

## Lifetime and Current Predictors of Non-Suicidal Self-Injury Among College Students

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### Abstract

Informed by previous research on non-suicidal self-injury, researchers in the current study sought to understand further the relationships between non-suicidal self-injury, self-esteem, anxiety, and biological sex among college students. Furthermore, the researchers were interested in both current non-suicidal self-injury engagement and lifetime non-suicidal self-injury engagement, which could provide information on prevalence before and after commencing college. In order to examine the predictive relationships between lifetime non-suicidal self-injury engagement, current non-suicidal self-injury engagement, self-esteem, anxiety, and biological sex, participants completed several instruments assessing variables. Results yielded that non-suicidal self-injury engagement rate was higher before commencing college. It was further found that while trait anxiety was a significant predictor for current non-suicidal self-injury occurrence, self-esteem was a significant predictor of lifetime non-suicidal self-injury occurrence. Concerning non-suicidal self-injury functions, affect regulation was the leading reason to engage in non-suicidal self-injury followed by self-punishment and anti-dissociation/markings distress.

**Keywords:** Anxiety; college students; non-suicidal self-injury; self-esteem.

## Üniversite Öğrencileri arasında Kendini Yaralama Davranışının Yordayıcıları Öz

Bu çalışmada kendini yaralama davranışı ile ilgili önceki araştırmalardan elde edilen bilgiler doğrultusunda üniversite öğrencileri arasında kendini yaralama, benlik saygısı, kaygı ve cinsiyet arasındaki ilişkileri daha derinlemesine incelenmiştir. Ayrıca üniversiteye başlamadan önce ve üniversiteye başladıktan sonra kendini yaralama davranışının yaygınlığı hakkında bilgi sağlayabilecek mevcut ve yaşam boyu durum araştırılmıştır. Yaşam boyu kendini yaralama davranışı, mevcut kendini yaralama davranışı, benlik saygısı, kaygı ve cinsiyet arasındaki öngörücü ilişkileri incelemek için, katılımcılardan yukarıda belirtilen değişkenleri değerlendiren ölçme araçları kullanılarak veri toplanmıştır. Araştırma sonuçlarına göre, kendini yaralama davranışında bulunma olasılığının üniversiteye başlamadan önce üniversiteye başladıktan sonraya kıyasla daha yüksek olduğu görülmüştür. Ayrıca, sürekli kaygı mevcut kendini yaralama davranışı oluşumu için anlamlı bir yordayıcısı iken, benlik saygısının yaşam boyu kendini yaralama davranışı oluşumunun anlamlı bir yordayıcısı olduğu bulunmuştur. Kendini yaralama davranışı işlevleriyle ilgili olarak, önde gelen nedeninin duygu düzenlemesi olduğu bulunmuştur.

**Anahtar kelimeler:** kendini yaralama; endişe; özsayı; üniversite öğrencileri.

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## INTRODUCTION

People have engaged in non-suicidal self-injury (NSSI) from the earliest times, with the first self-injurious behaviors documented in ancient Greek and Japanese writings (Favazza, 2009, p. 20). NSSI is defined as “the deliberate, self-inflicted damage of body tissue without suicidal intent and for purposes not socially or culturally sanctioned” (International Society for the Study of Self-injury [ISSS], 2018, para. 1). There are four aspects of NSSI: (a) The self-injury is intentional rather than accidental; (b) The self-injury results in immediate injury; (c) The self-injury is not due to a desire to die by suicide, but rather to reduce levels of distress; and (d) The self-injury is not accepted by society and is not due to cultural, religious, or spiritual practices (ISSS, 2018, para 1). People may engage in NSSI by cutting, burning, hitting, or scratching themselves (ISSS, 2018, para 2).

NSSI has been the focus of increased research over the past two decades (Turner et al., 2013; Whitlock et al., 2011). As a result, NSSI is included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a condition requiring further study, and criteria for NSSI Disorder are outlined (American Psychiatric Association, 2013). In the DSM-5, NSSI is associated with borderline personality disorder (BPD), making it difficult to diagnose individuals who only meet the self-injury criteria but do not meet the other criteria for BPD. Furthermore, it is challenging to diagnose adolescents who engage in NSSI and meet BPD criteria because individuals under eighteen cannot be diagnosed with personality disorders. In response to the need for a separate diagnostic category, NSSI is included in the DSM-5 in section 3, and it requires further investigation before it can be included as a separate clinical diagnosis.

In a review of 53 studies on NSSI conducted between 1998 and 2016, researchers Cipriano, Cella, and Cotrufo (2017) reported a range of prevalence rates of NSSI in adolescents of 7.5 to 46.5% - among university students- up to 38.9%, and in adults, 4 to 23%. Almost a decade ago Nock (2010) noted a rising number of NSSI incidents based on reports from mental health professionals, teachers, and other helping professionals. Similarly, Nixon and Heath (2009) indicated a rise in NSSI among adolescents. Walsh (2012) stated that “[...] the rate of self-injury grew by 250% over a 15-year period” (p. 37), indicating that this increase is related to environmental factors, psychological imbalances, prevalence in the media, and peer influence. NSSI is a troubling phenomenon due to its complexity and difficulties associated with treatment (Klonsky, Muehlenkamp, Lewis, & Walsh, 2012).

Although several studies provided different NSSI engagement rates for various populations, these rates are debatable due to the lack of cohesive terminology used to assess NSSI Klonsky (2011). Some previous studies have shown that NSSI engagement rates for college students are 16% on average (Cawood & Huprich, 2011; Gratz & Chapman, 2007; Nixon, Cloutier, & Jansson, 2008), while other studies indicated that almost a quarter of adolescents reported engaging in NSSI (Hilt, Cha, & Nolen-Hoelsema, 2008a; Hilt, Nock, Lloyd-Richarson, & Prinstein, 2008b; Laye-Gindhu & Schonert-Reichl, 2005; Lundh, Karim, & Quilisch, 2007; Muehlenkamp & Gutierrez, 2004, 2007; Ross & Heath, 2002). Concerning NSSI methods, cutting was the method that was most often utilized (Cawood & Huprich, 2011; Glenn & Klonsky, 2010, 2011; Gratz, 2001; Gratz, Conrad, & Roemer, 2002; Gratz & Chapman, 2007; Klonsky, 2011; Turner, Chapman, & Layden, 2012; Victor, Glenn, Klonsky, 2012; Weinberg, Klonsky, 2012). In addition, some studies found head banging (Glenn & Klonsky, 2009; Klonsky & Olino, 2008), scratching (Hasking et al., 2008; Whitlock, Eckenrode, & Silverman, 2006), picking skin (Aizenman, Jensen, 2007), preventing wound from healing (Gollust, Eisenberg, & Golberstein, 2008), punching self (Serran, Saules, Cranford, & Eisenberg, 2010), sticking self with an object (Lundh, Karim, & Quilisch, 2007), were NSSI methods that were most utilized.

Researchers have reported conflicting information regarding NSSI prevalence by biological sex. Several studies endorsed a difference between males and females, reporting a higher prevalence for females over males (Gollust, Eisenberg, & Golberstein, 2008; Hoff & Muehlenkamp, 2009; Wilcox, Arria, Calderia, Vincent, Pinchevsky, & O’Gard, 2012). Conversely, some studies indicated that NSSI affects both males and females at similar rates (Aizenman & Jensen, 2007; Bjarehed, Wangby-Lundh, & Lundh, 2012; Gratz, 2001; Gratz, Conrad & Roemer, 2002; Glenn & Klonsky, 2010b; Hasking, Monemi, Swannell, & Chia, 2008; Klonsky, 2011; Whitlock, Eckenrode, & Silverman, 2006).

According to researchers, there are several reasons why people engage in NSSI. Affect regulation was the most endorsed function for NSSI engagement (Brown, Comtois, and Linehan, 2002; Klonsky, 2007; Klonsky & Glenn, 2009; Klonsky, 2011; Nock & Prinstein, 2004; Laye-Gindhu & Schonert-Reichl, 2005; Scoliers et al., 2009), followed by self-punishment (Klonsky, 2007, Klonsky & Glenn, 2009; Nixon et al., 2002; Nock & Prinstein, 2004). In addition, anti-dissociation or depersonalization (Klonsky, 2007; Laye-Gindhu & Schonert-Reichl, 2005; Nock & Prinstein, 2004), sensation-seeking (Glenn & Klonsky, 2009, 2010; Laye-Gindhu &

Schonert-Reichl, 2005; Nixon et al., 2002), anti-suicide (Laye-Gindhu & Schonert-Reichl, 2005; Nixon et al., 2002), and interpersonal influence (Heath, Schaub, Holly, & Nixon, 2009; Laye-Gindhu & Schonert-Reichl, 2005; Nock & Prinstein, 2004; Scoliers et al., 2009; Turner et al., 2012) are some of the other functions of NSSI reported in the literature.

Low self-esteem is one of the factors that was associated with NSSI in prior research on both adolescents and college students (Aizenman & Jensen, 2007; Cawood & Huprich, 2011; Harrison, 2009; Laye-Gindhu & Schonert-Reichl, 2005; Lundh et al., 2007; Tatnell et al., 2013). A study with college students examined the differences between students who have self-injury and tattoo/piercing regarding motivation, functions, depression, and self-esteem (Aizenman et al., 2007). Study results revealed that participants who engaged in NSSI had lower self-esteem scores than individuals who had tattoos and piercings. In another relevant study among college students, the association between self-esteem and NSSI, as well as its mediating effect on personality disorders was explored (Cawood et al., 2011). According to the results, participants in the NSSI group had lower self-esteem scores than the non-NSSI group. Similarly, in an unpublished dissertation utilizing college students; Harrison (2009) found that self-esteem rates were lower for self-injurers than non-self-injurers.

Anxiety is another variable that has been linked to NSSI by various researchers. Anxiety could be a significant motivator for individuals engaging in NSSI because of its direct association with tension reduction (Andover et al., 2005; Glenn & Klonsky, 2009, 2011; Golloust et al., 2008; Hoff & Muehlenkamp, 2009; Klonsky, Oltmanns, & Turkheimer, 2003; Klonsky & Olino, 2008; Ross & Heath, 2002; Weinberg & Klonsky, 2012). In a comparative study, Andover et al. (2005) investigated the psychological characteristics of NSSI and non-NSSI groups. Results indicated that anxiety scores were higher for the NSSI group than the non-NSSI group. In another study, Golloust et al. (2008) explored the prevalence rates and relational predictors (depression, eating disorders, and anxiety) for NSSI among college students. The authors indicated that students in the NSSI group had higher tendencies for anxiety. Glenn and Klonsky (2009) explored clinical differences (depression, anxiety, and BPD) differences between NSSI and non-NSSI groups of college students. The results of the study revealed that anxiety was higher for the NSSI group than the non-NSSI group. In their study with college students that aimed at investigating the contributions of depression, anxiety, rumination, and perfectionism on NSSI, Hoff and Muehlenkamp (2009) found that participants in the NSSI group tended to have higher scores on anxiety, depression, and rumination than the non-NSSI group. Klonsky and Olino (2008) reported four subgroups of self-injurers in their research: “experimental, mild, multiple functions/anxious, and automatic functions/suicidal” (p. 26), with individuals in the multiple functions/anxious group reporting the highest anxiety levels of the four groups. Finally, in a control-group laboratory study, Weinberg and Klonsky (2012) aimed at exploring the causal relationship between emotional regulation and NSSI engagement among college students. The study further investigated the clinical differences between NSSI and non-NSSI groups, reporting higher levels of anxiety in the NSSI group.

The results discussed above support a link between low self-esteem, anxiety, and a higher prevalence of NSSI among college student participants. Self-esteem is purported to be one of the motivators for individuals to act on certain behaviors (Rosenberg, 1979). With low self-esteem, individuals may be more prone to engage in NSSI in an effort to reduce levels of distress. Based on an extensive literature review, Klonsky (2007, 2009) stated that individuals who engage in NSSI deal with elevated negative emotions including anger, frustration, and anxiety. Distorted or negative perceptions of self-concept could lead to higher levels of anxiety (Rosenberg, 1965, 1979), and result in behaviors focused on anxiety-reduction or management (Spielberg, 1972).

Informed by previous research on NSSI, researchers in the current study sought to understand further the relationships between NSSI, self-esteem, anxiety, and biological sex among college students. Moreover, the researchers were interested in both current NSSI engagement and lifetime NSSI engagement, which could provide information on prevalence before and after commencing college in order to examine the predictive relationships between lifetime NSSI engagement, current NSSI engagement, self-esteem, anxiety, and biological sex, the following research questions guided the current study:

1. What is the prevalence of NSSI reported by undergraduate college students about themselves a) before commencing college, b) while in college?
2. Do trait anxiety, state anxiety, self-esteem, and biological sex explain the predictive relationship in current NSSI occurrence among undergraduate college students?
3. Do trait anxiety, self-esteem, and biological sex explain the predictive relationship in current NSSI occurrence among undergraduate college students?
4. What are the common functions of NSSI endorsed by undergraduate college students?

## METHOD

### Procedure

The participants of this study were undergraduate college students enrolled in general education courses. Two hundred and thirty-one students participated in the study with 221 of the participants providing usable data for the study. The participants were asked to complete self-report instruments for NSSI, self-esteem (SE), state anxiety (SA), trait anxiety (TA), and demographic data. Details for the instruments are seen in the study as follows.

### Instruments

***Inventory of Statements about Self-Injury (ISAS).*** NSSI behaviors, frequencies, and functions were measured by the Inventory of Statements about Self-Injury (ISAS) (Klonsky & Glenn, 2009), which is comprised of two sections. Section I assesses the frequency of twelve specific NSSI behaviors (cutting, burning, biting, pinching, banging/hitting self, carving, needle-sticking, rubbing skin, swallowing chemicals, scratching, hair pulling, and wound picking) over the lifetime. After permission had been granted from the original authors, the instrument was modified for the current study. The modified instrument reduced the number of NSSI behaviors from twelve to six (cutting, banging/hitting self, burning, scratching, interfering with wound healing, hair pulling), and assessed the frequency of these behaviors at the time of participating in the study and before commencing college. Section II of the ISAS assesses two functions of NSSI, intrapersonal and interpersonal. The respondents are asked to rate items pertaining to NSSI engagement using 3 point-scale, 1 = not relevant, 2 = somewhat relevant, and 3 = very relevant. A sample item in Section II is, "When I harm myself, I am calming myself down." Klonsky and Olino (2008) reported an alpha coefficient of .84 for internal consistency of section I of the ISAS, and a four-week test-retest reliability of .85. Further, Glenn and Klonsky (2011) reported the one-year test-retest reliability of .68. In section II, alpha coefficients of .88 for interpersonal functions and .82 for intrapersonal functions were reported (Glenn & Klonsky, 2011). One-year test-retest reliability for Section II was reported at .82 for interpersonal function, and .60 for intrapersonal functions (Glenn & Klonsky, 2011). In the current study, the Cronbach's alpha reliability coefficient for interpersonal functions was .94, and .90 for intrapersonal functions.

***Rosenberg Self-Esteem Scale (RSES).*** Self-esteem was measured by the Rosenberg Self-Esteem Scale ([RSES], Rosenberg, 1965). The aim of the instrument is to assess self-worth. The instrument has ten items, five of which are positively worded and the remaining are negatively worded. The items are coded on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Rosenberg (1989) reported .92 reproducibility coefficient for the instrument. In the current study, the Cronbach's alpha reliability coefficient for the instrument was .91. A sample item is, "At times, I think I am no good at all."

***State Trait Anxiety Inventory (STAI).*** Anxiety was measured by the State Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The instrument was initially developed for using with high school students and further adapted for using with college students and adults. The aim of the instrument is to assess the intensity of current anxiety as well as the general tendency towards anxiety. For this purpose, the instrument has two sections consisting of twenty items for each section. The state anxiety section asks participants to rate their anxiety level at the moment on a 4-point scale ranging from 1 to 4, in which 1 stands for "not at all" and four means "very much so". A sample item is, "I am tense." The tendency towards anxiety is measured by the trait anxiety section. In this section, participants are asked to rate the frequency of having anxiety-related feelings in general on a 4-point scale ranging from 1 to 4 where 1 stands for "almost never" and 4 means "almost always". A sample item is, "I feel nervous and restless." Spielberger (1983) reported that alpha coefficients for internal consistencies for both forms ranged from .86 to .95 for different norm groups. In this study, the Cronbach's alpha reliability coefficient for trait anxiety was .93 and .92 for state anxiety.

***Demographic Questionnaire.*** Descriptive data from participants, including age, year in school, major, biological sex, ethnicity, sexual orientation, and marital status were gathered using a demographic questionnaire.

### Data Analysis Procedure

Data were analyzed using the SPSS 22.0 software package in order to present results by descriptive and logistic regression analysis methods. Before the analyses were conducted the assumptions of logistic regression were tested. According to the VIF values, there was no multicollinearity, and the model was a good fit for the data ( $X^2 = 7.45, p = .488$ ).

## FINDINGS

### Descriptive Statistics

The results yielded that the age of participants ranged from 18 to 26 ( $M = 20.93$ ,  $SD = 1.8$ ). Fifty-six percent of the group were female and 44% were male. Nearly one-third of the participants indicated that they willingly performed NSSI behaviors without suicidal intent; as a result, the prevalence rate was 32%. Regarding NSSI behaviors, study results indicated that nearly half of the NSSI group (49.2%) preferred interfering with wound healing, followed by banging/hitting self (38%), cutting (36.6%), hair pulling (33.8%), scratching (21.2%), and burning (19.7%). Of the participants 73.3% of the females preferred scratching, while 51.8% of the males preferred banging/hitting self. When participants were asked about the age of onset of NSSI, they reported a range from 3 to 18 years with a mean age of onset of 12 years of age ( $SD = 3.2$ ).

### Results of Research Questions

*Question 1:* What is the prevalence of NSSI reported by undergraduate college students about themselves a) before commencing college, b) while in college?

To analyze the prevalence of NSSI before and after commencing college, 2x2 crosstab analysis was utilized. The results of a Chi-Square test of independence were statistically significant  $X^2(1) = 10.55$ ,  $p < .05$ . Lifetime NSSI prevalence was 32.1% and current NSSI prevalence was 19.9%. Even though nearly one-third of the participants reported engaging in NSSI before commencing college, the rate decreased by nearly 12% after commencing college.

*Question 2:* Do trait anxiety, state anxiety, self-esteem, and biological sex explain the predictive relationship in current NSSI occurrence among undergraduate college students?

Logistic regression was used to analyze this research question. The results are presented in Table 1.

**Table 1.** Logistic Regression Results for Trait Anxiety, State Anxiety, Self Esteem, and Biological Sex in Predicting Current Occurrence

Predictor	B	SE	Wald	df	Sig.	Exp ( $\beta$ )
Constant	-3.367	2.48	1.837	1	.175	.035
Trait Anxiety	.033	.027	1.505	1	.220	1.034
State Anxiety	.27	.023	1.407	1	.236	1.027
Self-Esteem	-.017	.046	.139	1	.709	.983
Biological Sex (1)	-.124	.368	.114	1	.736	.883
Hosmer-Lemeshow			7.45	8	.488	
Nagelkerge $R^2$	.135					

According to the results, the predictive model was a good model  $X^2(4) = 19.70$ ,  $p < .05$ . Additionally, Hosmer-Lemeshow goodness of fit test results yielded that the model was a good fit for the data,  $X^2(8) = 7.45$ ,  $p > .05$ . The results yielded that the variables of Trait Anxiety, State Anxiety, Self-Esteem, and biological sex included in the model explained nearly 14% of the variation in the dependent variable of current NSSI occurrence. Following the logistic regression analysis, the Wald forward method was utilized to examine which of the variables in the model significantly explained the predictive relationship on current NSSI occurrence. According to the Wald statistics, among all the study variables included, only Trait Anxiety (TA) was a significant predictor for current NSSI occurrence,  $X^2(1) = 15.86$ ,  $p < .05$ . Nearly 12% of the variation in NSSI occurrence was explained by TA. This result indicated that the higher the TA score, the odds of someone engaging in NSSI increased.

*Question 3:* Do trait anxiety, self-esteem, and biological sex explain the predictive relationship in current NSSI occurrence among undergraduate college students?

To determine whether TA, SE, and biological sex explain the predictive relationship in lifetime NSSI occurrence, a logistic regression was used. The results are presented in Table 2.

**Table 2.** Logistic Regression Results for Trait Anxiety, Self-Esteem, and Biological Sex in Predicting Lifetime NSSI Occurrence

Predictor	B	SE	Wald	df	Sig.	Exp ( $\beta$ )
Constant	-.110	1.986	.003	1	.956	.896
Trait Anxiety	.023	.021	1.167	1	.280	1.023
Self-Esteem	-.052	.038	1.867	1	.172	.949
Biological Sex (1)	.090	.303	.089	1	.765	1.095
Hosmer-Lemeshow			4.754	8	.783	
Nagelkerge $R^2$	.095					

According to the results, the predictive model was a good model  $X^2(3) = 15.54, p < .05$ . Furthermore, the Hosmer-Lemeshow goodness of fit test results yielded that the model was a good fit for the data,  $X^2(8) = 4.75, p > .05$ . The variables of Trait Anxiety, Self-Esteem, and biological sex explained nearly 9% of the variation in the dependent variable of Lifetime NSSI occurrence. Following the logistic regression analysis, the Wald forward method was utilized. According to the Wald statistics among all the study variables included, only SE was a significant predictor for lifetime NSSI occurrence  $X^2(1) = 13.42, p < .05$ . Thus, according to the results, having higher SE decreases the odds of engaging in NSSI.

*Question 4:* What are the common functions of NSSI?

An analysis of the common functions of NSSI, indicated that affect regulation was the leading reason reported by participants for engaging in NSSI, followed by self-punishment as the second leading reason and anti-dissociation/markings distress as the third leading reason. The least preferred reasons for NSSI engagement were autonomy, revenge, and peer bonding for NSSI groups. The results are shown in Table 3.

**Table 3.** Common NSSI Function Descriptive Statistics for NSSI Group

Functions	n*	%	Functions	N*	%
Affect regulation	65	91.5	Toughness	41	57.7
Self-punishment	51	71.8	Anti-suicide	39	54.9
Anti-dissociation	51	71.8	Sensation seeking	39	54.9
Marking distress	51	71.8	Autonomy	32	45.1
Self-care	50	70.4	Revenge	28	39.4
Interpersonal boundaries	42	59.2	Peer bonding	25	35.2
Interpersonal influence	41	57.7			

\* Total n=71

## Discussion & Conclusion

The aim of the researchers in this study was to understand the relationships between NSSI, self-esteem, anxiety, and biological sex among college students. The study results yielded that approximately one-third of the participants ( $n = 71$ ) reported engaging in NSSI before starting college. The rate was higher in comparison to the previous research findings which indicated nearly 25% prevalence rate for nonclinical samples (Hilt et al., 2008a; Hilt, et al., 2008b; Laye-Gindhu & Schonert-Reichl, 2005; Lundh et al., 2007; Muchlenkamp & Gutierrez, 2004, 2007; Ross & Heath, 2002). The higher prevalence in the current study could be attributed to the participants' age or developmental stage because at in adolescence, there are several changes in emotions, development, psychology, and physiology (Bjarehed et al., 2012). In an effort to manage these changes, individuals may develop unhealthy coping strategies.

The lifetime NSSI prevalence rate, which was a combination of NSSI engagement before and after commencing college, was found to be 32%. Dissimilar to prior research findings, this rate was higher in some studies (Glenn & Klonsky, 2009; Glenn & Klonsky, 2010; Glenn & Klonsky, 2011; Muehlenkamp et al., 2013; Whitlock, Eckenrode, Silverman, 2006). On the other hand, the figure was closer to research studies that focused on NSSI with college students (Cawood & Huprich, 2011; Gratz, 2001; Gratz, Conrad, & Roemer, 2002). Walsh (2012) said that if an individual engages in NSSI during adolescence, he/she continues to engage in NSSI during early adulthood. The results of the current study supported this claim despite reporting a lower NSSI engagement rate after starting college.

Findings regarding biological sex and NSSI engagement in previous research were inconclusive. In the current study, females engaged in NSSI more than males (56% for females, 44% for males). This finding was consistent with prior researchers who found being female was associated with engaging in NSSI (Hoff & Muehlenkamp, 2009; Muehlenkamp et al., 2013; Wilcox et al., 2012). Other researchers have indicated that

engaging in NSSI was not correlated with being male or female (Aizenman & Jensen, 2007; Bjärred et al., 2012; Gollust et al., 2008; Gratz, 2001; Gratz et al., 2002; Glenn & Klonsky, 2010; Hasking et al., 2008; Klonsky, 2011; Whitlock et al., 2006). Further, researchers who focused on NSSI with adolescents also reported no biological sex differences regarding NSSI engagement (Hilt et al., 2008; Laye-Gindhu & Schonert-Reichl, 2005; Lundh, Karim & Quilisch, 2007). The reasons of for these inconsistent findings may be related to different interpretations of NSSI for males and females. Further research is still needed for solid conclusions regarding differences between males and females in NSSI engagement.

In regard to the preferred methods to engage in NSSI, findings in the current study were dissimilar to previous research findings that indicated cutting was mostly preferred. In the current study, the most common NSSI behavior was interfering with wound healing (49.2%). Although approximately fifty percent of the participants in the current study preferred interfering with wound healing, banging/hitting self (38%), cutting (36.6%), hair pulling (33.8%), scratching (21.2%), and burning (19.7%) were also endorsed by college students. Prior research by Gollust et al. (2008) and Andover et al. (2005) did support interfering with wound healing as a method of NSSI, but not at the high percentage reported by participants in the current study. A larger number of prior researchers reported cutting as the most favored NSSI method (Cawood & Huprich, 2011; Glenn & Klonsky, 2010a; Glenn & Klonsky, 2011; Gratz, 2001; Gratz et al., 2002; Heath et al., 2008; Muehlenkamp et al., 2013; Victor, Glenn, & Klonsky, 2012). Other researchers' findings that were not consistent with the finding in the current study indicated that scratching (Whitlock et al., 2006), banging (Glenn & Klonsky, 2009; Glenn et al., 2011), hair pulling (Glenn & Klonsky, 2011), and picking skin (Aizenman & Jensen, 2007) were preferred NSSI methods among college students. It is possible that the instruments used in prior work could have contributed to these divergent results as many simply asked participants to name the main NSSI methods instead of providing different types of NSSI methods.

The results of the study indicated that the mean age of onset to engage in NSSI was 12, which is similar to prior research findings that reported the age of onset to engage in NSSI to be 13 (Glenn & Klonsky, 2009; 2010b; 2011), 14 (Aizenman & Jensen, 2007; Klonsky, 2011; Muehlekamp & Gutierrez, 2007; Weinberg & Klonsky, 2012), and 15 (Nixon et al., 2008). This result supported the commonly-held belief that individuals start engaging in NSSI at earlier ages as well at higher NSSI rates of prevalence during adolescence.

Using current NSSI as the dependent variable, the researchers found that there was no difference between SA, TA, SE, and biological sex in explaining the predictive relationship as they acted as one predictor. Further analysis to identify the most significant variable indicated that TA was the only significant predictor in explaining the predictive relationship in current NSSI occurrence. Although anxiety, self-esteem, and biological sex can play in role in NSSI engagement, having trait anxiety was related to higher odds of NSSI engagement. Thus, college students who tend to have anxious tendencies are more prone to engage in NSSI while in college. This finding was congruent with previous study results by Andover et al. (2005) and Hoff and Muehlenkamp (2009) indicating that participants who engaged in NSSI had higher trait anxiety scores. Other researchers reported that anxiety assessment scores were higher for nonclinical college students (Glenn & Klonsky, 2009; Gollust et al., 2008; Klonsky & Olinio, 2008), as well as for clinical participants (Weinberg & Klonsky, 2012). Results in the current study regarding anxiety and NSSI engagement were in agreement with studies in nonclinical adolescents (Ross and Heath, 2002) and military recruits (Klonsky et al., 2003). However, there was one prior research study with college students that reported that anxiety was not a predictor for NSSI engagement (Glenn & Klonsky, 2011). Despite some inconsistency in the literature, results yielded support for a positive relationship between anxiety and NSSI engagement.

According to the study results, TA, SE, and biological sex were not significant predictors of lifetime NSSI engagement. When further analysis was utilized, it was found that SE significantly explained the prediction of lifetime NSSI engagement among college students. While anxiety, self-esteem, and biological sex could play in role in lifetime NSSI engagement, self-esteem was the most crucial variable related to the likelihood of NSSI engagement. Lower self-esteem was associated with a higher likelihood of engaging in NSSI. In other words, a higher self-esteem score was associated with a decreased likelihood of engaging in NSSI. This finding in the context of self-esteem is like the findings by Aizenman et al. (2007) indicating that self-esteem was a significant predictor of NSSI engagement, as well as Cawood et al.'s (2011) study results reporting that college students who engage in NSSI had lower self-esteem scores. Additionally, these results were consistent with previous research with high school students (Laye-Gindhu et al., 2005; Lundh et al., 2007; Tattnel et al., 2014).

Concerning common NSSI functions, the study results indicated that affect regulation was the leading reason that college students engage in NSSI. This result was congruent with previous studies that aimed at

investigating common NSSI functions among college students (Glenn et al., 2011; Klonsky, 2009; Klonsky & Glenn, 2009; Muehlenkamp et al., 2013). Moreover, although the participants of the current study were college students, similar results were found with clinical (Brown et al., 2002; Nock & Prieinstein, 2004; Weinberg & Klonsky, 2012) and non-clinical adolescents (Laye-Gindhu & Schonert-Reichl, 2005; Scoliers et al., 2009). It is highly likely that individuals engage in NSSI without thinking when they have overwhelming feelings or when they are not able to control these emotions. The sense of relief individuals get from NSSI might trigger them to engage in NSSI again. It can be concluded that individuals who engage in NSSI do not have effective coping strategies to regulate their emotional state.

According to study findings, self-punishment was the second leading reason for NSSI. This result echoed previous research findings (Hoff & Muehlenkamp, 2009; Klonsky, 2007; Klonsky & Glenn, 2009; Muehlenkamp et al., 2013) sampling college students. Moreover, this result corresponded with research findings utilized nonclinical adolescents (Laye-Gindhu & Schonert-Reichl, 2005; Scoliers et al., 2009; Turner et al., 2012) and clinical adolescents (Nixon et al., 2002; Nock & Prieinstein, 2004). Even though current research did not investigate related risk factors for NSSI engagement, several previous research proposed that negative childhood experiences (emotional, physical, and sexual abuse) may increase chances to engage in NSSI to punish themselves for what happened to them in the past (Ferrara, Terrinoni, & Williams, 2012; Walsh, 2012).

Based on current research findings, the third preferred reason for NSSI engagement was anti-dissociation and marking distress. This result was consistent with Klonsky's (2007) research indicating that generating feeling was the third most common NSSI function. Although the current research was with college students, the results were congruent with previous research findings with both non-clinical adolescents (Laye-Gindhu & Schonert-Reichl, 2005) and clinical adolescents (Nock & Prieinstein, 2004). On the other hand, this finding was incongruent with previous research sampling clinical female clients indicating that the most preferred reason for NSSI engagement was feeling generation (Brown et al., 2002). In sum, the results of current study confirmed the majority of previous research for the leading NSSI functions in literature.

Although current study yielded significant results, there are several limitations regarding research design, instrumentation, and sampling. The research was exploratory and lacked randomization. Thus, it was not possible to establish a causal relationship between variables such as anxiety and self-esteem with NSSI despite their association. There are also sampling limitations for this study. Even though it was valuable to conduct research among college students regarding NSSI, the sampling method was limited to convenience sampling. Thus, study results cannot be generalized.

The current study utilized anxiety and self-esteem as independent variables, while psychological and social risk factors (i.e. childhood aversive experiences, emotion regulation, BPD) were not included in this study. It would be helpful to explore the association between these additional variables and the study variables in greater depth. Additionally, the current study only utilized anxiety as a variable. Future research could include additional diagnosable disorders such as depression, obsessive-compulsive disorders, and personality disorders. Finally, future research with individuals who engage in NSSI would be valuable in order to differentiate between reasons and functions for starting to engage and maintain NSSI behaviors.

#### **Statements Of Publication Ethics**

The authors of this article declare that this research has not any ethical conflicts or problems that may limit the publication of the article.

#### **Researchers' Contribution Rate**

The authors equally contributed to this study.

#### **Conflict of Interest**

The authors have no conflicts of interest to disclose.

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