



January 2017

## An Investigation Of The Latent Structure Of Eating Disorder Behaviors And Non-Suicidal Self-Injury (nssi)

Erica Goodman Goodman

[How does access to this work benefit you? Let us know!](#)

Follow this and additional works at: <https://commons.und.edu/theses>

---

### Recommended Citation

Goodman, Erica Goodman, "An Investigation Of The Latent Structure Of Eating Disorder Behaviors And Non-Suicidal Self-Injury (nssi)" (2017). *Theses and Dissertations*. 2219.  
<https://commons.und.edu/theses/2219>

This Thesis is brought to you for free and open access by the Theses, Dissertations, and Senior Projects at UND Scholarly Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of UND Scholarly Commons. For more information, please contact [und.common@library.und.edu](mailto:und.common@library.und.edu).

AN INVESTIGATION OF THE LATENT STRUCTURE OF EATING DISORDER  
BEHAVIORS AND NON-SUICIDAL SELF-INJURY (NSSI)

by

Erica L. Goodman  
Bachelor of Arts, University of Wisconsin-Madison, 2012

A Thesis

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Master of Arts

Grand Forks, North Dakota

August  
2017

This thesis, submitted by Erica L. Goodman in partial fulfillment of the requirements for the Degree of Master of Arts from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

---

Kyle De Young, Ph.D.

---

Andre Kehn, Ph.D.

---

Alan King, Ph.D.

This thesis is being submitted by the appointed advisory committee as having met all of the requirements of the School of Graduate Studies at the University of North Dakota and is hereby approved.

---

Grant McGimpsey  
Dean of the School of Graduate Studies

---

Date

## PERMISSION

Title	An Investigation of the Latent Structure of Eating Disorder Behaviors and Non-Suicidal Self-Injury (NSSI)
Department	Psychology
Degree	Master of Arts

In presenting this thesis in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my thesis work or, in his absence, by the Chairperson of the department or the dean of the School of Graduate Studies. It is understood that any copying or publication or other use of this thesis or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of North Dakota in any scholarly use which may be made of any material in my thesis.

Erica L. Goodman  
06/23/2017

## TABLE OF CONTENTS

LIST OF FIGURES .....	vii
LIST OF TABLES .....	viii
ACKNOWLEDGMENTS .....	ix
ABSTRACT .....	x
CHAPTER	
I.    INTRODUCTION.....	1
Psychopathology Classification Practices and Concerns.....	3
Direct and Indirect Self-Injury .....	7
Intent .....	9
Function .....	10
Purpose of the present study .....	14
II.   METHOD .....	17
Participants.....	17
Materials .....	18
Demographics .....	18
Behaviors .....	18
Intent .....	19
Function .....	20

	NSSI.....	21
	Eating Disorder Behaviors.....	22
	Procedure .....	22
	Statistical Analysis.....	23
III.	RESULTS .....	28
	Correlations.....	29
	Modeling.....	31
	Model Series 1 .....	31
	Measurement Model (Confirmatory Factor Analysis [CFA]) - Intent .....	31
	Structural Model - Intent.....	32
	Measurement Model (CFA) - Function .....	34
	Structural Model - Function.....	34
	Intent Model vs. Function Model.....	36
	Model Series 2 .....	37
	Measurement Model (CFA) - Intent .....	37
	Structural Model - Intent.....	38
	Measurement Model (CFA) - Function .....	39
	Structural Model - Function.....	40
	Intent Model vs. Function Model.....	42
	Model Series 1 vs. Model Series 2.....	42
	Intent.....	42

Function.....	42
IV. DISCUSSION.....	44
Model Series 1 .....	44
Model Series 2 .....	46
Theoretical Implications .....	47
Implications for Clinical Practice .....	48
Strengths and Limitations .....	50
Conclusion .....	53
APPENDICES .....	55
REFERENCES .....	67

## LIST OF FIGURES

Figure	Page
1. Proposed intent model of NSSI and eating disorder behaviors .....	25
2. Proposed function model of NSSI and eating disorder behaviors .....	25
3. Final intent model of NSSI and eating disorder behaviors for model series 1 .....	34
4. Final function model of NSSI and eating disorder behaviors for model series 1 .....	36
5. Final intent model of NSSI and eating disorder behaviors for model series 2 .....	39
6. Final function model of NSSI and eating disorder behaviors for model series 2 .....	40



## LIST OF TABLES

Table	Page
1. Demographic Information.....	17
2. Content of Each Predictor Variable in the Intent and Function Models.....	26
3. Means, Standard Deviations, and Ranges of Predictor and Indicator Variables .....	28
4. Intercorrelation Table Between Observed and Indicator Variables.....	31

## ACKNOWLEDGMENTS

I wish to express my profound gratitude to my committee chairperson, previous academic advisor, and ongoing mentor, Dr. Kyle De Young. With our shared passion for scientific research, experimental and statistical rigor, and clinical work in the field of eating disorders as a backbone, your constant support and guidance have helped me immensely on my journey to becoming a clinical psychologist. You challenge me to think critically and to pursue whatever I set my mind to. I would like to offer my appreciation to all the members of my advisory committee, Dr. Andre Kehn and Dr. Alan King, whose suggestions, flexibility, and understanding have aided me in this endeavor.

I would like to thank fellow graduate student and friend, Tiffany Russell, for her generosity and patience in teaching me and helping me with SEM for this project.

I would like to thank my mom, Chris Goodman, for her continued and constant love and support.

## ABSTRACT

Non-suicidal self-injury (NSSI; deliberate harm to the self) and eating disorders frequently co-occur, and both place an individual at increased risk for suicide. Individuals who report NSSI are similar to those that report eating disorder behaviors on emotion regulation, impulsivity, and pain tolerance. Thus, the current study aimed to investigate how the relationship between NSSI and eating disorder behaviors is best understood, based on the intent of the behavior (e.g., “to hurt myself”) or the function (e.g., “I became less angry”). Participants were 493 undergraduate students (80% female; 90% white) who completed an online survey regarding lifetime NSSI and eating disorder behaviors. Structural Equation Modeling (SEM) was used to test whether a hypothesized model based on function of NSSI and eating disorder behaviors would fit study data better than a hypothesized model based on intent. Both the final intent and function models yielded an excellent fit; the models were not statistically different from one another,  $\Delta \chi^2(1) = 0.576, p = .45$ . The intent model accounted for 14% of the variance in eating disorder behaviors and 62% in NSSI, while the function model accounted for 19% of the variance in eating disorder behaviors and 51% in NSSI. These findings are consistent with previous literature in terms of emotion regulation being a function of both NSSI and eating disorder behaviors. However, in both models, there was an inverse relationship between eating disorder behaviors and NSSI, which is inconsistent with existing

literature. Thus, a second series of models were run; a positive relationship between NSSI and eating disorders was found. This study sheds light on the complex nature of empirically derived categorization or continuums, such that these behaviors may lie on a continuum of emotion regulation and have other distinct factors, such as appearance change, which may inform treatments.

## **CHAPTER I**

### **INTRODUCTION**

Non-suicidal self-injury (NSSI) is deliberate harm to the self without the intention to die that is not culturally acceptable, such as cutting, burning, or abrading the skin (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Claes & Muehlenkamp, 2014). Such behaviors often lead to wounds on the body that may require medical attention. Thus, NSSI is concerning, and has an 18% lifetime prevalence (Claes & Muehlenkamp, 2014). NSSI appears to be of particular concern amongst adolescents and young adults, as the average age of onset of NSSI is between 12 to 16 years, and approximately 17% of young adults (ages 18-25) have engaged in NSSI (Claes & Muehlenkamp, 2014). NSSI is not only maladaptive, but many studies have shown that engaging in NSSI may increase the risk for suicide (Andover & Gibb, 2010). A study of 89 adolescents with a history of NSSI found a strong association between NSSI and suicide attempts; 70% of participants had made a lifetime suicide attempt (Nock et al., 2006). Moreover, 61% of a college student sample who had experienced NSSI reported that NSSI preceded or co-occurred with suicidal ideation (Whitlock et al., 2013).

Eating disorders are commonly comorbid with NSSI (Muehlenkamp, 2005), and up to 72% of individuals who experience an eating disorder engage in NSSI (Jacobson & Luik, 2014). Recent meta-analytic research indicates that in individuals diagnosed with an eating disorder, 27.3% of them had engaged in lifetime NSSI (Cucchi et al., 2016).

Gollust, Eisenberg, and Golberstein (2008) found that of 200 college-aged individuals who had experienced NSSI, 25.9% of them had an eating disorder, which was the second most common comorbidity in the sample (32.5% had depression). Moreover, research has shown that NSSI and disordered eating practices are concurrently and longitudinally related; frequency of NSSI is concurrently associated with disordered eating severity and frequency of NSSI predicts disordered eating severity 3 months later (Turner et al., 2015). Eating disorders have one of the highest mortality rates of all psychiatric disorders, and suicide is a major contributor to this mortality (Forcano et al., 2011). Individuals with an eating disorder are 23 times more at risk for suicide than the general population, which is even greater than the risk of suicide of individuals with depression (Harris & Barraclough, 1997). Due to the harmful nature of both NSSI and eating disorders and their respective increased risk for suicide, it is imperative that research aims to better understand these behaviors in order to inform the most effective treatments and prevention efforts.

Currently, treatment of psychological disorders relies heavily on how they are diagnosed by the Diagnostic and Statistical Manual of Mental Disorders (DSM) or the International Classification of Diseases (ICD). The diagnostic theory used by DSM/ICD is based on commonly co-occurring symptom configurations; for example, Major Depressive Disorder is diagnosed based on a cluster of symptoms that have been empirically shown to co-occur, such as a variety of mood, sleep, eating/weight, cognitive, and behavioral symptoms. Researchers have expressed their dissatisfaction with the face valid categorization of disorders in the DSM or groupings based on “superficial

similarities” (Kotov, Perlman, Gamez, & Watson, 2015, p. 1687) instead of empirically derived groupings or dimensions based on “objective evidence of the construct validity” (Meehl, 1995, p. 267). Thus, while criteria for a certain disorder may be empirically based, the categorization of the symptoms into different disorders is often lacking empirical support.

Investigating the function of particular symptoms of disorders may better inform diagnostic classification *and* treatment efforts. For instance, a variety of mechanisms could conceivably result in the same symptom configurations, which would suggest that symptom configurations might not always indicate the most effective treatments. An alternative approach is to understand the function of behavioral symptoms, which might point to effective behavioral interventions. Such interventions may differ among individuals with the same symptoms or be the same across individuals with different symptoms, depending on the function their behaviors serve. For example, Wulfert, Greenway, and Dougher (1996) aimed to identify “homogenous subgroups within diagnostic classes based on functional principles” (p. 1140) of two reinforcement-based disorders (alcoholism and pedophilia) in order to show how psychopathologies that look similar based on behavioral principles (i.e., operant conditioning) can serve different functions. The differences in the functions of the respective behaviors help inform treatments to the specific target behaviors.

### **Psychopathology Classification Practices and Concerns**

As such, the researchers completed a logical functional analysis for each disorder (alcoholism and pedophilia) and identified subgroupings within each diagnostic category:

positively reinforced drinkers (Type P) and negatively reinforced drinkers (Type N); preference pedophiles (children elicit more sexual desire than adults) and situational pedophiles. These findings supported their hypothesis that “topographically similar behaviors may serve many different functions and may very well demand different interventions” (p. 1146). Based on the function of each subtype of alcoholism or pedophilia, the authors provided treatment recommendations. Preference pedophiles may be best treated by interventions that focus on controlling target behaviors, remaining abstinent, and relapse prevention, while situational pedophiles may be best treated by focusing on more appropriate ways of expressing and obtaining their psychological needs, such as by developing safe, intimate relationships with adults and eliminating their rationalizations for pedophilic behaviors (p. 1148). With regards to individuals who suffer from alcoholism, Type P drinkers may be best treated with motivational interviewing in order to increase their motivation for change as well as cognitive therapy techniques (e.g., cognitive restructuring), whereas Type N drinkers may best be served with cognitive-behavioral techniques that aim to decrease the desire to escape/avoid nonpreferred situations. For both types of drinkers, it is imperative to find a rewarding and pleasurable replacement behavior for the alcohol consumption (p. 1144). This study provides insight into how the classification system used by the DSM may be too generalized and such diagnoses may lead to ineffective treatments for a given individual. Thus, identifying the specific function of clients’ problematic behaviors is crucial to providing effective treatment.



Classification in psychology is as old as the field itself; researchers such as Meehl (1995) suggest that classification should aim to “carve nature at its joints (Plato)” and “identify categories that are in some sense nonarbitrary, not man-made” (p. 268). That is, in terms of clinical psychology, the field should aim to identify psychopathological constructs as they occur in nature and not place “man-made,” clear-cut boundaries around pathologies/diagnoses that neglect to capture their latent organization. As Widiger and Samuel (2005) discuss, the DSM’s classification of diagnostic categories is problematic as there is “excessive diagnostic co-occurrence and unresolvable boundary disputes” (p. 495).

The boundary disputes Widiger and Samuel (2005) refer to are a direct example of Meehl’s discussion of clear-cut boundaries; they argue that the DSM’s taxonomy is based on drawing arbitrary distinctions or cut points between seemingly “different” pathologies, when in fact, these pathologies may lie on a continuum or dimension of functioning. For example, Widiger and Samuel (2005) argue that new diagnoses added to the DSM, such as the addition of Binge-Eating Disorder (BED) to DSM-5, are not the result of discovering a new disease or disorder, but function as ways to fill gaps between diagnoses. BED, for example, may be seen as an extension or addition to the diagnosis of Bulimia Nervosa (BN), wherein individuals with BED endorse binge eating with the same criteria as in BN, but they do not engage in inappropriate compensatory behaviors (e.g., self-induced vomiting, laxative/diuretic use, over exercising, fasting) to counteract the effects of binge eating as do individuals with BN (American Psychiatric Association [APA], 2013). While individuals with BN tend to be normal weighted and those with

BED tend to be overweight (Masheb & Grilo, 2000), individuals in both diagnostic categories endorse overvaluation of body shape/weight (Grilo, 2013) and trouble with emotion regulation (Haedt-Matt & Keel, 2011). Thus, while BED and BN are distinctive categories in the DSM, their eating pathology appears to result from similar psychological difficulties (body weight/shape overvaluation, emotion dysregulation) and thus, may be treated in a similar manner (Ljotsson et al., 2007; Wilfley & Cohen, 1997).

Excessive comorbidity/co-occurrence is “the norm rather than the exception” in psychological diagnostic practice (Widiger & Samuel, 2005). This is problematic, as comorbidity implies that the concurrent diagnoses are categorically (etiologically, pathologically) different from one another, when in fact, they may exist on the same dimension, such as a negative affect dimension (p. 495). Thus, the two disorders may not be comorbid but instead be manifestations of the same pathology and be mollified by the same treatment. The issue of excessive comorbidity/co-occurrence, boundary disputes, and overall problems with categorization of pathology are applicable to NSSI and eating disorders. NSSI and eating disorders are often comorbid, and researchers have investigated their functional and clinical similarities and differences in order to identify if these behaviors are in fact discrete categories in nature or lie on the same functional dimension.

Given that eating disorder diagnostic criteria include behaviors that may be a source of pain or discomfort (e.g., binge eating, purging, fasting), some research suggests that perhaps eating disorder behaviors are a form of NSSI or “indirect” self-injury (Claes et al., 2012; Favaro and Santonastaso, 1998; St. Germain & Hooley, 2012; St. Germain &

Hooley, 2013, p. 694). Indirect self-injury has been defined as persistent behavior that may lead to physical damage that is 1) clinically significant and 2) of marked concern to physicians/clinicians or family members (St. Germain & Hooley, 2012). This description bears similarities to the definition of NSSI in the DSM-5 and as defined by others (APA, 2013; Turner et al., 2015), except that NSSI is explicitly defined as resulting in deliberate self-harm. Eating disorder behaviors have been characterized as indirect self-injury, or as self-destructive behaviors on par with NSSI, by many researchers (Claes & Muehlenkamp, 2014; Favazza & Rosenthal, 1993; St. Germain & Hooley, 2013; Van der Kolk & Herman, 1991).

### **Direct and Indirect Self-Injury**

However, research has shown that individuals who indirectly self-injure, including those with eating disorder behaviors, differ on levels of suicide proneness and self-criticism, with the NSSI group (direct self-injurers) scoring higher on both measures than the indirect self-injury group (St. Germain & Hooley, 2012). Given these differences, some researchers posit that indirect self-injury, such as eating disorder behaviors, should be distinct in their categorization from NSSI (St. Germain & Hooley, 2012). However, those who engage in indirect self-injury versus NSSI do not differ on many etiological and clinical factors, such as emotion regulation (Claes & Muehlenkamp, 2014), impulsivity (Caswell, Bond, Duka, & Morgan, 2015; Muehlenkamp et al., 2009), levels of pain tolerance (St. Germain & Hooley, 2013) and depressive symptoms (Cooper & Cowen, 2009; Guerry & Prinstein, 2010); all of which have been found to be associated with NSSI and eating disorder behaviors (St. Germain & Hooley, 2012).

NSSI and eating disorders are currently categorically distinct in DSM-5 (appearing in Categories for Further Study and Feeding and Eating Disorders, respectively; APA, 2013). The DSM categorization of these diagnoses appears to be based on intent (the intent to harm the self in NSSI versus the intent to lose weight/change body shape in eating disorders), which may explain why these disorders are in separate diagnostic families. However, little-to-no research has been conducted to support the distinction between these seemingly face-valid categories based on intent.

Another way to investigate these behaviors, as Meehl (1995) and others (e.g., Widiger & Samuel, 2005) have argued, is to investigate their function (i.e., their consequences). It could be that NSSI and eating disorders are discrete categories because the intent of the behaviors in each is different; or, it could be that the function of the behaviors in each is similar and is best represented by a functional dimension, such as Kotov, Perlman, Gámez, and Watson (2015) discovered when investigating emotional disorders (depressive, bipolar, anxiety, post-traumatic stress, and obsessive-compulsive disorders). Though the DSM-5 considers these disorders separate diagnoses, Kotov et al. (2015) discovered that they are best explained by a longitudinally-stable three factor model of distress, fear, and bipolar that has disorder-specific consistency.

Research is needed to clarify whether the latent structure of NSSI and eating disorders are better explained by the intent or the function of the behaviors. This will aid in an empirical classification of these disorders, which is currently lacking, whether it be categorical or dimensional. Identifying if these disorders are better explained by intent or function will also aid in the development of effective treatments for these disorders, such

that behaviors that are employed based on intent (i.e., the intent to harm oneself) versus function (i.e., to regulate one's emotion) may be differentially treated.

**Intent.** The notion of self-harm, be it direct or indirect, has not been operationally defined in the literature (Gratz, 2001); in fact, Laye-Gindhu and Schonert-Reichl (2005) express that, "Indeed, there has been no consensus regarding what self-harm is or is not" (p. 447). Given this ambiguity, recent research has aimed to not only classify, but also investigate the latent structure of specific groupings of self-injurious behavior (SIB). NSSI and suicidal self-injury (SSI) are two common categories of SIBs that differ in their definitions based on intent: if the intent of the person when they are harming themselves is of a suicidal nature (e.g., intention to die) in SSI or not (NSSI). For example, cutting and scraping/scratching the skin are the most common types of NSSI (Klonsky, 2011); however, if someone intended to kill him or herself by cutting, then this would be characterized as SSI. Orlando, Broman-Fulks, Whitlock, Curtin, and Michael (2015) investigated the latent structure of NSSI and SSI to test whether SIB is a construct that is best characterized as being made up of smaller categories (i.e., NSSI and SSI) or if SIB as a construct is dimensionally distributed. They argue that investigating the best way to characterize SIB is crucial as it helps inform SIB theory, research, assessment, diagnosis, and treatment (p. 825) with regards to Meehl's (1995) call-to-action of investigative research into naturally occurring classification of psychological constructs. Orlando et al. (2015) discovered, through taxometric procedures, that NSSI and SSI are best described as lying on the same dimension, which can be attributed, at least partially, to the temporal instability of intent of those who engage in NSSI. That is, individuals with a history of

NSSI may experience suicidal ideation *between* periods of NSSI or *during* some occurrences of NSSI, which underlies the dimensional nature of NSSI and SSI.

The study by Orlando et al. (2015) is paramount, as it has taken necessary steps to guide the empirical classification of SIBs. An important aspect of their findings is the idea of intent; if they found NSSI and SSI to be categorically distinct, this would imply that the intent of the self-injurious behavior most likely explains much of the variance or is one of the main distinguishing factors between NSSI and SSI. However, they discovered that NSSI and SSI are better characterized as lying on a continuum, which implies that the intent of the behavior may only be an indicator of severity and that it does not define two distinct categories.

While empirical research has indicated that the intent of direct SIBs is not a statistically and, therefore, clinically sound way to classify different SIBs, research has not investigated how intent of direct versus indirect self-harming behaviors (NSSI versus eating disorder behaviors) may or may not be an appropriate way to understand these disorders. For example, while eating disorder behaviors (e.g., binge eating, purging, restricting) may elicit pain or discomfort, the primary intention of these behaviors generally lies within the realm of affecting body shape and/or weight.

**Function.** Much research has investigated the *function* of eating disorder behaviors, such as to regulate emotions. The affect regulation theory of eating disorder behaviors posits that these behaviors are maintained in part because they lead to a decrease in negative affect (Berg et al., 2013; Cook, Wonderlich, & Lavender, 2014; Haedt-Matt & Keel, 2015; Polivy & Herman, 1993). A meta-analysis on ecological

momentary assessment (EMA) studies of the affect regulation model of binge eating found that while negative affect tended to increase before a binge-eating episode, negative affect tended to continue to increase after binge eating (Haedt-Matt & Keel, 2011). However, analysis of purging behavior of individuals with BN in the same study revealed a decrease in negative affect after purging. More recent EMA research has investigated particular facets of negative affect and its role in eating disorder behavior maintenance. Berg et al. (2013) discovered that, in women with BN, fear, guilt, hostility, and sadness (four facets of negative affect) each increased prior to binge-eating only, purging-only (except hostility), and binge-eating/purging behaviors and decreased after completion of these behaviors. Negative affect has also been reported to precede exercising in some non-clinical individuals, though engaging in exercise in response to negative affect is associated with engagement in eating disorder behaviors and psychopathology (De Young & Anderson, 2010).

Similarly, research has investigated how positive and negative affect play a role in the maintenance of fasting behavior in individuals with AN. Negative affect has been found to predict dietary restriction in individuals with AN (Engel et al., 2013; Goodman & De Young, 2015). However, fasting in these individuals has been shown to predict positive affect (Goodman & De Young, 2015), and increased engagement in weight loss behaviors in individuals with AN, who also have low positive emotion differentiation, predicts positive emotionality (Selby et al., 2013). Thus, while individuals may not engage in eating disorder behaviors with the intent to cause harm, these behaviors may be maintained by affect-regulation.

Both theory and research of NSSI has identified emotion regulation as a maintenance factor of NSSI through negative reinforcement. Individuals who engage in NSSI report that the experience of pain leads to perceived emotional benefits (Bresin, Gordon, Bender, Gordon, & Joiner, 2010), which in turn, makes them more likely to engage in NSSI again, via negative reinforcement of the behavior (negative feelings are removed after engaging in NSSI; Nock & Prinstein, 2004).

A recent review by Andover and Morris (2014) revealed that there is much empirical evidence that supports the role of emotion regulation and trait emotion dysregulation in individuals who engage in NSSI; that NSSI is maintained via its use as an emotion regulation strategy. EMA data corroborate these findings as negative affect has been shown to increase before one engages in NSSI, peak during the act of NSSI, and decrease gradually during the hours after NSSI (Arney, Crowther, & Miller, 2011). This study also found that changes in negative affect prior to NSSI were detectable hours before the NSSI occurred.

NSSI research has also lead to the investigation of different types of emotion regulation: internal and external. These types of emotion regulation have been distinguished from one another for theoretical and empirical reasons. Theory posits that internal emotion regulation involves internalized symptoms, such as those seen in depressive and anxiety disorders (e.g., sadness, suicidality, loneliness; Alva & de Los Reyes, 1999; APA 2013; Martin, et al., 2013), while external emotion regulation includes emotions that may be expressed externally, such as frustration and anger (Martin, et al.,



2013). As such, one may act in anger or frustration towards someone/something else but one cannot act in loneliness or sadness towards someone/something external.

Empirically, the Ottawa Self-Injury Inventory (OSI), a scale that investigates the functions and additive features of various SIBs, has yielded a sound/replicable factor structure that includes these two different emotion regulation factors (Cloutier & Nixon, 2003; Martin, et al., 2013). The OSI has been shown to have great convergent validity with other self-harm function inventories, such as the Functional Assessment of Self-Mutilation (FASM; Lloyd, Kelley, & Hope, 1997), though the external emotion regulation factor of the OSI did not correlate with a factor on the FASM, which may be due to the OSI asking more in-depth/specific emotion regulation questions than the FASM, such as inquiring about “aggressive emotions” (i.e., to release anger). However, the external emotion regulation factor of the OSI did closely resemble a previously established factor of NSSI function (Klonsky, 2007). The theoretical and empirical support for differentiating internal and external emotion regulation as different functions of NSSI is important as it may lead to improved treatment options. For example, if an individual reports primarily external results of self-injury (e.g., feeling less angry) as opposed to internal results (e.g., feeling less sad), then treatment may best serve this individual if it focuses on replacement behaviors that target external versus internal emotion regulation (e.g., releasing anger vs. decreasing sadness). Although, to the author’s knowledge, no eating disorder research has investigated disordered eating behaviors and emotion regulation in the context of different types (internal and external) of emotion regulation, it may be beneficial to do so in that it may provide insight into

more effect treatments for individuals with differing functions of their problematic behaviors.

### **Purpose of the Present Study**

Research shows that while the intent of NSSI appears to be different from that of eating disorder behaviors, their function, at least in terms of regulating emotions, may be quite similar. Thus, NSSI and eating disorder behaviors appear to be emotion regulation strategies (and maintained by negative or positive reinforcement), whether that is the intent of the person engaging in the behavior or not. How maladaptive behaviors are maintained often affects how they are treated (Haedt-Matt & Keel, 2015). Given that classification as well as maintenance factors of psychological disorders and behaviors inform how they are treated, functional similarities of NSSI and eating disorders may indicate that these disorders are best understood as lying on the same functional dimension, an emotion regulation dimension, even though the behaviors in each disorder may *look* much different (i.e., cutting versus binge eating).

Whether behaviors are best classified by the *intent* of the person engaging in those behaviors (e.g., to lose weight), or the *function* of those behaviors (e.g., to regulate emotions) is a specific example of one of the underlying questions of the field of psychology: at what level is human behavior best understood? Researchers and clinicians attempt to answer these questions from, primarily, two different perspectives: motivation and consequences. Is someone's substance use behavior best understood from their motivation to use substances (e.g., to fit in with peers) or from the consequences of using substances (e.g., feeling high)? Is cutting best understood by one's motivation, one's

*intent* to cut (e.g., to feel pain), or the consequences, the *function* of cutting (e.g., to relieve negative affect)? Where motivation and consequences tend to differ the most is in the areas of awareness and how they are measured. People are generally aware of *why* they engage in a certain behavior: they fast to lose weight, they burn their skin to feel pain. Due to the awareness of one's reasons for engaging in a behavior, self-report is often sufficient for measuring motive or intent. The consequences of behavior, on the other hand, are not always salient to the individual engaging in a particular behavior and are thus more challenging to measure. For example, someone who restricts their food intake may be aware that they do this to lose weight, but they may not be aware that restricting helps them regulate their emotions (as research suggests). Thus, consequences often need to be measured by an unbiased observer, or via some other form of measurement, such as a reliable and valid sampling of behavior or emotion.

The current study aimed to investigate what best explains the relationship between NSSI and eating disorder behaviors: motivation or consequences, intent or function. Based on previous literature of classifying SIBs (Orlando et al., 2015) and emotional disorders (Kotov et al., 2015), I hypothesized that the relationship between NSSI and eating disorder behaviors would be best understood by their shared function of emotion regulation as opposed to the differing intents of the individuals who engage in them. Structural equation modeling (SEM) was used to assess whether an intent model or a function model best explains the latent nature of NSSI and eating disorder behaviors. I hypothesized that a model based on function would be a better model than one based on

intent in terms of model fit and amount of variance accounted for in the latent variables (NSSI and eating disorder behaviors).

## CHAPTER II

### METHOD

#### Participants

Individuals were recruited from the University of North Dakota SONA system (undergraduate psychology students who receive credit for participating in research studies). Participants were 503 students at a large Midwestern university. Eight participants were excluded due to providing data without providing online consent (did not check the “I consent” box) due to this question not being a “forced response” in Qualtrics; two participants were excluded for providing no data after consenting. Thus, 493 participants provided data that were used in analyses. Participants ranged in age from 18-45 years ( $M=19.39$ ,  $SD=2.38$ ) and primarily identified as white (90.5%), Non-Hispanic (97.2%) females (80.3%; see Table 1 for further demographic data). The majority of students were either freshman (51.1%) or sophomores (27.2%). This study was approved by the University of North Dakota Institutional Review Board (IRB-201608-050).

Table 1. *Demographic information.*

	<i>N</i>	<i>%</i>
Biological Sex		
Female	396	80.3
Male	96	19.5
Intersex	1	0.2
Gender		
Female	393	79.7

Table 1. *con't.*

	<i>N</i>	%
	98	19.9
	1	0.2
	1	0.2
Race		
	8	1.6
	446	90.5
	10	2.0
	15	3.0
	14	2.8
Ethnicity		
	479	97.2
	14	2.8
Year in School		
	252	51.1
	134	27.2
	69	14.0
	37	7.5
	1	.2

## Materials

### Demographics

Questionnaire on Eating and Weight Patterns—Revised (QWEP-R; Spitzer et al., 1992). The QWEP-R includes a number of demographic questions (i.e., age, gender) as well as body image and eating and weight patterns. A number of questions from the original survey were omitted, because eating disorder behaviors were assessed by another measure more suited to the present purposes. Some questions were added to the questionnaire, such as questions about sexual orientation and dietary restrictions (vegetarian, vegan, gluten-free, or none; see Appendix A).

### Behaviors

Lifetime NSSI behaviors were assessed with a list of yes/no statements such as: I have cut myself with a knife or razor, I have pulled out pieces of my hair or eye lashes, I have burned myself. These statements were modeled after the wording of the Non-Suicidal Self-Injury Assessment Tool (NSSI-AT; Whitlock, Exner-Cortens, & Purington, 2014). Lifetime eating disorder behaviors were assessed with a list of yes/no statements such as: I have had a binge eating episode such that I ate an abnormally large amount of food in a short period of time (e.g., less than 2 hours) and felt out of control while I was eating. The wording of these statements is based on the phraseology used in the Eating Disorders Examination – Questionnaire (EDE-Q; Fairburn & Beglin, 1994). In addition, a question regarding excessive exercise was added and modeled after items on the Obligatory Exercise Questionnaire (Pasman & Thompson, 1988). Both NSSI and eating disorder behavior statements did not include language detailing explicit intent of the behavior (i.e., to influence weight or shape) as intent was assessed separately (see Appendix B). The behaviors made up the following indicator variables in the SEM models: number of (lifetime) eating disorder behaviors (e.g., restricting), number of (lifetime) traditional self-harm behaviors (e.g., cutting), number of (lifetime) non-traditional self-harm behaviors (e.g., tattoos). The lifetime behaviors questionnaire had acceptable internal reliability in the current sample, Cronbach's alpha ( $\alpha = .74$ ).

### **Intent**

The Ottawa Self-Injury Inventory – Functions (OSI - F; Cloutier & Nixon, 2003) scale is designed to assess the reasons why individuals engage in non-suicidal self-injury. The participant is presented with 29 reasons for why they have engaged in self-

harm behavior (e.g., to release anger) and asked to rate how true each statement is for them on a 4-point scale (0 = “never” – 3 = “always”). Psychometric analyses of the OSI in a university sample have yielded a stable four-factor structure as well as acceptable convergent and discriminatory validity (Martin, et al., 2013). Because the current study also addressed reasons for eating disorder behaviors, and there currently is not a validated measure for the reasons why an individual may engage in eating disorders, the author added “to lose weight” as a response option. In addition, the OSI includes a question about appearance change (“to change my body image and/or appearance”). In order to rule out suicidal intent, the option “to kill myself” was added to the list of reasons (see Appendix C). Because the current study was interested in assessing the lifetime presence of intent of behaviors and not the frequency, the item responses will be dichotomized such that “0” responses are coded “no” and responses “1, 2, and 3” are coded “yes.” The intent questionnaire had excellent internal consistency in the current sample ( $\alpha = .98$ ).

### **Function**

To assess the function of the endorsed behaviors, the OSI-F questions were transformed into statements that assess whether the behavior was successful in rendering the intended consequence(s). For example, the intent statement “to release anger” as a response to “I burned myself” was transformed into “I felt less angry” as a response to “after I burned myself.” The response options for each function statement were the same four options as the intent statements (“never” – “always”). There was one fewer function item compared to the intent items because assessing the function of “to kill yourself” is unnecessary. All of the function statements were presented, regardless of



which intent statements were selected, as a behavior may elicit a function that was not intended (see Appendix D). For the same reasons described above in the *Intent* section, the items were dichotomized in the same manner. The function questionnaire had excellent internal consistency in the current sample ( $\alpha = .98$ ).

## **NSSI**

Self-Harm Behavior Questionnaire (SHBQ; Gutierrez, Osman, Barrios, & Kopper, 2001). The SHBQ includes four distinct components of self-injury and suicidal behavior/attempts. For the purpose of this study, only the self-harm behaviors (SHB) risk component was utilized. The questionnaire begins by assessing if the participant has ever engaged in some form of NSSI. If they respond yes, they provide free-response answers indicating the specific behavior(s) they engaged in, the frequency, the age they first engaged in and the age of the last time they engaged in the behavior(s), if they have ever told anyone about their use of the behavior(s) and who, and if they ever saw a doctor for their behavior(s; see Appendix E). Gutierrez and Osman (2008) published coding guidelines for how to score the free-response items; a risk score is calculated for each individual by subtracting age of most recent NSSI from current age (scoring: none = 0, 1 year or less = 4, 1–2 years = 3, >2 years = 2). The SHBQ has excellent factor structure; as a result, the NSSI risk factor (SHB) alone has been shown to have excellent internal consistency and moderate convergent validity (Gutierrez, Osman, Barrios, & Kopper, 2001). Consistent with previous research investigating a model of NSSI, negative emotion, and body image (Muehlenkamp & Brausch, 2012), the current study used number of lifetime traditional methods of NSSI (from the NSSI-AT) and SHB as

indicators of the endogenous variable: NSSI psychopathology (Figures 1 and 2). An additional factor, number of lifetime non-traditional methods of NSSI was used in order to assess if the intent and function of piercings and tattoos is similar to those of traditional NSSI behaviors (e.g., cutting). These three factors were also used as indicators of NSSI psychopathology in a second series of exploratory models (Figures 5 and 6). The SHB questionnaire had good internal consistency in the current sample ( $\alpha = .83$ ).

### **Eating Disorder Behaviors**

EDE-Q (Fairburn & Beglin, 1994). The EDE-Q assesses past-month frequency of ED behaviors (i.e., quantity of episodes; Appendix F). Thus, the following 6 behaviors from the EDE-Q were used as indicators of the endogenous variable eating disorder psychopathology: dietary restraint, fasting, self-induced vomiting, laxative use, binge eating, and excessive exercise (Figures 1 and 2). The EDE-Q global score was used as an indicator variable (as well as number of eating disorder behaviors) of eating disorder psychopathology in a second series of exploratory models (Figures 5 and 6). The EDE-Q global score had good internal consistency in the current sample ( $\alpha = .87$ ).

### **Procedure**

Participants provided online consent to participate in the study and then completed the demographic and self-report measures via Qualtrics. Due to the sensitive nature of some of the items, Qualtrics was programmed to automatically provide participants with contact information for national suicide support systems, such as The National Suicide Hotline phone number and website, if they endorsed past or current

suicidal ideation. Participants also indicated if they would like to receive information on local mental health services from the author. The author checked the survey results frequently to monitor responses that indicated current or past suicidal ideation and to provide mental health information to those that expressed interest in receiving it. Upon completion of the survey, participants received one course credit via the UND SONA system.

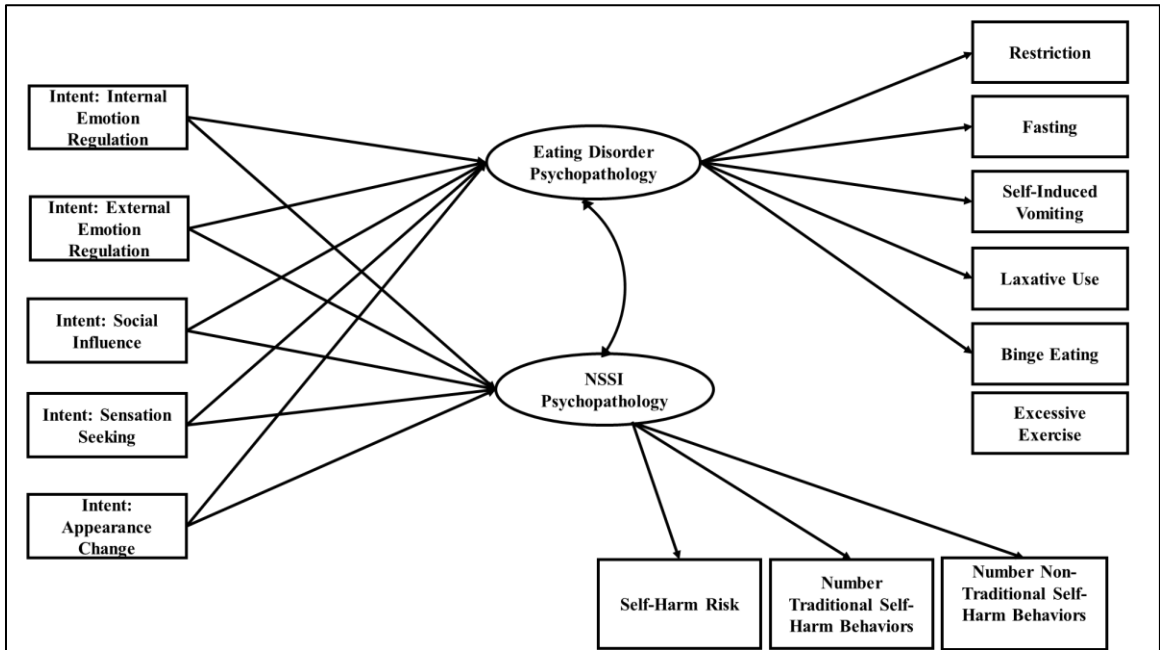
### **Statistical Analysis**

Structural Equation Modeling (SEM) was used to assess which model (an intent model vs. a function model) accounted for more of the variance in the endogenous variables (NSSI and eating disorder psychopathology) and had better model fit. The statistical program AMOS was used to conduct the analyses. As Kline (1998) mentions, there are no power analysis for SEM; however, there are recommendations, such that SEM requires large sample sizes in general. Previous research suggests that a median sample size for SEM analyses is about  $N = 200 - 260$ , with more complex models requiring larger sample sizes (Kline, 1998). The proposed models are relatively straightforward, which indicated that a sample size of approximately 200-260 individuals would be sufficient. However, a larger total sample size was needed due to the relatively low base rates of assessed behaviors (Appendix B). According to previous research, prevalence rates for the behaviors of interest in this study among college students are as follows: NSSI (17%; Claes & Muehlenkamp, 2014), eating disorder behaviors (30.5%; White, Reynolds-Malear, & Cordero, 2011), and tattoos and piercings (14% and 37%, respectively; Koch, Roberts, Armstrong, & Owen, 2010). Given that the most frequent

behavior (piercing) is about 40%, the total sample size for this study was aimed to be 500 participants, which was hypothesized to yield about 200 participants that would contribute data to the SEM model, which is within the recommended range for non-mediation/moderation models. The current study had 493 participants that contributed to the SEM model.

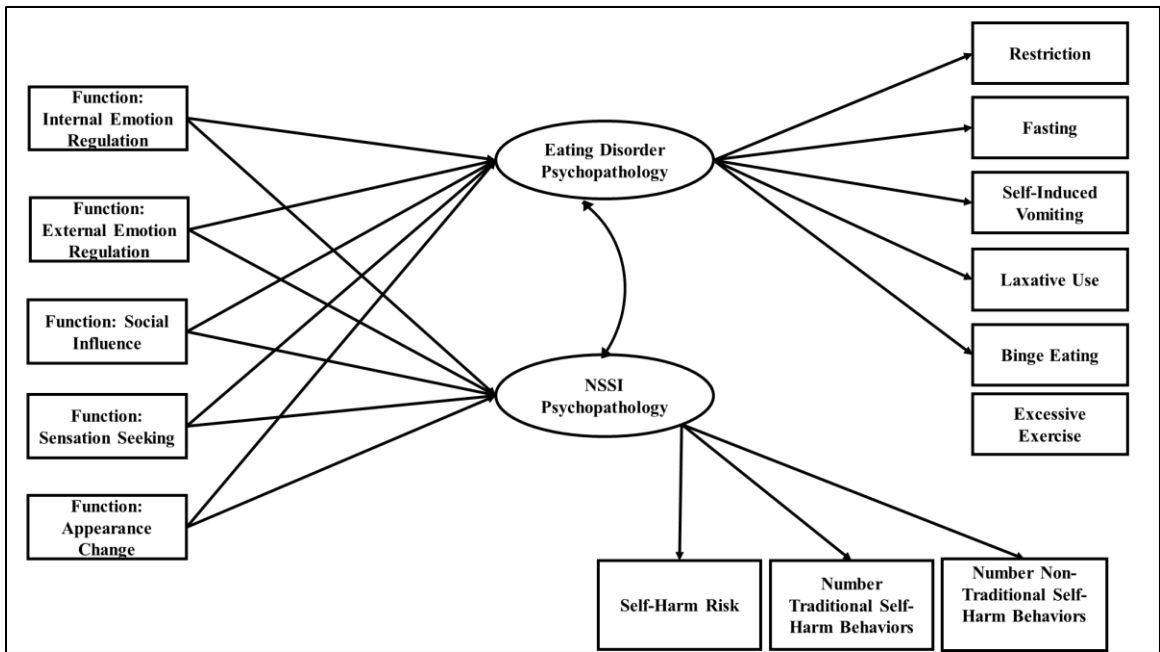
In both the proposed intent model and the function model, NSSI and eating disorder psychopathology were the endogenous variables (see Figures 1 and 2). In the intent model (Figure 1), the predictor variables were created based on the previously determined factors of the measure of intent (OSI - F; Cloutier & Nixon, 2003; Martin, et al., 2013) and the addition of appearance-related questions. Thus, five predictor variables were created with the inclusion of the appearance related questions: internal emotion regulation (e.g., to stop feeling lonely), external emotion regulation (e.g., to release frustration), social influence (e.g., to get attention), sensation seeking (e.g., to feel high), and appearance-related (e.g., to change body image; see Table 2 for which questions were included in each predictor variable). Given that the function questions are based off of the intent questions, the five predictor variables for the function model were similar, but based on consequences of behavior rather than the intent of the behavior: internal emotion regulation (e.g., felt less lonely), external emotion regulation (e.g., relieved anger), social influence (e.g., got attention), sensation seeking (e.g., felt high), and appearance-related (e.g., changed body image; Table 2; Figure 2). Significance was tested at  $p < .05$ .

Figure 1. *Proposed intent model of NSSI and eating disorder behaviors.*



Note. NSSI = non-suicidal self-injury

Figure 2. *Proposed function model of NSSI and eating disorder behaviors.*



*Note.* NSSI = non-suicidal self-injury

Table 2. *Content of each predictor variable in the intent and function models.*

**Internal Emotion Regulation**

Punish self  
Experience physical pain in one area  
Distract from memories  
Stop feeling alone and empty  
To feel real  
Stop feeling sad  
Stop behaviors of killing myself  
Stop thoughts of killing myself  
To kill myself (Intent only)

**External Emotion Regulation**

Relieve guilt  
Release frustration  
Release anger  
Release tension

**Social Influence**

Get out of doing something  
Belong to a group  
Decrease sexual arousal  
Seek attention from others  
Avoid getting in trouble  
Stop being angry at my parents  
To show how much I hurt  
To stop expectations

**Sensation Seeking**

Provide excitement  
Feel high  
Prove to myself I can take it  
Sexual excitement

**Appearance Change**

Change to body image  
To lose weight

Bentler and Bonnett (1980) recommend using multiple goodness of fit indices to comprehensively assess models. Thus, the following recommended goodness of fit indices were used in the current study with their recommended numerical cut-offs: Chi-Square Difference Test (Bentler & Bonnett, 1980), ideal when non-significant, and relative chi-square (the quotient of chi-square divided by *dfs*) < 3.00 (Brown & Cudeck, 1993; Garson, 2015), Normed Fit Index (NFI) and Comparative Fit Index (CFI) > .95, and Root Mean Squared Error of Approximation (RMSEA; Fan & Sivo, 2005) and RMSEA 90% confidence intervals (CIs) < .08, with excellent model fit RMSEA < .05 (Brown & Cudeck, 1993). These values as well as the amount of variance accounted for in both endogenous variables in each model were used to determine how well the data fit each model.

## CHAPTER III

### RESULTS

Table 3 includes the means, standard deviations, and ranges for the predictor and indicator variables. There were minimal missing data, as individuals who reported never engaging in behaviors were assigned intent and function scores of zero, which allowed them to be included in analyses. Thus, the sample size was the same for each variable ( $N = 493$ ). The most frequently endorsed form of lifetime traditional NSSI was skin picking (57.4%), followed by hair pulling (14.4%), cutting (13.2%), and scratching/pinching (12.6%). The rest of the traditional NSSI behaviors ranged from 0.4 – 8.1% (prevent wounds from healing, etc.). In terms of non-traditional NSSI, 70.6% reported having gotten a piercing and 27.6% reported having gotten a tattoo. The most prevalent lifetime eating disorder behavior was restriction (55.4%), followed by excessive exercise (38.3%) and binge eating (36.3%).

Table 3. *Means, standard deviations, and ranges of predictor and indicator variables.*

Indicator Variables	<i>M</i>	<i>SD</i>	Range
<b>Eating disorder behaviors (EDE-Q)</b>			
Restriction	.64	1.18	0 – 4 days
Fasting	.13	.54	0 – 4 days
Self-induced vomiting	.20	1.32	0 – 19 instances
Laxative use	.21	1.56	0 – 20 instances
Binge eating	1.43	10.02	0 – 215 instances



Table 3. *con't.*

	<i>M</i>	<i>SD</i>	Range
Excessive exercise	3.11	6.27	0 – 28 instances
Global Score	1.05	0.85	0 - 3.66
<b>Number of Eating Disorder Behaviors</b>	1.84	1.56	0 – 6
<b>NSSI</b>			
Self-harm risk (SHB)	2.35	4.91	0 – 16
Number traditional self-harm behaviors	1.41	1.77	0 – 11
Number non-traditional self-harm	.98	.71	0 – 2
<b>Predictor Variables</b>			
Intent: internal emotion regulation	2.30	2.68	0 – 9
Intent: external emotion regulation	1.76	1.62	0 – 4
Intent: social influence	1.10	1.77	0 – 8
Intent: sensation seeking	.96	1.15	0 – 4
Intent: appearance change	1.24	.85	0 – 2
Function: internal emotion regulation	1.74	2.42	0 – 8
Function: external emotion regulation	1.59	1.56	0 – 4
Function: social influence	.92	1.6	0 – 8
Function: sensation seeking	.95	1.18	0 – 4

### Correlations

Intercorrelations of the observed variables are presented in Table 4;

Spearman's rho ( $r_s$ ) was used due to the variables not being normally distributed.

Significant correlations ranged from  $r_s = 0.09$  to  $0.85$ . The strongest correlation was between function: external emotion regulation and intent: external emotion regulation in that those who reported greater intent to regulate external emotions by using behaviors tended to report experiencing greater regulation of external emotions after engaging in behaviors (function). The second highest correlation ( $r_s = 0.82$ ) indicated that those who reported greater intent to regulate internal emotions also reported greater intent to regulate external emotions. Individuals who reported greater intent to regulate internal emotions reported experiencing greater regulation of internal emotions after engaging in behaviors (function;  $r_s = 0.81$ ). The correlations between the intent variables and their respective function variables (e.g., intent: appearance change and function: appearance change) ranged from  $r_s = 0.72$  to  $0.85$ , with the correlation between the external emotion regulation variables being the strongest. The significant correlations between the NSSI and eating disorder variables ranged from  $r_s = 0.09$  to  $0.15$ , with the relationship between SHB risk and binge eating being the strongest. Individuals that were at higher risk for engaging in self-harm behaviors reported more frequent binge eating in the past 28 days. There were no significant correlations between eating disorder behaviors and number of traditional and non-traditional NSSI behaviors. On the contrary, number of eating disorder behaviors and EDE-Q global score were significantly and positively correlated with each predictor and indicator variable. Number of eating disorder behaviors was most strongly associated with intent: internal emotion regulation ( $r_s = 0.63$ ), and EDE-Q global score was most strongly associated with intent: appearance change.

Table 4. Intercorrelation table between observed and indicator variables.

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1. IIR	1																				
2. IER	.82**	1																			
3. ISI	.62**	.60**	1																		
4. ISS	.65**	.64**	.64**	1																	
5. IAC	.62**	.60**	.50**	.54**	1																
6. FIR	.81**	.78**	.60**	.62**	.60**	1															
7. FER	.75**	.85**	.54**	.62**	.60**	.80**	1														
8. FSI	.50**	.50**	.72**	.56**	.41**	.55**	.51**	1													
9. FSS	.60**	.60**	.60**	.80**	.51**	.60**	.63**	.60**	1												
10. FAC	.55**	.56**	.43**	.55**	.74**	.55**	.61**	.46**	.53**	1											
11. Rest	.22**	.22**	.13**	.17**	.31**	.24**	.28**	.16**	.17**	.33**	1										
12. Fast	.25**	.29**	.12*	.14**	.24**	.20**	.18**	.11*	.14**	.20**	.29**	1									
13. BE	.40**	.34*	.34**	.32**	.28*	.33**	.36**	.34**	.26**	.30**	.27**	.15**	1								
14. SIV	.23**	.22**	.07	.12**	.15**	.24**	.21**	.10*	.05	.12**	.16**	.15**	.23**	1							
15. Lax	.14**	.11*	.12*	.08	.15**	.13**	.13**	.12**	.12**	.15**	.11**	.07	.12**	.38**	1						
16. EE	.36**	.40**	.27**	.39**	.41**	.40**	.45**	.28**	.34**	.50**	.34**	.20**	.26**	.20**	.19**	1					
17. NT	.52**	.50**	.32**	.34**	.31**	.45**	.41**	.27**	.30**	.21**	.01	.02	.07	.06	.02	.068	1				
18. NN	.20**	.20**	.15**	.17**	.17**	.14**	.15**	.07**	.16**	.17*	.02	.00	.08	.02	.02	.03	.23**	1			
19. SHB	.55**	.44**	.30**	.34**	.29**	.51**	.38**	.23**	.27**	.23**	.03	.14**	.15**	.09*	.04	.12**	.51**	.19**	1		
20. NE	.63**	.61**	.44**	.52**	.63**	.57**	.57**	.37**	.47**	.55**	.23**	.24**	.37**	.22**	.19**	.35**	.28**	.13**	.33**	1	
21. EG	.47**	.44**	.28**	.37**	.53**	.44**	.49**	.28**	.38**	.48**	.59**	.34**	.41**	.18**	.13**	.43**	.13**	.13**	.24**	.38**	1

*Note.* IIR = Intent: Internal Emotion Regulation; IER = Intent: External Emotion Regulation; ISI = Intent: Social Influence; ISS = Intent: Sensation Seeking; IAC = Intent: Appearance Change; FIR = Function: Internal Emotion Regulation; FER = Function: External Emotion Regulation; FSI = Function: Social Influence; FSS = Function: Sensation Seeking; FAC = Function: Appearance Change; Rest = Restriction; Fast = Fasting; BE = Binge Eating; SIV = Self-induced vomiting; Lax = Laxatives; EE = Excessive Exercise; NT = number traditional self-harm behaviors; NN = number non-traditional self-harm behaviors; SHB = Self-Harm Risk; NE = Number of Eating Disorder Behaviors; EG = EDE-Q Global Score.

## Modeling

### Model Series 1

#### Measurement Model (Confirmatory Factor Analysis [CFA]) – Intent.

A CFA was constructed with the six eating disorder behaviors, the three NSSI variables, the five intent variables, and the two latent variables: eating disorder and NSSI

psychopathology. Restriction, fasting, self-induced vomiting, laxative use, binge eating, and excessive exercise were indicators of eating disorder psychopathology and self-harm risk, number of traditional self-harm behaviors, and number of non-traditional self-harm behaviors were indicators of NSSI psychopathology.

After specifying intercorrelations among indicator error terms, the CFA was an excellent fit to the data,  $\chi^2(51) = 52.00, p < .435$ , RMSEA = .006, RMSEA 90% CI = [ $<.001$  - .030], NFI = .978, CFI = 1.00, relative  $\chi^2 = 1.02$ .

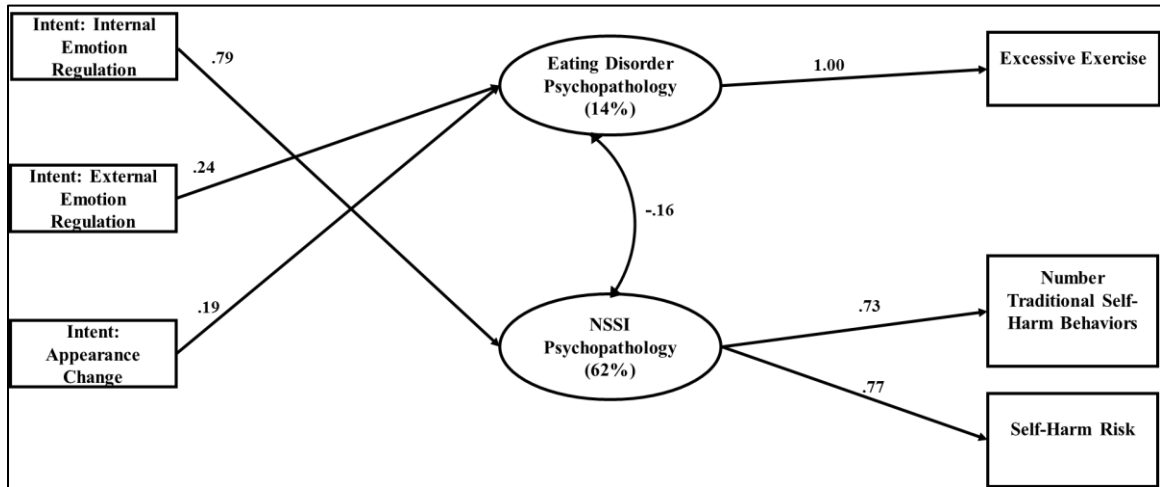
**Structural Model – Intent.** The variables from the CFA were carried over into SEM. NSSI and eating disorder psychopathology remained as the endogenous variables; self-harm risk, number of traditional self-harm behaviors, and number of non-traditional self-harm behaviors remained as indicators of NSSI psychopathology and all six indicators of eating disorder psychopathology remained. The five intent predictor variables remained as observed variables, with each directly predicting NSSI and eating disorder psychopathology.

Number of non-traditional self-injury behaviors did not load onto NSSI ( $\beta = .25$ ) with respect to the “.7 rule-of-thumb,” which suggests that standardized paths have coefficients above .7, or at least above .6, which is a more liberal factor loading cutoff (Garson, 2015). Thus, self-induced vomiting ( $\beta = .28$ ), binge eating ( $\beta = .12$ ), laxative use ( $\beta = .27$ ), fasting ( $\beta = .38$ ), and restricting ( $\beta = .48$ ) did not adequately load onto eating disorder behaviors. These were trimmed from subsequent analyses. Excessive exercise ( $\beta = .60$ ) did not meet the recommended .7 criteria, but met the .6 criteria. Garson (2015) indicates that variables that are essential to the theory of the model remain in the model

as long as they load adequately (about .6 as mentioned above; p. 95); thus, excessive exercise was kept in the model

In the initial SEM specification, sensation-seeking did not significantly predict eating disorder behaviors ( $\beta = -.18$ ) or NSSI ( $\beta = .05$ ), internal emotion regulation ( $\beta = .18$ ) and social influence ( $\beta = .04$ ) did not significantly predict eating disorder behaviors, external emotion regulation ( $\beta = -.02$ ) and appearance change ( $\beta = -.03$ ) did not significantly predict NSSI; these were removed from the model. While social influence was a significant predictor of NSSI, it was negatively associated with NSSI, which is not interpretable, given the data (i.e., if someone has never engaged in NSSI then they would have no response for how it related to social influence). In these circumstances, another predictor variable in the model is accounting for the positive variance in the predictor in question and thus only negative variance is left. Thus, social influence was also removed from the model. The final model had an excellent fit,  $\chi^2(5) = 6.480$ ,  $p = .262$ , RMSEA = .025, RMSEA 90% CI = [ $<.001$  - .071], NFI = .995, CFI = .999, relative  $\chi^2 = 1.296$ . As demonstrated in Figure 3, internal emotion regulation had a strong direct path to NSSI; this accounted for 62% of the variance in NSSI. External emotion regulation and appearance change both had a moderate direct path to eating disorder behaviors and accounted for 14% of the variance. There was an inverse relationship between the two latent variables ( $r = -.16$ ), indicating more frequent excessive exercise in the past 28 days was associated with less severe lifetime NSSI.

Figure 3. *Final intent model of NSSI and eating disorder behaviors for model series 1.*



Note. NSSI = non-suicidal self-injury

**Measurement Model (CFA) – Function.** A CFA was constructed with the six eating disorder behaviors, the three NSSI variables, the five intent variables, and the two latent variables: eating disorder and NSSI psychopathology. Restriction, fasting, self-induced vomiting, laxative use, binge eating, and excessive exercise were indicators of eating disorder psychopathology and self-harm risk, number of traditional self-harm behaviors, and number of non-traditional self-harm behaviors were indicators of NSSI psychopathology.

After specifying intercorrelations among indicator error terms, the CFA was an excellent fit to the data,  $\chi^2(48) = 47.987, p = .473, RMSEA < .001, RMSEA\ 90\% CI = [<.001 - .029], NFI = .979, CFI = 1.00, relative\ \chi^2 = 1.00.$

**Structural Model – Function.** The variables from the CFA were carried over into SEM. NSSI and eating disorder psychopathology remained as the endogenous variables; self-harm risk, number of traditional self-harm behaviors, and number of non-

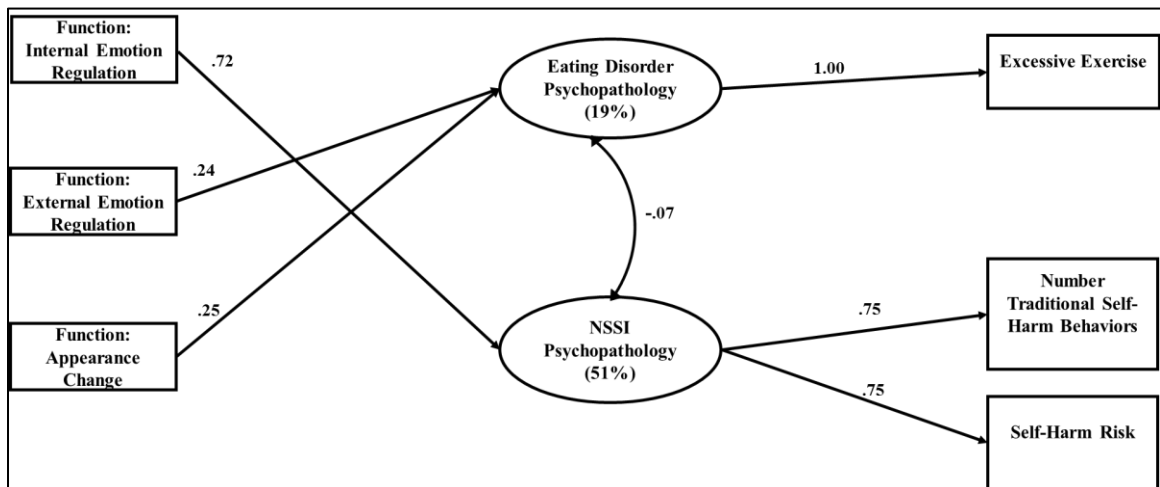
traditional self-harm behaviors remained as indicators of NSSI psychopathology and all six indicators of eating disorder psychopathology remained. The five function predictor variables remained as observed variables, with each directly predicting NSSI and eating disorder psychopathology.

Following the same recommendation as before (Garson, 2015), number of non-traditional self-injury behaviors did not load onto NSSI ( $\beta = .31$ ), and self-induced vomiting ( $\beta = .28$ ), binge eating ( $\beta = .11$ ), fasting ( $\beta = .32$ ), restriction ( $\beta = .48$ ) and laxative use ( $\beta = .21$ ) did not load onto eating disorder behaviors. These were trimmed from subsequent analyses.

In the initial SEM specification, sensation-seeking did not significantly predict eating disorder behaviors ( $\beta = -.05$ ) or NSSI ( $\beta = .01$ ), internal emotion regulation ( $\beta = .01$ ) and social influence ( $\beta = .02$ ) did not significantly predict eating disorder behaviors, and external emotion regulation ( $\beta = .03$ ) and appearance change ( $\beta = -.06$ ) did not significantly predict NSSI; these were removed from the model. While social influence was a significant predictor of NSSI, it was negatively associated with NSSI, which is not interpretable, given the data (i.e., if someone has never engaged in NSSI then they would have no response for how it related to social influence). In these circumstances, another predictor variable in the model is accounting for the positive variance in the predictor in question and thus only negative variance is left. Thus, social influence was also removed from the model. The final model had an excellent fit,  $\chi^2(6) = 7.056$ ,  $p = .316$ , RMSEA = .019, RMSEA 90% CI = [ $<.001$  - .064], NFI = .994, CFI = .999, relative  $\chi^2 = 1.176$ . As demonstrated in Figure 4, internal emotion regulation had a strong direct path to NSSI,

which accounted for 51% of the variance in NSSI. External emotion regulation and appearance change both had a moderate direct path to eating disorder behaviors and accounted for 19% of the variance. Similar to the intent model, there was an inverse relationship between the two latent variables ( $r = -.07$ ) indicating more frequent excessive exercise in the past 28 days was associated with less severe lifetime NSSI.

Figure 4. *Final function model of NSSI and eating disorder behaviors for model series 1.*



Note. NSSI = non-suicidal self-injury

**Intent Model vs. Function Model.** In order to determine if there was a significant difference between the intent model and the function model, a delta  $\chi^2$  test was run, yielding no significant difference between the two,  $\Delta \chi^2(1) = 0.576, p = .45$ .

Given that the SEM analyses of Model Series 1 resulted in 1) removing eating disorder behaviors from the model that have been shown to be related to NSSI and emotion regulation (and only leaving one behavior as the indicator of eating disorder psychopathology) and 2) an inverse relationship between NSSI and eating disorder psychopathology, which is contradictory to the theory underlying the proposed models, it



was decided that another exploratory set of models should be tested to examine the data based on theory and previous research: that NSSI and eating disorder behaviors are positively related. In the second set of models, the six eating disorder behavior indicator variables were replaced with number of lifetime eating disorder behaviors and EDE-Q global score. This was done to mirror the indicator variables of the NSSI latent construct in timeframe assessed and metric used to quantify the psychopathology in the hopes that the expected positive relationship would emerge. Thus, Model Series 2 (below) was conducted as a change to the methodology in investigating the relationship between eating disorder and NSSI psychopathology in order to attempt to achieve a positive relationship between the latent constructs and increase the amount of variance accounted for in each latent variable.

### **Model Series 2**

**Measurement Model (CFA) – Intent.** A CFA was constructed with the two eating disorder indicators (EDE-Q global and number of eating disorder behaviors), the three NSSI indicators (SHB risk, number of traditional NSSI behaviors, and number of non-traditional NSSI behaviors), the five intent variables, and the two latent variables: eating disorder and NSSI psychopathology.

After specifying intercorrelations among indicator error terms, the CFA was an excellent fit to the data,  $\chi^2(16) = 19.243$ ,  $p = .256$ , RMSEA = .020, RMSEA 90% CI = [ $<.001$  - .048], NFI = .992, CFI = .999, relative  $\chi^2 = 1.203$ . With respect to the advised cut-offs mentioned earlier (Garson, 2015), non-traditional self-harm behaviors ( $\beta = .24$ ) did not load onto NSSI psychopathology. Though EDE-Q global score ( $\beta = .56$ )

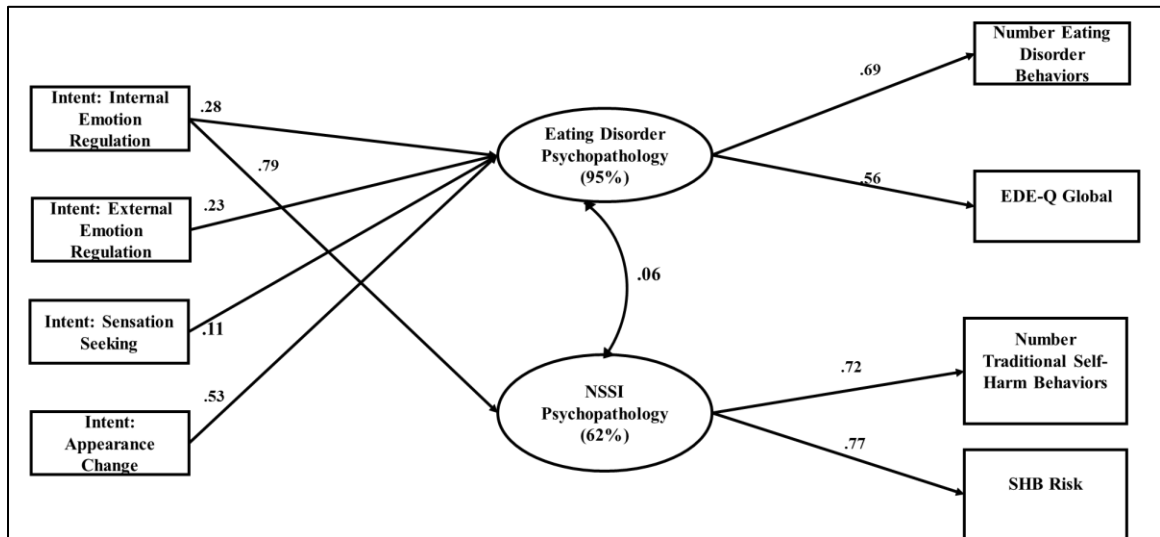
was a bit less than .6, the liberal suggested cut-off, it was retained in the model because it rounded to .6 and was an essential indicator to the model in terms of theory. The CFA without the non-traditional NSSI behaviors indicator was an excellent fit to the data,  $\chi^2(8) = 12.44$ ,  $p = .133$ , RMSEA = .034, RMSEA 90% CI = [ $<.001$  - .068], NFI = .995, CFI = .998, relative  $\chi^2 = 1.56$ . This was not a significant improvement from the previous model,  $\Delta \chi^2(8) = 6.80$ ,  $p = .58$ .

**Structural Model – Intent.** The variables from the CFA were carried over into SEM. eating disorder and NSSI psychopathology remained as the endogenous variables; SHB risk and number of traditional NSSI behaviors remained as indicators of NSSI and EDE-Q global score and number of eating disorder behaviors remained as indicators of eating disorder psychopathology. The five intent predictor variables remained as observed variables, with each directly predicting both latent variables.

In the initial SEM specification, the following variables did not significantly predict NSSI: external emotion regulation ( $\beta = -.03$ ), sensation seeking ( $\beta = .04$ ), and appearance change ( $\beta = -.03$ ). Social influence did not predict eating disorder severity ( $\beta = -.11$ ). These predictor variables were removed from the model. While social influence was a significant predictor of NSSI, it was negatively associated with NSSI, which is not interpretable, given the data (i.e., if someone has never engaged in NSSI then they would have no response for how it related to social influence). In these circumstances, another predictor variable in the model is accounting for the positive variance in the predictor in question and thus only negative variance is left. Thus, social influence was also removed from the model. The final model had an excellent fit,  $\chi^2(10)$

= 15.283,  $p = .122$ , RMSEA = .033, RMSEA 90% CI = [ $<.001 - .064$ ], NFI = .992, CFI = .997, relative  $\chi^2 = 1.528$ . As demonstrated in Figure 5, internal emotion regulation had a strong direct path to NSSI. This variable accounted for 62% of the variance in NSSI. Internal emotion regulation, external emotion regulation, and appearance change all had moderate direct paths to eating disorder psychopathology; sensation-seeking had a weak direct path. The four eating disorder severity predictors accounted for 95% of the variance. There was a positive relationship between the two latent variables ( $r = .06$ ), indicating that those with more severe eating disorder psychopathology tend to have more severe NSSI psychopathology.

Figure 5. Final intent model of NSSI and eating disorder behaviors for model series 2.



Note. NSSI = non-suicidal self-injury

**Measurement Model (CFA) – Function.** A CFA was constructed with the two eating disorder indicators (EDE-Q global score and number of eating disorder behaviors), the three NSSI indicators (SHB risk, Number of traditional NSSI behaviors,

and number of non-traditional NSSI behaviors), the five function variables, and the two latent variables: eating disorder and NSSI psychopathology.

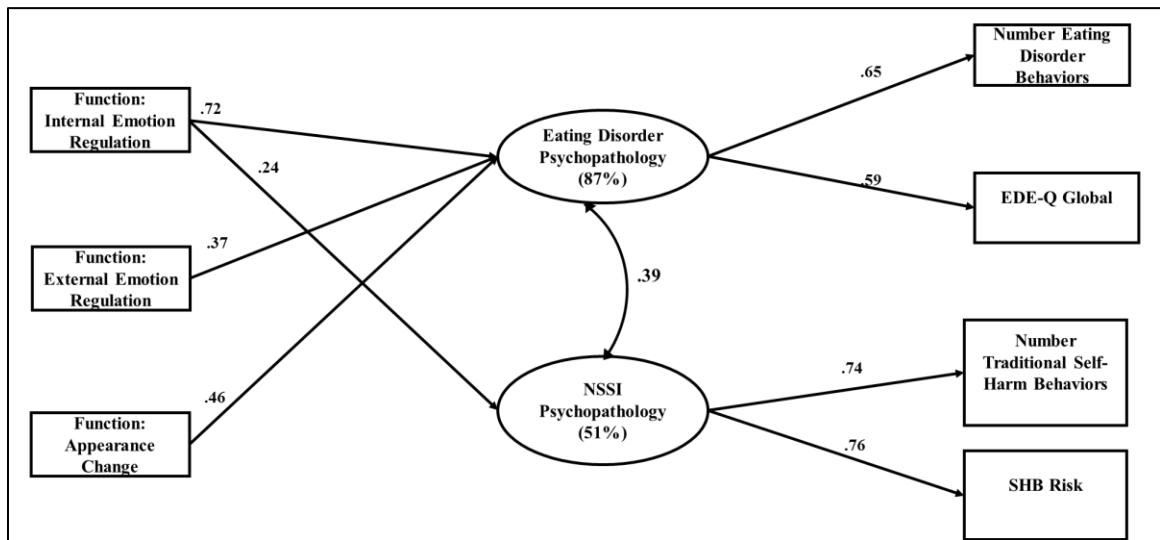
After specifying intercorrelations among indicator error terms, the CFA was an excellent fit to the data,  $\chi^2(15) = 16.690$ ,  $p = .338$ , RMSEA = .015, RMSEA 90% CI = [ $<.001$  - .046], NFI = .992, CFI = .999, relative  $\chi^2 = 1.113$ . However, number of non-traditional self-injury behaviors did not load onto NSSI ( $\beta = .24$ ) with respect to the Garson's (2015) "rule-of-thumb." EDE-Q global score ( $\beta = .59$ ) and number of eating disorder behaviors ( $\beta = .65$ ) remained since they are essential to the theory underlying the model. The CFA without the non-traditional NSSI behaviors indicator was an excellent fit to the data,  $\chi^2(8) = 8.930$ ,  $p = .348$ , RMSEA = .026, RMSEA 90% CI = [ $<.001$  - .065], NFI = .994, CFI = .998, relative  $\chi^2 = 1.34$ . This was not a significant improvement from the previous model,  $\Delta \chi^2(8) = 6.80$ ,  $p = .35$ .

**Structural Model – Function.** The variables from the CFA were carried over into SEM. Eating disorder and NSSI psychopathology remained as the endogenous variables; SHB risk and number of traditional NSSI behaviors remained as indicators of NSSI and EDE-Q global score and number of eating disorder behaviors remained as indicators of eating disorder psychopathology. The five function predictor variables remained as observed variables, with each directly predicting both latent variables.

In the initial SEM specification, the following variables did not significantly predict NSSI: external emotion regulation ( $\beta = .06$ ), sensation seeking ( $\beta = -.03$ ), and appearance change ( $\beta = -.06$ ). Social influence did not predict eating disorder psychopathology ( $\beta = -.10$ ), and neither did sensation seeking ( $\beta = -.03$ ). These predictor

variables were removed from the model. While social influence was a significant predictor of NSSI, it was negatively associated with NSSI, which is not a possible relationship given the data (as previously mentioned). Thus, social influence was also removed from the model. The final model had an excellent fit,  $\chi^2(7) = 9.38, p = .23$ , RMSEA = .015, RMSEA 90% CI = [ $<.001 - .056$ ], NFI = .996, CFI = 1.00, relative  $\chi^2 = 1.12$ . As demonstrated in Figure 6, internal emotion regulation had a strong direct path to NSSI. These variables accounted for 51% of the variance in NSSI. Internal emotion regulation, external emotion regulation, and appearance change all had moderate direct paths to eating disorder risk and accounted for 87% of the variance. There was a positive relationship between the two latent variables ( $r = .39$ ), indicating that those with more severe eating disorder psychopathology tend to have more severe NSSI psychopathology.

Figure 6. *Final function model of NSSI and eating disorder behaviors for model series 2.*



Note. NSSI = non-suicidal self-injury

**Intent Model vs. Function Model.** To determine if there was a significant difference between the intent model and the function model, a delta  $\chi^2$  test was run, yielding no significant difference between the two,  $\Delta \chi^2(3) = 5.90, p = .12$ .

### **Model Series 1 vs. Model Series 2**

**Intent.** A delta  $\chi^2$  test was run in order to determine if there was a significant difference between the intent models of Model Series 1 and Model Series 2. There was no significant difference between the two,  $\Delta \chi^2(5) = 8.803, p = .12$ . The predictors of NSSI psychopathology in both models accounted for the same percent of variance (62%). In terms of eating disorder psychopathology, the predictors in Model Series 1 accounted for 14% of the variance versus 95% in Model Series 2. While there is not a way to show whether this difference in amount of variance accounted for is significant, the predictors from Model Series 2 accounted for 81% more of the variance than those in Model Series 1 while also having excellent model fit. Thus, the intent model from Model Series 2 is favored for the current data set.

**Function.** A delta  $\chi^2$  test was run in order to determine if there was a significant difference between the intent models of Model Series 1 and Model Series 2. There was no significant difference between the two,  $\Delta \chi^2(1) = 2.324, p = .13$ . The predictors of NSSI psychopathology in both models accounted for the same percent of variance (51%). In terms of eating disorder psychopathology, the predictors in Model Series 1 accounted for 19% of the variance versus 87% in Model Series 2. While there is not a way to show whether this difference in amount of variance accounted for is significant, the predictors from Model Series 2 accounted for 68% more of the variance

than those in Model Series 1 while also having excellent model fit. Thus, the intent model from Model Series 2 is favored for the current data set.

## **CHAPTER IV**

### **DISCUSSION**

#### **Model Series 1**

The current study sought to identify the latent structure of eating disorder and NSSI psychopathology based on the intent and function of these behaviors in a college sample (a population where these behaviors tend to be more common compared to other populations; Claes & Muehlenkamp, 2014; Gollust et al., 2008). It was hypothesized that a model based on function would be a better fitting model than one based on intent in terms of model fit and amount of variance accounted for in the latent variables (NSSI and eating disorder behaviors psychopathology). The final versions of both models (intent and function) from Model Series 1 yielded excellent fit to the data as indicated by multiple fit indices. When compared to one another with a chi-square difference test, the models were not found to be significantly different from one another. That is, one model did not fit the data better than the other. In both models from Model Series 1, only internal emotion regulation predicted NSSI, and only external emotion regulation and appearance change predicted eating disorder behaviors. Descriptively, the NSSI psychopathology predictors explained 11% more variance in NSSI in the intent model than the function model; the eating disorder psychopathology predictors explained 5% more variance in eating disorder behaviors in the function model than the intent model. In both models, the latent variables were negatively associated (which is inconsistent with existing literature).



The analyses of the models in Model Series 1 called for trimming eating disorder behaviors from the model that have otherwise been shown to be related to both NSSI and emotion regulation, except for excessive exercise. This is especially problematic as eating disorder psychopathology has been shown to include many more constructs (e.g., behaviors) than just excessive exercise (Fairburn & Beglin, 1994; Garner, 2002). It is also problematic that the only significant bivariate correlations between eating disorder behaviors and the NSSI indicator variables were SHB risk associated with fasting, binge eating, self-induced vomiting, and excessive exercise. These significant positive relationships suggest that those eating disorder behaviors are important to have in the model; however, the CFA called to trim these indicators. Similarly, number of NSSI behaviors was not significantly associated with any of the eating disorder behavior variables. Given that NSSI and eating disorders have been found to be concurrently related and predictive of one another (Turner et al., 2015), it is evident that the variables in the proposed model may not have been ideal indicators of the latent construct of eating disorder psychopathology.

A potential contribution to these findings is that number of NSSI behaviors was indicated by lifetime presence and eating disorder behavior frequency was only over the past 28 days. Similarly, given that the eating disorders latent variable was only constructed of specific behaviors and the NSSI latent variable was made up of risk and number of symptoms, the two latent variables were comprised of different components: specific behavior frequency versus severity. This may contribute to the negative relationship between the two latent variables found in Model Series 1. A

possible explanation for this negative association may be due to individuals in the current study engaging in eating disorder behaviors when they are not at high risk for NSSI or, conversely, they are not engaging in eating disorder behaviors when they are at high risk for NSSI. Individuals in this study may be using NSSI and eating disorder behaviors to replace one another and *not* using them concurrently, though these behaviors have been shown to co-occur in non-clinical samples (Turner et al., 2015), thus highlighting the importance of replication in this at-risk population. None-the-less, the results of the proposed models made it clear that the models needed to be altered in order to test the expected relationship between NSSI and eating disorder psychopathology.

### **Model Series 2**

For Model Series 2, the eating disorder indicators for the intent and function models were changed to mirror the NSSI indicator variables. Not only did these models yield a positive relationship between NSSI and eating disorder psychopathology, but they also indicated that internal emotion regulation is associated with both eating disorders and NSSI in terms of intent and function. The analyses from Model Series 1 found internal emotion regulation to be only predictive of NSSI, which is inconsistent with the literature. The final models of Model Series 1 and Model Series 2 both indicated that appearance change and external emotion regulation are associated with eating disorders, but not NSSI. While internal emotion regulation accounted for similar percentages of the variance in NSSI psychopathology in all models, the predictor variables of eating disorder psychopathology in Model Series 2 (internal and external emotion regulation and sensation seeking [intent only]) accounted for more variance in

both models than external emotion regulation and appearance change in the models from Model Series 1 (Figure 3 versus 5; Figure 4 versus 6). This indicates that the models from Model Series 2 included an improved depiction of the relationship between intent/function variables and eating disorder psychopathology.

### **Theoretical Implications**

The findings of the current study are consistent with existing theory and literature in that all models implicated at least some type of emotion regulation as an important factor in both the intent and function of eating disorder and NSSI psychopathology. However, the type of emotion regulation may differ between the two. Individuals who engage in eating disorder behaviors may tend to do so in order to regulate internal *and* external emotions (e.g., guilt) and feel as if they have regulated both types of emotions after engaging in the behaviors. In turn, those who seek out NSSI tend to do so to regulate internal emotions (e.g., loneliness) and report that engaging in NSSI tends to help them regulate those internal emotions (e.g., feel less lonely) while not being related to external emotions. Thus, these results are consistent with previous research that both eating disorder behaviors (Cook, Wonderlich, & Lavender, 2014; Haedt-Matt & Keel, 2011, 2015) and NSSI (Andover & Morris, 2014) serve as a way to regulate emotions *and* that individuals seek out both types of these behaviors to regulate emotions, though internal emotion regulation seems to be the particularly salient to NSSI.

The ambiguity of “self-harm” behaviors as mentioned earlier (Gratz, 2001; Laye-Gindhu and Schonert-Reichl, 2005) remains after this study, though this study was able to exclude tattoos and piercings as indicators of NSSI. From the current findings, it

appears that direct and indirect self-harm (e.g., eating disorder behaviors) are associated with emotion regulation, which may be a key component in future definitions of SIBs. Appearance change was only indicative of eating disorder psychopathology. Thus, it appears that while individuals engage in eating disorder behaviors for reasons related to emotion regulation as well as appearance change, those who engage in NSSI primarily perform those behaviors to regulate their internal emotions (intent) and do not endorse appearance change intents or functions.

The findings that eating disorder psychopathology is associated with the function of regulating internal and external emotions and appearance change and NSSI is solely associated with in the function of regulating internal emotions may shed light on how these behaviors should be classified and, therefore, treated. Although these behaviors appear to serve similar functions, eating disorder behaviors appear to serve other functions as well. Thus, the question remains if these other functions of eating disorder behaviors are enough to categorically and diagnostically set them apart from NSSI. That is, is the fact that appearance change is an important function of eating disorder behaviors salient enough to categorize, and therefore treat, them differently than NSSI? It would be beneficial for future research to investigate the relationship between eating disorder behaviors and NSSI further in terms of types of emotion regulation and appearance change to further theory and empirical classification of these behaviors.

### **Implications for Clinical Practice**

The current study found that NSSI may typically function to regulate internal emotions and eating disorder behaviors may typically function to regulate both

internal and external emotions. To the author's knowledge, no eating disorder research has investigated the differences between external and internal emotion regulation as they relate to function of eating disorder behaviors. Thus, this study provides insight to future research to investigate types of emotion regulation in relation to eating disorder behaviors. This may inform interventions for eating disorder behaviors, such as focusing on external *and* internal emotion control as well as appearance change. Similarly, given that the path from internal emotion regulation to NSSI was by far the strongest in all models, perhaps NSSI interventions should focus primarily on appropriate methods of internal emotional control as a way to replace harmful NSSI. In all, these findings provide some evidence that perhaps NSSI and eating disorders fall on an emotion regulation continuum, with external and internal emotion regulation being specific locations on that continuum.

However, the study models make it clear that emotion regulation is not the only facet to address in treatments and interventions. The intent and function of appearance change was associated with eating disorder psychopathology. This is consistent with the DSM-5 criteria for eating disorders (APA, 2013) and research that has identified adopting the thin ideal, or wanting to change body weight/shape to meet the thin ideal, as a mechanism that drives disordered eating practices (Mask & Blanchard, 2011). Although individuals who engage in NSSI may obtain changes in their appearance (e.g., scars), the models indicate that these individuals do not intend to change their appearance nor do they identify actual appearance changes as a function their behaviors.

Thus, appearance-related motives and functions of eating disorder behaviors are important to target in interventions as well as emotion regulation.

### **Strengths and Limitations**

The current study had a variety of strengths, such as utilizing a large sample of young adult students, which is a population that is one of the most vulnerable to the development of eating disorder behaviors and NSSI. Thus, this study is generalizable to undergraduate college students of schools with similar demographics. This study was able to shed light on how NSSI and eating disorder psychopathology are conceptualized in terms of their intents and their functions, which may have implications for future diagnostic discussions and treatment approaches. This study was also well powered for modeling analyses, which allowed for a comprehensive investigation into eating disorder and NSSI psychopathology as latent constructs and a variety of theoretically based predictors, such as emotion regulation and appearance change. The models were congruent with extant SEM literature on the relationship between emotion regulation and pathological eating (Vandewalle, Moens, Beyers, & Braet, 2016). Parsing out external versus internal regulation was a strength of this study and provides implications for research on eating disorders and NSSI. The ability to compare and contrast models based on intent and function was another strength of this study, particularly with regard to classification and treatment practices of psychological dysfunction. As mentioned previously, numerous criticisms have been made about current diagnostic practice, such as seemingly face-valid categorizations as opposed to those based on function (Meehl, 1995; Widiger & Samuel, 2005). It is thought that

identifying and perhaps classifying psychopathology based on function may provide an improved way to conceptualize similar pathologies as well as treat them (Meehl, 1995; Widiger & Samuel, 2005). Behaviors that serve similar functions or are maintained in similar ways (e.g., negative reinforcement) may be best treated with similar interventions (Wulfert et al., 1996). Individuals within a similar diagnostic category (e.g., Anorexia Nervosa) may engage in behaviors maintained by different principles (e.g., positive versus negative reinforcement), in which case, it would be most beneficial if the treatments were different in order to target the particular function of each clients' behaviors. The current study found something similar to that of Wulfert et al. (1996) in which they found that different types of drinkers may benefit from differential treatments (motivational interviewing versus cognitive-behavioral interventions) in addition to similar treatments (appropriate replacement behaviors). The findings of the current study suggest that perhaps treatments of NSSI and eating disorder psychopathology should aim to target internal emotion regulation, while treatments for eating disorders and not NSSI should focus on appearance change and external emotion regulation.

On the other hand, this study had various limitations, all which point to the importance of replication and improving methodology in this area of research. This study was unable to replicate a well-established positive relationship between NSSI and eating disorder psychopathology (Turner et al., 2015) in Model Series 1, although Model Series 2 was able to detect this relationship using lifetime eating disorder behaviors and current eating disorder psychopathology. Similarly, the models from Model Series 1 were unable to empirically show specific eating disorder behaviors loading adequately onto the latent

construct of eating disorder behaviors (e.g., binge eating), which previous literature has shown numerous times. This may be due to the non-clinical nature of this sample, in that many studies on emotion regulation and eating disorder behaviors have been completed in a sample of individuals with eating disorder diagnoses, though these studies have not used modeling analyses (Engel et al., 2013; Haedt-Matt & Keel, 2015); to the author's knowledge, no research has investigated specific eating disorder behaviors and emotion regulation using SEM. It also may be due to indirect effects in the model or lack of moderating/mediating variables. Perhaps future models should test previously established personality variables in similar models as the ones in this study, such as impulsivity and compulsivity. For example, perhaps individuals that are more impulsive use binge eating to regulate emotions more than individuals low on impulsivity.

Relatedly, research has identified various factors associated with NSSI that were not tested in the current study. Experiential pain and pain tolerance have been shown to be related to NSSI (Bresin et al, 2010; St. Germain & Hooley, 2013) though, to the author's knowledge, this relationship has remained relatively unexplored in eating disorders. Given that this study has shed light on the similarities and differences between the intents and functions of those engaging in both eating disorder behaviors and NSSI, it is essential to further this research by re-investigating the variables examined in this study as well as others that may contribute to their understanding, such as experiential pain and pain tolerance. This would add information to the hypothesized dimensional nature of these types of SIBs which, in turn, ultimately informs treatment and prevention,



such that internal emotion regulation and pain should be implicated in treatment for both types of behaviors, hypothetically speaking.

This study also lacked external validity, as the sample was relatively homogenous with respect to white female students. Future research should aim to expand this external validity to more diverse populations. Similarly, the sample was from one university, which may implicate cultural factors. The study was cross-sectional in nature, which precluded causal and even temporal conclusions. This is especially important in identifying factors that maintain the self-destructive behaviors in question (and would help inform treatment even further). In addition, all data were collected via self-report. While this is not a limitation for some of the constructs, such as intent, it is a limitation for others, such as function, which may require information not salient or even available to some individuals. Participation in this study was completed entirely online which, while efficient, comes with limitations such as less participant oversight than telephone or in-person data collection.

### **Conclusion**

This study contributes to the eating disorder and NSSI literature by testing models of intent and function of these behaviors. Not only does it add to the theoretical basis of these disorders, especially diagnostic theory, it also provides implications for treatment. For example, finding that NSSI and eating disorder behaviors may be used to regulate similar *and* different types of emotion suggests that future research should investigate this relationship further as, if replicated, it can further treatments for these self-destructive behaviors. Overall, this study was able to take a step towards empirically

testing behaviors that may have more in common than perhaps their current diagnostic criteria suggests, which also feeds into treatment implications, as diagnoses dictate treatment recommendations and practice.

Appendix A  
Demographics Questionnaire

Instructions: Please answer the following questions

1. How old are you? \_\_\_\_\_ years
2. Biological sex:
  - a. Female
  - b. Male
  - c. Intersex
3. Gender:
  - a. Female
  - b. Female to Male Transgender
  - c. Male
  - d. Male to Female Transgender
  - e. Other (Please specify): \_\_\_\_\_
4. What is your race?
  - a. Black
  - b. White
  - c. Asian
  - d. Native American
  - e. Other (Please specify): \_\_\_\_\_
5. What is your ethnicity?
  - a. Non-Hispanic
  - b. Hispanic
6. What year are you in school?
  - a. Freshman
  - b. Sophomore
  - c. Junior
  - d. Senior
  - e. Graduate Student
7. Are you involved in a Sorority or Fraternity?
  - a. Yes
  - b. No
8. How tall are you? \_\_\_\_ feet \_\_\_\_ inches
9. How much do you weight now? \_\_\_\_\_ lbs
10. What has been your highest adult, non-pregnancy weight ever? \_\_\_\_\_ lbs
11. What has been your lowest adult weight ever? \_\_\_\_\_ lbs
12. Dietary restrictions. Select all that apply
  - a. Vegetarian

Instructions: Please answer the following questions

- b. Vegan
- c. Gluten-free
- d. Other; explain: \_\_\_\_\_

- e. None
13. IF SELECTED A-D ABOVE: For what reasons do you have these dietary restrictions? Select all that apply
- a. Moral reasons (e.g., animal rights)
  - b. Medical reasons (e.g., gluten intolerance)
  - c. Clean/Healthy eating
  - d. To lose weight
  - e. Other; Explain: \_\_\_\_\_
  - f. None of the above
14. What is your sexual orientation?
- a. Heterosexual
  - b. Homosexual
  - c. Bisexual
  - d. Asexual
  - e. Other; Explain: \_\_\_\_\_
15. Have you ever been overweight by at least 10 lbs as a child or 15 lbs as an adult (when not pregnant)? YES NO or NOT SURE
- a. **IF YES:** How old were you when you were first overweight (at least 10 lbs as a child or 15 lbs as an adult)? If you are not sure, what is your best guess? \_\_\_\_ years
16. How many times (approximately) have you lost 20 lbs or more—when you weren't sick—and then gained it back?
- a. Never
  - b. Once or twice
  - c. Three or four times
  - d. Five times or more
17. During the past **six** months, how important has your weight or shape been in how you feel about or evaluate yourself as a person—as compared to other aspects of your life, such as how you do at work, as a parent, or how you get along with other people?
- a. Weight and shape were **not very important**
  - b. Weight and shape **played a part** in how you felt about yourself
  - c. Weight and shape **were among the main things** that affected how you felt about yourself
  - d. Weight and shape **were the most important things** that affected how you felt about yourself

Instructions: Please answer the following questions

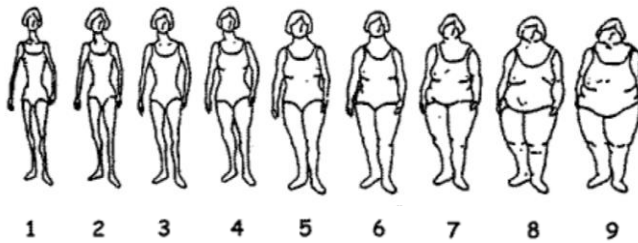
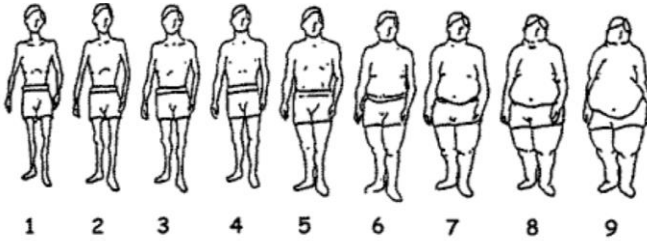
18. Since you have been an adult—18 years old—how much of the time have you been on a diet, been trying to follow a diet, or in some way been limiting how much you were eating in order to lose weight or keep from regaining weight you had lost? Would you say...?
- a. None or hardly any of the time
  - b. About a quarter of the time

- c. About half of the time
- d. About three-quarters of the time
- e. Nearly all of the time

19. **SKIP THIS QUESTION IF YOU NEVER LOST AT LEAST 10 LBS BY DIETING:** How old were you the first time you lost at least 10 lbs by dieting, or in some way limiting how much you ate? If you are not sure, what is your best guess? \_\_\_\_ \_\_ years

20. Please take a look at these silhouettes.

- a. Which figure best characterizes your **current** body build? \_\_\_\_ (1-9)
- b. Which figure best characterizes your **ideal** body build? \_\_\_\_ (1-9)
- c. Which figure best characterizes which body build you think you **should/ought to be**? \_\_\_\_ (1-9)



## Appendix B Behaviors Questionnaire

Instructions: Have you ever done any of the following in your lifetime? Select all that apply:

- Gone for long periods of time (between 8 and 23 waking hours) without eating anything at all?
- Gone for a full 24 hours or more without eating anything at all?
- Have you eaten what other people would regard as an unusually large amount of food (given the circumstances) in a short period of time (e.g., about 2 hours) and have a sense of having lost control over your eating (at the time that you were eating)?
- Made yourself vomit?
- Taken laxatives?
- Exercised in a driven/compulsive way even if you were tired or did not want to exercise?
- Scratched or pinched your skin with fingernails or other objects to the point that bleeding occurs or marks remain on the skin?
- Cut wrists, arms, legs, torso or other areas of the body
- Dripped acid onto skin
- Carved words or symbols into the skin
- Ingested a caustic substance(s) or sharp object(s) (Drano, other cleaning substances, pins, etc.)
- Bitten yourself to the point that bleeding occurs or marks remain on the skin
- Tried to break your own bone(s)
- Ripped or torn skin
- Burned wrists, hands, arms, legs, torso or other areas of the body
- Rubbed glass into skin or stuck sharp objects such as needles, pins, and staples into or underneath the skin
- Banged or punched objects to the point of bruising or bleeding
- Punched or banged oneself to the point of bruising or bleeding
- Prevented wounds from healing
- Pulling hair or eyelashes
- Skin picking, such as picking at zits, bumps, or scabs
- Gotten a tattoo
- Gotten a piercing

Appendix C  
Intent Questionnaire

Instructions: When you engaged in \_\_\_\_\_(behavior)<sup>1</sup>\_\_\_\_\_, how often did you do that behavior in order to (select all that apply):

0 = NEVER, 1 = SOMETIMES, 2 = OFTEN, 3 = ALWAYS

1. To release unbearable tension	0	1	2	3
2. To experience a “high” that feels like a drug high	0	1	2	3
3. To stop my parents and/or friends from being angry with me	0	1	2	3
4. To stop feeling alone and empty	0	1	2	3
5. To get care or attention from other people	0	1	2	3
6. To punish myself	0	1	2	3
7. To provide a sense of excitement that feels exhilarating	0	1	2	3
8. To avoid getting into trouble for something I did	0	1	2	3
9. To distract me from unpleasant memories	0	1	2	3
10. To change my body image and/or appearance	0	1	2	3
11. To belong to a group	0	1	2	3
12. To release anger	0	1	2	3
13. To show others how hurt or damaged I am	0	1	2	3
14. To experience physical pain in one area, when the other pain I feel is unbearable	0	1	2	3
15. To stop people from expecting so much from me	0	1	2	3
16. To relieve feelings of sadness or feeling “down”	0	1	2	3
17. To stop me from thinking about ideas of killing myself	0	1	2	3
18. To stop me from acting out ideas of killing myself	0	1	2	3
19. To produce a sense of being real when I feel numb and “unreal”	0	1	2	3
20. To release frustration	0	1	2	3
21. To get out of doing something that I don’t want to do	0	1	2	3
22. To prove to myself how much I can take	0	1	2	3
23. For sexual excitement	0	1	2	3
24. To diminish feeling of sexual arousal	0	1	2	3
25. To lose weight	0	1	2	3
26. To change my body shape	0	1	2	3

---

<sup>1</sup> Participants will answer these questions individually for each behavior they endorsed on the Behavior Questionnaire.

27. To kill myself	0	1	2	3
28. To relieve feelings of guilt	0	1	2	3
29. Other (please specify): _____	0	1	2	3



Appendix D  
Function Questionnaire

Instructions: **AFTER** you engaged in \_\_\_\_\_ (behavior)<sup>2</sup>, how often did you (select all that apply):

0 = NEVER, 1 = SOMETIMES, 2 = OFTEN, 3 = ALWAYS

1. Feel less tense than before the behavior	0	1	2	3
2. Experience a “high” similar to a drug high	0	1	2	3
3. Your parents/friends stop being mad at you	0	1	2	3
4. Stop feeling alone and empty	0	1	2	3
5. Get attention from other people	0	1	2	3
6. Feel punished	0	1	2	3
7. Feel excited, exhilarated, or get a “rush”	0	1	2	3
8. Avoid getting in trouble	0	1	2	3
9. Feel distracted from unpleasant memories	0	1	2	3
10. Change your body image or appearance	0	1	2	3
11. Feel like you belonged to a group	0	1	2	3
12. Feel less angry	0	1	2	3
13. Others realized how hurt or damaged you were	0	1	2	3
14. Experience physical pain that helped distract from other unbearable pain	0	1	2	3
15. Others stop expecting so much from you	0	1	2	3
16. Feel better or not as sad or “down”	0	1	2	3
17. Stop thinking about killing yourself	0	1	2	3
18. Stop yourself from acting on behaviors to kill yourself	0	1	2	3
19. Feel a sense of being “real” or decrease feelings of numbness	0	1	2	3
20. Feel less frustrated	0	1	2	3
21. Get out of doing something you didn’t want to do	0	1	2	3
22. Prove to yourself how much you can take	0	1	2	3
23. Feel sexually excited	0	1	2	3
24. Stop feelings of sexual excitement	0	1	2	3
25. Lose weight	0	1	2	3
26. Feel less guilty	0	1	2	3

---

<sup>2</sup> Participants will answer these questions individually for each behavior they endorsed on the Behavior Questionnaire.

27. Other (please specify): _____	0	1	2	3
-----------------------------------	---	---	---	---

Appendix E  
Self-Harm Behavior Questionnaire (SHBQ)

Please choose YES or NO in response to each question and answer the follow-up questions. For questions where you are asked who you told something to, please do not give specific names. We only want to know if it was someone like a parent, teacher, doctor, friend, etc.

1. Have you ever hurt yourself on purpose? (e.g., scratched yourself with a fingernail or sharp object.) YES or NO  
(if NO, skip out of survey)
2. Approximately how many times did you do this? \_\_\_\_\_(free response)\_\_\_\_\_
3. Approximately when did you first do this to yourself? (write your age) \_\_\_\_\_
4. When was the last time you did this to yourself? (write your age)  
\_\_\_\_\_
5. Have you ever told anyone that you had done these things? YES or NO  
If YES, go to #6, if NO, skip to #7
6. If yes, who did you tell? \_\_\_\_\_(free response)\_\_\_\_\_
7. Have you ever needed to see a doctor after doing these things? YES or NO

Appendix F  
Eating Disorder Examination – Questionnaire (EDE-Q)

Instructions: The following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all of the questions. Please only choose one answer for each question. Thank you.

On how many of the past 28 days...	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
1. Have you been deliberately <u>trying</u> to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
2. Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?	0	1	2	3	4	5	6
3. Have you <u>tried</u> to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
4. Have you <u>tried</u> to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
5. Have you had a definite desire to have an <u>empty</u> stomach with the aim of influencing your shape or weight?	0	1	2	3	4	5	6
6. Have you had a definite desire to have a totally flat stomach?	0	1	2	3	4	5	6
7. Has thinking about <u>food, eating, or calories</u> made it very difficult to concentrate on things you are interested in (e.g., working, following a conversation, or reading)?	0	1	2	3	4	5	6
8. Has thinking about <u>shape or weight</u> made it very difficult to concentrate on things you are interested in (e.g., working, following a conversation, or reading)?	0	1	2	3	4	5	6
9. Have you had a definite fear of losing control over eating?	0	1	2	3	4	5	6
10. Have you had a definite fear that you might gain weight?	0	1	2	3	4	5	6
11. Have you felt fat?	0	1	2	3	4	5	6
12. Have you had a strong desire to lose weight?	0	1	2	3	4	5	6

Questions 13-18: Please enter the appropriate number for each question. Remember that each question only refers to the past four weeks (28 days).

13. Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (give the circumstances)? \_\_\_\_\_
14. ...On how many of these times did you have a sense of loss of control over your eating (at the time you were eating)? \_\_\_\_\_
15. Over the past 28 days, how many DAYS have such episodes of overeating occurred (i.e. you have eating an unusually large amount of food and have had a sense of loss of control at the time)? \_\_\_\_\_
16. Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight? \_\_\_\_\_
17. Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight? \_\_\_\_\_
18. Over the past 28 days, how many times have you exercised in a “driven” or “compulsive” way as a means of controlling your weight, shape, or amount of fat or to burn off calories? \_\_\_\_\_

Questions 19-21: Please choose the appropriate number. Please note that for these questions the term “binge eating” means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

<b>On how many of the past 28 days...</b>	<b>No days</b>	<b>1-5 days</b>	<b>6-12 days</b>	<b>13-15 days</b>	<b>16-22 days</b>	<b>23-27 days</b>	<b>Every day</b>
19. Over the past 28 days, on how many days have you eaten in secret (i.e., furtively)?...Do not count episodes of binge eating.	0	1	2	3	4	5	6
	<b>None of the times</b>	<b>A few of the times</b>	<b>Less than half</b>	<b>Half of the times</b>	<b>More than half</b>	<b>Most of the time</b>	<b>Every time</b>
20. On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effects on your shape or weight?...Do not count episodes of binge eating.	0	1	2	3	4	5	6
	<b>Not at all</b>		<b>Slightly</b>		<b>Moderately</b>		<b>Markedly</b>
21. Over the past 28 days, how concerned have you been about other people seeing you eat?...Do not	0	1	2	3	4	5	6

count episodes of binge eating.							
---------------------------------	--	--	--	--	--	--	--

Questions 22-28: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days).

<b>On how many of the past 28 days...</b>	<b>Not at all</b>		<b>Slightly</b>		<b>Moderately</b>		<b>Markedly</b>
22. Has your <u>weight</u> influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
23. Has your <u>shape</u> influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
24. How much would it have upset you if you had been asked to weight yourself once a week (no more, or less, often) for the next four weeks?	0	1	2	3	4	5	6
25. How dissatisfied have you been with your <u>weight</u> ?	0	1	2	3	4	5	6
26. How dissatisfied have you been with your <u>shape</u> ?	0	1	2	3	4	5	6
27. How uncomfortable have you felt seeing your body (e.g., seeing your shape in the mirror, in a shop window reflection, while undressing, or taking a bath or shower)?	0	1	2	3	4	5	6
28. How uncomfortable have you felt about others seeing your shape or figure (e.g., in communal changing rooms, when swimming, or wearing light clothes)?	0	1	2	3	4	5	6

29. IF FEMALE: Over the past 3-4 months, have you missed any of your menstrual periods? YES or NO  
(If NO, skip to #31)

30. IF FEMALE: If yes, how many menstrual periods did you miss in the past 3-4 months? \_\_\_\_\_

31. IF FEMALE: Are you using a method of birth control? YES or NO  
(If NO, skip out of survey)

32. If you are using a method of birth control, what are you using (list all types)?  
\_\_\_\_\_ (free response) \_\_\_\_\_

## REFERENCES

- Alva, S. A. & de Los Reyes, R. (1999). Psychosocial stress, internalized symptoms, and the academic achievement of hispanic adolescents. *Journal of Adolescent Research, 14*, 343-358. doi:10.1177/0743558499143004
- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: Author.
- Andover, M. S., & Gibb, B. E. (2010). Non-suicidal self-injury, attempted suicide, and suicidal intent among psychiatric inpatients. *Psychiatry Research, 178*(1), 101-105. doi:10.1016/j.psychres.2010.03.019
- Andover, M. S., & Morris, B. W. (2014). Suicidal and nonsuicidal self-injury in the obsessive-compulsive spectrum. In E. A. Storch & D. McKay (Eds). *Obsessive-compulsive disorder and its spectrum: A life-span approach* (241-259). Washington, DC: American
- Arney, M. F., Crowther, J. H., & Miller, I. W. (2011). Changes in ecological momentary assessment reported affect associated with episodes of nonsuicidal self-injury. *Behavior Therapy, 42*(4), 579-588. doi:10.1016/j.beth.2011.01.002
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88*, 588-606. doi:10.1037/0033-2909.88.3.588



- Berg, K. C., Crosby, R. D., Cao, L., Peterson, C. B., Engel, S. G., Mitchell, J. E., et al. (2013). Facets of negative affect prior to and following binge-only, purge-only, and binge/purge events in women with bulimia nervosa. *Journal of Abnormal Psychology, 122*, 111-118. doi:10.1037/a0029703
- Bresin, K., Gordon, K. H., Bender, T. W., Gordon, L. J., & Joiner, T. E. (2010). No pain, no change: Reductions in prior negative affect following physical pain. *Motivation and Emotion, 34*(3), 280-287. doi:10.1007/s11031-010-9168-7
- Brown, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 445-455). Newbury Park, CA: SAGE.
- Caswell, A. J., Bond, R., Duka, T., & Morgan, M. J. (2015). Further evidence of the heterogeneous nature of impulsivity. *Personality and Individual Differences, 76*, 68-74. doi:10.1016/j.paid.2014.11.059
- Claes, L., & Muehlenkamp, J. (2014). *Non-suicidal self-injury in eating disorders: advancements in etiology and treatment*. Heidelberg, Germany: Springer.
- Claes, L., Willem, L., Bijttebier, P., Sools, J., Vandenbussche, I., Wonderlich, S., & Mitchell, J. (2012). Non-suicidal self-injury in adolescents with substance abuse/dependence: Associations with indirect self-harm and temperament. In A. M.

Columbus, & A. M. (Eds.), (pp. 143-152). Hauppauge, NY, US: Nova Science Publishers.

Cloutier, P. F., & Nixon, M. K. (2003). The Ottawa self-injury inventory: A preliminary evaluation. In *Abstracts to the 12th International Congress European Society for Child and Adolescent Psychiatry. European Child & Adolescent Psychiatry* (Vol. 12, pp. 1-94).

Cook, B. J., Wonderlich, S. A., & Lavender, J. M. (2014). The role of negative affect in eating disorders and substance use disorders. In T. D. Brewerton, A. B. Dennis, T. D. (Eds.), (pp. 363-378). New York, NY, US: Springer-Verlag Publishing.  
doi:10.1007/978-3-642-45378-6\_16

Cooper, M. J., & Cowen, P. (2009). Negative self-beliefs in relation to eating disorder and depressive symptoms: Different themes are characteristic of the two sets of symptoms in those with eating disorders and/ or depression. *Journal of Cognitive Psychotherapy*, 23(2), 147-159. doi:10.1891/0889-8391.23.2.147

Cucchi, A., Ryan, D., Konstantakopoulos, G., Stroumpa, S., Kaçar, A. S., Renshaw, S., ... Kravariti, E. (2016). Lifetime prevalence of non-suicidal self-injury in patients with eating disorders: A systematic review and meta-analysis. *Psychological Medicine*, 46, 1345-1358. doi:10.1017/S0033291716000027

- De Young, K. P., & Anderson, D. A. (2010). Prevalence and correlates of exercise motivated by negative affect. *International Journal of Eating Disorders, 43*, 50-58. doi:10.1002/eat.20656
- Engel, S. G., Wonderlich, S. A., Crosby, R. D., Mitchell, J. E., Crow, S., Peterson, C. B., ... Gordon, K. H. (2013). The role of affect in the maintenance of anorexia nervosa: Evidence from a naturalistic assessment of momentary behaviors and emotion. *Journal of Abnormal Psychology, 122*, 709-719. doi:10.1037/a0034010
- Fan, X., & Sivo, S. A. (2005). Sensitivity of fit indexes to misspecified structural or measurement model components: Rationale of two-index strategy revisited. *Structural Equation Modeling, 12*, 343-367. doi:10.1207/s15328007sem1203\_1
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *The International Journal of Eating Disorders, 16*, 363-370. doi:10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-#
- Favaro, A., & Santonastaso, P. (1998). Impulsive and compulsive self-injurious behavior in bulimia nervosa: Prevalence and psychological correlates. *Journal of Nervous and Mental Disease, 186*, 157-165. doi:10.1097/00005053-199803000-00004
- Favazza, A. R., & Rosenthal, R. J. (1993). Diagnostic issues in self-mutilation. *Hospital & Community Psychiatry, 44*, 134-140. Retrieved from <http://www.ncbi.nlm.nih.gov/>

- Forcano, L., Álvarez, E., Santamaría, J. J., Jimenez-Murcia, S., Granero, R., Penelo, E., ... Fernández-Aranda, F. (2011). Suicide attempts in anorexia nervosa subtypes. *Comprehensive Psychiatry*, 52, 352-358. doi:10.1016/j.comppsy.2010.09.003
- Garner, D. M. (2002). Measurement of eating disorder psychopathology. In C. G. Fairburn & K. D. Brownell (Eds.), *Eating disorders and obesity* (141-146). New York, NY: The Guilford Press.
- Garson, G. D. (2015). *Structural equation modeling*. Asheboro, NC: Statistical Associates.
- Gollust, S. E., Eisenberg, D., & Golberstein, E. (2008). Prevalence and correlates of self-injury among university students. *Journal of American College Health*, 56, 491-498. doi:10.3200/JACH.56.5.491-498
- Goodman, E. L. & De Young, K. P. (2015, April). Affective Antecedents and Consequences of Fasting at the Week-Level in Anorexia Nervosa. Poster presented at the 21st annual International Conference on Eating Disorders, Boston, Massachusetts.
- Gratz, K. L. (2001). Measurement of deliberate self-harm: Preliminary data on the deliberate self-harm inventory. *Journal of Psychopathology and Behavioral Assessment*, 23, 253-263. doi:10.1023/A:1012779403943

- Grilo, C. M. (2013). Why no cognitive body image feature such as overvaluation of shape/weight in the binge eating disorder diagnosis? *International Journal of Eating Disorders, 46*, 208-211. doi:10.1002/eat.22082
- Guerry, J. D., & Prinstein, M. J. (2010). Longitudinal prediction of adolescent nonsuicidal self-injury: Examination of a cognitive vulnerability-stress model. *Journal of Clinical Child and Adolescent Psychology, 39*, 77-89. doi:10.1080/15374410903401195
- Gutierrez, P. M., & Osman, A. (2008). *Adolescent suicide: An integrated approach to the assessment of risk and protective factors*. DeKalb, IL: Northern Illinois University Press.
- Gutierrez, P. M., Osman, A., Barrios, F. X., & Kopper, B. A. (2001). Development and initial validation of the self-harm behavior questionnaire. *Journal of Personality Assessment, 77*, 475–490. doi:dx.doi.org/10.1207/S15327752JPA7703\_08
- Haedt-Matt, A., & Keel, P. K. (2011). Revisiting the affect regulation model of binge eating: A meta-analysis of studies using ecological momentary assessment. *Psychological Bulletin, 137*, 660-681. doi:10.1037/a0023660
- Haedt-Matt, A., & Keel, P. K. (2015). Affect regulation and purging: An ecological momentary assessment study in purging disorder. *Journal of Abnormal Psychology, 124*, 399-411. doi:10.1037/a0038815

- Harris, E. C., & Barraclough, B. (1997). Suicide as an outcome for mental disorders: A meta-analysis. *The British Journal of Psychiatry*, *170*, 205-228.  
doi:10.1192/bjp.170.3.205
- Jacobson, C. M., & Luik, C. C. (2014). Epidemiology and sociocultural aspects of non-suicidal self-injury and eating disorders. In L. Claes, J. J. Muehlenkamp, L. (Eds.), (pp. 19-34). New York, NY, US: Springer-Verlag Publishing. doi:10.1007/978-3-642-40107-7\_2
- Kline, R. B. (1998). Principles and practice of structural equation modeling. New York, NY: Guilford Press.
- Klonsky, E. D. (2007). The functions of deliberate self-injury: A review of the evidence. *Clinical Psychology Review*, *27*, 226–239. doi:10.1016/j.cpr.2006.08.002
- Klonsky, E. D. (2011). Non-suicidal self injury in United States adults: Prevalence, sociodemographics, topography and functions. *Psychological Medicine*, *41*, 1981-1986. doi:10.1017/S00332917110002497
- Koch, J. R., Roberts, A. E., Armstrong, M. L., & Owen, D. C. (2010). Body art, deviance, and American college students. *The Social Science Journal*, *47*, 151-161.  
doi:dx.doi.org/10.1016/j.soscij.2009.10.001
- Kotov, R., Perlman, G., Gámez, W., & Watson, D. (2015). The structure and short-term stability of the emotional disorders: A dimensional approach. *Psychological*

- Medicine*, 45(8), 1687-1698. Retrieved from Kupfer, D. J., Frank, E., & Phillips, M. L. (2012). Major depressive disorder: New clinical, neurobiological, and treatment perspectives. *Lancet*, 379, 1045-1055. doi:10.1016/S0140-6736(11)60602-8
- Laye-Gindhu, A., & Schonert-Reichl, K. (2005). Nonsuicidal self-harm among community adolescents: Understanding the 'whats' and 'whys' of self-harm. *Journal of Youth and Adolescence*, 34, 447-457. doi:10.1007/s10964-005-7262-z
- Ljotsson, B., Lundin, C., Mitsell, K., Carlbring, P., Ramklint, M., & Ghaden, A. (2007). Remote treatment of bulimia nervosa and binge eating disorder: A randomized trial of internet-assisted cognitive behavioural therapy. *Behaviour Research and Therapy*, 45, 649-661. doi:10.1016/j.brat.2006.06.010
- Lloyd, E. E., Kelley, M. L., & Hope, T. (1997, October). *Self-mutilation in a community sample to adolescents: Descriptive characteristics and provisional prevalence rates*. Poster presented at the annual meeting of the Society for Behavioral Medicine, New Orleans, LA.
- Martin, J., Cloutier, P. F., Levesque, C., Bureau, J., Lafontaine, M., & Nixon, M. K. (2013). Psychometric properties of the functions and addictive features scales of the Ottawa Self-Injury Inventory: A preliminary investigation using a university sample. *Psychological Assessment*, 25, 1013-1018. doi:10.1037/a0032575

- Masheb, R. M., Grilo, C. M. (2000). Binge eating disorder: A need for additional diagnostic criteria. *Comparative Psychiatry, 41*, 159–162. doi:10.1016/S0010-440X(00)90041-5
- Mask, L. & Blanchard, C. M. (2011). The effects of “thin ideal” media on women’s body image concerns and eating-related intentions: The beneficial role of an autonomous regulation of eating behaviors. *Body Image, 8*, 357-365.  
doi:10.1016/j.bodyim.2011.06.003
- Meehl, P. E. (1995). Bootstraps taxometrics: Solving the classification problem in psychopathology. *American Psychologist, 50*, 266-275. doi:10.1037/0003-066X.50.4.266
- Muehlenkamp, J. J. (2005). Self-injurious behavior as a separate clinical syndrome. *American Journal of Orthopsychiatry, 75*, 324–333. doi:10.1037/0002-9432.75.2.324
- Muehlenkamp, J. J. & Brausch, A. M. (2012). Body image as a mediator of non-suicidal self-injury in adolescents. *Journal of Adolescence, 35*, 1–9.  
doi:10.1016/j.adolescence.2011.06.010
- Muehlenkamp, J. J., Engel, S. G., Wadson, A., Crosby, R. D., Wonderlich, S. A., Simonich, H., & Mitchell, J. E. (2009). Emotional states preceding and following



acts of non-suicidal self-injury in bulimia nervosa patients. *Behaviour Research and Therapy*, 47, 83-87. doi:10.1016/j.brat.2008.10.011

Nock, M. K., Joiner, T. E., Jr, Gordon, K. H., Lloyd-Richardson, E., & Prinstein, M. J. (2006). Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts. *Psychiatry Research*, 144(1), 65-72. doi:S0165-1781(06)00135-1

Nock, M.K., Prinstein, M.J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology*, 72, 885-890. doi:10.1037/0022-006X.72.5.885

Orlando, C. M., Broman-Fulks, J., Whitlock, J. L., Curtin, L., & Michael, K. D. (2015). Nonsuicidal self-injury and suicidal self-injury: A taxometric investigation. *Behavior Therapy*, 46, 824-833. doi:10.1016/j.beth.2015.01.002

Pasman, L. J. & Thompson, J. K. (1988). Body image and eating disturbance in obligatory runners, obligatory weightlifters, and sedentary individuals. *International Journal of Eating Disorders*, 7, 759-769. doi: 10.1002/1098-108X(198811)7:6<759::AID-EAT2260070605>3.0.CO;2-G

Polivy, J., & Herman, C. P. (1993). Etiology of binge eating: Psychological mechanisms. In C. G. Fairburn, G. T. Wilson (Eds.), (pp. 173-205). New York, NY, US: Guilford Press.

Selby, E. A., Wonderlich, S. A., Crosby, R. D., Engel, S. G., Panza, E., Mitchell, J. E., Crow, S. J., Peterson, C. B., & Le Grange, D. (2013). Nothing tastes as good as thin feels: Low positive emotion differentiation and weight loss activities in anorexia nervosa. *Clinical Psychological Science*, 2(4), 514–531.  
doi:10.1177/2167702613512794

Spitzer, R.L., Devlin, M., Walsh, B.T., Hasin, D., Wing, R., Marcus, M., Stunkard, ...Nonas, C. (1992). Binge eating disorder: A multisite field trial of the diagnostic criteria. *International Journal of Eating Disorders*, 11, 191–203.  
doi:10.1002/1098-108X(199204)11:3<191::AID-EAT2260110302>3.0.CO;2-S

St. Germain, S.A. & Hooley, J.M. (2012). Direct and indirect forms of non-suicidal self-injury: Evidence for a distinction. *Psychiatry Research*, 197(1-2), 78-84.  
doi:10.1016/j.psychres.2011.12.050

St. Germain, S.A. & Hooley, J.M. (2013). Aberrant pain perception in direct and indirect non-suicidal self-injury: An empirical test of Joiner's interpersonal theory. *Comprehensive Psychiatry*, 54, 694-701. doi:10.1016/j.comppsy.2012.12.029

Turner, B. J., Yiu, A., Layden, B. K., Claes, L., Zaitsoff, S., & Chapman, A. L. (2015). Temporal associations between disordered eating and nonsuicidal self-injury: Examining symptom overlap over 1 year. *Behavior Therapy*, 46, 125-138.  
doi:10.1016/j.beth.2014.09.002

- Van der Kolk, B. A., Perry, J. C., & Herman, J. L. (1991). Childhood origins of self-destructive behavior. *The American Journal of Psychiatry*, *148*, 1665-1671.  
doi:10.1176/ajp.148.12.1665
- Vandewalle, J., Moens, E., Beyers, W., & Braet, C. (2016). Can we link emotional eating with the emotion regulation skills of adolescents? *Psychology & Health*, 1-16.  
doi:10.1080/08870446.2016.1149586.
- White, S., Reynolds-Malec, J. B., & Cordero, E. (2011). Disordered eating and the use of the unhealthy weight control methods in college students: 1995, 2002, and 2008. *Eating Disorders*, *19*, 323-334. doi:10.1080/10640266.2011.584805
- Whitlock, J., Muehlenkamp, J., Eckenrode, J., Purington, A., Baral Abrams, G., Barreira, P., & Kress, V. (2013). Nonsuicidal self-injury as a gateway to suicide in young adults. *The Journal of Adolescent Health*, *52*, 486-492.  
doi:10.1016/j.jadohealth.2012.09.010
- Whitlock, J., Exner-Cortens, D., & Purington, A. (2014). Assessment of nonsuicidal self-injury: Development and initial validation of the non-suicidal self-Injury–Assessment tool (NSSI-AT). *Psychological Assessment*, *26*, 935-946.  
doi:10.1037/a0036611; 10.1037/a0036611.supp

- Widiger, T. A., & Samuel, D. B. (2005). Diagnostic categories or dimensions? A question for the diagnostic and statistical manual of mental disorders--fifth edition. *Journal of Abnormal Psychology, 114*, 494-504. doi:2005-15138-002
- Wilfley, D. E., & Cohen, L. R. (1997). Psychological treatment of bulimia nervosa and binge eating disorder. *Psychopharmacology Bulletin, 33*, 437-454. Retrieved from <https://medworksmedia.com/>
- Wulfert, E., Greenway, D. E., & Dougher, M. J. (1996). A logical functional analysis of reinforcement-based disorders: Alcoholism and pedophilia. *Journal of Consulting and Clinical Psychology, 64*, 1140-1151.