuals who have reported difficulty in regulating their emotions are more likely to engage in NSSI and have reported engaging in NSSI (Andover et al., 2005; Klonsky et al., 2011). Furthermore, the literature has also shown that undergraduate students who have trouble regulating their emotions are also at risk and engage in NSSI (Gratz, Conrad, & Roemer, 2002; MacLaren & Best, 2010).

There is also literature on the relationship between affectivity and engagement in NSSI. Affectivity has been defined as the outward expression of an individual's emotions; a person can have a positive affect, negative affect, or combination of both (Briere & Gil., 1998; Hamza & Willoughby, 2015). Examples of positive affect include enthusiasm, excitement, and alertness (Briere & Gil., 1998; Hamza & Willoughby, 2015). Distress, shame, and fear, on the other hand, are examples of negative affect (Briere & Gil., 1998; Hamza & Willoughby, 2015). Studies have shown that individuals with negative affect are more likely to engage in NSSI (Briere & Gil., 1998; Hamza & Willoughby, 2015; Claes, *et al.*, 2010). When this relationship was examined among college students, the same results were found (Dennhardt & Murphy, 2011; Pritchard, Wilson, & Yamnitz, 2007). This work shows that students who are distressed are more

likely to engage in NSSI than those students who do not report being stressed. Predictors besides psychiatric correlates (i.e. physical health) have also been explored.

The research on relationship between physical health and engagement in NSSI is relatively limited. Physical health is operationalized as a regulatory concept, or the ability for the body to maintain at least a level of homeostasis (Thoits, 2011). In this manner, individuals who report being healthier are considered to be more regulated than those who do not report being as healthy. Studies that have assessed the relationship between physical health and engagement in NSSI conclude that individuals who report lower physical health engage in NSSI (Barnes, Eisenberg, Resnick, 2010; Caine, 2012; Lossnitzer, 2009; Zullig, 2016). Within a college population, the research on this relationship is especially limited. It is important to look at this relationship due to the high rates of engagement in NSSI that has been reported in this population, as well as the increasing rates of physical illnesses (Hussain, Guppy, & Temple, 2013; Whitlock, Eckenrode, & Silverman, 2006). The present research will provide additional insight as to the physical health of undergraduate students as well as how physical health relates to engagement in NSSI.

### **Significance of Study**

Prior studies have analyzed the relationship between mental health, physical health, and non-suicidal self-injury separately (Andover et al., 2005; Klonsky et al., 2011; Briere & Gil., 1998; Hamza & Willoughby, 2015; Claes, *et al.*, 2010; Barnes, Eisenberg, Resnick, 2010; Caine, 2012; Lossnitzer, 2009; Zullig, 2016). These studies considered mental and physical health to be two separate entities. However, research has shown that mental and physical to be related / integrated, not separate entities (Ohrnberger, Fichera,

& Sutton, 2017). This study fills a gap in the literature through examining how predictive an integration of an individual's physical and mental health is of engagement in NSSI. Additionally, this study also fills a gap through examination of this relationship in an undergraduate population.

**Purpose.** Project PAN: Relationship between Physical Health, Psychiatric Correlates and Engagement in Non-Suicidal Self-Injury aims to consider how predictive level of mood (emotion regulation and affectivity) and regulation (emotion regulation and physical health) are of engagement in non-suicidal self-injury. Furthermore, we aim to consider whether the mood variables (emotion regulation and affect) or regulation variables (emotion regulation and physical health) are more predictive of engagement in NSSI.

**Hypothesis.** An investigation of the behaviors of undergraduate students can provide insight as to how this population interacts with their new environment. This study aims to consider how predictive mood (emotion regulation and affect) and regulation (emotion regulation and physical health) are of engagement in non-suicidal self-injury. Additionally, this study is assessing whether the mood variables (emotion regulation and affect) or regulation variables (emotion regulation and physical health) are more predictive of engagement in NSSI.

***Hypothesis 1.:*** Once gender is controlled for, those who have more mood (emotion regulation and affect) disturbances are more likely to engage in NSSI.

***Hypothesis 2.:*** Once gender is controlled for, those who are less regulated (emotion regulation and physical health) are more likely to engage in NSSI.

***Hypothesis 3.:*** The mood variables will be more predictive of engagement in NSSI than the regulation variables.

## Chapter 2

### Methodology

#### Participants

IRB approved advertisements, such as fliers, for participation were placed throughout Rowan campuses, asking for students to enroll in the study. Presentations in psychology classes were also given, asking students for their participation. The sample consisted of 281 Rowan University undergraduate students from Rowan's main campus. The final sample included 248 participants. The demographics included a mean age of 21.1, 75.4% females (n=187) and 24.6% male (n=61).

#### Measures

**Demographics, screener, and future contact form questionnaires.** The screener asked whether or not the individual is interested in participating in the study, as well as their gender and ethnicity. The self-report demographics questionnaire included age, race, gender, employment status, marital status, whether or not they have health insurance, amount of physical activity, height and weight, risky behaviors, and if they were a transfer student. The future contact form asks the participant if they would like to be contacted for other studies. These questionnaires were experimenter derived from members of the current research (Frierson *et al.*, 2017).

**Difficulties in Emotion Regulation Scale (DERS).** The DERS is a 36-item self-report measure that assesses deficits in emotion regulation. Additionally, this questionnaire looks at awareness, understand and acceptance of emotions, as well as the ability to act in desired ways regardless of an individual's emotional state. Questions are asked on a 5-point Likert scale, ranging from (1) Almost never to (5) Almost always.



Total scores range from 36-180, with higher indicating greater problems with emotion regulation. The DERS has indicated to have good internal consistency, with all sub-scales having scoring above 0.80 (Gratz & Roemer, 2004; Lee *et al.*, 2016).

**The Positive and Negative Affect Schedule (PANAS).** The PANAS is a 20-item self-report measure that assesses positive and negative affect. Questions are asked on a 5-point Likert scale, ranging from (1) very slightly or not at all to (5) Extremely. For positive and negative affect, total scores can range from 10-50, with higher scores representing higher levels of positive or negative affect, respectively. The internal consistency for positive affect is 0.86-0.90, while these scores for negative affect is 0.84-0.87 (Watson, Clark, & Tellegen, 1988; Serafini *et al.*, 2016).

**Inventory of Statements about Self-Injury (ISAS).** The ISAS is a 39-item self-report measure that assesses the functions of NSSI. In addition to asking 13 functions of engagement in this behavior, this measure also asks for the frequency of engagement in 12 types of NSSI behaviors. Some questions ask the individual to fill-in how many times they've engaged in a type of NSSI, other questions use multiple choice, and a section of questions are asked through using a Likert scale ranging from (0) not relevant, (1) somewhat relevant, and (2) very relevant. The internal consistency for this measure ranges from 0.80 - 0.87 (Klonsky & Glenn, 2009).

**Medical Outcomes Study Questionnaire Short Form 36 Health Survey (SF-36).** The SF-36 is a 36-item self-report measure that assesses aspects of quality of life. Questions are asked using multiple Likert scales, with responses ranging from the following: (1) Excellent to (5) Poor, (1) Much better now than on year ago to (5) Much worse now than one year ago, (1) Yes, limited a lot to (3) No, not limited at all, (1) Not at

all to (5) Extremely, (1) None to (6) Very severe, (1) All of the time to (6) None of the time, and (1) Definitely true to (5) Definitely false. Total scores on the SF-36 range from 1-100, with higher scores indicating less disability / better quality of life. This measure has good internal reliability, with scores ranging from 0.80-0.90 (Ware, J.E, & Sherbourne, 1992; Morgan *et al.*, 2017).

### **Procedure**

Students who agreed to participate were given a web-based informed consent form and provided voluntary consent through an electronic signature. After the participant passed the screener, which asked them information pertaining to their demographics, if they read / spoke English well, as well as if they wanted to be contacted for future studies, they were eligible to complete the online survey. This would take approximately 30-45 minutes to complete. If the participant is in an Essentials of Psychology class, typically enrolled by college freshmen, they received four Sona credits. Sona is a cloud-based research tool used for undergraduate students to partake in research projects for research credit. In order to pass Essentials of Psychology, students must acquire eight Sona points.

If the students were not enrolled in an Essentials of Psychology class, their professor provided extra credit points. The methodologies used in this study are consistent with established methods of research and will help determine the relationship race, psychiatric correlates, and physical health has with non-suicidal self-injury. Furthermore, use of a secure online survey software to administer the survey and collect data is a commonly used procedure and considered to be the least invasive manner of

collection information. The secure online survey software used in this project was Qualtrics.

### **Analytic Strategy**

**Preliminary analyses.** Descriptive analyses were performed on all of the participants in the sample in each group. Chi-square analyses, *t* tests, and comparison of means / standard deviations were used when appropriate to compare group differences. The study team analyzed data using SPSS 24 (SPSS, 2016). Exploratory analyses, including frequencies, were run in order to find out how many individuals participated, as well as their demographic information. An a priori g-power analysis was conducted before collection in order to determine whether enough participants were obtained to analyze the results. Chi-square analysis were performed to compare the physical health, psychiatric correlates, and rates of non-suicidal self-injury in traditional undergraduate students. This allowed for insight as to which variables to include in the main analysis. Any participants whose scores were missing / incomplete were omitted from data analysis.

**Main analyses.** In this project, the independent variables were grouped into two categories, mood and regulation. The mood category is comprised of emotion regulation and affectivity. Both of these constructs have been previously found to play a role in an individual's mood (Gross & Thompson, 2007; Kállay, Tincas, & Benga, 2009). To analyze the first hypothesis, a hierarchical logistic regression was applied. This allowed for the consideration as to how predictive the addition of the mood variables (emotion regulation and affectivity) were of engagement in NSSI after gender was added to the model. The regulation category is comprised of emotion regulation and physical health.

The conceptualization of this category is similar to the way Trindade, Ferreira, and Pinto-Gouveia did in their study, which also combined the concepts of physical and mental health (Trindade, Ferreira, & Pinto-Gouveia, 2018). To analyze the second hypothesis, a hierarchical logistic regression was also applied. This allowed for the consideration as to how predictive the addition of the regulation variables (emotion regulation and physical health) were of engagement in NSSI after gender was added to the model. To analyze the third hypothesis, the accuracy values of both models were compared in order to see which model was more predictive of engagement in NSSI.

## Chapter 3

### Results

#### Sample Characteristics

Sample characteristics, means, and standard deviations are reported in Table 1. Two hundred and eighty-one undergraduate students participated in the study. One hundred and eighty-four (74.2%) of the participants identified as being White or Caucasian, while thirty-five (14.1%) of the participants identified as being Black or African American. One hundred eighty-seven (75.4%) of the participants reported being female (Table 1). The sample reported a mean of 14 years of education (range 8-20, SD 1.2) with an average age of 21.1 years old (range 19 - 36, SD 2.4). The majority of the sample (63%, n = 177), reported having not engaged in NSSI. Over half of the participants (54.1%) also reported not being transfer students from another 4-year college or community (Table 1).

Table 1

#### *Demographical Characteristics of the Sample*

Characteristic		No.	%
<b>Age, years</b>			
<b>Mean</b>	21.1		
<b>Standard deviation</b>	1.2		
<b>Sex</b>			
<b>Male</b>		61	24.6
<b>Female</b>		187	75.4
<b>Race / Ethnicity</b>			
<b>White</b>		184	74.2
<b>Black</b>		35	14.1

Table 1 (Continued)

<b>Characteristic</b>	<b>No.</b>	<b>%</b>
<b>American Indian /</b>	2	0.8
<b>Alaska Native</b>	12	4.8
<b>Asian</b>	15	6.1
<b>Other</b>		
<b>Total</b>	248	

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### **Mood Variables**

To test the hypothesis as to how much the mood variables (emotion regulation and affectivity) predict engagement in NSSI, a hierarchical logistic regression analysis was performed. In order to control for gender, gender was added at stage one of the regression. The mood variables (emotion regulation and affectivity) were added on the second stage. The full model, which included gender, emotion regulation, and affectivity, was found to be significant  $\chi^2(3) = 35.7, p < 0.05$  (Table 2). This indicates that having more mood disturbances is significantly predictive of engagement in NSSI. The full model correctly predicted 64.9% of participants who engaged in self-injury (Table 4). The odds ratio for the relationship between emotion regulation and engagement in NSSI was 1.02 (OR=1.02, CI=1.01, 1.04,  $p=0.001$ ), while the odds ratio for the relationship between negative affect and NSSI was 1.05 (OR=1.05, CI=1.01, 1.08,  $p=0.01$ ) (Table 2). The odds ratio for the relationship between positive affect and engagement in NSSI was 0.99. (OR=0.99, CI=0.97, 1.02,  $p=0.56$ ) (Table 2).

Table 2

*Hierarchical Logistic Regression Models Estimating the Effects of the Mood Variables (Emotion Regulation and Affectivity) on Engagement in NSSI (N=248)*

Variable	B	SE	EXP (B)
Step 1			
Gender	0.57	0.30	1.76
Step 2			
Gender	0.69	0.32	1.99*
Emotion Regulation	0.02	0.01	1.02**
Positive Affect	-0.01	0.01	0.99
Negative Affect	0.05	0.02	1.05*

Notes.  $\Delta R^2$  for full model = 0.18,  $p < 0.001$ . \* $p < .05$ , \*\* $p < .01$ .

### Regulation Variables

To test the hypothesis as to how much the regulation variables (emotion regulation and physical health) predict engagement in NSSI, a hierarchical logistic regression analysis was performed. In order to control for gender, gender was added at stage one of the regression. The regulation variables (emotion regulation and physical health) were added on the second stage. The full model, which included gender, emotion regulation, and physical health, was found to be significant  $\chi^2(2) = 25.7$ ,  $p < 0.05$  (Table

3). This indicates that a low level of regulation (i.e have a low level of physical health and have issues regulating emotions) is significantly predictive of engagement in NSSI. The full model correctly predicted 65.9% of participants who engaged in self injury (Table 4). The odds ratio for the relationship between emotion regulation and engagement in NSSI was 1.03 (OR=1.03, CI=1.02, 1.05,  $p < 0.001$ ) (Table 3). The odds ratio for the relationship between physical health and engagement in NSSI was 0.97 (OR=0.97, CI=0.94, 1.01,  $p = 0.11$ ) (Table 3).

Table 3

*Hierarchical Logistic Regression Models Estimating the Effects of the Regulation Variables (Emotion Regulation and Physical Health) on Engagement in NSSI (N=248)*

Variable	<b>B</b>	<b>SE</b>	<b>EXP (B)</b>
Step 1			
Gender	0.60	0.31	1.82
Step 2			
Gender	0.66	0.33	1.93*
Emotion Regulation	0.031	0.01	1.03**
Physical Health	-0.03	0.02	0.97

Notes.  $\Delta R^2$  for full model = 0.14,  $p < 0.001$ . \* $p < .05$ , \*\* $p < .01$ .



### Comparison of Mood Variables and Regulation Variables

Once both models were run, accuracy values for each model were compared in order to determine which variables were more predictive of engagement in NSSI. Results showed that the the regulation variables (emotion regulation and physical health) were slightly more predictive of engagement in NSSI than the mood variables (emotion regulation and affectivity). The mood variables (emotion regulation and affectivity) were 64.9% accurate in predicting engagement in NSSI (Table 4). The regulation variables (emotion regulation and physical health) were 65.9% accurate in predicting engagement in NSSI (Table 4).

Table 4

*Sensitivity, Specificity, Positive Predictive Values, Negative Predictive Values, and Accuracy Values for the Mood and Regulation Variables (N=248)*

Variable	Sensitivity	Specificity	PPV	NPV	ACC
Mood Variables	61.0	66.6	45.2	79.2	64.9
Regulation Variables	64.2	66.9	51.5	77.3	65.9

Notes. PPV = Positive Predictive Value, NPV = Negative Predictive Value, ACC = Accuracy. Accuracy values are percentages.

## Chapter 4

### Discussion

The purpose of this study was to determine how predictive the mood variables (emotion regulation and affectivity) and the regulation variables (emotion regulation and physical health) are of engagement in NSSI. Furthermore, whether the mood or regulation variables were more predictive of engagement in NSSI was also examined. Previous studies have found a relationship to exist between emotion regulation and engagement in NSSI, affectivity and engagement in NSSI, and level of physical health and engagement in NSSI (Andover et al., 2005; Klonsky et al., 2011; Briere & Gil., 1998; Hamza & Willoughby, 2015; Claes, *et al.*, 2010; Barnes, Eisenberg, Resnick, 2010; Caine, 2012; Lossnitzer, 2009; Zullig, 2016). This study fills a gap in the literature through examining how predictive a combination of an individual's physical and mental health is of engagement in NSSI.

#### Overview of Results

**Mood variables.** Our research indicated that individuals who have more mood disturbances are more likely to engage in NSSI. Analyzation of the results in greater detail showed that individuals who have issues regulating their emotions are significantly predictive of engagement in NSSI and that reporting negative affect is significantly predictive of engagement in NSSI; this is similar to prior findings. For example, results from a study on young adults indicated that participants who had trouble regulating their emotions were more likely to engage in NSSI (Gratz, Conrad, & Roemer, 2002; Tatnell, Hasking, & Newman, 2018). Additionally, research concerning the relationship between affectivity and NSSI indicated that individuals who report having a negative affect are

more likely to engage in NSSI as well (Brown, Comtois, & Linehan, 2002; Favazza, 1996; Klonsky, 2007). Even though the populations used in the included studies concerning the relationship between affectivity and engagement in NSSI are not solely on undergraduate students, the same results were obtained.

**Regulation variables.** Our research indicated that individuals who are less regulated are more likely to engage in NSSI. Analyzation of the results in greater detail showed that individuals who have issues regulating their emotions are significantly predictive of engagement in NSSI, while individuals who report having a low physical health is not significantly predictive of engagement in NSSI. These findings are inconsistent with the literature, which has shown that report of a low level of physical health is predictive of engagement in NSSI (Caine, 2012; Marusic & Goodwin, 2006; Xin et al., 2017). A reason for this could be that different measures were used to operationalize physical health. Additionally, different methods of analyzation were used, which could have led to varying results.

**Comparison of mood variables to regulation variables.** Inconsistent with our hypothesis, our results showed that the regulation variables (emotion regulation and physical health) were more predictive of engagement in NSSI than the mood variables (emotion regulation and affectivity). When considering the mood variables, (emotion regulation and affectivity) they have been found to predict engagement in NSSI previously (emotion regulation and affectivity) (Fox *et al.*, 2017; Allen & Hooley, 2017; Claes *et al.*, 2015). Aforementioned, emotion regulation was found to significantly predict engagement in NSSI. Even though there was not a significant relationship between level of physical health and engagement and NSSI, the relationship was such

that an individual who reported a low physical health was more likely to engage in NSSI. If a specific physical illnesses was examined or a different physical health questionnaire was used, this relationship might have turned out differently (Caine, 2012; Karling *et al.*, 2016; Zullig, 2016).

**Overall results.** There could be additional explanations as to why both categories (mood and regulation) were significant. The grouping of the variables might have led to the obtained results; the variables were primarily grouped due to their similarity. The mood variables (emotion regulation and affectivity) have previously been found to be related to mood (Gross & Thompson, 2007; Kállay, Tincas, & Benga, 2009). The regulation variables (emotion regulation and physical health) grouped together because they described how an individual mentally and physically regulates himself. The results could have been different if the predictors were grouped another way. As mentioned previously, the results would have been different if each variable was considered individually. This was not the goal of the current research, however; the goal was to examine how predictive the integration of mental and physical health was of engagement in NSSI.

Oversaturation could be an additional explanation as to the results. The model might have been oversaturated if all the variables were input into one model. If a univariate relationship was considered for each predictor (emotion regulation, affectivity, and physical health) and the outcome variable, however, some of the relationships would not have been significant. An example of this is how the relationship between physical health and engagement in NSSI was shown to be not significant. This shows the significance of the multivariate analysis and the integration of mental and physical health.

Gender should also be considered when analyzing the results. Gender was controlled for due to the amount of females in comparison to males in the sample, and because the literature has shown that overall more women engage in NSSI than men (Andover, Primack, Gibb, and Pepper, 2010; Favazza & Conterio, 1989; Suyemoto, 1998; Taliaferro & Muehlenkamp, 2015). If a more equal ratio of genders was obtained, the result might be different. Additionally, if gender was included in the model, however, the results might have turned out differently. For example, gender might be predictive of whether or not an individual engages in NSSI.

### **Implications**

The results obtained in this study have clinical implications. In prior studies, primary prevention interventions could be applied through using the results (Meerwijk *et al.*, 2016). Psychoeducation could be provided to college students as to potential predictors of engagement in NSSI, so the students could have this in mind. This could be in the form of a seminar during orientation week. This has previously been found to work on a population of adolescents (Vale, Nixon, & Kucharski, 2009). Additionally, a screener could be implemented at college wellness centers, which would provide school counselors with insight as to whether or not their students engage in NSSI. Furthermore, these results could also provide a clinician with additional information concerning their patients. Similar to a school psychologist, if a patient reports the symptoms analyzed in this study, the clinician should ask about NSSI.

## **Limitations and Future Directions**

There were several limitations to this study. Self-report measures were utilized, meaning that participants were left to answer the survey as they wanted. This could have resulted in various methodological issues, including participants' mood, low external validity, and socially-desirable reporting styles (Huprich, Bornstein, & Schmitt, 2011). If the Marlow-Crowne Social Desirability Scale was used in the survey, the truthfulness of the participants' answers might have been better assessed (Crowne & Marlowe, 1960; Vésteinsdóttir, Reips, Joinson, & Thorsdottir, 2015). Additionally, the survey was all online, leaving the participants to interpret the survey on their own; they could not ask questions, and they might have forgotten their past behaviors (Revilla, Ochoa, & Loewe, 2017). The sample also was not representative of the population of the university, being that the study sample was primarily women (75.4% females n=187). If the sample was more representative of the university, different results might have been obtained. Gender might have been a significant predictor of engagement in NSSI if the sample was more representative of the university.

There are a few recommendations for continuing this study in the future. First, examining the type of NSSI used might provide additional insight concerning why individuals engage in this type of behavior as well as information about the sample. Previous studies have analyzed this, finding that method of NSSI differs based on gender; an example being that cutting was the most frequent type of NSSI used (Andover *et al.*, 2005; Brown *et al.*, 2005; Claes, Vandereycken, & Vertommen, 2008). Second, additional predictors might also be considered, in order to for a clearer understanding as to why individuals engage in NSSI. For example, Tatnell and colleagues found that

lack of attachment and child abuse were significant predictors of engagement in NSSI (Tatnell *et al.*, 2017).

Finally, the consideration of additional aspects of diversity might provide insight as to transfer students might provide additional insight. An example might include an examination into if race / ethnicity affects engagement in NSSI. This has been analyzed previously, with results indicating that race is significantly related to engagement in NSSI (Van Gundy, Howerton-Orcutt, & Mills, 2015). Whether or not being a transfer student is predictive of engagement of NSSI might also be an interesting direction. Studies have shown that this population is under additional stress due to them being in a new environment (Jason, *et. al*, 1992; Ong & Cheong, 2009; Beiter *et al.*, 2015); it would be interesting to see how this population copes with this stress.

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