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Exploration of Affect and Antecedent Experiences in Non-suicidal Self-injury

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EXPLORATION OF AFFECT AND ANTECEDENT EXPERIENCES IN
NON-SUICIDAL SELF-INJURY

by

Shana Anne Franklin

A Dissertation Submitted in
Partial Fulfillment of the
Requirements for the Degree of

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December 2017

ABSTRACT

EXPLORATION OF AFFECT AND ANTECEDENT EXPERIENCES IN NON-SUICIDAL SELF-INJURY

by

Shana Anne Franklin

The University of Wisconsin-Milwaukee, 2017
Under the Supervision of Professor Shawn P. Cahill, PhD

Background: Non-suicidal self-injury (NSSI) is defined as deliberate self-harm, without the intention of suicide, causing direct destruction of body tissue (Nock & Favazza, 2009).

Individuals with NSSI have significantly increased risk of suicide completion compared to individuals who do not engage in NSSI (Cooper et al., 2007). Therefore, understanding this behavior and the experiences that underlie it are of critical importance.

Objective: Current conceptualization of NSSI includes four distinct functions described as the Four Factor Model of NSSI (FFM; Nock and Prinstein, 2004). The present study aims to investigate the distinction between the two automatic (intrapersonal) functions of NSSI described with the FFM- Automatic Negative Reinforcement (ANR) and Automatic Positive Reinforcement (APR). More specifically, the study aims to investigate evidence to support the Automatic Positive Reinforcement subtype.

Method: We utilized online survey to recruit participants with clinically significant NSSI. Participants rated experiences of positive and negative affect before and after self-injury for NSSI associated with ANR and APR. These patterns of affect were compared to examine support for the APR subtype.

Results: We failed to find support for a distinct APR subtype characterized by significant increases in positive affect or that significantly differed from traditional ANR. A possible

subgroup of individuals endorsing “because you were feeling numb or empty” who report low antecedent affect may indicate initial support for APR that requires further follow-up.

Conclusions: Implications for the APR and FFM are discussed. Alternative perspectives and future directions for research are also reviewed.

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LIST OF ABBREVIATIONS

ANR	Automatic Negative Reinforcement
APA	American Psychiatric Association
APR	Automatic Positive Reinforcement
BPD	Borderline Personality Disorder
DSHI	Deliberate Self-Harm Inventory
DSM	Diagnostic and Statistical Manual of Mental Disorders
ESG	Evaluative Space Grid
FASM	Functional Assessment of Self-Mutilation
NSSI	Non-suicidal self-injury
PANAS	Positive and Negative Affect Schedule
SNR	Social Negative Reinforcement
SPR	Social Positive Reinforcement
SITBI	Self-Injurious Thoughts and Behaviors Interview
UWM	University of Wisconsin-Milwaukee

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I pierce myself to wake up my veins
I'd pierce my heart if I thought things would change
But I'm just like the skin that's been stung and restung
And the campfire songs that are sung and resung
For a girl of my age why am I so numb?

- Bree Sharp

I hurt myself today
To see if I still feel
I focus on the pain
The only thing that's real

- Nine Inch Nails

Sometimes you gotta bleed to know
That you're alive and have a soul

- Twenty One Pilot

Self-injury appears to be a behavioral paradox – it defies our natural inclination for physical self-preservation and avoidance of pain. Despite its counterintuitive nature, self-injury has been described for thousands of years. Examples range from the literary tale of Oedipus Rex, who infamously gouged out his eyes upon realizing his destiny, to documented cases during the Middle Ages of the Catholic sect known as “flagellants” who systematically whipped their bodies during prayer as a form of penance (Conterio & Lader, 1998). However, the last several decades have witnessed a growing trend for self-injury that differs from these historical descriptions – it is neither consistent with the severe singular act committed by Oedipus nor is it performed as religious practice. Rather, this emerging trend of self-injury appears to reflect disturbances in mental health primarily impacting adolescents and young adults.

Definition

Non-suicidal self-injury (NSSI) is defined as deliberate self-harm, without intention of suicide, causing direct destruction of body tissue (Nock & Favazza, 2009). The most common form of self-injury involves cutting one’s skin until it bleeds – typically using the assistance of sharp object such as a razor or pin (Lang & Patel, 2011; Klonsky, 2007). Generally referred to as “cutting,” this behavior is endorsed by 70% - 90% of individuals engaging in NSSI (Nock, 2010; Klonsky, 2007). Other forms of NSSI include burning oneself as well as banging or bruising a part of the body to intentionally cause injury (Briere & Gil, 1998).

To understand the phenomenon of NSSI, it is important to accurately classify NSSI behaviors and clearly differentiate them from other types of self-harm. NSSI involves the deliberate intention to injure one’s self, thereby distinguishing it from accidental self-injury. Another requisite of NSSI behavior is that it results in direct bodily harm – injury is an

immediate consequence of the behavior. Other self-destructive behaviors including substance abuse, disordered eating, or risk-taking behaviors – such as sexual promiscuity or reckless driving – do not qualify as NSSI. These behaviors may have eventual negative consequences to one's body but do not result in immediate destruction of bodily tissue. Although substance abuse can cause damage to the body relatively quickly, bodily harm is not immediate, nor is it considered “direct” as it results from the inability to effectively metabolize the substance rather than immediate consequence of the consumption. However, substances such as bleach or acid intentionally applied to the skin cause immediate tissue damage; this behavior can therefore be classified as NSSI, although it is reported to occur infrequently (Gratz, 2001).

NSSI is distinguished from severe cases of self-injury resulting in permanent physical damage such as that described in the aforementioned tale of Oedipus Rex. This extreme type of self-injury (e.g., cutting off a limb, self-castration, etc.) typically occurs only once in an individual's lifetime and usually in the context of a psychotic episode or substance induced psychosis (Nock & Favazza, 2009). Culturally sanctioned behaviors, such as those occurring for religious practice – as is the case of the “flagellants” of the Middle Ages – also do not qualify as NSSI. However, body piercing and tattooing are considered culturally acceptable behaviors and therefore are not representative of NSSI (Nock & Favazza, 2009).

NSSI, by definition, excludes any self-injurious behaviors intended for suicide. Some suicidal behaviors (e.g., wrist cutting) may appear topographically similar to NSSI but are distinguished by an individual's intent – NSSI is not intended to be lethal. Injuries sustained from unsuccessful suicide attempts do not qualify as NSSI. Despite this distinction, NSSI has been shown to correlate with suicide attempts, thus suggesting that these behaviors have a shared etiology or possibly reflect a continuum of self-harm. Although these behaviors may co-occur,

research indicates that individuals are able to distinguish between NSSI and injury with suicidal intent (Nock, Prinstein, & Sterba, 2009).

Prevalence and Demographics of NSSI

Epidemiological data regarding NSSI has been difficult to determine. Individuals are often reluctant to disclose self-harm behaviors and injuries are rarely severe enough to require medical attention (Lynch & Cozza, 2009; Hawton, Harriss, Simkin, Bale, & Bond, 2004; Muehlenkamp, 2005). Research focusing on this particular form of self-injury only began in earnest in the past few decades. Therefore it has been difficult to establish its prevalence or phenomenology. In fact, clear diagnostic criteria were only established in the most recent years (Nock & Favazza, 2009). Additionally, researchers agreed to refer to the behavior as “Non-Suicidal Self-Injury” or NSSI (Nock & Favazza, 2009; Nixon & Heath, 2009). This provided a universal name for the behavior – as previously it had been referred to under many names (e.g., self-mutilation or deliberate self-harm) – and also served to distinguish it from behaviors representative of other disorders (e.g., hair-pulling diagnostic of trichotillomania).

Furthermore, rates of NSSI vary considerably across research studies depending on the type (i.e., clinical vs. community) and age of the sample population. Review of multiple studies suggests that approximately 1%-4% of adults and 13%-23% of adolescents report a lifetime history of NSSI (Jacobson & Gould, 2007). Substantial evidence indicates adolescents and young adults are at highest risk for NSSI (Muehlenkamp & Gutierrez, 2004; Ross & Heath, 2002; Jacobson & Gould, 2007). The higher lifetime rate of NSSI reported by this population has led some researchers to speculate that NSSI is becoming more common – although this phenomenon could also be explained by recall bias in adults (Nock, 2009). However, other studies support the

former explanation suggesting that rates of NSSI are indeed increasing within the adolescent and young adult populations (Muehlenkamp, 2005; Hawton et al., 2004).

There is a precedence assuming women are at greater risk for self-injury – which is supported by several research studies (Ogundipe, 1999; Suyemoto, 1998; Hawton, Rodham, Evans, & Weatherall, 2002; Walsh, 2006). However, more recent evidence has found rates of NSSI among males and females to be relatively equal (Briere & Gil, 1998; Klonsky, Olthmanns, & Turkheimer, 2003). These discrepancies may reflect differences in the type of NSSI reported by males and females rather than difference in prevalence rates. For example, recent research indicates that women are more likely to endorse cutting, whereas men are more likely to endorse punching objects with the intention of deliberately hurting oneself (Whitlock et al., 2011).

There is also debate about NSSI regarding potential differences in NSSI across ethnic and socio-economic demographics. Some studies suggest higher rates of self-injury in Caucasian populations (Deliberto & Nock, 2008; Bhugra, Singh, Fellow-Smith, & Bayliss, 2002; Ross & Heath, 2002), whereas other studies have found similar rates of NSSI in Caucasian and minority samples (Lipschitz et al., 1999; Marshall & Yazdani, 1999; Hilt, Cha, & Nolen-Hoeksema, 2008). Despite earlier reports of demographic differences, more recent evidence suggests that NSSI appears equally prevalent across sexes, ethnicities, and socioeconomic statuses (Nock, 2010).

Diagnostic Correlates

Under the recently replaced fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 2000), NSSI existed only as a symptom of Borderline Personality Disorder (BPD). This represents a longstanding association between NSSI and BPD. However, overestimation of this association is likely due to self-injury

existing as one of the criteria for BPD. One research study examining individuals with history of self-injury and comorbid BPD found that when self-harm was excluded from BPD diagnostic criteria only 28% of individuals continued to meet criteria for BPD diagnosis (Herpetz, Sass, & Favazza, 1997). While this does not entirely explain overlap in BPD and NSSI, researchers have suggested emotion dysregulation – considered a core feature of both BPD and NSSI – may explain their comorbidity (Linehan, 1993; Klonsky, 2007; Glenn & Klonsky, 2009).

Anxiety and depression symptoms are both reported to co-occur with NSSI (Hawton et al., 2002, Klonsky et al., 2003; Ross & Heath, 2002) – thus NSSI has high comorbidity with related disorders. A study by Nock and colleagues (2006) of adolescent inpatients with NSSI behavior found that 41.6% were diagnosed with Major Depressive Disorder (MDD), 23.6% with Post-Traumatic Stress Disorder (PTSD), and 15.6% with Generalized Anxiety Disorder (GAD). Significant research indicates NSSI co-occurs with many internalizing and externalizing disorders, as well as a range of personality disorders (e.g., Briere & Gil, 1998; Jacobson, Muehlenkamp, Miller, & Turner, 2008; Nock et al., 2006). It does not appear NSSI is specific to any single diagnosis; therefore researchers have proposed viewing NSSI behavior as transdiagnostic and have suggested research focus on variables– such as emotion dysregulation or the experience of trauma – that may be shared by NSSI and comorbid disorders (Bentley, Nock, & Barlow, 2014).

One clinically significant variable associated with NSSI is particularly noteworthy – NSSI is highly correlated with suicide. By definition, NSSI is explicitly distinguished from suicidality and research indicates that individuals are able to differentiate thoughts and behaviors related to NSSI versus those related to suicide (Glenn & Klonsky, 2009; Nock et al., 2006). However, individuals with NSSI have a 30-fold increase in risk for completing suicide compared

to individuals who do not engage in self-injury (Cooper et al., 2007). In fact, 50% - 85% of those with a history of NSSI report having made at least one attempt at suicide (Favazza & Conterio, 1988; Nock et al., 2006, Fyer, Frances, Sullivan, Hurt, & Clarkin, 1988). Among adolescents, NSSI has been determined to predict longitudinal trajectories of suicidality (Prinstein, 2008). For this reason, NSSI is sometimes conceptualized within a spectrum of suicidal behaviors potentially representing an early indicator of suicidality (Joiner, 2005).

Currently, the American Psychiatric Association (APA) does not officially recognize NSSI as a distinct disorder and – as previously discussed – exists only under criterion for BPD. However, research indicates a large percentage of individuals with clinically significant NSSI do not meet criteria for BPD nor is NSSI behavior indicative of any singular diagnosis (Nock et al., 2006; Herpetz et al., 1997; Klonsky & Olino, 2008; Whitlock, Muehlenkamp, & Eckenrode, 2008). Consequently, many researchers have argued NSSI be classified as a distinct syndrome (Favazza, 1996; Muehlenkamp, 2005) and it was therefore proposed as a disorder for inclusion in the fifth edition of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013). While it did not qualify as a formal diagnosis in DSM-5, NSSI was listed in Section III as one of the “Conditions for Further Study.” Disorders included in Section III were “contingent on the on the amount of empirical evidence available on a diagnosis, diagnostic reliability or validity, a clear clinical need, and potential benefit in advancing research,” (American Psychiatric Association, 2013, p. 7). NSSI was therefore deemed a significant public health issue requiring additional research to be evaluated for potential inclusion in future DSM editions.

FUNCTIONAL MODEL OF NSSI

Throughout the last several decades, researchers proposed a variety of theoretical motivations to account for the paradoxical nature of NSSI. Early perspectives theorized that NSSI may function to replace suicide or control sexual impulses (Friedman, Glasser, Laufer, Laufer, & Wohl, 1972; Bennun, 1984; Grossman, 1986; Novick & Novick, 1987; Firestone & Seiden, 1990; Suyemoto, 1998; Lane, 2002). However over the last half-century, clinicians and researchers have predominantly conceptualized NSSI to serve a manipulative or attention-seeking function (Yates, 2004). This is largely due to observation of its occurrence in individuals with BPD, particularly within inpatient settings, where NSSI was deemed to serve interpersonal functions (e.g., “a call for help). However, this perspective is challenged by contemporary research indicating that the majority of NSSI does not draw clinical attention (Lynch & Cozza, 2009; Hawton et al., 2004; Muehlenkamp, 2005). Furthermore, the reported prevalence of NSSI within adolescent populations – often in the double-digits – suggests that this behavior is not limited to individuals with severe psychopathology or diagnosis of BPD. Additionally, NSSI is most frequently reported to occur while alone and individuals often report efforts to hide NSSI scars with clothing or make-up (Walsh, 2006) therefore suggesting functions other than solely interpersonal influence. Comprehensive, evidence-based models explaining NSSI functions and motivations are crucial for development of effective clinical interventions.

Functional Approach

At the turn of the 21st century, researchers had yet to reach consensus on terminology for NSSI – it was referred to by various names including deliberate self-harm or self-mutilative behaviors – much less agree upon models related to NSSI behavior. Nock and Prinstein (2004) decided to utilize a functional approach to develop a model of NSSI. The functional approach

contends that behaviors are influenced by events that immediately precede and follow the behavior (i.e., antecedents and consequences). This functional approach has been used to assess a wide range of clinical behaviors as well as provide guidance for treatment interventions, such as those developed for anxiety, depression, and substance use (Barlow, 2002; Dimidjian et al., 2006, Dutra et al., 2008). Furthermore, the functional approach has successfully guided understanding and treatment of self-injurious behaviors in individuals with developmental disabilities (e.g., Iwata et al., 1994).

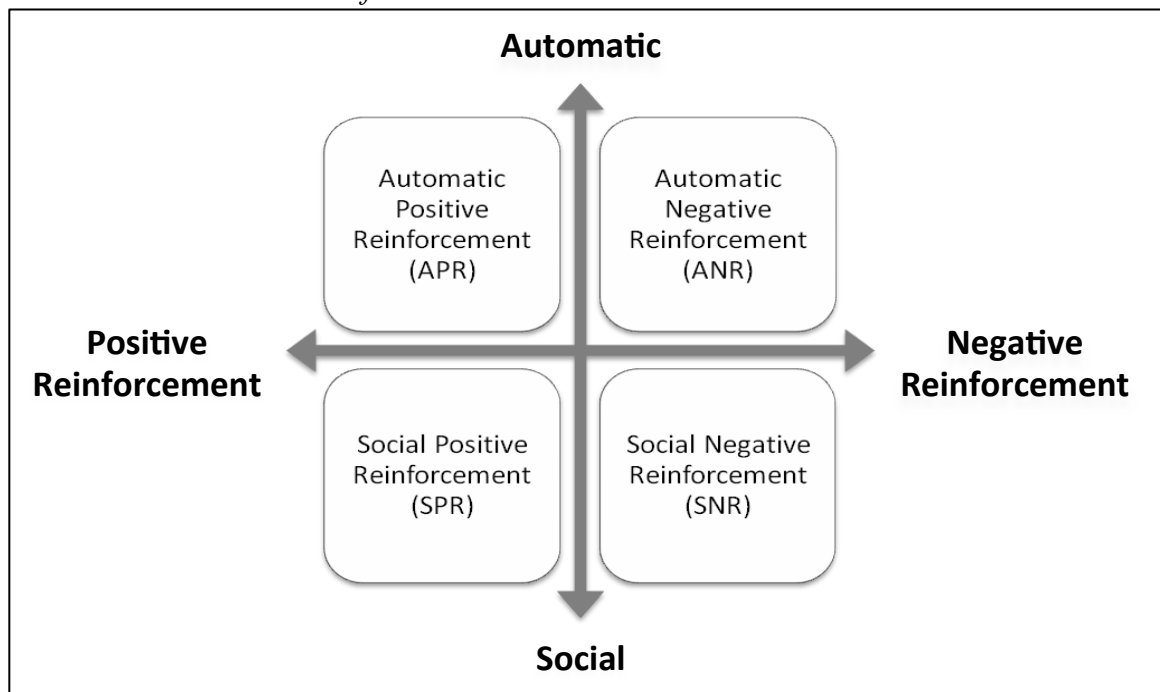
Nock and Prinstein (2004, 2005) utilized a functional perspective to create the Four Factor Model (FFM) of NSSI. Development of this model stemmed from extensive research on the functions of self-injurious behavior among individuals with developmental disabilities (e.g., Iwata et al., 1994). The FFM is novel in that it applied a functional analytic approach to understanding self-injury in populations without developmental disabilities, whereby, the specific functions of NSSI are investigated in reference to potential antecedent and consequent experiences. This expanded upon the conceptualization of NSSI as merely manipulative or attention-seeking, yielding more comprehensive descriptions of interpersonal influence, as well as proposing several internal (e.g., affect or cognitions) motivations for NSSI.

Four Factor Model

The FFM (Nock & Prinstein, 2004) proposes that NSSI is maintained by four distinct functional reinforcement processes. These four functions are divided across two dimensions: loci and type of reinforcement. The loci of reinforcement refer to reinforcing stimuli that are internal or “*automatic*” (i.e., intrapersonal) vs. external or “*social*” (i.e., interpersonal). Automatic variables are private experiences within the person, such as thoughts and feelings, and social variables are experiences and interactions with others. The two types of reinforcement within the

FFM are *positive* vs. *negative* reinforcement. Positive reinforcement involves the addition of a stimulus whereas negative reinforcement involves the removal of a stimulus. The FFM involves the combination of variable type and reinforcement type yielding four distinct functions of NSSI. These factors are outlined in Figure 1.

Figure 1. The Four Factor Model of NSSI



Automatic Negative Reinforcement (ANR) – NSSI that functions to remove, lessen, or escape from aversive affective or cognitive states (e.g., “to stop bad feelings”).

Automatic Positive Reinforcement (APR) – NSSI that functions to achieve desirable sensations, feelings, or cognitive states (e.g., “to feel something, even if it is pain” or “to feel relief”).

Social Negative Reinforcement (SNR) – NSSI that functions to remove or avoid interpersonal demands (e.g., to avoid school, work, or other activities).

Social Positive Reinforcement (SPR) – NSSI that functions to gain attention or resources from others (e.g., “to let others know how unhappy I am”; Nock & Cha, 2009). These four factors are summarized in Table 1.

Table 1. Descriptions of the Four Factors.

Description	
APR	Performed to achieve desirable sensations, feelings or physiological state (e.g., “to feel something, even it was pain”)
ANR	Performed to remove, lessen, or escape from aversive affective or cognitive states (e.g., “to stop bad feelings”)
SPR	Performed to remove or avoid interpersonal demands or pressure (e.g., to avoid school, work, or other activities)
SNR	Performed to gain attention or resources from others (e.g., to let others know how unhappy I am)

Since its inception, the FFM has been considered the predominant model to understanding functions of NSSI and is notably the first model to gain recognition for its emphasis on automatic as well as social functions (Bentley, Nock, & Barlow, 2014). For this reason, the FFM drastically challenged the prevailing clinical understanding – that NSSI behavior was limited to individuals with severe psychopathology and intended to draw clinical attention. The FFM was crucial to facilitating research outside clinical settings. This improved understanding of NSSI – the lifetime prevalence rates of self-injury in the general community are now estimated to range from 4% to as high as 18.4% (Klonsky, Oltmanns, & Turkheimer, 2003; Martin, Berger, Richardson, Roeger, & Allison, 2004; Yates, Carlson, & Egeland, 2008).

Subsequent research has consistently supported the distinction between the loci of reinforcement (i.e., automatic vs. social reinforcement; see Bentley et al., 2014 for review). However, evidence for the additional distinction between types of reinforcement (i.e., positive vs. negative reinforcement) within the different foci is less clear. This has been particularly problematic for the automatic functions as the reinforcing properties are not readily observable and likely more difficult to assess than properties associated with social reinforcement. A recent review of the FFM by Bentley and colleagues (2014) highlights this concern: “Distinguishing between forms of social reinforcement is more straightforward because it involves demonstrating

that NSSI is maintained by attention (SPR) or escape (SNR)—both clearly observable, distinct contingencies,”(p.5).

Although empirical distinction of social contingencies reinforcing NSSI is still needed within the research field, the current paper will focus on automatic functions within NSSI. The reason for this is three-fold:

- 1) Automatic functions are consistently the most prominently reported motivations for NSSI (e.g., Klonsky, 2011; Nock & Prinstein, 2004, 2005) with multiple studies reporting over 90% of their sample endorse these functions to some degree (Turner, Chapman, & Layden, 2012; Zetterqvist, Lundh, Dahlström, & Svedin, 2013).
- 2) There is significant debate about the distinction of ANR and APR within the research field. For example, a recent review by Bentley and colleagues (2014) explicitly called for studies to address this issue and considered it an area of high priority for treatment development.
- 3) Theoretical distinctions amongst automatic functions have far greater repercussions for research directions compared to distinctions among the social functions. This is not meant to discount research examining the domain of social reinforcement contingencies – this too is critical for comprehensive understanding of NSSI and treatment development. For example, research aiming to distinguish NSSI performed to “fit in” with a peer group versus NSSI performed to “prevent bullying” may be important to guiding clinical interventions. However, this direction of research likely focuses on a relatively narrow range of social and environmental variables. By comparison, research related to automatic functions and possible mechanisms of reinforcement has already been pursued through avenues involving affect, cognition,

attention/neurocognitive processes, as well as biological processes related neurotransmitters and opioid responses. Refining the understanding of the automatic functions and potential processes of reinforcement is likely crucial to guiding the relevant research in these domains.

This proposal intends to carefully examine the automatic functions of NSSI described by the FFM. This includes review of the current evidence for distinct reinforcement processes supporting unique ANR and APR functions within NSSI. The general classification of automatic functioning in NSSI – to regulate affective and cognitive experiences –is well-established across a range of measures, including self-report and psychophysiological assessment, using both descriptive and experimental research methods (Armey, Crowther, & Miller, 2011; Hilt et al., 2008; Klonsky & Olino, 2008; Chapman, Gratz, & Brown, 2006). A recent study involving several hundred adolescents with a reported history of more than ten instances of NSSI found 98.5% reported a psychological precipitant (e.g., thoughts or emotions) prior to engaging in NSSI (Zetterqvist et al., 2013). In fact, some researchers suggest that social functions may be secondary or more critical to the initial adoption of NSSI behavior to be later replaced by automatic functions (McKenzie & Gross, 2014). However, there may be under-reporting of social functions due to response-biases and lack of research accurately addressing these functions (Bentley et al., 2014).

Thus, the automatic functions appear to encompass the majority of instances of NSSI. Distinguishing potential subtypes of automatic functions – such as APR and ANR described in the FFM is particularly important. However, there is lack of clear evidence supporting distinction of ANR from APR resulting in considerable debate among researchers within the field (Klonsky, 2009; Bentley et al., 2014; Selby, Nock, & Kranzler, 2014; Zetterqvist et al., 2013).

The uncertainty surrounding the APR subtype is concerning because the theoretical conceptualization of APR has substantially influenced directions of certain areas of research. For example, there has been considerable examination into the role of opioids in NSSI (Chapman et al., 2006; Sher & Stanley, 2009; Stanley et al., 2010; Bresin & Gordon, 2013). To date, researchers have failed to identify clear evidence pertaining to opioid functioning in NSSI and interventions utilizing opioid-antagonizing drugs have not yet demonstrated sufficient empirical evidence for support (Russ et al., 1992; Grossman & Siever, 2001; Heilbron, Franklin, Guerry, & Prinstein, 2014; Kirtley, O'Carroll, & O'Connor, 2015). While continued research involving opioids may still yield potential, part of the rationale for continuation of this line of research stems from conceptualization of the APR function of NSSI (i.e., positive or pleasant sensations motivating self-injury). Models of NSSI thus have significant consequences for multi-modal research and development of efficacious interventions.

For these reasons, examination of automatic functions of NSSI and potential reinforcement processes represents a critical area of research within the field. In fact, a recent review by Bentley and colleagues (2014) explicitly identified this as a key area of focus for future research studies. The authors stated that “researchers have yet to resolve whether an automatic positive mechanism is truly distinct from an ANR function” as well as calling for potential studies “needed to resolve the controversy surrounding an APR mechanism” (p. 5). To properly address this “controversy,” it is first necessary to review the history pertaining to the development of the APR function of NSSI and evolution of its conceptualization throughout the literature.

Conceptualization of the APR

The APR function has a complex history despite its relatively recent conceptualization as a construct within the FFM (Nock & Prinstein, 2004, 2005). It has been interpreted in different ways within the NSSI literature and studies have utilized inconsistent criteria – many of which are not in line with the functional analytic perspective that guided the development of the FFM. For this reason, it is important to review the history and evolution of the APR function as it has been applied throughout the literature; proper understanding of its various interpretations is essential to understanding research evidence supporting this function.

Origin of APR. Nock and Prinstein’s 2004 article outlining the FFM defined APR as functioning “to create a desirable physiological state.” Furthermore, the authors expanded upon this definition and distinguished it from ANR stating “rather than serving the purpose of removing feelings [NSSI] may also function as a means of feeling generation,” (p.886). To test this hypothesis, Nock and Prinstein examined a self-injurious population using questions from the Functional Assessment of Self-Mutilation (FASM; Lloyd, Kelley, & Hope, 1997). The FASM was developed based on extensive review of motivations reported for self-injury that were then consolidated into twenty-two unique question items. Nock and Printstein (2004, 2005) assessed the validity of their FFM based on factor analysis of the FASM items corresponding to their hypothesized functions.

Based on this analysis, five of the twenty-two FASM items were determined to represent automatic factors (APR and ANR). The two items that loaded onto the ANR factor included:

- 1) “To stop bad feelings,”
- 2) “To relieve feeling numb or empty,”

The three items that loaded onto the APR factor included:

- 1) “To feel something, even if it was pain,”
- 2) “To feel relaxed,”
- 3) “To punish oneself,”

Nock and Prinstein (2004) concluded APR to be defined by motivations consistent with these three specific items from the FASM questionnaire as they loaded together in their analyses.

However, review of the original factor analysis by Nock and Prinstein (2004) reveals that the four-function model was not a significantly better fit than two- and three-function models – models that noticeably did not include distinction of ANR and APR. These more simplistic models were acknowledged to be more parsimonious; however, the authors retained the FFM as it was consistent with their hypothesized four-function model. Therefore, the distinction of automatic subtypes stems from theoretical rather than empirical rationale. For this reason, researchers recently reassessed functional models of NSSI as outlined in the original FFM paper (Zetterqvist et al., 2013). The authors examined data from a sample of several hundred adolescents with NSSI and found that a two-factor model – designating social versus automatic reinforcement – resulted in a better fit than the original FFM (Zetterqvist et al., 2013). This evidence, particularly in light of its highly theoretical origins, casts doubt on the utility of distinguishing automatic subtypes (APR vs. ANR) within NSSI.

Definition of Reinforcement. The definition of reinforcement used in the original papers presenting the FFM also led to confusion of distinction and conceptualization of the proposed APR subtype. Although Nock and Prinstein (2004, 2005) developed the FFM from a functional analytic perspective – derived from behavioral analysis – the definitions within the FFM are not always consistent with this perspective. From a strictly behavioral standpoint, **positive reinforcement** is the *addition* of a stimulus immediately following a behavior resulting

in an increased likelihood for the behavior's reoccurrence. By contrast, **negative reinforcement** involves the *removal* of a stimulus following a behavior resulting in an increased likelihood for the behavior's reoccurrence (Skinner, 1974). A common, though less behaviorally focused, definition characterizes positive reinforcement as the addition of "pleasant" stimuli and negative reinforcement with removal of "unpleasant" stimuli. These affective experiences typically map onto the more behavioral analytic definitions of reinforcement – however, this is not always the case. For example, functional analyses sometimes reveal that stimuli perceived as "unpleasant" or "aversive" can positively reinforce behavior (see Baron & Galizio, 2005 for review). Clear and precise definitions of reinforcement may be particularly important for NSSI since seemingly unpleasant stimuli (e.g., pain) may serve to increase the behavior, thus representing positive reinforcement.

The authors' decision to stray from strict definitions of reinforcement used in functional analyses has greatly impacted the interpretation of functions of the FFM including APR. In their first article of the FFM, Nock and Prinstein (2004) define positive reinforcement as "followed by the presentation of a favorable stimulus" and negative reinforcement as "followed by the removal of an aversive stimulus." Inclusion of wording related to the affective experience (i.e., favorable or unfavorable) has led many researchers and clinicians to interpret APR as NSSI functioning to increase positive affect or pleasant sensations. This interpretation of APR as the increase of positive emotions or positive sensations has provided rationale for specific lines of research including biological processes related to opioid functioning (Chapman et al., 2006; Sher & Stanley, 2009). While this increase in positive affect may represent a subtype of NSSI functioning, this definition is not consistently applied to APR.

For example, a recent study conducted by researchers including one of the original authors of the FFM, states explicitly that APR is not limited to increases in positive or pleasant experiences (Selby et al., 2014). In their introduction of APR, they assert “there may be positive reinforcement taking place, regardless of the specific sensation being reported (e.g., pain vs. relaxation)”. However, closer examination of the authors’ interpretation of APR proves problematic as demonstrated by the following passage:

“Thus, in the present study, we define APR in the case of NSSI as an instance of NSSI that was engaged in specifically to ‘feel’ a sensation, such as to feel stimulation, satisfaction, or pain. This is in contrast to engaging in NSSI to escape or remove an unpleasant thought or feeling, instances that would be classified as ANR. This definition of APR is consistent with empirical evidence that motivations such as trying to ‘feel relaxed’ or ‘trying to feel something, even if it was pain’ tend to load onto the same factor,” (p.418).

The authors appear to be using a more functional definition of APR, focusing on addition or generation of new feelings regardless of perceived “pleasantness.” However, “unpleasantness” is clearly still integrated into the ANR definition. While these new definitions allow for APR to include both pleasant and unpleasant stimuli (e.g., pain and relaxation) to fit empirical evidence of overlapping motivations (Nock & Prinstein, 2004), utilizing subjective affective experiences for ANR “in contrast” to APR leads to confusion. This represents a core problem for the FFM as ANR definitions are often confounded with definitions of APR.

Distinction of ANR and APR. For instance, in the study by Selby and colleagues (2014) reports of “satisfaction” or “relaxation” are interpreted as APR; however, escape or removal of an unpleasant thought or feeling – as they define ANR – can also result in feelings of “satisfaction” or “relaxation.” The report of these experiences subsequent to NSSI does not necessarily distinguish functions of positive versus negative reinforcement. Current definitions of APR – as exemplified above – do not necessarily preclude negative reinforcement processes

calling into question the existence of a distinct subtype of automatic motivations and the utility of distinguishing these potential subtypes under current conceptualization.

Since its inception, research involving the FFM has struggled with the distinction of positive versus negative reinforcement – particularly as regards automatic functions. For example, the FASM item “to relieve feeling numb or empty” was initially classified as ANR in the original factor analysis (Nock & Prinstein, 2004). Theoretically, “relief” of feelings of numbness or emptiness is consistent with removal of an aversive stimulus – and thus negative reinforcement as the authors define it – so that this item was grouped with the item “to stop bad feelings” as examples of ANR function. However, Nock and colleagues (2007) reassigned “to relieve feeling numb or empty” to APR – although the rationale was not described in the article itself. Reasoning for this change was relegated to a brief footnote justifying reassignment of the item “to relieve feeling numb or empty” because of its face-value similarity to the item “to feel something, even if it’s pain.” In fact, the item that once was assigned to ANR was integrated into the definitive question assessing for APR functioning in the *Self-Injurious Thoughts and Behaviors Interview* (SITBI; Nock et al., 2007) – “did you engage in NSSI in order to feel something, because you were feeling numb or empty?” Subsequent researchers have utilized the five FASM items originally used by Nock and Prinstein (2004, 2005) to identify automatic functions; however, discrepancies within the literature has resulted in inconsistencies regarding which items correspond to ANR as opposed to APR (Nock et al., 2007; Hilt et al., 2008; Turner et al., 2012; Selby et al., 2014; Zetterqvist et al. 2013).

Other Interpretations of APR. The APR concept already suffers from confusion relating to its distinction from ANR and the definition of its associated reinforcement processes. Adding to this confusion, APR has also been used within the literature to describe very specific

theoretical functions relating to NSSI. These include functions such as “anti-dissociation,” “self-retribution”, and “thrill-seeking.”

Anti-dissociation. Experiences of being “numb” or “empty” are interpreted by some researchers to represent dissociative symptoms – which have been found to be correlated with NSSI (Briere & Gil, 1998; Zlotnick, Mattia, & Zimmerman, 1999; Yates et al., 2008). For this reason, the function is often referred to as anti-dissociation. There is preliminary evidence indicating that this anti-dissociation function of NSSI may be associated with clinical symptoms related to posttraumatic stress disorder (PTSD), especially those from the avoidance/numbing cluster (Weierich & Nock, 2008), as well as symptoms related to major depressive disorder, such as anhedonia and psychic numbness (Nock & Prinstein, 2005; Weierich & Nock, 2008).

Researchers have theorized that for some individuals NSSI functions to end feelings of dissociation, derealization, or “numbness” by redirecting attention to the physical experience of self-injury (Klonsky, 2009; Muehlenkamp et al., 2009; Nock & Prinstein, 2004; Briere & Gil, 1998). The sight of blood has been reported as important for restoring a sense of authenticity to the individual or may function to remind oneself one is still alive (Favazza, 1996) thereby facilitating the end of the dissociative state (Van der Kolk, Perry, & Herman, 1991). These two theories postulate how NSSI may function for those experiencing numbness or emptiness but do not reveal whether this is through positive or negative reinforcement. Although many authors classify this type of NSSI as APR (Selby et al., 2014; Bentley et al., 2014; Nock et al., 2007; Rallis, Deming, Glenn, & Knock, 2012) there is no current evidence to indicate that this type of NSSI functions through positive reinforcement or is necessarily distinct from the ANR subtype.

Self-Punishment. The original factor analysis by Nock and Prinstein (2004), FASM item “to punish yourself” loaded onto the APR factor and this specific motivation has since been referred to as “self-punishment” within the NSSI literature. However, this is problematic from a functional analytic perspective as the term “punishment” refers to stimuli that *decrease* a behavior so that by definition “punishment” cannot serve as reinforcement. However, individuals with NSSI often report motivations consistent with a more colloquial definition of punishment – the imposition of injury or suffering as retribution for an offense or misdeed.

Self-punishment NSSI is conceptualized as self-injury performed to derogate or express anger at oneself (Klonsky, 2007). Nock (2010) describes this function as providing a vehicle to reprimand oneself for “some perceived wrong- doing or responding to general self-hatred or self-deprecation,” (p. 353). Some researchers have reported that individuals feel “purified” after NSSI (Glenn & Klonsky, 2010, Himber, 1994). The FASM item describing self-punishment originally loaded onto the APR factor and has thus been described as functioning through positive reinforcement (e.g., generation of feelings of “self-punishment). However, research has yet to provide empirical support for this type of reinforcement. Rather, researchers who have historically classified this type of NSSI as APR have theorized that the behaviors potentially “relieves guilt by allowing individuals to reappraise their view of themselves...[and] may be considered to act via cognitive change,” (McKenzie & Gross, 2014; p.8). While these and other authors (Glenn & Klonsky, 2009) propose that self-punishment NSSI is performed in response to antecedent feelings of guilt or anger it is unclear if NSSI reduces these initial feelings – suggestive of negative reinforcement – or whether it functions through creation of new feelings (e.g., “purified”) or changes in cognition that would reflect positive reinforcement.

Thrill-seeking. “Thrill-seeking” refers to feelings of excitement or exhilaration specifically related to experiences associated with other risky behaviors such as skydiving or bungee jumping (Nixon, Cloutier, & Aggarwal, 2002; Osuch, Noll, & Putnam, 1999; Klonsky, 2007). While not explicitly described within the context of the FFM, it has since been referred to on occasion as part of the conceptualization of APR (Selby et al., 2014). However, Klonsky (2007) purports that experiences of excitement and exhilaration are not readily apparent in NSSI clinical populations. However, definitional criteria may be responsible for reports of experiences resembling thrill-seeking – some studies group NSSI behaviors such as “skin-cutting” with other types of self-harm such as “jumping from a height” (Hawton et al., 2002).

Summary of APR Conceptualization. Review of the original article factor analyses and subsequent research examining the FFM suggest that there is not strong empirical support for distinction of APR and ANR. Furthermore, confusion regarding the definition of reinforcement has further complicated understanding of the APR construct. Moreover, the APR has typically subsumed specific functions such as self-retribution and anti-dissociation. While these motivations are consistently reported among individuals with NSSI the evidence does not yet indicate that they function through positive rather than negative reinforcement. Although researchers have conceptualized NSSI performed in response to dissociative symptoms as positive reinforcement because of the generation of new feelings (e.g., to feel something), an alternative interpretation is that this function represents escape from feelings of numbness or emptiness – thus functioning through negative reinforcement and representing ANR. Similarly, NSSI performed as self-retribution is considered to be performed in response to antecedent feelings of anger and self-criticism but the mechanism and specific type of reinforcement have yet to be identified.

Furthermore, APR function has also been used to reference increases in desired or wanted sensations, thoughts or emotions consistent with a more colloquial definition of positive reinforcement. Sometimes these definitions refer to very specific positive emotional experiences (e.g., thrill-seeking) while other times the definition refers more broadly to any positive-valence increase in subjective experiences. Evidence suggests that early reports of desirable sensations associated with “thrill-seeking”, such as exhilaration, are likely due to broad definitions of self-harm; however, self-report studies consistently find individuals report increases in positive - valence emotions subsequent to NSSI (Muehlenkamp et al., 2009; Nock & Prinstein, 2004; Selby et al., 2014). These studies find increases in states of “calm,” “relaxation,” and “relief” – relatively low arousal states contrary to the higher arousal states associated with thrill-seeking. While increases in positive affect may appear to represent a distinct APR functioning, this increase in positive affect is strongly correlated with concomitant decreases in negative affect (Bentley et al., 2014). Some researchers (e.g., Klonsky, 2009) have argued that the generation of positive affective experiences subsequent to NSSI is actually a *result* of diminished negative affect – again calling into question whether an independent APR mechanism can be differentiated from that of ANR. Studies examining positive and negative affect in NSSI have relied on endorsement of affect-related words (Muehlenkamp et al., 2009; Selby et al., 2014) thus making it challenging to quantitatively compare valence of positive versus negative affective experiences. Therefore, current research has yet to conclusively demonstrate that increases in positive valence represent a distinct APR subtype in which the increase of positive affect is predominant.

Current evidence indicates that distinction of positive and negative reinforcement – as defined by the original FFM article – do not necessarily improve models of NSSI (Zetterqvist et

al., 2013, Klonsky & Glenn, 2009). Failure to distinguish APR from the ANR subtype may be in part due to imprecise and inconsistent definitions of reinforcement. Relying on subjective experience – while inconsistent with functional analytic definitions of reinforcement – may provide greater utility in identifying subtypes of NSSI if novel methodological approaches are employed.

Exploration of Affective Experiences in NSSI

The FFM’s classification of NSSI – specifically the distinction of APR and ANR – is not currently supported by research evidence. Reliance on reinforcement processes has yet to provide utility in distinguishing functions or motivations for NSSI. This may be in part due to inconsistent definitions of positive versus negative reinforcement. However, it may also be that the physiologic mechanisms involved in NSSI may be outside individuals’ awareness so that they are unable to report the specific function or reason for self-injury – thus making it difficult to ascertain reinforcement. Furthermore, ethical constraints prohibit proper functional analysis (i.e., in vivo assessment and testing of NSSI behavior), which is the most accurate gauge of reinforcement processes. Research historically preoccupied with distinguishing positive and negative reinforcement may, in actuality, obfuscate independent subtypes of NSSI function. For example, NSSI described to function as anti-dissociation may be distinct from NSSI reported to function as self-retribution but do not necessarily differ by *type* of reinforcement. Hypothetically, both may function to escape aversive experiences (e.g., “numbness” or “guilt”) – thus reflecting negative reinforcement – however, this may be achieved through very different mechanisms.

A current review by McKenzie and Gross (2014) aptly summarizes many of the current problems with APR, particularly in regards to evidence relying on affective state:

“While differences in terminology can make discussions of changes in affective state difficult, the bulk of the evidence suggests that the positive affect that emerges through

NSSI may be principally via increases in low negative activation such as calm, rather than via changes in positive activation,” (p.8). Currently, there is nominal evidence to suggest that some NSSI may function through increased positive affect but several researchers (e.g., Klonsky, 2009, McKenzie & Gross, 2014) argue that this actually reflects reduction in negative affect. However, inconsistent terminology – as mentioned by McKenzie and Gross (2014) – has made it difficult to provide definitive conclusions regarding affective changes reflective of a distinct APR subtype.

Therefore, careful examination of affective experiences is needed to end speculation regarding an APR mechanism in which NSSI is positively reinforced by increases in positive affect. To do this, particular attention must be paid to criteria defining NSSI and terminology related to the definition of reinforcement. Criteria encompassing other self-harm may be responsible for positive affect resembling “thrill-seeking” (Hawton et al., 2002). Furthermore, many studies of self-injury include “hair pulling” and “picking at wounds” as types of NSSI (Klonsky & Olino, 2008; Klonsky, 2011; Lloyd-Richardson et al., 2007), although these specific behaviors are respectively characteristic of trichotillomania and excoriation disorder (DSM-5). Therefore, much of the research involving the APR functions of NSSI utilized samples of individuals with behaviors potentially better classified under another diagnosis. Thus, the motivations and experiences related to trichotillomania and excoriation disorder – which include generation of pleasurable sensations, relaxation, and relief from boredom (Snorrason, Belleau, & Woods, 2012) – may have contaminated research into the functions of NSSI. This is not to say these disorders do not share functions of NSSI; rather this has yet to be appropriately assessed within the research field. Therefore, it is essential that future research utilize the most up-to-date criteria defining NSSI that specifically excludes these disorders (Selby, Bender, Gordon, Nock, & Joiner, 2012).

Furthermore, clear terminology and methodology are required for examination of affective experiences related to the reinforcement of NSSI. Ethical limitations prevent traditional functional analysis to assess reinforcement processes. However, self-report studies focusing on antecedent and consequent experiences – as is essential in functional analysis – may represent the next best approach to assessment of reinforcement. Traditionally, studies making conclusions regarding reinforcement of NSSI have focused on affective experiences subsequent to NSSI (Muehlenkamp et al., 2009; Nock, Prinstein, & Sterba, 2009; Vansteelandt et al., 2013; Claes, Klonsky, Muehlenkamp, Kuppens, & Vandereycken, 2010.) However, focusing on both antecedent and consequent experiences provides greater insight into affective changes and motivations pertaining to self-injury. For example, NSSI reported to predominantly reduce negative affect may be interpreted as functioning through negative reinforcement whereas NSSI resulting in predominant increases in positive affect may be interpreted as functioning through positive reinforcement.

Additionally, clarity is needed regarding positive and negative affect – previous research relies on assessment of affect-related words rather than quantitative ratings of positive and negative affect to allow for comparative analysis of these experiences before and after NSSI. This quantitative analysis of affective experiences is crucial for evaluating the five FASM items reflecting automatic functions of NSSI to determine if these items differ in experiential changes predominantly involving positive versus negative affect. Evidence indicating that FASM items relating to APR are associated primarily with increased positive affect and that FASM items relating to ANR are associated primarily with decreased negative affect would represent a first step to supporting the distinct reinforcement processes associated with each construct. In addition, research examining antecedent and consequent affective experience may identify

contextual differences associated with the different automatic functions (as identified through each FASM item). For instance, motivations related to “stop bad feelings” may be associated with high antecedent negative affect that is lessened after NSSI, whereas motivations “to punish myself” may involve mild antecedent negative affect mixed with mild positive affect that remains relatively unchanged subsequent to NSSI. While the first example would be consistent with the ANR subtype, the latter example does not support reinforcement strongly indicative of either ANR or APR. However, the latter case may represent a subtype that has distinct antecedent triggers compared to the former example and potentially suggests emotion-regulation processes are less pronounced, perhaps indicating changes in cognition be explored within this motivation. This example is purely hypothetical but it demonstrates how potential difference in contextual factors may help to understand differences in automatic subtypes.

Therefore, greater focus on antecedent and consequent experiences involved in NSSI appears to be crucial for identifying differences among automatic functions – whether these are consistent with the FFM’s conceptualization or reflective of other potential subtypes. This approach is emphasized by McKenzie and Gross (2014): “One important direction for future research is to clarify the precise functions NSSI may be serving for a given individual in a particular context. In analyzing the processes engaged by NSSI in a particular context, it will be useful to clarify how each of these momentary functions relates to one another,” (p.9). This rationale guided the development of an original study (Franklin, 2012) – previously conducted by the author of this proposal as part of her Masters Thesis– however, additional analyses not published in the original study have since been explored in accordance with the literature’s recent emphasis on contextual features relating to the functions of NSSI.

Original Study:

Affective Experiences Associated with NSSI

The purpose of this study was to investigate patterns of change in positive and negative affect from before to after instances of NSSI that, according to participants' report, occur for different functional reasons (i.e., ANR and APR) as identified through a modified version of the FASM. This was done utilizing an internet survey of students enrolled in psychology classes at the University of Wisconsin-Milwaukee (UWM) to gather information on individuals who report NSSI and their experiences related to self-injury. Results from the survey were examined using two separate approaches, each intended to assess the automatic functions of NSSI.

Description of the Initial Study

A total of 296 UWM students consented to participate in the survey as unremunerated volunteers or in exchange for class extra credit (the majority of cases). NSSI was defined as intentional "cutting" or "burning" without suicidal intent. The survey was limited to these two types of self-injury because they are the most common (Nock, 2010) and less likely to capture other self-harm behaviors (e.g., hairpulling or head banging) that may be better characterized by a specific disorder (e.g., trichotillomania or motor stereotypy). Questions involving endorsement of NSSI were adapted from the *Deliberate Self-Harm Inventory* (DSHI; Gratz, 2001). Overall, eighty-three students endorsed a history of either cutting or burning. Reinforcement maintaining NSSI is important to conceptualizations of the ANR and APR subtypes. Since reinforcement implies recurrence of the behavior, this study focused on participants with a history of repeated self-injury (i.e., more than one incident) that included sixty-six individuals. Questions derived from the *Functional Assessment of Self-Mutilation* (FASM; Lloyd, Kelley, & Hope, 1997) were used to assess the functional reasons or motivations related to self-injury. Specifically, this

comprised the five questions from the FASM identified to represent automatic factors (ANR or APR) of FFM (Nock & Prinstein, 2004, 2005). The items from the FASM questionnaire utilized in this study are referred to as “FASM1,” “FASM2,” and so on. These questions, along with the reinforcement function hypothesized in the FFM, are outlined in Table 2.

Table 2. FASM Items Assessing Automatic Functions of NSSI

FASM1	As a way to get rid of bad feelings?
FASM2	Because you were feeling numb or empty?
FASM3	To feel something, even if it was pain?
FASM4	To punish yourself?
FASM5	To feel relaxed?

For each endorsed item of the FASM, participants were instructed to “think of a time you cut or burned for this reason” and then asked to rate emotional antecedents and consequents using the *Evaluative Space Grid* (ESG; Larsen et al., 2009). The ESG is a method used to examine mixed emotional experiences in a single-item measure allowing for the independent activation of positive and negative affect as well as the possibility of their co-activation (Norris, Gollan, Berntson, & Cacioppo, 2010). An example is presented in Figure 2. In this example, the respondent is indicating the concurrence of “quite a bit” of negative affect along with “slight” positive affect. Such findings are consistent with the factor structure of the *Positive and Negative Affect Schedule* (PANAS), indicating that positive and negative affect are independent factors and not opposite poles on a single dimensions (Watson, Clark, & Tellegen; 1988; Watson, Wiese, Vaidya, & Tellegen, 1999). Several studies have demonstrated the generalizability and predictive validity of the ESG and additional research has found ESG ratings to predict facial electromyographic activity for tasks utilizing affective stimuli (Larsen et al., 2009). Participants completed the ESG twice for each of the five FASMS endorsed, once to capture their affective experience before negating in NSSI, and then a second to capture their affective experience after engaging in NSSI.

Figure 2. Example of the Evaluative Space Grid

Think of the EMOTIONS you were experiencing *immediately before* hurting yourself. How **positive and negative** would you rate the experience of these emotions?

How **NEGATIVE** was the experience?

Extremely					
Quite a bit		✓			
Moderately					
Slightly					
Not at all					
	Not at all	Slightly	Moderately	Quite a Bit	Extremely

How **POSITIVE** was the experience?

Hypotheses Related to the Initial Study

The primary aim of this study was to characterize the patterns of change in positive and negative affect from before to after engaging in NSSI and to contrast the pattern for instances designated as ANR with those designated as APR. According to Nock and Prinstein's FFM (2004, 2005), NSSI identified by FASM1 – “As a way to get rid of bad feelings?” – represents the definitive example of ANR. Accordingly, we hypothesized that individuals endorsing this item would describe high negative affect, low positive affect prior to NSSI and that afterward these individuals would report reductions in negative affect and possible increases in positive affect. However, the reduction of negative affect should be primary and thus more substantial than any increases in positive affect.

The other FASM items (FASM2 – FASM5) have all been at times associated with APR. Therefore, we hypothesized that patterns of affect (before and after) for these items would be significantly different from that observed in FASM1 – the prototypical example of ANR. Furthermore, FASM1 should reflect negative reinforcement and thus primarily involve *reductions in negative* affect rather than increases in positive affect; whereas FASM items associated with positive reinforcement should primarily involve *increases in positive* affect rather than reduction in negative affect.

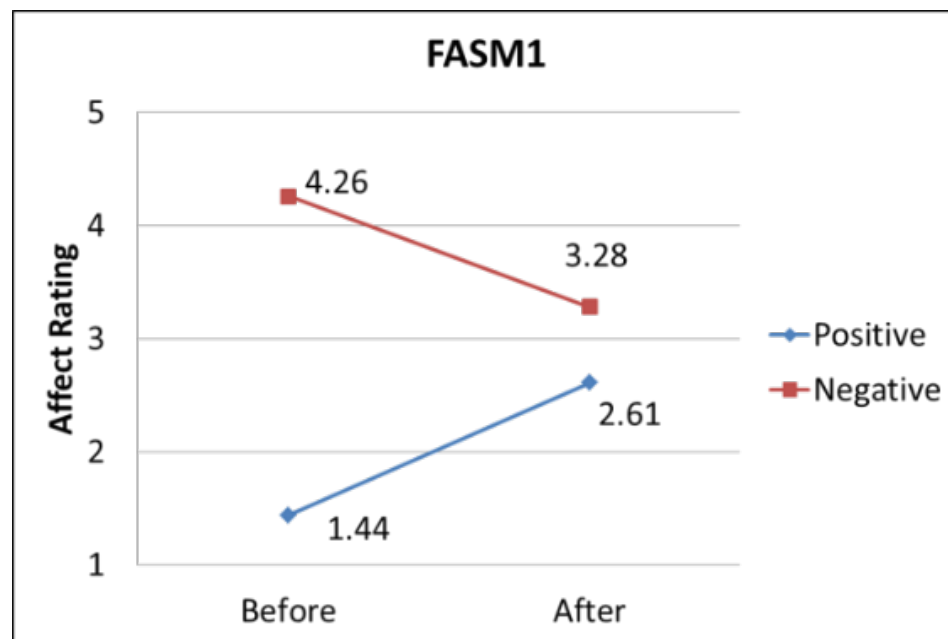
Results of Initial Study

The purpose of the following analyses was to characterize the pattern of change in positive and negative affect reported immediately prior and subsequent to NSSI using the evaluative space graph. It was hypothesized that FASM items associated with ANR would reflect decreased negative affect subsequent to engaging in NSSI accompanied by little or no change in positive affect. FASM items associated with APR should hypothetically be associated with the

reverse pattern – increased positive affect subsequent to NSSI accompanied by little to no change in negative affect.

FASM 1 – “To get rid of bad feelings” (ANR). To test the hypothesis ANR would be associated with a decline in negative affect from prior to post-NSSI, data from FASM1 (“as a way to get rid of bad feelings”) – which is considered the prototypical question identifying ANR – were submitted to a 2 X 2 (“Time”: before vs. after NSSI) X (“Affect”: positive vs. negative) repeated measures factorial analysis of variance (ANOVA). Results of the ANOVA revealed a significant “Time” X “Affect” interaction, the means for which are displayed in Figure 3.

Figure 3. Affect Changes in FASM1



Subsequently, the simple main effects of time were explored through separate paired *t*-tests for positive and negative affect. Results indicated a significant decrease in negative affect from prior ($M = 4.26$, $SD = 1.03$) to after ($M = 3.28$, $SD = 1.16$) engaging in NSSI, $t(53) = 4.98$, $p < .001$; results also indicated a significant increase in positive affect from prior ($M = 1.44$, $SD = 0.77$) to after ($M = 2.61$, $SD = 1.17$) NSSI, $t(53) = -5.62$, $p < .001$. Interaction contrasts utilizing the

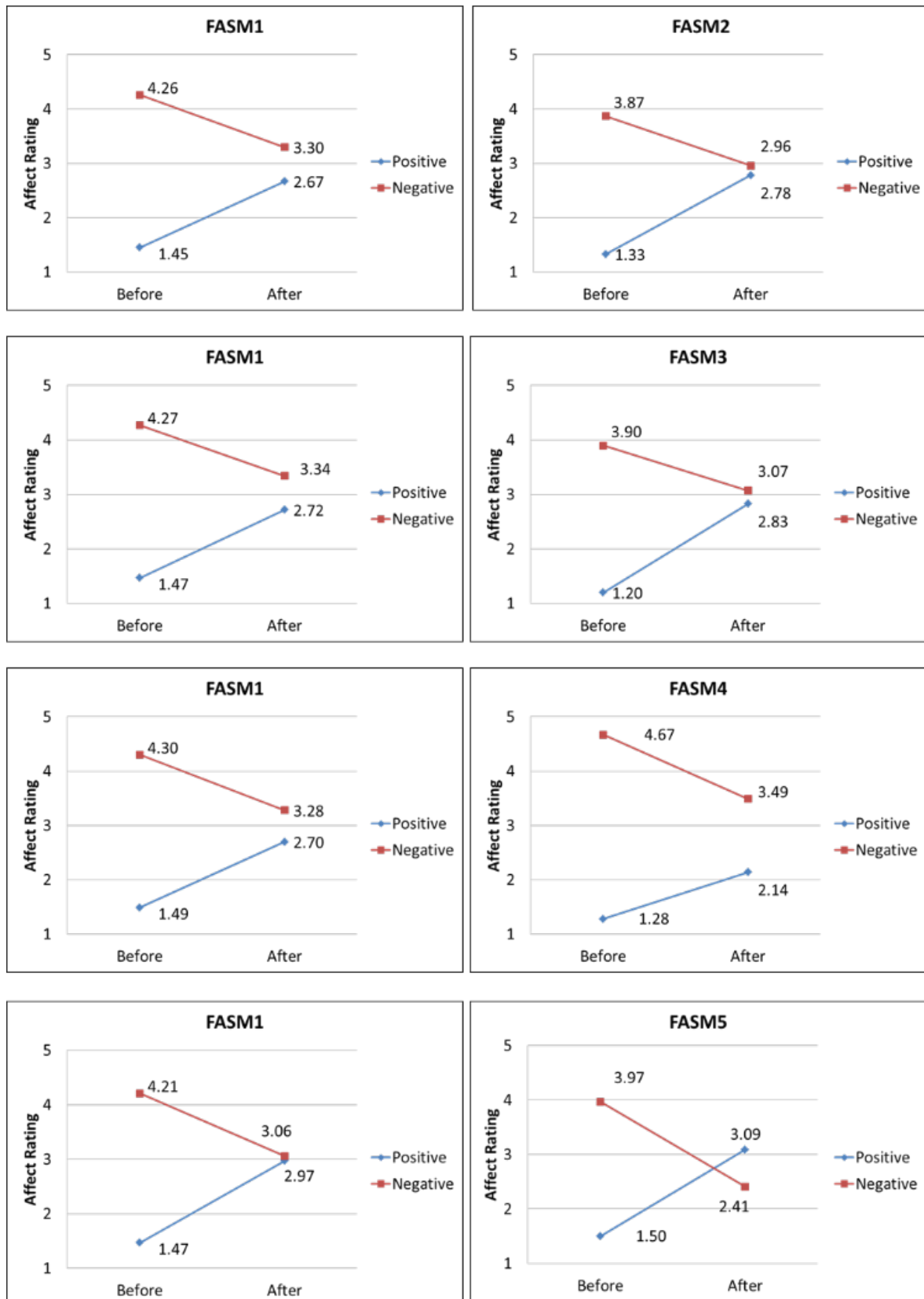
absolute value of the change scores indicated no difference in the magnitude of change between positive and negative affect, $t(53) = 1.302$, $p = .198$).

In summary, consistent with our expectations the assessment of negative affect experienced before and after engaging in NSSI for reasons of automatic negative reinforcement, as indicated by endorsing the FASM1 item, found a significant decrease in reported negative affect. However, *contrary* to our predictions, FASM1 was also associated with a significant increase in positive affect subsequent to NSSI – we had hypothesized little or no change in positive affect in cases of ANR. Furthermore, it was expected that changes in negative affect would be significantly greater than changes in positive affect; however this was not the case, as net change was not statistically different for positive and negative affect.

Comparison of FASM Items. Since FASM2 – FASM5 represent items potentially reflecting APR, comparison with the prototypical item representing ANR assesses whether any of these items (FASM2 – FASM5) possess distinct (non-ANR) patterns of affective change. This comparison was conducted using four separate 2 X 2 X 2 (“FASM” X “Time” X “Affect”) repeated measure factorial ANOVAs. For the “FASM” factor of each ANOVA, FASM1 was compared with one of the four remaining FASM items (i.e., FASM1 vs. FASM2, FASM1 vs. FASM3, FASM1 vs. FASM4, and FASM1 vs. FASM5). The “Time” factor assessed ratings before and after NSSI. Finally, the “Affect” factor compared positive and negative affect.

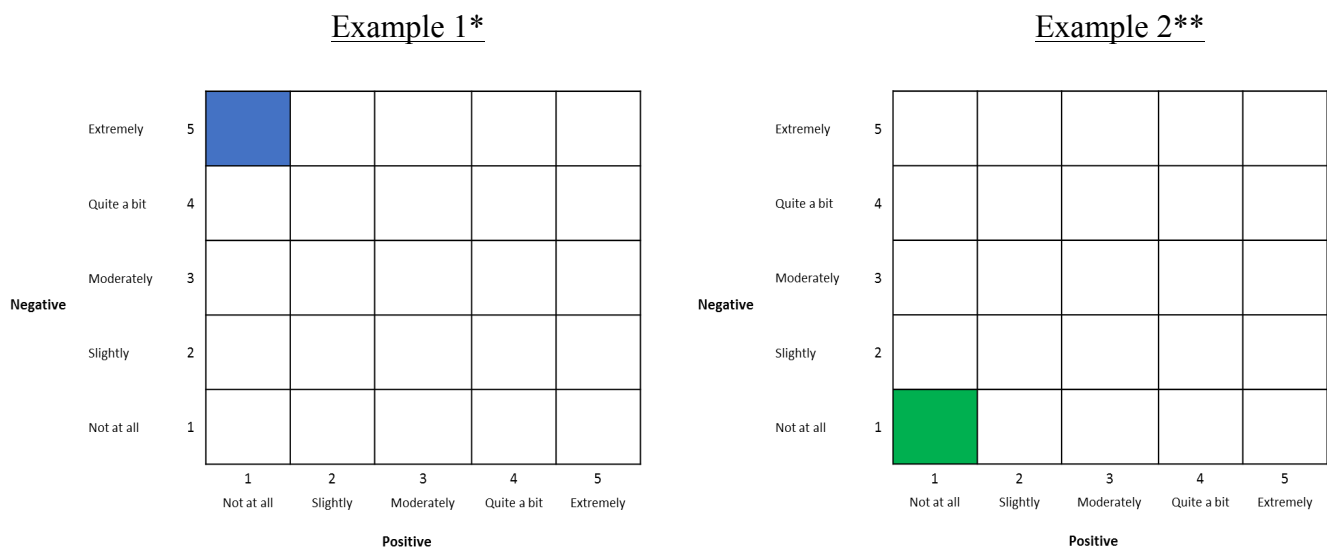
The results of all four ANOVAs indicated a statistically significant “Time” X “Affect” interaction, but none resulted in a significant 3-way interaction. This suggests that although there were significant differential changes in positive and negative affect across time, the pattern of changes were not significantly different for FASM1 than for any of the other FASM items. The means for the 3-way interaction are displayed in Figure 4.

Figure 4. Pattern of Affect Change in FASM Items



Additional Analyses. Evaluation of reports of antecedent affect may represent an alternative approach to distinguishing subtypes of NSSI. The following is a previously unreported exploratory analysis of the Franklin (2012) data conducted for the purpose of informing the current proposal. On the ESG, participants obtain two scores for each FASM at each time point, one score reflecting the degree of positive affect experience (1 to 5) and the degree of negative affect (also 1 to 5). Thus each participant's score consists of an ordered pair. For example, an ordered pair of (1, 5) before engaging in NSSI would indicate no positive affect and extreme negative affect. By contrast, someone endorsing an ordered pair of (1, 1) before engaging in NSSI would indicate no positive affect AND no negative affect antecedent to NSSI. These examples are outlined in Figure 5.

Figure 5. Examples of ESG Responses



**Example 1 reflects high negative affect and no positive affect antecedent to NSSI*

***Example 2 reflects no negative or positive affect antecedent to NSSI*

Each participant's selection within the ESG – regarding initial positive and negative affect – was determined for each FASM item and can be seen in Figure 7. This represents the number of participants who selected each specific combinations of positive and negative affect corresponding to the ESG grid square. Shades of gray are used to help visualize response frequencies – higher frequency affect combinations (ESG grid square) are reflected with darker shades of gray.

Responses to the FASM items were coded to examine antecedent affect that was low in both positive and negative ratings (i.e., 1 or 2 on both dimensions). This represents the bottom left squares outlined in red in Figure 7. A total of 53 participants completed FASM 1, three of whom fall in the area defined as representing the combination of low antecedent positive and negative affect (5.6%). Similarly low percentages were obtained for FASM 4 (0 of 42; 0%) and FASM 5 (4 of 34; 11%). By contrast, approximately 20% of cases for each of FASMS 2 and 3 were characterized by low antecedent positive and negative affect. Utilizing FASM 1, the most commonly endorsed reason for engaging in NSSI, to estimate the proportion of participants expected to report low antecedent positive and negative affect under the null hypothesis that there are would be differences across the remaining FASMS (i.e., 6% with low antecedent positive and negative affect, 94% without), separate chi-square analyses were conducted for each of the remaining FASMS. Table 3 presents the observed frequency (%) of participants with and without low antecedent positive and negative affect for all five FASMS and presents the results of the chi-square analyses for FASMS 2 – 5. Consistent with initial impressions based on visual inspection of Figure 7, a significantly greater proportion of participants than expected had low antecedent positive and negative affect on FASMS 2 and 3 (“Because you were feeling numb or empty?” and “To feel something, even if it was pain?”), but not FASMS 4 and 5.

Figure 6. Frequencies of Antecedent Low Affect Represented by the ESG

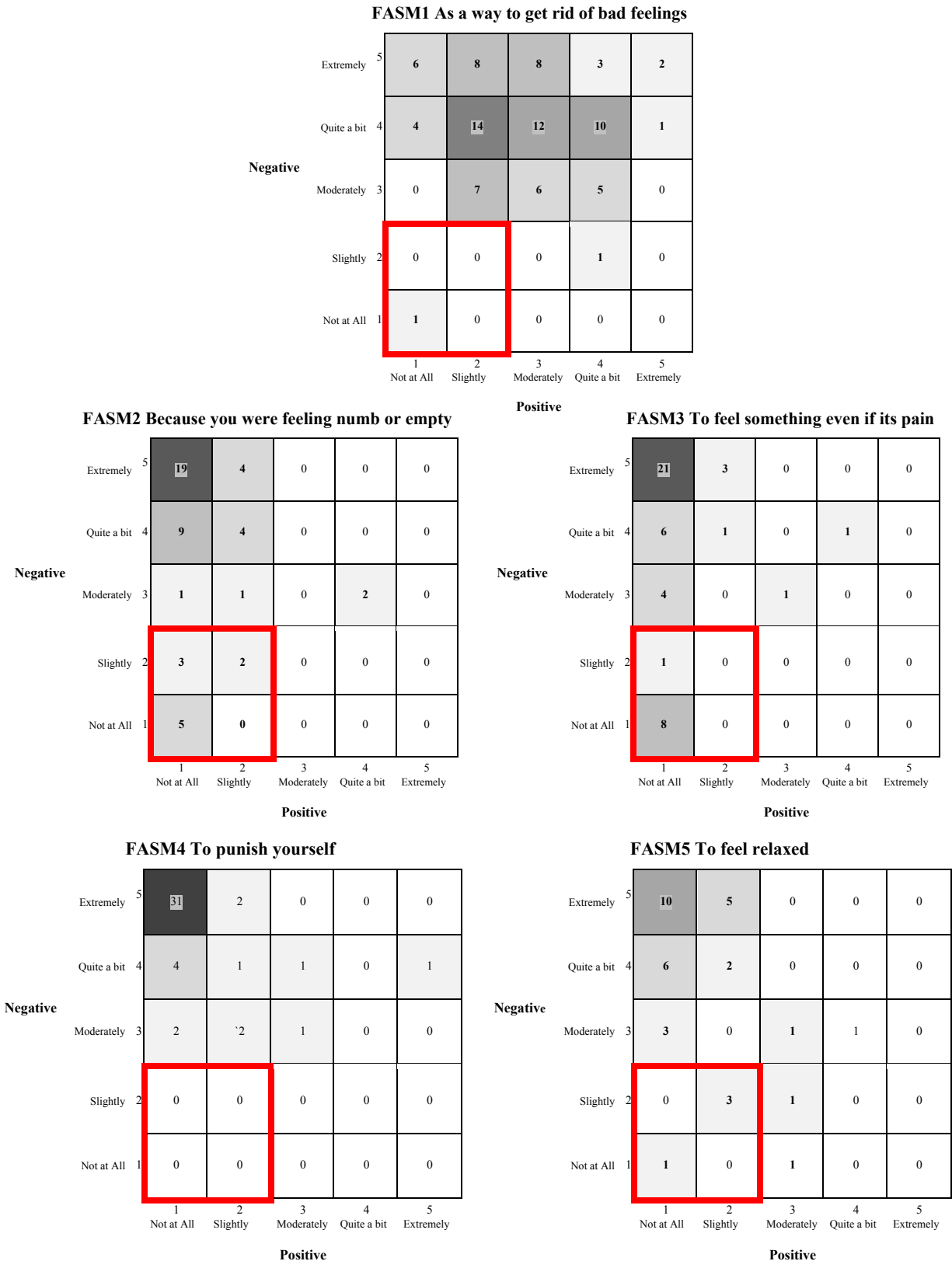


Table 3. Frequency of Individuals Reporting Low Affect Across FASM Items

FASM	Low Antecedent Positive and Negative Affect		χ^2 value (<i>df</i> = 1)	<i>p</i>
	Yes	No		
	Frequency (%)	Frequency (%)		
FASM 1	3 (5.7%)	50 (94.3%)	not computed	not computed
FAMS 2	10 (20.4%)	39 (79.6%)	18.0	< .001
FASM 3	9 (19.6%)	37 (80.4%)	15.0	< .001
FASM 4	0 (0%)	42 (100%)	2.7	> .05
FASM 5	4 (11.8%)	30 (88.2%)	2.0	> .05

Note: The proportion of individuals with low antecedent positive and negative effect was use to estimate the predicted frequencies under the null hypothesis for FASMS 2 – 5 (.06 vs. .94).

Conclusions and Limitations from Initial Study

Results from this Initial study indicate that, consistent with our hypotheses, ANR NSSI characterized by FASM1 was associated with a significant decrease in negative affect. However, contrary to our hypotheses we found that this item was also associated with significant increases in positive affect subsequent to NSSI. Moreover, when magnitude of changes in positive and negative affect was compared, there was no statistically significant difference between them. Therefore, FASM1 – and by extension ANR – was characterized by significant reduction in negative affect and significant increases in positive affect, and these changes in affect were similar in magnitude.

The remaining four FASM items – each having been associated with APR in the literature – were examined to assess changes in affect as well as compare these patterns to that of FASM1, the prototypical example of ANR. This pattern of findings for FASM2 – FASM5 indicates significant differential changes in positive and negative affect across time, but that the pattern of changes were not different than that observed in FASM1. The present results suggest

that, overall, positive and negative affect reported before and after NSSI is not significantly different for any of the five FASM items associated with automatic reinforcement. This contradicts the FFM – which historically divides FASM1-FASM5 among two distinct subtypes. Accordingly, these results do not provide any support in the aggregate for discriminating between positive and negative reinforcement functions on the basis of differential change in positive vs. negative affect.

Additional analyses focused on the data of individual participants, however, reveal that antecedent affect may help identify potential subtypes of NSSI. Although antecedent affect is generally characterized by high negative affect and low positive affect for most individuals across all automatic FASMS items, FASM2 and FASM3 have a significant subgroup characterized by antecedent low affect (both positive and negative). These FASM items, “because you were feeling numb or empty?” and “to feel something, even if it was pain?” have often been associated with the anti-dissociation subtype of NSSI (Klonsky, Muehlenkamp, Lewis, & Walsh, 2011; Bentley et al., 2014). A subgroup of respondents endorsing these items appears consistent with this conceptualization, in which individuals report lack of feelings or emotions as a reason for engaging in NSSI. This is consistent with previous studies of NSSI in which individuals report motivations such as “to elicit feelings” (Nixon et al., 2002; Turner et al., 2012). However, data from the initial study adds to this conceptualization of “feeling generation” as a motivation for some individuals with NSSI in that it provides evidence for antecedent experiences devoid of positive or negative affect.

There are several limitations of note with the original study. This sample was derived from an undergraduate population and the majority of participants who reported a history of NSSI did not report current NSSI of clinical significance. This presented uncertainty about

whether these findings would translate to a sample with clinically significant NSSI. Moreover, many of the participants in the original study had not self-injured in a year or more's time, thus questioning the accuracy of recall for the specific affective experiences before and after instances of NSSI. Therefore, it was considered important to replicate these initial findings in a sample of individuals who currently engage in clinically significant levels of NSSI (e.g., five or more instances within the last year).

Another limitation of the original study was the failure to specify that instances of NSSI relating to each FASM be distinct episodes. Therefore, some individuals potentially may have described the same episode of NSSI but endorsed multiple functions as described by various FASM items. Therefore, true comparison of affective experiences related to each FASM item (FASM1- FASM5) should clearly differentiate unique episodes related to the FASM items functions.

Current conceptualization of APR may fail to recognize distinct subtypes of NSSI due to confusion in the definition and interpretation of positive reinforcement. Distinguishing potential automatic subtypes is theorized to be crucial in development of empirically supported interventions for treating NSSI. For example, Bloom and Holly (2011) argue that the existence of two subtypes suggests that treatment effectiveness may vary by group. However, the relevant research data have not supported the FFM distinction between APR and ANR. Reanalysis of the Franklin (2012) data suggests antecedent experiences may be a more effective means of assessing subtypes of NSSI. This may have important treatment implications – interventions that focus on regulation of intense negative affect may be useful for some individuals or certain instances of NSSI. However, alternative interventions that focus on ways of dealing with numbness, anhedonia, or lack of affect in general may be necessary for other individuals.

Current Study:

Exploration of Affect and Antecedent Experiences in NSSI

The current study was designed to be an extension of the original study with minor alterations intended to address limitations of the initial study. For example, the current study aimed to utilize a population with more clinically significant NSSI. The workgroup for NSSI (Selby, Bender, Gordon, Nock, & Joiner, 2012) proposed criteria for “NSSI Disorder,” – although not yet adopted by DSM-5 – the criteria outlined was theorized to best represent clinically significant NSSI. For example, diagnosis requires five or more instances of NSSI within the past year. Based on these criteria, only two individuals from the original study would be diagnosed with the proposed NSSI Disorder so that responses may not reflect current or clinically significant NSSI. The current study planned to address this problem by recruiting individuals meeting the proposed criteria for NSSI Disorder. This was also intended to lessen retrospective bias in reporting as many individuals in the original study reported history of NSSI but no episodes of self-injury in over a year.

Additionally, the current study intends to address the second major limitation of the original study –that episodes of NSSI associated with each FASM item were not specified to represent distinct episodes. Therefore, the failure to find significant difference in affective experiences may be related to individuals reporting multiple functions associated with a singular episode. To address this, the current study will specify that individuals think of a unique episode associated with each FASM item endorsed.

Another limitation of the Initial study and self-report studies of NSSI more generally is that NSSI is characterized by alexithymia – a pattern of difficulty identifying, distinguishing, and describing emotional experiences (Sifneos, 1973). Higher levels of alexithymia have been

demonstrated to differentiate between groups of individuals with a history of NSSI from groups without history of self-injury (Polk & Liss, 2007; Evren & Evren, 2005). Alexithymia – defined as difficulty identifying and distinguishing emotional experiences – is thought to be one of many variables that contribute to emotion dysregulation within NSSI (Gratz & Roemer, 2008). While the use of qualitative ratings of affect is likely superior to use of affect related words, individuals with NSSI likely still have difficulty accurately reporting their emotional experiences. This is not to say that reports of antecedent and consequent affect are useless – in a recent large sample study of adolescents, 98.5% of individuals who had self-injured more than ten times in the last year identified psychological precipitants (thoughts or feelings) to self-injury. These antecedent experiences thus appear crucial to understanding NSSI and developing treatment.

The FFM acknowledges that NSSI serves emotion regulation function – despite lacking evidence for distinct functions related to APR versus ANR. However, as McKenzie and Gross (2014) note:

“One of the most important points to emerge from examining NSSI through the framework of the process model of emotion regulation is that simply labeling NSSI as ‘emotion regulatory’ does not tell us precisely what is going on. This is because, at any given moment, NSSI can serve to regulate emotions in many ways. NSSI may act to select or modify the individual’s environment, to shift attention, to change cognitions about the self or environment, and to modulate the individual’s physiological responses,” (p.9). The purpose of this study is not to necessarily identify mechanisms of NSSI *per se*; rather, explorations of possible affective experiences associated with NSSI may help clarify antecedent and consequent experiences that help guide future research pertaining to mechanisms, as well as provide greater understanding of the automatic subtypes.

Summary of Current Study

The current study intended to extend the original study to a population with current and clinically significant NSSI. Furthermore, it aimed to address one of the limitations of the original study by clearly distinguishing unique episodes of self-injury for each of the endorsed functions encompassed by the five FASM items. Therefore, follow-up questions related to each FASM item were clarified so that distinct episode of NSSI were assessed allowing for comparison across FASM items without the possibility of overlap by individuals describing the same incident of NSSI serving multiple functions.

This study was designed to examine quantitative ratings of positive and negative affect in the five FASM items historically representing ANR and APR. Examination of the reported affect before and after allowed for patterns of change to be assessed for support of differential reinforcement processes (APR versus ANR). Additionally, it permitted greater examination of affective experiences preceding NSSI, which may ultimately prove to be more valuable in the identification of subtypes of NSSI – particularly low antecedent positive and negative affect.

Although complicated by ethical and methodological challenges, this is an area of high priority as described in the recent review by McKenzie and Gross (2014):

Regarding psychological underpinnings, there is a major lack of understanding of the moment-to-moment experiences... Partly this is based on the difficulty of studying the actual behavior in a laboratory setting, and the need for more innovative methods of gathering these data...investigating exactly what thoughts and images an individual experiences immediately prior to and following an episode of NSSI. The temporal relationship between NSSI and particular cognitions and emotions is an essential part of understanding how to treat and prevent this behavior, and it is clear that much remains to be learned about how NSSI serves to regulate negative and positive activation in different individuals in different contexts, (p. 10).

Comprehensive exploration of images, cognitions, and emotional experiences remained outside of the realm of the current study. However, assessment of affective experiences associated with NSSI may guide this type of research in the future.

Primary Aims of the Current Study

First Aim. The first aim of the current study was to characterize the patterns of positive and negative affect reported antecedent and consequent to NSSI in an online survey. Five questions corresponding to the automatic motivations in NSSI, as outlined in the Four Factor Model, were used to assess distinct episodes of NSSI corresponding to each motivation endorsed. Follow-up questions prompted individuals to rate affective experiences (positive and negative) as they are recalled to have been present immediately prior and subsequent to NSSI. The primary purpose of this study was to examine patterns of affective change reflective of positive and negative reinforcement to assess support for a distinct APR subtype predominated by increases in positive affect rather than reductions in negative affect.

This was also the main aim of the original study by Franklin (2012), but the current study included two procedural changes to address limitations of the prior study:

- a) Individuals with clinically significant NSSI were recruited from online websites and forums.
- b) Individuals endorsing more than one FASM item as reasoning for NSSI were explicitly instructed to answer follow-up questions involving distinct episodes of NSSI.

Second Aim. The second aim was to contrast FASM items traditionally associated with ANR (FASM1) and APR (FASM2, FASM3, FASM4, and FASM5) as regards the antecedent and consequent affective experiences as well as their associated pattern of change.

Third Aim. Antecedent experiences in the FASM items will be assessed for a potential subgroup characterized by low antecedent positive and negative affect reflecting a possible subtype of NSSI distinct from NSSI that is preceded by high levels of negative affect.

Hypotheses

Hypothesis 1. Self-injury performed for ANR motivations should be associated with significant reductions in negative affect, without significant changes in positive affect, to reflect negative reinforcement. FASM1 has consistently been classified as ANR within the NSSI literature and should therefore be associated primarily with decreases in negative affect to demonstrate evidence for negative reinforcement.

Hypothesis 2. Self-injury performed for APR motivations should primarily be characterized by increases in ratings of positive affect – with limited change to negative affect – indicating positive reinforcement. FASM items reflective of APR (FASM2 – FASM5) were hypothesized to exhibit significant increases in ratings of positive affect without significant changes in ratings of negative affect. Furthermore, items traditionally associated with APR were predicted to demonstrate significantly different patterns of affect compared to those observed in prototypical ANR (FASM1). In statistical terms, we predict a significant two-way Affect (PA vs. NA) X Assessment (pre-NSSI vs. post-NSSI) interaction that would be further modified by FASM.

Hypothesis 3. Within FASM2 (“Because you were feeling numb or empty?”) and FASM3 (“To feel something, even if it was pain?”), it was hypothesized that a significant number of individuals would report both low positive and low negative affect antecedent to NSSI. The percentage of individuals endorsing this low antecedent subgroup was predicted to be significantly greater in FASM2 and FASM3 in comparison to the percentage of individuals in

prototypical ANR (FASM1). Chi-square analyses utilizing FASM 1 to calculate expected values under the null hypothesis were predicted to demonstrate significant differences in frequencies of individuals endorsing “low affect” within FASM2 and FASM3.

METHODS

Recruitment

Participants with clinically significant NSSI were recruited from a website and online forums pertaining to NSSI self-help. The author received permission to post recruitment materials from website administration and moderators of the Internet forums at www.selfinjury.com. To incentivize study participation, recruitment materials advertised compensation for study completion in the form of \$10 online gift cards to www.amazon.com. Prior to starting the study, individuals were informed that distribution of the online gift card required a personal e-mail address that would not be directly linked to study responses and would remain confidential. At the end of the study, individuals were provided a unique link to a separate website where they were instructed to provide e-mail information for gift card receipt. While this information was not directly linked to study data or IP address, it is possible that data may be linked via metadata – such as date and time of completion – automatically collected by the survey program (<http://www.qualtrics.com>). Study compensation was supported by a \$1000 University of Wisconsin-Milwaukee *John and Lynn Schiek Research Award in Behavior Analysis* grant awarded to the author.

Screening

Potential study participants were first directed to read brief explanation of the study. Next, individuals were screened for eligibility criteria using a screener questionnaire proceeding the start of the study. Eligibility for the study required participants be:

- 1) 18-years of age or older.
- 2) Fluent in English
- 3) Endorse five or more instances of self-injury (cutting or burning) over the last 12 months

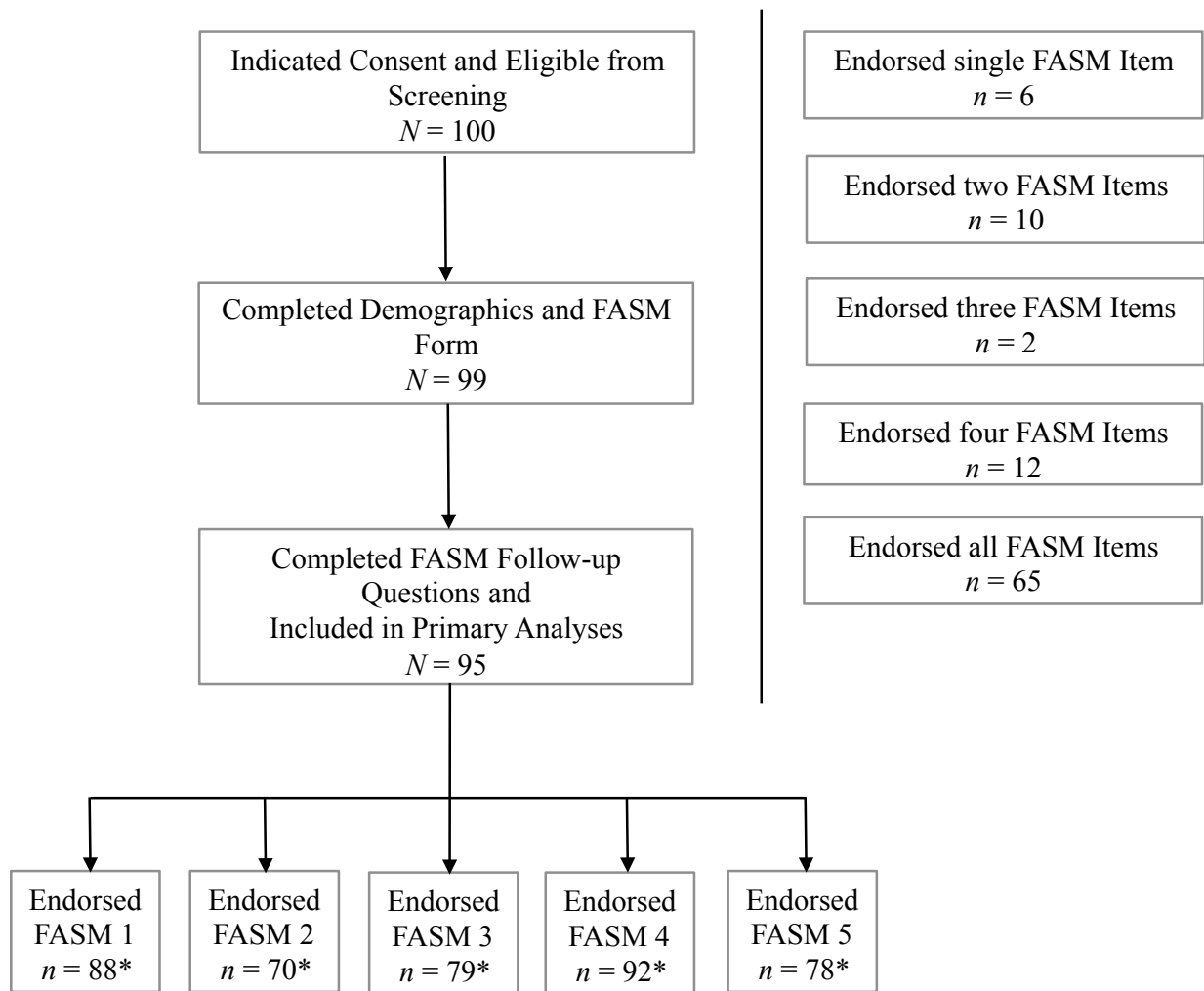
Eligible participants were then directed to the beginning of the research survey thus initiating data collection. For confidentiality purposes, no data were collected for participants not meeting eligibility criteria. Individuals who met eligibility criteria were directed to a new link with more detailed description of the study and a page related to informed consent. Participants who agreed to consent were directed to the beginning of the study questions.

Participants

A total of 100 participants indicated initial consent and met eligibility criteria. Ultimately, 95 individuals successfully completed the FASM questionnaire and all follow-up questions related to the primary aim of the current study. Analyses are therefore based on the 95 individuals with adequate data. A visual depiction of the flow of study participants is illustrated in Figure 7.

The current study involved exploration of affective experiences associated with reasons for NSSI corresponding with the five automatic FASM items. Individuals within the sample were permitted to endorse multiple FASM items. In fact, the majority of participants (n=89) endorsed more than one item from the FASM and most individuals (n=65) endorsed all five FASM items. Therefore, the data collected for FASM follow-up questions depends on the number of individuals identifying a particular reason for NSSI associated with each FASM (e.g., FASM1, FASM2, FASM3, FASM4, and FASM5).

Figure 7. Flow of Study Participants



The left-hand panel illustrates the flow of participants. The asterisk (*) in the final row of boxes indicates that the sum of these n_s exceeds 95 because most participants endorsed engaging in NSSI for more than reason. The right-hand panel indicates the number of FASM items participants endorsed.

Demographic Characteristics. Participants in the sample ranged from 18 – 38 years of age; mean age of participants was 22.2 years old ($SD=3.0$). Regarding gender, 40.0% of the sample ($n=38$) identified as female, 58.9% of the sample ($n=56$) identified as male, and 1.0% of the sample identified as transgender. The majority of the sample reported themselves to be white (92.6%; $n=88$) and identified as non-Hispanic (93.7%, $n=89$). In terms of sexual orientation, 42.1% ($n=40$) reported attraction to the opposite sex, 38.9% ($n=37$) reported attraction to the same sex, 16.8% ($n=16$) reported attraction to both sexes, and 2.1% ($n=2$) identified their sexual orientation to be “other.” Information related to demographics can be found in Table 4.

Clinical Characteristics. Individuals in the current study also provided relevant clinical information pertaining to NSSI (see Table 5). Regarding onset of NSSI, individuals reported first age of NSSI behavior to occur between 12 – 27 years of age with the average age for initial onset occurring at 15 years of age ($M=15.05$, $SD=2.25$). The most common estimate for number of lifetime episodes of NSSI was found to be “21 – 50” episodes endorsed by 37.9% ($n=36$) of individuals. Over half (51.6%; $n=49$) of the sample reported episodes of NSSI occurring “within the past month,” and approximately one-third of the sample (34.7%; $n=33$) reported “hospitalization or injury severe enough to require medical attention (e.g., stitches, antibiotics, etc.)” due to NSSI. The majority of individuals (68.4%; $n=65$) acknowledged the experience of an “urge” prior to self-injury or acknowledged it to occur at least “sometimes” (30.5%, $n=29$). Areas of the body most commonly self-injured included arms (85.4%, $n=82$) and legs (85.4%, $n=82$) with most individuals (92.6%, $n=88$) reporting more than one area of the body ($M=2.9$, $SD=1.2$).

Table 4. Sample Demographics

	NSSI (<i>n</i> = 95)	
<hr/>		
Age in years		
Mean (SD)	22.2 (3.0)	
Min	18	
Max	38	
<hr/>		
Gender		
Female	38	(40.0%)
Male	56	(58.9%)
Transgender	1	(1.0 %)
<hr/>		
Sexual Orientation		
Opposite sex	40	(42.1%)
Same sex	37	(38.9%)
Both sexes	16	(16.8%)
Other	2	(2.1%)
<hr/>		
Race		
Asian	4	(4.2%)
Black/African American	2	(2.1%)
White/Caucasian	88	(92.6%)
Native Hawaiian or Pacific Islander	1	(1.1%)
American Indian or Alaskan Native	0	(0%)
Multiple races	0	(0%)
Other	0	(0%)
<hr/>		
Hispanic		
No	89	(93.7%)
Yes	6	(6.3%)

Table 5. Clinical Characteristics of NSSI

	NSSI (n=95)	
<hr/>		
Age first self-harmed?		
Mean (SD)	15.05 (2.25)	
Min	12	
Max	27	
<hr/>		
How many times ever in lifetime?		
5 times or less	3	(3.2%)
6-10 times	7	(7.4%)
11-20 times	13	(13.7%)
21-50 times	36	(37.9%)
51-100 times	27	(28.4%)
More than 100 times	9	(9.5%)
<hr/>		
How recently?		
Today	0	(0.0%)
Within the past week	23	(24.2%)
Within the past month	49	(51.6%)
Within the past 6 months	20	(21.1%)
Within the past 12 months	3	(3.2%)
I don't know	0	0.0%)
<hr/>		
Hospitalization or medical attention required?		
Yes	33	(34.7%)
No	62	(65.3%)
<hr/>		
Where on the body?*		
Arms	82	(85.4%)
Legs	82	(85.4%)
Chest	22	(23.2%)
Stomach	27	(19.2%)
Thighs	49	(28.4%)
Face	6	(6.3%)
Genitals	3	(3.2%)
Other (hands, shoulders, feet)**	3	(3.2%)
<hr/>		
Experience an "urge" to harm yourself?		
Yes	65	(68.4%)
No	1	(1.1%)
Sometimes	29	(30.5%)
I don't know	0	(0.0%)

*Able to endorse multiple answers; accordingly the sum exceeds 100%.

** Represents responses written in upon request after endorsing "Other."

Comparison with Original Study. As regards gender, the current study was found to have significantly different distribution than that reported in the original study, $\chi^2 = 42.41$, $p < .001$. Of note, the current sample included a greater percentage of male participants (58.9%) in comparison to the percentage (9.1%) of males reported in the original study. A greater percentage of individuals identified as attracted to the same sex (38.9%) in the current study compared to (6.1%) from the original study; a smaller percentage from the current study identified as attracted to the opposite sex (42.1%) compared to (80.3%) in the original study. Overall, the distribution of participants' reported race was found to be significantly different than from the original study. However, the current study was comparable to the original study in the percentage of individuals identifying as white vs. non-white. Approximately 92.6% ($n=88$) of individuals identified as white in the current study compared to 84.8% ($n=56$) from the original study. Furthermore, the samples from both studies were found to be similar in the percentage of individuals identifying as Hispanic. Table 6 provides an overview of comparison of demographic information reported in the current study compared to the initial original study.

The majority of the sample endorsed 75.8% ($n=72$) 20 or more episodes of NSSI. Additionally, 34.7% ($n=33$) of the sample reported NSSI requiring hospitalization or injury severe enough to require medical attention (e.g., stitches, antibiotics, etc.) compared to only 5 (7.6%) of individuals from the original study. Furthermore, 24.2% ($n=23$) of individuals in the current sample reported NSSI within the last week, and 51.6% ($n=49$) of individuals in the current sample reported NSSI within the last month. This suggests the current sample reflects increased clinical severity –as indicated by greater number of episodes of NSSI – as well as more recent episodes of NSSI, which should lessen retrospective bias and theoretically reflect more reliable recall of experiences.

Table 6. Sample Characteristics and Comparisons

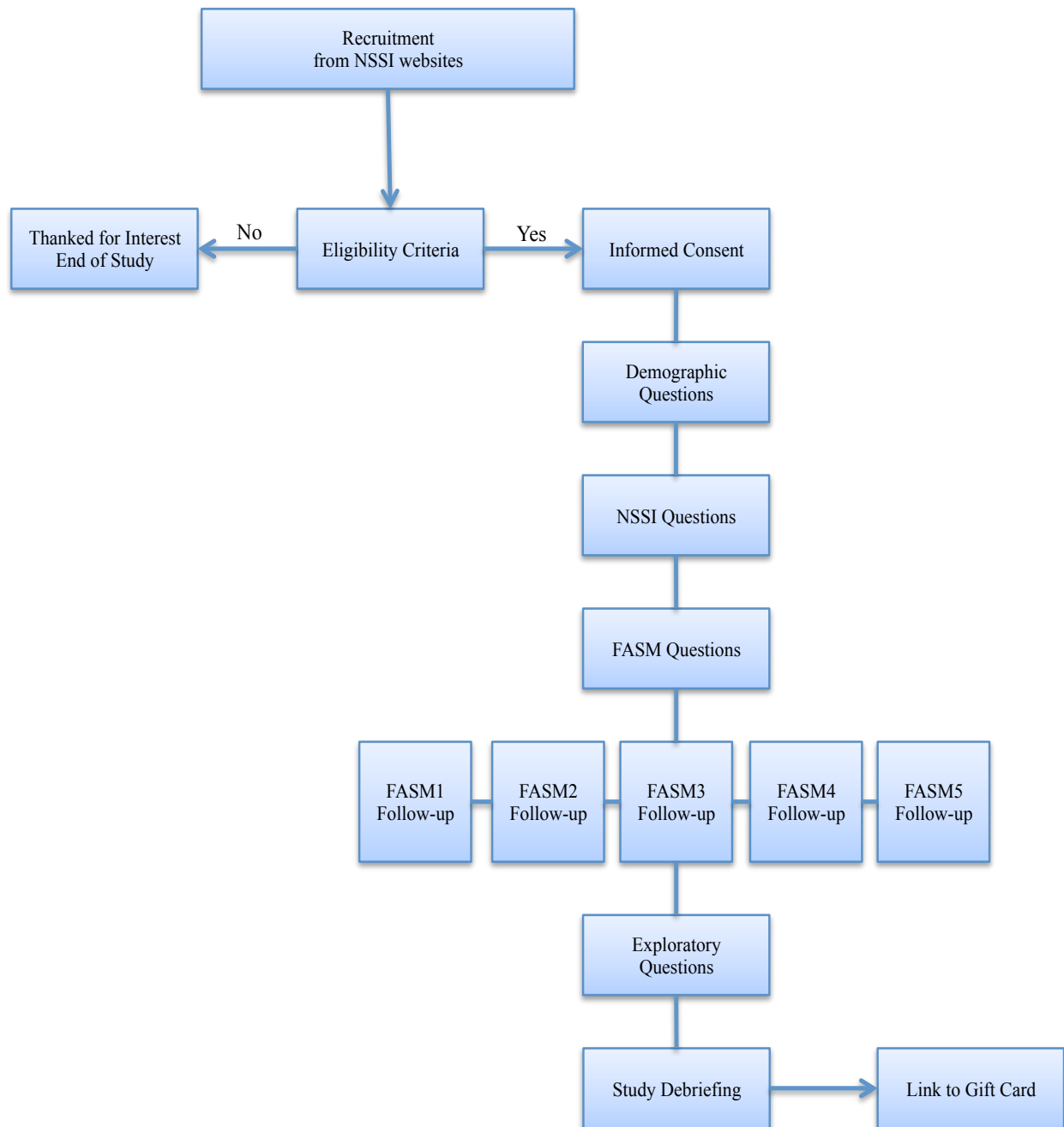
	NSSI Original Study Sample (<i>n</i> = 66)		NSSI Internet Study Sample (<i>n</i> = 95)		Comparison of Original Study with Internet Sample
Age in years*					<i>t</i> (133) = -2.98, <i>p</i> =.003
Mean (SD)	20.7 (2.2)		22.2 (3.0)		
Min	18		18		
Max	28		38		
Sex					$\chi^2 = 42.41, p <.001$
Female	60	(90.9%)	38	(40.0%)	
Male	6	(9.1%)	56	(58.9%)	
Transgender	0	(0%)	1	(1.0 %)	
Sexual Orientation					$\chi^2 =28.02, p <.001$
Opposite sex	53	(80.3%)	40	(42.1%)	
Same sex	4	(6.1%)	37	(38.9%)	
Both sexes	9	(13.6%)	16	(16.8%)	
Other	0	(0%)	2	(2.1%)	
Race					$\chi^2 =10.70, p =.030.$
Asian	1	(1.5%)	4	(4.2%)	
Black/African American	4	(6.1%)	2	(2.1%)	
White/Caucasian	56	(84.8%)	88	(92.6%)	
Native Hawaiian or Pacific Islander	0	0 (0%)	1	(1.1%)	
American Indian or Alaskan Native	0	0 (0%)	0	(0%)	
Multiple race	5	5 (7.6%)	0	(0%)	
Other	0	0 (0%)	0	(0%)	
Hispanic					$\chi^2 = 0.231, p =.631.$
No	63	(95.5%)	89	(93.7%)	
Yes	3	(4.5%)	6	(6.3%)	

Procedures

Recruitment flyers were posted to online NSSI forums provide a link directing participants to a survey hosted by the Qualtrics Survey Instrument (<http://www.qualtrics.com>). The first page of the survey presented a detailed explanation of the study and provided an online consent form approved by UWM's Institutional Review Board. Study participants who met eligibility criteria and indicated consent were provided access to the study questions. Responses were recorded using a unique study ID code generated randomly by the Qualtrics program. Survey responses were not linked by e-mail – if the participant decided to redeem their gift card at the end of the study, they were directed to a separate link to enter e-mail information for redemption of the gift card.

After consent, individuals were directed to the main survey which contained sections including: 1) Demographics, 2) NSSI related questions, 3) Select FASM questions, 4) FASM follow-up including ESG, 5) Additional variables of exploratory interest, 6) Study Debriefing and 7) Gift Card Redemption Information. Additionally, crisis information (*National Suicide Prevention Lifeline*) was provided at the bottom of every page throughout the survey in the case distress was experienced during the study. See Figure 8 for visual representation of study design.

Figure 8. Survey Design



Measures

Demographics. Participants provided basic demographic information such as age, gender, sexual orientation, ethnicity, and race (Hispanic or not).

NSSI Questions. The presence of NSSI was assessed using an adaptation of the Deliberate Self-Harm Inventory (DSHI; Gratz, 2001). The survey was limited to self-injury via cutting or burning because these are the most common forms of NSSI and less likely to capture other self-harm behaviors (i.e., hairpulling or head banging) that may be better characterized by another disorder (i.e., trichotillomania or motor stereotypy). Additional follow-up questions assessed for the history, frequency, severity, and topography of NSSI adapted from the Self-Injurious Thoughts and Behavior Interview (SITBI; Nock et al., 2007).

Functional Assessment of Self-Mutilation. Functional Assessment of Self-Mutilation (FASM; Lloyd, Kelley, & Hope, 1997) was administered to determine reasons for NSSI. The study focused on the five FASM questions associated with automatic NSSI. See Figure 9.

Figure 9. Questions Derived from the FASM to Assess Automatic NSSI

Below are some of the reported reasons for self-harming (cutting or burning). Please read each reason <u>carefully</u> and select how often this is a reason for your self-harm.				
	Never	Rarely	Sometimes	Often
1) As a way to get rid of bad feelings?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2) Because you were feeling numb or empty?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3) To feel something, even if it was pain?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4) To punish yourself?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5) To feel relaxed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ESG Follow-Up to FASM. Each of the five FASM questions associated with automatic functioning (Nock & Prinstein, 2004; 2005) that an individual endorsed were followed-up with questions related to affective experience before and after NSSI using the Evaluative Space Grid (ESG, Larsen et al., 2009) – a method for describing mixed emotional experiences in a single-item measure. The ESG is based on evidence suggesting that dimensions of positivity and negativity are functionally separable – an increase in one dimension does not necessarily result in an equal reduction of the other dimension, which may or may not be reduced at all (although they may partially correspond). The ESG allowed for evaluation of independent ratings of positive and negative affect as well as examination of possible co-activation (Norris et al., 2010).

The ESG grid in the current study was designed with negative affect along the x-axis (1-5) and positive affect along the y-axis (1-5). Participants could select the point on the grid that reflected their simultaneous experience of positive and negative affect before NSSI and again after NSSI. This procedure yields a pair of scores for positive and negative affect that corresponded to the x and y coordinates of the ESG, respectively, at each time point (i.e., before and after engaging in NSSI). A short video explaining how to rate positive and negative affect using the ESG was provided to participants before follow-up questions. For example of ESG question display, see Figure 2 (pg.29).

End of Survey

Debriefing. The end of the survey provided a short explanation to debrief participants and thank them for their time. Additional support services pertaining to NSSI were provided on this page.

Gift-cards. Participants received directions to a link separate from the initial survey where they may input information to redeem their online gift-card of \$10.

RESULTS

Primary Analyses of FASM

The purpose of the current study was to extend the previous study to a population with clinically significant NSSI with minor procedural updates to address potential limitations with the initial study design. The primary objective of the original study and present study was to explore changes in affect associated with different reasons for NSSI. To achieve this aim, statistical analyses were performed on data related to ratings of positive and negative affect occurring immediately before and after NSSI utilizing the Evaluative Space Grid (ESG) paradigm.

Endorsement of FASM Items. Nock and Prinstein (2004) previously identified five of the twenty-two items of the FASM questionnaire to correspond with automatic reinforcement – either APR or ANR. These five questions, which the present study refers to as FASM1 – FASM5, were administered to participants. Responses “Rarely,” “Sometimes,” and “Often” were considered endorsement of episode(s) of NSSI performed for the reason associated with the corresponding FASM item. Participants were instructed to answer whether they had ever engaged in self-injury for each of the five FASM items. Only six individuals endorsed a single FASM item (6.3%); it was most common for individuals ($n=65$) to endorse all five FASM items as reasons for NSSI (68.4%). See Figure 7 (pg.48) for more information. As participants were allowed to endorse multiple items, the rate of endorsement for FASM items exceeds the participant total ($n=95$). The number of individuals endorsing each item is reported below:

FASM1	“As a way to get rid of bad feelings,”	$n=88$
FASM2	“Because you were feeling numb or empty,”	$n=70$
FASM3	“To feel something, even if it was pain”	$n=79$
FASM4	“To punish yourself,”	$n=92$
FASM5	“To feel relaxed,”	$n=78$

The most commonly endorsed item (96.8%) was FASM4 – “to punish yourself” – which was also the item with highest ratings pertaining to frequency; 86.3% of individuals in the sample reported engaging in this type of NSSI “sometimes” or “often”. The least endorsed item 73.7% was found to be FASM2 – “because you were feeling numb or empty” – for which 41.0% of the sample either denied or endorsed “rarely” as a reason for NSSI. The questions and their associated response rates are provided in Table 7.

Table 7. Response Rates for FASM Items Associated with Automatic Reinforcement

FASM Questions	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Mean (SD)
1) As a way to get rid of bad feelings?	7	14	41	33	3.05 (0.89)
2) Because you were feeling numb or empty?	25	14	29	27	2.61 (1.16)
3) To feel something, even if it was pain?	16	11	37	31	2.87 (1.05)
4) To punish yourself?	3	10	40	42	3.27 (0.78)
5) To feel relaxed?	17	12	39	27	2.80 (1.05)

Analysis of Affect Changes Within FASM Items. The following analyses examine the pattern of change in positive and negative affect describing experiences before and after self-injury using the ESG in each of the five FASM questions associated with automatic or intrapersonally motivated NSSI. Theoretically, NSSI motivated by ANR should be primarily associated with reductions in negative affect, with minimal or no change in levels of positive affect. By contrast, APR should be associated primarily with increases in positive affect and little or no changes negative affect. The current study, therefore, hypothesized that pattern of change in positive and negative affect reflected across the five FASM items would correspond accordingly. More specifically, FASM 1 should show a pattern of results consistent with ANR and FASMs 2 – 5 should show a pattern consistent with APR.

To test these predictions, data from the five FASMs were submitted to separate 2 (“Affect”: positive vs. negative) X 2 (“Time”: before vs. after NSSI) repeated measures factorial analyses of variance (ANOVAs). The ANOVA results for these analyses are summarized in Table 8. In summary, the ANOVA results revealed a significant main effect for “Affect” for each of the five FASM items, such that levels of positive affect were higher than levels of negative affect. The main effect of “Time” was non-significant for each of the five FASM items. The “Affect” X “Time” interaction was significant for all FASM items with the exception of FASM5 – “To feel relaxed” – which yielded a trend toward significance ($.05 < p < .10$). The means for the “Affect” X “Time” interactions are presented in Table 9 and depicted visually in Figure 10.

Table 8. 2X2 ANOVA Results

FASM	Source of Variance		
	Affect	Time	Time X Affect
FASM 1	$F(1,87) = 92.1, p < .001^{**}$	$F(1,87) < 1.0, p = .348$	$F(1,87) = 10.9, p = .001^*$
FASM 2	$F(1,69) = 27.6, p < .001^{**}$	$F(1,69) = 3.0, p = .088$	$F(1,69) = 4.1, p = .046^*$
FASM 3	$F(1,78) = 33.4, p < .001^{**}$	$F(1,78) = 2.2, p = .139$	$F(1,78) = 9.3, p = .003^*$
FASM 4	$F(1,91) = 30.4, p < .001^{**}$	$F(1,91) = .049, p = .826$	$F(1,91) = 7.1, p = .009^*$
FASM 5	$F(1,77) = 12.8, p = .001^*$	$F(1,77) = 2.9, p = .091$	$F(1,77) = 3.7, p = .057$

Table 9. Affect by Time Interaction Means

FASM	Affect	Time Point	
		Before NSSI	After NSSI
FASM 1 ($n = 88$)	Positive Affect	2.70 (1.05)	2.93 (1.09) ^{ns}
	Negative Affect	4.05 (0.82)	3.61 (0.08)***
FASM 2 ($n = 70$)	Positive Affect	2.90 (1.09)	2.93 (1.08) ^{ns}
	Negative Affect	3.77 (0.98)	3.40 (0.86)**
FASM 3 ($n = 79$)	Positive Affect	2.75 (1.07)	2.85 (1.04) ^{ns}
	Negative Affect	3.67 (0.81)	3.27 (0.84)***
FASM 4 ($n = 92$)	Positive Affect	2.85 (1.17)	3.10 (1.19) *
	Negative Affect	3.72 (0.82)	3.51 (0.69) *
FASM 5 ($n = 78$)	Positive Affect	2.83 (1.18)	2.85 (1.10) ^{ns}
	Negative Affect	3.50 (0.91)	3.12 (0.91)**

Note:

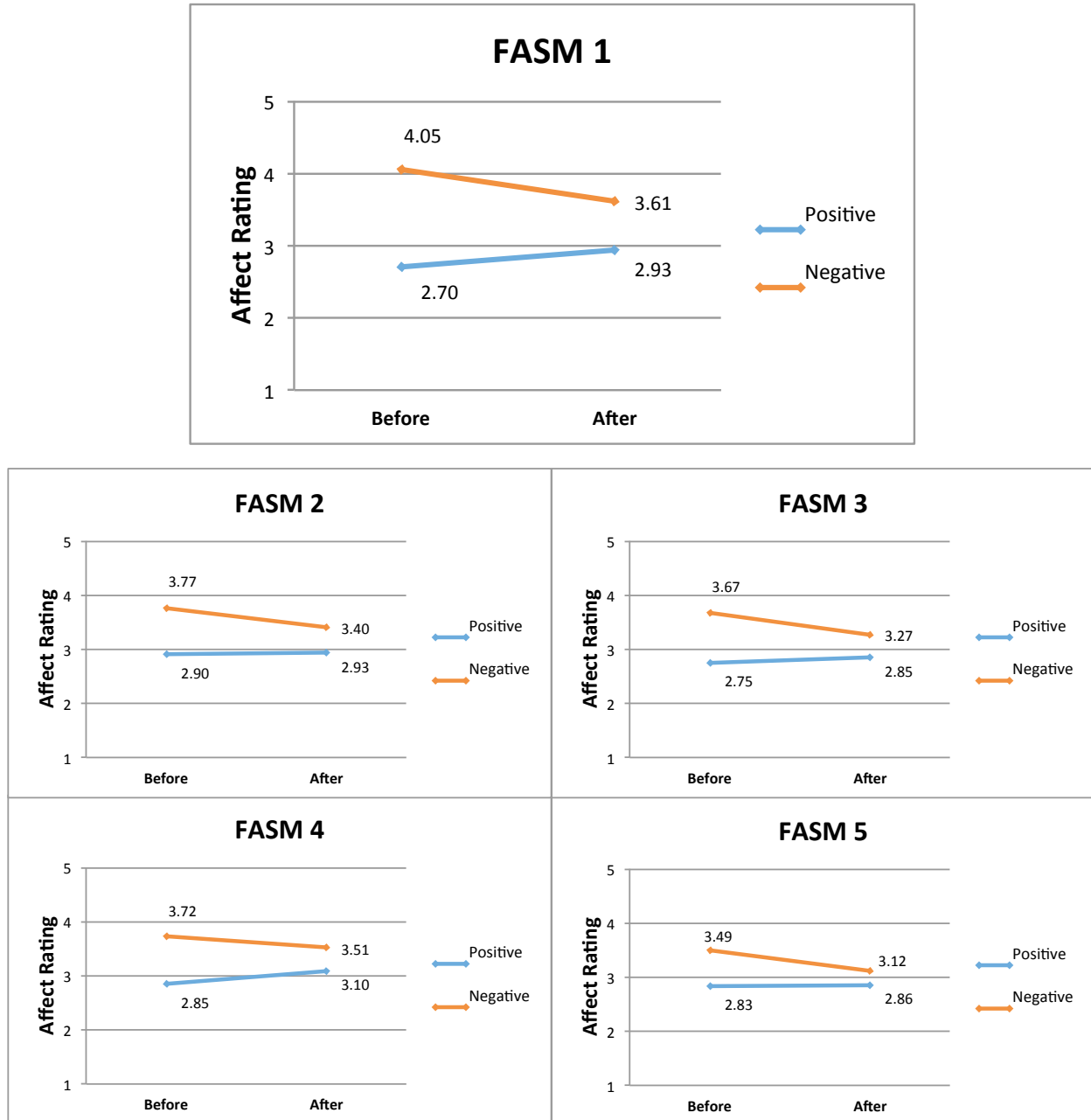
* Means in the same row are different at $p < .10$ (trend)

** Means in the same row are significantly different at $p < .01$

*** Means in the same row are significantly different at $p < .001$

ns Means in the same row are not significantly different, $p > .10$

Figure 10. Affect Change in FASM 1-5



* The top chart represents changes in positive and negative affect for FASM1 – the prototypical example of ANR.

** The four smaller charts represent changes in positive and negative affect in FASM items (FASM2 – FASM5) potentially representative of the APR presented for comparison with FASM1.

The interactions for each FASM were explored with separate paired sample *t*-tests for positive and negative affect. Consistent with our prediction, for FASM1 there was a significant reduction in reported negative affect subsequent to NSSI, $t(87) = 3.345$, $p < .001$, but no change in positive affect, $t(87) = -1.387$, $p = .169$. Similar patterns were observed for the remaining FASMs. Specifically, for FASM 2 there was a significant reduction in negative affect, $t(69) = 2.916$, $p < .01$, but no change in positive affect, $t(69) = -.189$, $p = .850$. Likewise for FASM 3, there was significant reduction in negative affect, $t(78) = 3.671$, $p < .001$, but no change in positive affect, $t(78) = -.679$, $p = .499$. For FASM 4, there were trends towards both a reduction in negative affect, $t(91) = 1.918$, $p = .058$, and towards an increase in positive affect, $t(91) = -1.672$, $p = .098$. Although the interaction for FASM 5 only trended towards significance, the same pattern for the follow-up tests was also observed, with a significant reduction in negative affect, $t(77) = 2.850$, $p < .01$, but no change in positive affect, $t(77) = -.163$, $p = .871$.

In summary, significant “Affect” X “Time” interactions were observed across FASM items 1 – 4, with a trend towards an interaction for FASM item 5. Analysis of the simple main effect of for each affect time revealed for FASM items 1 – 3, and FASM 5, there were significant reductions in negative affect following NSSI and no change in positive affect. For FASM 4 – “To punish yourself” – there were trends towards both a decrease in negative affect and an increase in positive affect.

These results suggest then FASM1 demonstrated support for ANR function, consistent with our hypotheses, due to the significant reductions in negative affect subsequent to NSSI without changes in positive affect. However, contrary to our initial hypotheses, results for FASM2, FASM3, and FASM5 also support ANR functions of NSSI. Only in the case of FASM4

was there initial support for the possibility of the APR function due to finding a trend toward increase in positive affect; however this was not statistically significant.

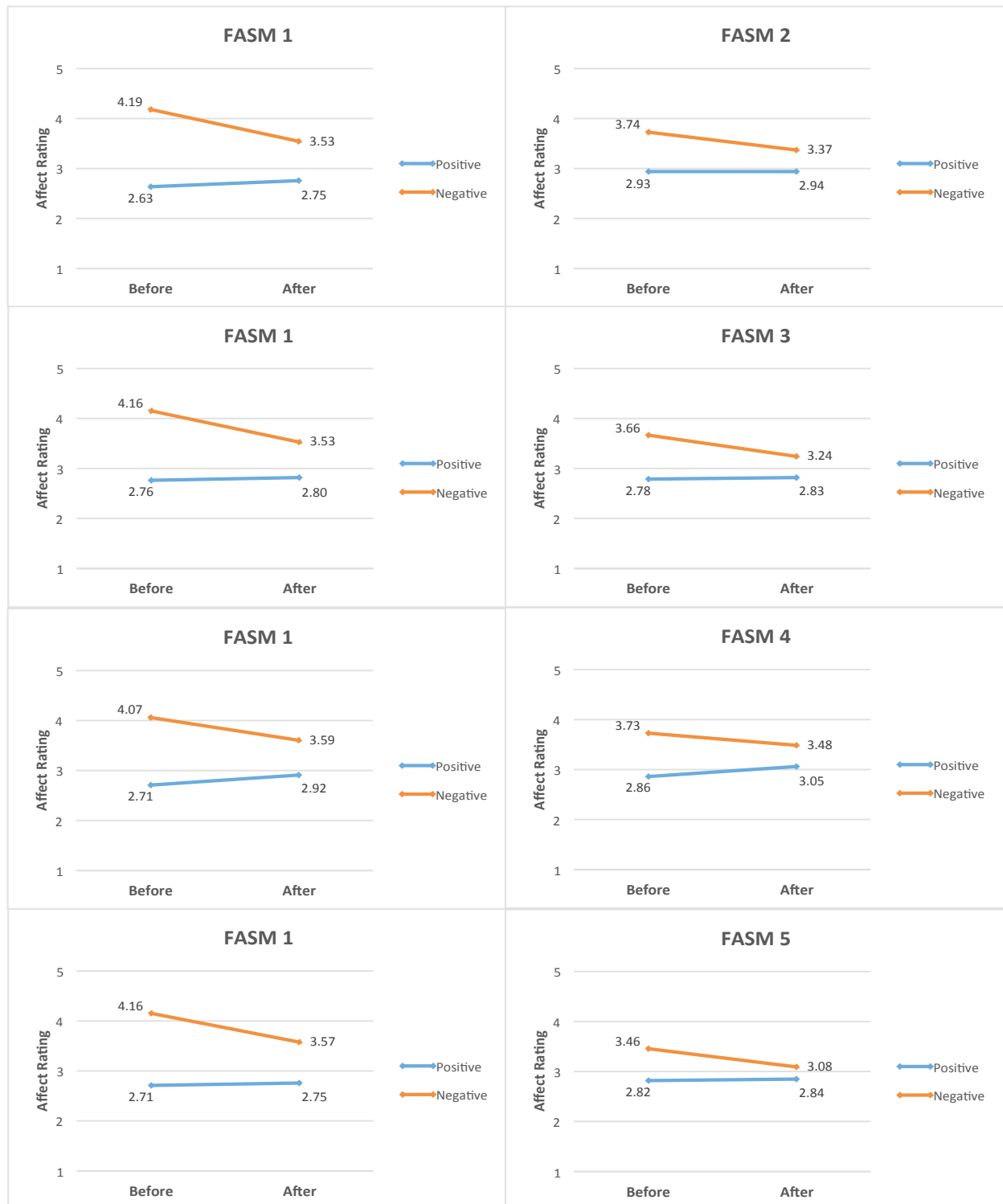
Comparisons to ANR (FASM1). To further investigate significant differences in the pattern of change in affect across the various FASM items, we next conducted four 2 (“Affect”: positive vs. negative) X 2 (“Time”: before vs. after NSSI) X 2 (“FASM”) repeated measures factorial ANOVAs. Each ANOVA compared FASM item 1 – the prototypical example of ANR – with one of the remaining items (i.e., 1 vs. 2, 1 vs. 3, 1 vs. 4, and 1 vs. 5). Significant three-way interaction would indicate differences in the magnitude of the “Affect” X “Time” interaction across FASM items. The ANOVA results for these analyses are summarized in Table 10. The three-way interaction was not significant for any of the four ANOVAs. Means for the three-way interactions are presented in Figure 11 to allow visual comparison; this demonstrates that the patterns observed for the “Affect” X “Time” interaction for each item (FASM2 – FASM5) are similar to the interaction for FASM1. Table Xx also notes significant two-way “Time” X “Affect” and “FASM” X “Affect” interactions for all ANOVAs. As the previous analyses investigated the “Time” X “Affect” interactions for each FASM separately, and the three-way “FASM” X “Time” X “Affect” was not significant in the current set of analyses, we did not conduct follow-up analyses. We did conduct follow-up interaction contrasts to investigate the significant “FASM” X “Affect” interactions. Table 11 presents the mean negative and positive affect scores, averaged across time points, for each FASM. Difference scores were then obtained by subtracting the positive affect scores from the negative affect scores. Paired *t*-tests were then conducted to compare the difference scores of FASM1 with each of the other FASMs. Results of these *t*-tests are summarized in the final column of Table 11. In each case, the difference between negative and positive affect was larger for FASM 1 than for the comparison FASM.

Table 10. Results for Time X Affect ANOVA for Each FASM

FASM Comparison	FASM	Time	Affect	FASM X Time	FASM X Affect	Time X Affect	FASM X Time X Affect
FASM1 vs. FASM2	$F(1,67)=0.204$ $p=0.653$	$F(1,67)=6.862$ $p=0.011^*$	$F(1,67)=83.040$ $p<0.001^{***}$	$F(1,67)=0.523$ $p=0.472$	$F(1,67)=13.509$ $p<0.001^{***}$	$F(1,67)=14.881$ $p<0.001^{***}$	$F(1,67)=1.540$ $p=0.219$
FASM1 vs. FASM3	$F(1,75)=6.047$ $p=0.016^*$	$F(1,75)=8.283$ $p=0.005^{**}$	$F(1,75)=85.049$ $p<0.001^{***}$	$F(1,75)=0.798$ $p=0.374$	$F(1,75)=10.395$ $p=0.002^{**}$	$F(1,75)=13.026$ $p=0.001^{**}$	$F(1,75)=0.776$ $p=0.381$
FASM1 vs. FASM4	$F(1,85)=0.431$ $p=0.513$	$F(1,85)=0.918$ $p=0.341$	$F(1,85)=89.147$ $p<0.001^{***}$	$F(1,85)=0.786$ $p=0.378$	$F(1,85)=6.401$ $p=0.013^*$	$F(1,85)=13.486$ $p<0.001^{***}$	$F(1,85)=1.118$ $p=0.293$
FASM1 vs. FASM5	$F(1,75)=10.223$ $p=0.002^{**}$	$F(1,75)=7.314$ $p=0.008^{**}$	$F(1,75)=77.281$ $p<0.001^{***}$	$F(1,75)=0.594$ $p=0.443$	$F(1,75)=17.664$ $p<0.001^{***}$	$F(1,75)=10.713$ $p=0.002^{**}$	$F(1,75)=0.664$ $p=0.418$

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 11. Visual Comparisons of Affect Patterns



Note. Charts in the first column represent depictions of positive and negative affect in FASM1 for comparison with representation of ANR. Charts in the second column depict patterns of affect in FASM2 – FASM5. Rows displays results from overlapping individuals who endorse the comparison item and FASM1. Therefore, means in column 1 vary slightly. The associated n_s are reported in Table 11.

Table 11. Means for Positive and Negative Affect in Comparison with FASM1

	Affect		Difference	Result
	Negative	Positive		
FASM1	3.86 (0.60)	2.69 (0.76)	1.17 (1.01)	$t(67) = 3.68, p < .001$
FASM2 ($n = 68$)	3.55 (0.73)	2.93 (0.88)	0.62 (1.02)	
FASM1	3.84 (0.57)	2.78 (0.73)	1.06 (0.95)	$t(75) = 3.22, p = .002$
FASM3 ($n = 76$)	3.45 (1.65)	2.80 (0.83)	0.64 (1.02)	
FASM1	3.83 (0.56)	2.81 (0.76)	1.02 (1.00)	$t(86) = 2.53, p = .013$
FASM4 ($n = 87$)	3.60 (0.56)	2.95 (0.94)	0.65 (1.12)	
FASM1	3.86 (0.58)	2.73 (0.75)	1.13 (0.99)	$t(75) = 4.20, p < .001$
FASM5 ($n = 76$)	3.27 (0.68)	2.83 (0.91)	.44 (1.12)	

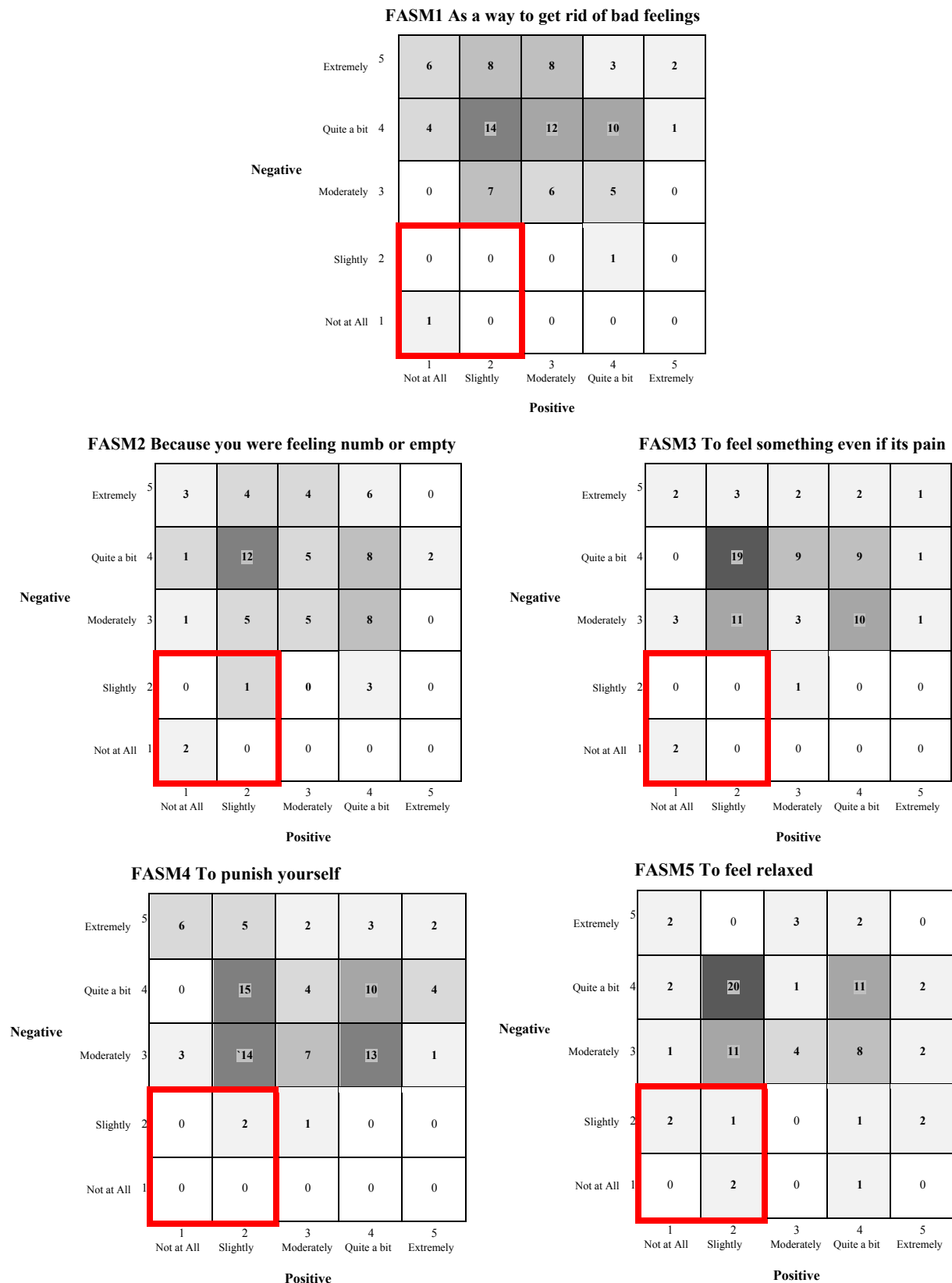
Existing NSSI literature previously determined FASM1 to be most representative of ANR. Therefore, patterns of positive and negative affect over time for each of the four additional FASM item (FASM2 – FASM5) were compared to the patterns observed in FASM1. In summary of the present results, none of these analyses yielded a significant three-way interaction, suggesting patterns of affect within FASM2 – FASM5 are not significantly different than patterns expected for ANR. The present analyses found greater levels of negative in general, in comparison to positive affect. In addition, the difference between negative and positive affect scores for FASM1 was determined to be significantly larger than each corresponding difference scores for FASM2 – FASM5. This suggests that negative affect was primary in all cases but it was significantly more so in FASM1 compared to FASM2 – FASM5. This implies that all FASM items are predominantly associated with high negative affect as would be expected in ANR.

Examination of Low Affect Ratings

Although the previous results failed to yield support for the APR, additional analyses were performed to explore a possible subtype of self-injury. Data from the original study indicated a potential subtype of NSSI within FASM2 and FASM3 characterized by low antecedent affect. Therefore, additional analyses were performed to explore antecedent affect within each FASM item. As previously discussed, participants obtained two scores for each FASM at each time point, one score reflecting the degree of positive affect experience (1 to 5) and the degree of negative affect (also 1 to 5). Thus each participant's score consists of an ordered pair indicating their location in a two-dimensional array. For example, an ordered pair of (1, 5) indicates no positive affect and extreme negative affect. By contrast, an ordered pair of (1, 1) would indicate no positive affect AND no negative affect antecedent to NSSI.

Responses to the FASM items were coded to examine antecedent affect that was low in both positive and negative ratings, operationally defined as 1 or 2 on both dimensions. The results are displayed visually in Figure 12, which presents the number of participants reporting each possible combination of scores prior to engaging in NSSI. The bottom left squares outlined in Figure 12 highlight individuals reporting low antecedent affect. Conversely, "high affect" represents ratings of "3" or higher on one or both dimensions of affect (e.g. positive or negative). The observed frequency (%) of participants characterized as antecedent "low affect" versus "high affect" are provided for each of the five FASM items in Table 12. As FASM1 is considered the prototypical representation of ANR, chi-square analyses were conducted to explore observed frequencies from FASM1 to each of the four FASM items (FASM2 – FASM5). These chi-square analyses utilized the proportion of participants with "low affect" for FASM 1 to calculate expected values under the null hypothesis –these results are also listed in Table 12.

Figure 12. ESG Affect Responses Rates and Low Antecedent Affect



Low Positive and Low Negative Affect

FASM	Yes Frequency (%)	No Frequency (%)	χ^2 value (<i>df</i> = 1)	<i>P</i> (<i>one-tailed test</i>)
FASM1 (<i>n</i> =88)	1 (1.1%)	87 (98.9%)	not computed	not computed
FASM2 (<i>n</i> =70)	3 (4.3%)	70 (95.7%)	6.5	< .025
FASM3 (<i>n</i> =79)	2 (2.5%)	79 (97.5%)	1.5	> .10
FASM4 (<i>n</i> =92)	2 (2.2%)	92 (97.8%)	1.0	> .10
FASM5 (<i>n</i> =78)	5 (6.4%)	78 (93.6%)	20.2	< .005

Note. The proportion of individuals with low antecedent positive and negative affect for FASM 1 (.011 vs. .989) was used to estimate the predicted frequencies under the null hypothesis for FASMs 2 – 5.

Of the participants who endorsed FASM 1 (*n*=88), only one individual reported antecedent affect characterized as “low affect” and represented 1.1% of respondents. In the pilot study, FASM2 and FASM3 yielded a greater percentage of individuals with antecedent experiences associated with “low affect” compared to the percentage of “low affect” endorsed in FASM1. Therefore, it was hypothesized that this would also be true for FASM2 and FASM3 in the current sample. Consistent with expectations, the percent of respondents reporting low antecedent positive and negative affect – “low affect” – was found to be significantly greater for FASM2 (3 of 70; 4.3%) than for FASM1. Contrary to expectations, the rate of individuals endorsing low positive and negative affect in FASM3 (2 of 79; 2.5%) was not significantly different than the rate observed in FASM1. However, in the current study FASM5 was found to yield the highest number of individuals reporting “low affect” for antecedent experiences and the proportion of “low affect” responses in FASM5 (5 of 78; 5.4%) was also significantly different than that reported for FASM1. In summary, this suggests initial support for APR in a small percentage of individuals who experience low antecedent affect when endorsing FASM2 (“because you were feeling numb or empty,”). Overall, results pertaining to low antecedent affect do not provide strong support for a distinct low-affect subtype.

DISCUSSION

The current study represents an extension of the original study by Franklin (2012), involving an online survey to explore antecedent experiences related to positive and negative reinforcement in the automatic functions of non-suicidal self-injury (NSSI) to obtain support for a distinct automatic positive reinforcement (APR) subtype. This study intended to address methodological limitations from the original study while utilizing a population with current, clinically significant NSSI. Both the original study and the current study were designed to focus on the automatic functions of NSSI using the five items from Functional Assessment of Self-Mutilation (FASM; Lloyd, Kelley, & Hope, 1997) corresponding to automatic reinforcement as described by the Four Factor Model (FFM; Nock & Prinstein, 2004). Participants were asked questions relating to personal affective experiences pre- and post-NSSI for each endorsed FASM item. These questions utilized the Evaluative Space Grid (ESG; Larsen et al., 2009), which permits discrete ratings of positive and negative affect, so that potential differentiation of reinforcement processes (APR versus ANR) could be examined.

Primary Aims of the Current Study

There are two *Primary Aims* of the current study: 1) address limitations from the original study with an updated procedural approach; and 2) examine patterns of affective change reflective of positive and negative reinforcement to assess support for a distinct APR subtype.

Updated Procedural Approach. One limitation of the original study was the failure to give the participants specific instructions differentiating distinct episodes of NSSI when responding to the different FASM follow-up questions. For this reason, individuals in the original study potentially rated affective experiences for the same episode of NSSI under multiple automatic functions limiting conclusions of data. For example, an individual thinking about his

most recent episode of NSSI may attribute “to feel something, even if it was pain” (FASM3) *and* “to punish myself” (FASM4) as reasons pertaining to this one specific episode of NSSI. This overlap then may have accounted for the similar patterns of affective change across different FASM items.

To address this limitation, the current study implemented procedural changes to provide clarity in directions for FASM follow-up questions. Individuals endorsing more than one FASM item as reasons for NSSI were instructed to provide answers involving distinct episodes of NSSI. This change was intended to limit the possibility that individuals provide reports about the same episode of NSSI that may potentially be associated with more than one reason delineated in the FASM questionnaire. To limit this potential for overlap, the current study includes specific instructions in bold letters designed to remind individuals to respond to distinct episodes of NSSI.

In the current study, only 6% of participants endorsed a single FASM item (1 of 5 automatic FASMs) as a reason for NSSI. This indicates that procedural updates clarifying directions for individuals endorsing multiple FASM items were likely important and necessary as they pertained to the majority of individuals. Endorsement of multiple FASM items as reasons for self-injury is consistent with research literature (Nock & Prinstein, 2004, 2005; Lloyd-Richardson et al., 2007; Zetterqvist et al., 2013).

Another limitation of the original study was that it utilized a sample of convenience rather than a clinically significant population with current NSSI. Therefore, the second object of the current study was to make use of a sample with clinically significant NSSI as the original study involved exclusively students recruited from college psychology courses at a large Midwestern university (University of Wisconsin-Milwaukee). Results from the original study

may not be generalizable or reflect individuals with history of clinically significant self-injury. To address these concerns, the current study posted recruitment materials on an NSSI Internet forum (www.selfinjury.com) to target individuals with self-identified, clinically significant NSSI. Furthermore, this recruitment method allowed broader geographic access for sampling that increases overall generalizability of results and reduces chances for potential sampling confounds from the original study.

Another modification to the original study involved updated screening criteria and procedures. Initial screening questions in the current study were designed to be consistent with the diagnostic criteria proposed for “NSSI Disorder” outlined by NSSI researchers (In-Albon, Ruf, & Schmid, 2013; Shaffer & Jacobson, 2009; Selby, Bender, Gordon, Nock, & Joiner, 2012) for consideration in future editions of the DSM. This involved endorsement of NSSI occurring on “5 OR MORE DAYS in the PAST YEAR.”

Clinical Characteristics and Comparisons to Original Study

In the original study only 56% of the sample reported lifetime history of 5 or more episodes of NSSI and 77% the majority of individuals reported no NSSI to have occurred in the year prior to the study. By comparison, the current sample reflects individuals with more clinically significant NSSI as indicated by endorsement of greater frequency of NSSI – the 76% of the sample endorsed 20 or more episodes of NSSI. Additionally, 35% of the current sample reported NSSI requiring hospitalization or injury severe enough to require medical attention (e.g., stitches, antibiotics, etc.) compared to only 8% in the original study. Furthermore, 24% of the current sample reported NSSI within the last week and 52% of individuals in the current sample reported NSSI within the last month. This suggests that the current sample reflects increased clinical severity – as indicated by greater number of episodes of NSSI – as well

as more current episodes of NSSI compared to data from the original study. Participants endorsing more recent episodes of NSSI should theoretically decrease retrospective bias in reporting and thus be considered more reliable than earlier data.

In summary, the current study aimed to address methodological concerns from the original study and results suggest that clarification of instructions related to administration of FASM follow-up questions was warranted as the majority endorsed multiple automatic functions. Furthermore, study design allowed participation of English speakers over 18 accessing the NSSI self-help forum theoretically broadening sampling procedures compared to the original study data that relied on college psychology students from a single university. Finally, participants in the current study endorsed NSSI more recent NSSI, greater frequency of NSSI episodes, and were more likely to endorse NSSI requiring hospitalization or injury severe enough to require medical attention in comparison to data from the earlier study suggesting the current sample represents a more reliable and clinically significant NSSI sample

Demographic Characteristics. The current sample yielded some noticeable differences from data obtained in the original study pertaining to participant demographics. The most noteworthy difference between the current sample and the original sample is the reported gender distribution. In the current study sample, 40% of participants endorsed female gender, 59% participants endorsed male gender, and 1% identified as transgender. This was significantly different from the gender breakdown in the original study – the sample was 91% female and 9% male. NSSI has often been assumed to occur more frequently in females, and although several initial studies indicated possibly higher prevalence among females, recent general population studies report equivalent rates between men and women (see Nock, 2014 for review).

A possible explanation for gender differences between the studies is sampling method. The greater percentage of females in the original study may reflect gender differences in college students taking courses in psychology and gender differences in who seeks extra credit. It is possible that men are more likely to frequent the self-injury site where recruitment for the current study took place or utilize Internet forums more generally. For example, Taipale (2016) found that women are more likely to use the Internet for social networking purposes and men are more likely to frequent discussion forums thereby creating a potential selection bias. Research from Whitlock and colleagues (2011) suggests men may favor NSSI that presents as “outward-focused aggression” (e.g., punching walls, cigarette burns, “games” such as bloody knuckles) that may be less likely to draw clinical attention or be characterized as self-injury. Biases among medical professionals and researchers may account for initial reports of gender discrepancies in NSSI. However, it is possible that differences between the current study and original study’s gender rates may pertain to differences in frequency and severity of NSSI associated with participant gender. For example, women may be more likely to “try” NSSI a few times (e.g., a participant in the original study) whereas men may be more likely to engage in chronic, repeated episodes of NSSI (e.g., a participant in the current study).

Finally, demographic breakdown of the current sample largely matched two other overarching trends within the literature observed by Klonsky (2014): “NSSI appears to be more common among people who report nonheterosexual orientations (for example, homosexual, bisexual, and questioning) and among Caucasians than non-Caucasians.” There were significant differences in the distribution of reported sexual orientations between the current sample compared to the original study, with more people in the current sample endorsing attraction to the “same sex,” “both sexes,” and “other.” However, both studies samples involved individuals

predominantly endorsing “White/Caucasian” race as is consistent with reported literature trends (Selby et al., 2011).

Affect Changes within FASM Items. This study aimed to characterize patterns of positive and negative affect reported pre- and post- NSSI for reasons corresponding to automatic motivations for NSSI. The five FASM items corresponding to the automatic motivations for NSSI, as outlined in the Four Factor Model, were administered to participants. Follow-up questions utilized the ESG to assess affect, positive and negative, experienced before and after distinct episodes of NSSI associated with each FASM item endorsed as a motivation for self-injury. This methodology was also used in Franklin’s original study (2012), with the minor differences previously mentioned. As was true for the original study, the current study aimed to examine patterns of affective change reflective of positive and negative reinforcement to ascertain support for a distinct APR subtype.

Review of Hypotheses

The APR subtype should theoretically be characterized by primary increases in positive affect rather than reductions in negative affect, as it reflects positive reinforcement. Franklin’s (2012) original study investigated changes in affect (positive and negative) within FASM1 – the prototypical representation of ANR – compared to the other automatic FASM items (FASM2 – FASM5). Results from this initial study failed to find significant differences in the patterns of affect supporting a distinct APR subtype. However, this was possibly due to using a nonclinical sample without current history of NSSI.

In the current study, we hypothesized that NSSI performed for reasons associated with ANR would be characterized by significant reductions in negative affect, without significant changes in positive affect, suggesting negative reinforcement. We predicted FASM1 to follow

this pattern of affect ratings as it has consistently been described within the literature as ANR. We also hypothesized that APR should be primarily characterized by significant increases in ratings of positive affect with minimal changes in ratings of negative affect to indicate evidence for positive reinforcement. We therefore predicted that affective experience reported for each of the FASM items reflective of APR (FASM2 – FASM5) would be associated with significant increases in ratings of positive affect without significant changes in ratings of negative affect. Support for these hypotheses was assessed via statistical analysis that predicted significant two-way Affect (PA vs. NA) X Assessment (pre-NSSI vs. post-NSSI) interaction that would be further modified by FASM.

Additional examination of the original Franklin (2012) study data yielded a potential subgroup within some FASM items (FASM2 and FASM3) that were characterized by overall low antecedent affect (i.e., both low positive and negative affect experienced prior to NSSI). This may possibly reflect a subgroup of individuals with NSSI that functions through increasing overall affective experiences (e.g., feeling generation) consistent with positive reinforcement. It was hypothesized that in the current study we would find a similar subgroup of individuals characterized by low ratings of both positive and negative affect prior to NSSI – most likely within FASM2 and FASM3 as was found in the original study.

In summary, the current study intended to test for possible evidence supporting the APR function of self-injury in a sample with clinically significant NSSI. This was achieved through ratings of positive and negative affect before and after NSSI for various motivations potentially associated with APR and compared with ANR. Examination of a potential subgroup with low antecedent affective experiences was also conducted to explore the additional possibility of positive reinforcement through “feeling generation.”

Affective Experiences reported in FASM1.

The first aim of the current study was to characterize patterns of positive and negative affect reported antecedent and consequent to NSSI to assess for evidence of positive reinforcement and the APR subtype. To achieve this aim, the current study utilized the five questions originally identified within the FFM to correspond with automatic motivations of NSSI. FASM1 – “to get rid of bad feelings?” – is consistently acknowledged as representative of ANR within the research literature and therefore affect patterns within FASM1 were used for comparison with the four other questions pertaining to automatic motivations.

Consistent with literature consensus, the current study found patterns of affect reported in FASM1 (“to get rid of bad feelings”) were consistent with the ANR function of NSSI. The rating of negative affect prior to self-injury was found to be highest in FASM1 compared to the other automatic FASM items (FASM2 – FASM5). This indicates that NSSI occurring for motivation consistent with FASM1 was associated with the strongest initial experiences of negative affect prior to self-injury. FASM1 was also characterized by significant reductions in reported negative affect subsequent to self-injury suggestive of functioning through negative reinforcement. There were only minor increases observed for positive affect that were not found to be statistically significant for FASM1, lending further support that this self-injury functions primarily through reduction of negative affect and suggests ANR. This was expected based on face validity of the question, as well as previous reports in the literature, and findings from the original study by Franklin (2012). This establishes support for FASM1 as prototypical ANR and thus the benchmark for comparison to determine whether affect patterns observed in other motives for NSSI (FASM2 – FASM5) are also consistent with ANR or whether these support a distinct APR subtype.

Examination of Affective Experiences in FASM2 – FASM5

Patterns of positive and negative affect observed in FASMs 2 – 5 were found to be similar to those observed in FASM1. All motivations for NSSI were characterized by relatively high negative affect and reductions in negative affect subsequent to self-injury with minimal increases in positive affect. The decrease in negative affect was found to be statistically significant for FASM2, FASM3, and FASM5. Only responses within FASM4 – “To punish yourself” – failed to produce statistically significant changes in negative affect. However, the changes in negative affect for FASM4 trended toward significance.

Ratings of positive affect within all FASM items (FASM2 – FASM5) followed patterns similar to that observed within FASM1. Prior to NSSI, individuals reported mild experiences of positive affect with minimal increases subsequent to NSSI. None of the five FASM items pertaining to automatic functions in NSSI were associated with statistically significant changes in positive affect. The failure to find significant increases in affect subsequent to NSSI does not support an APR subtype in which reinforcement occurs primarily due to increased positive emotional experiences.

These results indicate that NSSI motivations associated with FASM items 1 - 3, and 5 function primarily through reduction of negative affect and negative reinforcement as outlined by the ANR. FASM4 – “To punish yourself” – was the singular exception of the group of automatic motivations as it was the only one that failed to display a significant decrease in negative affect, although it did trend toward significance. FASM4 was also the only item to display a trend towards an increase in positive affect.

Although these results are mostly consistent with the findings of the original study, there are also several notable differences. In both studies, FASM1 was associated with significant

decreases in reported negative affect subsequent to NSSI. This was expected as FASM1 – “To get rid of bad feelings,” – is consistently identified within the literature to represent ANR. However, in the original study FASM1 was also associated with a significant increase in positive affect subsequent to NSSI. Results from the current study found no significant increase in positive affect for FASM1.

Furthermore, in the original study FASM items 2 – 5 all displayed significant decreases in negative affect as well as significant increases in positive affect across time. In the current study, FASM items 1 - 3, and 5 were associated with significant decreases negative affect but, unlike the original study, no significant increases in positive affect. In contrast to findings observed in the original study, FASM4 – “To punish yourself,” – failed to yield significant changes in either positive or negative affect in the current study.

Comparisons to ANR (FASM1)

The second primary aim of the current study was to contrast the FASM item traditionally associated with ANR (FASM1) with the items associated with APR (FASM2, FASM3, FASM4, and FASM5) in regards to the antecedent and consequent affective experiences as well as their associated pattern of change. We therefore conducted four 2 (“Affect”: positive vs. negative) X 2 (“Time”: before vs. after NSSI) X 2 (“FASM”) ANOVAs comparing FASM1– the prototypical example of ANR – to the remaining automatic FASM items often associated with APR (i.e., 1 vs. 2, 1 vs. 3, 1 vs. 4, and 1 vs. 5).

Results yielded no significant three-way interactions. This indicates the patterns of affect change within each of FASM potentially representative of APR (FASM2 – FASM5) are not significantly different than the pattern of affect change observed in ANR (FASM1). These results fail to support a distinct APR subtype, at least in terms of reinforcement primarily via the

induction of positive emotion, as the patterns of affect change are not statistically different from the patterns seen in NSSI characterized as ANR.

These results comparing FASM items 2 – 5 against FASM1 are consistent with the findings in the original study. Although FASM items 2 – 5 were associated with significant decreases in negative affect as well as significant increases in positive affect across time in the original study, the patterns of affective changes were not significantly different when compared to FASM1. Therefore, findings from both studies suggest there are no statistical differences in patterns of affect or affective change in automatic functions identified as potential representatives of APR and that traditionally characterized as ANR.

Examination of Antecedent Affect

The third primary aim of the current study was to explore antecedent experiences within FASM items to determine evidence of a potential subgroup of NSSI characterized by low antecedent affect. To assess for this, frequencies of individuals endorsing both low positive affect ratings and low negative affect ratings in FASM items potentially representative of APR (FASM items 2-5) were compared against the frequency observed for ANR NSSI as embodied by FASM1.

These analyses were conducted based on findings from the original study using this methodology to explore potential subgroups of NSSI suggestive of APR. In the original study, FASM2 (“feeling numb or empty”) and FASM3 (“To feel something, even if it was pain”) were associated with greater percentage of individuals with antecedent experiences associated with “low affect” compared to the percentage of “low affect” endorsed in FASM1 (“to get rid of bad feelings”). It was therefore hypothesized that the current sample would observe similar frequency differences for both FASM2 and FASM3 in comparison to FASM1. This was true for

FASM2, which was found to have significantly greater percentage of individuals reporting “low affect” than for FASM1 in the current study. However, no statistical difference was observed in the current data between frequencies of “low affect” in FASM3 and FASM1. Interestingly, FASM5 (“to feel relaxed”) yielded the highest number of individuals reporting “low affect” prior to NSSI and frequency of “low affect” responses in FASM5 was also significantly different than that reported in FASM1.

These results suggest possible support for a distinct APR subtype with certain FASM items, however with several caveats. While both studies noted statistically significant differences between percentages of “low affect” in FASM2, in the current study this amounted to only 4% of individuals identifying FASM2 as a motivation for NSSI compared to over 20% noted in the original study for this FASM item. Furthermore, the current study failed to replicate the initial findings of statistically higher frequency in the number of individuals endorsing “low affect” for FASM3 versus FASM1. There was a statistical difference observed in the current study not found in the original study involving FASM5; however, the overall percentage of individuals endorsing “low affect” for FASM5 was only 6% in the current study.

Findings from the current study supporting a distinct subtype of low antecedent affect within FASM2 and FASM5 are lackluster in comparison with percentages observed in the original study. However, both should be viewed skeptically given the relatively small sample size. Potential implications and limitations with these findings, as well as those pertaining to the two additional primary aims, will be explored next.

Summary of Findings

Summarizing the similarities and differences among the findings in this study and the original Franklin (2012) study will best guide further interpretation of findings and potential

implications for this line of research. In both studies, FASM1 was associated with significant reductions in negative affect as would be expected based on its prototypical representation of ANR. Furthermore, both studies found no differences in the patterns of affect and their associated changes for any of the potential candidates for APR (FASM items 2 – 5) when these were compared to the pattern of affect observed for FASM1. When both studies looked at low antecedent affective experiences, there was potential support for APR NSSI in a subgroup of individuals in FASM2 – “feeling numb or empty.” This evidence suggests that NSSI may act as positive reinforcement through feeling generation for a subgroup of individuals potentially representing APR.

There were also several notable differences between these two studies. One major difference was that significant increases in positive affect were observed across all FASM items associated with automatic motivations in the original study. This was true for both NSSI associated with ANR (e.g., FASM1) as well as the other automatic motivations potentially reflective of APR (e.g., FASM items 2 – 5). By contrast, the current study found no significant increase in positive affect for any of the automatic motivations of self-injury related to ANR (e.g., FASM1) or those investigated for APR (e.g., FASM items 2 – 5). However, the current study did identify a possible trend toward increased positive affect reported for FASM4 – “To punish yourself.”

Results pertaining to FASM4 in the current study were also notable for differences in overall patterns of positive and negative affect. In the original study, all automatic motivations (e.g. FASM items 1-5), including that reported for FASM4, yielded patterns of affect similar to one another. While different than the patterns reported in original study – patterns of affect observed in the current study were mostly similar to one another with the exception of FASM4.

In the current study, FASM1, FASM2, FASM3, and FASM5 were all characterized by similar patterns of affect involving significant decreases in negative affect whereas FASM4 failed to yield significant changes in positive or negative affect but did trend toward significance for both decreased negative affect and increased positive affect.

A third major difference between studies involved reports of low antecedent affect. Both studies noted a possible subgroup of low antecedent affect for FASM2 (“Feeling numb or empty,”) however, the frequency percentage reported in the original study were notably higher in the original study. A subgroup of low antecedent affect for FASM3 (“To feel something, even if it was pain,”) was observed in the original study that was not observed in the current study. Additionally, the current study found evidence in support of a subgroup of low antecedent affect for FASM5 (“To feel relaxed,”) that was not noted in the original study.

CONCLUSIONS

Findings from the current study provide additional support for conclusions drawn from the original Franklin (2012) study in two notable ways: (1) automatic motivations are primarily associated with reductions in negative affect; and (2) automatic motivations potentially representing APR do not significantly differ in their overall patterns of affect from the patterns observed in ANR. In contrast, the role of increased positive affect following NSSI was inconsistent across studies. In the original study, automatic motivations were also associated with increased positive affect, whereas this was not seen in the current. These findings may question the validity of the distinction between the automatic functions of NSSI (APR vs. ANR) outlined within the FFM and researchers have determined this to be an area of high priority within the field (Bentley, Nock, & Barlow, 2014; Selby, Nock, & Kranzler, 2014).

Alternatives to the APR

The results from the current study as well from the original Franklin (2012) are consistent with emerging research that yielded support for both automatic and social functions of NSSI but failed to find support for dividing automatic functioning further according to positive and negative reinforcement (Dahlström et al., 2015; Klonsky, Glenn, Styer, Olino, & Washburn, 2015; Young, Sproeber, Groschwitz, Preiss, & Plener, 2014). Dahlström and colleagues (2015) furthermore specified that the automatic factor encapsulates more than just emotion regulation but also serves functions to regulate “dissociative experiences,” and “punishing oneself.” These three factors – 1) regulation of negative emotion, 2) “anti-dissociation,” and 3) “self-punishment” are repeatedly described as three of the most common functions of NSSI (Klonsky, 2007; Kaess et al., 2012). Regulation of negative emotions has already been reviewed in conjunction with the current findings and is considered to reflect ANR. However, the “anti-dissociation” and “self-punishment” concepts will be explored further.

Anti-dissociation. Feeling generation, particularly in the context of dissociation, is endorsed by approximately 25% of individuals with NSSI (Nock, Prinstein, & Sterba, 2009) and is theoretically performed in response to feelings of “numbness,” or “emptiness,” (Rallis, Deming, Glenn, & Nock, 2012; Weierich & Nock, 2008; Klonsky, 2009; Muehlenkamp et al., 2009; Nock & Prinstein, 2004; Briere & Gil, 1998). Many researchers have classified this type of NSSI as APR (Selby et al., 2014; Bentley et al., 2014; Nock et al., 2007; Rallis et al., 2012), as self-injury is theorized to generate feelings in response to low arousal states pertaining to dissociation. However, there is a lack of conclusive evidence to suggest this type of NSSI functions through positive reinforcement or is necessarily distinct from the ANR subtype.

Finding from the original study by Franklin (2012) provided initial support for the subgroup of individuals who report low antecedent affect for NSSI for reasons consistent with anti-dissociation (FASM2 – “because you were feeling numb or empty,” and FASM3 – “to feel something, even if it was pain,”). However, the current study failed to yield conclusive support for a distinct subgroup of low antecedent affect.

The current study did provide additional support for a possible subgroup of low antecedent affect pertaining to individuals who endorse FASM2. However, it failed to replicate the original findings related to FASM3. The current study results also yielded a possible subgroup of low antecedent affect for FASM5 – “to feel relaxed” – which was not observed in the original study. Overall, results pertaining to a low affect subgroup in FASM items associated with dissociation were inconsistent. However, these results do provide evidence that a small percentage of individuals endorsing motivations related to FASM2 experience low antecedent affect. For this subgroup, NSSI may function through “feeling generation” and reflect positive reinforcement as this represents addition of stimuli.

Self-Punishment. In the current study, FASM4 – “to punish yourself” – stood out from the other automatic motivations. Some researchers have argued that “self-punishment” NSSI may be distinct from other automatic motivations (Klonsky, 2007; Glenn & Klonsky, 2009; Nock, 2009). In the original factor analysis by Nock and Prinstein (2004), the FASM4 item, “to punish yourself,” loaded onto the APR factor and was considered to function via positive reinforcement through “feeling generation” or feeling “purified” subsequent self-injury (Glenn & Klonsky, 2010, Himber, 1994), however there is a lack of clear empirical evidence to support this conclusion. Furthermore, conceptualization of “self-punishment” within the FFM framework is

problematic from a functional analytic perspective. The term “punishment” refers to stimuli that *decrease* a behavior so that by definition “punishment” cannot serve as reinforcement.

The current study failed to note significant changes in either positive or negative affect for FASM4 – “to punish yourself.” Researchers have argued that NSSI for self-punishment is more directly related to cognitions rather than affective experiences (McKenzie & Gross, 2014; Klonsky, 2007; Glenn & Klonsky, 2009; Nock, 2009). McKenzie and Gross (2014) argue that self-punishment potentially “relieves guilt by allowing individuals to reappraise their view of themselves... [and] may be considered to act via cognitive change,” (p.8). Glenn and Klonsky (2009) proposed that self-punishment NSSI is performed in response antecedent feelings of guilt or anger, but it unclear if NSSI reduces these initial feelings – suggestive of negative reinforcement – or whether it functions through creation of new feelings (e.g., “purified”) or changes in cognition that may reflect positive reinforcement. However, the current study indicates that changes in emotional experiences may be less relevant for self-punishment than other forms of automatic motivations. This would consistent with Nock (2009) who stated that that self-punishment NSSI represents “a form of self-directed abuse learned via repeated abuse or criticism by others. This would explain further how and why childhood abuse is associated with the behavior,” (pg.4).

Experiential Avoidance

Some researchers have postulated that items in the automatic factor may function through a form of experiential avoidance (Dahlström et al., 2015; Chapman et al., 2006).

Experiential avoidance is defined as:

‘When a person is unwilling to remain in contact with particular private experiences (e.g., bodily sensations, emotions, thoughts, memories, images, behavioral predispositions) and takes steps to alter the form or frequency of these experiences or the contexts that

occasion them, even when these forms of avoidance cause behavioral harm” (Hayes et al., 2004, p. 554).

The concept of experiential avoidance is theorized to function through escape from unwanted or distressing experiences – thus representing negative reinforcement. The role of experiential avoidance and NSSI has recently received increased attention within the research field (Anderson & Crowther, 2012; Skinner, Rojas, & Veilleux, 2017; Nielsen, Sayal, & Townsend, 2017).

The concept of experiential avoidance may improve understanding of the experiences related to NSSI and prove superior to the current ANR/APR conceptualization. The current data suggest that the primary function of automatic NSSI – both those pertaining to ANR and those traditionally associated with APR – is through the reductions of negative affect. This can be viewed as “avoidance” of the experiences of negative affective states.

There is some indication of a potential subgroup of individuals who experience overall low antecedent affect within those who endorse the motivation for FASM2 “because you were feeling numb or empty.” While this may represent NSSI performed for “feeling generation” that is possibly suggestive of positive reinforcement. This is consistent with previous studies of NSSI in which individuals report motivations such as “to elicit feelings” (Nixon et al., 2002; Turner et al., 2012). However, an alternative perspective consistent with experiential avoidance is that this type of NSSI is performed to “escape” or avoid experiences related to dissociation including “numbness” or “emptiness.” This function of NSSI is consistently reported as a motivation and has even been referred to as its own category – “anti-dissociation.” There is preliminary evidence suggesting this anti-dissociation function is associated with avoidance/numbing symptoms of posttraumatic stress disorder (PTSD; Weierich & Nock, 2008), as well as symptoms related to major depressive disorder, such as anhedonia and psychic numbness (Nock

& Prinstein, 2005; Weierich & Nock, 2008). NSSI may function as a way to avoid the experiences associated with these symptoms.

The experiential avoidance model may also help to explain NSSI performed for motivations related to “self-punishment.” Nock (2010) describes this function as a method to reprimand oneself for “some perceived wrong- doing or responding to general self-hatred or self-deprecation,” (p. 353). There is evidence that NSSI is associated with self-criticism and low self-esteem (Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Lundh, Karim, & Quilisch, 2007); therefore, that individuals may engage in NSSI to express guilt or anger at oneself (Glenn & Klonsky, 2009). This concept of “self-punishment” can also be interpreted through the lens of experiential avoidance – NSSI may be performed as an escape from negative cognitive and affective experiences. Negative cognitions pertaining to self-criticism, low self-esteem, and guilt may play a larger role in “self-punishment” NSSI compared to other types of self-injury that may relate more strongly to negative affect. As a test of the experiential avoidance hypothesis, we might expect to find in cross-sectional research a positive between levels of experiential avoidance in general and the severity of NSSI. Moreover, we might expect in longitudinal studies to find the high levels of experiential avoidance may serve as a risk factor for the subsequent development of NSSI or from the transition from occasional NSSI to chronic NSSI.

Findings Related to Positive Affect

One of the main differences between current study results in comparison to results from the original study involves the findings related to positive affect. Both studies involved significant decreases in negative affect across all FASM items (with a trend toward significance in FASM4 in the current study). In the original study, however, increases in positive affect were also observed across all FASM items in conjunction with the significant decreases in negative

affect. Similar to the current study, overall patterns of affect for FASM items explored as potential APR (FASM2 – FASM5) did not differ from patterns of affect reported for ANR (FASM1).

There are several possible reasons for this finding. These differences may potentially be explained by differences in the study samples. It is possible that the current sample – which recruited individuals with more clinically significant NSSI – may be more representative of actual experiences of positive affect in NSSI. However, NSSI is also highly correlated with alexithymia – the inability to properly identify and communicate emotional experiences (Sifneos, 1973). Because of this correlation, individuals with more severe NSSI may have less accurate insight into emotional experiences than individuals recruited from a student sample. It is therefore plausible that individuals from the student sample may in fact be more reliable in terms of assessing the role of positive affect induction. Self-report and experimental measures of alexithymia may potentially be critical to future NSSI research.

Opponent-Process Theory

It is also possible that the differences observed represent differences in the trajectory of NSSI. Positive emotional experiences may be more salient during the initial adoption of NSSI. Researchers have recently postulated that NSSI may be better understood within the context of opponent-process theory (Solomon, 1980; Joiner, 2005; Franklin et al., 2010; see Hamza & Willoughby, 2015 for review). Opponent-process theory involves two processes – an “A” process and an opposing “B” process. Initially, a behavior is primarily motivated by the “A” process with minimal aftereffect from the opposing “B” process. However, over time the strength of the “A” process diminishes and the opposing “B” process becomes the primary motivation. This theory has been suggested to explain addictive behaviors with the initial “A”

process (e.g., drug high) producing pleasurable experiences that weaken over time, while the opposing “B” process (e.g., withdrawal) intensifies until responding to the “B” process is the predominant motivation for the behavior.

Joseph Franklin and colleagues (2010) have argued that NSSI may begin as APR and over time shift towards ANR. These researchers drew this hypothesis from multiple studies pertaining to pain and pain offset, and summarized this accordingly:

NSSI (or its offset) is initially positively reinforcing and later becomes negatively reinforcing. This hypothesis is supported when the affective valence results of the present study are combined with the affective arousal results of previous laboratory NSSI studies. In sum, these studies have shown that NSSI groups display decreased arousal and a shift away from negative valence, indicating a reduction in negative affect (see Lang et al., 1990). This supports an ANR function for individuals with NSSI experience. In contrast, control groups have shown increased arousal and a shift away from negative valence, suggesting increased positive affect (see Lang et al., 1990). This supports an APR function for individuals with no NSSI experience. (p. 861)

There is currently mixed support for this hypothesis (Hamza & Willoughby, 2015). However, this perspective may explain differences in results from the original study and the follow-up study relating to negative affect.

The initial study by Franklin (2012) found significant increases in positive affect subsequent to NSSI performed for automatic motivations that were not observed in the current study. This may be due to the initial study’s sample utilization of a sample with less clinically severe NSSI. This sample represents individuals with fewer episodes of NSSI that may be more strongly motivated by positive experiences associated with self-injury. However, as individuals engage in NSSI more frequently these positive experiences become less pronounced and the reductions in negative affect become more predominant. This process may involve physical sensations of pain and relief that are intertwined with emotional experiences; this is further explained by Hamza and Willoughby (2015):

More specifically, researchers have suggested that an act of NSSI (i.e., the primary

response being pain) produces an opponent process after the termination of the act (i.e., relief). According to Franklin, Puzia et al. (2013), this opponent process may transcend physical pain to emotional pain as well (i.e., pain offset relief). Specifically, the removal of physical pain (i.e., NSSI) may result in not only decreased physical pain but also decreased emotional pain, because these two systems are thought to be interconnected. (pg. 569)

In both our initial study and the present study, NSSI was associated with reductions in negative affect. The initial experiences of positive affect may be associated with offset of physical pain (e.g., “relief”) that accounts for positive sensations that counteract negative affect. In their review of opponent-process theory and NSSI, Hamza and Willoughby (2015) attempt to account for research pertaining to diminished pain responses experienced by individuals with NSSI and argue that:

Individuals who engage in repetitive NSSI, therefore, are thought to develop decreased pain response and increased opponent processes (i.e., reductions in negative affect) after painful stimulation, making painful stimuli less aversive among self-injurers relative to noninjuring individuals. (p. 570)

However, research related to pain processes in NSSI remains inconsistent. Furthermore, it is unclear whether reduced physical pain is linked to increased reductions in negative affect. Reductions in negative affect may be the primary “A” process and emotional relief may function as “B” process; physical pain may be independent of these motivations and diminished pain responses may represent habituation over time for individuals repeatedly engaging in NSSI motivated by affective change processes. The opponent process model of self-injury will likely require additional research examining the trajectory of NSSI. Future studies utilizing pain proxies (e.g., cold pressor task), in individuals with and without NSSI, may benefit from longitudinal analysis of repeated exposure to a pain proxy over time. This area of research may further benefit from including negative mood inductions as an additional experimental variable to explore potential interactions and changes related to the experiences of pain and negative emotion.

Limitations of the Current Study

There are several limitations pertaining to the current study and its predecessor. The main limitation of these studies was reliance on retrospective reporting of affective states that may involve recall biases. Research suggests reports of mental processes are often invalid (Nisbett & Wilson, 1977) and that individuals with NSSI may have particular difficulty recalling and reporting emotional experiences related to self-injury (Nock, Prinstein, & Sterba, 2009). Furthermore, recent review of NSSI research suggests that there are considerable challenges for interpretation of self-report data, noting that individuals may cognitively reinterpret experiences associated with NSSI, presenting possible confounds for conclusions related to emotional change (Hamza & Willoughby, 2015). Furthermore, alexithymia is highly correlated with self-injury (Swannell et al., 2012; Plener et al., 2016), which suggests that individuals who engage in NSSI may have difficulty interpreting and describing their emotional responses in real time, much less report them accurately during retrospective recall. The current study is also not designed to establish causality pertaining to affect change and NSSI further limiting conclusions about the functions of self-injury.

Another limitation of the current study was the utilization of anonymous individuals recruited from the Internet. The study was designed to protect confidentiality and did not identify individual users presenting the possibility that individuals completed the survey more than once to receive study compensation.

As the NSSI field remains in its infancy, there is limited research pertaining to the assessment of NSSI behaviors. The current study relied on screening criteria derived from the proposal for inclusion of NSSI in DSM-5 (Shaffer & Jacobson, 2009), which has limited research to support its initial reliability and validity. Furthermore, this assessment method has yet

to be tested for use in an Internet sample and more comprehensive measures of NSSI utilize clinical interview (SITBI; Nock et al. 2007). In addition, there remains ongoing debate within the field related to the exact behaviors encompassed by NSSI and how these are distinguished from other similar behaviors (e.g., skin-picking).

Another limitation related to the assessment of NSSI is the use of the Functional Assessment of Self-Mutilation (FASM; Lloyd et al., 1997) to identify motivations underlying NSSI. This questionnaire was utilized to develop the FFM (Nock & Prinstein, 2004; 2005) and continues to be utilized as a standard assessment for research assessing self-injurious motivations (Dahlström et al., 2015; Zetterqvist et al., 2013; Kaess et al., 2012). However, the origin of the FASM questionnaire stems from a poster presentation at the Society for Behavioral Medicine annual conference (1997) and the research pertaining to its development has not been made widely available through peer-reviewed publication. Other assessments have been utilized – although with considerably less frequency than the FASM – to assess for motivations associated with self-injury. For example, Klonsky (2007) reviews 18 studies utilizing various assessments, including methods other than self-report (e.g., interview, laboratory studies with self-injury proxy) to explore motivations underlying NSSI. Five of these studies found support for a “sensation-seeking” motivation that included reasons such as: “to provide a sense of excitement or stimulation that feels exhilarating,” “to experience a ‘high’ that feels like a drug high,” or “I thought it would be fun.” Klonsky (2007) noted modest support for the sensation-seeking function of NSSI with rates of endorsement across studies ranging from approximately 5-10%. This example of potential positive reinforcement fails to be adequately captured by the FASM assessment and may have been overlooked in the current study. Furthermore, the low endorsement rate for “sensation-seeking” suggests the current study would have lacked sufficient

statistical power to detect evidence of APR resulting from sensation-seeking.

Finally, the current study and its predecessor relied on reports of positive and negative affect to assess support for mode of reinforcement. Reinforcement contingencies associated with self-injury may exist outside of individual awareness, thereby limiting the utility of self-report. While the increase in “positive” experiences is most often associated with positive reinforcement and reduction of “negative” experiences associated with negative reinforcement, this is not the true definition of reinforcement terms from a functional analytic perspective. However, in vivo observation of self-injury presents several ethical challenges, which limit more traditional methods of determining contingencies and reinforcement processes. However, some behavior analysts have even argued against the distinction between positive and negative reinforcement (Baron & Galizio, 2005). These researchers cite the lack of behavioral and physiological evidence supporting distinctly different processes presenting further confounds within the current study.

Future Directions

Overall, results from the original study (Franklin, 2012) and the current study failed to provide support for the APR subtype of NSSI. There was minimal support that a subgroup of individuals who endorse “because you were feeling numb or empty” may demonstrate some antecedent and consequent experiences consistent with APR. However, this was an extremely small percentage of overall respondents and requires additional research for further conclusions. Another limitation of the current study and its predecessor is their reliance on retrospective self-report to assess experiences and emotions related to self-injury. Findings from the current study require additional support utilizing alternatives to retrospective reports, including ecological momentary assessment (EMA) that obtains reports about affect in real-time and laboratory

protocols involving self-injury proxies. These types of studies should be explored in the future to strengthen support for the findings and conclusions of the current study.

At present, the current study results suggest limited utility in distinguishing between automatic factors within the FFM. In recent years, other researchers have begun to advocate for an updated model pertaining to motivations and subtypes within NSSI (Klonsky, 2007; 2009; Zetterqvist et al., 2013; Dahlström et al., 2015). The experiential avoidance model of NSSI has been proposed as an alternative model to explain automatic functions of NSSI (Anderson & Crowther, 2012; Dahlström et al., 2015; Skinner et al., 2017; Nielsen et al., 2017). Findings from the current study involving individuals with clinically significant NSSI suggest that automatic motivations are associated with reductions in negative affect subsequent to self-injury. While this is theoretically consistent with ANR, the experiential avoidance model may provide greater utility in distinguishing subtypes of self-injury as well as guide future development of treatment interventions.

From the experiential avoidance perspective, less focus is placed on the affective valence (positive vs. negative) of experiences. Instead, this model relies more heavily on understanding the antecedent contextual variables that precipitate “escape” via self-injury. This may allow for the integration of subtypes of NSSI not encompassed by the FFM such as “self-punishment” and “anti-dissociation” in addition to the more general function of reducing negative affect. While NSSI may function as a means to avoid or escape experiences through self-injury, the antecedent experiences pertaining to “anti-dissociation” may be very different than antecedent experiences involving intense negative affect or the experiences of self-criticism and self-directed anger preceding “self-punishment” NSSI. In fact, it has been argued that self-injury may serve to regulate arousal states rather than affective valence (Klonsky, 2007; Naoum et al., 2016). Future

research may benefit from examining antecedent contextual variables potentially eliciting “escape” via self-injury. Researchers should also consider including measures of experiential avoidance such as the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011) and the Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011).

There evidence that self-injury serves to reduce high-arousal negative affect states (e.g., overwhelmed, angry, etc.) to bring about homeostasis. Similarly, self-injury may function to increase low-arousal aversive states associated with dissociation (e.g., empty, numb, etc.). Utilizing the experiential avoidance model may help future research explore the potential role of arousal regulation and other prospective mechanisms associated with NSSI that may remain obscured by use of outdated models to understand self-injury. Additionally, understanding the trajectory of NSSI – in particular, possible changes pertaining to motivations and experiences over time – may further highlight potential mechanisms and subtypes of self-injury. For example, assessing the opponent-process model of NSSI facilitate development of clinical interventions for self-injury that are based on interventions for other behaviors that also fit this model (e.g., addiction). Researchers may choose to examine psychological interventions used in substance abuse such as Motivational Interviewing (Miller & Rollnick, 1991) for treatment of NSSI. This may also have implications for pharmacological interventions. There is some initial support for medications used to treat opiate abuse (e.g., naltrexone) in the treatment of NSSI (see Smith, 2005 for review) and additional support for the opponent process theory in NSSI may guide future pharmacological research.

Currently, there are no empirically supported interventions meeting sufficient recommendation criteria for the treatment of NSSI (Plener et al., 2016; Stanley, Fineran, &

Brodsky, 2014). This has been deemed a high priority for future research (Bentley et al., 2014). Greater understanding of the antecedent and consequent experiences associated with NSSI are likely essential for the development of efficacious treatment protocols. The findings from the current study fail to support distinction between the automatic subtypes of NSSI described within the FFM. However, researchers within the field have urged for continued studies to explore this distinction between APR and ANR (Bentley et al., 2014; Dahlström et al., 2015). Findings and conclusions from the current study support reprioritization of research directives within the NSSI field and suggest future research may benefit from closer examination of the precise contextual variables antecedent to self-injury.

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APPENDIX A:

Demographic Questions

What is your age? _____

What is your gender?

- ☐ Male
- ☐ Female
- ☐ Transgender
- ☐ Other

What is your sexual orientation?

- ☐ Attracted to the **opposite** sex
- ☐ Attracted to the **same** sex
- ☐ Attracted to **both** sexes
- ☐ Other

Do you consider yourself to be Hispanic or Latino/a?

- ☐ Hispanic or Latino/a
- ☐ **Not** Hispanic or Latino/a

Which racial group best describes you? Please check all that apply.

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African-American
- ☐ Native Hawaiian or Pacific Islander
- ☐ White or Caucasian
- ☐ Other (specify) _____
- ☐ More than one race (specify) _____

APPENDIX B:
NSSI Clinical Characteristic Questions

1) How old were you when you first self-harmed (burning or cutting)? _____

2) In the last 12 months, how many times have you self-harmed?

- ☐ 5 times or less
- ☐ 6-10 times
- ☐ 11-20 times
- ☐ 21-50 times
- ☐ 51-100 times
- ☐ More than 100 times

3) How many times have you self-harmed in your lifetime?

- ☐ 5 times or less
- ☐ 6-10 times
- ☐ 11-20 times
- ☐ 21-50 times
- ☐ 51-100 times
- ☐ More than 100 times

4) When was the most recent time you self-harmed?

- ☐ Today
- ☐ Within the past week
- ☐ Within the past month

- ☐ Within the past 6 months
- ☐ Within the past 12 months
- ☐ I don't know

5) Has this behavior ever resulted in hospitalization or injury severe enough to require medical attention (e.g., stitches, antibiotics, etc.)?

- ☐ Yes
- ☐ No

6) Where on your body have you engaged in self-harm? (Select all that apply)

- ☐ Arms
- ☐ Legs
- ☐ Chest
- ☐ Stomach
- ☐ Thighs
- ☐ Face
- ☐ Genitals
- ☐ Other (specify) _____

7) Do you experience an "urge" to self-harm?

- ☐ Yes
- ☐ No
- ☐ Sometimes
- ☐ I don't know

APPENDIX C:

FASM Questions

Below are some of the reported reasons for self-harming (cutting or burning). Please read each reason carefully and select how often this is a reason for your self-harm.

	Never	Rarely	Sometimes	Often
1) As a way to get rid of bad feelings?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2) Because you were feeling numb or empty?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3) To feel something, even if it was pain?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4) To punish yourself?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5) To feel relaxed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

APPENDIX D:

ESG Example from Current Study

Think of the **most recent** time you harmed yourself
"to feel something even if it's pain" when responding to the next group of questions.

*Be sure that this specific instance of self-harm is *not* the same instance of self-harm for which you have previously answered questions.*

Please rate how **positive** and **negative** you were feeling **immediately before** harming yourself.

How NEGATIVE was the experience?	Extremely					
	Quite a bit					
	Moderately					
	Slightly					
	Not at all					
		Not at all	Slightly	Moderately	Quite a Bit	Extremely

How **POSITIVE** was the
experience?

APPENDIX E:

End of Study – Debriefing and Gift Card

What is self-injury?

Self-injury is defined by the deliberate harm to one's own body or bodily tissues without the intention of suicide. It is estimated that approximately 4% of the general population engages in self-injury.

Your participation in the study will hopefully help us to understand the experiences of those with self-injury.

Thank you for completing the survey.

Where can I get help?

S.A.F.E. (Self Abuse Finally Ends) Alternatives
1-800-DON'T CUT or (1-800-366-8288)
www.selfinjury.com

National Suicide Prevention Lifeline
1-800-273-TALK or (1-800-273-8255)
www.suicidepreventionlifeline.org

TO RECEIVE YOUR GIFT CARD

Please click on the link below where you will be asked to provide an email address and the initials to your name. This information is for payment purposes only and will NOT be linked to your survey answers.

https://milwaukee.qualtrics.com/SE/?SID=SV_bQ6Irg8IWVMyJOR

CURRICULUM VITAE
SHANA A. FRANKLIN, M.A.

EDUCATION

Current	Ph.D. Candidate in Clinical Psychology University of Wisconsin-Milwaukee Milwaukee, Wisconsin Ph.D. Candidate in Clinical Psychology Dissertation: <i>Exploration of Affect and Antecedent Experiences in Non-Suicidal Self-Injury</i> Dissertation Chair: Shawn Cahill, Ph.D. Defense Date: November, 7th 2017
2012	M.A. in Clinical Psychology University of Wisconsin-Milwaukee Milwaukee, Wisconsin
2006	B.A. Cum Laude with Honors in Psychology Major: Psychology Harvard College Cambridge, Massachusetts

INTERNSHIP

July 2015 – April 2016	Predoctoral Internship in Clinical Psychology Department of Psychiatry and Behavioral Neuroscience University of Chicago Medicine Chicago, Illinois
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HONORS AND AWARDS

2014	UWM Graduate Research Travel Award – (\$500)
2014	UWM Department of Psychology Summer Graduate Research Fellowship – (\$3000)
2012	John and Lynn Schiek Research Award in Behavior Analysis – (\$1000)
2011 – 2015	UWM Merit-based Graduate Assistantship
2010	National Science Foundation Graduate Research Fellowship Program – Honorable Mention
2006	Academic All-District (Third Team) – NCAA Recognition of Outstanding Student Athletes

CLINICAL EXPERIENCE

2017 – current	<p>Clinical Therapist <i>Dura LLC Medical Group</i> Supervisors: Ndidi Onyejiaka, MD, FAAP; Diana Goldman-DeZocchi, MA, LCPC Dura LLC Medical Group, Chicago, IL</p>
2016 – 2017	<p>Psychological Assistant <i>Child and Adolescent Day Treatment</i> Supervisors: Debra Minsky-Kelly, LCSW; Jamie Roberts PsyD Rogers Memorial Hospital, Kenosha, WI</p>
July 2015 – April 2016	<p>Predoctoral Internship in Clinical Psychology Department of Psychiatry and Behavioral Neuroscience University of Chicago Medicine, Chicago, IL</p> <ul style="list-style-type: none">● Adult Outpatient Psychotherapy Clinic Supervisors: Lindsay Brauer, Ph.D. and Maureen Lacy, Ph.D.● Adult Anxiety Clinic Supervisor: Shona Vas, Ph.D.● Addictive, Compulsive and Impulse Control Disorders Clinic Supervisors: Daniel Fridberg, Ph.D. and Andrea King, Ph.D.● Behavioral Sleep Medicine Program Supervisor: Lisa Medalie, Psy.D.● Chicago Weight Management Clinic Supervisor: Andrea Busby, Ph.D.● Research Rotation in Addiction Clinic Supervisor: Andrea King, Ph.D.
2014 – 2015	<p>Graduate Assistant and Clinical Facilitator <i>Alcohol and your College Experience (A.C.E.) Program</i> Campus Substance Use Program using Motivational Interviewing Supervisors: Julie Bonner, M.D.; Susan Cushman, MPH University of Wisconsin – Milwaukee Norris Health Center</p>
2012 – 2014	<p>Community Placement – Therapy Practicum <i>Residential Treatment Center for Obsessive-Compulsive Disorder</i> Supervisor: Brad Riemann, Ph.D. Rogers Memorial Hospital, Oconomowoc, WI</p>
2010 – 2012	<p>Clinical Assessment and Therapy Practicum <i>Traumatic Stress and Anxiety Disorder Clinic</i> University of Wisconsin – Milwaukee Psychology Clinic Supervisors: Shawn Cahill, Ph.D.</p>

- 2011 – 2012 **Clinical Assessment and Therapy Practicum**
University of Wisconsin – Milwaukee Psychology Clinic
Supervisors: Gwynne Kohl, Ph.D.
- 2009 – 2011 **Clinical Assessment Practicum**
University of Wisconsin – Milwaukee Psychology Clinic
Supervisors: Bonnie Klein-Tasman, Ph.D.; Hanjoo Lee, Ph.D.

PUBLICATIONS

- Conelea, C.A., **Franklin, S.A.**, & Woods, D.W. (2012). Tic, Tourettes, and related disorders. In R. Levesque (Ed.), *Encyclopedia of Adolescence*. (pp. 2976-2983). New York, NY: Springer.
- Himle, M.B., Freitag, M.J., Walther, M., **Franklin, S.A.**, Ely, L.J., Woods, D.W., (2012). A randomized pilot trial comparing videoconference versus face-to-face delivery of behavior therapy for childhood tic disorders. *Behaviour Research and Therapy*, 50, 565-570.
- Lee, H. -J., **Franklin, S. A.**, Turkel, J. E., Goetz, A. R., & Woods, D. W. (2012). Facilitated Attentional Disengagement from Hair-Related Cues among Individuals Diagnosed with Trichotillomania: An Investigation based on the Exogenous Cueing Paradigm. *Journal of Obsessive-Compulsive and Related Disorders*, 1, 8-15.
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- Franklin, S.A.**, McNally, R.J., & Riemann, B.C. (2009). Moral reasoning in obsessive-compulsive disorder. *Journal of Anxiety Disorders*, 23, 575-577.

POSTERS AND PRESENTATIONS:

- Franklin, S.A.**, Grout, K.M. (2014). *Why do People Self-Injure? Examination of Automatic Positive and Negative Reinforcement*. Suicide and Self-Injury SIG Datablitz at the Association of Behavioral and Cognitive Therapies 48th Annual Convention in Philadelphia, PA.
- Grout, K.M., **Franklin, S.A** (2014). *Shame and Guilt in Nonsuicidal Self-Injury: Shedding Light on the Reinforcement Contingencies*. Suicide and Self-Injury SIG Datablitz at the Association of Behavioral and Cognitive Therapies 48th Annual Convention in Philadelphia, PA.
- Franklin, S.A.**, Grout, K.M., Cahill, S.P. (2014). *Functions of Non-suicidal Self-Injury: Examination of Automatic Positive Reinforcement*. Poster presented at the Association of Behavioral and Cognitive Therapies 48th Annual Convention in Philadelphia, PA.
- Grout, K.M., **Franklin, S.A.**, Cahill, S.P. (Poster Accepted for 2014). *Examining the Role of Shame and Guilt in Nonsuicidal Self-Injury*. Poster presented at the Association of Behavioral and Cognitive Therapies 48th Annual Convention in Philadelphia, PA.
- Franklin, S.A.**, Grout, K.M., Cahill, S.P. (2014) *Reinforcement and Punishment in Non-suicidal Self-Injury*. Poster presented at the Wisconsin Psychological Association Convention in Madison, WI.
- Grout, K.M., **Franklin, S.A.**, Cahill, S.P. (2014) *A Preliminary Examination of Shame and Guilt in a College Sample of Cutters*. Poster presented at the Wisconsin Psychological Association Convention in Madison, WI.
- Grout, K.M., Cahill, S.P., Simpson, H. B., Wetterneck, C. **Franklin, S.A.**, & Riemann, B. (2013) *Patterns and Challenges of Polypharmacy Among Patients with Comorbid Eating Disorder and Obsessive Compulsive Disorder*. Poster presented at the Association of Cognitive and Behavioral Therapies 47th Annual Convention in Nashville, TN.
- Franklin, S.A.** Lee, H.-J., Green, B.M., Turkel, J.E., Goetz, A.R., & Woods, D.W. (November, 2012). *Implicit attitudes towards hair-related stimuli in individuals with trichotillomania: an investigation using the Implicit Association Test*. Poster presented at the annual Association for Behavioral and Cognitive Therapy (ABCT), National Harbor, MD.
- Franklin, S.A.**, Woods, D.W., Lee, H., Ricketts, E., Aringer, A., & Smith, O. (2011, April). *Neurocognitive Correlates of Hair Pulling*. University of Wisconsin-Milwaukee Association for Graduate Studies in Psychology (AGSIP) Symposium.
- Woods, D.W., **Franklin, S.A.**, Lee, H., Ricketts, E., Aringer, A., & Smith, O. (2011, April). *Neurocognitive Correlates of Hair Pulling*. In N.J. Keuthen (Chair) *Recent Research Findings in Phenomenology and Treatment of Hair Pulling in Adults and Children*.

Symposium presented at the Trichotillomania Learning Center (TLC) annual conference, San Francisco, California.

Burkel, R., Aringer, H., Smith, O., Rebitski, R., Wissing, A. & **Franklin, S. A.** (2011, February). *Sensory processing disorder and intensity of tics associated with Tourette Syndrome in children*. Poster presented at the 4th annual Interdisciplinary Pediatric Behavioral Health Research Conference, Milwaukee WI.

Rebitski, R., Burkel, R., Aringer, H., Smith, O., Wissing, A. & **Franklin, S.A.** (2011, February). *The impact of PANDAS in children with Tourette Syndrome*. Poster presented at the 4th annual Interdisciplinary Pediatric Behavioral Health Research Conference, Milwaukee WI.

Piacentini, J., McGuire, J.F., Conelea, C.A., Lee, J., Specht, M., Benson, T., Liu, H., & **Franklin, S.A.** (2010, June) Efficacy of comprehensive behavioral interventions for tics across the lifespan. In D.W. Woods (Chair) *Understanding the Efficacy and Mechanisms of Change in Behavioral Treatments for Tourette Syndrome and Other Tic Disorders Across the Developmental Spectrum*. Symposium presented at the World Congress of Behavioral and Cognitive Therapies, Boston, Massachusetts.

Ricketts, E. J., **Franklin, S.A.**, Conelea, C. A., Woods, D. W., & Tourette Syndrome Impact Working Group (2010, June). *Examining the relationship between anxiety, mood, and tic severity in an internet sample of children with Tourette Syndrome*. Poster presented at the World Congress of Behavioral and Cognitive Therapies, Boston, Massachusetts.

Franklin, S.A., Brandt, B., Conelea, C., & Woods, D. (2010, February). *The impact of Tourette Syndrome with and without ADHD on quality of life in children*. Poster presented at the 3rd annual Interdisciplinary Pediatric Behavioral Health Research Conference, Milwaukee WI.

Chang, S., Sukhodolsky, D. G., Deckersbach, T., Casey, B., Chang, S., Landeros-Weisenberger, A., Schultz, R., Scahill, L., Leckman, J. F., Carlson, L. E., **Franklin, S. A.**, Beucke, J. C., Britton, J., Marsh, R., Wang, Z., Packard, M., Skudlarski, P., Peterson, B., Saxena, S., Gorbis, E., O'Neill, J., Maidment, K. M. (2009). *Neurobiological Correlates of OC-Spectrum Disorders: Cognitive, Imaging, and Clinical Comparisons*. Symposium presented at the annual meeting of the Association for Behavioral and Cognitive Therapy, New York, NY.

Fama, J. M., Fang, A., **Franklin, S.A.**, Buhlmann, U., Steketee, G., & Wilhelm, S. (2008, November). *Recollections of Influential Childhood Relationships in Individuals with OCD and BDD*. Symposium presented at the 42nd annual meeting of the Association for Behavioral and Cognitive Therapies, Orlando FL.

Franklin, S.A., Fang, A., Fama, J.M., Steketee, G., & Wilhelm, S. (2008, August). *Perceived parental styles in individuals with Obsessive Compulsive Disorder and Body Dysmorphic*

Disorder. Poster presented at the 15th annual meeting of the Obsessive Compulsive Foundation, Boston MA.

Fang, A., **Franklin, S.A.**, Fama, J.M., Steketee, G., & Wilhelm, S. (2008, August). *Levels of expressed emotion in Obsessive-Compulsive Disorder and Body Dysmorphic Disorder*. Poster presented at the 15th annual meeting of the Obsessive Compulsive Foundation, Boston MA.

Franklin, S.A., Fang, A., Buhlmann, U., Marques, L., & Wilhelm, S. (2008, August). *Traumatic experiences in individuals with Body Dysmorphic Disorder*. Poster presented at the annual meeting of the American Psychological Association, Boston MA.

INVITED LECTURES

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| 2016 | <i>Introduction to Acceptance and Commitment Therapy</i>
Cognitive Behavioral Therapy Case Conference
Department of Psychiatry & Behavioral Neuroscience
The University of Chicago Medicine, Chicago, IL |
| 2015 | <i>Bipolar Disorder vs. Borderline Personality? Affect Lability, Cultural Factors, and Other Diagnostic Challenges</i>
Grand Rounds
Department of Psychiatry & Behavioral Neuroscience
The University of Chicago Medicine, Chicago, IL |
| 2015 | <i>Introduction to Habit Reversal Therapy</i>
Cognitive Behavioral Therapy Case Conference
Department of Psychiatry & Behavioral Neuroscience
The University of Chicago Medicine, Chicago, IL |
| 2015 | <i>OCD and Related Disorders</i>
Anxiety Clinic Team Meeting
Department of Psychiatry & Behavioral Neuroscience
The University of Chicago Medicine, Chicago, IL |
| 2015 | <i>Tips for Internship Interviews – Panel Discussion</i>
The Predoctoral Clinical Psychology Internship Program
The University of Chicago Medicine, Chicago, IL |
| 2015 | <i>Applying for Internship: Strategies for Success</i>
The Cognitive Behavioral Therapy Program
University of Chicago Medicine, Chicago, IL |
| 2013 | <i>Obsessive-Compulsive Disorder Spectrum Conditions</i>
Introduction to Abnormal Psychology
University of Wisconsin-Milwaukee, Milwaukee, WI |

RESEARCH EXPERIENCE

- 2014 – 2017 **Dissertation Research Project**
Exploration of Affect and Antecedent Experiences in Non-Suicidal Self Injury
Dissertation Chair: Shawn Cahill, Ph.D.
Committee Members: Christine Larson, Ph.D.; Hanjoo Lee, Ph.D.; Susan Lima, Ph.D.; Jeffrey Tiger, Ph.D.; Robyn Ridley, Ph.D.
- 2010 – 2012 **Master Research Project**
Experiences Associated with Non-Suicidal Self-Injury: An Internet Survey
Advisor: Shawn Cahill, Ph.D.
Committee Members: Jonathon Kanter, Ph.D.; Christine Larson, Ph.D.; Hanjoo Lee, Ph.D.
- 2009 – 2011 **Clinical Research Assistant**
Acceptance Enhanced Behavior Therapy for Trichotillomania
Supervisor: Douglas Woods, Ph.D.
University of Wisconsin-Milwaukee
- 2009 – 2011 **Clinical Research Assistant**
Telehealth Therapy for Children with Chronic Tic Disorder
Supervisor: Douglas Woods, Ph.D. and Michael Himle, Ph.D.
University of Wisconsin-Milwaukee and University of Utah
- 2007 –2009 **Clinical Research Assistant**
Obsessive Compulsive Disorder and Related Disorders Program
Supervisor: Sabine Wilhelm, Ph. D.
Massachusetts General Hospital/ Harvard Medical School
- 2005 – 2006 **Undergraduate Honors Thesis**
Moral Reasoning and Obsessive-Compulsive Disorder
Harvard College, Cambridge MA
Rogers Memorial Hospital, Oconomowoc, WI
Supervisors: Richard McNally, Ph.D. and Bradley Reimann, Ph.D.

TEACHING EXPERIENCE

- 2015 **Peer Clinical Supervisor**, University of Chicago
Supervision of Externs in the University of Chicago Anxiety Clinic
Supervisor: Shona Vas, Ph.D.
- 2014 – 2015 **Online Course in Abnormal Psychology**, UWM
Online Teaching Assistant for Undergraduate Students
Supervisor: Robyn Ridley, Ph.D.

- 2012 – 2014 **Online Course in Personality Psychology, UWM**
Online Teaching Assistant for Undergraduate Students
 Supervisor: Robyn Ridley, Ph.D.
- 2011 – 2012 **Personality Psychology, UWM**
Teaching Assistant for Undergraduate Students
 Supervisors: Shawn Cahill, Ph.D. and Flint Espil, M.S.

MEMBERSHIP IN PROFESSIONAL ASSOCIATIONS

- 2007 – Present Association for Behavioral and Cognitive Therapies (ABCT)
- 2008 – Present American Psychological Association (APA)
- 2017 – Present Illinois Psychology Association (IPA)
- 2012 – 2014 Wisconsin Psychology Association (WPA)