

**Engaging in Non-suicidal Self-Injury: The Contribution of Early Life Experiences,  
Attachment and Emotion Dysregulation.**

Rania Christoforou

PhD in Clinical Psychology

University of Nicosia

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UNIVERSITY *of* NICOSIA

## Declaration of Own Work

I, Rania Christoforou, declare that this thesis has been composed solely by myself and that it has not been submitted elsewhere, in whole or in part, for any other academic purposes. Except where otherwise stated by reference or acknowledgement, the work presented is entirely my own.



**Name:** Rania Christoforou

**Signature:** 

**Date:** 16.05.2020

## **Dedication / Acknowledgements**

I would like to dedicate the following thesis to my parents, my brother and my partner, who supported me, each one of them in their own way, in pursuing one of my life-long dreams, a PhD in Clinical Psychology.

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## Table of Contents

|  |           |
|--|-----------|
| <b>ABSTRACT .....</b>  | <b>7</b>  |
| <b>INTRODUCTION.....</b>   | <b>9</b>  |
| NON-SUICIDAL SELF-INJURY (NSSI) .....  | 9         |
| <i>Definition</i> .....  | 9         |
| <i>NSSI &amp; Suicide attempts</i> .....   | 11        |
| <i>Classification</i> .....  | 11        |
| HISTORY OF NSSI .....  | 13        |
| EPIDEMIOLOGY OF NSSI.....  | 14        |
| IMPACT OF NSSI .....   | 16        |
| FUNCTIONS OF NSSI .....  | 17        |
| RISK FACTORS OF NSSI.....  | 18        |
| <i>Theoretical Models</i> .....  | 18        |
| <i>Empirical findings &amp; Gaps in Literature</i> .....   | 20        |
| THESIS OBJECTIVES .....  | 22        |
| RESEARCH QUESTIONS .....   | 22        |
| <b>THE ROLE OF EARLY LIFE EXPERIENCES, ATTACHMENT AND EMOTION REGULATION IN PREDICTING SELF-HARM IN ADULTS: A SYSTEMATIC REVIEW AND META-ANALYSIS.....</b> | <b>23</b> |
| <b>HIGHLIGHTS .....</b>  | <b>24</b> |
| <b>ABSTRACT .....</b>  | <b>25</b> |
| <b>INTRODUCTION.....</b>   | <b>26</b> |
| <b>METHOD.....</b>   | <b>29</b> |
| PROTOCOL REGISTRATION & GUIDANCE.....  | 29        |
| ELIGIBILITY CRITERIA.....  | 29        |
| SEARCH STRATEGY .....  | 30        |
| STUDY SELECTION .....  | 31        |
| DATA EXTRACTION.....   | 33        |
| RISK OF BIAS (QUALITY) ASSESSMENT .....  | 33        |
| STRATEGY FOR DATA SYNTHESIS.....   | 34        |
| Narrative Synthesis.....   | 34        |
| Meta-analysis.....   | 34        |
| Transforming / Computing effect sizes.....   | 34        |
| Statistical analysis.....  | 35        |
| <b>RESULTS.....</b>  | <b>35</b> |
| CHARACTERISTICS OF REVIEWED STUDIES .....  | 35        |
| Study focus.....   | 36        |
| Study design .....   | 36        |
| Sample characteristics .....   | 36        |
| Quality assessment .....   | 37        |
| Exclusion of studies .....   | 37        |
| NARRATIVE SYNTHESIS .....  | 37        |
| Adverse childhood experiences & NSSI .....   | 37        |
| Observational studies .....  | 38        |
| Insecure attachment & NSSI.....  | 43        |
| Observational studies .....  | 43        |
| Emotion dysregulation & NSSI.....  | 46        |
| Randomised-controlled trials (RCTs) .....  | 46        |
| Observational studies .....  | 47        |
| Interaction of risk factors .....  | 52        |
| META-ANALYSIS.....   | 55        |
| Adverse childhood experiences & NSSI .....   | 55        |
| Heterogeneity between studies .....  | 55        |
| Effect sizes and significance.....   | 56        |
| Publication bias.....  | 57        |

|  |            |
|--|------------|
| Insecure attachment & NSSI.....  | 59         |
| Heterogeneity between studies.....   | 59         |
| Pooled effect sizes and significance.....  | 59         |
| Publication bias.....  | 61         |
| Emotion dysregulation & NSSI.....  | 61         |
| Heterogeneity between studies.....   | 61         |
| Pooled effect sizes and significance.....  | 61         |
| Publication bias.....  | 62         |
| <b>DISCUSSION.....</b>   | <b>64</b>  |
| <b>REFERENCES.....</b>   | <b>68</b>  |
| <b>APPENDICES.....</b>   | <b>76</b>  |
| APPENDIX A.....  | 76         |
| APPENDIX B.....  | 77         |
| APPENDIX C.....  | 91         |
| APPENDIX D.....  | 91         |
| APPENDIX E.....  | 94         |
| APPENDIX F.....  | 96         |
| APPENDIX G.....  | 97         |
| <b>THE SERIAL MEDIATIONAL ROLE OF ATTACHMENT AND EMOTION REGULATION IN THE<br/>RELATIONSHIP BETWEEN EARLY LIFE EXPERIENCES AND NON-SUICIDAL SELF-INJURY.....</b> | <b>109</b> |
| <b>ABSTRACT.....</b>   | <b>110</b> |
| <b>INTRODUCTION.....</b>   | <b>111</b> |
| <b>METHOD.....</b>   | <b>113</b> |
| PARTICIPANTS.....  | 113        |
| MEASURES.....  | 113        |
| <i>Adverse Childhood Experiences - International Questionnaire (ACE-IQ; WHO, 2018)</i> .....   | 113        |
| <i>Adult Attachment Scale (AAS; Collins &amp; Read, 1990)</i> .....  | 114        |
| <i>Emotion Regulation Questionnaire (ERQ; Gross &amp; John, 2003)</i> .....  | 114        |
| <i>Self-harm Inventory (SHI; Sansone, Wiederman, &amp; Sansone, 1998)</i> .....  | 115        |
| PROCEDURE.....   | 115        |
| DATA PREPARATION & STATISTICAL ANALYSIS.....   | 115        |
| ETHICAL CONCERNS.....  | 116        |
| <b>RESULTS.....</b>  | <b>116</b> |
| PARTICIPANT DESCRIPTIVES.....  | 116        |
| COVARIATES.....  | 117        |
| EARLY LIFE EXPERIENCES, ATTACHMENT, EMOTION REGULATION & NSSI.....   | 117        |
| MEDIATIONAL PATHWAYS.....  | 118        |
| <i>Early life experiences associated to emotion dysregulation via attachment</i> .....   | 118        |
| <i>Attachment to NSSI via emotion dysregulation</i> .....  | 118        |
| <i>Early life experiences to NSSI via attachment and emotion dysregulation</i> .....   | 119        |
| <b>DISCUSSION.....</b>   | <b>120</b> |
| <b>REFERENCES.....</b>   | <b>123</b> |
| <b>APPENDIX.....</b>   | <b>130</b> |
| <b>VALIDATION OF ADVERSE CHILDHOOD EXPERIENCES INTERNATIONAL QUESTIONNAIRE (ACE-IQ)<br/>WITH ADULTS ENGAGING IN NON-SUICIDAL SELF-INJURY.....</b>                | <b>131</b> |
| <b>HIGHLIGHTS.....</b>   | <b>132</b> |
| <b>ABSTRACT.....</b>   | <b>133</b> |
| <b>INTRODUCTION.....</b>   | <b>134</b> |
| <b>METHOD.....</b>   | <b>136</b> |
| PARTICIPANTS.....  | 136        |

|  |            |
|--|------------|
| MEASURES.....  | 137        |
| Adverse Childhood Experiences – International Questionnaire (ACE-IQ; WHO, 2018)..... | 137        |
| Childhood Trauma Questionnaire – Short form (CTQ-SF; Bernstein et al., 2003). ....   | 137        |
| Self-harm Inventory (SHI; Sansone, Wiederman, Sansone, 1998).....                    | 138        |
| PROCEDURE .....  | 138        |
| STATISTICAL ANALYSIS.....  | 139        |
| ETHICAL CONSIDERATIONS .....   | 139        |
| <b>RESULTS.....</b>  | <b>140</b> |
| DEMOGRAPHIC CHARACTERISTICS .....  | 140        |
| FACTOR STRUCTURE .....   | 141        |
| Exploratory Factor Analysis. ....  | 141        |
| RELIABILITY.....   | 145        |
| Internal consistency.....  | 145        |
| VALIDITY .....   | 146        |
| Convergent validity.....   | 146        |
| Predictive validity.....   | 147        |
| Discriminant validity.....   | 147        |
| <b>DISCUSSION.....</b>   | <b>148</b> |
| <b>REFERENCES.....</b>   | <b>153</b> |
| <b>APPENDICES .....</b>  | <b>162</b> |
| APPENDIX A.....  | 162        |
| APPENDIX B.....  | 163        |
| APPENDIX C.....  | 164        |
| <b>CONCLUSION.....</b>   | <b>165</b> |
| SUMMARY OF FINDINGS.....   | 165        |
| FINDINGS IN ACCORDANCE TO PREVIOUS THEORIES AND EMPIRICAL MODELS.....                | 166        |
| RESEARCH IMPLICATIONS .....  | 168        |
| CLINICAL IMPLICATIONS.....   | 169        |
| STRENGTHS & LIMITATIONS.....   | 171        |
| RECOMMENDATIONS FOR FUTURE RESEARCH .....  | 173        |
| CONCLUDING REMARKS.....  | 174        |
| <b>REFERENCES.....</b>   | <b>176</b> |
| <b>APPENDICES .....</b>  | <b>212</b> |
| APPENDIX A.....  | 212        |
| APPENDIX B.....  | 213        |
| APPENDIX E.....  | 220        |
| APPENDIX F.....  | 221        |
| APPENDIX G.....  | 222        |
| APPENDIX H.....  | 235        |
| APPENDIX I.....  | 239        |

## Abstract

**Background:** Non-suicidal self-injury (NSSI) has attracted the attention of several clinicians and researchers due to its rising prevalence rates, its impact both on an individual and on a community level and more specifically, due to the possibility that it could form a distinct clinical category in the Diagnostic and Statistical Manual of Mental Disorders. Particular emphasis is given on accurately conceptualizing NSSI, which includes the risk factors leading to it. Although there are numerous studies supporting the role of early life experiences, attachment and emotion dysregulation, there is a lack of recent reviews investigating the contribution of all these factors together and a lack of studies investigating the interaction of all these factors, which might lead to NSSI engagement. Theorists and researchers investigating the interaction of two of the three aforementioned risk factors, suggest that the effect of early life experiences on NSSI might be serially mediated by attachment and emotion dysregulation. However, there is no study exclusively investigating this pathway. Additionally, it has been observed that the majority of studies examining the role of early life experiences have focused on basic forms of adversities, such as physical, sexual and emotional abuse, limiting in this way the scope of their effect. This demonstrates the need for a more inclusive measure, such as the Adverse Childhood Experiences-International Questionnaire, which has not been validated within a NSSI population.

**Objectives:** Therefore, the following thesis aimed: i) to provide a more recent systematic review and meta-analysis of the effects of early life experiences, attachment and emotion dysregulation (Systematic Review), ii) to investigate the proposed pathway leading to NSSI (Empirical Paper 1) and iii) to examine the psychometric properties of the ACE-IQ (Empirical Paper 2).

**Results:** Systematic Review - The findings from the systematic review and meta-analysis supported the effect of childhood maltreatment ( $d=0.271$ ,  $p<0.001$ ) and

emotion dysregulation ( $d=0.198$ ,  $p < 0.001$ ) on NSSI. Although a significant effect was not demonstrated from the meta-analysis due to limited evidence ( $d=0.015$ ,  $p=0.392$ ), several studies supported the effect of insecure attachment on NSSI too. Empirical paper 1 - The proposed serial mediational model between early life experiences and NSSI via attachment and emotion dysregulation was supported [Indirect effect = 0.004, SE = 0.002, 95% CI (0.0007, 0.0090)]. Empirical paper 2 - The ACE-IQ was found to be a reliable (Cronbach's alpha = 0.854) and valid measure (Convergent validity –  $r = 0.85$ ,  $p < 0.001$  with the CTQ-SF; Predictive validity –  $R^2 = 0.12$ ,  $p = 0.001$  of the SHI total score; Discriminant validity – F-value = 13.90,  $p < 0.001$ ) to be used with individuals engaging in NSSI. However, some issues were identified with the factor structure of the ACE-IQ. **Conclusion:** The findings were in accordance to previous theories and studies. Several research and clinical implications were discussed, such as the use of the proposed pathway for identifying individuals, who might be at risk of engaging in NSSI and for developing prevention strategies. Lastly, some suggestions were made for future studies, such as to expand the current proposed pathway by adding resiliency factors that might lead to NSSI engagement instead of suicide attempts. Additionally, a modification of the ACE-IQ was suggested to improve its subscales.

*Keywords: early life experiences, attachment, emotion regulation, self-harm, NSSI*



## **Introduction**

In recent years particular attention has been paid to non-suicidal self-injury (NSSI) or otherwise known as deliberate self-harm (DSH) due to its rising prevalence rates and its impact both on a personal and societal level (Wester, Trepal, & King, 2018). Particularly, there is a growing concern that NSSI could be a distinct clinical phenomenon and not a suicide attempt or a symptom of borderline personality disorder (Brausch & Gutierrez, 2010; Selby, Bender, Gordon, Nock, & Joiner, 2012). Conceptualizing NSSI accurately and its underlying risk factors and functions is crucial in enhancing clarity in clinical care by identifying the right clinical diagnosis and hence, the most appropriate treatment. Therefore, the current thesis is aiming to shed light to the processes leading to NSSI, which might aid in its distinction from other mental health difficulties. In this chapter, NSSI will be conceptualized based on previous definitions, research, its history, its epidemiology, its impact, its assessment, its functions and the risk factors leading to NSSI behaviors. Gaps in literature will be addressed, which will lead to the thesis objectives and hence, to the research questions.

### **Non-suicidal Self-Injury (NSSI)**

As previously stated, NSSI is also referred to as DSH. The term NSSI is mainly adopted by studies and clinicians, which and who are based in the USA and Canada, while the term “DSH” is used within Europe and Australia (Muehlenkamp, Claes, Havertape, & Plener, 2012).

### ***Definition***

Favazza (1998) defined NSSI as “a direct destruction or alteration of body tissue without conscious suicidal intent” and this is the most commonly used reference of the

definition within the NSSI literature until today. The term “direct” was used to explain that the act of self-injury occurs without any intervening steps (Nock, 2009). Due to the emphasis given to the non-suicidal intent of the act, Favazza’s (1998) definition is closer to the conceptualization of the concept as it is used within the USA and Canada. In contrast in Europe, the definition is considered more encompassing by focusing on the presence of a purposeful intention to harm oneself without ending one’s life, than on the intention itself, categorizing both NSSI and suicide attempts under the same umbrella (Muehlenkamp et al., 2012). Both definitions though agree that socially sanctioned behaviors of self-injury are excluded from the definition (such as tattooing). Common self-harm behaviors include self-cutting, self-hitting, self-scratching and self-burning.

Despite the general acceptance of the two definitions, findings from current research and suggestions from clinical guidelines suggest that some behaviors previously considered as suicidal, could be a form of NSSI (Hawton et al., 2012; NCCMH, 2012). For example, according to the National Collaboration Center for Mental Health (NCCMH, 2012) self-cutting, which is considered as one of the main acts of NSSI and self-poisoning, which is perceived a suicide-related behavior, need similar management. This indirectly suggests that self-cutting and self-poisoning might fall under the same umbrella, which is supported by a multicenter study of self-harm in England (Hawton et al., 2012). Hawton et al. (2012) found that self-cutting elicited greater risk of suicide and repetition of the behavior than self-poisoning, which was previously considered as a lethal act of self-harm and hence, a suicide attempt, which demonstrates that self-poisoning might not be as lethal as previously thought (Hawton et al., 2012). Furthermore, studies have argued that the function of NSSI is different to the function of suicide attempts (Favazza, 1998; Zetterqvist, Lundh, Dahlström, & Svedin, 2013). Therefore, one could argue that regardless of the behavior, the intention of it and its function have a more significant role in distinguishing it from suicide attempts.

Consequently, taking into consideration previous definitions, research and clinical guidelines, the definition adopted for this thesis is that NSSI is a non-socially sanctioned act, which leads to deliberate direct destruction of body tissue or an alteration of the biochemistry of one's body without conscious suicidal intent.

### ***NSSI & Suicide attempts***

Distinguishing NSSI from suicide attempts is one of the fundamental reasons for investigating NSSI in depth. Misdiagnosing the observed behavior could lead to inaccurate treatment planning, misallocation of emergency resources and unnecessary hospitalizations, which could become iatrogenic (Klonsky, May, & Glenn, 2013). NSSI has been intertwined with suicide attempts for many years and untangling their differences has been very difficult despite their primary differentiating feature, which is the lack of the intention to die in individuals engaging in NSSI (Muehlenkamp & Kerr, 2010). Although the two behaviors often co-occur, NSSI has been observed to be more prevalent, more frequent, less severe and with different functions (sometimes used even to avoid suicidal urges; Klonsky et al., 2013). Consequently, it is important to distinguish the two concepts, without ignoring their association and the potential effect of NSSI to future suicide attempts (Ribeiro et al., 2016).

### ***Classification***

One of the pioneering steps towards the distinction of the two concepts was the suggestion to include NSSI as a distinct disorder in future versions of the Diagnostic and Statistical Manual of Mental Disorders (DSM). Attempts to include NSSI in the DSM began since early 1980s by Kahan and Pattison (1984), who introduced the concept of "deliberate self-harm syndrome" and proposed its inclusion as a separate diagnostic category in the fourth version of the DSM. Kahan and Pattison (1984) described that tension preceded the act

of self-injury and afterwards there was a sense of release/relief. A few years later, Favazza and Rosenthal (1990; 1993) proposed that a “syndrome of self-mutilation” should be included within impulse disorders and began to form the definition that it is used until today. Muehlenkamp (2005) reviewed the evidence on the field and supported the proposal that “deliberate self-harm injury syndrome” should be included in the DSM as a separate clinical syndrome. However, Muehlenkamp (2005) also recognized that there was a limited number of high quality studies investigating the syndrome, the definition of the syndrome was still not consistent between studies and there was a difficulty in identifying the etiology of NSSI. With these limitations, its inclusion within the DSM required more research. In the fifth version of the DSM (DSM-5; American Psychiatric Association [APA], 2013), the American Psychiatric Association adopted the terminology of “Non-suicidal self-injury” (i.e. NSSI) and proposed certain diagnostic criteria (see Table 1), which were listed under the “Conditions for Further Study”, encouraging in this way more research on the topic and particularly on the risk factors of NSSI.

**Table 1.**

*Proposed Criteria for Non-suicidal Self-Injury.*

| Proposed Criteria |  |
|-------------------|--|
| A.                | In the last year, the individual has, on 5 or more days, engaged in intentional self-inflicted damage to the surface of his or her body of a sort likely to induce bleeding, bruising, or pain (e.g. cutting, burning, stabbing, hitting, excessive rubbing), with the expectation that the injury will lead to only minor or moderate physical harm (i.e. there is no suicidal intent).<br><b>Note:</b> The absence of suicidal intent has either been stated by the individual or can be inferred by the individual’s repeated engagement in a behavior that the individual knows, or has learned, is not likely to result in death. |
| B.                | The individual engages in self-injurious behavior with one or more of the following expectations:<br>1. To obtain relief from a negative feeling or cognitive state.<br>2. To resolve an interpersonal difficulty.<br>3. To induce a positive feeling state.<br><b>Note:</b> The desired relief or response is experienced during or shortly after the self-injury, and the individual may display patterns of behavior suggesting a dependence on repeatedly engaging in it.  |

- C. The intentional self-injury is associated with at least one of the following:
    - 1. Interpersonal difficulties or negative feelings or thoughts, such as depression, anxiety, tension, anger, generalized distress, or self-criticism, occurring in the period immediately prior to the self-injurious act.
    - 2. Prior to engaging in the act, a period of preoccupation with the intended behavior that is difficult to control.
    - 3. Thinking about self-injury that occurs frequently, even when it is not acted upon.
  - D. The behavior is not socially sanctioned (e.g. body piercing, tattooing, part of a religious or cultural ritual) and is not restricted to picking a scab or nail biting.
  - E. The behavior or its consequences cause clinically significant distress or interference in interpersonal, academic, or other important areas of functioning.
  - F. The behavior does not occur exclusively during psychotic episodes, delirium, substance intoxication, or substance withdrawal. In individuals with a neurodevelopmental disorder, the behavior is not part of a pattern of repetitive stereotypies. The behavior is not better explained by another mental disorder or medical condition (e.g. psychotic disorder, autism spectrum disorder, intellectual disability, Lesch-Nyhan syndrome, stereotypic movement disorder with self-injury, trichotillomania [hair-pulling disorder], excoriation [skin-picking] disorder).
- 

**Source:** DSM-5 (American Psychiatric Association, 2013).

## **History of NSSI**

The history of NSSI has also attracted limited attention by researchers or experts on the topic. Favazza (1996) and Nock (2009) were two of the few who attempted to provide a cultural understanding of the origins of NSSI and they did that by linking NSSI to body modification rituals. Nock (2009) explained that both body modification rituals and NSSI have a function to correct or prevent pathological or destabilizing conditions, which might have a negative impact both on the community and/or on the individual. He provided several examples, such as the procedure of amputation to prevent the spread of gangrene and the Hamadsha rituals (Nock, 2009). During the Hamadsha rituals, her followers cut themselves, take their blood and use it on their body in order to heal themselves from any physical or mental condition. Therefore, Nock (2009) used these examples to explain that body modification rituals exist in our lives both within the medical and spiritual worlds, hence, they are not unfamiliar to people. Western adolescents sometimes cut themselves as a rite-of-passage into adult life (Nock, 2009). Consequently, NSSI is already mentally associated with

the ability to provide the opportunity to heal or make a new start and although no one knows the actual origins of NSSI, this seems to provide a plausible explanation of possibly an instinctively first contact with NSSI. According to Anderson et al. (2017), there are numerous studies supporting the link between on-screen violence and child/adolescent behavior and several theories, such as social learning theory, which suggest that children imitate the behaviors that they see on screen. Therefore, one could suggest that NSSI might have been disseminated by social media and the Internet throughout the years. This was supported by a review on the impact of social contagion to NSSI, which found that social media and peers have an important role in disseminating NSSI behavior (Jarvi, Jackson, Swenson, & Crawford, 2013).

### **Epidemiology of NSSI**

Taking into consideration the lack of a universally agreed definition of NSSI and that many people, who engage in NSSI are in the community and hence, their behaviors do not come to the clinical attention, examining the prevalence rates of NSSI has been challenging throughout the years (Rodham & Hawton, 2009). Studies have shown that NSSI begins in adolescence, around the age of 11 to 15 years old (Tatnell, Kelada, Hasking, & Martin, 2014; Andover, Primack, Gibb, & Pepper, 2010). Early NSSI onset (i.e. before the age of 11 years old) was correlated with increased number of NSSI acts (Ammerman, Jacobucci, Kleiman, Uyeji, & McCloskey, 2018). Although historically there was an assumption that NSSI was more prevalent in women than men, numerous studies have found no gender differences, leading to inconclusive findings (Gratz, 2001; Klonsky, Oltmanns, & Turkheimer, 2003). Therefore, a recent meta-analysis was conducted in order to investigate whether there is an actual gender difference in the prevalence of NSSI (Bresin & Schoenleber, 2015). Bresin and Schoenleber (2015) supported that there is a gender difference and suggested that females

have increased odds of engaging in NSSI. However, the difference in effect sizes was considered small for epidemiological studies (Chen, Cohen, & Chen, 2010). Additionally, the gender difference was found to be larger in clinical populations compared to community or student populations, indicating that males might be underrepresented because they are less likely to seek treatment compared to women (Bresin & Schoenleber, 2015). It could also be that males are more likely to be involved in socially acceptable self-harm behaviors, such as violent sports or fighting, which might serve the same function as NSSI. Woodman, Hardy, Barlow, and Le Scanff (2010) found that engagement in high-risk sports was a form of emotion regulation for some individuals, which is one of the main functions of NSSI.

With regards to age differences in prevalence rates, a systematic review by Cipriano, Cella and Cotrufo (2017) demonstrated that adolescents have the highest prevalence rates ranging from 7.5% to 46.5% compared to university students (38.9%) and adults (4-23%). These prevalence rates are expected since NSSI begins in adolescence and many people grow out of it when they reach adulthood (Plener, Schumacher, Munz, & Groschwitz, 2015). Racial group differences were also reported, although they are limited to USA populations (Polanco-Roman, Tsypes, Soffer, & Miranda, 2014; Wester & Trepal, 2015). For example, Wester and Trepal (2015) found that African American (8.4%) and Asian American (7%) are less likely to engage in NSSI compared to Hispanic (17.8%), Caucasian (16.3%), Multiracial (16.1%) and Native American (28.6%) (Wester & Trepal, 2015). Nevertheless, these outcomes should be treated with caution since they might not reflect ethnic differences existing outside the USA. Lastly, a significant difference in prevalence rates was observed between clinical populations (21%) and individuals living in the community (4%; Briere & Gil, 1998). However, the findings of this study are outdated and there is a lack of recent

comparisons within the literature. It is expected though that the same difference exists, but the prevalence rates are now much higher.

### **Impact of NSSI**

Given the high prevalence rates of NSSI both in a clinical and in a community setting, it is particularly important to consider its impact. One of the most commonly reported consequences of engaging in NSSI is the increased risk for future suicide attempts or completed suicides (Hamza, Stewart, & Willoughby, 2012). However, there is also a negative cascade of events, which is rarely reported in the literature (Waals et al., 2018). According to Taylor, McDonald, Smith, Nicholson and Forrester (2019), individuals engaging in NSSI experience elevated levels of shame compared to individuals who never engaged in NSSI. Shame-proneness has been found to increase the likelihood of engaging in NSSI behaviors via internalizing shame-coping (i.e. “attack self and withdraw”; Mahtani, Hasking, & Melvin, 2019). Consequently, individuals engaging in NSSI enter a vicious circle, with elevated levels of shame leading to an increase likelihood of NSSI behaviors and vice-versa. As a result, there is an increasing level of concern from the family, which might attempt to control the self-injurer’s behavior, leading to feelings of intrusion and reduced independence, impacting both the individual and his/her family environment (Waals et al., 2018). Additionally, shame could lead to withdrawal and hence, to feelings of isolation and distress, increasing the likelihood of developing other mental health difficulties, such as depression (de Jong Gierveld, van Tilburg, & Dykstra, 2006; Matthews et al., 2016). Furthermore, disclosure of NSSI has been related to a reduction in perceived social support by the individual engaging in NSSI behaviors, further enhancing the feeling of isolation (Hasking, Rees, Martin, & Quigley, 2015). However, despite the negative impact of NSSI, individuals



engaging in those behaviors tend to report positive consequences resulting from self-injury, such as experiencing relief and calmness (Chapman & Dixon-Gordon, 2007).

### **Functions of NSSI**

These positive consequences of NSSI have been related to its different functions. According to the four-functions model of NSSI developed by Nock and Prinstein (2004), individuals engage in NSSI for automatic-negative reinforcement, for automatic-positive reinforcement, for social-negative reinforcement and for social-positive reinforcement, with the automatic-negative reinforcement function being the most frequently endorsed. The automatic-negative reinforcement function refers to the use of NSSI for reducing tension or negative affective states (e.g. “to stop bad feelings”) and the automatic-positive reinforcement function refers to the use of NSSI for achieving a desirable physiological state (e.g. to feel something when you are feeling numb; Nock & Prinstein, 2004, p.886). Additionally, the social reinforcement functions refer to the use of NSSI to avoid unwanted interpersonal tasks (e.g. avoid punishment; social-negative reinforcement) or to gain attention from others or gain access to materials (e.g. to inform others about negative psychological state; social-positive reinforcement; Nock & Prinstein, 2004). This four-function model was supported by a review of the evidence and a meta-analysis, which supported the previously described functions and the fact that the intrapersonal (i.e. automatic) functions are the most common ones (Klonsky, 2007; Taylor et al., 2018). However, Klonsky (2007) named the function categories differently, giving emphasis to the actual purpose (i.e. 1) affect regulation, 2) anti-dissociation, 3) anti-suicide, 4) interpersonal boundaries, 5) interpersonal-influence, 6) self-punishment, and 7) sensation-seeking). Since self-punishment, sensation seeking, dissociation and desire to end one’s life, are all related to personal emotional states, it is suggested that individuals engaging in NSSI have a difficulty with coping with their

emotions. Additionally, having the need to engage in NSSI in order to influence others and to set boundaries, indicates a difficulty with interpersonal relationships. These two aforementioned difficulties propose that individuals engaging in NSSI might have a predisposition, limiting them to cope with emotions and to interact with others in a more adaptive way. This predisposition can be explained by the risk factors of NSSI.

## **Risk Factors of NSSI**

### ***Theoretical Models***

Despite the biological risk factors related to NSSI, which are beyond the scope of this study, interpersonal and developmental models have been proposed in an attempt to explain the underlying processes leading to NSSI (Jacobson & Batejan, 2014). Both interpersonal models and developmental models suggest that childhood maltreatment and early relationship disturbances have a significant role in NSSI engagement (Bunclark & Crowe, 2000; Gratz, 2003). According to attachment theorists, maladaptive interpersonal experiences in early childhood can lead to a reduced capacity to form supportive relationships and to develop mature regulation skills (Yates, 2004). Therefore, early maladaptive experiences might be indirectly related to NSSI behaviors via attachment and emotion dysregulation. Similarly, developmental theorists focus on the role of childhood maltreatment and insecure attachment (Farber, 2002). More specifically, three developmental pathways have been proposed: 1) the representational path, 2) the regulatory path and 3) the reactive path (Nock, 2009).

According to the representational path, childhood maltreatment exacerbates or develops a negative representation of the self, and others or of the self in relation to others, which then contributes to NSSI behaviors because the individual turns towards the body for self-punishment or self-soothing (Nock, 2009). Additionally, the regulatory path proposes that

maltreated children are more likely to form a disorganized attachment, which reduces the capacity of a child to progress normatively towards symbolic play and language and hence, all experiences are symbolized on a somatosensory level (i.e. through sensation, behavior and somatization), leading to NSSI behaviors (Nock, 2009). Furthermore, according to the reactive path, traumatic childhood experiences may induce alterations in biological systems, which are related to flight-fight reactions and the stress system, which in turn contribute to NSSI engagement based on biological theories (Nock, 2009). Consequently, taking into consideration all the aforementioned models, it is suggested that theoretically the proposed pathway leading to NSSI begins from childhood maltreatment, which influences the representation of self, the attachment of the individual and his/her biological process, which in turn influence his/her emotion regulation, leading to NSSI (see Figure 1). Self-representation is also influenced by the attachment style (Mikulincer, 1995). Therefore, if biological alterations are excluded from this model because they are beyond the scope of this thesis, one could argue that the main pathway leading to NSSI is from childhood maltreatment to NSSI via insecure attachment and emotion dysregulation.

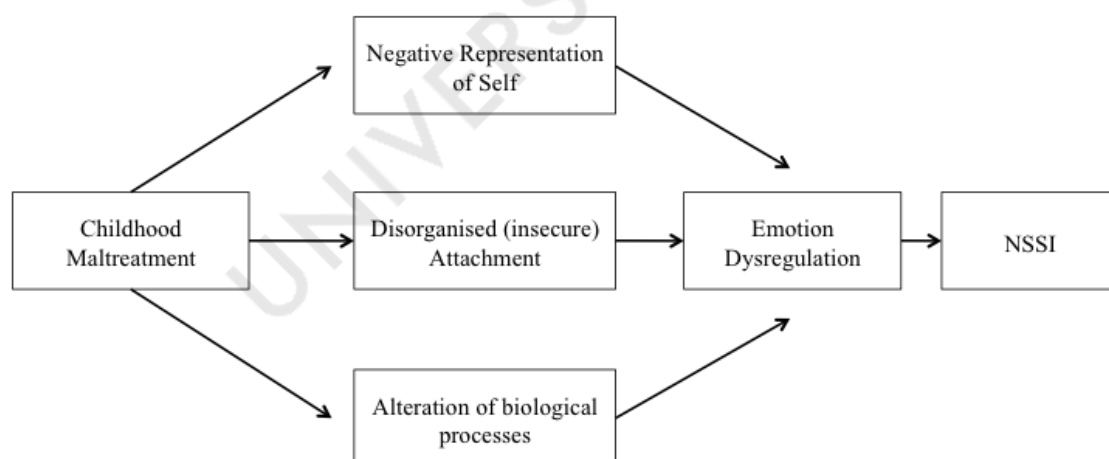


Figure 1. Representation of the three developmental pathways.

### *Empirical findings & Gaps in Literature*

To our knowledge, there is not a single study investigating empirically the proposed pathway, although there is a study investigating the cumulative contribution of childhood maltreatment, attachment and emotion dysregulation on NSSI (Tatnell, Hasking, Newman, Taffe, & Martin, 2017). Findings from this study suggested that the cumulative effect of the aforementioned factors was a significant predictor of NSSI, proposing that the risk of engaging in NSSI is multifactorial. Numerous studies also supported the individual contribution of childhood maltreatment, attachment and emotion dysregulation on NSSI, further supporting the notion that there are several risk factors (Gunter, Chibnall, Antoniak, Philibert, & Hollenbeck, 2011; Martin et al., 2017; Midkiff, Lindsey, & Meadows, 2018). Although the majority of studies have investigated the effect of childhood maltreatment, attachment and emotion dysregulation separately, some studies attempted to explore the interaction of these factors. For example, Kimball and Diddams (2007) investigated the mediational role of emotion dysregulation on the relationship between attachment and NSSI and Titelius et al. (2018) investigated the mediational role of emotion dysregulation on the relationship between child maltreatment and NSSI, demonstrating significant mediational pathways. Nevertheless, there is still a gap in literature on the serial mediational effect of attachment and emotion dysregulation on the relationship between childhood maltreatment and NSSI.

Although, there are several reviews on the individual effects of childhood experiences, attachment and emotion regulation on NSSI (Liu, Scopelliti, Pittman, & Zamora, 2018; Buckmaster, McNulty, & Guerin, 2019; Wolff et al., 2019), only two reviews focused on synthesizing the data from all the risk factors together (Gratz, 2003; Fliege, Lee, Grimm, &

Klapp, 2009). Those two reviews supported the notion that childhood experiences, attachment and emotion dysregulation are three of the most prominent risk factors of NSSI and briefly explored their interaction. However, they lacked recent evidence on the topic and meta-analytic data, indicating a need for more up-to-date reviews and meta-analyses.

Additionally, examining the articles investigating the impact of childhood maltreatment on NSSI, it was observed that the majority of studies reported in the reviews were focusing only on basic forms of childhood maltreatment (e.g. sexual abuse, physical abuse and emotional abuse; Bornovalova, Tull, Gratz, Levy, & Lejuez, 2011; Franzke, Wabnitz, & Catani, 2015). Although sexual abuse, physical abuse and emotional abuse are core areas within the childhood maltreatment literature, there are several other experiences, which could also be considered as childhood adversities, such as bullying (Anda, Butchart, Felitti, & Brown, 2010). According to Chartier, Walker and Naimark (2010), the cumulative effect of childhood adversities can be particularly detrimental. Therefore, examining a variety of adversities is important in order to observe the real scale of its impact. This cannot be achieved by commonly used childhood maltreatment measures, such as the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994), which focuses only on sexual abuse, physical abuse and emotional abuse. There is a need of a more inclusive measure, such as the Adverse Childhood Experiences International Questionnaire (ACE-IQ; World Health Organization [WHO], 2018), which explores numerous additional adversities, such as dysfunctional family environment, parental loss and violence within a peer, community or collective setting.

## **Thesis Objectives**

Consequently, the current study aims to firstly, systematically review the evidence on the effects of childhood maltreatment, attachment, emotion dysregulation and their interaction on NSSI, while providing meta-analytic data on their effects. Secondly, the study aims to investigate the proposed serial mediational effect of attachment and emotion dysregulation on the relationship between early life experiences and NSSI using the ACE-IQ to examine the adverse childhood experiences. Thirdly, due to the absence of formal validation of ACE-IQ with individuals engaging in NSSI, the study aims to investigate the psychometric properties of the ACE-IQ measure within this population.

## **Research Questions**

Therefore, this thesis is divided into three papers, with each paper addressing different research questions. In paper 1, a systematic review and meta-analysis will address the questions: i) “Do early life experiences predict self-harm?”, ii) “Does the type of attachment of an individual predict self-harm?” and iii) “Does the ability of oneself to regulate emotions predict self-harm?”. Paper 2 will explore the proposed pathway leading to NSSI by investigating the following research questions: i) “Does attachment mediate the relationship between early life experiences and emotion dysregulation?”, ii) “Does emotion dysregulation mediate the relationship between attachment and NSSI?” and iii) “Do attachment and emotion dysregulation serially mediate the relationship between early life experiences and NSSI?”. Lastly, Paper 3 will investigate the psychometric properties of the ACE-IQ by addressing the questions: i) “Is ACE-IQ a reliable questionnaire?” and ii) “Is ACE-IQ a valid questionnaire?”.

**THE ROLE OF EARLY LIFE EXPERIENCES, ATTACHMENT AND EMOTION  
REGULATION IN PREDICTING SELF-HARM IN ADULTS: A SYSTEMATIC  
REVIEW AND META-ANALYSIS.**

Rania Christoforou<sup>a\*</sup> & Nuno Ferreira<sup>a</sup>

<sup>a</sup> University of Nicosia, Department of Social Sciences, 46 Makedonitissas Avenue,  
CY-2417, Nicosia, Cyprus

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\* Correspondence to: Rania Christoforou, University of Nicosia, Department of Social  
Sciences, 46 Makedonitissas Avenue, CY-2417, Nicosia, Cyprus.

Email: rania.chri@gmail.com

Declaration of interest: none

## Highlights

- Childhood maltreatment showed a significant effect in predicting NSSI behavior.
- Emotion dysregulation seems to have a moderational or mediational role in NSSI.
- Not enough literature on attachment and NSSI to support a significant effect.
- A model combining all three risk factors might be better in predicting NSSI.





## Abstract

**Background:** Despite the growing body of evidence that engagement in non-suicidal self-injury (NSSI) is multifactorial, systematic reviews on the risk factors of NSSI have given emphasis on individual factors. Additionally, meta-analyses were only conducted for two of the most prominent risk factors (childhood maltreatment and emotion dysregulation). Therefore, the present systematic review and meta-analysis was conducted to address these gaps in literature. **Methods:** Key databases (such as Embase, PubMed Central, and Scopus) were searched up to October 2019 and a total of 11996 articles were screened for eligibility based on specific criteria. Seventy-nine articles were deemed eligible for inclusion in the review and analyses were conducted using both a narrative synthesis and a meta-analytical approach. **Results:** Findings from both the narrative synthesis and meta-analysis suggest that childhood maltreatment ( $d=0.271$ ,  $p < 0.001$ ) and emotion dysregulation ( $d=0.198$ ,  $p < 0.001$ ) have a significant effect on NSSI. However, literature on the effects of attachment on NSSI remains inconclusive. Preoccupied insecure attachment seems to have a role in the development of NSSI, however, this is not supported by the meta-analysis ( $d=0.015$ ,  $p=0.392$ ). **Conclusion:** It is suggested that a potential serial mediation model involving of combination of these factors might be more fruitful for predicting NSSI.

*Keywords: childhood maltreatment, emotion dysregulation, attachment, self-harm*

## Introduction

Non-suicidal self-injury (NSSI), or otherwise known as “deliberate self-harm” (DSH), has been a growing clinical and public health concern (Ammerman et al., 2019; Lengel & Mullins-Sweatt, 2013) due to its increasing prevalence and serious consequences. Particularly, NSSI has been described as one of the most prominent risk factors for completed suicide (Nagra, Lin & Upthegrove, 2016). Its high comorbidity with several mental illnesses, such as Borderline Personality disorder (Turner et al., 2015), Post-traumatic Stress Disorder (Ford & Gómez, 2015), Depression (Nitkowski & Petermann, 2011) and Eating Disorders (Claes & Muehlenkamp, 2013) can interfere with treatment procedures and it can lead to feelings of guilt, shame, disappointment and disapproval, which raise difficulties both on a personal and on an interpersonal level (O’Keefe, 2000). However, NSSI is also present in non-clinical populations, especially in adolescents and among university students usually as an emotion regulation strategy (Jacobson & Gould, 2007; Taylor et al., 2018). According to a systematic review by Cipriano, Cella and Cotrufo (2017), the prevalence rates range between 7.5 - 46.5% in adolescents, around 38.9% in university students and 4 - 23% among adults.

Although there is no formal conceptualization of the definition of NSSI, it has been mainly defined as a “direct destruction or alteration of body tissue without conscious suicidal intent” (Favazza, 1998). Some definitions are limited to forms of NSSI such as self-cutting, self-burning and self-hitting, which are in accordance to the definition by Favazza and other definitions are more inclusive, sometimes including suicide attempts within. Findings from the “Multicentre Study of Self-harm in England” (Hawton et al., 2012) suggest that other forms of self-harming behavior could be added to the definition, such as self-poisoning (excluding self-poisoning for recreational use), due to the fact that they are not as lethal as previously thought and they need similar management according to the National

Collaboration Centre for Mental Health (NCCMH, 2012). Consequently, the definition of NSSI used for this study is: “a direct destruction or alteration of the body tissue” (Favazza, 1998) or an alteration of the biochemistry of one’s body, without conscious suicidal intent and with no social or cultural approval.

Due to the absence of clear understanding of the concept, there are also discrepancies on the risk factors leading to NSSI. Studies demonstrate a correlation between NSSI and many risk factors, with three of the most prominent ones being childhood adversity, insecure attachment and emotion dysregulation (Fox et al., 2015). Childhood adversity refers to “experiences that are likely to require significant adaptation by an average child (under the age of 16 years old) and that represent a deviation from the expectable environment” (McLaughlin, 2016), such as physical, sexual and emotional abuse and physical and emotional neglect. Attachment refers to the type of relationship an individual forms with primitive attachment figures (usually the mother), which is described as insecure, when the relationship is characterized by anxiety, fear or mixed emotions due to failure of the attachment figure to meet the needs of the child (Bowlby, 1988). Lastly, emotion regulation has been correlated to NSSI both as a function and as a risk factor. For the purposes of this paper, emotion dysregulation will only be considered as a risk factor for developing NSSI. Emotion dysregulation as a risk factor is defined as having difficulties in the ability to experience genuine emotions and to express these emotions in a way that allows modulation of both positive and negative emotions (Bridges, Denham, & Ganiban, 2004).

From both theoretical and empirical models, childhood adversity is considered to be one of the most important contributors to the development of insecure attachment (Bowlby, 1969/1982; Lamb et al., 1985; Baer & Martinez, 2006). Childhood adversity in all of its forms can begin from home. Children who are emotionally or physically abused or neglected by their attachment figure are more likely to develop an insecure attachment based on the

Minnesota study (Egeland & Sroufe, 1981). Additionally, models suggest that insecure attachment could minimize the ability of a child to learn how to properly regulate his/her emotions (Brumariu, 2015). Therefore, taking these interrelations into consideration, it can be argued that the pathways leading to NSSI behavior are much more complex than they are currently presented in the literature, since all the risk factors are related to each other. This argument is supported by a study conducted by Fox et al. (2019), which investigated the impact of statistical complexity on the predictive accuracy for NSSI. Findings from the study demonstrated that machine learning algorithms models outperformed univariate logistic regression models and the multiple logistic regression model, suggesting that model complexity was positively correlated with predictive accuracy.

This comes into contrast to recent systematic reviews on the topic, which are focusing only on one NSSI risk factor (Wrath & Adams, 2019; Liu, Scopelliti, Pittman, & Zamora, 2018; Wolff et al., 2019). For example, Wrath and Adams (2019) investigated the relationship between self-injurious behaviours and adult attachment and Wolff et al. (2019) investigated the relationship between emotion dysregulation and NSSI. To our knowledge, there are only two systematic reviews (Gratz, 2003; Fliege et al., 2009), which tried to synthesize data from several risk factors. However, both reviews have been produced at the early stages of NSSI research and they lack recent articles on the topic. Furthermore, both reviews were qualitative in nature, indicating a meta-analytic gap in the literature.

This study addresses these gaps in literature by systematically reviewing and conducting a meta-analysis on articles exploring the relationship between NSSI and three of the most prominent risk factors (childhood adversity, insecure attachment and emotion dysregulation). The objective of the study was to systematically identify related articles, to synthesize their outcomes both qualitatively and quantitatively and to critically appraise the overall findings. The principal questions were: i) Do early life experiences predict self-harm?

ii) Does the type of attachment of an individual predict self-harm? and iii) Does the ability of oneself to regulate emotions predict self-harm? Given that particular emphasis is given on adolescent studies in previous reviews, the current review focuses on synthesizing data just from adult studies in order to explore any potential differences between the two populations.

## **Method**

### **Protocol Registration & Guidance**

The systematic review and meta-analysis was registered in advance on the International Prospective Register of Systematic Reviews (PROSPERO). The registration number of the study is CRD42019139428 (PROSPERO 2019). The full protocol can be found on: [https://www.crd.york.ac.uk/prospero/display\\_record.php?ID=CRD42019139428](https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019139428). The procedure followed was based on the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009).

### **Eligibility Criteria**

Eligibility criteria were determined before the initial searches of the literature. Studies were considered eligible for inclusion in this systematic review, if : 1) the study was either an observational study (cross-sectional or longitudinal), a randomized controlled trial or a non-randomized controlled trial, 2) the study included a measure of NSSI, as it is defined for the purposes of this paper, 3) the study included a measure of at least one of the risk factors being investigated (early life experiences, attachment and emotion regulation), 4) the study investigated the relationship between one of the predictor variables (early life experiences, attachment and emotion regulation) and NSSI, 5) the study was written in English, 6) it was published in a peer-reviewed journal or at least accepted for publication, and lastly, 7)

participants included in the study were all 17 years old or above. Studies were excluded if they: 1) were case studies, 2) were written in any language other than English, 3) were not fitting the aforementioned inclusion criteria and were not specific to NSSI, and 4) had no separate analysis for self-harm without suicidal intent.

Although the study was focusing on NSSI, there were no restrictions on the underlying mental health difficulties of the participants. As it was suggested by Nock (2009), the functions and risk factors of NSSI are similar to all individuals, regardless of mental health difficulties. Additionally, there were no restrictions on possible mediators to the relationship between predictors and NSSI. Despite the focus of the systematic review on the risk factors leading to NSSI, intervention studies were also included if the relationship between one of the predictors and NSSI was investigated separately. In those cases, emphasis was given only on the relationship and not on the intervention or exposure being explored. Comparator or control groups were not considered central for conducting this review.

### **Search Strategy**

Key databases (Embase, PsycARTICLES, PsycINFO, PubMed Central, Global Health and Scopus) were searched comprehensively by the first author. A combination of search terms related to childhood maltreatment, insecure attachment, emotion dysregulation and NSSI was used (see Appendix A). No restrictions were set on the language, as articles not written in the English language were excluded after retrieval of outcomes. The final search was run on the 28<sup>th</sup> October 2019. Following the electronic search, hand-in searches were performed in order to identify further eligible articles from the reference list of already eligible articles and previous systematic reviews.

## **Study Selection**

The electronic search yielded a total of 11,996 articles, which were screened based on the aforementioned eligibility criteria by the first author. When the author was unsure if the study met the criteria due to limited information from the title or the abstract, the articles were retained for further screening at the next stage. Additionally, hand-in searches were conducted by looking at the reference lists of the 72 eligible articles and the references of nine relevant systematic reviews (Gratz, 2003; Klosky & Moyer, 2008; Fliege et al., 2009; Lang & Sharma-Patel, 2011; Serafini et al., 2017; Liu et al., 2018; Buckmaster et al., 2019; Wrath & Adams, 2019; Wolff et al., 2019). The study selection process is presented in Figure 1. More than half of the articles (56.25% - 45 articles) were assessed for eligibility by a second reviewer. The two reviewers disagreed on only two articles, indicating a 96% reliability of the study selection process. Disagreements were discussed between the two reviewers and decisions were made for final inclusions.

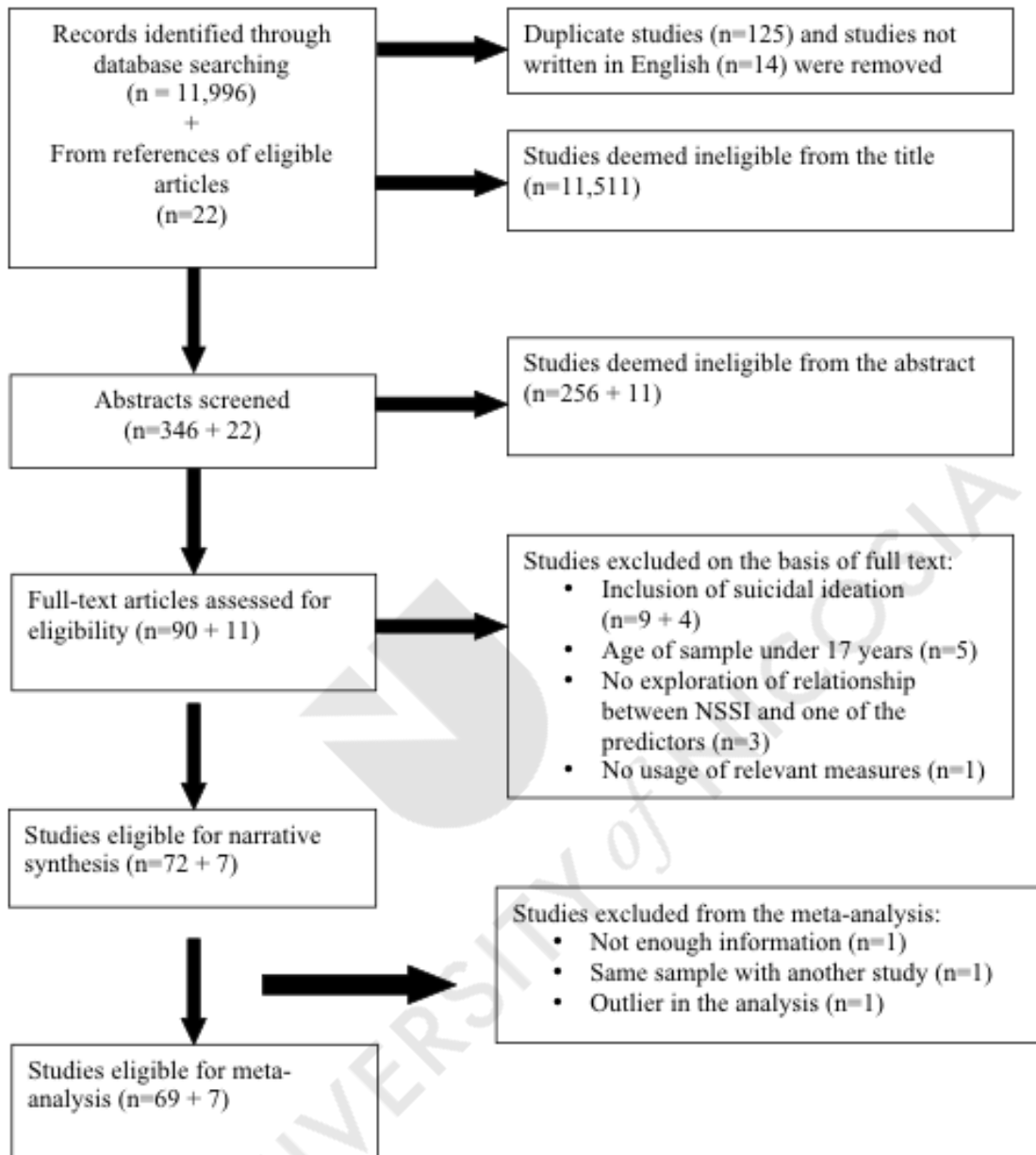


Figure 1. Flow diagram of study selection process with reasons for exclusion of studies.



## **Data Extraction**

The data extracted from all eligible studies was separated into five different categories: 1) General study information (title, type of research, country conducted, authors, year of publication & conflicts of interest), 2) Eligibility (list of all eligibility criteria), 3) Participants (number, average age, % of females, diagnosis, recruitment, type of self-harm), 4) Results (description of primary outcome measures & outcomes), and 5) Conclusions (summary of key conclusions, strengths & limitations). Only data related to the research questions of this systematic review was extracted from the articles. A summary of extracted information can be found in Appendix B.

## **Risk of Bias (Quality) Assessment**

After data extraction, a risk of bias (quality) assessment was carried out. Due to the absence of a formal and universal tool for all types of research, two assessment tools were used to assess the studies based on the quality criteria meeting their type of research. As recommended by Zeng et al. (2015), an adapted version of the Newcastle-Ottawa Quality Assessment Scale (Modesti et al., 2016) was used for assessing the observational studies and RCTs were assessed using the revised version of the Cochrane risk-of-bias tool for randomized trials (Sterne et al., 2019). The Newcastle-Ottawa Quality Assessment scale is composed of three categories (Selection, Comparability, Outcome; see Appendix D) and assessment results are presented in the form of stars. While Cochrane's assessment tool is divided into five domains [Risk of bias: 1) arising from the randomization process, 2) due to deviations from the intended interventions (effect of assignment to intervention), 3) due to missing data, 4) in measurement tools, 5) in selection of the reported result; see Appendix E] and assessment outcomes are presented in the form of judgment as "low risk", "some

concerns” and “high risk”. Each domain has a risk-of-bias judgment, which contributes towards a general risk-of-bias assessment at the end of the tool.

All eligible studies were assessed for their quality by the first author as it is presented in Appendix D and Appendix E. Sixteen articles were also assessed by other two reviewers. The agreement between the reviewers was 87.5%. Disagreements were discussed and a common understanding and decision was reached. Despite of the quality assessment of the studies, all studies were included in the review and findings from low quality studies were treated with caution.

### **Strategy for Data Synthesis**

**Narrative Synthesis.** All eligible studies were analyzed using narrative synthesis based on the Popay et al.’s (2006) “Guidance on the Conduct of Narrative Synthesis in Systematic Reviews”. Although this guide is primarily focused on narrative synthesis techniques for synthesizing data for effectiveness and implementation studies, Snilstveit, Oliver, and Vojtkova (2012) argued that it can be useful for other type of studies too. The basic elements of synthesis suggested by Popay et al. (2006) are: 1) to develop a theory related to the association being investigated, 2) to develop a preliminary synthesis of findings of included studies, 3) to explore further relationships in the data and to 4) assess the robustness of the synthesis.

#### **Meta-analysis.**

***Transforming / Computing effect sizes.*** Due to the expected diverse reporting of effect sizes in the literature, a common “language” was needed before synthesizing the data in a quantitative way. Cohen’s *d* is considered to be the most suitable estimate for summarizing dichotomous and continuous data (Botella & Gambara, 2006) and hence, all estimates were computed into Cohen’s *d*, along with its standard error (see Appendix C). In the absence of

any available statistical information, the studies were excluded from the review (N=1). The magnitude of effect size was predetermined by Cohen's (1988) guidelines (small effect = 0.2, moderate effect = 0.5, large effect = 0.8).

**Statistical analysis.** Meta-analytic statistical procedures were conducted with the use of the Comprehensive Meta-Analysis software (CMA; version 3.0; Borenstein, Hedges, Higgins, & Rothstein, 2013). A random-effects model was selected since the eligible studies did not have an identical true effect size (Borenstein, Hedges, Higgins, & Rothstein, 2009). Cohen's d values and standard errors were entered into the program separately for each study predictor (childhood maltreatment, attachment and emotion regulation). Studies investigating the relationship of more than one predictor with NSSI were considered as separate studies. Only data related to the association explored by the specific meta-analysis was reported. As an outcome, three different pooled effect sizes were calculated, one for each predictor. The heterogeneity of studies was determined by  $I^2$ , which is considered as the most appropriate statistic to evaluate the heterogeneity of studies with different effect size indexes (Huedo-Medina, Sanchez-Meca, Martin-Martinez, & Botella, 2006). Interpretations of heterogeneity were made based on the percentage reported, with 0% indicating no heterogeneity, 25% showing low heterogeneity and with 50% and 75% marking a moderate and high heterogeneity respectively. Lastly, publication bias was calculated by Egger's regression intercept (Egger, Smith, Schneider, & Minder, 1997).

## **Results**

### **Characteristics of Reviewed Studies**

The majority of the studies were published after 2010 (N=59) and especially within the last five years (i.e. after 2014; N=36). Studies were conducted in 16 different countries, but

the majority of them were in the USA (N=40). The association between insecure attachment and NSSI was mainly investigated in Canada and Australia. Literature on insecure attachment and NSSI presents itself as being at a very early stage when compared to the other two sub-categories (childhood adversity and emotion dysregulation).

**Study focus.** From the 79 articles included in this review, 44 studies were focused on the relationship between adverse childhood experiences and NSSI, nine studies only on the relationship between insecure attachment and NSSI and 21 studies were investigating only the association between emotion dysregulation and NSSI. Five studies (Gratz & Chapman, 2007; Gratz & Roemer, 2008; Bedi et al., 2014; Yurkowski et al., 2015; Tatnell et al., 2018) investigated more than one variable of interest in association with NSSI, hence, they were included in more than one section. Only data referring to the corresponding section was reported under each sub-category.

**Study design.** Among the 79 studies included in the review, 76 studies were observational and three studies implemented a randomized-controlled study design (RCT; see Appendix B). All three RCT studies explored the relationship of NSSI with emotion dysregulation. Observational studies were aiming to associate NSSI with the different concepts at a specific point in time, indicating an emphasis on a cross-sectional study design, with only six studies adopting a longitudinal approach. The most common form of assessment was the use of self-reports.

**Sample characteristics.** The sample used in the RCT studies was mainly females, which is very similar to the sample used in observational studies. More specifically, there was only one male participant in one of the three RCTs (Bentley et al., 2017). The average age of the participants included in the RCT studies was 29 years old. In observational studies, the average age was 26 years old, which indicates a slightly younger population. For the majority of studies, the presence of diagnosis was not assessed or not reported (N=44). When

the presence of diagnosis was assessed, most of the studies reported a diagnosis of Borderline Personality Disorder (BPD), several Mood Disorders (e.g. Depression) and stimulant-dependence.

**Quality assessment.** The quality of the studies varied between the sub-categories. Studies investigating the association between NSSI and adverse life events appeared to be of higher quality than studies investigating the relationship between NSSI and emotion dysregulation or insecure attachment. Their main differences were in the sample used and in the reporting of statistical analyses (see Appendix D & Appendix E). Studies investigating the relationship between childhood maltreatment and NSSI were more likely to have samples, which were justified and satisfactory. Additionally, the reporting of their findings was more clearly described, and all the measurements were more likely to be presented. Overall, the majority of studies in all sub-categories were relying on self-report data, which introduces a lot of biases in findings (Stone et al., 1999; Van de Mortel, 2008). However, the majority of studies were using validated measures and they were controlling for possible confounding variables, optimizing in this way the validity of their results.

**Exclusion of studies.** Two studies (Zweig-Frank et al., 1994b; Gratz, 2006) were included in the narrative synthesis, but excluded from the meta-analysis. The reasons for exclusion were that: 1) the Zweig-Frank et al. (1994b) study did not include enough information to be included in the meta-analysis and there was no contact person to retrieve the missing data and 2) Gratz (2006) used the same population as the Gratz and Roemer (2008) study, which was already included in the meta-analysis.

## **Narrative Synthesis**

**Adverse childhood experiences & NSSI.** The relationship between adverse childhood experiences and NSSI was investigated only through observational studies.

**Observational studies.** The first studies investigating this relationship provided contradictory results, even with similar samples (participants with borderline personality disorder). Van der Kolk, Perry and Herman (1991) supported that traumatic experiences in childhood, such as sexual and physical abuse were significant predictors of NSSI behavior, while Zweig-Frank, Paris and Guzder (1994a+b) demonstrated a non-significant relationship between adverse childhood experiences and NSSI. However, individuals within the NSSI group in the Zweig-Frank et al. (1994a) study had more experiences of childhood sexual abuse than the comparison group (non-NSSI group). Therefore, it can be argued that maybe the lack of power, due to the small sample, did not allow a significant finding to occur. The authors suggested that a non-significant finding could be an indicator of a mediational effect between early life experiences and NSSI. The significant relationship between childhood maltreatment and NSSI was further supported by future studies (Sansone, Sansone, & Wiederman, 1995; Zlotnick et al., 1996), however, no particular emphasis was given to possible mediators or moderators to the relationship. Two studies (Rodriguez-Srednicki, 2002; Gratz, Conrad, & Roemer, 2002) demonstrated that adverse childhood experiences were not a unique predictor to NSSI, further suggesting an indirect effect between them. This suggestion was supported by Paivio and McCulloch (2004) and Gladstone et al. (2004), who both found a significant mediational relationship between childhood adversity and NSSI via alexithymia and personality dysfunction respectively. Gladstone et al. (2004) also argued that childhood sexual abuse can be a mediator to the relationship between childhood physical abuse and NSSI. However, a significant direct relationship between childhood sexual abuse and NSSI was also reported.

Although the majority of studies conducted were based on samples with personality disorders, this relationship was supported with other populations too. For example, Evren and Evren (2005) and Evren, Kural, and Cakmak (2006) investigated the relationship between

childhood physical abuse and NSSI in a sample of 136 and 112 stimulant-dependent individuals respectively. The findings confirmed that there was indeed a predictive relationship between childhood abuse and NSSI. Roe-Sepowitz (2007) and Gratz and Chapman (2007) further confirmed this relationship with incarcerated women and undergraduate psychology students respectively. With the progress of research on the topic, researchers attempted to investigate also the effect of gender on the predictive relationship between adverse experiences and NSSI. Although no gender differences were observed between males and females regarding, prevalence of NSSI, the age of onset, method of NSSI, reasons, triggers, blockers, duration or outcomes, a gender difference was observed in the predictive variables, suggesting that the effect of gender should be controlled in future studies (Oyefeso, Brown, Chiang, & Clancy, 2008; Yates, Carlson, & Egeland, 2008; O'Neill et al., 2018). Controlling for gender effects in the relationship is also crucial due to cultural differences. Idig-Camuroglu and Golge (2018) demonstrated that gender differences existed in a sample of 285 university students from Turkey, even with regards to NSSI engagement.

Subgroup analyses were also explored. Yates et al. (2008) found that child sexual abuse and physical neglect had a predictive effect on recurrent NSSI, while child physical abuse was more predictive of intermittent use of NSSI, which suggests that the NSSI phenomenon is multidimensional. Muehlenkamp, Kerr, Bradley, and Larsen (2010) investigated the difference between recurrent and intermittent users and demonstrated that there were no significant differences with regards to the different childhood abuse categories, except for physical abuse, partly supporting Yates et al.'s (2008) outcomes. This specific relationship between physical abuse and episodic NSSI could demonstrate a need for a form of reenactment of previous trauma (Wachter et al., 2009).

All studies from 2011 replicated the significant relationship between adverse childhood experiences (particularly sexual abuse) and NSSI (Bornovalova, Tull, Gratz, Levy, & Lejuez, 2011; Martin, Bureau, Cloutier, & Lafontaine, 2011; Nada-Raja & Skegg, 2011; Zannarini, Laudate, Frankenburg, Reich, & Fitzmaurice, 2011). However, Evren, Dalbudak, Evren, Cetin and Durkaya (2011) found that early life trauma despite its relationship with NSSI, was not a significant predictor to it, further supporting the argument that adverse life experiences and NSSI are related through a mediational process, possibly through processes associated to negative affect (Evren et al., 2011). The impact of negative affectivity was also reported in the study conducted by Gunter, Chibnall, Antoniak, Philibert and Hollenbeck (2011), which demonstrated a greater contribution of post-traumatic stress disorder in the prediction of NSSI than the traumatic experience itself.

Closely related variables were further explored in order to identify the mediators to the association between adverse childhood experiences and NSSI. Dissociation, alexithymia, self-blame and urgency significantly and independently reduced the direct effect of childhood adversity on NSSI (Arens, Gaher, & Simons, 2012; Swannell et al., 2012; Franzke, Wabnitz, & Catani, 2015; Talmon & Ginzburg, 2018). However, although Arens et al. (2012) found no gender differences in the mediational relationship, Swannell et al. (2012) reported that alexithymia was not a significant mediator to the relationship between child maltreatment and NSSI in males. Meta-analytic research on alexithymia and gender has shown that males are more likely to exhibit alexithymic behavior than females because of the traditional masculinity ideology, which encourages men to talk less about their emotions than females (Levant, Hall, Williams, & Hasan, 2009). Therefore, alexithymia might be a more normative behavior for men compared to women. Alexithymic symptoms in women might indicate an underlying pathology, possibly originating from trauma, indicating a gender difference in the predictors and not in the NSSI, which further supports Yates et al.'s (2008) conclusions



described previously. Arens, Gaher, Simons, and Dvorak (2014) also explored the mediational effect of distress tolerance, sense of control and desire for control. Although none of the variables was a significant mediator when the full sample was included in the analysis, sense of control reached significance with those reporting self-harm.

Another explanation of the minor inconsistencies presented in the literature regarding the relationship between childhood maltreatment and NSSI, was offered by Martin et al. (2016). Martin et al. (2016) proposed that these inconsistencies might be due to relational trauma, i.e. not only due to the experience itself, but also because of the characteristics developed as an outcome of this experience (e.g. elevated stress exposure). Findings demonstrated that both adverse life events and perceived relational trauma were significant unique predictors of NSSI. However, no other studies included in this review attempted to replicate this finding and hence, further research is required to investigate whether relational trauma is indeed a unique predictor of NSSI and not a mediator to the relationship between adverse life events and NSSI.

In addition to relational trauma, it is important to distinguish the relationship between early life trauma and recent traumatic experiences with NSSI. According to Nobakht and Dale (2017), self-harm sub-groups (i.e. frequent self-harm, infrequent self-harm and no self-harm) were significantly different only with regards to early life experiences, demonstrating a possible pattern between certain early life events and frequency of engagement in self-harm. For example, Merza, Papp, Molnar and Szabo (2017), found that experiencing child sexual abuse and witnessing trauma was more related to frequent use than moderate or no use at all of NSSI. On the other hand, with regards to recent traumatic events, a significant difference was only observed between frequent and no use of self-harm (i.e. infrequent self-harm group was not significantly different from other groups). The distinct relationships observed between childhood and recent traumatic events could be an outcome of the distinct functions

leading to NSSI behavior, possibly suggesting a different pathway. However, recent traumatic events could also be related to previous traumatic experiences, transforming in this way the pathways into complex overarching mind maps. For example, Caron, Lafontaine and Bureau (2017a) found that intimate partner victimization mediated the relationship between child maltreatment and NSSI, demonstrating an interaction between previous traumatic experiences and recent traumatic events, further confirming the complexity of the pathways involved. It is possible that other variables, such as attachment are also included in the model serially mediating the relationship.

During the last two years, researchers have focused on exploring these complex relations further by investigating multiple unique predictors of NSSI, which add to the contribution of early life experiences, instead of focusing on the interaction of already associated predictors. For example, Chang et al. (2019) investigated the contribution of perfectionism while controlling for early life experiences, McMahon et al. (2018) investigated the independent contribution of impulsivity and Richmond-Rakerd et al. (2018) explored the genetic vulnerability to NSSI in addition to trauma exposure. Furthermore, McLafferty et al. (2019) demonstrated that childhood adversity was associated to NSSI, in the presence of current high levels of stress experienced by the individual. Contrary, a study conducted by Macrynika, Miranda and Soffer (2018) turned the attention to the resilience factors that might act as a buffer to the relationship between childhood adversity and self-harm. The interaction effect between childhood adversity and social connectedness was not significant in predicting self-harm, indicating that social connectedness is probably not a buffer to the relationship. However, the self-report measure used was addressing the concept of “loneliness” and not social connectedness directly, which might have influenced the outcomes of the study. Further research is definitely needed in order to explore other resilience factors to the relationship between childhood adversity and NSSI.

**Insecure attachment & NSSI.** Another predictor that was independently assessed was insecure attachment. Although insecure attachment is one of the three most prominent risk factors of NSSI, research on insecure attachment is still very limited and only observational studies have been identified for this systematic review.

*Observational studies.* The first study that met the criteria for inclusion was a study conducted by Bureau et al. (2010), who investigated whether characteristics of insecure attachment will be more present in a self-harm population than in a non-self-harm population. They used a sample of 1238 (NSSI = 105) psychology students and they demonstrated that there was a significant difference in attachment characteristics between the two groups. Participants who reported self-harm were more likely to have parent-child relationships characterized by “failed protection, more fear, less care, more overprotection, less trust, less communication and more alienation” (Bureau et al., 2010, p.490) and insecure attachment was shown to have a predictive effect on NSSI. However, when the analyses were repeated separately for males and females, it was observed that insecure attachment characteristics were not related to NSSI behavior with regards to men. These findings suggest that a gender difference might exist in the predictive ability of insecure attachment on NSSI. Nevertheless, this gender difference was not supported by Hallab and Covic (2010; N=114 psychology students), who found a significant difference between the two groups (NSSI and non-NSSI group), but a non-significant direct effect of attachment on NSSI. Non-significant findings might indicate an indirect relationship, as it was previously proposed for non-significant pathways within the child maltreatment literature. The possible mediational effect was investigated and Hallab and Covic (2010) found that stress mediated the pathway between insecure attachment and NSSI. Stress is strongly related to emotion regulation, another prominent risk factor of NSSI.

The relationship of insecure attachment and NSSI was further investigated in a small sample of clinical population (N=78; Bolen, Winter, & Hodges, 2012). Adult survivors of childhood sexual abuse were asked about their engagement in NSSI behavior and their attachment style. Findings from this study (Bolen et al., 2012) revealed that insecure attachment was related to NSSI behavior and it had a predictive role in NSSI. Importantly, the sample used were survivors of sexual abuse, which might demonstrate that despite the childhood maltreatment, the style of attachment is still independently contributing to the prediction of NSSI. Although the sample was very small, the outcomes of this study in addition to previous findings suggest that regardless of the type of population (non-clinical or clinical), the association between insecure attachment and NSSI is present. This could be explained by a study conducted by Braga and Gonçalves (2014), who found that psychopathological symptoms within non-clinical populations (university students) were the ones related to NSSI behavior. Braga and Gonçalves (2014) also found a significant association of attachment to NSSI. However, no analyses were conducted linking the three aspects together. Perceptions of parental bonding have also been investigated for their relationship with NSSI. Martin, Bureau, Yurkowski, Lafontaine and Cloutier (2015) used several self-report measures of attachment in order to categorize participants into four different profiles based on their parent-child relationship (1. Negative-invalidating, 2. Positive-Moderate, 3. Positive-Idealistic, 4. Negative-disturbed). Findings indicated that individuals with a negative-invalidating and a negative-disturbed parent-child relationship were more likely to engage in NSSI, which supports findings from previous studies.

More complex pathways describing the relationship between attachment and NSSI, have only recently began to emerge. Claes, Raedt, van de Walle and Bosmans (2016) found a significant mediational pathway between trust in the availability of their attachment figure

and engagement in NSSI through communication with the attachment figure. The mediational pathway though was moderated by an attentional bias towards the mother. Despite the promising findings on demonstrating the pathways leading to NSSI through the different attachment characteristics (trust, communication and attentional bias to the attachment figure), outcomes should be interpreted with caution due to the small sample size of the study (N=42) and the selected sample (only university students). Partial support to the aforementioned findings is provided by Martin's et al. (2017) study, which found that preoccupation with the attachment figure and not dismissing attachment states of mind was associated to NSSI behavior. Taking into consideration that primitive attachment styles form the basis of our future relationships (Pascuzzo, Cyr, & Moss, 2013), studies have also investigated the role of romantic attachment to the development of NSSI. For example, a study conducted by Caron, Lafontaine and Bureau (2017b) explored this relationship and found that attachment anxiety, which is part of the preoccupied attachment style, was positively related to NSSI behavior, demonstrating a similar pattern to the primitive attachment styles. Consequently, it is observed that insecure attachment and particularly preoccupied insecure attachment has a significant role in the development of NSSI behavior.

Going beyond the attachment characteristics, Tatnell, Hasking and Newman (2018) explored the relationship between preoccupied attachment style and specifically, the attachment-related anxiety and NSSI further. They demonstrated that attachment-related anxiety with the mother was indeed a predictor of NSSI, but only indirectly, through limited access to emotion regulation strategies. Unfortunately, the sample (N=237) was also based on university students, hence, generalizability of the findings can be limited. Data from a clinical population (N=200) demonstrated that emotional pain was a mediator to the relationship between preoccupied attachment and NSSI (Molaie et al., 2019). Emotional pain was defined as “feelings of intolerable agonizing mental pain and anguish” (Molaie et al., 2019, p. 3),

which is very closely related to emotion dysregulation (Greenberg & Bolger, 2001). Consequently, it can be argued that the actual mediator was emotion dysregulation, which led to intolerable feelings of pain. Importantly, all other types of attachment styles were also investigated in the study (Molaie et al., 2019) and although the NSSI group scored higher on all insecure types, only preoccupied attachment style was a predictor of NSSI behavior. Therefore, the type of insecure attachment that seems to have a predictive role in the development of NSSI is the preoccupied attachment style. However, only a few studies have investigated this relationship and more studies are needed before reaching a conclusion. Recent studies suggest an indirect relationship to NSSI, which is mediated through emotion-related factors, such as stress, emotion dysregulation and emotional pain. Findings on gender differences remain inconclusive for this relationship.

**Emotion dysregulation & NSSI.** As previously mentioned, emotion dysregulation has been suggested to be a mediational factor to other independent predictors of NSSI, such as childhood maltreatment and preoccupied insecure attachment. However, there are many studies, both observational and some randomized controlled trials, investigating specifically the correlation between emotion dysregulation and NSSI.

**Randomised-controlled trials (RCTs).** Emotion dysregulation is the only prominent risk factor that has been investigated through RCTs. However, two of the three published RCTs have used the same population, indicating sparsity in this area of research. The two RCTs conducted within the same research group (Gratz, Tull & Levy, 2014; Gratz, Bardeen, Levy, Dixon-Gordon, & Tull, 2015) investigated the effect of an emotion regulation group therapy on NSSI and its mechanisms of change. The sample used was very small (N=61) and very specific (women with borderline personality disorder). They found that the emotion regulation group was effective in reducing NSSI behavior through the learning of emotion regulation techniques. However, there was no direct effect of emotion regulation on NSSI.

The outcomes showed that the group was able to improve the cognitive symptoms of borderline personality disorder, which in turn was able to reduce NSSI behavior through improved emotion regulation. Their findings were supported by Bentley, Nock, Sauer-Zavala, Gorman, & Barlow (2017), who found that eight out of ten participants demonstrated clinically meaningful reductions in NSSI following exposure to emotion regulation therapies (mindful emotion awareness training and cognitive reappraisal). However, the mechanisms of change were not investigated in this study. Although promising results have been observed from these RCTs, the very small and specific sample sizes of these RTCs make it difficult to conclude on the effect of emotion dysregulation on NSSI.

*Observational studies.* Contrary to RCTs, there are many observational studies, but with similar limitations. One of the pioneering studies on the topic was conducted by Gratz and Chapman (2007), who investigated the contribution of both childhood maltreatment and emotion dysregulation in the development of NSSI behavior. Findings demonstrated that although the NSSI group scored higher on childhood maltreatment and emotion dysregulation, none of the factors was independently correlated with NSSI. Gratz and Chapman (2007) explained this non-significant finding as an outcome of low statistical power due to the small sample size of the study (N=97). However, when the factors were entered into logistic regression analysis, physical abuse and emotion dysregulation reliably predicted NSSI. Emotion dysregulation was found to account for 10% of NSSI behavior. Notably, the participants were only male students, hence, findings from this study have limited generalizability and should be interpreted with caution.

Gratz and Tull (2010) tried to replicate these findings with a mixed-gender and clinical population (residents in a drug and alcohol treatment center). The outcomes showed that individuals within the NSSI group demonstrated higher levels of emotion dysregulation than the non-NSSI group. These findings remained significant even after controlling for other

relevant risk factors (gender, post-traumatic stress disorder, borderline personality disorder, substance use severity and child maltreatment), indicating that emotion dysregulation has an independent and unique contribution to NSSI behavior. However, there were no differences in emotion dysregulation between those who reported recent NSSI and non-recent NSSI. The sample was again very small ( $N = 61$ ) and very specific to generalize the outcomes. Martin, White, Flanagan, Yensel and Bloomberg (2011) attempted to overcome the limitations from the previous study using a larger sample ( $N=455$ ) and a multisite approach (the population were still in-patients with stimulant-dependence). Martin et al. (2011) replicated the findings by showing that individuals with a history of NSSI reported significantly higher levels of emotion dysregulation and there were no differences in emotion dysregulation between participants with and without recent NSSI behaviors. Consequently, it can be argued that NSSI is related to higher levels of emotion dysregulation in stimulant-dependent individuals, but no difference is observed within NSSI sub-categories based on recency of behavior.

Due to the specificity of the aforementioned samples, literature has shifted to other population groups to be able to generalize the findings on the topic. Wilcox et al. (2012) used a sample of 1081 students to investigate the predictive abilities of emotion dysregulation on NSSI. Although, they found a significant predictive effect of emotion dysregulation on NSSI, even after controlling for lifetime suicide attempt, the NSSI subgroup was again very small in size ( $N=75$  for lifetime NSSI and  $N=24$  for past-year NSSI). Therefore, although a progress was observed within the emotion dysregulation literature, the limitations remained very similar throughout the years.

Despite the small sample sizes, researchers continued investigating more complex models. For example, Muehlenkamp, Bagge, Tull and Gratz (2013) investigated the moderation effect of body regard on the relationship between emotion dysregulation and NSSI ( $N=398$ , but only 102 with NSSI history). They found that emotion dysregulation was



not a significant predictor of NSSI and that its effect was only significant among individuals with low body regard. These inconsistencies in outcomes between studies could be a reflection of the limitations of the studies (i.e. the small sample sizes) or an indication that other processes (moderational or mediational) are involved in the relationship between emotion dysregulation and NSSI. Bedi, Muller and Classen (2014) investigated whether cumulative risk of internal risk factors might be implicated in developing NSSI. With a sample of treatment-seeking women with a history of childhood abuse (NSSI N=67, non-NSSI N= 100), they investigated the contribution of emotion dysregulation, along with insecure attachment, alexithymia, dissociation, self-soothing and frequencies of previous suicide attempts in developing NSSI behaviors. Findings demonstrated that participants within the NSSI group reported greater difficulties with emotion dysregulation than the non-NSSI group. Although there were no significant differences with regards to their attachment style between groups, the full model was found significant in predicting NSSI behavior, indicating that cumulative adversity might be a risk factor of NSSI, suggesting a multifactorial approach to NSSI. Interestingly, the non-significant difference found between the two groups, could demonstrate that childhood maltreatment is a catalytic factor in determining the attachment style of an individual, suggesting a very close relationship between the two already mentioned prominent risk factors of NSSI. The interaction of these risk factors will be explored in the next sections.

One of the limitations of the aforementioned studies was the use of self-report data in order to explore the association between emotion dysregulation and NSSI, which might have been biasing the results. Laboratory analyses were conducted by Davis et al. (2014) to investigate the association further, while controlling for these self-report biases. Davis et al. (2014) conducted two studies, one using an emotion regulation task, which guided participants through emotion regulation strategies while being exposed to emotional clips

(N=148, only 25 with NSSI) and one with another emotion regulation task along with fMRI data (N=48, 21 with NSSI). Findings from both studies revealed that the NSSI group demonstrated lower ability to regulate emotions compared to the non-NSSI group. They also found a difference in the activation of left-amygdala regulation, but not in the right amygdala regulation, indicating a partial emotional dysregulation within the NSSI group. According to biological theories, left amygdalae are involved in the evaluation of an emotional stimulus, while right amygdalae play a more dynamic role in the detection of the stimulus (Baeken et al., 2014). Additionally, the right amygdala have been suggested to be involved in the processing of negative emotions, while left amygdala of positive emotions (Davidson & Irwin, 1999). Consequently, Davis et al. (2014) study could suggest that individuals engaging in NSSI behavior demonstrate reduced abilities to regulate their emotions due to difficulties in evaluating the emotional stimulus, but also due to a dysregulation in processing positive feelings.

While studies continued to replicate the association between emotion dysregulation and NSSI (Terzi et al., 2017), demonstrating a more consistent relationship, researchers explored the effect of comorbidity of NSSI with other disorders. Navarro-Haro, Wessman, Botella, and García-Palacios (2015) demonstrated that emotion dysregulation was a significant predictor of NSSI in a sample of 68 women diagnosed with borderline personality disorder and comorbid eating disorder. Additionally, Buckholdt et al. (2015) found that co-occurrence with other clinically-relevant maladaptive behaviors (e.g. disordered eating and substance misuse) was related to greater difficulties in regulating emotions, which suggested that comorbidity might be enhancing the effect of emotion dysregulation on NSSI (Weintraub, van de Loo, Gitlin & Miklowitz, 2017). A possible explanation could have been that the internalizing behaviours exhibited by the participants with eating disorders, were the ones mediating the relationship between emotion dysregulation and NSSI. Krazler, Fehling,

Anestis, & Selby (2016) showed that a significant relationship between emotion dysregulation and NSSI was only present through the mediational effect of internalizing symptoms. However, the comorbidity of substance misuse (Buckholdt et al., 2015), which is related to externalizing behaviors, partly contradicts this finding. Gholamrezaei, Heath and Panaghi (2017) found that emotion dysregulation was not a significant predictor of NSSI after controlling for anxiety in a sample of 556 undergraduate students in Iran, hence supporting the mediational effect of internalizing behaviors.

Other factors that were found to interact with emotion dysregulation in order to predict NSSI behavior were self-concept clarity as a mediator to the relationship (Lear & Pepper, 2016), negative affectivity as an interaction variable with emotion dysregulation (Nicolai, Wielgus, & Mezulis, 2016), impulsivity as an independent predictor (Terzi et al., 2017) and coping self-efficacy as a non-independent interaction variable (not a significant mediator; Midkiff, Lindsey, & Meadows, 2018). According to Watson and Clark (1984), the construct of negative affectivity reflects individual differences in negative emotionality and self-concept, hence, self-concept clarity and negative affectivity are very closely related. Studies have shown that self-concept clarity is also related to insecure attachment (Wu, 2009; Emery, Gardner, Carswell, & Finkel, 2018), which is one of the most prominent risk factors of NSSI, indicating perhaps an underlying contribution of insecure attachment to the relationship between emotion dysregulation and NSSI. Theories and empirical evidence also associate attachment with impulsivity (Olson, Bates, & Bayles, 1990) and coping self-efficacy (Wright, Firsick, Kacmarski, & Jenkins-Guarnieri, 2017). Attachment plays a foundational role in the development of emotion regulation (Gentzler, Contreras-Grau, Kerns, & Weimer, 2005) and hence, to the ability and perception of the ability of a child to cope based on reflective behaviors from the attachment figure. Impulsivity reflects the ability of an individual to exercise self-control, which is a subset of the concept of emotion regulation. Consequently, it

can be argued that all factors interacting with emotion dysregulation and NSSI are related to the attachment style of the participants.

A common misconception within the NSSI literature is the high association given between emotion reactivity and emotion dysregulation, which is actually based only on a very small overlap between the two concepts (Zelkowitz, Cole, Han, & Tomarken, 2016). Zelkowitz et al. (2016) investigated the two concepts independently for their contribution to NSSI behavior. They found that emotion dysregulation was related to NSSI and was a significant predictor of NSSI behavior, whilst emotion reactivity had no significant relationship to NSSI.

Lastly, one of the most recent studies on the topic conducted by Ewing, Hamza, and Willoughby (2019) suggested and supported a bidirectional relationship between emotion dysregulation and NSSI. Outcomes of this study showed that there was a significant indirect effect between stressful experiences and NSSI through emotion dysregulation over time, as well as a significant indirect path from NSSI to stressful experiences via emotion dysregulation. These findings demonstrate the complexity involved in the association between the two variables (emotion dysregulation and NSSI) and the need for further exploration of more complex models in order to gain a greater understanding of NSSI behavior.

**Interaction of risk factors.** Reviewing the aforementioned articles on the associations between childhood maltreatment, insecure attachment, emotion dysregulation and NSSI, it becomes apparent that the risk for engaging in NSSI behavior is multifactorial. Additionally, all the risk factors are correlated to each other, prompting the need to investigate their intercorrelations with regards to NSSI behavior. Although none of the studies have investigated the interplay of all three prominent risk factors together in the development of NSSI behavior, some studies have focused on two of these risk factors. Gratz (2006)

investigated the interaction of childhood maltreatment and emotional inexpressivity in predicting self-harm (N=249 females) and found a non-significant finding, despite the significant independent effect of each variable. However, expanding her research on a smaller sample of male university students (Gratz and Chapman, 2007), they found a significant effect in predicting NSSI when all variables of childhood maltreatment and emotion dysregulation were included. This difference in findings could be an outcome of gender differences or of a distinct effect of emotion dysregulation, which cannot be observed through emotional inexpressivity alone. Additionally, it could demonstrate the cumulative effect of childhood maltreatment and emotion dysregulation in predicting NSSI. Gratz and Roemer (2008) explored the association of the two variables (childhood maltreatment and emotion dysregulation) in the same female sample as in Gratz (2006) study and used the total effect of emotion dysregulation, demonstrating a significant effect of emotion dysregulation and childhood maltreatment on NSSI, supporting Gratz and Chapman's findings. A partial mediation was supported when a significant indirect effect was observed between childhood maltreatment and NSSI through limited access to emotion regulation strategies. Arney, Nugent and Crowther (2012) supported Gratz (2006) by demonstrating a non-significant interaction effect of childhood maltreatment and emotion dysregulation on NSSI behavior. Consequently, it is suggested that emotion dysregulation might have a mediational effect to the relationship between childhood maltreatment and NSSI, but not a moderational role. This is supported by Karatzias, Power and Mahoney (2017), who found that emotion dysregulation mediated the relationship between childhood trauma and NSSI in a sample of 89 female prisoners. Another mediational variable in the relationship between childhood maltreatment and NSSI was found to be parental care (Johnstone et al., 2015).

Contrary, Tresno, Ito and Mearns (2013) found a significant interaction effect of childhood maltreatment and emotion dysregulation in predicting NSSI behavior. Tresno et al. (2013) supported that strong negative mood regulation (i.e. low mood dysregulation) can buffer the effects of childhood trauma on NSSI. However, the sample of the study is very small (N=313 but only 31 within the NSSI group) and hence, outcomes should be interpreted with caution. Further support of the moderational role of emotion dysregulation in the association of childhood trauma and NSSI is provided by Dixon-Gordon, Tull and Gratz (2014), who demonstrated a significant moderational effect among individuals with high levels of emotional dysregulation. However, in contrast to Tresno et al. (2013), Dixon-Gordon et al. (2014) found a non-significant moderational effect with individuals with low levels of emotion dysregulation, indicating that the moderational role of emotion dysregulation might be only exhibited on individuals with high emotion dysregulation levels.

A different combination of the risk factors has also been explored. Yurkowski et al. (2015), Tatnell, Hasking, Newman (2018) and Guerin-Marion, Martin, Lafontaine and Bureau (2019) investigated the mediational role of emotion dysregulation on the effect of attachment on NSSI and found significant findings, particularly, when emotion dysregulation was measured with regards to limited access in emotion regulation strategies. Therefore, the interaction between attachment, emotion dysregulation and NSSI has been found to be more consistent in comparison to the interaction between childhood maltreatment, emotion dysregulation and NSSI. This consistency suggests that further research should maintain the mediational model identified and explore the contribution of early life experiences to the aforementioned pathway.

## Meta-analysis

Three meta-analyses were conducted in order to investigate the overall predictive ability of each of the three most prominent risk factors. The number of studies included in each meta-analysis was: i) 45 studies for the overall effect of adverse childhood experiences on NSSI, ii) 12 studies for the overall effect of insecure attachment on NSSI and iii) 23 for the overall effect of emotion dysregulation on NSSI. Given that the homogeneity of studies is very important in a meta-analytic context, only observational studies were included in the analysis (Borenstein et al., 2009). It would have been ideal to conduct a distinct meta-analysis for RCTs, however, due to the extremely small number of studies (N=3 and two are with the same population), this was not possible.

### **Adverse childhood experiences & NSSI.**

*Heterogeneity between studies.* Testing for the heterogeneity of observational studies referring to adverse childhood experiences, it was observed that there is a high degree of variance in the effect sizes [ $Q(74) = 2583.04, p < 0.001$ ]. This was confirmed by an  $I^2$  value of 97.14%, which showed high heterogeneity. Sensitivity analyses were conducted and one study (Wachter et al., 2009) was excluded from the meta-analysis, as it was considered an outlier to the dataset based on its Z-value (Ghosh & Vogt, 2012). After the exclusion, the heterogeneity remained high [ $Q(73)=862.25, p < 0.001, I^2 = 91.53\%$ ], which was expected due to the variety of childhood maltreatment forms included in each study. Consequently, a subgroup analysis was conducted to identify possible differences in the effects of distinct adversity types. The subgroups created were: i) emotional abuse, ii) emotional neglect, iii) sexual abuse, iv) physical abuse, v) physical neglect, vi) overall childhood maltreatment and vii) other minor subgroups such as degree of adversity, sexual assault, onset of abuse and multiple traumas, which were created based on very few studies (1-3). From the subgroup analysis, high heterogeneity was observed even within the subgroups, but only in the main

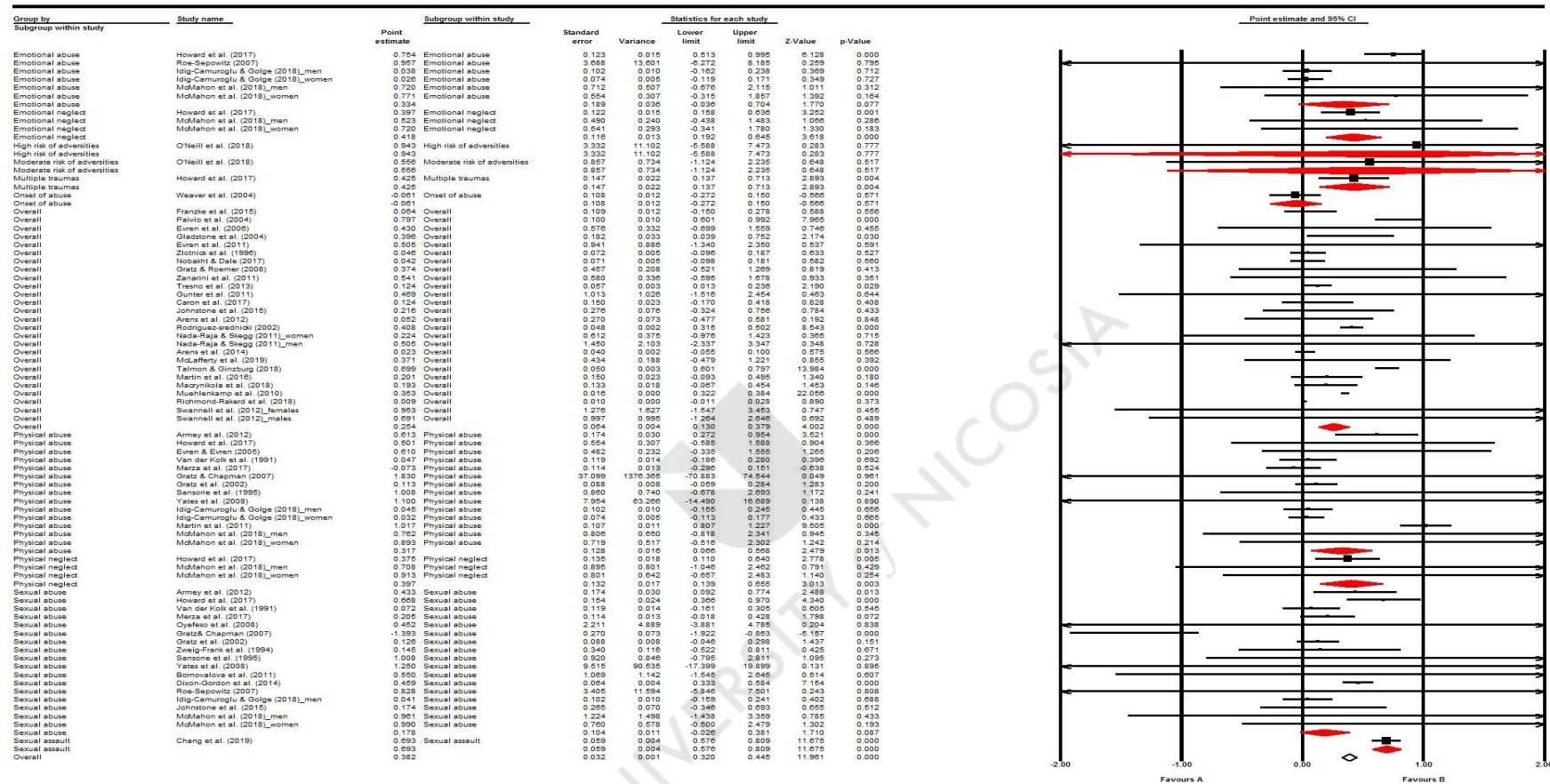
ones: i) emotional abuse [Q(5)= 29.81,  $p < 0.001$ ,  $I^2 = 83.23\%$ ], ii) physical abuse [Q(13)= 83.09,  $p < 0.001$ ,  $I^2 = 84.35\%$ ], iii) sexual abuse [Q(16)= 66.95,  $p < 0.001$ ,  $I^2 = 76.10\%$ ] and iv) overall childhood maltreatment [Q(25)= 564.54,  $p < 0.001$ ,  $I^2 = 95.57\%$ ], which were the subgroups with the highest number of studies (N=6, N=14, N=17 and N=26 respectively). Subgroup contrast analyses have demonstrated both within [Q(63)=745.34,  $p < 0.001$ ] and between [Q(10)=116.91,  $p < 0.001$ ] studies significant heterogeneity.

***Effect sizes and significance.*** Taking into consideration the high heterogeneity between the studies, a fixed effect size was not assumed and hence, a random model was used to calculate the pooled effect sizes. The meta-analysis revealed a significant small to medium overall effect of adverse childhood experiences on NSSI ( $d=0.271$ ,  $SE=0.042$ , 95% CI [0.189, 0.353],  $p < 0.001$ ), which increased after accounting for subgroup effects ( $d=0.382$ ,  $SE=0.032$ , 95% CI [0.320, 0.445],  $p < 0.001$ ). Subgroup analyses demonstrated that only certain adverse childhood experiences have shown significant effects on NSSI behavior, ranging from small to medium effects. Significant effects have been demonstrated by emotional neglect [ $d=0.418$ ,  $SE=0.116$ , 95% CI (0.192, 0.645),  $p < 0.001$ ], multiple traumas [ $d=0.425$ ,  $SE=0.147$ , 95% CI (0.137, 0.713),  $p=0.004$ ], studies investigating overall maltreatment [ $d=0.254$ ,  $SE=0.064$ , 95% CI (0.130, 0.379),  $p < 0.001$ ], physical abuse [ $d=0.317$ ,  $SE=0.128$ , 95% CI (0.066, 0.586),  $p=0.013$ ], physical neglect [ $d=0.397$ ,  $SE=0.132$ , 95% CI (0.139, 0.655),  $p=0.003$ ] and sexual assault [ $d=0.693$ ,  $SE=0.059$ , 95% CI (0.576, 0.809),  $p < 0.001$ ]. However, particular attention should be paid to the fact that emotional neglect (N=3), multiple traumas (N=1), physical neglect (3) and sexual assault (N=1) have been investigated in very few studies and hence, interpretation of their effect sizes should be made with caution. Overall childhood maltreatment (N=26) and physical abuse (N=14) seem to have the greatest and most reliable effect on NSSI behaviour. Surprisingly, subgroup analyses on sexual abuse [ $d=0.178$ ,  $SE=0.104$ , 95% CI (-0.026, 0.381),  $p=0.087$ ] and



emotional abuse [ $d=0.334$ ,  $SE= 0.189$ , 95% CI (-0.036, 0.704),  $p=0.077$ ] have shown non-significant findings, but only marginally. The level of adversities (high, moderate, low) and onset of adversities have demonstrated non-significant effects on NSSI behaviour, however, these analyses were based on only one study (see Figure 2) and hence, should be again interpreted with caution.

**Publication bias.** Publication bias was investigated with the total set of studies (excluding the outlier) using Egger's regression intercept, which demonstrated a significant finding (Egger's regression intercept = 1.04, 95% CI [0.152, 1.937],  $p = 0.022$ ). A significant finding suggests that publication bias exists within the literature investigating childhood maltreatment and NSSI. This is also supported from the Funnel Plot (see Appendix F) and the narrative synthesis of this review, since only two outdated studies showed a non-significant effect of childhood maltreatment on NSSI.



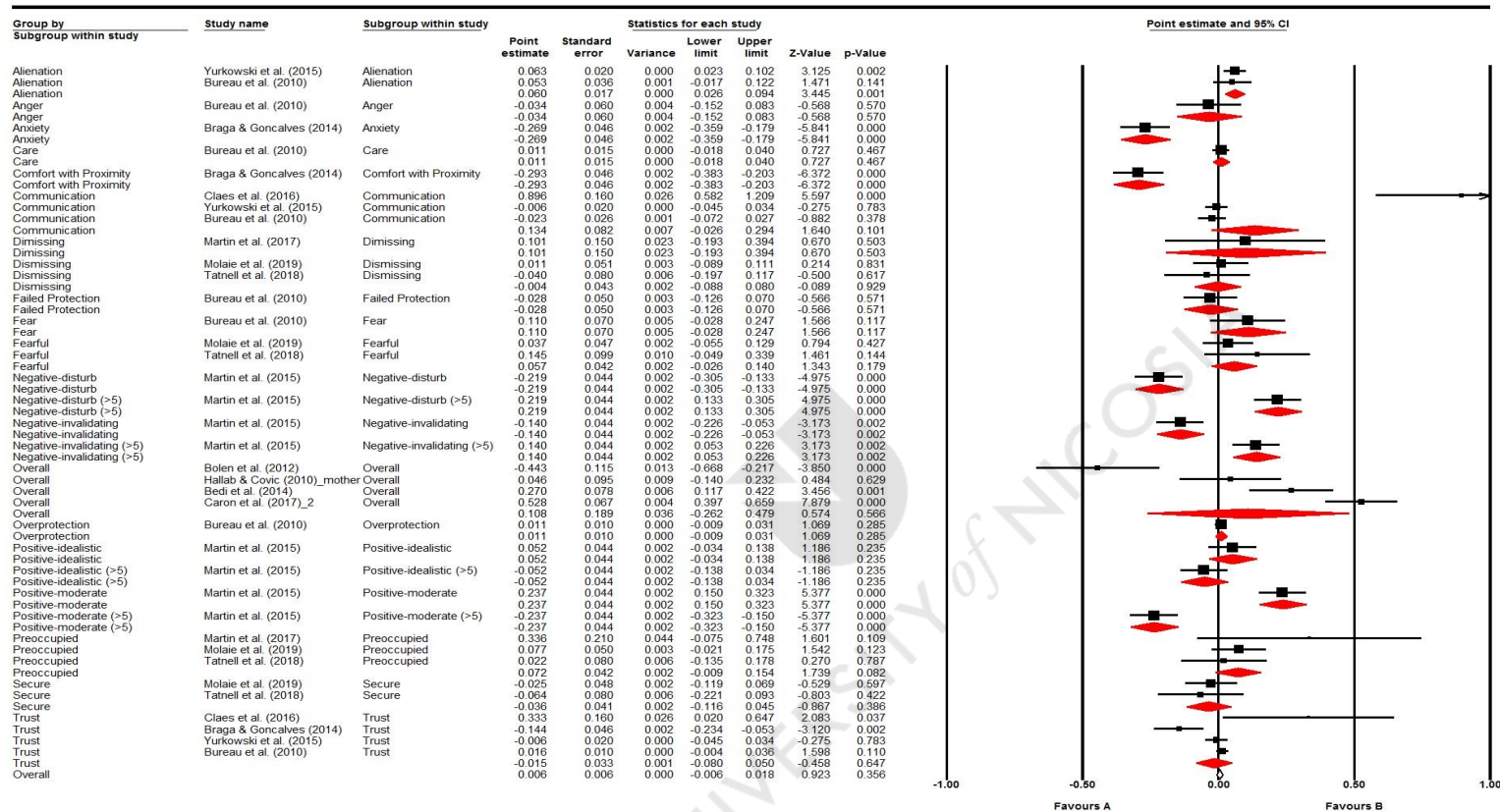
Meta Analysis of Childhood adversity

Figure 2. Subgroup analysis of the effect of childhood maltreatment on NSSI behavior. The figure presents the subgroup names, study authors, individual study characteristics and pooled effect sizes. Black lines represent the 95% confidence interval of individual studies, the red diamonds represent the pooled effect of each subgroup and the white diamond represents the total pooled effect of childhood maltreatment on NSSI while taking into consideration the subgroup analysis.

### **Insecure attachment & NSSI.**

***Heterogeneity between studies.*** Heterogeneity tests have demonstrated a significant high degree of variance in effect sizes of attachment on NSSI [ $Q(37)=366.24$ ,  $I^2 = 89.897$ ]. Sensitivity analyses showed no particular outliers to the dataset. Therefore, subgroup analyses were conducted in order to investigate the heterogeneity further. Heterogeneity was indicated only in three attachment variables: i) communication ( $I^2 = 93.78\%$ ), ii) trust ( $I^2 = 81.35\%$ ) and iii) overall attachment ( $I^2 = 94.83\%$ ), which were the ones with the higher number of studies. Significant heterogeneity was observed both within [ $Q(14)=109.69$ ,  $p<0.001$ ] and between [ $Q(23)=256.55$ ,  $p < 0.001$ ] attachment subgroups.

***Pooled effect sizes and significance.*** Pooled effect sizes revealed a non-significant effect of attachment on NSSI ( $d=0.015$ ,  $SE=0.018$ , 95% CI [-0.020, 0.01],  $p=0.392$ ), even after subgroups were taken into consideration ( $d=0.006$ ,  $SE=0.006$ , 95% CI [-0.006, 0.018],  $p=0.356$ ). Significant effect sizes were only reached by alienation ( $d= 0.06$ ,  $SE= 0.017$ , 95% CI [0.026, 0.094],  $p=0.001$ ), anxiety ( $d=-0.269$ ,  $SE=0.046$ , 95% CI [-0.359, -0.179],  $p<0.001$ ), comfort with proximity ( $d=-0.293$ ,  $SE=0.046$ , 95% CI [-0.383, -0.203],  $p<0.001$ ), negative disturb ( $d= -0.219$ ,  $SE=0.044$ , 95% CI [-0.305, -0.133],  $p<0.001$ ), negative invalidating ( $d=-0.140$ ,  $SE=0.044$ , 95% CI [-0.226, -0.053],  $p<0.001$ ) and positive-moderate ( $d=0.237$ ,  $SE=0.044$ , 95% CI [0.150, 0.323],  $p<0.001$ ) perception of attachment. However, findings should be interpreted with caution because all these variables were based on one or two studies (see Figure 3). In contrast to the narrative review, preoccupied style of attachment has failed to reach significance ( $d=0.072$ ,  $SE=0.042$ , 95% CI [-0.009, 0.154],  $p=0.082$ ).



Meta Analysis of Attachment and NSSI

Figure 3. Subgroup analysis of the effect of attachment variables on NSSI behavior. The figure presents the subgroup names, study authors, individual study characteristics and pooled effect sizes. Black lines represent the 95% confidence interval of individual studies, the red diamonds represent the pooled effect of each subgroup and the white diamond represents the total pooled effect of attachment on NSSI while taking into consideration the subgroup analysis.

**Publication bias.** Despite the very small number of studies investigating the association between attachment and NSSI behavior compared to the other prominent risk factors, the analysis has shown that no publication bias exists within this literature. The outcomes from the Egger's regression intercept revealed a non-significant finding (Egger's regression intercept = 0.26, 95% CI [-1.37, 1.89],  $p=0.75$ ). This is also presented from the Funnel Plot of the analysis (see Appendix F).

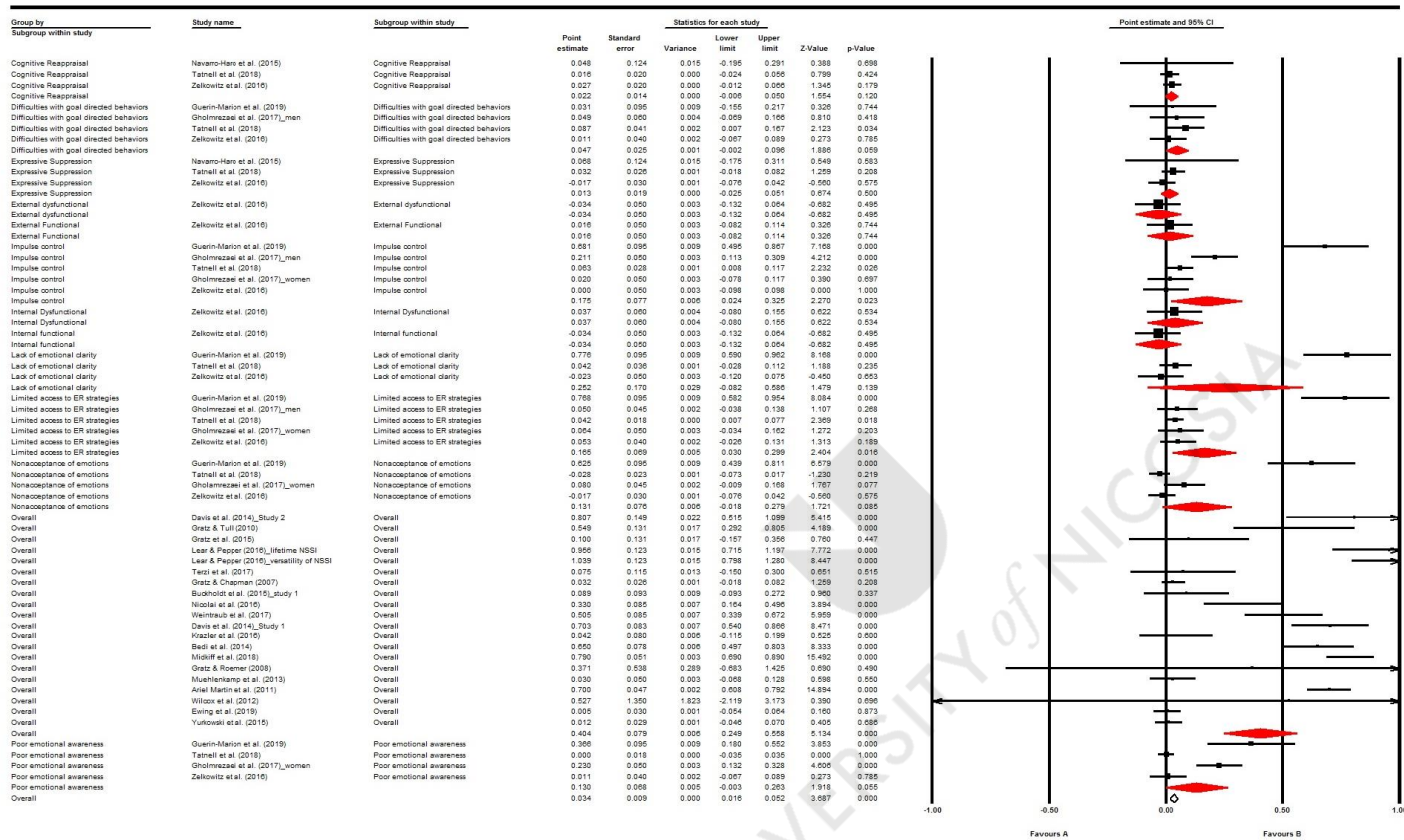
### **Emotion dysregulation & NSSI.**

**Heterogeneity between studies.** Similarly to the other two meta-analyses, heterogeneity in the effect sizes (see Figure 4) of the association between emotion dysregulation and NSSI behavior was found to be significantly high [ $Q(54)=993.50$ ,  $p<0.001$ ,  $I^2 = 94.57\%$ ]. No outliers were identified from sensitivity analyses. Subgroup analyses indicated that heterogeneity was observed between studies investigating impulse control ( $I^2 = 92.10\%$ ), lack of emotional clarity ( $I^2 = 96.61\%$ ), limited access to emotion regulation strategies ( $I^2 = 92.93\%$ ), non-acceptance of emotions ( $I^2 = 93.73\%$ ), poor emotional awareness ( $I^2 = 90.48\%$ ) and overall emotion dysregulation ( $I^2 = 96.76\%$ ). Studies investigating expressive suppression, cognitive reappraisal and difficulties with goal directed behaviors demonstrated no heterogeneity in the effect sizes ( $I^2 = 0\%$ ). Significant differences were observed both within [ $Q(42)=835.07$ ,  $p<0.001$ ] and between [ $Q(12)=158.43$ ,  $p<0.001$ ] studies with regards to heterogeneity.

**Pooled effect sizes and significance.** Pooled effect sizes demonstrated a significant small effect of emotion dysregulation on NSSI behavior [ $d=0.198$ ,  $SE=0.025$ , 95% CI (0.149, 0.248),  $p<0.001$ ], which remained significant, although reduced, after subgroups were taken into consideration [ $d=0.034$ ,  $SE=0.009$ , 95% CI (0.016, 0.052),  $p<0.001$ ]. From the emotion

dysregulation subgroups only impulse control [ $d=0.175$ ,  $SE=0.077$ , 95% CI (0.024, 0.325),  $p=0.023$ ], limited access to emotion regulation strategies [ $d=0.165$ ,  $SE=0.069$ , 95% CI (0.030, 0.299),  $p=0.016$ ] and overall emotion dysregulation [ $d=0.404$ ,  $SE=0.079$ , 95% CI (0.249, 0.558),  $p<0.001$ ] showed a significant effect on NSSI. Interestingly, investigating the overall emotion dysregulation and not its subgroups increased the effect size from a small to nearly moderate effect. The impact of emotion dysregulation as a unified concept was supported from the narrative review too. Subgroups very close to reaching significant effects were difficulties with goal directed behaviours ( $d=0.047$ ,  $p=0.059$ ) and poor emotional awareness ( $d=0.130$ ,  $p=0.055$ ).

**Publication bias.** The unexpected increase in the effect when only the overall emotion dysregulation subgroup was taken into consideration could reflect a publication bias of only significant findings. This explanation was supported by analyses and the Funnel plot of the studies (see Appendix F), which indicated the existence of publication bias by the Egger's regression intercept test (Egger's regression intercept= $4.46$ , 95% CI [ $2.64$ ,  $6.28$ ],  $p < 0.001$ ). Additionally, the majority of studies investigating the effect of emotion dysregulation on NSSI behavior were conducted by the same research group and hence, outcomes should be interpreted with caution.



Meta Analysis of Emotion Dysregulation and NSSI

Figure 4. Subgroup analyses of the effect of emotion dysregulation on NSSI behavior. The figure presents the subgroup names, study authors, individual study characteristics and pooled effect sizes. Black lines represent the 95% confidence interval of individual studies, the red diamonds represent the pooled effect of each subgroup and the white diamond represents the total pooled effect of emotion dysregulation on NSSI while taking into consideration the subgroup analysis.

## Discussion

Reviewing the data on three of the most prominent risk factors of NSSI behavior, childhood adversity, insecure attachment and emotion dysregulation, it was observed that each predictor had a unique association with NSSI. While childhood adversity was found to be associated both directly and indirectly to NSSI behavior, emotion dysregulation appeared to have a more mediational or moderational role in the development of NSSI. Studies investigating the relationship between attachment and NSSI are still very few and with high heterogeneity within their methodology, which limits our understanding of the type of their relationship. What becomes apparent from the attachment literature is that preoccupied insecure attachment seems to be the attachment style related to NSSI behavior. Studies investigating the interactions of these risk factors suggest that a model including all three risk factors might be a promising predictor of NSSI. Meta-analytic data has shown that overall childhood adversity and emotion dysregulation are significantly related with NSSI. Pooled effect sizes revealed a significant small to medium effect of childhood maltreatment and a small effect of emotion dysregulation on NSSI. As expected after the narrative review, the pooled effect of attachment was found to be non-significant. This could be explained by the limited number of studies on the topic, or it could be an indication that other factors are mediating their relationship, such as emotion dysregulation, as it was demonstrated by Yurkowski et al. (2015), Tatnell et al. (2018) and Guerin-Marion et al. (2019).

The outcomes of this systematic review are in agreement with previous systematic reviews on the topics (Serafini et al., 2017; Liu et al., 2018; Buckmaster et al., 2019; Wrath & Adams, 2019), demonstrating an association between childhood maltreatment, attachment, emotion dysregulation and NSSI. Similar to Wrath and Adams (2019) and Buckmaster et al. (2019), there are only a few studies investigating the relationship between attachment and



NSSI and although there are not enough studies to support it, insecure attachment is suggested to be related to NSSI. Meta-analytic outcomes are only calculated previously for childhood maltreatment (Klonsky & Moyer, 2008; Liu et al., 2018) and emotion dysregulation (Wolff et al., 2019). With regards to childhood maltreatment, the effect sizes reported in this systematic review were similar to Liu et al. (2018), who investigated the effect of childhood maltreatment in both adolescents and adults (OR=3.42). In contrast to this study, a publication bias was not found by Liu et al. (2018), which could suggest that studies on adolescents might be covering the missing publication from the adult literature. The pooled effect size reported by Wolff et al. (2019) for emotion dysregulation appears to be slightly higher (OR=2.40) than the findings from this meta-analysis, which could also be explained by the difference in the population used (both adolescents and adults in the Wolff et al. (2019) study).

Despite the thorough investigation of the associations between the three predictors and NSSI, the limitation of this review is mostly the methodology design used by the eligible studies. Findings from the synthesis are based on cross-sectional study designs with self-report data, small sample sizes, high heterogeneity and possible publication bias. Therefore, the findings might not reflect the actual associations between the predictors and NSSI. Additionally, the cross-sectional study designs limit our ability to infer causality between the predictors and NSSI, hence, definitive conclusions to their research questions cannot be drawn. However, studies with self-report data and small sample sizes mark the initial steps of research development within the NSSI literature and hence, reviewing them can aid to design better informed and of higher quality studies. Some of its strengths are its compliance with the NSSI definition (studies with suicidal ideation were excluded), the inclusion of more than one predictors, the use of a variety of search engines and its combination of both a

narrative and a meta-analytic synthesis, which provides a wider understanding of the associations.

Taking into consideration the wider picture provided by this review, findings suggest that it might be fruitful to explore in future studies whether the relationship between childhood maltreatment and NSSI is serially mediated by insecure attachment and emotion dysregulation. Studies investigating the interaction of these variables supported the mediational role of emotion dysregulation in the relationship between childhood maltreatment and NSSI, even with adolescent samples (Titelius et al., 2018), but also in the relationship between attachment and NSSI (Kimbal & Diddams, 2007). Consequently, combining the two proposed models could increase our understanding of the risk processes leading to NSSI behavior. Additionally, given the small proportion of individuals engaging in NSSI behavior, it might be beneficial to focus on NSSI samples, instead of collecting data from a general population and then identifying the NSSI group, in order to increase the NSSI sample sizes and hence, the power of the study and the validity of findings.

In conclusion, 79 studies were reviewed in order to explore the predictive effect of childhood maltreatment, emotion dysregulation and attachment on NSSI behavior. Studies were synthesized both in a narrative form and in a quantitative form using a meta-analytic software. Findings from this systematic review and meta-analysis demonstrated significant effects of childhood maltreatment and emotion dysregulation on NSSI, suggesting that both can be significant predictors of NSSI behavior. Non-significant effects of attachment on NSSI could be attributed to the small number of studies investigating the relationship, but also to other mediational variables influencing the predictive abilities of attachment, as it was indicated in the narrative synthesis. The limitations of the review were based on the methodology of eligible studies. Future studies may benefit from exploring the serial

mediational effect of attachment and emotion dysregulation on the association between childhood maltreatment and NSSI.

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## References

- Ammmerman, B. A., Hong, M., Sorgi, K., Park, Y., Jacobucci, R., & McCloskey, M. S. (2019). An examination of individual forms of nonsuicidal self-injury. *Psychiatry Research*, 278, 268-274. <https://doi.org/10.1016/j.psychres.2019.06.029>
- Baeken, C., Marinazzo, D., Van Schuerbeek, P., Wu, G. R., De Mey, J., Luypaert, R., & De Raedt, R. (2014). Left and right amygdala-mediofrontal cortical functional connectivity is differentially modulated by harm avoidance. *PLoS One*, 9(4), e95740. <https://doi.org/10.1371/journal.pone.0095740>
- Baer, J. C., & Martinez, C. D. (2006). Child maltreatment and insecure attachment: A meta-analysis. *Journal of Reproductive and Infant psychology*, 24(3), 187-197. <https://doi.org/10.1080/02646830600821231>
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2009). *Introduction to Meta-analysis*. UK: John Wiley & Sons.
- Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2013). *Comprehensive Meta-analysis Version 3*. Englewood: Biostat.
- Botella, J., & Gambara, H. (2006). Doing and reporting a meta-analysis. *International Journal of Clinical and Health Psychology*, 6(2), 425-440.
- Bowlby, J. (1969/1982). *Attachment and Loss: Volume 1*. New York: Basic Books.
- Bowlby, J. (1988). *A Secure Base: Parent-child Attachment and Healthy Human Development*. USA: Basic Books.
- Bridges, L. J., Denham, S. A., & Ganiban, J. M. (2004). Definitional issues in emotion regulation research. *Child Development*, 75(2), 340-345.
- Brumariu, L. E. (2015). Parent-child attachment and emotion regulation. *New directions for child and adolescent development*, 2015(148), 31-45. <https://doi.org/10.1002/cad.20098>

- Buckmaster, R., McNulty, M., & Guerin, S. (2019). Family factors associated with self-harm in adults: A systematic review. *Journal of Family Therapy*, 41(4), 537-558.  
<https://doi.org/10.1111/1467-6427.12232>
- Cipriano, A., Cella, S., & Cotrufo, P. (2017). Nonsuicidal self-injury: A systematic review. *Frontiers in Psychology*, 8, 1946. <https://doi.org/10.3389/fpsyg.2017.01946>
- Claes L., & Muehlenkamp J. J. (2013). Non-suicidal Self-Injury and Eating Disorders: Dimensions of Self-Harm. In: Claes L., & Muehlenkamp J. (Eds.), *Non-Suicidal Self-Injury in Eating Disorders* (3-18). Berlin, Heidelberg: Springer.  
[https://doi.org/10.1007/978-3-642-40107-7\\_1](https://doi.org/10.1007/978-3-642-40107-7_1)
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Davidson, R. J., & Irwin, W. (1999). The functional neuroanatomy of emotion and affective style. *Trends in cognitive sciences*, 3(1), 11-21.
- Egeland, B., & Sroufe, L. A. (1981). Attachment and early maltreatment. *Child development*, 44-52.
- Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, 315(7109), 629-634.
- Emery, L. F., Gardner, W. L., Carswell, K. L., & Finkel, E. J. (2018). You can't see the real me: Attachment avoidance, self-verification, and self-concept clarity. *Personality and Social Psychology Bulletin*, 44(8), 1133-1146.  
<https://doi.org/10.1177/0146167218760799>
- Favazza, A. R. (1998). The coming of age of self-mutilation. *The Journal of nervous and mental disease*, 186(5), 259-268.

- Fliege, H., Lee, J. R., Grimm, A., & Klapp, B. F. (2009). Risk factors and correlates of deliberate self-harm behavior: A systematic review. *Journal of Psychosomatic Research*, 66(6), 477-493. <https://doi.org/10.1016/j.jpsychores.2008.10.013>
- Ford, J. D., & Gómez, J. M. (2015). The relationship of psychological trauma and dissociative and posttraumatic stress disorders to nonsuicidal self-injury and suicidality: A review. *Journal of Trauma & Dissociation*, 16(3), 232-271. <https://doi.org/10.1080/15299732.2015.989563>
- Fox, K. R., Franklin, J. C., Ribeiro, J. D., Kleiman, E. M., Bentley, K. H., & Nock, M. K. (2015). Meta-analysis of risk factors for nonsuicidal self-injury. *Clinical Psychology Review*, 42, 156-167. <https://doi.org/10.1016/j.cpr.2015.09.002>
- Fox, K. R., Huang, X., Linthicum, K. P., Wang, S. B., Franklin, J. C., & Ribeiro, J. D. (2019). Model complexity improves the prediction of nonsuicidal self-injury. *Journal of Consulting and Clinical Psychology*, 87(8), 684. <http://dx.doi.org/10.1037/ccp0000421>
- Gentzler, A. L., Contreras- Grau, J. M., Kerns, K. A., & Weimer, B. L. (2005). Parent-child emotional communication and children's coping in middle childhood. *Social Development*, 14(4), 591-612.
- Ghosh, D., & Vogt, A. (2012). Outliers: An evaluation of methodologies. *Joint Statistical Meetings*, 3455-3460.
- Gratz, K. L. (2003). Risk factors for and functions of deliberate self-harm: An empirical and conceptual review. *Clinical Psychology: Science and Practice*, 10(2), 192-205. <https://doi.org/10.1093/clipsy/bpg022>
- Greenberg, L. S., & Bolger, E. (2001). An emotion-focused approach to the overregulation of emotion and emotional pain. *Journal of Clinical Psychology*, 57(2), 197-211. [https://doi.org/10.1002/1097-4679\(200102\)57:2<197::AID-JCLP6>3.0.CO;2-O](https://doi.org/10.1002/1097-4679(200102)57:2<197::AID-JCLP6>3.0.CO;2-O)

- Hawton, K., Bergen, H., Kapur, N., Cooper, J., Steeg, S., Ness, J., & Waters, K. (2012). Repetition of self-harm and suicide following self-harm in children and adolescents: Findings from the Multicentre Study of Self-harm in England. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 53(12), 1212–1219. <https://doi.org/10.1111/j.1469-7610.2012.02559.x>
- Higgins, J. P., & Green, S. (Eds.). (2011). *Cochrane handbook for systematic reviews of interventions* (Vol. 4). England: John Wiley & Sons.
- Huedo-Medina, T. B., Sánchez-Meca, J., Marín-Martínez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: Q statistic or I<sup>2</sup> index?. *Psychological methods*, 11(2), 193.
- Jacobson, C. M., & Gould, M. (2007). The epidemiology and phenomenology of non-suicidal self-injurious behavior among adolescents: A critical review of the literature. *Archives of Suicide Research*, 11(2), 129-147. <https://doi.org/10.1080/13811110701247602>
- Kimball, J. S., & Diddams, M. (2007). Affect regulation as a mediator of attachment and deliberate self-harm. *Journal of College Counseling*, 10(1), 44-53. <https://doi.org/10.1002/j.2161-1882.2007.tb00005.x>
- Klonsky, E. D., & Moyer, A. (2008). Childhood sexual abuse and non-suicidal self-injury: Meta-analysis. *The British Journal of Psychiatry*, 192(3), 166-170. <https://doi.org/10.1192/bjp.bp.106.030650>
- Lamb, M. E., Gaensbauer, T. J., Malkin, C. M., & Schultz, L. A. (1985). The effects of child maltreatment on security of infant-adult attachment. *Infant Behavior and Development*, 8(1), 35-45.
- Lang, C. M., & Sharma-Patel, K. (2011). The relation between childhood maltreatment and self-injury: A review of the literature on conceptualization and intervention. *Trauma, Violence, & Abuse*, 12(1), 23-37. <https://doi.org/10.1177/1524838010386975>

- Lengel, G. J., & Mullins-Sweatt, S. N. (2013). Nonsuicidal self-injury disorder: Clinician and expert ratings. *Psychiatry Research*, *210*(3), 940-944.  
<https://doi.org/10.1016/j.psychres.2013.08.047>
- Levant, R. F., Hall, R. J., Williams, C. M., & Hasan, N. T. (2009). Gender differences in alexithymia. *Psychology of Men & Masculinity*, *10*(3), 190-203.  
<https://doi.org/10.1037/a0015652>
- Liu, R. T., Scopelliti, K. M., Pittman, S. K., & Zamora, A. S. (2018). Childhood maltreatment and non-suicidal self-injury: A systematic review and meta-analysis. *The Lancet Psychiatry*, *5*(1), 51-64. [https://doi.org/10.1016/S2215-0366\(17\)30469-8](https://doi.org/10.1016/S2215-0366(17)30469-8)
- McLaughlin, K. A. (2016). Future directions in childhood adversity and youth psychopathology. *Journal of Clinical Child & Adolescent Psychology*, *45*(3), 361-382.  
<https://doi.org/10.1080/15374416.2015.1110823>
- Modesti, P. A., Reboldi, G., Cappuccio, F. P., Agyemang, C., Remuzzi, G., Rapi, S., ... & ESH Working Group on CV Risk in Low Resource Settings (2016). Panethnic differences in blood pressure in Europe: A systematic review and meta-analysis. *PloS one*, *11*(1), e0147601. <https://doi.org/10.1371/journal.pone.0147601>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (The PRISMA Group) (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med*, *6*(7), e1000097. <https://doi.org/10.1371/journal.pmed1000097>
- Nagra, G. S., Lin, A., & Upthegrove, R. (2016). What bridges the gap between self-harm and suicidality? The role of forgiveness, resilience and attachment. *Psychiatry Research*, *241*, 78-82. <http://dx.doi.org/10.1016/j.psychres.2016.04.103>
- NCCMH (2012). *Self-harm: Longer-term management. The NICE Guideline on longer-term management. National Clinical Guideline Number 133*. Leicester, UK: National Collaborating Centre for Mental Health, commissioned by the National Institute for



Health and Clinical Excellence. The British Psychological Society & The Royal College of Psychiatrists.

- Nitkowski D, & Petermann F. (2011). [Non-suicidal self-injury and comorbid mental disorders: a review]. *Fortschritte der Neurologie-psychiatrie*, 79(1), 9-20.  
<https://doi.org/10.1055/s-0029-1245772>
- Nock, M. K. (2009). *Understanding Non-suicidal Self-injury: Origins, Assessment, and Treatment*. Washington, DC: American Psychological Association.
- O'Keefe, D. J. (2000). Guilt and social influence. *Annals of the International Communication Association*, 23(1), 67-101. <https://doi.org/10.1080/23808985.2000.11678970>
- Olson, S. L., Bates, J. E., & Bayles, K. (1990). Early antecedents of childhood impulsivity: The role of parent-child interaction, cognitive competence, and temperament. *Journal of abnormal child psychology*, 18(3), 317-334.
- Pascuzzo, K., Cyr, C., & Moss, E. (2013). Longitudinal association between adolescent attachment, adult romantic attachment, and emotion regulation strategies. *Attachment & Human Development*, 15(1), 83-103. <https://doi.org/10.1080/14616734.2013.745713>
- Peterson, R. A., & Brown, S. P. (2005). On the use of beta coefficients in meta-analysis. *Journal of Applied Psychology*, 90(1), 175-181. <https://doi.org/10.1037/0021-9010.90.1.175>
- Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., ... & Duffy, S. (2006). Guidance on the conduct of narrative synthesis in systematic reviews. A *Product from the ESRC methods programme, Version 1*, b92.
- Serafini, G., Canepa, G., Adavastro, G., Nebbia, J., Belvederi Murri, M., Erbuto, D., ... & Amore, M. (2017). The relationship between childhood maltreatment and non-suicidal self-injury: A systematic review. *Frontiers in Psychiatry*, 8, 149.  
<https://doi.org/10.3389/fpsy.2017.00149>

- Snilstveit, B., Oliver, S., & Vojtkova, M. (2012). Narrative approaches to systematic review and synthesis of evidence for international development policy and practice. *Journal of Development Effectiveness*, 4(3), 409-429.  
<https://doi.org/10.1080/19439342.2012.710641>
- Sterne, J.A.C., Savović, J., Page, M.J., Elbers, R.G., Blencowe, N.S., Boutron, I., ... & Sterne, J.A.C. (2019). RoB 2: A Revised tool for assessing risk of bias in randomised trials. *BMJ*, 366, 14898. Retrieved on 5<sup>th</sup> January 2020 from:  
<https://sites.google.com/site/riskofbiastool/welcome/rob-2-0-tool?authuser=0>
- Stone, A. A., Bachrach, C. A., Jobe, J. B., Kurtzman, H. S., & Cain, V. S. (Eds.). (1999). *The science of self-report: Implications for research and practice*. USA: Psychology Press.
- Taylor, P. J., Jomar, K., Dhingra, K., Forrester, R., Shahmalak, U., & Dickson, J. M. (2018). A meta-analysis of the prevalence of different functions of non-suicidal self-injury. *Journal of Affective Disorders*, 227, 759-769. <https://doi.org/10.1016/j.jad.2017.11.073>
- Titelius, E. N., Cook, E., Spas, J., Orchowski, L., Kivisto, K., O'Brien, K., ... & Seymour, K. E. (2018). Emotion dysregulation mediates the relationship between child maltreatment and non-suicidal self-injury. *Journal of Aggression, Maltreatment & Trauma*, 27(3), 323-331. <https://doi.org/10.1080/10926771.2017.1338814>
- Turner, B. J., Dixon-Gordon, K. L., Austin, S. B., Rodriguez, M. A., Rosenthal, M. Z., & Chapman, A. L. (2015). Non-suicidal self-injury with and without borderline personality disorder: differences in self-injury and diagnostic comorbidity. *Psychiatry Research*, 230(1), 28-35. <https://doi.org/10.1016/j.psychres.2015.07.058>
- Van de Mortel, T. F. (2008). Faking it: social desirability response bias in self-report research. *Australian Journal of Advanced Nursing*, 25(4), 40-48.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: the disposition to experience aversive emotional states. *Psychological Bulletin*, 96(3), 465-490.

- Wolff, J. C., Thompson, E., Thomas, S. A., Nesi, J., Bettis, A. H., Ransford, B., ... & Liu, R. T. (2019). Emotion dysregulation and non-suicidal self-injury: A systematic review and meta-analysis. *European Psychiatry*, 59, 25-36.  
<http://dx.doi.org/10.1016/j.eurpsy.2019.03.004>
- Wrath, A. J., & Adams, G. C. (2019). Self-injurious behaviors and adult attachment: A review of the literature. *Archives of Suicide Research*, 23(4), 527-550.  
<https://doi.org/10.1080/13811118.2018.1486251>
- Wright, S. L., Firsick, D. M., Kacmarski, J. A., & Jenkins- Guarnieri, M. A. (2017). Effects of attachment on coping efficacy, career decision self- efficacy, and life satisfaction. *Journal of Counseling & Development*, 95(4), 445-456.  
<https://doi.org/10.1002/jcad.12159>
- Wu, C. H. (2009). The relationship between attachment style and self-concept clarity: The mediation effect of self-esteem. *Personality and Individual Differences*, 47(1), 42-46.  
<https://doi.org/10.1016/j.paid.2009.01.043>
- Zeng, X., Zhang, Y., Kwong, J. S., Zhang, C., Li, S., Sun, F., ... & Du, L. (2015). The methodological quality assessment tools for preclinical and clinical studies, systematic review and meta- analysis, and clinical practice guideline: A systematic review. *Journal of Evidence-based Medicine*, 8(1), 2-10. <https://doi.org/10.1111/jebm.12141>

## Appendices

**Appendix A.** Search string employed for electronic database searches.

“self-harm”, OR “self harm”, OR “non-suicidal self injury”, OR “non suicidal self injury”,  
OR “self-injury”, OR “self injury”, OR “NSSI”, OR “deliberate self-harm”, OR “deliberate  
self harm”, OR “self-cut”, OR “self cut”, OR “self-mutil\*”, OR “self-inflicted injur\*” AND  
“early life experiences” OR “childhood experiences” OR “adverse early life events” OR  
“childhood events” OR “early trauma” OR “early life adversity” OR “early life stress” OR  
“attachment” OR “attach\*” OR “emotion regulation” OR “emotion dysregulation” OR  
“mood regulation” OR “affect regulation” OR “emotion process” AND “adults” OR  
“adulthood” OR “grown-up” OR “mature person” OR “grown\*”

**Appendix B.** Summary of reviewed studies' characteristics, effect sizes and key findings.

| Study                 | Country | Type of study | Sample size | Gender (% of females) | Mean Age (years) | Diagnosis    | Recruitment method                           | Type of outcome measure        | Possible mediators/moderators   | Effect sizes of direct relationship (Cohen's d)  | Key findings   |
|-----------------------|---------|---------------|-------------|-----------------------|------------------|--------------|--|--------------------------------|---|--|--|
| Arens et al. (2012)   | USA     | OCS           | 407         | 65%                   | 20.33            | Not assessed | University                                   | Self-report                    | Negative Urgency  | 0.05   | Negative urgency mediated the relationship between CM and NSSI   |
| Arens et al. (2014)   | USA     | OCS           | 641         | 73%                   | 19.68            | Not assessed | University                                   | Self-report                    | Negative urgency, Distress Tolerance, Sense of Control and Desire for control | 0.02   | CM directly associated with NSSI and via distress tolerance and negative urgency.  |
| Arney et al. (2012)   | USA     | OEMA          | 36          | 75%                   | 18.70            | Not assessed | University                                   | Self-report                    | Affect Dysregulation  | 0.43 for sexual abuse<br>0.61 for physical abuse | CM before the age of 6 was significantly associated with NSSI. The interaction of trauma history and affect dysregulation was not significant.                   |
| Bedi et al. (2014)    | Canada  | OCS           | 167         | 100%                  | 39.95            | Not assessed | Women Recovering from Abuse Program          | Self-report & Projective tests | N/A   | 0.65 for ER<br>0.27 for attachment               | NSSI group reported greater difficulties with ER.<br>No significant difference between groups with regards to attachment.<br>Cumulative risk predicted NSSI.     |
| Bentley et al. (2017) | USA     | RCT           | 10          | 90%                   | 21.3             | Several      | Referred by institutions, online recruitment | Self-report & Clinical reports | N/A   | N/A  | Significantly smaller proportions of NSSI acts during the mindful emotion awareness, cognitive reappraisal, and follow-up phases compared to the baseline phase. |

|                           |          |     |                             |                              |                                |   |  |             |                                |  |  |
|---------------------------|----------|-----|-----------------------------|------------------------------|--------------------------------|---|--|-------------|--------------------------------|--|--|
| Bolen et al. (2012)       | USA      | OCS | 78                          | Not reported                 | 34.2                           | Adult survivors of childhood sexual abuse         | Specific Agency  | Self-report | N/A                            | -0.44  | Attachment was a significant predictor of NSSI.  |
| Bornovalova et al. (2011) | USA      | OCS | 180                         | 28%                          | 43.05                          | Substance abuse                                   | Inpatient unit   | Self-report | N/A                            | 0.55   | Only sexual abuse had a significant effect on NSSI.  |
| Braga & Gonçalves (2014)  | Portugal | OCS | 518                         | 67%                          | 20.9                           | Not reported                                      | University   | Self-report | N/A                            | -0.27 for anxiety<br>-0.29 for comfort with proximity<br>-0.14 for trust in others.  | Significant differences between NSSI group and non-NSSI group with regards to attachment variables.  |
| Buckholdt et al. (2015)   | USA      | OCS | Study 1: 118<br>Study 2: 82 | Study 1: 76%<br>Study 2: 48% | Study 1: 20.9<br>Study 2: 36.6 | Study 1: Not reported<br>Study 2: Substance abuse | Study 1: University<br>Study 2: Residential substance abuse treatment facility | Self-report | N/A                            | Study 1: 0.09  | No significant differences between NSSI and non-NSSI groups with regards to total ER scale. Differences were reported for certain ER aspects (e.g. goal directed behaviors). |
| Bureau et al. (2010)      | Canada   | OCS | 1238 (105 with NSSI)        | 71.6%                        | 19.4                           | Not assessed                                      | Online university system for psychology students                               | Self-report | N/A                            | -0.03 for failed protection<br>-0.03 for anger<br>0.11 for fear<br>0.01 for care, & overprotection<br>0.02 for trust<br>-0.02 for communication<br>0.05 for alienation | Attachment variables predicted NSSI but not in men.  |
| Caron et al. (2017a)      | Canada   | OCS | 406                         | 85%                          | 19.87                          | Not assessed                                      | University   | Self-report | Intimate partner victimization | 0.12   | CM was directly associated with NSSI.  |
| Caron et al. (2017b)      | Canada   | OCS | 263                         | 87.8%                        | 20.5                           | Not assessed                                      | Introductory psychology courses and external advertisements                    | Self-report | N/A                            | 0.53   | Insecure attachment and particularly anxiety was related to NSSI behaviors.  |

|                            |         |     |                             |                                 |  |                               |  |                                  |                               |  |  |
|----------------------------|---------|-----|-----------------------------|---------------------------------|--|-------------------------------|--|----------------------------------|-------------------------------|--|--|
| Chang et al. (2019)        | USA     | OCS | 287                         | 100%                            | 20.2                                       | Unclear                       | University                               | Self-report                      | N/A                           | 0.12                                     | Sexual assault consistently accounted for unique variance in NSSI.   |
| Claes et al. (2016)        | Belgium | OCS | 42                          | 71.4%                           | 22.76                                      | Not assessed                  | Through Facebook                         | Self-report & Experimental       | Communication with the mother | 0.90 for communication<br>0.33 for trust | The results showed that students with a more enhanced attentional focus on their mother and low Trust in their mother had a significant higher probability to engage in NSSI compared to students with high Trust in their mother; however, for students with a low attentional focus on mother, the level of Trust did not influence the probability to engage in NSSI. |
| Davis et al. (2014)        | USA     | OCS | Study 1: 148<br>Study 2: 48 | Study 1: 42.6%<br>Study 2: 100% | Study 1: 43.7<br>Study 2: 28               | Depression, Anxiety           | Postings online – part of a larger study | Self-report & Lab-based          | N/A                           | Study 1: 0.70<br>Study 2: 0.81           | Study 1: The results suggest that although the control groups reduced negative emotion with reappraisal, the NSSI did not.<br>Study 2: NSSI group reported less successful regulation in the amygdala.   |
| Dixon-Gordon et al. (2014) | USA     | OCS | 246                         | 36.2%                           | 35.6                                       | Mainly PTSD and substance-use | Residential SUD treatment facility       | Clinician report and self-report | N/A                           | 0.46                                     | Sexual assault related trauma was a significant predictor of NSSI.   |
| Evren & Evren (2005)       | Turkey  | OCS | 136                         | 0%                              | 28.5 (NSSI group)<br>40.6 (non-NSSI group) | Substance-dependence          | State hospital                           | Self-report                      | N/A                           | 0.61                                     | Childhood physical abuse predicted NSSI.   |
| Evren et al. (2006)        | Turkey  | OCS | 112                         | 0%                              | 27.8 (NSSI group)<br>36.7 (non-            | Substance-dependence          | State hospital                           | Self-report + Clinical report    | N/A                           | 0.43                                     | Childhood physical abuse predicted NSSI.   |

|                             |           |     |      |       |  |  |  |             |   |   |  |
|-----------------------------|-----------|-----|------|-------|--|--|--|-------------|---|---|--|
|                             |           |     |      |       | NSSI group)                                |  |  |             |   |   |  |
| Evren et al. (2011)         | Turkey    | OCS | 156  | 0%    | 38.7 (NSSI group)<br>47.1 (non-NSSI group) | Alcohol Dependent                          | State Hospital   | Self-report | N/A   | 0.51  | CM was related to NSSI but not a predictor to it.  |
| Ewing et al. (2019)         | Canada    | OLT | 1132 | 70.5% | 19.11                                      | Not assessed                               | Posters, classroom announcements, website postings and residence visits. | Self-report | ER  | 0.005   | ER mediated the relationship between stressful experiences and NSSI (bidirectionally)  |
| Franzke et al. (2015)       | Germany   | OCS | 87   | 100%  | 41.32                                      | Unclear                                    | Inpatient clinic   | Self-report | Dissociative, Post-traumatic, depressive symptoms | 0.06  | Dissociation independently mediated the relation between CM and NSSI, but not the other mediators.   |
| Gholam-rezaei et al. (2017) | Iran      | OCS | 556  | 57.2% | 22.65                                      | Not assessed                               | University   | Self-report | N/A   | Non-acceptance: 0.08 (women)<br>Impulse: 0.02 (women), 0.21 (men)<br>Awareness: 0.23 (women)<br>Strategies: 0.06 (women), 0.05 (men)<br>Goals: 0.05 (men) | No DERS subscale significantly predicted NSSI after controlling for anxiety and suicide ideation.  |
| Gladstone et al. (2004)     | Australia | OCS | 126  | 100%  | 37.8                                       | Depression, Dysthymia, Adjustment disorder | Mood Disorders Unit at a hospital  | Self-report | Personality Dysfunction                           | 0.40  | Childhood physical & emotional abuse and neglect were associated with NSSI via personality dysfunction. Direct effect of sexual abuse on NSSI. |
| Gratz (2006)                | USA       | OCS | 249  | 100%  | 23.29                                      | Not assessed                               | Psychology courses   | Self-report | N/A   | 0.49 for childhood maltreatment   | Among women with a history of self-harm, emotional inexpressivity was associated with more frequent self-harm, as was                          |



|                        |     |     |     |      |       |   |  |             |                       |   |   |
|------------------------|-----|-----|-----|------|-------|---|--|-------------|-----------------------|---|---|
|                        |     |     |     |      |       |   |  |             |                       | 0.14 for emotion dysregulation  | the combination of greater maltreatment, greater inexpressivity and lower levels of positive affect intensity/reactivity.   |
| Gratz & Chapman (2007) | USA | OCS | 97  | 0%   | 22.67 | Not assessed  | University   | Self-report | N/A                   | -1.39 for sexual abuse<br>1.83 for physical abuse<br>0.03 for emotion dysregulation | Only physical abuse and emotion dysregulation reliably predicted NSSI.  |
| Gratz et al. (2002)    | USA | OCS | 133 | 67%  | 22.73 | Not assessed  | University   | Self-report | N/A                   | 0.13 for sexual abuse<br>0.11 for physical abuse                                    | Physical abuse was not a unique predictor to NSSI and sexual abuse was not a predictor for men.   |
| Gratz et al. (2015)    | USA | RCT | 61  | 100% | 33    | Borderline Personality Disorder                           | Clinical referrals & advertisements                            | Self-report | ER                    | 0.10  | No significant correlation between ER and NSSI (when examined directly). Significant effects were reported for their indirect correlation based on changes in BPD affective + cognitive symptoms.   |
| Gratz & Roemer (2008)  | USA | OCS | 249 | 100% | 23.29 | Not assessed  | Undergraduate psychology courses                               | Self-report | Emotion Dysregulation | 0.37 for emotion dysregulation<br>0.37 for CM                                       | CM and emotion dysregulation independently predicted NSSI. However emotion dysregulation was not a mediator between CM and NSSI. (only strategies were a significant mediator).   |
| Gratz & Tull (2010)    | USA | OCS | 61  | 46%  | 44.45 | Cocaine dependence, PTSD, Borderline personality disorder | Inpatient residents in drug and alcohol abuse treatment center | Self-report | N/A                   | 0.55  | No significant differences in emotion dysregulation between participants with and without recent NSSI. Even when controlling for the influence of other risk factors emotion dysregulation, remained significantly higher among NSSI group. |

|                             |           |     |                |      |       |                                       |  |                                   |  |  |   |
|-----------------------------|-----------|-----|----------------|------|-------|---------------------------------------|--|-----------------------------------|--|--|---|
| Gratz, Tull & Levy (2014)   | USA       | RCT | 61             | 100% | 33    | Borderline Personality Disorder       | Referrals by clinicians & self-referrals                             | Self-report                       | N/A  | N/A  | Particular improvements in NSSI after ER group therapy.   |
| Guerin-Marion et al. (2019) | Canada    | OCS | 114            | 89%  | 20.4  | Not assessed                          | University   | Self-report                       | ER   | 0.63 for non-acceptance of emotions<br>0.03 for goal directed behaviors<br>0.68 for impulse control<br>0.37 for emotional awareness<br>0.77 for limited access to strategies<br>0.78 for emotional clarity | Significant indirect effects of maternal maltreatment on NSSI through limited access to ER strategies, lack of emotional clarity, and difficulties engaging in goal-directed behavior. Indirect effects from paternal maltreatment were only apparent through poorer emotional clarity. |
| Gunter et al. (2011)        | USA       | OCS | 337 (14% NSSI) | 35%  | 33.9  | Several                               | Community corrections office   | Self-report and community records | N/A  | 0.47   | CM was a significant predictor of NSSI  |
| Hallab & Covic (2010)       | Australia | OCS | 114            | 81%  | 18.89 | Depression and anxiety                | University-based research participation system: psychology students. | Self-report                       | Mood states  | 0.05   | No significant effect of mother attachment on NSSI, although lower attachment scores were reported by the NSSI group.   |
| Howard et al. (2017)        | UK        | OCS | 89             | 100% | 34.52 | 59.6% were on psychotropic medication | Female prison  | Self-report                       | PTSD symptoms, emotion regulation and dissociation | 0.75 for emotion abuse<br>0.50 for physical abuse<br>0.67 for sexual abuse<br>0.40 for emotion neglect<br>0.38 for physical neglect<br>0.43 for multiple traumas   | Emotion dysregulation mediated the effect of CM on NSSI.  |

|                               |             |                               |                           |        |                                       |  |   |                               |                        |  |  |
|-------------------------------|-------------|-------------------------------|---------------------------|--------|---------------------------------------|--|---|-------------------------------|------------------------|--|--|
| Idig-Camuroglu & Golge (2018) | Turkey      | OCS                           | 1000 (only 285 with NSSI) | 69%    | Not reported – majority between 18-20 | Not assessed                           | State and Private Universities            | Self-report                   | N/A                    | 0.03 for physical abuse in women<br>0.03 for emotion abuse in women<br>0.04 for emotion abuse in men<br>0.04 for sexual abuse in men<br>0.05 for physical abuse in men | All types of trauma had a significant effect on NSSI.<br>The interaction between gender and NSSI was significant only on the sexual abuse scale.                 |
| Johnstone et al. (2015)       | New Zealand | RCT but data reported was OCS | 372 (only 11% with NSSI)  | 64%    | 33.3                                  | Non-psychotic major depression episode | Outpatients                               | Clinician-rated & self-report | N/A                    | 0.22 general abuse<br>0.17 sexual abuse  | Not direct association between CM and NSSI   |
| Krazler et al. (2016)         | USA         | OCS                           | 148                       | 70.9%  | 21.48                                 | Not assessed                           | University                                | Self-report                   | Internalizing symptoms | 0.04   | Direct path from emotion dysregulation to NSSI was not significant. However, the indirect association via internalizing symptoms was significant.                |
| Lear & Pepper (2016)          | USA         | OCS                           | 146                       | 83.65% | 19.32                                 | Not assessed                           | Psychology participant pool at University | Self-report                   | Self-Concept clarity   | 0.96 for lifetime NSSI<br>1.04 for NSSI versatility  | Emotion dysregulation was a predictor of lifetime NSSI and NSSI versatility.   |
| Macrynikola                   | New York    | OCS                           | 1712 (18% NSSI)           | 81%    | 22.76                                 | Not assessed                           | College                                   | Self-report                   | Social connectedness   | 0.19   | Stressful events were associated with NSSI, but there was no interaction with social connectedness.  |
| Martin, A. et al. (2011)      | USA         | OCS                           | 455                       | 43%    | 40.11                                 | Several                                | Flyers in clinics                         | Self-report                   | N/A                    | 0.70   | No significant differences in emotion dysregulation between with and without recent NSSI. Higher levels of emotion dysregulation between NSSI and no NSSI group. |

|                          |         |     |                                  |       |       |              |   |             |     |  |  |
|--------------------------|---------|-----|----------------------------------|-------|-------|--------------|---|-------------|-----|--|--|
| Martin et al. (2011)     | Canada  | OCS | 1296 (only 90 with NSSI actions) | 74.6% | 19.29 | Not assessed | University  | Self-report | N/A | 1.02   | The NSSI-action group reported significantly higher severity of sexual abuse history than participants in the other two groups |
| Martin et al. (2015)     | Canada  | OCS | 528                              | 77.6% | 19.32 | Not assessed | From introductory psychology courses  | Self-report | N/A | For negative invalidating: -0.14 (1-5 times) and 0.14 (more than 5 times).<br>For positive moderate: 0.24 (1-5 times) and -0.24 (more than 5 times)<br>For positive idealistic: 0.05 (1-5 times) and -0.05 (more than 5 times)<br>For negative disturbed: -0.22 (1-5 times) and 0.22 (more than 5 times) | Four different profiles were identified and the NSSI group differed significantly in these groups from the non-NSSI group.     |
| Martin et al. (2016)     | Canada  | OCS | 957                              | 78%   | 20.14 | Not assessed | Research participant pool at a University   | Self-report | N/A | 0.20   | Adverse life events were uniquely associated with NSSI.  |
| Martin et al. (2017)     | Canada  | OCS | 120                              | 88%   | 20.38 | Not assessed | Research participant pool at a University & external advertisements posted online | Self-report | N/A | 0.34 for preoccupied attachment<br>0.10 for dismissing attachment  | Preoccupied, but not dismissing states of mind were significant predictors of NSSI.  |
| McLafferty et al. (2019) | Ireland | OCS | 716                              | 63%   | 20.69 | Not reported | University  | Self-report | N/A | 0.37   | Individuals with CM, who experience stress, were more likely to experience NSSI.   |

|                       |         |     |        |  |  |                                 |                                  |             |                      |  |   |
|-----------------------|---------|-----|--------|--|--|---------------------------------|----------------------------------|-------------|----------------------|--|---|
| McMahon et al. (2018) | USA     | OCS | 34,653 | 58%  | Not reported – All above 18 years old                      | Not reported                    | Data drawn from a national study | Self-report | Unclear              | For emotional neglect: 0.52 in men and 0.54 in women<br>For physical neglect: 0.71 in men and 0.91 in women<br>For emotional abuse: 0.72 in men and 0.77 in women<br>For sexual abuse: 0.96 in men and 0.99 in women<br>For physical abuse: 0.76 in men and 0.89 in women. | Significant effect of CM on NSSI and specifically, child sexual abuse.  |
| Merza et al. (2017)   | Hungary | OCS | 80     | 81.4% in the moderate NSSI group and 94.7% in the super NSSI group | 29.6 the moderate NSSI group and 29.7 the super NSSI group | Borderline Personality disorder | Public Psychiatric hospitals     | Self-report | N/A                  | -0.07 for physical abuse<br>0.21 for sexual abuse  | CM significantly related with more NSSI engagement.   |
| Midkiff et al. (2018) | USA     | OCS | 187    | 76.5%  | 20.21  | Not assessed                    | University and word-of-mouth     | Self-report | Coping Self-efficacy | 0.79   | Emotion dysregulation was a unique predictor to NSSI.   |
| Molaie et al. (2019)  | USA     | OCS | 200    | 53.5%  | 35.4   | Several                         | Clinical referrals               | Self-report | Emotional pain       | -0.03 for secure attachment<br>0.08 for preoccupied attachment<br>0.01 for dismissing attachment<br>0.04 for fearful attachment  | Preoccupied attachment was the sole significant independent predictor of NSSI.<br>Acute emotional pain was a significant partial mediator of the relationship between preoccupied attachment style and lifetime NSSI. |

|                            |             |     |                           |       |       |   |                                   |             |   |   |  |
|----------------------------|-------------|-----|---------------------------|-------|-------|---|-----------------------------------|-------------|---|---|--|
| Muehlenkamp et al. (2010)  | USA         | OCS | 2238                      | 66%   | 19.7  | Not assessed                                      | University                        | Self-report | N/A   | 0.35  | Participants with CM were significantly more likely to report NSSI.  |
| Muehlenkamp et al. (2013)  | USA         | OCS | 398                       | 74.6% | 20.25 | Not assessed                                      | University                        | Self-report | N/A   | 0.03  | Emotion dysregulation did not predict NSSI. Significant association between emotion dysregulation and NSSI only among individuals with low body regard.  |
| Nada-Raja & Skegg (2011)   | New Zealand | OLT | 916                       | 49%   | 26    | Several   | From a cohort study               | Self-report | N/A   | 0.51 for men<br>0.22 for women  | For both genders, childhood sexual abuse was not a significant predictor of NSSI.  |
| Navarro-Haro et al. (2015) | Spain       | OCS | 91 - 68 in final analysis | 100%  | 27.48 | Borderline Personality Disorder & Eating Disorder | Private clinic                    | Self-report | N/A   | 0.05 for cognitive reappraisal<br>0.07 for expressive suppression       | Expressive suppression was related to an increase in NSSI. In addition, the level of expressive suppression determined the effect cognitive reappraisal had on NSSI (and vice versa).                              |
| Nicolai et al. (2016)      | USA         | OCS | 142                       | 72%   | 19.3  | Not assessed                                      | Classroom recruitment             | Self-report | N/A   | 0.33  | Significant effect of rumination on NSSI.  |
| Nobakht & Dale (2017)      | Iran        | OCS | 200                       | 50%   | 25.1  | Not assessed                                      | University                        | Self-report | Dissociation, Depersonalization/derealization | 0.04  | Childhood trauma was associated to NSSI. Depersonalization/derealization mediated the relationship between childhood trauma and NSSI, while dissociation mediated the relationship between recent trauma and NSSI. |
| O'Neill et al. (2018)      | Ireland     | OCS | 739                       | 62.5% | 21    | Mood disorders, GAD, Alcohol dependence           | University                        | Self-report | N/A   | 0.94 for high risk adversities<br>0.56 for moderate risk of adversities | Association between NSSI and moderate or high levels of childhood adversities.   |
| Oyefeso et al. (2008)      | UK          | OCS | 80                        | 27.5% | 38.4  | Stimulant-dependence                              | Inpatient and outpatient settings | Self-report | N/A   | 0.45  | Sexual harassment independently predicted NSSI.  |

|                               |           |     |                           |       |              |                                 |                                  |             |                                       |  |  |
|-------------------------------|-----------|-----|---------------------------|-------|--------------|---------------------------------|----------------------------------|-------------|---------------------------------------|--|--|
| Paivio & McCulloch (2004)     | Canada    | OCS | 100                       | 100%  | 21           | Not reported                    | Pool of students                 | Self-report | Alexithymia                           | 0.80   | A significant path from childhood maltreatment to NSSI, which was not significant after controlling for alexithymia.       |
| Richmond-Rakerd et al. (2018) | Australia | OCS | 9526                      | 58.6% | 31.7         | Not assessed                    | Twin Registry                    | Self-report | N/A                                   | 0.01   | Correlation between high-risk trauma exposure and NSSI.  |
| Rodriguez-srednicki (2002)    | USA       | OCS | 441 (only 4.1% with NSSI) | 100%  | 20.6         | Not assessed                    | Public colleges and Universities | Self-report | Dissociation                          | 0.41   | No significant difference between childhood sexual abuse and no sexual abuse group with regards to NSSI.                   |
| Roe-Sepowitz (2007)           | USA       | OCS | 256 (109 with NSSI)       | 100%  | 35.46        | Not assessed                    | From prisons                     | Self-report | N/A                                   | 0.96 for emotional abuse<br>0.83 for sexual abuse  | Significant association between CM and NSSI.   |
| Sansone et al. (1995)         | USA       | OCS | 152                       | 100%  | Not reported | Borderline Personality Disorder | Health maintenance organisation  | Self-report | N/A                                   | 1.01 for sexual abuse and physical abuse   | Sexual abuse and physical abuse were predictive of NSSI.   |
| Swannell et al. (2012)        | Australia | OCS | 11,423 (186 with NSSI)    | 62.2% | 52.11        | Several                         | Electronic white pages           | Self-report | Dissociation, alexithymia, self-blame | 0.95 for females<br>0.69 for males   | CM increased the odds of NSSI and particularly physical abuse.   |
| Talmon & Ginzburg (2018)      | Israel    | OCS | 766                       | 65%   | 25.95        | Not assessed                    | Social media networks            | Self-report | Dissociation                          | 0.70   | Childhood sexual abuse had a significant effect on NSSI, even after controlling for dissociation.                          |
| Tatnell et al. (2018)         | Australia | OCS | 237                       | 89.5% | 20.77        | Not assessed                    | University                       | Self-report | Emotion dysregulation variables       | -0.06 for secure attachment<br>-0.04 for dismissing attachment<br>0.02 for preoccupied attachment<br>0.14 for fearful attachment<br>0.03 for suppression | Attachment-related anxiety with mothers indirectly predicted NSSI through limited access to emotion regulation strategies. |

|                            |       |     |                    |       |              |  |   |                         |      |  |   |
|----------------------------|-------|-----|--------------------|-------|--------------|--|---|-------------------------|------|--|---|
|                            |       |     |                    |       |              |  |   |                         |      | 0.02 for reappraisal<br>-0.03 for non-acceptance<br>0.09 for lack of goals<br>0.06 for impulse control<br>0 for awareness<br>0.04 for strategies<br>0.04 for clarity |   |
| Terzi et al. (2017)        | Italy | OCS | 79                 | 79.7% | 34           | Borderline Personality Disorder                    | Outpatient centers  | Self-report             | N/A  | 0.07   | Emotion dysregulation was a significant predictor of NSSI.  |
| Tresno et al. (2013)       | Japan | OCS | 313 (31 with NSSI) | 50%   | 19           | Not reported                                       | Psychology classes  | Self-report             | N/A  | 0.12   | CM was an independent predictor of NSSI, however, its interaction with emotion dysregulation made it a stronger predictor.                            |
| Van der Kolk et al. (1991) | USA   | OLT | 74                 | 52%   | Not reported | Borderline Personality Disorder (32%)              | Clinical settings, advertisements and local probation department                              | Self-report             | N/A  | 0.05 for physical abuse<br>0.07 for sexual abuse   | Childhood trauma predicted NSSI and particularly sexual abuse – the earlier the trauma the more cutting. Dissociation improved the predictive models. |
| Wachter et al. (2009)      | UK    | OCS | 58                 | 72%   | 37.05        | Mood disorders, anxiety disorders and dissociation | Community mental health teams, psychiatry outpatient clinics and clinical psychology services | Self-report & Interview | N/A  | 1.03   | CM was a significant predictor of NSSI and particularly physical abuse.   |
| Weaver et al. (2004)       | USA   | OCS | 89                 | 100%  | 33.06        | PTSD   | Through flyers and letters  | Self-report             | PTSD | -0.06  | Age of onset of sexual abuse significantly predicted NSSI and via PTSD.   |



|                         |        |     |                    |       |                             |                                 |   |  |                               |   |  |
|-------------------------|--------|-----|--------------------|-------|-----------------------------|---------------------------------|---|--|-------------------------------|---|--|
| Weintraub et al. (2017) | USA    | OCS | 142                | 70.4% | 34.2                        | Depression, Bipolar             | Registry database program, referrals and posting flyers | Self-report & clinician rated  | N/A                           | 0.51  | Significant association between NSSI and emotion regulation.   |
| Wilcox et al. (2012)    | USA    | OLT | 1081               | 54%   | Not reported (range: 17-19) | Not assessed                    | Public University                                       | Self-report  | N/A                           | 0.53  | Affect dysregulation was a significant predictor of NSSI, even after controlling for lifetime suicide attempt.   |
| Yates et al. (2008)     | USA    | OLT | 155 (26 with NSSI) | 51.6% | 26                          | Not reported                    | From a longitudinal study of parents and children       | Direct interviews, caregiver interviews, from medical records and teacher interviews | Dissociation and somatization | 1.25 for sexual abuse<br>1.10 for physical abuse  | Child sexual abuse increased the likelihood of recurrent self-injury (dissociation as possible mediator), but was not predictive of intermittent NSSI. Child physical abuse was not predictive of recurrent NSSI but it was predictive of intermittent NSSI. |
| Yurkowski et al. (2015) | Canada | OCS | 1153 (79 NSSI)     | 79%   | 19.35                       | Not assessed                    | Psychology courses                                      | Self-report  | ER                            | 0.01 for ER<br>-0.01 for parent trust<br>-0.01 for parent communication<br>0.06 for parent alienation   | Alienated from parents was a predictor of NSSI. No direct effect of attachment on NSSI. ER predicted NSSI. ER mediated the effect of attachment on NSSI.   |
| Zanarini et al. (2011)  | USA    | OLT | 140                | 80.3% | 26.9                        | Borderline Personality Disorder | Hospital  | Interviews   | N/A                           | 0.54  | Childhood abuse was a predictor of NSSI over time.   |
| Zelkowitz et al. (2016) | USA    | OCS | 379 (24.46% NSSI)  | 79.1% | 18.62                       | Not assessed                    | Undergraduate research pool                             | Self-report  | N/A                           | -0.02 for expressive suppression<br>0.03 for cognitive reappraisal<br>0 for impulse<br>0.05 for strategies<br>0.02 for clarity<br>0.01 for directed goals | Only DERS strategies showed significant effect on NSSI.  |

|                            |        |     |                     |      |       |                       |  |                               |     |   |  |
|----------------------------|--------|-----|---------------------|------|-------|-----------------------|--|-------------------------------|-----|---|--|
|                            |        |     |                     |      |       |                       |  |                               |     | 0.01 for awareness<br>-0.02 for nonacceptance<br>-0.03 for Internal Functional<br>-0.03 for external dysfunctional<br>0.02 for external functional<br>0.04 for internal dysfunctional |  |
| Zlotnick et al. (1996)     | USA    | OCS | 148 (103 with NSSI) | 100% | 33    | Not specified         | Women's psychiatric unit                       | Self-report                   | N/A | 0.05  | Childhood sexual abuse was related to NSSI but could not be tested for predictive abilities due to high colinearity with dissociation. |
| Zweig-Frank et al. (1994a) | Canada | OCS | 150                 | 100% | 29    | Personality disorders | Outpatient department of a University hospital | Self-report & Clinician-rated | N/A | 0.14  | CM variables were not significant predictors of NSSI, although greater frequency of child sexual abuse was reported in NSSI group.     |
| Zweig-Frank et al. (1994b) | Canada | OCS | 121                 | 0%   | 31.45 | Personality disorders | University clinic and newspaper advertisements | Self-report & Clinician-rated | N/A | Not reported  | None of CM factors was a significant predictor of NSSI.  |

**Abbreviations:**

CM = childhood maltreatment

ER = emotion regulation

OCS = observational cross-sectional study

OLT = observational longitudinal study

OEMA = observational – ecological momentary assessment study

RCT = randomized controlled trial

**Appendix C.** Methods of computing effect sizes and standard error.

Computations were done with the use of online effect size calculators, such as the Psychometrica calculator ([https://www.psychometrica.de/effect\\_size.html](https://www.psychometrica.de/effect_size.html)) and the Campbell Collaboration calculator (<http://www.campbellcollaboration.org/escalc/html/EffectSizeCalculator-R2.php>) and by specific formulas provided in the Cochrane Handbook for Systematic Reviews, such as “SE = (upper limit – lower limit) / 3.92” when the 95% confidence interval was available (Higgins & Green, 2011). When only beta values were reported by the authors, specific formulas were used as recommended by Peterson and Brown (2005), who argued that it is better to use beta-values than to omit studies. Omitting studies could lead to biases in the review outcomes.

**Appendix D.** Quality assessment of observational studies.

a) Quality assessment of studies investigating childhood maltreatment and NSSI.

| Study                            | Selection<br>(maximum 5 stars)   |             |                 |                              | Comparability<br>(maximum 2 stars)                              | Outcome<br>(maximum 3 stars) |                           |
|----------------------------------|----------------------------------|-------------|-----------------|------------------------------|---|------------------------------|---------------------------|
|                                  | Representativeness of the sample | Sample size | Non-respondents | Ascertainment of risk factor | Subject groups comparability - confounding variables controlled | Assessment of the outcome    | Statistical analysis/test |
| Cross-sectional studies (N = 42) |                                  |             |                 |                              |   |                              |                           |
| Arens et al. (2012)              | ★                                | -           | -               | ★★                           | ★★  | ★                            | ★                         |
| Arens et al. (2014)              | ★                                | ★           | -               | ★★                           | ★★  | ★                            | ★                         |
| Armey et al. (2012)              | ★                                | -           | ★               | ★★                           | ★★  | ★★                           | -                         |
| Bornovalova et al. (2011)        | ★                                | ★           | ★               | ★★                           | ★★  | ★                            | ★                         |
| Caron et al. (2017a)             | ★                                | ★           | -               | ★★                           | ★★  | ★                            | ★                         |
| Chang et al. (2019)              | ★                                | ★           | -               | ★                            | ★★  | ★                            | -                         |
| Dixon-Gordon et al. (2014)       | ★                                | ★           | -               | ★★                           | ★★  | ★                            | -                         |
| Evren & Evren (2005)             | ★                                | ★           | ★               | ★★                           | ★   | ★                            | ★                         |
| Evren et al. (2006)              | ★                                | ★           | ★               | ★★                           | ★   | ★                            | ★                         |

|                                     |   |   |   |    |    |    |   |
|-------------------------------------|---|---|---|----|----|----|---|
| Evren et al. (2011)                 | ★ | ★ | ★ | ★★ | ★  | ★  | ★ |
| Franzke et al. (2015)               | ★ | ★ | - | ★★ | -  | ★  | ★ |
| Gladstone et al. (2004)             | ★ | ★ | ★ | ★  | ★★ | ★★ | - |
| Gratz & Chapman (2007)              | - | - | - | ★★ | ★★ | ★  | ★ |
| Gratz & Roemer (2008)               | ★ | ★ | - | ★★ | ★★ | ★  | ★ |
| Gratz et al. (2002)                 | - | - | - | ★★ | ★★ | ★  | - |
| Gunter et al. (2011)                | ★ | ★ | - | ★★ | ★★ | ★★ | ★ |
| Howard et al. (2017)                | ★ | ★ | ★ | ★★ | -  | ★  | ★ |
| Idig-Camuroglu & Golge (2018)       | ★ | ★ | ★ | ★★ | -  | ★  | - |
| Johnstone et al. (2015)             | ★ | ★ | - | ★  | ★★ | ★★ | ★ |
| Macrynika et al. (2018)             | ★ | ★ | - | ★  | ★★ | ★  | ★ |
| Martin et al. (2011)                | ★ | ★ | - | ★★ | ★★ | ★  | - |
| Martin et al. (2016)                | - | - | - | ★★ | ★★ | ★  | ★ |
| McLafferty et al. (2019)            | ★ | ★ | ★ | ★★ | ★★ | ★  | ★ |
| McMahon et al. (2018)               | ★ | ★ | ★ | ★★ | ★★ | ★  | ★ |
| Merza et al. (2017)                 | ★ | ★ | - | ★★ | ★★ | ★  | - |
| Muehlenkamp et al. (2010)           | - | - | - | ★★ | ★★ | ★  | - |
| Nobakht & Dale (2017)               | - | ★ | - | ★★ | ★★ | ★  | ★ |
| O'Neill et al. (2018)               | ★ | ★ | - | ★★ | ★★ | ★  | ★ |
| Oyefeso et al. (2008)               | ★ | ★ | ★ | ★★ | ★★ | ★  | ★ |
| Paivio & McCulloch (2004)           | ★ | ★ | ★ | ★★ | ★★ | ★  | - |
| Richmond-Rakerd et al. (2018)       | ★ | ★ | - | ★  | ★★ | ★★ | ★ |
| Rodriguez-srednicki (2002)          | - | - | - | ★★ | ★★ | ★  | - |
| Roe-Sepowitz (2007)                 | ★ | ★ | - | ★★ | -  | ★  | ★ |
| Sansone et al. (1995)               | ★ | - | - | ★  | -  | ★  | - |
| Swannell et al. (2012)              | ★ | ★ | - | ★★ | ★★ | ★  | ★ |
| Talmon & Ginzburg (2018)            | ★ | ★ | - | ★★ | ★★ | ★  | ★ |
| Tresno et al. (2013)                | - | ★ | - | ★★ | -  | ★  | - |
| Wachter et al. (2009)               | - | - | ★ | ★★ | ★★ | ★★ | - |
| Weaver et al. (2004)                | ★ | - | - | ★★ | ★★ | ★★ | - |
| Zlotnick et al. (1996)              | ★ | ★ | - | ★★ | ★★ | ★  | - |
| Zweig – Frank et al. (1994b)        | ★ | ★ | - | ★★ | ★★ | ★★ | - |
| Zweig – Frank et al. (1994a)-female | ★ | ★ | - | ★★ | ★★ | ★★ | - |
| Longitudinal studies (N = 4)        |   |   |   |    |    |    |   |
| Nada-Raja & Skegg (2011)            | ★ | ★ | - | ★  | ★★ | ★  | ★ |
| Van der Kolk et al. (1991)          | ★ | - | ★ | ★★ | -  | ★★ | - |
| Yates et al. (2008)                 | - | - | ★ | ★★ | ★★ | ★★ | ★ |
| Zanarini et al. (2011)              | ★ | ★ | - | ★★ | ★  | ★★ | ★ |

b) Quality assessment of studies investigating attachment and NSSI.

| Study                            | Selection<br>(maximum 5 stars)   |             |                 |                              | Comparability<br>(maximum 2 stars)                                | Outcome<br>(maximum 3 stars) |                           |
|----------------------------------|----------------------------------|-------------|-----------------|------------------------------|---|------------------------------|---------------------------|
|                                  | Representativeness of the sample | Sample size | Non-respondents | Ascertainment of risk factor | Subject groups - comparability - confounding variables controlled | Assessment of the outcome    | Statistical analysis/test |
| Cross-sectional studies (N = 12) |                                  |             |                 |                              |   |                              |                           |
| Bedi et al. (2014)               | ★                                | ★           | -               | ★★                           | ★★  | ★★                           | ★                         |
| Bolen et al. (2012)              | ★                                | -           | -               | ★★                           | -   | ★                            | -                         |
| Braga & Goncalves (2014)         | ★                                | ★           | -               | ★★                           | -   | ★                            | -                         |
| Bureau et al. (2010)             | -                                | -           | -               | ★★                           | ★★  | ★                            | ★                         |
| Caron et al. (2017b)             | ★                                | ★           | -               | ★★                           | ★★  | ★                            | -                         |
| Claes et al. (2016)              | -                                | -           | -               | ★★                           | ★★  | ★                            | ★                         |
| Hallab & Covic (2010)            | -                                | -           | -               | ★★                           | ★★  | ★                            | -                         |
| Martin et al. (2015)             | -                                | -           | ★               | ★★                           | ★★  | ★                            | -                         |
| Martin et al. (2017)             | ★                                | -           | -               | ★★                           | ★★  | ★                            | ★                         |
| Molaie et al. (2019)             | ★                                | ★           | -               | ★★                           | ★   | ★                            | ★                         |
| Tatnell et al. (2018)            | ★                                | ★           | -               | ★★                           | ★★  | ★                            | ★                         |
| Yurkowski et al. (2015)          | ★                                | ★           | -               | ★★                           | ★★  | ★                            | ★                         |

c) Quality assessment of studies investigating emotion dysregulation and NSSI.

| Study                            | Selection<br>(maximum 5 stars)   |             |                 |                              | Comparability<br>(maximum 2 stars)                                | Outcome<br>(maximum 3 stars) |                           |
|----------------------------------|----------------------------------|-------------|-----------------|------------------------------|---|------------------------------|---------------------------|
|                                  | Representativeness of the sample | Sample size | Non-respondents | Ascertainment of risk factor | Subject groups - comparability - confounding variables controlled | Assessment of the outcome    | Statistical analysis/test |
| Cross-sectional studies (N = 21) |                                  |             |                 |                              |   |                              |                           |
| Bedi et al. (2014)               | ★                                | ★           | -               | ★★                           | ★★  | ★★                           | ★                         |
| Buckholdt et al. (2015)          | ★                                | ★           | -               | ★★                           | ★★  | ★                            | -                         |
| Davis et al. (2014)              | ★                                | ★           | -               | ★                            | ★★  | ★★                           | -                         |
| Gholamrezaei et al. (2017)       | -                                | -           | -               | ★★                           | ★★  | ★                            | -                         |
| Gratz (2006)                     | -                                | -           | ★               | ★★                           | ★★  | ★                            | ★                         |
| Gratz & Chapman (2007)           | -                                | -           | -               | ★★                           | ★★  | ★                            | ★                         |
| Gratz & Roemer (2008)            | -                                | -           | -               | ★★                           | ★★  | ★                            | ★                         |
| Gratz & Tull (2010)              | ★                                | -           | -               | ★★                           | ★★  | ★                            | -                         |

|                              |   |   |   |    |    |    |   |
|------------------------------|---|---|---|----|----|----|---|
| Guerin-Marion et al. (2019)  | ★ | - | - | ★★ | ★★ | ★  | ★ |
| Krazler et al. (2016)        | - | - | - | ★★ | ★★ | ★  | - |
| Lear & Pepper (2016)         | ★ | ★ | - | ★★ | ★★ | ★  | - |
| Martin, A. et al. (2011)     | ★ | ★ | - | ★★ | ★★ | ★  | - |
| Midkiff et al. (2018)        | ★ | ★ | - | ★★ | ★★ | ★  | ★ |
| Muehlenkamp et al. (2013)    | - | - | - | ★★ | ★★ | ★  | ★ |
| Navarro-Haro et al. (2015)   | ★ | ★ | ★ | ★★ | -  | ★  | ★ |
| Nicolai et al. (2016)        | ★ | - | - | ★★ | ★★ | ★  | ★ |
| Tatnell et al. (2018)        | ★ | ★ | - | ★★ | ★★ | ★  | ★ |
| Terzi et al. (2017)          | ★ | - | - | ★★ | -  | ★  | - |
| Weintraub et al. (2017)      | ★ | ★ | - | ★★ | ★★ | ★★ | - |
| Yurkowski et al. (2015)      | ★ | ★ | - | ★★ | ★★ | ★  | ★ |
| Zelkowitz et al. (2016)      | ★ | ★ | - | ★★ | -  | ★  | - |
| Longitudinal studies (N = 2) |   |   |   |    |    |    |   |
| Ewing et al. (2019)          | ★ | ★ | ★ | ★★ | ★★ | ★  | ★ |
| Wilcox et al. (2012)         | ★ | ★ | ★ | ★★ | ★★ | ★  | ★ |

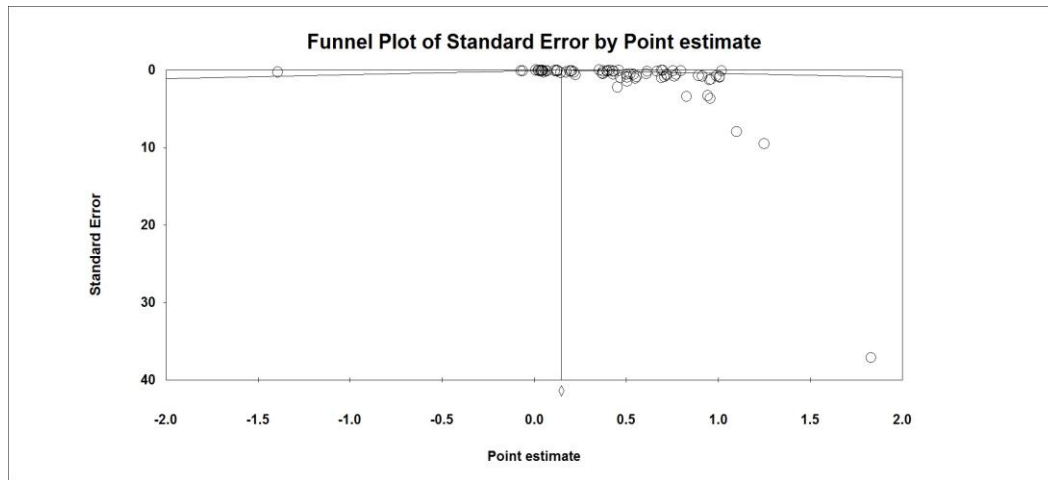
#### Appendix E. Quality assessment of randomized controlled trials (N=3).

| Domain   | Signaling Questions   | Studies being assessed |                     |                     |
|--|---|------------------------|---------------------|---------------------|
|  |   | Bentley et al. (2017)  | Gratz et al. (2014) | Gratz et al. (2015) |
| Domain 1: Risk of bias arising from the randomization process  | 1.1 Was the allocation sequence random?   | Y                      | Y                   | Y                   |
|  | 1.2 Was the allocation sequence concealed until participants were enrolled and assigned to interventions?                   | N                      | N                   | N                   |
|  | 1.3 Did baseline differences between intervention groups suggest a problem with the randomization process?                  | Y                      | Y                   | Y                   |
|  | Risk-of-bias judgement:   | High risk              | High risk           | High risk           |
| Domain 2: Risk of bias due to deviation from the intended interventions (effect of assignment to intervention) | 2.1 Were participants aware of their assigned intervention during the trial?  | PY                     | PY                  | PY                  |
|  | 2.2 Were carers and people delivering the interventions aware of participants' assigned intervention during the trial?      | Y                      | Y                   | Y                   |
|  | 2.3 If Y/PY/Ni to 2.1 or 2.2: Were there deviations from the intended intervention that arose because of the trial context? | PN                     | NI                  | NI                  |
|  | 2.4 If Y/PY to 2.3: Were these deviations likely to have affected the outcome?  | NA                     | NA                  | NA                  |
|  | 2.5 If Y/PY/Ni to 2.4: Were these deviations from intended intervention balanced between groups?                            | NA                     | NA                  | NA                  |
|  | 2.6 Was an appropriate analysis used to estimate the effect of assignment to intervention?                                  | Y                      | Y                   | Y                   |

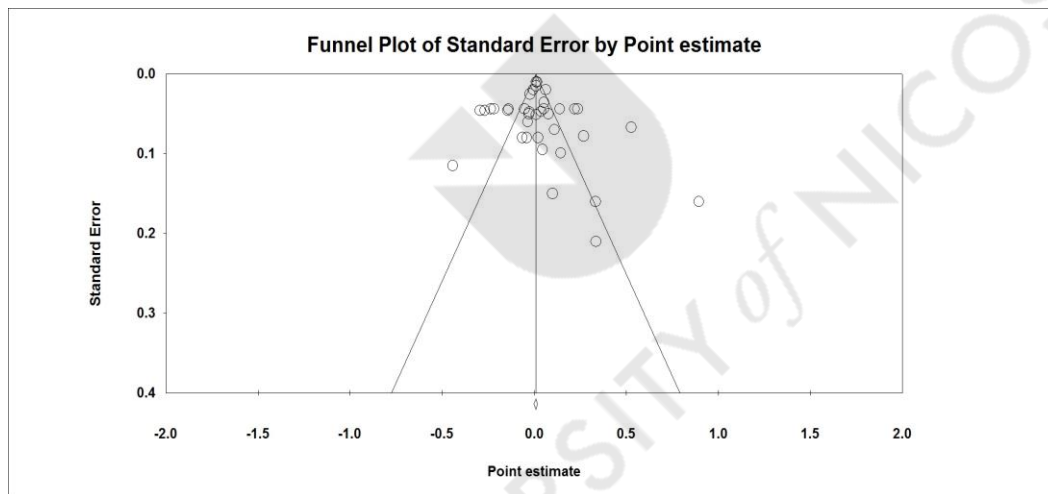
|  |   |           |               |               |
|--|---|-----------|---------------|---------------|
|  | 2.7 If N/PN/NI to 2.6: Was there potential for a substantial impact (on the result) of the failure to analyse participants in the group to which they were randomized?              | NA        | NA            | NA            |
|  | Risk-of-bias judgement:   | Low risk  | Some concerns | Some concerns |
| Domain 3: Risk of bias due to missing outcome data         | 3.1 Were data for this outcome available for all, or nearly all, participants randomized?   | Y         | N             | N             |
|  | 3.2 If N/PN/NI to 3.1: Is there evidence that the result was not biased by missing outcome data?  | NA        | Y             | Y             |
|  | 3.3 If N/PN to 3.2: Could missingness in the outcome depend on its true value?  | NA        | NA            | NA            |
|  | 3.4 If Y/PY/NI to 3.3: Is it likely that missingness in the outcome depended on its true value?   | NA        | NA            | NA            |
|  | Risk-of-bias judgement:   | Low risk  | Low risk      | Low risk      |
| Domain 4: Risk of bias in measurement of the outcome       | 4.1 Was the method of measuring the outcome inappropriate?  | N         | N             | N             |
|  | 4.2 Could measurement or ascertainment of the outcome have differed between intervention groups?  | N         | N             | N             |
|  | 4.3 If N/PN/NI to 4.1 and 4.2: Were outcome assessors aware of the intervention received by study participants?   | Y         | N             | N             |
|  | 4.4 If Y/PY/NI to 4.3: Could assessment of the outcome have been influenced by knowledge of intervention received?  | PY        | NA            | NA            |
|  | 4.5 If Y/PY/NI to 4.4: Is it likely that assessment of the outcome was influenced by knowledge of intervention received?  | PY        | NA            | NA            |
|  | Risk-of-bias judgement:   | High risk | Low risk      | Low risk      |
| Domain 5: Risk of bias in selection of the reported result | 5.1 Were the data that produced this result analysed in accordance with a pre-specified analysis plan that was finalized before unblinded outcome data were available for analysis? | PY        | PN            | PN            |
|  | Is the numerical result being assessed likely to have been selected on the basis of the results, from...  |           |               |               |
|  | 5.2 ...multiple eligible outcome measurements (e.g. scales, definitions, time points) within the outcome domain?  | N         | N             | N             |
|  | 5.3 ...multiple eligible analyses of the data?  | PN        | PN            | PN            |
|  | Risk-of-bias judgement:   | Low risk  | Some concerns | Some concerns |
|  | <b>Overall Risk-of-bias Judgement:</b>  | High risk | High risk     | High risk     |

**Appendix F.** Funnel Plots investigating publication bias.

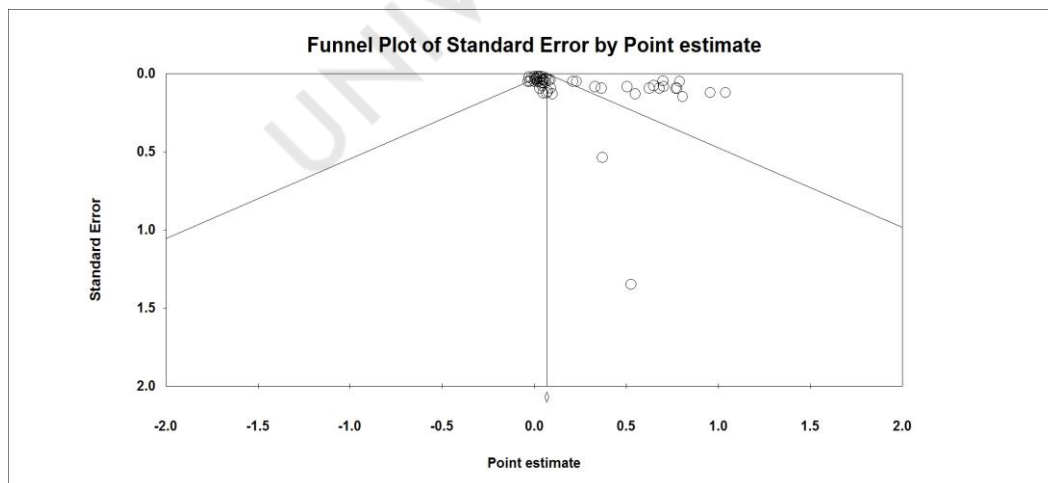
a) Publication bias in studies exploring the effect of childhood maltreatment on NSSI.



b) Publication bias in studies exploring the effect of attachment on NSSI.



c) Publication bias in studies exploring the effect of emotion dysregulation on NSSI.





**Appendix G.** References of articles solely included in narrative synthesis and meta-analysis.

- Arens, A. M., Gaher, R. M., & Simons, J. S. (2012). Child maltreatment and deliberate self-harm among college students: Testing mediation and moderation models for impulsivity. *American Journal of Orthopsychiatry*, 82(3), 328-337.  
<https://doi.org/10.1111/j.1939-0025.2012.01165.x>
- Arens, A. M., Gaher, R. M., Simons, J. S., & Dvorak, R. D. (2014). Child maltreatment and deliberate self-harm: A negative binomial hurdle model for explanatory constructs. *Child Maltreatment*, 19(3-4), 168-177. <https://doi.org/10.1177/1077559514548315>
- Armev, M. F., Nugent, N. R., & Crowther, J. H. (2012). An exploratory analysis of situational affect, early life stress, and nonsuicidal self-injury in college students. *Journal of Child & Adolescent Trauma*, 5(4), 327-343.  
<https://doi.org/10.1080/19361521.2012.719594>
- Bedi, R., Muller, R. T., & Classen, C. C. (2014). Cumulative risk for deliberate self-harm among treatment-seeking women with histories of childhood abuse. *Psychological Trauma: Theory, Research, Practice, and Policy*, 6(6), 600-609.  
<http://dx.doi.org/10.1037/a0033897>
- Bentley, K. H., Nock, M. K., Sauer-Zavala, S., Gorman, B. S., & Barlow, D. H. (2017). A functional analysis of two transdiagnostic, emotion-focused interventions on nonsuicidal self-injury. *Journal of consulting and clinical psychology*, 85(6), 632-646.  
<https://doi.org/10.1037/ccp0000205>
- Bolen, R. M., Winter, V. R., & Hodges, L. (2012). Affect and state dysregulation as moderators of the relationship between childhood sexual abuse and nonsuicidal self-injury. *Journal of interpersonal violence*, 28(1), 201-228.  
<https://doi.org/10.1177/0886260512448844>

- Bornovalova, M. A., Tull, M. T., Gratz, K. L., Levy, R., & Lejuez, C. W. (2011). Extending models of deliberate self-harm and suicide attempts to substance users: Exploring the roles of childhood abuse, posttraumatic stress, and difficulties controlling impulsive behavior when distressed. *Psychological Trauma: Theory, Research, Practice, and Policy*, 3(4), 349-359. <https://doi.org/10.1037/a0021579>
- Braga, C., & Gonçalves, S. (2014). Non-suicidal self injury, psychopathology and attachment: A study with university students. *The Spanish Journal of Psychology*, 17 (e66), 1-7. <https://doi.org/10.1017/sjp.2014.66>
- Buckholdt, K. E., Parra, G. R., Anestis, M. D., Lavender, J. M., Jobe-Shields, L. E., Tull, M. T., & Gratz, K. L. (2015). Emotion regulation difficulties and maladaptive behaviors: Examination of deliberate self-harm, disordered eating, and substance misuse in two samples. *Cognitive Therapy and Research*, 39(2), 140-152. <https://doi.org/10.1007/s10608-014-9655-3>
- Bureau, J. F., Martin, J., Freynet, N., Poirier, A. A., Lafontaine, M. F., & Cloutier, P. (2010). Perceived dimensions of parenting and non-suicidal self-injury in young adults. *Journal of Youth and Adolescence*, 39(5), 484-494. <https://doi.org/10.1007/s10964-009-9470-4>
- Caron, A., Lafontaine, M. F., & Bureau, J. F. (2017a). Exploring the relationship between child maltreatment, intimate partner violence victimization, and self-injurious thoughts and behaviors. *Journal of Aggression, Maltreatment & Trauma*, 27(7), 759-776. <https://doi.org/10.1080/10926771.2017.1410746>
- Caron, A., Lafontaine, M. F., & Bureau, J. F. (2017b). Linking Romantic Attachment and Self-Injury: The Roles of the Behavioural Systems. *Journal of Relationships Research*, 8(e4), 1-14. <https://doi.org/10.1017/jrr.2017.5>
- Chang, E. C., Schaffer, M. R., Novak, C. J., Ablow, D. B., Gregory, A. E., Chang, O. D., ... & Hirsch, J. K. (2019). Sexual assault history and self-destructive behaviors in women

- college students: Testing the perniciousness of perfectionism in predicting non-suicidal self-injury and suicidal behaviors. *Personality and Individual Differences*, 149, 186-191. <https://doi.org/10.1016/j.paid.2019.05.021>
- Claes, L., De Raedt, R., Van de Walle, M., & Bosmans, G. (2016). Attentional bias moderates the link between attachment-related expectations and non-suicidal self-injury. *Cognitive Therapy and Research*, 40(4), 540-548. <https://doi.org/10.1007/s10608-016-9761-5>
- Davis, T. S., Mauss, I. B., Lumian, D., Troy, A. S., Shallcross, A. J., Zorolia, P., ... & McRae, K. (2014). Emotional reactivity and emotion regulation among adults with a history of self-harm: Laboratory self-report and functional MRI evidence. *Journal of Abnormal Psychology*, 123(3), 499-509. <https://doi.org/10.1037/a0036962>
- Dixon-Gordon, K. L., Tull, M. T., & Gratz, K. L. (2014). Self-injurious behaviors in posttraumatic stress disorder: An examination of potential moderators. *Journal of Affective Disorders*, 166, 359-367. <https://doi.org/10.1016/j.jad.2014.05.033>
- Evren, C., Dalbudak, E., Evren, B., Cetin, R., & Durkaya, M. (2011). Self-mutilative behaviours in male alcohol-dependent inpatients and relationship with posttraumatic stress disorder. *Psychiatry Research*, 186(1), 91-96. <https://doi.org/10.1016/j.psychres.2010.07.045>
- Evren, C., & Evren, B. (2005). Self-mutilation in substance-dependent patients and relationship with childhood abuse and neglect, alexithymia and temperament and character dimensions of personality. *Drug and Alcohol Dependence*, 80(1), 15-22. <https://doi.org/10.1016/j.drugalcdep.2005.03.017>
- Evren, C., Kural, S., & Cakmak, D. (2006). Clinical correlates of self-mutilation in Turkish male substance-dependent inpatients. *Psychopathology*, 39(5), 248-254. <https://doi.org/10.1159/000094722>

- Ewing, L., Hamza, C. A., & Willoughby, T. (2019). Stressful experiences, emotion dysregulation, and nonsuicidal self-injury among university students. *Journal of youth and adolescence*, 48(7), 1379-1389. <https://doi.org/10.1007/s10964-019-01025-y>
- Franzke, I., Wabnitz, P., & Catani, C. (2015). Dissociation as a mediator of the relationship between childhood trauma and nonsuicidal self-injury in females: A path analytic approach. *Journal of Trauma & Dissociation*, 16(3), 286-302. <https://doi.org/10.1080/15299732.2015.989646>
- Gholamrezaei, M., Heath, N., & Panaghi, L. (2017). Non-suicidal self-injury in a sample of university students in Tehran, Iran: prevalence, characteristics and risk factors. *International journal of culture and mental health*, 10(2), 136-149. <https://doi.org/10.1080/17542863.2016.1265999>
- Gladstone, G. L., Parker, G. B., Mitchell, P. B., Malhi, G. S., Wilhelm, K., & Austin, M. P. (2004). Implications of childhood trauma for depressed women: an analysis of pathways from childhood sexual abuse to deliberate self-harm and revictimization. *American Journal of Psychiatry*, 161(8), 1417-1425.
- Gratz, K. L. (2006). Risk factors for deliberate self-harm among female college students: The role and interaction of childhood maltreatment, emotional inexpressivity, and affect intensity/reactivity. *American Journal of Orthopsychiatry*, 76(2), 238-250. <https://doi.org/10.1037/0002-9432.76.2.238>
- Gratz, K. L., Bardeen, J. R., Levy, R., Dixon-Gordon, K. L., & Tull, M. T. (2015). Mechanisms of change in an emotion regulation group therapy for deliberate self-harm among women with borderline personality disorder. *Behaviour research and therapy*, 65, 29-35. <http://dx.doi.org/10.1016/j.brat.2014.12.005>
- Gratz, K. L., & Chapman, A. L. (2007). The role of emotional responding and childhood maltreatment in the development and maintenance of deliberate self-harm among male

undergraduates. *Psychology of Men & Masculinity*, 8(1), 1-14.

<https://doi.org/10.1037/1524-9220.8.1.1>

Gratz, K. L., Conrad, S. D., & Roemer, L. (2002). Risk factors for deliberate self-harm among college students. *American journal of Orthopsychiatry*, 72(1), 128-140.

<https://doi.org/10.1037//0002-9432.72.1.128>

Gratz, K. L., & Roemer, L. (2008). The relationship between emotion dysregulation and deliberate self-harm among female undergraduate students at an urban commuter university. *Cognitive Behaviour Therapy*, 37(1), 14-25.

<https://doi.org/10.1080/16506070701819524>

Gratz, K. L., & Tull, M. T. (2010). The relationship between emotion dysregulation and deliberate self-harm among inpatients with substance use disorders. *Cognitive Therapy and Research*, 34(6), 544-553. <https://doi.org/10.1007/s10608-009-9268-4>

Gratz, K. L., Tull, M. T., & Levy, R. J. P. M. (2014). Randomized controlled trial and uncontrolled 9-month follow-up of an adjunctive emotion regulation group therapy for deliberate self-harm among women with borderline personality disorder. *Psychological Medicine*, 44(10), 2099-2112. <https://doi.org/10.1017/S0033291713002134>

Guérin-Marion, C., Martin, J., Lafontaine, M. F., & Bureau, J. F. (2019). Invalidating caregiving environments, specific emotion regulation deficits, and non-suicidal self-injury. *Child Psychiatry & Human Development*, 51(1), 39-47.

<https://doi.org/10.1007/s10578-019-00908-2>

Gunter, T. D., Chibnall, J. T., Antoniak, S. K., Philibert, R. A., & Hollenbeck, N. (2011).

Predictors of suicidal ideation, suicide attempts, and self-harm without lethal intent in a community corrections sample. *Journal of Criminal Justice*, 39(3), 238-245.

<https://doi.org/10.1016/j.jcrimjus.2011.02.005>

- Hallab, L., & Covic, T. (2010). Deliberate self-harm: The interplay between attachment and stress. *Behaviour Change*, 27(2), 93-103. <https://doi.org/10.1375/bech.27.2.93>
- Howard, R., Karatzias, T., Power, K., & Mahoney, A. (2017). From childhood trauma to self-harm: An investigation of theoretical pathways among female prisoners. *Clinical psychology & psychotherapy*, 24(4), 942-951. <https://doi.org/10.1002/cpp.2058>
- Idig-Camuroglu, M., & Gölge, Z. B. (2018). Non-suicidal self-injury among university students in Turkey: The effect of gender and childhood abuse. *Psychiatria Danubina*, 30(4), 410-420.
- Johnstone, J. M., Carter, J. D., Luty, S. E., Mulder, R. T., Frampton, C. M., & Joyce, P. R. (2015). Childhood predictors of lifetime suicide attempts and non-suicidal self-injury in depressed adults. *Australian & New Zealand Journal of Psychiatry*, 50(2), 135-144. <https://doi.org/10.1177/0004867415585581>
- Kranzler, A., Fehling, K. B., Anestis, M. D., & Selby, E. A. (2016). Emotional dysregulation, internalizing symptoms, and self-injurious and suicidal behavior: Structural equation modeling analysis. *Death studies*, 40(6), 358-366. <http://dx.doi.org/10.1080/07481187.2016.1145156>
- Lear, M. K., & Pepper, C. M. (2016). Self-concept clarity and emotion dysregulation in nonsuicidal self-injury. *Journal of Personality Disorders*, 30(6), 813-827.
- Macrynika, N., Miranda, R., & Soffer, A. (2018). Social connectedness, stressful life events, and self-injurious thoughts and behaviors among young adults. *Comprehensive psychiatry*, 80, 140-149. <https://doi.org/10.1016/j.comppsy.2017.09.008>
- Martin, A., White, H., Flanagan, T. J., Yensel, N. H., & Bloomberg, T. V. (2011). A multisite study of the association between emotion dysregulation and deliberate self-harm among substance use disorder inpatients: Replication and extension. *Addictive Disorders & Their Treatment*, 10(4), 191-198.

- Martin, J., Bureau, J. F., Cloutier, P., & Lafontaine, M. F. (2011). A comparison of invalidating family environment characteristics between university students engaging in self-injurious thoughts & actions and non-self-injuring university students. *Journal of Youth and Adolescence*, 40(11), 1477-1488. <https://doi.org/10.1007/s10964-011-9643-9>
- Martin, J., Bureau, J. F., Lafontaine, M. F., Cloutier, P., Hsiao, C., Pallanca, D., & Meinz, P. (2017). Preoccupied but not dismissing attachment states of mind are associated with nonsuicidal self-injury. *Development and psychopathology*, 29(2), 379-388. <https://doi.org/10.1017/S0954579417000050>
- Martin, J., Bureau, J. F., Yurkowski, K., Fournier, T. R., Lafontaine, M. F., & Cloutier, P. (2016). Family-based risk factors for non-suicidal self-injury: Considering influences of maltreatment, adverse family-life experiences, and parent–child relational risk. *Journal of Adolescence*, 49, 170-180. <http://dx.doi.org/10.1016/j.adolescence.2016.03.015>
- Martin, J., Bureau, J. F., Yurkowski, K., Lafontaine, M. F., & Cloutier, P. (2015). Heterogeneity of relational backgrounds is associated with variation in non-suicidal self-injurious behavior. *Journal of Abnormal Child Psychology*, 44(3), 511-522. <https://doi.org/10.1007/s10802-015-0048-1>
- McLafferty, M., Armour, C., Bunting, B., Ennis, E., Lapsley, C., Murray, E., & O'Neill, S. (2019). Coping, stress, and negative childhood experiences: The link to psychopathology, self-harm, and suicidal behavior. *PsyCh journal*, 8(3), 293-306. <https://doi.org/10.1002/pchj.301>
- McMahon, K., Hoertel, N., Olfson, M., Wall, M., Wang, S., & Blanco, C. (2018). Childhood maltreatment and impulsivity as predictors of interpersonal violence, self-injury and suicide attempts: a national study. *Psychiatry research*, 269, 386-393. <https://doi.org/10.1016/j.psychres.2018.08.059>

- Merza, K., Papp, G., Molnár, J., & Kuritárné Szabó, I. (2017). Characteristics and development of nonsuicidal self-harm among borderline inpatients. *Psychiatria Danubina*, 29(4), 480-489.
- Midkiff, M. F., Lindsey, C. R., & Meadows, E. A. (2018). The role of coping self-efficacy in emotion regulation and frequency of NSSI in young adult college students. *Cogent Psychology*, 5(1), 1520437. <https://doi.org/10.1080/23311908.2018.1520437>
- Molaie, A. M., Chiu, C. Y., Habib, Z., Galynker, I., Briggs, J., Rosenfield, P. J., ... & Yaseen, Z. S. (2019). Emotional Pain Mediates the Link Between Preoccupied Attachment and Non-suicidal Self-Injury in High Suicide Risk Psychiatric Inpatients. *Frontiers in Psychology*, 10, 289. <https://doi.org/10.3389/fpsyg.2019.00289>
- Muehlenkamp, J. J., Bagge, C. L., Tull, M. T., & Gratz, K. L. (2013). Body regard as a moderator of the relation between emotion dysregulation and nonsuicidal self-injury. *Suicide and Life-Threatening Behavior*, 43(5), 479-493. <https://doi.org/10.1111/sltb.12032>
- Muehlenkamp, J. J., Kerr, P. L., Bradley, A. R., & Larsen, M. A. (2010). Abuse subtypes and nonsuicidal self-injury: Preliminary evidence of complex emotion regulation patterns. *The Journal of Nervous and Mental Disease*, 198(4), 258-263. <https://doi.org/10.1097/NMD.0b013e3181d612ab>
- Nada-Raja, S., & Skegg, K. (2011). Victimization, posttraumatic stress disorder symptomatology, and later nonsuicidal self-harm in a birth cohort. *Journal of Interpersonal Violence*, 26(18), 3667-3681. <https://doi.org/10.1177/0886260511403757>
- Navarro-Haro, M. V., Wessman, I., Botella, C., & García-Palacios, A. (2015). The role of emotion regulation strategies and dissociation in non-suicidal self-injury for women with borderline personality disorder and comorbid eating disorder. *Comprehensive psychiatry*, 63, 123-130. <http://dx.doi.org/10.1016/j.comppsy.2015.09.001>



- Nicolai, K. A., Wielgus, M. D., & Mezulis, A. (2016). Identifying risk for self-harm: Rumination and negative affectivity in the prospective prediction of nonsuicidal self-injury. *Suicide and Life-Threatening Behavior*, 46(2), 223-233.  
<https://doi.org/10.1111/sltb.12186>
- Nobakht, H. N., & Dale, K. Y. (2017). The prevalence of deliberate self-harm and its relationships to trauma and dissociation among Iranian young adults. *Journal of Trauma & Dissociation*, 18(4), 610-623.  
<https://doi.org/10.1080/15299732.2016.1246397>
- O'Neill, S., McLafferty, M., Ennis, E., Lapsley, C., Bjourson, T., Armour, C., ... & Murray, E. (2018). Socio-demographic, mental health and childhood adversity risk factors for self-harm and suicidal behaviour in College Students in Northern Ireland. *Journal of affective disorders*, 239, 58-65. <https://doi.org/10.1016/j.jad.2018.06.006>
- Oyefeso, A., Brown, S., Chiang, Y., & Clancy, C. (2008). Self-injurious behaviour, traumatic life events and alexithymia among treatment-seeking opiate addicts: Prevalence, pattern and correlates. *Drug and Alcohol Dependence*, 98(3), 227-234.  
<https://doi.org/10.1016/j.drugalcdep.2008.06.004>
- Paivio, S. C., & McCulloch, C. R. (2004). Alexithymia as a mediator between childhood trauma and self-injurious behaviors. *Child abuse & neglect*, 28(3), 339-354.  
<https://doi.org/10.1016/j.chiabu.2003.11.018>
- Richmond-Rakerd, L. S., Trull, T. J., Gizer, I. R., McLaughlin, K., Scheiderer, E. M., Nelson, E. C., ... & Statham, D. J. (2018). Common genetic contributions to high-risk trauma exposure and self-injurious thoughts and behaviors. *Psychological medicine*, 49(3), 421-430. <https://doi.org/10.1017/S0033291718001034>

- Rodriguez-Srednicki, O. (2002). Childhood sexual abuse, dissociation, and adult self-destructive behavior. *Journal of Child Sexual Abuse, 10*(3), 75-89.  
[https://doi.org/10.1300/J070v10n03\\_05](https://doi.org/10.1300/J070v10n03_05)
- Roe-Sepowitz, D. (2007). Characteristics and predictors of self-mutilation: A study of incarcerated women. *Criminal Behaviour and Mental Health, 17*(5), 312-321.  
<https://doi.org/10.1002/cbm.665>
- Sansone, R. A., Sansone, L. A., & Wiederman, M. (1995). The prevalence of trauma and its relationship to borderline personality symptoms and self-destructive behaviors in a primary care setting. *Archives of Family Medicine, 4*(5), 439-442.
- Swannell, S., Martin, G., Page, A., Hasking, P., Hazell, P., Taylor, A., & Protani, M. (2012). Child maltreatment, subsequent non-suicidal self-injury and the mediating roles of dissociation, alexithymia and self-blame. *Child abuse & neglect, 36*(7-8), 572-584.  
<http://dx.doi.org/10.1016/j.chiabu.2012.05.005>
- Talmon, A., & Ginzburg, K. (2018). The differential role of narcissism in the relations between childhood sexual abuse, dissociation, and self-harm. *Journal of Interpersonal Violence, 00*(0), 1-20. <https://doi.org/10.1177/0886260518799450>
- Tatnell, R., Hasking, P., & Newman, L. (2018). Multiple mediation modelling exploring relationships between specific aspects of attachment, emotion regulation, and non-suicidal self-injury. *Australian Journal of Psychology, 70*(1), 48-56.  
<https://doi.org/10.1111/ajpy.12166>
- Terzi, L., Martino, F., Berardi, D., Bortolotti, B., Sasdelli, A., & Menchetti, M. (2017). Aggressive behavior and self-harm in Borderline Personality Disorder: The role of impulsivity and emotion dysregulation in a sample of outpatients. *Psychiatry Research, 249*, 321-326. <http://dx.doi.org/10.1016/j.psychres.2017.01.011>

- Tresno, F., Ito, Y., & Mearns, J. (2013). Risk factors for nonsuicidal self-injury in Japanese college students: The moderating role of mood regulation expectancies. *International Journal of Psychology*, 48(6), 1009-1017.  
<https://doi.org/10.1080/00207594.2012.733399>
- Van der Kolk, B. A., Perry, J. C., & Herman, J. L. (1991). Childhood origins of self-destructive behavior. *American journal of Psychiatry*, 148(12), 1665-1671.
- Wachter, T., Murphy, S., Kennerley, H., & Wachter, S. (2009). A preliminary study examining relationships between childhood maltreatment, dissociation, and self-injury in psychiatric outpatients. *Journal of trauma & dissociation*, 10(3), 261-275.  
<https://doi.org/10.1080/15299730902956770>
- Weaver, T. L., Chard, K. M., Mechanic, M. B., & Etzel, J. C. (2004). Self-injurious behaviors, PTSD arousal, and general health complaints within a treatment-seeking sample of sexually abused women. *Journal of interpersonal violence*, 19(5), 558-575.  
<https://doi.org/210.1177/0886260504262965>
- Weintraub, M. J., Van de Loo, M. M., Gitlin, M. J., & Miklowitz, D. J. (2017). Self-harm, affective traits, and psychosocial functioning in adults with depressive and bipolar disorders. *The Journal of Nervous and Mental Disease*, 205(11), 896-899.  
<https://doi.org/10.1097/NMD.0000000000000744>
- Wilcox, H. C., Arria, A. M., Caldeira, K. M., Vincent, K. B., Pinchevsky, G. M., & O'Grady, K. E. (2012). Longitudinal predictors of past-year non-suicidal self-injury and motives among college students. *Psychological medicine*, 42(4), 717-726.  
<https://doi.org/10.1017/S0033291711001814>
- Yates, T. M., Carlson, E. A., & Egeland, B. (2008). A prospective study of child maltreatment and self-injurious behavior in a community sample. *Development and Psychopathology*, 20(2), 651-671. <https://doi.org/10.1017/S0954579408000321>

- Yurkowski, K., Martin, J., Levesque, C., Bureau, J. F., Lafontaine, M. F., & Cloutier, P. (2015). Emotion dysregulation mediates the influence of relationship difficulties on non-suicidal self-injury behavior in young adults. *Psychiatry Research*, 228(3), 871-878. <http://dx.doi.org/10.1016/j.psychres.2015.05.006>
- Zanarini, M. C., Laudate, C. S., Frankenburg, F. R., Reich, D. B., & Fitzmaurice, G. (2011). Predictors of self-mutilation in patients with borderline personality disorder: A 10-year follow-up study. *Journal of psychiatric research*, 45(6), 823-828. <https://doi.org/10.1016/j.jpsychires.2010.10.015>
- Zelkowitz, R. L., Cole, D. A., Han, G. T., & Tomarken, A. J. (2016). The incremental utility of emotion regulation but not emotion reactivity in nonsuicidal self- injury. *Suicide and Life- Threatening Behavior*, 46(5), 545-562. <https://doi.org/10.1111/sltb.12236>
- Zlotnick, C., Shea, M. T., Pearlstein, T., Simpson, E., Costello, E., & Begin, A. (1996). The relationship between dissociative symptoms, alexithymia, impulsivity, sexual abuse, and self-mutilation. *Comprehensive Psychiatry*, 37(1), 12-16.
- Zweig-Frank, H., Paris, J., & Guzder, J. (1994a). Psychological risk factors for dissociation and self-mutilation in female patients with borderline personality disorder. *The Canadian Journal of Psychiatry*, 39(5), 259-264.
- Zweig-Frank, H., Paris, J., & Guzder, J. (1994b). Psychological risk factors and self-mutilation in male patients with BPD. *The Canadian Journal of Psychiatry*, 39(5), 266-268.

**The serial mediational role of Attachment and Emotion Regulation in the relationship  
between Early Life Experiences and Non-suicidal Self-Injury**

Rania Christoforou, BSc, MSc & Nuno Ferreira, CPsych, PhD

University of Nicosia, Cyprus

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Ms Rania Christoforou: [rania.chri@gmail.com](mailto:rania.chri@gmail.com)

Dr Nuno Ferreira: [ferreira.n@unic.ac.cy](mailto:ferreira.n@unic.ac.cy)

Declaration of interest: none

## Abstract

**Objective:** The aim of the study was to investigate whether the relationship between early life experiences and non-suicidal self-injury (NSSI) is serially mediated by insecure attachment and emotion dysregulation. Studies have shown that all three factors have a significant effect in predicting NSSI behavior, however, there are no previous studies exploring the pathway leading to NSSI with these factors. **Method:** A sample of 284 adults (77% females) was recruited online via specific self-harm groups on social media platforms (e.g. the subreddit r/AdultSelf-Harm on Reddit) and was asked to complete an online survey, consisting of four self-report questionnaires. Conditional process analysis was used to investigate the proposed model (using the PROCESS macro). **Results:** The findings supported the serial mediation model [Indirect effect = 0.004, SE = 0.002, 95% CI (0.0007, 0.0090)], even after controlling for previous suicide attempts. **Conclusions:** The findings of the study seem to provide a fruitful start to the development of conceptual models of NSSI. Applications regarding early identification and assessment of NSSI and the development of specific interventions are discussed.

*Keywords: early life experiences, attachment, emotion regulation, self-harm, NSSI*

## Introduction

Despite the absence of suicidal intent presented in non-suicidal self-injury (NSSI), NSSI has been highly correlated with suicide attempts and completed suicides both in community and clinical samples regardless of age (Grandclerc, De Labrouhe, Spodenkiewicz, Lachal, & Moro, 2016; Ribeiro et al., 2016). Although research on NSSI has increased in recent years, little is known about the phenomenon when compared to suicidal behavior. Due to the absence of a clear understanding of the concept, there are several definitions of NSSI within the literature (Favazza, 1998; Bragazzi, 2014; Groschwitz et al., 2015). However, the majority of studies adopted a definition, which does not take into account outcomes from recent studies (Hawton et al., 2012) and current guidelines (NCCMH, 2012). Taking into consideration the aforementioned issues, for the purposes of this article NSSI will be defined as the deliberate direct destruction or alteration of body tissue or of body's biochemistry without conscious suicidal intent and with no social or cultural approval.

Until now, there have been several risk factors implicated in NSSI behavior, with adverse childhood experiences, attachment and emotion dysregulation being the three most prominent ones (Fox et al., 2015). Childhood adversities and particularly, physical and sexual abuse appear to have a direct and indirect effect on NSSI behavior, such as through distress tolerance and negative urgency (Gladstone et al., 2004; Arens, Gaher, Simons, & Dvorak, 2014; Caron, Lafontaine, & Bureau, 2017a). Additionally, emotion dysregulation has been demonstrated to have a direct effect (Midkiff, Lindsey, & Meadows, 2018) or a mediational role in the association of other risk factors with NSSI (i.e. emotion dysregulation mediated the association between stressful experiences and NSSI; Ewing, Hamza, & Willoughby, 2019). Despite the limited number of studies investigating the association of attachment and NSSI, there is enough evidence to suggest that insecure attachment can be a predictor of it

(Martin et al., 2017; Caron, Lafontaine, & Bureau, 2017b). Consequently, with numerous risk factors being suggested, literature supports the notion of a multifactorial approach to the risk of engaging in NSSI (Christoforou & Ferreira, 2020a). Studies investigating the interplay of these risk factors have demonstrated that emotion dysregulation was a moderator (Tresno, Ito, & Mearns, 2013; Dixon-Gordon, Tull & Gratz, 2014) and a mediator (Gratz & Roemer, 2008; Howard, Karatzias, Power, & Mahoney, 2017) to the association between early life experiences and NSSI. Additionally, studies have found that emotion dysregulation is a significant mediator to the relationship between attachment and NSSI (Tatnell, Hasking, Newman, 2018; Guérin-Marion, Martin, Lafontaine, & Bureau, 2019), further supporting the mediational role of emotion dysregulation. To our knowledge, there is only one study investigating the possible interaction of all these three factors in predicting NSSI. Tatnell, Hasking, Newman, Taffe and Martin (2017) investigated in a sample of 2,637 adolescents whether childhood abuse, attachment anxiety and emotion dysregulation increased the likelihood of NSSI and found that cumulative adversity (i.e. having all these risk factors) was a significant predictor of NSSI. However, the absence of a clear pathway or explanation of their interaction indicates a gap in literature.

Developmental theories and empirical models propose that adverse childhood experiences can interfere with attachment security (Bowlby, 1969/1982; Baer & Martinez, 2006). Additionally, attachment has a fundamental role in the development of emotion regulation strategies (Brumariu, 2015). Consequently, it can be suggested that a serial pathway might exist between adverse childhood experiences and NSSI through attachment and emotion dysregulation. This study aims to investigate whether the proposed pathway exists by examining the serial mediational effect of attachment and emotion dysregulation in the relationship between early life experiences and NSSI. It was hypothesized that: i) attachment would mediate the relationship between early life experiences and emotion



regulation, ii) emotion regulation would mediate the relationship between attachment and NSSI and iii) attachment and emotion regulation would serially mediate the relationship between early life experiences and NSSI.

## **Method**

### **Participants**

Participants were recruited online via specific groups on social media platforms (e.g. the subreddit r/AdultSelfHarm on Reddit). In order to participate, participants were required to be above 18 years old, to have at least one experience with self-harm, to have good knowledge of the English language in order to understand the questions and to have no suicidal thoughts. Individuals who expressed suicidal thoughts were excluded from the study and encouraged to seek help from their family doctor, mental health professional, or local health system.

### **Measures**

#### ***Adverse Childhood Experiences - International Questionnaire (ACE-IQ; WHO, 2018)***

The ACE-IQ is a 45-item self-report measure, which refers to some of the most intensive and frequently occurring sources of childhood stress, such as multiple types of abuse, neglect and peer violence. It was developed to take into consideration cultural differences, which makes it ideal for international use over the Internet. The majority of the items are rated on a 4-point Likert scale with the exception of seven questions, two which are rated on a 5-point Likert scale and five, which require a “Yes” or “No” answer. Higher scores indicate greater exposure to adverse childhood experiences. Its psychometric properties have not been evaluated within NSSI literature. However, preliminary findings on other populations, such as prison inmates in Nigeria and adolescents from Malawi, have

demonstrated good reliability (Cronbach's alpha = 0.80; Kazeem, 2015) and validity (Kazeem, 2015; Kidman, Smith, Piccolo & Kohler, 2019). Investigating the reliability of ACE-IQ with the population used for this study, outcomes showed good reliability too (Cronbach's alpha = 0.85).

***Adult Attachment Scale (AAS; Collins & Read, 1990)***

The AAS is a self-report measure consisting of 18 items scored on a 5-point Likert scale [1 (Not at all characteristic of me) to 5 (Very characteristic of me)]. AAS outcomes can indicate both the total level of attachment security and the individual attachment styles (Secure, Anxious, Avoidant). However, due to the limited literature associating NSSI with specific attachment styles, only the total score was used for the analysis. Higher scores indicated higher levels of insecurity. The psychometric properties of AAS have been investigated in many studies, demonstrating that it is a reliable and valid measure (Collins & Read, 1990; Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010). The AAS was found to be a reliable measure for this study too (Cronbach's alpha = 0.81).

***Emotion Regulation Questionnaire (ERQ; Gross & John, 2003)***

The ERQ is a 10-item self-report measure, which examines two emotion regulation strategies (Cognitive Reappraisal and Expressive Suppression). Total scores were calculated for this study by reversing the cognitive reappraisal items. Items were rated on a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). Higher scores on ERQ indicated reduced ability to regulate their emotions. Examinations of its psychometric properties have demonstrated good internal consistency (0.79 for Reappraisal & 0.73 for Suppression) and a three-month test-retest reliability of about 0.7 (Gross & John, 2003). The psychometric properties of the total scale for this study indicated a similar reliability (Cronbach's alpha = 0.75).

### ***Self-harm Inventory (SHI; Sansone, Wiederman, & Sansone, 1998)***

SHI lists 22 different self-harm behaviors and participants are required to respond with a “Yes” or “No”, depending on whether they have ever intentionally engaged in those behaviors. SHI was selected because of its wide range of self-harm behaviors compared to other measures (e.g. the Deliberate Self-harm Inventory; Gratz, 2001) that fit the definition of NSSI for this study. However, some of the items (6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20) were not in accordance to the definition and hence, they were removed from the analysis (see Appendix), leaving a total of 10 items and hence, a maximum score of 10. Higher scores represented greater NSSI. The psychometric properties of this shorten version were explored and findings indicated a Cronbach’s alpha score of 0.71, which demonstrated its suitability for use in the analysis.

### **Procedure**

A survey platform was created online via Google Forms, which included the information sheet, the informed consent, questions on demographics and the four measures described above. Convenience and snowball sampling method was used by distributing the link to the study through social media platforms, such as Facebook and Reddit. The link remained active for six months and then all the data was extracted for analysis. The duration of the study was approximately 25-30 minutes for each participant.

### **Data Preparation & Statistical Analysis**

Data was analyzed with the use of Statistical Package for Social Sciences (SPSS version 25; IBM Corp, 2017). A series of one-way between-subjects ANOVA tests were conducted to identify any potential covariates to the analysis based on demographic characteristics. Additionally, a series of Pearson’s Correlation tests were used in order to

investigate whether the predictor variables were related to each other. Due to the fact that data was not normally distributed, both series of tests were conducted using 1,000 bootstrapped re-samples (bias corrected 95% confidence intervals are reported) as it was considered superior to non-parametric tests (Dwivedi, Mallawaarachchi, & Alvarado, 2017). Lastly, conditional process analyses, using PROCESS macro (version 3.3; Hayes, 2013) were conducted for the mediational pathways (5,000 bootstrapped re-samples).

### **Ethical Concerns**

Ethical approval was granted by the Social Sciences Ethics Review Board at the University of Nicosia, Cyprus (SSERB 45). Participants were informed about the study before their participation and they were allowed to withdraw at any time. Consent to participate was obtained via Google Forms. No identifying data was collected and hence, confidentiality was maintained throughout.

## **Results**

### **Participant Descriptives**

A sample of 284 participants was recruited (220 females, 45 males & 19 identified themselves as being non-binary/genderqueer or transgender). The average age was 23.39 years old ( $SD = 5.68$ ). The majority of the participants ( $N=182$ , 64.1%) reported being diagnosed with a mental health disorder, such as borderline personality disorder, anxiety, depression, schizophrenia, eating disorders, posttraumatic stress disorder and bipolar disorder. One hundred and forty-five individuals reported never attempting to commit suicide (51%), 107 admitted that they have attempted to commit suicide (majority of them only one time [ $N=34$ ]) and 32 reported that they might have attempted to commit suicide. Regarding

participants' education, 154 completed secondary/high school, 84 completed a University or College course, 25 completed a post-graduate degree and the rest completed other formal qualifications. Only two participants received no formal schooling. The majority of the participants reported engagement in five or more different NSSI behaviors (72.9%) indicating a high degree of NSSI. Five participants (1.8%) reported engagement in all ten NSSI behaviors. The most prominent behaviors were deliberate self-cutting (91.5%), self-scratching (83.1%) and self-hitting (70.8%). All participants reported having an experience of childhood adversity. The most frequent childhood adversities were verbal abuse by a family member (88%), bullying (82.7%) and physical abuse by a parent (67.3%). Sexual abuse was reported by 27.8% of the participants.

### **Covariates**

Gender, age, presence of diagnosis and presence of previous suicide attempts were explored as potential covariates to the analyses. One-way between subjects ANOVA tests were conducted and findings are presented in Table 1. As it is demonstrated in Table 1, early life experiences, attachment and emotion dysregulation showed significant between-subjects differences only with regards to presence of previous suicide attempts. Significant age, presence of diagnosis and previous suicide attempt differences were found with regards to NSSI. Since only the presence of previous suicide attempts showed a significant difference between subjects for all variables, it was the only one considered as a covariate in the analyses to avoid unnecessary interference in pathways not influenced by age and diagnosis.

### **Early life experiences, Attachment, Emotion Regulation & NSSI**

Correlational analyses indicated that all the measures were correlated to each other. Adverse childhood experiences were positively correlated to attachment insecurity [ $r=0.35$ ,

95% CI (0.24, 0.46)], emotion dysregulation [ $r=0.19$ , 95% CI (0.07, 0.29)] and NSSI [ $r=0.35$ , 95% CI (0.24, 0.45)]. Attachment insecurity was also positively related to emotion dysregulation [ $r=0.41$ , 95% CI (0.31, 0.52)] and NSSI [ $r=0.26$ , 95% CI (0.14, 0.37)]. Emotion dysregulation was additionally positively related to NSSI [ $r=0.24$ , 95% CI (0.13, 0.35)].

## **Mediational pathways**

### ***Early life experiences associated to emotion dysregulation via attachment***

The mediational pathway from early life experiences to emotion dysregulation via attachment was found to be significant [Indirect effect = 0.12, SE = 0.03, 95% CI (0.07, 0.19)], supporting the first hypothesis. There was a significant effect from early life experiences to attachment [Effect = 0.35, SE=0.06,  $p < 0.001$ , 95% CI (0.24, 0.46)] and a significant effect from attachment to emotion dysregulation [Effect = 0.35, SE = 0.05,  $p < 0.001$ , 95% CI (0.25, 0.44)]. The direct effect of early life experiences onto emotion dysregulation was not significant [Effect = 0.04, SE = 0.05,  $p = 0.38$ , 95% CI (-0.06, 0.14)]. There was no difference in the associations when accounting for previous suicide attempts. The indirect relationship was still significant [Indirect effect = 0.11, SE = 0.03, 95% CI (0.06, 0.17)], supporting the mediational pathway.

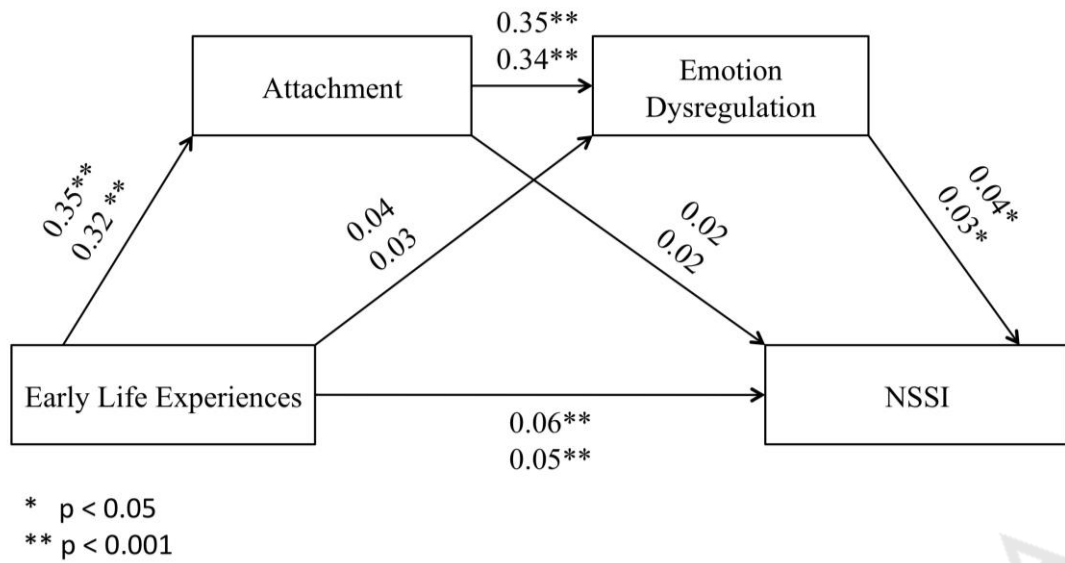
### ***Attachment to NSSI via emotion dysregulation***

The mediational pathway from attachment to NSSI via emotion dysregulation was also significant [Indirect effect = 0.01, SE = 0.01, 95% CI (0.003, 0.027)], supporting the second hypothesis. There was a significant effect from attachment to emotion dysregulation [Effect = 0.36, SE = 0.05,  $p < 0.001$ , 95% CI (0.27, 0.45)] and from emotion dysregulation to NSSI [Effect = 0.04, SE = 0.02,  $p < 0.05$ , 95% CI (0.01, 0.07)]. However, there was still a significant direct effect of attachment to NSSI [Effect = 0.04, SE = 0.02,  $p < 0.05$ , 95% CI

(0.01, 0.07)]. Controlling for previous suicide attempts, no differences were demonstrated between the associations. The indirect pathway was still significant [Indirect effect = 0.01, SE = 0.01, 95% CI (0.001, 0.022)], in addition to the direct pathway from attachment to NSSI [Effect: 0.03, SE = 0.01,  $p < 0.05$ , 95% CI (0.004, 0.054)].

### ***Early life experiences to NSSI via attachment and emotion dysregulation***

The serial mediational model was also significant [Indirect effect = 0.004, SE = 0.002, 95% CI (0.0007, 0.0090)], supporting the third hypothesis. There was a significant effect from early life experiences to attachment [Effect = 0.35, SE = 0.06,  $p < 0.001$ , 95% CI (0.24, 0.46)], from attachment to emotion dysregulation [Effect = 0.35, SE = 0.05,  $p < 0.001$ , 95% CI (0.25, 0.44)] and from emotion dysregulation to NSSI [Effect = 0.04, SE = 0.01,  $p < 0.05$ , 95% CI (0.007, 0.064)]. No significant effects were demonstrated from early life experiences to emotion dysregulation [Effect = 0.04, SE = 0.05,  $p = 0.379$ , 95% CI (-0.06, 0.14)] and from attachment to NSSI [Effect = 0.02, SE = 0.01,  $p = 0.128$ , 95% CI (-0.006, 0.046)]. However, a direct effect from early life experiences to NSSI was also supported [Direct effect = 0.06, SE = 0.01,  $p < 0.001$ , 95% CI (0.04, 0.08)]. Similarly to the previous models, no difference was observed in the associations after controlling for previous suicide attempts [Indirect effect: 0.003, SE = 0.002, 95% CI (0.0001, 0.0070)]. All the associations are illustrated in Figure 1.



**Figure 1.** The figure presents the serial mediational effect of attachment and emotion dysregulation on the association between early life experiences and NSSI. Unstandardised effects are illustrated for both analyses (without covariate – first line, with covariate – second line) along with significance levels.

## Discussion

Mediational and conditional process analyses have demonstrated a significant pathway from early life experiences to emotion dysregulation through attachment insecurity and a significant pathway from attachment to NSSI via emotion dysregulation. Additionally, the proposed serial mediation model was supported, suggesting that the association between early life experiences and NSSI is serially mediated via attachment and emotion dysregulation. All associations remained the same after controlling for reported previous suicide attempts. Importantly, the serial mediational pathway seemed to explain a larger



proportion of the variance than any of the alternative pathways that looked at a direct relationship between early life experiences and NSSI or that included only one of the mediators. Consequently, it is suggested that the proposed pathway is more likely to be the medium through which individuals engage in NSSI behavior.

These findings are in accordance to empirical and theoretical models, which support the notion that early life experiences can have an impact on attachment style, that attachment can interfere with the development of emotion regulation strategies and that emotion dysregulation could lead to NSSI (Bowlby, 1969/1982; Baer & Martinez, 2006; Brumariu, 2015; Lear & Pepper, 2016). Additionally, findings from this study are in accordance to the Tatnell et al. (2017) study, which demonstrated that all three risk factors are contributing to the development of NSSI behavior. The study also replicated the positive associations of childhood maltreatment, attachment and emotion dysregulation with NSSI (Gratz, 2003) and the mediational pathway from attachment to NSSI via emotion dysregulation (Tatnell et al., 2018; Guérin-Marion et al., 2019).

Taking into consideration these findings, it is suggested that early identification of individuals engaging in NSSI behavior can be achieved by exploring childhood adversity and its impact on attachment style and hence, on the emotion regulation. Related assessment measures could be used, such as the ACE-IQ, AAS and ERQ in order to identify potential risk for NSSI behavior. With regards to treatment, targeting early life experiences or attachment relationships would be ideal for preventing NSSI behavior. However, controlling for adversities and attachment style in every family is very difficult. Therefore, targeting emotion dysregulation might be more fruitful. There are several established models of therapy addressing emotion regulation, such as Emotion Focused Therapy, Dialectical Behavior Therapy, Emotion regulation group therapy, Cognitive therapy, Dynamic deconstructive therapy and Psychoanalytic/Psychodynamic psychotherapy. However, there is

still limited evidence on their effectiveness with NSSI populations (Turner, Austin, & Chapman, 2014; Bentley, Nock, Sauer-Zavala, Gorman, & Barlow, 2017; Briggs et al., 2019). Further research is needed to explore their mechanisms of change and their effectiveness with NSSI.

This study however is not without limitations. The authors adopted a definition, which was not in accordance to available NSSI measures hence, the NSSI measure used was a modified version of an already validated measure. In order to overcome this limitation, the authors investigated the reliability of the modified version before using it. Additionally, the ACE-IQ measure has not been validated within the NSSI population before, although its psychometric properties with other populations have shown good reliability and validity. Generally, the study relied on self-report measures and a retrospective study design, which can introduce biases to the outcomes (Stone, Bachrach, Jobe, Kurtzman, & Cain, 1999). Nevertheless, the study had an appropriate sample size compared to previous studies, which focused on very small samples of NSSI participants and controlled for potential covariates to the proposed pathways. The study also proposed a novel serial mediational model to NSSI, which could form the basis for future treatment developments and assessment of NSSI. Future studies could use the model to identify potentially effective therapies, to develop and explore new therapies specific to individuals engaging in NSSI and to develop new measures for assessing NSSI behavior.

## References

- Arens, A. M., Gaher, R. M., Simons, J. S., & Dvorak, R. D. (2014). Child maltreatment and deliberate self-harm: A negative binomial hurdle model for explanatory constructs. *Child Maltreatment, 19*(3-4), 168-177. <https://doi.org/10.1177/1077559514548315>
- Baer, J. C., & Martinez, C. D. (2006). Child maltreatment and insecure attachment: A meta-analysis. *Journal of Reproductive and Infant psychology, 24*(3), 187-197. <https://doi.org/10.1080/02646830600821231>
- Bentley, K. H., Nock, M. K., Sauer-Zavala, S., Gorman, B. S., & Barlow, D. H. (2017). A functional analysis of two transdiagnostic, emotion-focused interventions on nonsuicidal self-injury. *Journal of consulting and clinical psychology, 85*(6), 632-646. <https://doi.org/10.1037/ccp0000205>
- Bowlby, J. (1969/1982). *Attachment and Loss: Volume 1*. New York: Basic Books.
- Bragazzi, N. L. (2014). A Google Trends-based approach for monitoring NSSI. *Psychology Research and Behavior Management, 7*, 1-8. <https://doi.org/10.2147/PRBM.S44084>
- Briggs, S., Netuveli, G., Gould, N., Gkaravella, A., Gluckman, N. S., Kangogyere, P., ... & Lindner, R. (2019). The effectiveness of psychoanalytic/psychodynamic psychotherapy for reducing suicide attempts and self-harm: systematic review and meta-analysis. *The British Journal of Psychiatry, 214*(6), 320-328.
- Brumariu, L. E. (2015). Parent–child attachment and emotion regulation. *New directions for child and adolescent development, 2015*(148), 31-45. <https://doi.org/10.1002/cad.20098>
- Caron, A., Lafontaine, M. F., & Bureau, J. F. (2017a). Exploring the relationship between child maltreatment, intimate partner violence victimization, and self-injurious thoughts and behaviors. *Journal of Aggression, Maltreatment & Trauma, 27*(7), 759-776. <https://doi.org/10.1080/10926771.2017.1410746>

- Caron, A., Lafontaine, M. F., & Bureau, J. F. (2017b). Linking Romantic Attachment and Self-Injury: The Roles of the Behavioural Systems. *Journal of Relationships Research*, 8(e4), 1-14. <https://doi.org/10.1017/jrr.2017.5>
- Christoforou, R. & Ferreira, N. (2020a). *The role of early life experiences, attachment and emotion regulation in predicting self-harm in adults: A systematic review and meta-analysis*. Manuscript submitted for publication.
- Collins, N. L., & Read, S. J. (1990). Adult attachment, working models, and relationship quality in dating couples. *Journal of Personality and Social Psychology*, 58(4), 644-663.
- Dixon-Gordon, K. L., Tull, M. T., & Gratz, K. L. (2014). Self-injurious behaviors in posttraumatic stress disorder: An examination of potential moderators. *Journal of Affective Disorders*, 166, 359-367. <https://doi.org/10.1016/j.jad.2014.05.033>
- Dwivedi, A. K., Mallawaarachchi, I., & Alvarado, L. A. (2017). Analysis of small sample size studies using nonparametric bootstrap test with pooled resampling method. *Statistics in medicine*, 36(14), 2187-2205. <https://doi.org/10.1002/sim.7263>
- Ewing, L., Hamza, C. A., & Willoughby, T. (2019). Stressful experiences, emotion dysregulation, and nonsuicidal self-injury among university students. *Journal of youth and adolescence*, 48(7), 1379-1389. <https://doi.org/10.1007/s10964-019-01025-y>
- Favazza, A. R. (1998). The coming of age of self-mutilation. *The Journal of nervous and mental disease*, 186(5), 259-268.
- Fox, K. R., Franklin, J. C., Ribeiro, J. D., Kleiman, E. M., Bentley, K. H., & Nock, M. K. (2015). Meta-analysis of risk factors for nonsuicidal self-injury. *Clinical Psychology Review*, 42, 156-167. <https://doi.org/10.1016/j.cpr.2015.09.002>
- Gladstone, G. L., Parker, G. B., Mitchell, P. B., Malhi, G. S., Wilhelm, K., & Austin, M. P. (2004). Implications of childhood trauma for depressed women: an analysis of

- pathways from childhood sexual abuse to deliberate self-harm and revictimization. *American Journal of Psychiatry*, *161*(8), 1417-1425.
- Grandclerc, S., De Labrouhe, D., Spodenkiewicz, M., Lachal, J., & Moro, M. R. (2016). Relations between nonsuicidal self-injury and suicidal behavior in adolescence: A systematic review. *PloS One*, *11*(4), e0153760.
- Gratz, K. L. (2001). Measurement of deliberate self-harm: Preliminary data on the Deliberate Self-Harm Inventory. *Journal of psychopathology and behavioral assessment*, *23*(4), 253-263.
- Gratz, K. L. (2003). Risk factors for and functions of deliberate self-harm: An empirical and conceptual review. *Clinical Psychology: Science and Practice*, *10*(2), 192-205.  
<https://doi.org/10.1093/clipsy/bpg022>
- Gratz, K. L., & Roemer, L. (2008). The relationship between emotion dysregulation and deliberate self-harm among female undergraduate students at an urban commuter university. *Cognitive Behaviour Therapy*, *37*(1), 14-25.  
<https://doi.org/10.1080/16506070701819524>
- Groschwitz, R. C., Kaess, M., Fischer, G., Ameis, N., Schulze, U. M., Brunner, R., ... & Plener, P. L. (2015). The association of non-suicidal self-injury and suicidal behavior according to DSM-5 in adolescent psychiatric inpatients. *Psychiatry Research*, *228*(3), 454-461. <https://doi.org/10.1016/j.psychres.2015.06.019>
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348-362. <https://doi.org/10.1037/0022-3514.85.2.348>
- Guérin-Marion, C., Martin, J., Lafontaine, M. F., & Bureau, J. F. (2019). Invalidating caregiving environments, specific emotion regulation deficits, and non-suicidal self-

injury. *Child Psychiatry & Human Development*, 51(1), 39-47.

<https://doi.org/10.1007/s10578-019-00908-2>

Hawton, K., Bergen, H., Kapur, N., Cooper, J., Steeg, S., Ness, J., & Waters, K. (2012).

Repetition of self-harm and suicide following self-harm in children and adolescents:

Findings from the Multicentre Study of Self-harm in England. *Journal of Child*

*Psychology and Psychiatry, and Allied Disciplines*, 53(12), 1212–1219.

<https://doi.org/10.1111/j.1469-7610.2012.02559.x>

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis:

A regression-based approach. New York: Guilford Press.

Howard, R., Karatzias, T., Power, K., & Mahoney, A. (2017). From childhood trauma to

self-harm: An investigation of theoretical pathways among female prisoners. *Clinical*

*psychology & psychotherapy*, 24(4), 942-951. <https://doi.org/10.1002/cpp.2058>

IBM Corp. (2017). IBM SPSS Statistics for Macintosh, Version 25.0. Armonk, NY: IBM Corp.

Kazeem, O. T. (2015). A validation of the adverse childhood experiences scale in Nigeria.

*Research on Humanities and Social Sciences*, 5(11), 18-23.

Kidman, R., Smith, D., Piccolo, L. R., & Kohler, H. P. (2019). Psychometric evaluation of the Adverse Childhood Experience International Questionnaire (ACE-IQ) in Malawian adolescents. *Child abuse & Neglect*, 92, 139-145.

<https://doi.org/10.1016/j.chiabu.2019.03.015>

Lear, M. K., & Pepper, C. M. (2016). Self-concept clarity and emotion dysregulation in nonsuicidal self-injury. *Journal of Personality Disorders*, 30(6), 813-827.

Martin, J., Bureau, J. F., Lafontaine, M. F., Cloutier, P., Hsiao, C., Pallanca, D., & Meinz, P. (2017). Preoccupied but not dismissing attachment states of mind are associated with

nonsuicidal self-injury. *Development and psychopathology*, 29(2), 379-388.

<https://doi.org/10.1017/S0954579417000050>

Midkiff, M. F., Lindsey, C. R., & Meadows, E. A. (2018). The role of coping self-efficacy in emotion regulation and frequency of NSSI in young adult college students. *Cogent Psychology*, 5(1), 1520437. <https://doi.org/10.1080/23311908.2018.1520437>

NCCMH (2012). *Self-harm: Longer-term management. The NICE Guideline on longer-term management. National Clinical Guideline Number 133*. Leicester, UK: National Collaborating Centre for Mental Health, commissioned by the National Institute for Health and Clinical Excellence. The British Psychological Society & The Royal College of Psychiatrists.

Ravitz, P., Maunder, R., Hunter, J., Sthankiya, B., & Lancee, W. (2010). Adult attachment measures: A 25-year review. *Journal of Psychosomatic Research*, 69(4), 419-432. <https://doi.org/10.1016/j.jpsychores.2009.08.006>

Ribeiro, J. D., Franklin, J. C., Fox, K. R., Bentley, K. H., Kleiman, E. M., Chang, B. P., & Nock, M. K. (2016). Self-injurious thoughts and behaviors as risk factors for future suicide ideation, attempts, and death: a meta-analysis of longitudinal studies.

*Psychological Medicine*, 46(2), 225-236. <https://doi.org/10.1017/S0033291715001804>

Sansone, R. A., Wiederman, M. W., & Sansone, L. A. (1998). The self-harm inventory (SHI): Development of a scale for identifying self-destructive behaviors and borderline personality disorder. *Journal of Clinical Psychology*, 54(7), 973-983.

Stone, A. A., Bachrach, C. A., Jobe, J. B., Kurtzman, H. S., & Cain, V. S. (Eds.). (1999). *The science of self-report: Implications for research and practice*. USA: Psychology Press.

Tatnell, R., Hasking, P., & Newman, L. (2018). Multiple mediation modelling exploring relationships between specific aspects of attachment, emotion regulation, and non-

suicidal self- injury. *Australian Journal of Psychology*, 70(1), 48-56.

<https://doi.org/10.1111/ajpy.12166>

Tatnell, R., Hasking, P., Newman, L., Taffe, J., & Martin, G. (2017). Attachment, emotion regulation, childhood abuse and assault: examining predictors of NSSI among adolescents. *Archives of suicide research*, 21(4), 610-620.

<https://doi.org/10.1080/13811118.2016.1246267>

Tresno, F., Ito, Y., & Mearns, J. (2013). Risk factors for nonsuicidal self-injury in Japanese college students: The moderating role of mood regulation expectancies. *International Journal of Psychology*, 48(6), 1009-1017.

<https://doi.org/10.1080/00207594.2012.733399>

Turner, B. J., Austin, S. B., & Chapman, A. L. (2014). Treating nonsuicidal self-injury: a systematic review of psychological and pharmacological interventions. *The Canadian Journal of Psychiatry*, 59(11), 576-585.

World Health Organization (WHO; 2018). *Adverse Childhood Experiences International Questionnaire (ACE-IQ)*. Geneva: WHO, 2018. Retrieved on 25<sup>th</sup> of March 2019 from: [https://www.who.int/violence\\_injury\\_prevention/violence/activities/adverse\\_childhood\\_experiences/en/](https://www.who.int/violence_injury_prevention/violence/activities/adverse_childhood_experiences/en/)



**Table 1.**

*Results from ANOVA analyses investigating between-subjects differences with regards to gender, age, presence of diagnosis and previous suicide attempts on early life experiences, attachment, emotion dysregulation and NSSI.*

|     |                 | Degrees of Freedom | Mean Square | F-Value | Significance |
|-----|-----------------|--------------------|-------------|---------|--------------|
| ACE | Gender          | (2, 281)           | 59.61       | 0.49    | 0.61         |
|     | Age             | (24, 259)          | 164.54      | 1.42    | 0.10         |
|     | Diagnosis       | (1, 282)           | 130.73      | 1.01    | 0.30         |
|     | Suicide attempt | (1, 282)           | 3096.90     | 28.20   | < 0.001*     |
| AAS | Gender          | (2, 281)           | 268.31      | 2.22    | 0.11         |
|     | Age             | (24, 259)          | 148.17      | 1.24    | 0.21         |
|     | Diagnosis       | (1, 282)           | 439.75      | 3.64    | 0.06         |
|     | Suicide attempt | (1, 282)           | 1491.39     | 12.75   | < 0.001*     |
| ERQ | Gender          | (2, 281)           | 26.73       | 0.29    | 0.75         |
|     | Age             | (24, 259)          | 61.11       | 0.64    | 0.90         |
|     | Diagnosis       | (1, 282)           | 141.43      | 1.53    | 0.22         |
|     | Suicide attempt | (1, 282)           | 794.51      | 8.82    | < 0.001*     |
| SHI | Gender          | (2, 281)           | 2.64        | 0.50    | 0.61         |
|     | Age             | (24, 259)          | 11.68       | 2.47    | < 0.001*     |
|     | Diagnosis       | (1, 282)           | 68.53       | 13.46   | < 0.001*     |
|     | Suicide attempt | (1, 282)           | 201.64      | 43.65   | < 0.001*     |

## Appendix

### Excluded items from the SHI and reasons for exclusion

| Item | Item description   | Reason for exclusion  |                              |                             |
|------|--|---|------------------------------|-----------------------------|
|      |  | No direct destruction of body tissue or alteration of body's biochemistry | Socially sanctioned behavior | Presence of suicidal intent |
| 6    | Abused alcohol   |   | ✓                            |                             |
| 7    | Driven recklessly on purpose                                       | ✓   |                              |                             |
| 10   | Made medical situations worse on purpose (e.g. skipped medication) | ✓   |                              |                             |
| 11   | Been promiscuous (i.e. had many sexual partners)                   | ✓   |                              |                             |
| 12   | Set yourself up in a relationship to be rejected                   | ✓   |                              |                             |
| 13   | Abused prescription medication                                     |   |                              | ✓                           |
| 14   | Distance yourself from God as punishment                           | ✓   |                              |                             |
| 15   | Engaged in emotionally abusive relationships                       | ✓   |                              |                             |
| 16   | Engaged in sexually abusive relationships                          | ✓   |                              |                             |
| 17   | Lost a job on purpose  | ✓   |                              |                             |
| 18   | Attempted suicide  |   |                              | ✓                           |
| 20   | Tortured yourself with self-defeating thoughts                     | ✓   |                              |                             |

**Validation of adverse childhood experiences international questionnaire (ACE-IQ) with  
adults engaging in non-suicidal self-injury**

Rania Christoforou<sup>a\*</sup> & Nuno Ferreira<sup>a</sup>

<sup>a</sup>University of Nicosia, Department of Social Sciences, 46 Makedonitissas Avenue, CY-  
2417, Nicosia, Cyprus.

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Ms Rania Christoforou: [rania.chri@gmail.com](mailto:rania.chri@gmail.com)

Dr Nuno Ferreira: [ferreira.n@unic.ac.cy](mailto:ferreira.n@unic.ac.cy)

\* Correspondence to: Rania Christoforou, University of Nicosia, Department of Social  
Sciences, 46 Makedonitissas Avenue, CY-2417, Nicosia, Cyprus.

Email: [rania.chri@gmail.com](mailto:rania.chri@gmail.com)

Declaration of interest: none

## Highlights

- Investigation of psychometric properties of ACE-IQ with non-suicidal self-injury.
- The ACE-IQ demonstrated good internal-consistency (Cronbach's  $\alpha=0.854$ ).
- The ACE-IQ showed good convergent, predictive and discriminant validity.
- A 5-factor structure was suggested, although not all items loaded onto the factors.



## Abstract

**Background:** Numerous studies have supported the association of adverse childhood experiences with risk behaviors, chronic diseases and mental health difficulties. Therefore, it is particularly important to assess adverse childhood experiences for prevention purposes. Although several measures have been developed for assessing childhood adversity, the majority of them are limited to basic forms of abuse and neglect. An exception is the Adverse Childhood Experiences – International Questionnaire (ACE-IQ). However, the ACE-IQ questionnaire has not been previously validated with individuals engaging in non-suicidal self-injury. **Objective:** Consequently, the current study investigated ACE-IQ's psychometric properties with individuals engaging in non-suicidal self-injury. **Participants and Setting:** Two hundred eighty-four adult participants were recruited online via specific self-harm groups on social media platforms. **Methods:** Participants were asked to complete an online survey consisting of three self-report measures regarding early childhood experiences and engagement in non-suicidal self-injury. **Results:** The findings of this study supported ACE-IQ's reliability (Cronbach's alpha = 0.854), convergent validity ( $r = 0.85$ ,  $p < 0.001$  with the CTQ-SF), predictive validity ( $R^2 = 0.12$ ,  $p = 0.001$  of the SHI total score) and discriminant validity ( $F$ -value = 13.90,  $p < 0.001$ ). An exploration of the factor structure demonstrated a 5-factor solution (physical abuse, sexual abuse, emotional abuse, exposure to violence, family environment). **Conclusions:** It was concluded that ACE-IQ is a reliable and valid measure to be used for research or clinical purposes with individuals engaging in non-suicidal self-injury, although further research is needed on its factor structure. Research and clinical implications are discussed.

*Keywords: adverse childhood experiences, ACE, self-harm, reliability, validity, adults*

## Introduction

Adverse childhood experiences have been associated throughout the years with numerous risk behaviors, chronic diseases and mental health difficulties, which have a huge impact both on a personal and societal level (Dube, Felitti, Dong, Giles, & Anda, 2003; Danese & McEwen, 2012; Merrick et al., 2017). Specifically, adverse childhood experiences have been linked with behaviors and diseases that are considered as leading causes of death in adults, such as smoking, obesity, ischemic heart disease, cancer, stroke and suicide (Rehkopf et al., 2016; Brown, Thacker, & Cohen, 2013; Dong et al., 2004; Campbell, Walker, & Egede, 2016; Dube et al., 2001). Additionally, they have been related to almost all common mental health illnesses, including schizophrenia (Hirt, Schalinski, & Rockstroh, 2019), anxiety (Reiser, McMillan, Wright, & Asmundson, 2014), depression (Chapman et al., 2004), and personality disorders (Battle et al., 2004). Therefore, there is great emphasis on the importance of assessing adverse childhood events for the development of prevention strategies. Although individual incidences of childhood abuse contribute to the development of the above difficulties, the cumulative effect of childhood adversities seems to be detrimental too (Chartier, Walker, & Naimark, 2010). Consequently, it is particularly important to consider a variety of childhood experiences when investigating their contribution.

Although there is not a universally agreed definition, adverse childhood experiences can be described as experiences, which are not expected to occur within a nurturing environment and that require significant adaptation by an average child (under the age of 16 years old) to cope (McLaughlin, 2016). The most commonly addressed childhood experiences are sexual, physical and emotional abuse and physical and emotional neglect (Gratz, 2003;

Serafini et al., 2017). However, there are several other experiences, such as bullying, which could also be considered as childhood adversities (Copeland et al., 2014) and are not incorporated into commonly used childhood maltreatment measures, such as the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994). A variety of childhood experiences are included though within the Adverse Childhood Experiences International Questionnaire (ACE-IQ), which was developed by the World Health Organization (WHO; World Health Organization, 2018) for international use. The ACE-IQ takes into consideration a wide array of adversities that might be experienced by children (Anda, Butchart, Felitti, & Brown, 2010), such as parental neglect, dysfunctional family environment, loss of a parent, verbal abuse, physical abuse, sexual abuse, peer violence, community violence and exposure to war/collective violence. Although the ACE-IQ has been widely used in research (Almuneef, Qayad, Aleissa, & Albuhairan, 2014; Al-Shawi & Lafta, 2015; Tran, Dunne, van Vo, & Luu, 2015; Soares et al., 2016; Goodman, Martinez, Keiser, Gitari, & Seidel, 2017; Kim, 2017; El Mhamdi et al., 2018; Mall et al., 2018; Chang, Jiang, Mkandarwire, & Shen, 2019), its psychometric properties have only been evaluated by a limited number of studies (Kazeem, 2015; Quinn et al., 2018; Ho, Chan, Chien, Bressington, & Karatzias, 2019; van der Feltz-Cornelis et al., 2019; Kidman, Smith, Piccolo, & Kohler, 2019). The outcomes of these studies demonstrate that ACE-IQ is a reliable measure, with satisfying internal consistency; a concurrent validity with the CTQ questionnaire in a sample of prisoners in Nigeria (Kazeem, 2015); with good test-retest reliability (0.90) in a sample of young adults in Hong Kong (Ho et al., 2019); with moderate predictive validity in a sample of adolescents living in rural Malawi; with individuals diagnosed with anxiety and depressive disorders (Kidman et al., 2019; van der Feltz-Cornelis et al., 2019) and; with adjustable cultural competency for adult residents of Munsieville (Quinn et al., 2018).

However, there is a lack of evaluation of its psychometric properties within high-risk groups, which have already been associated with childhood adversities, such as with individuals engaging in non-suicidal self-injury (NSSI). Non-suicidal self-injury is defined as a non-socially sanctioned deliberate act, which leads to the destruction of body tissue (Favazza, 1998) or an alteration of the biochemistry of one's body without conscious suicidal intent. Numerous studies have associated childhood maltreatment with NSSI (Liu, Scopelliti, Pittman, & Zamora, 2018; Christoforou & Ferreira, 2020a), but the majority of them have used measures with a particular focus on sexual, physical and emotion abuse (Arens, Gaher, & Simons, 2012; Bornovalova, Tull, Gratz, Levy, & Lejuez, 2011), limiting in this way the scope of childhood adversities and their true effect on NSSI behavior. Therefore, the current study aims to explore the psychometric properties of ACE-IQ in a sample of individuals engaging in NSSI in order to demonstrate its reliability and validity for potential use. Specifically, the study aimed to investigate ACE-IQ's factor structure, reliability, convergent validity, predictive validity and discriminant validity.

## **Method**

### **Participants**

Inclusion criteria included being 18 years old or above, have at least one experience of NSSI and have good knowledge of the English language to ensure good understanding of the questions. Participants were excluded from the study if they reported any suicidal thoughts and they were advised to contact their family doctor, mental health professional or local health system to seek help.



## Measures

*Adverse Childhood Experiences – International Questionnaire (ACE-IQ; WHO, 2018).* The ACE-IQ is a self-report measure, consisting of 45 items. Of the 45 items, 14 questions are demographics, 30 items explore adverse childhood experiences and one item is used for clarification purposes regarding bullying. For the purposes of this study, only the items exploring adverse childhood experiences were investigated for their reliability and validity (see Appendix A). The items investigate participants' family environment, parental neglect, parental loss, verbal abuse, physical abuse, sexual abuse and violence within a peer setting, community setting or collective setting. They are rated on a 4-point Likert scale, except for seven items (two rated on a 5-point Likert scale and five require a "Yes" or "No" answer). Higher scores indicate greater exposure to childhood adversities. The psychometric properties of this questionnaire have been discussed in the introduction.

*Childhood Trauma Questionnaire – Short form (CTQ-SF; Bernstein et al., 2003).*

The CTQ-SF is a self-report measure developed by reducing the items of the original Childhood Trauma Questionnaire (Bernstein et al., 1994; Bernstein & Fink, 1998). It consists of 28 items, which have a focus on emotional, physical and sexual abuse and emotional and physical neglect. CTQ and CTQ-SF are very commonly used within the NSSI literature in order to investigate the impact of childhood experiences (Bornovalova et al., 2011; Franzke, Wabnitz, & Catani, 2015; Howard, Karatzias, Power, & Mahoney, 2017). The items are rated on a 5-point Likert scale (from Never True to Very Often True). Higher scores indicate greater exposure to adverse childhood experiences (Range: 28-140). The CTQ-SF has been translated and psychometrically tested in several countries, showing good internal consistency, good criterion-related validity, convergent and concurrent validity (Bernstein et al., 2003; Gerdner & Allgulander, 2009; Kim, Bae, Han, Oh & Macdonald, 2013). It has been

previously used to validate the ACE-IQ measure in Nigeria (Kazeem, 2015) and hence, it will allow a direct comparison to be made.

*Self-harm Inventory (SHI; Sansone, Wiederman, Sansone, 1998).* The SHI is a self-report measure, consisting of 22 items investigating distinct NSSI behaviors. Participants are required to respond with a “Yes” or “No” in order to report whether they have ever deliberately engaged in those behaviors without having the intention to die. Although the SHI was selected due to its variety of NSSI behaviors, which are not included in other measures (e.g. the Deliberate Self-harm Inventory; Gratz, 2001), some items were deleted (6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20) in order to match the NSSI definition provided for this study (see Appendix B). A total number of 10 items were included, leaving a maximum total score of 10. Higher scores demonstrate greater engagement in NSSI. Its psychometric properties were investigated before its inclusion in the analysis and findings showed that the revised version of the SHI was a reliable measure to be used (Cronbach’s  $\alpha = 0.71$ ).

## **Procedure**

After ethical approval was granted, an online survey was created using Google Forms. Information about the study was placed at the beginning of the survey and was followed with an online informed consent form. The survey included questions on demographic characteristics and the three self-report measures mentioned above (ACE-IQ, CTQ-SF, & SHI). The survey’s duration was approximately 10-15 minutes for each participant. The link to the study was distributed through specific NSSI groups on social media platforms (e.g. the subreddit r/AdultSelfHarm on Reddit) and remained active for six months before extracting the data for analysis.

## **Statistical Analysis**

The data was analysed using the Statistical Package for Social Sciences (SPSS version 25; IBM Corp, 2017). Exploratory Factor Analysis (EFA) was performed in order to explore the factor structure of the measure. Since the data was non-parametric, principal axis factors extraction was used with direct oblimin rotation (Delta=0; Costello & Osborne, 2005). Cronbach's alpha scores were calculated in order to determine ACE-IQ's internal consistency. Convergent validity was explored by examining the correlation between ACE-IQ and CTQ-SF using Pearson's Correlation Coefficient test. Simple linear regression was conducted in order to investigate the predictive validity of ACE-IQ on NSSI behavior. One-way between subjects ANOVA test was used to examine differences between individuals scoring low (less than 45), medium (45-65) or high (more than 65) on ACE-IQ for discriminant validity. Due to the presence of non-parametric data, all analyses were run with the 1,000 bootstrapped re-samples method to overcome any normality issues (Field, 2013; Dwivedi, Mallawaarachchi, & Alvarado, 2017).

## **Ethical considerations**

Ethical approval was obtained by the Social Sciences Ethics Review Board at the University of Nicosia, Cyprus (SSERB 45). Participants were informed about the study and provided an informed consent before participating. Withdrawal from the study was allowed at any time. Identification information was not collected and hence, confidentiality was maintained throughout.

## Results

### Demographic characteristics

A sample of 284 individuals provided usable data for the study. The majority of the participants were females with one or more of the following diagnoses: borderline personality disorder, posttraumatic stress disorder, anxiety-related disorder, depression, schizophrenia, eating disorders and bipolar disorder (see Table 1). None of the participants reported suicidal thoughts at the time of data collection. Participants' scoring on ACE-IQ ranged from 31 to 88 and the average score was 51.7 ( $SD=10.97$ ). The childhood adversities reported by most of the participants were verbal abuse by a family member (88%), bullying (82.7%) and physical abuse by a parent (67.3%). The average score on CTQ-SF was 65.9 ( $SD = 23.28$ ). The majority of the participants (72.9%) reported engagement in more than five different NSSI behaviors. Self-cutting (91.5%), self-scratching (83.1%) and self-hitting (70.8%) were three of the most prominent behaviors.

**Table 1.**

*Participants' demographic characteristics (N=284).*

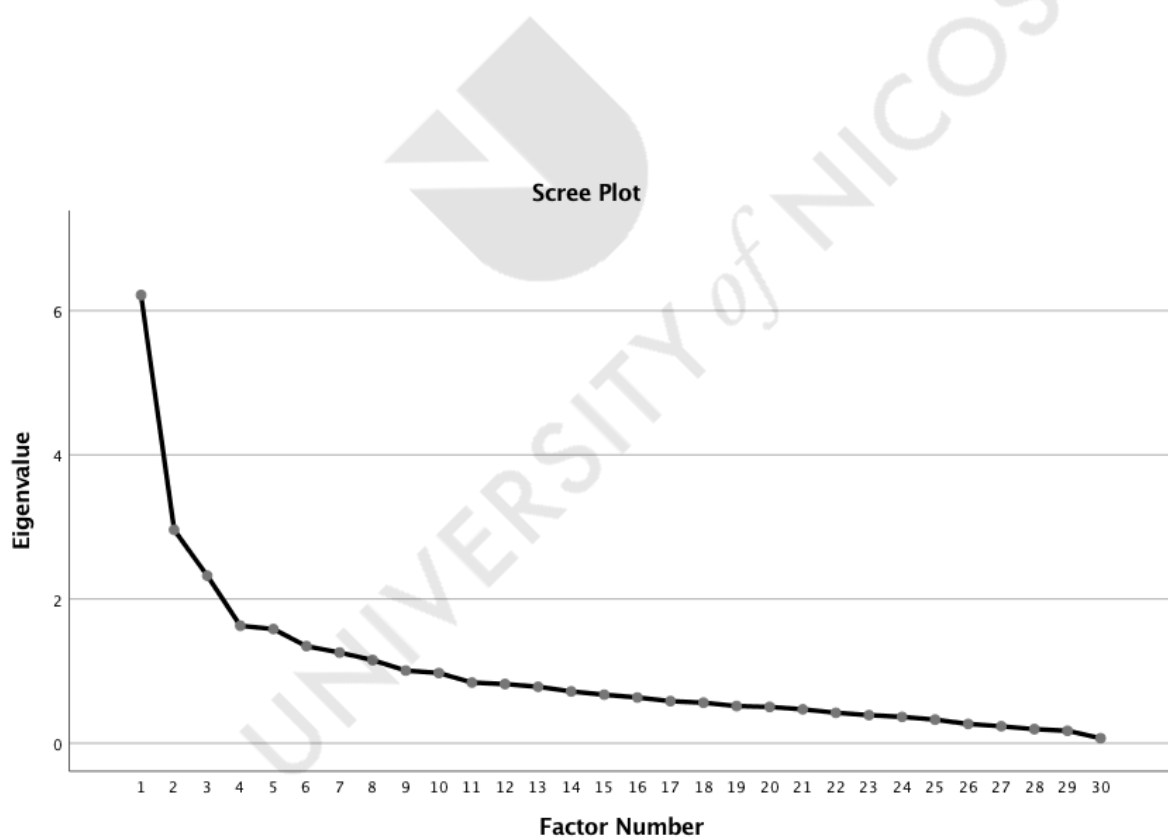
| Variable                                 | <i>M</i> | <i>SD</i> |
|--|----------|-----------|
| Age                                      | 23.4     | 5.7       |
| Variable                                 | <i>N</i> | %         |
| Gender                                   |          |           |
| Females                                  | 220      | 77.5      |
| Males                                    | 45       | 15.8      |
| Non-binary/Genderqueer<br>or Transgender | 19       | 6.7       |
| Mental health diagnosis                  |          |           |
| Yes                                      | 182      | 64.1      |
| No                                       | 102      | 35.9      |
| Previous suicide attempts                |          |           |
| Yes                                      | 107      | 37.7      |
| No                                       | 145      | 51.0      |
| Maybe                                    | 32       | 11.3      |

|                  |     |      |
|------------------|-----|------|
| Formal education |     |      |
| Yes              | 282 | 99.3 |
| No               | 2   | 0.7  |
| ACE-IQ           |     |      |
| Low              | 81  | 28.5 |
| Medium           | 170 | 59.9 |
| High             | 33  | 11.6 |

## Factor Structure

**Exploratory Factor Analysis.** The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.79 and the Barlett's Test of Sphericity was significant ( $p < 0.001$ ), indicating that the data had patterned relationships amongst the variables and was suitable for factor analysis (Yong & Pearce, 2013). Based on Eigen values ( $>1$ ) and inspection of the scree plot (Figure 1), a 5-factor model was suggested (see Table 2). The variance explained by the 5-factor model was 49%. Factor 1 (5 items) was named physical abuse, since it meant to reflect experiences that might cause harm to one's body and accounted for 20.7% of the variance. Factor 2 (4 items) was named sexual abuse, since it reflected unwanted sexual contact and accounted for 9.9% of the variance. Factor 3 (6 items) accounted for 7.7% of the variance and was named exposure to violence. It reflected several events of violence that someone might experience within a community or during war. Factor 4 (5 items) accounted for 5.4% of the variance and was named dysfunctional family environment, since it meant to reflect description of individuals living in the house and their behavior. Lastly, factor 5 (4 items) reflected experiences that could cause high emotional distress and hence, it was named as emotional abuse. Factor 5 accounted for 5.3% of the variance. All the factors showed weak associations with each other (see Table 3), indicating low overlap between them and hence, possible independence of the constructs. However, six items did not load on either factor. Items 1, 2, 9, 10, and 23 reflected important adversities, such as insecure attachment, parental

separation or death and bullying, which have significant impact on mental health in adulthood and in engaging in NSSI behavior (Egeland & Carlson, 2004; Maier & Lachman, 2000; Takizawa, Maughan, & Arseneault, 2014; Buckmaster, McNulty, & Guerin, 2019; Trujillo & Servaty-Seib, 2018; Esposito, Bacchini, & Affuso, 2019). Additionally, item 29 (being beaten up by soldiers, police, militia, or gangs) had a very low endorsement (N=1) and this might have interfered with its loading on Factor 3. Consequently, due to their importance and the low endorsement of item 29, all items were retained for the following analyses, since none of the other items examined the same adversities. Item 16 loaded on both Factor 1 and Factor 5, but it was placed under Factor 1, since its correlation with the factor was stronger (see Table 2).



**Figure 1.** Scree Plot for Principal Axis Factor Analysis.

**Table 2.***Five Factor model loadings by Principal Axis Factor Analysis.*

| <b>Items</b>  | <b>Factor 1:<br/>Physical Abuse</b> | <b>Factor 2:<br/>Sexual Abuse</b> | <b>Factor 3:<br/>Exposure to Violence</b> | <b>Factor 4:<br/>Dysfunctional<br/>Family<br/>Environment</b> | <b>Factor 5:<br/>Emotional Abuse</b> |
|---|-------------------------------------|-----------------------------------|---|---|--------------------------------------|
| 1. Parental understanding   | -                                   | -                                 | -   | -   | -                                    |
| 2. Parental knowledge of activities   | -                                   | -                                 | -   | -   | -                                    |
| 3. Not given enough food even when they could   | 0.416                               | -                                 | -   | -   | -                                    |
| 4. Parents too drunk or intoxicated to take care of you   | -                                   | -                                 | -   | 0.693   | -                                    |
| 5. Not sent to school even if available   | -                                   | -                                 | -   | 0.391   | -                                    |
| 6. Lived with a household member who was alcoholic, or misused drugs                              | -                                   | -                                 | -   | 0.815   | -                                    |
| 7. Lived with someone who was depressed or mentally ill or suicidal                               | -                                   | -                                 | -   | 0.361   | -                                    |
| 8. Lived with someone sent to jail or prison  | -                                   | -                                 | -   | 0.424   | -                                    |
| 9. Parental separation or divorce   | -                                   | -                                 | -   | -   | -                                    |
| 10. Death of a parent/guardian  | -                                   | -                                 | -   | -   | -                                    |
| 11. Experience of seeing/hearing someone being yelled at, screamed at, sworn at etc in the house  | -                                   | -                                 | -   | -   | 0.718                                |
| 12. Experience of seeing/hearing someone being slapped, kicked, punched or beaten up in the house | 0.469                               | -                                 | -   | -   | -                                    |
| 13. Experience of seeing/hearing someone being hit or cut with an object in the house             | 0.784                               | -                                 | -   | -   | -                                    |
| 14. Experience of being yelled, screamed etc by a parent  | -                                   | -                                 | -   | -   | 0.814                                |
| 15. Being threatened or actually abandoned being a parent/guardian                                | -                                   | -                                 | -   | -   | 0.388                                |

|   |       |       |       |   |       |
|---|-------|-------|-------|---|-------|
| 16. Being spanked, slapped, kicked etc by a parent/guardian                                 | 0.458 | -     | -     | - | 0.344 |
| 17. Being hit or cut with an object by a parent/guardian                                    | 0.723 | -     | -     | - | -     |
| 18. Touched or fondled by someone in a sexual way without wanting to                        | -     | 0.758 | -     | - | -     |
| 19. Made to touch someone's body in a sexual way without wanting to                         | -     | 0.827 | -     | - | -     |
| 20. Someone attempted oral, anal, vaginal intercourse without you wanting it                | -     | 0.937 | -     | - | -     |
| 21. Someone had oral, anal, or vaginal intercourse without you wanting it                   | -     | 0.891 | -     | - | -     |
| 22. Bullied   | -     | -     | -     | - | 0.359 |
| 23. Involved in a physical fight  | -     | -     | -     | - | -     |
| 24. Seen or heard someone being beaten up   | -     | -     | 0.422 | - | -     |
| 25. Seen or heard someone being stabbed or short in real life                               | -     | -     | 0.552 | - | -     |
| 26. Seen or heard someone being threatened with a knife or gun in real life                 | -     | -     | 0.582 | - | -     |
| 27. Forced to go and live in another place  | -     | -     | 0.645 | - | -     |
| 28. Experience of deliberate destruction of home  | -     | -     | 0.548 | - | -     |
| 29. Being beaten up by soldiers, police, militia, or gangs                                  | -     | -     | -     | - | -     |
| 30. Family member or friend being killed or beaten up by soldiers, police, militia or gangs | -     | -     | 0.334 | - | -     |



**Table 3.**

Correlations between factors.

| Factor | 1: Physical Abuse | 2: Sexual Abuse | 3: Exposure to Violence | 4: Dysfunctional Family Environment | 5: Emotional Abuse |
|--------|-------------------|-----------------|-------------------------|-------------------------------------|--------------------|
| 1      | 1.00              | -               | -                       | -                                   | -                  |
| 2      | 0.09              | 1.00            | -                       | -                                   | -                  |
| 3      | 0.08              | 0.09            | 1.00                    | -                                   | -                  |
| 4      | 0.26              | 0.16            | 0.23                    | 1.00                                | -                  |
| 5      | 0.32              | 0.22            | 0.03                    | 0.33                                | 1.00               |

**Reliability**

**Internal consistency.** The ACE-IQ's Cronbach's alpha for the total scale (i.e. including all items) was 0.854, indicating a generally good internal consistency within the scale. Two items were found to increase the Cronbach's alpha score once deleted, but the change would be minimal (0.857 if the item 1 referring to parental understanding is removed and 0.855 if the item 10 referring to parental death is removed; see Table 4), suggesting that all items can be retained within the measure. Nevertheless, inter-item correlations ranged from 0 to 0.92, which demonstrated that not all items were homogenous and not all items had sufficiently unique variance (see Appendix C). Item-total correlations ranged from 0.02 to 0.62 (see Table 4). Almost half of the items (47%) were correlated with the total of the scale for more than 0.40 and two items barely correlated with the total (item 10 examining parental death and item 29 examining being beaten up by soldiers, police, militia or gangs). Taking into consideration only the items loaded on the previously extracted factors, the Cronbach's alpha scores for each factor were: Factor 1 = 0.814, Factor 2 = 0.918, Factor 3 = 0.599, Factor 4 = 0.676 and Factor 5 = 0.748, indicating poor internal consistency for Factors 3 and 4.

**Table 4.***Item-total correlations and items' impact on Cronbach's alpha score.*

| Item | Item-Total Correlation | Cronbach's alpha if item deleted |
|------|------------------------|----------------------------------|
| 1    | 0.199                  | 0.857                            |
| 2    | 0.272                  | 0.854                            |
| 3    | 0.457                  | 0.847                            |
| 4    | 0.488                  | 0.846                            |
| 5    | 0.400                  | 0.849                            |
| 6    | 0.422                  | 0.850                            |
| 7    | 0.377                  | 0.850                            |
| 8    | 0.316                  | 0.852                            |
| 9    | 0.303                  | 0.852                            |
| 10   | 0.037                  | 0.855                            |
| 11   | 0.515                  | 0.845                            |
| 12   | 0.619                  | 0.841                            |
| 13   | 0.568                  | 0.843                            |
| 14   | 0.556                  | 0.843                            |
| 15   | 0.574                  | 0.842                            |
| 16   | 0.510                  | 0.845                            |
| 17   | 0.523                  | 0.845                            |
| 18   | 0.471                  | 0.846                            |
| 19   | 0.473                  | 0.846                            |
| 20   | 0.408                  | 0.848                            |
| 21   | 0.381                  | 0.849                            |
| 22   | 0.298                  | 0.853                            |
| 23   | 0.360                  | 0.850                            |
| 24   | 0.332                  | 0.851                            |
| 25   | 0.166                  | 0.854                            |
| 26   | 0.353                  | 0.850                            |
| 27   | 0.137                  | 0.854                            |
| 28   | 0.162                  | 0.854                            |
| 29   | -0.019                 | 0.855                            |
| 30   | 0.113                  | 0.854                            |

**Validity**

**Convergent validity.** Findings from the Pearson Correlation Coefficient test indicated that the ACE-IQ and CTQ-SF were highly positively related to each other [ $r=0.850$ ,  $p < 0.001$ , 95% CI (0.80, 0.89), SE = 0.02]. This strong correlation between the two measures, demonstrates an overlap in concepts, and hence, a good convergent validity of ACE-IQ.

**Predictive validity.** The findings from simple Linear Regression analysis showed a significant effect of ACE-IQ on SHI total score [ $F(1, 282) = 39.10, p=0.001, 95\% \text{ CI } (0.05, 0.09), SE = 0.01$ ] with an  $R^2 = 0.12$ . The significant effect demonstrated in this analysis, suggests that ACE-IQ has a predictive utility with individuals engaging in NSSI. Specifically, the ACE-IQ accounts for approximately 12% of the variability of the revised SHI total score, which is a substantial amount of explained variance to suggest predictive validity. When compared to the effect of CTQ on SHI total score [ $F(1, 282)=45.95, p=0.001, 95\% \text{ CI } (0.03, 0.05), SE = 0.005, R^2 = 0.14$ ], findings reveal a similar effect, further supporting ACE-IQ's predictive validity with individuals engaging in NSSI.

**Discriminant validity.** The sample was separated into three groups based on their ACE-IQ total score in order to investigate whether there is a meaningful and significant difference in the outcomes of the revised SHI total score between the ACE-IQ groups (low, medium and high exposure to adverse childhood experiences). Findings from the one-way between subjects ANOVA test demonstrated that there was a significant difference between the groups, which suggests a significant discriminant validity (see Table 5).

**Table 5.**

*ACE-IQ group comparisons based on SHI total score for discriminant validity (ANOVA test).*

| ACE-IQ groups | N   | Mean (SD) | Standard Error | 95% Confidence Intervals |       | F-Value (df) | Significance |
|---------------|-----|-----------|----------------|--------------------------|-------|--------------|--------------|
|               |     |           |                | Lower                    | Upper |              |              |
| Low           | 81  | 4.9 (2.3) | 0.3            | 4.4                      | 5.4   | 13.90        | p < 0.001    |
| Medium        | 170 | 5.6 (2.2) | 0.2            | 5.3                      | 6.0   | (2, 281)     |              |
| High          | 33  | 7.3 (1.9) | 0.3            | 6.6                      | 8.0   |              |              |

## Discussion

Overall the findings of this study suggest that the ACE-IQ is a reliable and valid measure to be used with NSSI populations. However, its proposed 5-factor structure appeared to have some issues, since not all items loaded onto the factors. It might be the case that the six items, which did not load onto the factors, need revision to match the suggested factors. Or, it might be the case that more items might be needed in order to form new factors, since two of the five proposed factors did not demonstrate good internal consistency. Nevertheless, the general internal consistency of the questionnaire is good, which demonstrates that almost all items are measuring the same concept (Tavakol & Dennick, 2011). Inter-item correlations indicated that the majority of items were correlated to each other, but the strength of their association was not as strong to suggest an overlap in concepts. There was only one combination, which showed a very strong association (Item 20 and Item 21:  $r=0.92$ ). This was expected since all individuals who were exposed to inappropriate sexual contact are more likely to report an attempt of inappropriate sexual contact too, indicating a natural overlap.

Additionally, certain items (N=13 combinations) demonstrated no correlation between them. Interestingly, the majority of item-combinations showing no correlation were with Item 29 (N=9), which refers to being beaten up by soldiers, police, militia, or gangs. This form of adversity is prevalent only in certain countries, which are exposed to war or collective violence. Therefore, the absence of a correlation could be due to the absence of experiences of these types of adversities within the sample. The sample itself was biased due to socio-economic status, since the majority of the participants were educated and had access to Internet, and hence, it is unlikely that they might be living in the circumstances in which this

type of violence can occur. Item 29 was barely correlated to the total score too.

Consequently, it is suggested that it might be more beneficial to include item 29 only when considering adverse childhood experiences in countries experiencing war or where collective violence exists.

Despite the inclusion of more diverse adversities within the ACE-IQ, the findings demonstrated a strong association with the CTQ-SF, as it is proposed by their theoretical underpinnings. These findings support ACE-IQ's convergent validity. Regarding ACE-IQ's predictive and discriminant validity, the findings of this study suggest that ACE-IQ is a valid measure to be used to predict NSSI and its score has a meaningful impact on the prediction (i.e. different scores have distinct impact on NSSI).

The findings are in accordance to previous studies investigating the psychometric properties of ACE-IQ, which demonstrated good reliability and validity. When compared to the study conducted by Kazeem (2015), the outcomes revealed similar reliability and convergent validity. However, both the Cronbach's alpha score and the association between ACE-IQ and CTQ-SF were stronger in this study [Cronbach's alpha = 0.80,  $r=0.72$  in Kazeem, (2015)]. This difference in findings could be attributed to the five items on marriage, which were included in Kazeem's (2015) analysis, but excluded for this study, since they were not measuring childhood adversities. Limiting the items specifically to childhood adversities (i.e. exclude all demographic items) increases the reliability of the scale and its association with other measures on childhood adversities, which might not include any demographic questions. Although according to our knowledge, no studies have previously investigated the predictive validity of ACE-IQ with individuals engaging in NSSI, the findings of this study demonstrated a very similar positive and moderate predictive

validity. A comparable study would be that of Kidman et al. (2019), who found a similar pattern of results in their investigation of the predictive utility of ACE-IQ on depression in an adolescent cohort in Malawi. However, when compared to the predictive validity of ACE-IQ with regards to somatic comorbidity and adverse life events in adulthood in a sample of outpatients with anxiety or depression (van der Feltz-Cornelis et al., 2019), the current study supports a stronger predictive validity. This could be explained by the use of age and gender as covariates in the analysis by van der Feltz-Cornelis et al. (2019). Van der Feltz-Cornelis et al. (2019) used age and gender as covariates in an attempt to investigate their differential effects on the variables being investigated, although no significant difference was reported for age and gender. Consequently, including them in the analysis might have introduced unnecessary interference to the analysis, which reduced the effect of ACE-IQ and hence, its predictive validity. Regarding the factor structure of the questionnaire, Kidman et al. (2019) also reported some issues, since some of the items were excluded from the analysis and not all factors made theoretical sense (i.e. bullying loaded on “neglect”). Therefore, it is suggested that some of the items might need revision in order to improve the factor structure of the ACE-IQ.

Taking into consideration the findings of this study, it is suggested that ACE-IQ can be a reliable and valid measure to use with individuals engaging in NSSI, when it is considered as a whole and not based on its subscales. Studies investigating the impact or association between adverse childhood experiences and NSSI can use this measure to explore a variety of adversities. Additionally, prevention of NSSI behaviors could lead to a reduction in suicides and improvement in the quality of life (e.g. by eliminating the shame and guilt felt following NSSI) of individuals belonging in the high-risk groups. Therefore, given the predictive validity of the measure, ACE-IQ could be used by clinicians as part of early identification

measures to predict potential risk in engaging in NSSI behaviors. Consequently, early prevention strategies, such as providing psychoeducation or psychotherapeutic treatment, can be more effectively employed. Previous studies supported the mediational role of emotion dysregulation in the association between early life experiences and NSSI (Guérin-Marion, Martin, Lafontaine, & Bureau, 2019; Howard et al., 2017), hence, established models of therapy targeting emotion regulation, such as Emotion Focused therapy and Dialectical Behavioral Therapy could form a fruitful prevention strategy.

Nevertheless, the study is not without limitations and hence, the results should be interpreted in light of these. The measure used to evaluate NSSI was a modified version of a previously validated measure and its psychometric properties have not been formally investigated. The study was limited to individuals engaging in NSSI and hence, the outcomes might not be generalizable to other populations. Additionally, the use of self-report measures might have introduced biases to the outcomes of the study (Stone, Bachrach, Jobe, Kurtzman, & Cain, 1999). However, due to the fact that the psychometric properties of ACE-IQ were evaluated in comparison to other self-report measures (CTQ-SF & SHI), the impact of these biases might have been reduced.

In conclusion, this study provided support for the reliability and validity of ACE-IQ with individuals engaging in NSSI, suggesting that it can be used for clinical assessment and research purposes. These findings were in accordance to previous studies investigating the psychometric properties of ACE-IQ with other populations. Therefore, future studies and clinicians might benefit from using ACE-IQ in order to evaluate adverse childhood experiences. However, further research is needed with regards to its factor structure.

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## References

- Almuneef, M., Qayad, M., Aleissa, M., & Albuhairan, F. (2014). Adverse childhood experiences, chronic diseases, and risky health behaviors in Saudi Arabian adults: A pilot study. *Child Abuse & Neglect*, *38*(11), 1787-1793.  
<http://dx.doi.org/10.1016/j.chiabu.2014.06.003>
- Al-Shawi, A. F., & Lafta, R. K. (2015). Effect of adverse childhood experiences on physical health in adulthood: Results of a study conducted in Baghdad city. *Journal of Family & Community Medicine*, *22*(2), 78-84. <https://doi.org/10.4103/2230-8229.155374>
- Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences. *American Journal of Preventive Medicine*, *39*(1), 93-98.  
<https://doi.org/10.1016/j.amepre.2010.03.015>
- Arens, A. M., Gaher, R. M., & Simons, J. S. (2012). Child maltreatment and deliberate self-harm among college students: Testing mediation and moderation models for impulsivity. *American Journal of Orthopsychiatry*, *82*(3), 328-337.  
<https://doi.org/10.1111/j.1939-0025.2012.01165.x>
- Battle, C. L., Shea, M. T., Johnson, D. M., Yen, S., Zlotnick, C., Zanarini, M. C., ... & McGlashan, T. H. (2004). Childhood maltreatment associated with adult personality disorders: findings from the Collaborative Longitudinal Personality Disorders Study. *Journal of Personality Disorders*, *18*(2), 193-211.
- Bernstein, D. P., & Fink, L. (1998). *Manual for the childhood trauma questionnaire*. New York: The Psychological Corporation.

- Bernstein, D. P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., ... & Ruggiero, J. (1994). Initial reliability and validity of a new retrospective measure of child abuse and neglect. *The American Journal of Psychiatry*, *151*, 1132-1136.
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., ... & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, *27*(2), 169-190.  
[https://doi.org/10.1016/S0145-2134\(02\)00541-0](https://doi.org/10.1016/S0145-2134(02)00541-0)
- Bornovalova, M. A., Tull, M. T., Gratz, K. L., Levy, R., & Lejuez, C. W. (2011). Extending models of deliberate self-harm and suicide attempts to substance users: Exploring the roles of childhood abuse, posttraumatic stress, and difficulties controlling impulsive behavior when distressed. *Psychological Trauma: Theory, Research, Practice, and Policy*, *3*(4), 349-359. <https://doi.org/10.1037/a0021579>
- Brown, M. J., Thacker, L. R., & Cohen, S. A. (2013). Association between adverse childhood experiences and diagnosis of cancer. *PloS one*, *8*(6), e65524.  
<https://doi.org/10.1371/journal.pone.0065524>
- Buckmaster, R., McNulty, M., & Guerin, S. (2019). Family factors associated with self-harm in adults: A systematic review. *Journal of Family Therapy*, *41*(4), 537-558.  
<https://doi.org/10.1111/1467-6427.12232>
- Campbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine*, *50*(3), 344-352.  
<https://doi.org/10.1016/j.amepre.2015.07.022>
- Chang, X., Jiang, X., Mkandarwire, T., & Shen, M. (2019). Associations between adverse childhood experiences and health outcomes in adults aged 18–59 years. *PloS one*, *14*(2), e0211850. <https://doi.org/10.1371/journal.pone.0211850>

- Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders*, 82(2), 217-225.  
<https://doi.org/10.1016/j.jad.2003.12.013>
- Chartier, M. J., Walker, J. R., & Naimark, B. (2010). Separate and cumulative effects of adverse childhood experiences in predicting adult health and health care utilization. *Child Abuse & Neglect*, 34(6), 454-464. <https://doi.org/10.1016/j.chiabu.2009.09.020>
- Christoforou, R. & Ferreira, N. (2020a). *The role of early life experiences, attachment and emotion regulation in predicting self-harm in adults: A systematic review and meta-analysis*. Manuscript submitted for publication.
- Christoforou, R. & Ferreira, N. (2020b). *The serial mediational role of Attachment and Emotion Regulation in the relationship between Early Life Experiences and Non-suicidal Self-injury: A Conceptual Model*. Manuscript submitted for publication.
- Copeland, W. E., Wolke, D., Lereya, S. T., Shanahan, L., Worthman, C., & Costello, E. J. (2014). Childhood bullying involvement predicts low-grade systemic inflammation into adulthood. *Proceedings of the National Academy of Sciences*, 111(21), 7570-7575.  
<https://doi.org/10.1073/pnas.1323641111>
- Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation*, 10(1), 7. <https://doi.org/10.7275/jyj1-4868>
- Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & behavior*, 106(1), 29-39.  
<https://doi.org/10.1016/j.physbeh.2011.08.019>
- Dong, M., Giles, W. H., Felitti, V. J., Dube, S. R., Williams, J. E., Chapman, D. P., & Anda, R. F. (2004). Insights into causal pathways for ischemic heart disease: Adverse

childhood experiences study. *Circulation*, 110(13), 1761-1766.

<https://doi.org/10.1161/01.CIR.0000143074.54995.7F>

Dube, S. R., Anda, R. F., Felitti, V. J., Chapman, D. P., Williamson, D. F., & Giles, W. H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study. *Jama*, 286(24), 3089-3096. <https://doi.org/10.1001/jama.286.24.3089>

Dube, S. R., Felitti, V. J., Dong, M., Giles, W. H., & Anda, R. F. (2003). The impact of adverse childhood experiences on health problems: evidence from four birth cohorts dating back to 1900. *Preventive medicine*, 37(3), 268-277.

[https://doi.org/10.1016/S0091-7435\(03\)00123-3](https://doi.org/10.1016/S0091-7435(03)00123-3)

Dwivedi, A. K., Mallawaarachchi, I., & Alvarado, L. A. (2017). Analysis of small sample size studies using nonparametric bootstrap test with pooled resampling method. *Statistics in medicine*, 36(14), 2187-2205. <https://doi.org/10.1002/sim.7263>

Egeland, B., & Carlson, E. A. (2004). Attachment and psychopathology. In L. Atkinson, & S. Goldberg (Eds.), *Attachment issues in Psychopathology and Intervention* (pp. 27-48). Lawrence Erlbaum Associates.

El Mhamdi, S., Lemieux, A., Ben Fredj, M., Bouanene, I., Ben Salah, A., Abroug, H., ... & al'Absi, M. (2018). Social and early life adversity and chronic health conditions among Tunisian adults. *Translational Behavioral Medicine*, 1-10.

<https://doi.org/10.1093/tbm/iby126>

Esposito, C., Bacchini, D., & Affuso, G. (2019). Adolescent non-suicidal self-injury and its relationships with school bullying and peer rejection. *Psychiatry Research*, 274, 1-6. <https://doi.org/10.1016/j.psychres.2019.02.018>

Favazza, A. R. (1998). The coming of age of self-mutilation. *The Journal of Nervous and Mental disease*, 186(5), 259-268.

- Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5<sup>th</sup> ed.). London: Sage Publications.
- Franzke, I., Wabnitz, P., & Catani, C. (2015). Dissociation as a mediator of the relationship between childhood trauma and nonsuicidal self-injury in females: A path analytic approach. *Journal of Trauma & Dissociation*, *16*(3), 286-302.  
<https://doi.org/10.1080/15299732.2015.989646>
- Gerdner, A., & Allgulander, C. (2009). Psychometric properties of the swedish version of the childhood trauma Questionnaire—Short form (CTQ-SF). *Nordic Journal of Psychiatry*, *63*(2), 160-170. <https://doi.org/10.1080/08039480802514366>
- Goodman, M. L., Martinez, K., Keiser, P. H., Gitari, S., & Seidel, S. E. (2017). Why do Kenyan children live on the streets? Evidence from a cross-section of semi-rural maternal caregivers. *Child Abuse & Neglect*, *63*, 51-60.  
<http://dx.doi.org/10.1016/j.chiabu.2016.10.018>
- Gratz, K. L. (2001). Measurement of deliberate self-harm: Preliminary data on the Deliberate Self-Harm Inventory. *Journal of psychopathology and behavioral assessment*, *23*(4), 253-263.
- Gratz, K. L. (2003). Risk factors for and functions of deliberate self-harm: An empirical and conceptual review. *Clinical Psychology: Science and Practice*, *10*(2), 192-205.  
<https://doi.org/10.1093/clipsy/bpg022>
- Guérin-Marion, C., Martin, J., Lafontaine, M. F., & Bureau, J. F. (2019). Invalidating caregiving environments, specific emotion regulation deficits, and non-suicidal self-injury. *Child Psychiatry & Human Development*, *51*(1), 39-47.  
<https://doi.org/10.1007/s10578-019-00908-2>

- Hirt, V., Schalinski, I., & Rockstroh, B. (2019). Decoding the impact of adverse childhood experiences on the progression of schizophrenia. *Mental Health & Prevention, 13*, 82-91. <https://doi.org/10.1016/j.mhp.2019.01.002>
- Ho, G. W., Chan, A. C., Chien, W. T., Bressington, D. T., & Karatzias, T. (2019). Examining patterns of adversity in Chinese young adults using the Adverse Childhood Experiences—International Questionnaire (ACE-IQ). *Child Abuse & Neglect, 88*, 179-188. <https://doi.org/10.1016/j.chiabu.2018.11.009>
- Howard, R., Karatzias, T., Power, K., & Mahoney, A. (2017). From childhood trauma to self-harm: An investigation of theoretical pathways among female prisoners. *Clinical Psychology & Psychotherapy, 24*(4), 942-951. <https://doi.org/10.1002/cpp.2058>
- IBM Corp. (2017). IBM SPSS Statistics for Macintosh, Version 25.0. Armonk, NY: IBM Corp.
- Kazeem, O. T. (2015). A validation of the adverse childhood experiences scale in Nigeria. *Research on Humanities and Social Sciences, 5*(11), 18-23.
- Kidman, R., Smith, D., Piccolo, L. R., & Kohler, H. P. (2019). Psychometric evaluation of the Adverse Childhood Experience International Questionnaire (ACE-IQ) in Malawian adolescents. *Child Abuse & Neglect, 92*, 139-145. <https://doi.org/10.1016/j.chiabu.2019.03.015>
- Kim, D., Bae, H., Han, C., Oh, H. Y., & MacDonald, K. (2013). Psychometric properties of the Childhood Trauma Questionnaire-Short Form (CTQ-SF) in Korean patients with schizophrenia. *Schizophrenia Research, 144*(1-3), 93-98. <http://dx.doi.org/10.1016/j.schres.2012.12.020>
- Kim, Y. H. (2017). Associations of adverse childhood experiences with depression and alcohol abuse among Korean college students. *Child Abuse & Neglect, 67*, 338-348. <http://dx.doi.org/10.1016/j.chiabu.2017.03.009>

- Liu, R. T., Scopelliti, K. M., Pittman, S. K., & Zamora, A. S. (2018). Childhood maltreatment and non-suicidal self-injury: A systematic review and meta-analysis. *The Lancet Psychiatry*, 5(1), 51-64. [https://doi.org/10.1016/S2215-0366\(17\)30469-8](https://doi.org/10.1016/S2215-0366(17)30469-8)
- Maier, H. E., & Lachman, M. E. (2000). Consequences of early parental loss and separation for health and well-being in midlife. *International Journal of Behavioral Development*, 24(2), 183-189. <https://doi.org/10.1080/016502500383304>
- Mall, S., Mortier, P., Taljaard, L., Roos, J., Stein, D. J., & Lochner, C. (2018). The relationship between childhood adversity, recent stressors, and depression in college students attending a South African university. *BMC Psychiatry*, 18(1), 63. <https://doi.org/10.1186/s12888-017-1583-9>
- McLaughlin, K. A. (2016). Future directions in childhood adversity and youth psychopathology. *Journal of Clinical Child & Adolescent Psychology*, 45(3), 361-382. <https://doi.org/10.1080/15374416.2015.1110823>
- Merrick, M. T., Ports, K. A., Ford, D. C., Afifi, T. O., Gershoff, E. T., & Grogan-Kaylor, A. (2017). Unpacking the impact of adverse childhood experiences on adult mental health. *Child Abuse & Neglect*, 69, 10-19. <https://doi.org/10.1016/j.chiabu.2017.03.016>
- Quinn, M., Caldara, G., Collins, K., Owens, H., Ozodiegwu, I., Loudermilk, E., & Stinson, J. D. (2018). Methods for understanding childhood trauma: Modifying the adverse childhood experiences international questionnaire for cultural competency. *International Journal of Public Health*, 63(1), 149-151. <https://doi.org/10.1007/s00038-017-1058-2>
- Rehkopf, D. H., Headen, I., Hubbard, A., Deardorff, J., Kesavan, Y., Cohen, A. K., ... & Abrams, B. (2016). Adverse childhood experiences and later life adult obesity and smoking in the United States. *Annals of Epidemiology*, 26(7), 488-492. <https://doi.org/10.1016/j.annepidem.2016.06.003>

- Reiser, S. J., McMillan, K. A., Wright, K. D., & Asmundson, G. J. (2014). Adverse childhood experiences and health anxiety in adulthood. *Child abuse & Neglect*, 38(3), 407-413. <http://dx.doi.org/10.1016/j.chiabu.2013.08.007>
- Sansone, R. A., Wiederman, M. W., & Sansone, L. A. (1998). The self-harm inventory (SHI): Development of a scale for identifying self-destructive behaviors and borderline personality disorder. *Journal of Clinical Psychology*, 54(7), 973-983.
- Serafini, G., Canepa, G., Adavastro, G., Nebbia, J., Belvederi Murri, M., Erbuto, D., ... & Amore, M. (2017). The relationship between childhood maltreatment and non-suicidal self-injury: A systematic review. *Frontiers in Psychiatry*, 8, 149. <https://doi.org/10.3389/fpsy.2017.00149>
- Soares, A. L. G., Howe, L. D., Matijasevich, A., Wehrmeister, F. C., Menezes, A. M., & Gonçalves, H. (2016). Adverse childhood experiences: Prevalence and related factors in adolescents of a Brazilian birth cohort. *Child Abuse & Neglect*, 51, 21-30. <http://dx.doi.org/10.1016/j.chiabu.2015.11.017>
- Stone, A. A., Bachrach, C. A., Jobe, J. B., Kurtzman, H. S., & Cain, V. S. (Eds.). (1999). *The science of self-report: Implications for research and practice*. USA: Psychology Press.
- Takizawa, R., Maughan, B., & Arseneault, L. (2014). Adult health outcomes of childhood bullying victimization: evidence from a five-decade longitudinal British birth cohort. *American Journal of Psychiatry*, 171(7), 777-784.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Tran, Q. A., Dunne, M. P., Vo, T. V., & Luu, N. H. (2015). Adverse childhood experiences and the health of university students in eight provinces of Vietnam. *Asia Pacific Journal of Public Health*, 27(8\_suppl), 26S-32S. <https://doi.org/10.1177/1010539515589812>



- Trujillo, N. P., & Servaty-Seib, H. (2018). Parental Absence and Non-Suicidal Self-Injury: Social Support, Social Constraints and Sense-Making. *Journal of Child and Family Studies*, 27(5), 1449-1459. <https://doi.org/10.1007/s10826-017-0976-1>
- van der Feltz-Cornelis, C. M., Potters, E. C., van Dam, A., Koorndijk, R. P., & Elfeddali, I. (2019). Adverse Childhood Experiences (ACE) in outpatients with anxiety and depressive disorders and their association with psychiatric and somatic comorbidity and revictimization. Cross-sectional observational study. *Journal of Affective Disorders*, 246, 458-464. <https://doi.org/10.1016/j.jad.2018.12.096>
- World Health Organization (WHO; 2018). *Adverse Childhood Experiences International Questionnaire (ACE-IQ)*. Geneva: WHO, 2018. Retrieved on 25<sup>th</sup> of March 2019 from: [https://www.who.int/violence\\_injury\\_prevention/violence/activities/adverse\\_childhood\\_experiences/en/](https://www.who.int/violence_injury_prevention/violence/activities/adverse_childhood_experiences/en/)
- Yong, A. G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in Quantitative Methods for Psychology*, 9(2), 79-94. <https://doi.org/10.20982/tqmp.09.2.p079>

## Appendices

**Appendix A.** ACE-IQ's items (WHO, 2018) used to test its psychometric properties.

| Item number | Item description  |
|-------------|---|
| 1           | Did your parents/guardians understand your problems and worries?  |
| 2           | Did your parents/guardians really know what you were doing with your free time when you were not at school or work?                                       |
| 3           | How often did your parents/guardians not give you enough food even when they could easily have done so?   |
| 4           | Were your parents/guardians too drunk or intoxicated by drugs to take care of you?  |
| 5           | How often did your parents/guardians not send you to school even when it was available?   |
| 6           | Did you live with a household member who was a problem drinker or alcoholic, or misused street or prescription drugs?                                     |
| 7           | Did you live with a household member who was depressed, mentally ill or suicidal?   |
| 8           | Did you live with a household member who was ever sent to jail or prison?   |
| 9           | Were your parents ever separated or divorced?   |
| 10          | Did your mother, father or guardian die?  |
| 11          | Did you see or hear a parent or household member in your home being yelled at, screamed at, sworn at, insulted or humiliated?                             |
| 12          | Did you see or hear a parent or household member in your home being slapped, kicked, punched, or beaten up?   |
| 13          | Did you see or hear a parent or household member in your home being hit or cut with an object, such as a stick (or cane), bottle, club, knife, whip etc.? |
| 14          | Did a parent, guardian or other household member yell, scream or swear at you, insult or humiliate you?   |
| 15          | Did a parent, guardian or other household member threaten to, or actually, abandon you or throw you out of the house?                                     |
| 16          | Did a parent, guardian or other household member spank, slap, kick, punch or beat you up?   |
| 17          | Did a parent, guardian, or other household member hit or cut you with an object, such as a stick (or cane), bottle, club, knife, whip etc?                |
| 18          | Did someone touch or fondle you in a sexual way when you did not want them to?  |
| 19          | Did someone make you touch their body in a sexual way when you did not want them to?  |
| 20          | Did someone attempt oral, anal, vaginal intercourse with you when you did not want them to?   |
| 21          | Did someone actually have oral, anal or vaginal intercourse with you when you did not want them to?   |
| 22          | How often were you bullied?   |
| 23          | How often were you in a physical fight?   |
| 24          | Did you see or hear someone being beaten up in real life?   |
| 25          | Did you see or hear someone being stabbed or shot in real life?   |

- 26 Did you see or hear someone being threatened with a knife or gun in real life?  
 27 Were you forced to go and live in another place due to any of these events?  
 28 Did you experience the deliberate destruction of your home due to any of these events?  
 29 Were you beaten up by soldiers, police, militia, or gangs?  
 30 Was a family member or friend killed or beaten up by soldiers, police, militia or gangs?
- 

**Appendix B.** SHI items that were excluded and the reasons for their exclusion.

| Item | Item description   | Reason for exclusion  |                              |                             |
|------|--|---|------------------------------|-----------------------------|
|      |  | No direct destruction of body tissue or alteration of body's biochemistry | Socially sanctioned behavior | Presence of suicidal intent |
| 6    | Abused alcohol   |   | ✓                            |                             |
| 7    | Driven recklessly on purpose                                       | ✓   |                              |                             |
| 10   | Made medical situations worse on purpose (e.g. skipped medication) | ✓   |                              |                             |
| 11   | Been promiscuous (i.e. had many sexual partners)                   | ✓   |                              |                             |
| 12   | Set yourself up in a relationship to be rejected                   | ✓   |                              |                             |
| 13   | Abused prescription medication                                     |   |                              | ✓                           |
| 14   | Distance yourself from God as punishment                           | ✓   |                              |                             |
| 15   | Engaged in emotionally abusive relationships                       | ✓   |                              |                             |
| 16   | Engaged in sexually abusive relationships                          | ✓   |                              |                             |
| 17   | Lost a job on purpose  | ✓   |                              |                             |
| 18   | Attempted suicide  |   |                              | ✓                           |
| 20   | Tortured yourself with self-defeating thoughts                     | ✓   |                              |                             |

**Source:** Christoforou & Ferreira (2020b)

Appendix C. Inter-item correlations.

| Item | 1    | 2     | 3    | 4     | 5     | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   |      |
|------|------|-------|------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1    | 1.00 | -     | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 2    | 0.40 | 1.00  | -    | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 3    | 0.12 | 0.08  | 1.00 | -     | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 4    | 0.06 | 0.21  | 0.41 | 1.00  | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 5    | 0.11 | 0.08  | 0.41 | 0.39  | 1.00  | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 6    | 0.12 | 0.19  | 0.23 | 0.64  | 0.36  | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 7    | 0.05 | 0.18  | 0.19 | 0.26  | 0.26  | 0.34 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 8    | -    | 0.03  | 0.17 | 0.27  | 0.25  | 0.35 | 0.26 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 9    | 0.01 | -     | 0.03 | 0.22  | 0.21  | 0.13 | 0.16 | 0.25 | 0.17 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 10   | 0.01 | 0.06  | -    | 0.05  | -     | 0.01 | 0.02 | 0.07 | -    | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 11   | 0.17 | 0.18  | 0.02 | 0.27  | 0.26  | 0.13 | 0.27 | 0.25 | 0.19 | 0.29 | -    | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 12   | 0.20 | 0.13  | 0.43 | 0.40  | 0.32  | 0.30 | 0.15 | 0.28 | 0.23 | -    | 0.10 | 0.48 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 13   | 0.09 | 0.15  | 0.45 | 0.36  | 0.37  | 0.21 | 0.18 | 0.21 | 0.15 | -    | 0.03 | 0.31 | 0.58 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 14   | 0.15 | 0.18  | 0.23 | 0.27  | 0.23  | 0.25 | 0.29 | 0.16 | 0.31 | -    | 0.07 | 0.71 | 0.43 | 0.29 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 15   | 0.12 | 0.12  | 0.31 | 0.33  | 0.26  | 0.21 | 0.29 | 0.20 | 0.24 | -    | 0.00 | 0.57 | 0.43 | 0.36 | 0.50 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 16   | 0.10 | 0.17  | 0.27 | 0.21  | 0.22  | 0.14 | 0.22 | 0.16 | 0.23 | -    | 0.01 | 0.53 | 0.52 | 0.42 | 0.43 | 0.41 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 17   | 0.11 | 0.12  | 0.39 | 0.31  | 0.30  | 0.21 | 0.17 | 0.21 | 0.08 | -    | 0.05 | 0.26 | 0.45 | 0.72 | 0.30 | 0.36 | 0.54 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 18   | 0.13 | 0.15  | 0.13 | 0.24  | 0.08  | 0.23 | 0.24 | 0.15 | 0.14 | 0.02 | 0.14 | 0.22 | 0.17 | 0.15 | 0.22 | 0.26 | 0.14 | 0.15 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 19   | 0.10 | 0.07  | 0.16 | 0.23  | 0.03  | 0.14 | 0.24 | 0.10 | 0.17 | 0.11 | 0.17 | 0.22 | 0.20 | 0.19 | 0.29 | 0.15 | 0.16 | 0.77 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 20   | 0.10 | 0.08  | 0.05 | 0.09  | 0.01  | 0.02 | 0.15 | 0.08 | 0.16 | 0.08 | 0.14 | 0.15 | 0.14 | 0.12 | 0.24 | 0.14 | 0.09 | 0.69 | 0.75 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 21   | 0.06 | 0.06  | 0.01 | 0.08  | 0.02  | -    | 0.13 | 0.08 | 0.16 | 0.09 | 0.13 | 0.17 | 0.17 | 0.11 | 0.21 | 0.13 | 0.07 | 0.64 | 0.70 | 0.92 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 22   | 0.11 | 0.08  | 0.09 | 0.09  | 0.10  | 0.11 | 0.13 | 0.03 | 0.15 | 0.05 | 0.22 | 0.18 | 0.10 | 0.30 | 0.30 | 0.21 | 0.10 | 0.20 | 0.18 | 0.15 | 0.12 | 1.00 | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 23   | 0.01 | 0.12  | 0.18 | 0.16  | 0.21  | 0.15 | 0.10 | 0.11 | 0.05 | 0.05 | 0.13 | 0.21 | 0.32 | 0.20 | 0.27 | 0.23 | 0.30 | 0.12 | 0.11 | 0.07 | 0.08 | 0.21 | 1.00 | -    | -    | -    | -    | -    | -    | -    |      |
| 24   | -    | 0.14  | 0.22 | -0.18 | -0.26 | 0.17 | 0.16 | 0.21 | 0.06 | -    | 0.00 | 0.22 | 0.24 | 0.20 | 0.24 | 0.20 | 0.17 | 0.17 | 0.04 | 0.04 | 0.05 | 0.04 | 0.10 | 0.34 | 1.00 | -    | -    | -    | -    | -    |      |
| 25   | -    | -0.03 | 0.19 | 0.10  | 0.11  | 0.08 | -    | 0.90 | -    | 0.21 | -    | 0.08 | 0.10 | -    | 0.08 | 0.07 | 0.15 | 0.06 | 0.07 | 0.06 | 0.03 | -    | 0.21 | 0.27 | 1.00 | -    | -    | -    | -    | -    |      |
| 26   | -    | 0.09  | 0.22 | 0.22  | 0.21  | 0.24 | 0.10 | 0.24 | 0.02 | 0.08 | 0.01 | 0.10 | 0.27 | 0.30 | 0.12 | 0.20 | 0.21 | 0.30 | 0.07 | 0.09 | 0.05 | 0.04 | 0.07 | 0.28 | 0.41 | 0.51 | 1.00 | -    | -    | -    |      |
| 27   | 0.06 | 0.02  | 0.10 | -0.00 | 0.05  | 0.00 | -    | -    | -    | 0.06 | 0.08 | 0.11 | 0.08 | 0.04 | -    | 0.08 | -    | -    | 0.02 | 0.06 | 0.04 | 0.04 | 0.15 | 0.21 | 0.37 | 0.32 | 1.00 | -    | -    | -    |      |
| 28   | 0.08 | 0.10  | 0.09 | 0.021 | 0.05  | 0.15 | 0.03 | -    | 0.01 | -    | 0.05 | 0.08 | .05  | 0.03 | -    | 0.06 | 0.04 | 0.03 | 0.06 | 0.07 | 0.05 | 0.12 | 0.09 | 0.21 | 0.22 | 0.28 | 0.44 | 1.00 | -    | -    |      |
| 29   | -    | 0.07  | -    | 0.00  | 0.00  | 0.09 | 0.00 | 0.13 | 0.00 | 0.13 | -    | -    | -    | -    | -    | -    | 0.00 | -    | -    | 0.00 | 0.00 | -    | -    | 0.15 | 0.00 | 0.07 | 0.00 | 0.17 | 1.00 | -    |      |
| 30   | -    | 0.04  | 0.09 | -     | 0.04  | 0.10 | -    | 0.01 | -    | 0.08 | 0.04 | 0.04 | 0.09 | 0.04 | 0.04 | 0.04 | 0.04 | 0.08 | 0.13 | 0.02 | 0.06 | 0.03 | 0.04 | 0.05 | 0.07 | 0.08 | 0.15 | 0.18 | 0.24 | 0.38 | 1.00 |
|      | 0.03 | -     | -    | -     | -     | -    | 0.00 | -    | 0.04 | -    | -    | -    | -    | -    | -    | -    | -    | 0.01 | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |      |

## Conclusion

### Summary of Findings

In conclusion, reviewing the evidence from previous studies in the first paper of this thesis, it seems there is enough evidence to support an overall small-to-medium significant effect of adverse childhood experiences on NSSI ( $d = 0.271$ ,  $p < 0.001$ ) and a small significant effect of emotion dysregulation on NSSI ( $d = 0.198$ ,  $p < 0.001$ ). Both childhood experiences and emotion dysregulation demonstrated distinct associations. For example, adverse childhood experiences were associated both directly and indirectly (e.g. via emotion dysregulation) with NSSI, while the majority of studies have used emotion dysregulation as a mediator or moderator to the association of NSSI with other risk factors (e.g. adverse childhood experiences and insecure attachment). Although the studies investigating the effect of attachment on NSSI were very limited to find a significant pooled effect ( $d = 0.015$ ,  $p = 0.392$ ), findings from those limited studies suggested that preoccupied insecure attachment could be a risk factor of NSSI. Studies investigating the interaction of some of the aforementioned risk factors and previous theoretical models demonstrated that investigating a serial mediational model might be more fruitful for explaining the underlying processes leading to NSSI (Howard, Karatzias, Power, & Mahoney, 2017; Johnstone et al., 2015; Nock, 2009). Therefore, investigating the interaction of the proposed risk factors in the second paper of this thesis, it showed that adverse childhood experiences were serially associated to NSSI via insecure attachment and emotion dysregulation [Indirect effect = 0.004, SE = 0.002, 95% CI (0.0007, 0.0090)]. The serial mediational pathway was found to provide a higher level of explained variance than alternative models that looked at a direct association between adverse childhood experiences and NSSI or that included only one of the mediators, suggesting that it might provide the best fit for predicting NSSI. Taking into consideration

that the measure used to investigate adverse childhood experiences in the second paper of this thesis was not validated within an NSSI population, the third paper focused on the evaluation of its psychometric properties. The outcomes of the validation study demonstrated that the measure is valid (Convergent validity –  $r = 0.85$ ,  $p < 0.001$  with the CTQ-SF; Predictive validity –  $R^2 = 0.12$ ,  $p = 0.001$  of the SHI total score; Discriminant validity –  $F\text{-value} = 13.90$ ,  $p < 0.001$ ) and reliable (Cronbach's alpha = 0.854) to be used with NSSI populations and hence, the findings with regards to adverse childhood experiences from paper two were reliable and valid. However, due to several issues with its factor structure, it was proposed that it is best to use it without considering its subscales, as it was utilized in paper two.

### **Findings in Accordance to Previous Theories and Empirical Models**

The aforementioned findings are in accordance to the developmental models proposed by Nock (2009), which were presented in the introduction of this thesis. More specifically, they provided evidence for the regulatory path and indirectly, for the representational path, since negative representation of the self could be influenced by the attachment style (Mikulincer, 1995). As previously mentioned the biological processes were beyond the scope of this thesis and hence, the proposed serial mediational model could not provide evidence for the reactive path.

In addition to the theoretical models, the findings from this study supported previous empirical models, such as the model suggested by Kimball and Diddams (2007), who found that emotion dysregulation was a mediator to the relationship between attachment and NSSI. Although a direct association between early life experiences and emotion dysregulation was not supported when accounting for attachment style, the general serial mediational model suggests that emotion dysregulation is a mediator to the relationship of adverse childhood experiences and NSSI, just not the only one. Therefore, one could argue that the findings

support previous empirical findings, which provided evidence of the mediational role of emotion dysregulation on the relationship between early life experiences and NSSI, such as the study conducted by Titelius et al. (2018).

Furthermore, the validity outcomes of the ACE-IQ questionnaire were similar to previous validations of the questionnaire with other populations (Kazeem, 2015; Kidman, Smith, Piccolo, & Kohler, 2019), indicating that the measure is consistently reliable and valid across several samples. Despite the expectations that ACE-IQ would demonstrate higher effect sizes on NSSI outcomes due to its more inclusive nature, findings from the third paper of this thesis, indicated that ACE-IQ and CTQ-SF had a similar effect on NSSI. In particular, in contrast to the expectations, the CTQ-SF had greater effect on NSSI than ACE-IQ ( $R^2 = 0.14$  and  $R^2 = 0.12$  respectively), but the difference was very small. This unexpected finding could be attributed to the impact of standard deviation on the effect sizes. Smaller standard deviations yield stronger effect sizes than larger standard deviations (Field, 2018) and due to the high number of questions included in the ACE-IQ, it is expected that ACE-IQ will have a larger standard deviation than CTQ-SF. However, both ACE-IQ and CTQ-SF demonstrated greater effect on NSSI than the suggested pooled effect size from paper one. This could be attributed to the fact that the pooled effect size was calculated while taking into consideration numerous studies with a variety of outcomes. It could also be due to the modification of the NSSI measure to match the definition of NSSI adopted for this thesis. It could be the case that this definition is more accurate and hence, the impact of adverse childhood experiences on NSSI is more clearly illustrated.

## **Research Implications**

The use of a different definition for this thesis, which was based on previous research and guidelines, could be utilized as a food for thought for future research. Widening the scope of Favazza's (1998) definition and increasing the specificity of the European definition for DSH, could provide a universally agreed definition, which could be more representative of the actual presentation of this newly conceptualized diagnosis. Having a universally agreed definition will potentially allow direct comparison to be made between studies, which will in turn allow the processing of more information on the concept and hence, enhance our knowledge of NSSI based on more solid grounds.

In addition to providing a new definition of the concept, this thesis has several other research implications. The first paper of this thesis provided an updated review of the most prominent risk factors related to NSSI and indicated areas that require further research before reaching to any conclusions, such as the role of attachment on NSSI; and areas that need improvement in order to allow comparison between studies, such as adopting a more homogenous study design. This is the first study that provided meta-analytic data for all three risk factors, which can be used for future studies. However, when considering the pooled effect of attachment on NSSI, findings should be interpreted with caution due to the limited number of studies exploring the effect of attachment on NSSI and their high heterogeneity in the study design.

Furthermore, validating the ACE-IQ with individuals engaging in NSSI provides the opportunity for future studies exploring the effect of adverse childhood experiences and NSSI to use it as one of their measures. However, it is important to take into consideration that the outcomes of the psychometric assessment of ACE-IQ, particularly with regards to its factor structure and convergent validity with CTQ-SF suggest that the measure mainly operates as a close proxy to CTQ-SF. Therefore, future studies should consider whether ACE-IQ or CTQ-



SF is more suitable for their analyses. The ACE-IQ may have utility in more general populations, where a focus on “adversity” rather than “trauma” could be preferable, although further validation of the ACE-IQ measure appears to be needed. The validation from this thesis indicated problems with the factor structure of the ACE-IQ, which can inform researchers on how it is best to use the ACE-IQ in the future and which areas of the questionnaire need improvement in order to ensure that analyses using its subscales are reliable and valid too.

Lastly, the second paper of this thesis provided empirical support for the serial mediational model between early life experiences and NSSI, which was previously proposed by developmental theorists (Nock, 2009). Although the proposed pathway was suggested many years ago, researchers focused only on the evaluation of more simplified mediational models, hence, this study is filling an important gap in the literature. With empirical evidence now supporting the proposed developmental model, researchers could explore how this pathway is related to the different functions of NSSI and how the pathway can be broken in order to develop prevention strategies for NSSI behaviors.

### **Clinical Implications**

The main findings of this thesis could be significantly helpful in the development of prevention/intervention strategies for NSSI. Since a clear pattern is observed between early life experiences and NSSI via insecure attachment and emotion dysregulation, intervening with the process at any point is expected to influence the outcome (i.e. the engagement in NSSI behaviors). Since it is very difficult to alter the experiences of every child and his/her attachment with the primitive attachment figures, it makes more sense to target the individual’s emotion regulation strategies. Emotion regulation strategies can be targeted at any time in someone’s life and hence, it can be used both as a prevention strategy and as a

treatment. To our knowledge, there are many established therapeutic models already targeting emotion dysregulation, such as Emotion Focused Therapy, Dialectical Behavior Therapy, Emotion regulation group therapy, Cognitive therapy, Dynamic deconstructive therapy and Psychoanalytic / Psychodynamic psychotherapy (Greenberg, 2006; Goodman et al., 2014; Gratz & Gunderson, 2006; Kumar, Feldman, & Hayes, 2008; Gregory & Remen, 2008; Chlebowski & Gregory, 2012; Lindqvist et al., 2020). Therefore, examining the effect of these established models on high-risk groups and on individuals engaging in NSSI might be beneficial, since there are only limited studies investigating their effectiveness with NSSI populations (Turner, Austin, & Chapman, 2014; Bentley, Nock, Sauer-Zavala, Gorman, & Barlow, 2017; Briggs et al., 2019).

Given the evidence provided from the systematic review and meta-analysis on the effects of early life experiences, insecure attachment and emotion dysregulation on NSSI, clinicians could use related measures in order to identify individuals who might be more at risk of engaging in NSSI behaviors. One of these measures could be the ACE-IQ, since it demonstrated its validity and reliability within an NSSI population. Using the ACE-IQ instead of the CTQ will aid clinicians to collect more information that might be beneficial during the therapeutic process, since more adversities are being discussed.

However, it is interesting to observe that the proposed pathway leading to NSSI is very similar to the pathway leading to symptoms of Borderline Personality Disorder and suicidal behavior (Sabo, 1997; Twomey, Kaslow, & Croft, 2000), hence, distinguishing NSSI as a separate disorder based on its risk factors might not be possible. It is suggested that it might be more fruitful to explore resiliency factors that might interfere with the process, differentiating the outcome, such as perceived meaning in life, which was previously suggested to be a resiliency factor of suicidal behavior (Kleiman & Beaver, 2013). Although resiliency factors might be helpful in distinguishing NSSI behavior from suicidal behavior,

Muehlenkamp and Brausch (2019) found that protective factors do not moderate the risk of suicide attempts conferred by recent NSSI behaviors, something that should be taken into consideration during a clinical evaluation.

### **Strengths & Limitations**

Despite the numerous research and clinical implications of the aforementioned findings, the thesis is not without any limitations. Although it was observed from the systematic review and meta-analysis that a cross-sectional study design with self-report measures was a general limitation across the NSSI literature, the empirical papers of this thesis did not overcome this limitation. Adopting a cross-sectional design limits our ability to infer causality, which is particularly important when investigating the effect of risk factors on NSSI. However, since childhood experiences and attachment formation happen before adulthood, one could argue that adopting a longitudinal study design would not make particular difference to the outcomes, since the order of the events cannot be altered. Self-report measures though can introduce several biases to the results, such as recall bias, which is also another limitation for not using a longitudinal study design (Stone, Bachrach, Jobe, Kurtzman, & Cain, 1999).

The use of self-reports within attachment literature has been especially controversial, since experts on the field suggest that the defenses of participants, who are insecurely attached, might lead to misleading outcomes or the interpretation of outcomes might differ due to the absence of clinical judgment in self-reports (Jacobvitz, Curran & Moller, 2002). For example, adults acknowledging difficulties in forming close relationships might be considered as insecure-avoidant on a self-report measure, while in an interview the acknowledgement and openness of the adult to share these difficulties might place him/her in the secure category (Jacobvitz et al., 2002). Self-report measures developed to explore adult

attachment styles are grounded in Bowlby's (1969/1982) theory of attachment. However, they constitute an elaboration of this theory, which suggests that adult romantic relationships share similar characteristics with the infant-caregiver relationship, such as the feeling of safety when the other person is present and responsive and the feeling of insecurity when the other is inaccessible (Mikulincer & Shaver, 2007). Studies have found a modest overlap between the attachment style formed with a primitive attachment figure and with a romantic partner, suggesting that the two schools of thought in attachment literature (the representational/developmental approach by Bowlby (1969/1982), Ainsworth, Blehar, Waters, & Wall (1978), Main & Weston (1981) and the social psychology/romantic approach by Hazan & Shaver (1987)) might not be as similar as originally perceived (Fraley, 2002). This has an impact on the conceptualization of attachment in the different studies and on the measures used to explore this distinct association, influencing the conclusions drawn from reviews including both types of attachment, such as the systematic review and meta-analysis of this thesis. It could be that the relative lack of association for attachment as a factor in NSSI observed in the systematic review is an outcome of the variation in measurement models and the position of attachment, rather than a "true" lack of association. Given that the association of attachment with NSSI was significant in the serial mediational model, one could argue that the serial mediational model presents a potentially more useful avenue for understanding the role of attachment in NSSI as a potential precipitant of other emotion (dys)regulation strategies.

Although the definition adopted for this study was based on empirical evidence and clinical guidelines, it was different to previous studies on NSSI. This led to the use of a shorter version of a previously validated measure, which has not been previously psychometrically assessed. In order to overcome this limitation, a reliability assessment was conducted before its use. Furthermore, the use of a different definition limits the opportunity

of direct comparison to be made with previous studies. However, it introduces a definition that might be more fruitful in the future.

One of the main strengths of this thesis in comparison to previous studies is that it collected information only from individuals engaging in NSSI. A very small cohort of participants recruited for the purposes of previous studies engaged in NSSI, leading to over-reliance on very small NSSI samples to observe any effects. Although it was good to have a comparison group, their findings lacked the power that might have been necessary in order to observe the actual effect sizes. Consequently, since there are many studies confirming the effect of childhood experiences, attachment and emotion dysregulation on NSSI (Liu, Scopelliti, Pittman, & Zamora, 2018; Wrath & Adams, 2019; Wolff et al., 2019), a comparison group was considered unnecessary at this stage.

Another strength of this thesis is that it attempted to provide a more comprehensive view of the risk factors of NSSI both within the systematic review and with the empirical assessment of the developmental pathway leading to NSSI. Although simplified empirical models form the basis of our understanding, more complex analyses are also needed to grasp the complexity of reality. In this way, all three papers of this thesis were able to enhance our knowledge in areas, in which gaps within NSSI literature have been observed.

### **Recommendations for Future Research**

Although several gaps in literature have been addressed with this thesis, the outcomes raised new questions that could be addressed in future research. For example, researchers could examine whether the definition of NSSI used for this thesis is more informative with regards to conceptualizing the presenting difficulty, distinguishing it from other mental health difficulties and identifying the most appropriate treatment compared to previous definitions. Additionally, researchers could explore whether this definition can enhance the

communication between clinicians, who are currently divided into two schools of thought. In the case that the definition adopted for this study is helpful, then the development of new measures reflective of the definition might be necessary. Particularly beneficial in distinguishing NSSI from other mental health difficulties, could be the exploration of a pathway combining both risk and resiliency factors.

With regards to the risk factors leading to NSSI, more studies investigating the effect of attachment on NSSI are required, with a more homogenous study design in order to determine a more realistic effect size. Comparison studies using longitudinal and cross-sectional study designs might also provide fruitful insights into the proposed pathway. Given the different functions of NSSI, future research could attempt to correlate the risk factors included in the proposed pathway, to the different functions, in order to determine which part of the pathway might need more attention, developing in this way more personalized treatments. With regards to prevention strategies, more research on the effectiveness of already established therapeutic models targeting emotion regulation might be beneficial within the NSSI literature. Lastly, despite ACE-IQ's reliability and validity within an NSSI sample, it is important to examine how it can be modified in order to improve its factor structure. Sometimes being more specific on the adversities is paramount in the development of personalized therapies.

### **Concluding Remarks**

To conclude, the current thesis provided a systematic review and meta-analysis of three of the most prominent risk factors of NSSI (adverse early life experiences, insecure attachment and emotion dysregulation), supported a serial mediational pathway between these risk factors and assessed the psychometric properties of ACE-IQ within an NSSI population. The findings supported a significant pooled effect for adverse childhood

experiences and emotion dysregulation on NSSI. However, there was not enough evidence to find a significant pooled effect for insecure attachment. As it was proposed adverse childhood experiences were associated to NSSI via insecure attachment and emotion dysregulation. Adverse childhood experiences were evaluated using the ACE-IQ, which was found to be a reliable and valid measure within an NSSI population. However, some issues with regards to its factor structure were indicated, suggesting that further research is required. The outcomes were in accordance to previous studies. Some of the research and clinical implications of this study were discussed, such as the use of the proposed pathway in order to develop new prevention strategies, which are focusing on modifying emotion regulation strategies. Additionally, it provided several research recommendations, such as to explore the definition of NSSI used in this study, to provide more evidence on the effect of insecure attachment on NSSI and to examine the effectiveness of established models of therapy targeting emotion dysregulation with high-risk individuals. Finally, future studies could expand the current model, by combining both risk and resiliency factors in order to develop a model, which might distinguish NSSI from suicidal behavior and borderline personality disorder.

## References

- Ainsworth, M. D. S., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of attachment: A Psychological Study of the Strange Situation*. London: Routledge - Taylor & Francis Group.
- Al-Shawi, A. F., & Lafta, R. K. (2015). Effect of adverse childhood experiences on physical health in adulthood: Results of a study conducted in Baghdad city. *Journal of Family & Community Medicine*, 22(2), 78-84. <https://doi.org/10.4103/2230-8229.155374>
- Almuneef, M., Qayad, M., Aleissa, M., & Albuhairan, F. (2014). Adverse childhood experiences, chronic diseases, and risky health behaviors in Saudi Arabian adults: A pilot study. *Child Abuse & Neglect*, 38(11), 1787-1793.  
<http://dx.doi.org/10.1016/j.chiabu.2014.06.003>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.  
<https://doi.org/10.1176/appi.books.9780890425596>
- Ammerman, B. A., Jacobucci, R., Kleiman, E. M., Uyeji, L. L., & McCloskey, M. S. (2018). The relationship between nonsuicidal self- injury age of onset and severity of self-harm. *Suicide and Life- Threatening Behavior*, 48(1), 31-37.  
<https://doi.org/10.1111/sltb.12330>
- Ammerman, B. A., Hong, M., Sorgi, K., Park, Y., Jacobucci, R., & McCloskey, M. S. (2019). An examination of individual forms of nonsuicidal self-injury. *Psychiatry Research*, 278, 268-274. <https://doi.org/10.1016/j.psychres.2019.06.029>
- Anda, R. F., Butchart, A., Felitti, V. J., & Brown, D. W. (2010). Building a framework for global surveillance of the public health implications of adverse childhood experiences.



*American Journal of Preventive Medicine*, 39(1), 93-98.

<https://doi.org/10.1016/j.amepre.2010.03.015>

Anderson, C. A., Bushman, B. J., Bartholow, B. D., Cantor, J., Christakis, D., Coyne, S. M., ... & Huesmann, R. (2017). Screen violence and youth behavior. *Pediatrics*, 140(Supplement 2), S142-S147. <https://doi.org/10.1542/peds.2016-1758T>

Andover, M. S., Primack, J. M., Gibb, B. E., & Pepper, C. M. (2010). An examination of non-suicidal self-injury in men: Do men differ from women in basic NSSI characteristics?. *Archives of Suicide Research*, 14(1), 79-88.

<https://doi.org/10.1080/13811110903479086>

Arens, A. M., Gaher, R. M., & Simons, J. S. (2012). Child maltreatment and deliberate self-harm among college students: Testing mediation and moderation models for impulsivity. *American Journal of Orthopsychiatry*, 82(3), 328-337.

<https://doi.org/10.1111/j.1939-0025.2012.01165.x>

Arens, A. M., Gaher, R. M., Simons, J. S., & Dvorak, R. D. (2014). Child maltreatment and deliberate self-harm: A negative binomial hurdle model for explanatory constructs. *Child Maltreatment*, 19(3-4), 168-177. <https://doi.org/10.1177/1077559514548315>

Arney, M. F., Nugent, N. R., & Crowther, J. H. (2012). An exploratory analysis of situational affect, early life stress, and nonsuicidal self-injury in college students. *Journal of Child & Adolescent Trauma*, 5(4), 327-343.

<https://doi.org/10.1080/19361521.2012.719594>

Baeken, C., Marinazzo, D., Van Schuerbeek, P., Wu, G. R., De Mey, J., Luypaert, R., & De Raedt, R. (2014). Left and right amygdala-mediofrontal cortical functional connectivity is differentially modulated by harm avoidance. *PLoS One*, 9(4), e95740.

<https://doi.org/10.1371/journal.pone.0095740>

- Baer, J. C., & Martinez, C. D. (2006). Child maltreatment and insecure attachment: A meta-analysis. *Journal of Reproductive and Infant psychology*, 24(3), 187-197.  
<https://doi.org/10.1080/02646830600821231>
- Battle, C. L., Shea, M. T., Johnson, D. M., Yen, S., Zlotnick, C., Zanarini, M. C., ... & McGlashan, T. H. (2004). Childhood maltreatment associated with adult personality disorders: findings from the Collaborative Longitudinal Personality Disorders Study. *Journal of Personality Disorders*, 18(2), 193-211.
- Bedi, R., Muller, R. T., & Classen, C. C. (2014). Cumulative risk for deliberate self-harm among treatment-seeking women with histories of childhood abuse. *Psychological Trauma: Theory, Research, Practice, and Policy*, 6(6), 600-609.  
<http://dx.doi.org/10.1037/a0033897>
- Bentley, K. H., Nock, M. K., Sauer-Zavala, S., Gorman, B. S., & Barlow, D. H. (2017). A functional analysis of two transdiagnostic, emotion-focused interventions on nonsuicidal self-injury. *Journal of Consulting and Clinical Psychology*, 85(6), 632-646.  
<https://doi.org/10.1037/ccp0000205>
- Bernstein, D. P., & Fink, L. (1998). *Manual for the childhood trauma questionnaire*. New York: The Psychological Corporation.
- Bernstein, D. P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., ... & Ruggiero, J. (1994). Initial reliability and validity of a new retrospective measure of child abuse and neglect. *The American Journal of Psychiatry*, 151, 1132-1136.
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., ... & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, 27(2), 169-190.  
[https://doi.org/10.1016/S0145-2134\(02\)00541-0](https://doi.org/10.1016/S0145-2134(02)00541-0)

- Bolen, R. M., Winter, V. R., & Hodges, L. (2012). Affect and state dysregulation as moderators of the relationship between childhood sexual abuse and nonsuicidal self-injury. *Journal of interpersonal violence*, 28(1), 201-228.  
<https://doi.org/10.1177/0886260512448844>
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2009). *Introduction to Meta-analysis*. UK: John Wiley & Sons.
- Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2013). *Comprehensive Meta-analysis Version 3*. Englewood: Biostat.
- Bornovalova, M. A., Tull, M. T., Gratz, K. L., Levy, R., & Lejuez, C. W. (2011). Extending models of deliberate self-harm and suicide attempts to substance users: Exploring the roles of childhood abuse, posttraumatic stress, and difficulties controlling impulsive behavior when distressed. *Psychological Trauma: Theory, Research, Practice, and Policy*, 3(4), 349-359. <https://doi.org/10.1037/a0021579>
- Botella, J., & Gambara, H. (2006). Doing and reporting a meta-analysis. *International Journal of Clinical and Health Psychology*, 6(2), 425-440.
- Bowlby, J. (1969/1982). *Attachment and Loss: Volume 1*. New York: Basic Books.
- Bowlby, J. (1988). *A Secure Base: Parent-child Attachment and Healthy Human Development*. USA: Basic Books.
- Braga, C., & Gonçalves, S. (2014). Non-suicidal self injury, psychopathology and attachment: A study with university students. *The Spanish Journal of Psychology*, 17 (e66), 1-7. <https://doi.org/10.1017/sjp.2014.66>
- Bragazzi, N. L. (2014). A Google Trends-based approach for monitoring NSSI. *Psychology Research and Behavior Management*, 7, 1-8. <https://doi.org/10.2147/PRBM.S44084>

- Brausch, A. M., & Gutierrez, P. M. (2010). Differences in non-suicidal self-injury and suicide attempts in adolescents. *Journal of Youth and Adolescence*, 39(3), 233-242.  
<https://doi.org/10.1007/s10964-009-9482-0>
- Bresin, K., & Schoenleber, M. (2015). Gender differences in the prevalence of nonsuicidal self-injury: A meta-analysis. *Clinical Psychology Review*, 38, 55-64.  
<https://doi.org/10.1016/j.cpr.2015.02.009>
- Bridges, L. J., Denham, S. A., & Ganiban, J. M. (2004). Definitional issues in emotion regulation research. *Child Development*, 75(2), 340-345.
- Briere, J., & Gil, E. (1998). Self- mutilation in clinical and general population samples: Prevalence, correlates, and functions. *American journal of Orthopsychiatry*, 68(4), 609-620.
- Briggs, S., Netuveli, G., Gould, N., Gkaravella, A., Gluckman, N. S., Kangogyere, P., ... & Lindner, R. (2019). The effectiveness of psychoanalytic/psychodynamic psychotherapy for reducing suicide attempts and self-harm: systematic review and meta-analysis. *The British Journal of Psychiatry*, 214(6), 320-328.
- Brown, M. J., Thacker, L. R., & Cohen, S. A. (2013). Association between adverse childhood experiences and diagnosis of cancer. *PloS one*, 8(6), e65524.  
<https://doi.org/10.1371/journal.pone.0065524>
- Brumariu, L. E. (2015). Parent–child attachment and emotion regulation. *New directions for child and adolescent development*, 2015(148), 31-45. <https://doi.org/10.1002/cad.20098>
- Buckholdt, K. E., Parra, G. R., Anestis, M. D., Lavender, J. M., Jobe-Shields, L. E., Tull, M. T., & Gratz, K. L. (2015). Emotion regulation difficulties and maladaptive behaviors: Examination of deliberate self-harm, disordered eating, and substance misuse in two samples. *Cognitive Therapy and Research*, 39(2), 140-152.  
<https://doi.org/10.1007/s10608-014-9655-3>

- Buckmaster, R., McNulty, M., & Guerin, S. (2019). Family factors associated with self-harm in adults: A systematic review. *Journal of Family Therapy*, *41*(4), 537-558.  
<https://doi.org/10.1111/1467-6427.12232>
- Bunclark, J., & Crowe, M. (2000). Repeated self-injury and its management. *International Review of Psychiatry*, *12*(1), 48-53. <https://doi.org/10.1080/09540260074120>
- Bureau, J. F., Martin, J., Freynet, N., Poirier, A. A., Lafontaine, M. F., & Cloutier, P. (2010). Perceived dimensions of parenting and non-suicidal self-injury in young adults. *Journal of Youth and Adolescence*, *39*(5), 484-494. <https://doi.org/10.1007/s10964-009-9470-4>
- Campbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine*, *50*(3), 344-352.  
<https://doi.org/10.1016/j.amepre.2015.07.022>
- Caron, A., Lafontaine, M. F., & Bureau, J. F. (2017a). Exploring the relationship between child maltreatment, intimate partner violence victimization, and self-injurious thoughts and behaviors. *Journal of Aggression, Maltreatment & Trauma*, *27*(7), 759-776.  
<https://doi.org/10.1080/10926771.2017.1410746>
- Caron, A., Lafontaine, M. F., & Bureau, J. F. (2017b). Linking Romantic Attachment and Self-Injury: The Roles of the Behavioural Systems. *Journal of Relationships Research*, *8*(e4), 1-14. <https://doi.org/10.1017/jrr.2017.5>
- Chang, E. C., Schaffer, M. R., Novak, C. J., Ablow, D. B., Gregory, A. E., Chang, O. D., ... & Hirsch, J. K. (2019). Sexual assault history and self-destructive behaviors in women college students: Testing the perniciousness of perfectionism in predicting non-suicidal self-injury and suicidal behaviors. *Personality and Individual Differences*, *149*, 186-191. <https://doi.org/10.1016/j.paid.2019.05.021>

- Chang, X., Jiang, X., Mkandarwire, T., & Shen, M. (2019). Associations between adverse childhood experiences and health outcomes in adults aged 18–59 years. *PloS one*, *14*(2), e0211850. <https://doi.org/10.1371/journal.pone.0211850>
- Chapman, A. L., & Dixon-Gordon, K. L. (2007). Emotional antecedents and consequences of deliberate self-harm and suicide attempts. *Suicide and Life-Threatening Behavior*, *37*(5), 543-552.
- Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders*, *82*(2), 217-225. <https://doi.org/10.1016/j.jad.2003.12.013>
- Chartier, M. J., Walker, J. R., & Naimark, B. (2010). Separate and cumulative effects of adverse childhood experiences in predicting adult health and health care utilization. *Child Abuse & Neglect*, *34*(6), 454-464. <https://doi.org/10.1016/j.chiabu.2009.09.020>
- Chen, H., Cohen, P., & Chen, S. (2010). How big is a big odds ratio? Interpreting the magnitudes of odds ratios in epidemiological studies. *Communications in Statistics—Simulation and Computation*, *39*(4), 860-864. <https://doi.org/10.1080/03610911003650383>
- Chlebowski, S. M., & Gregory, R. J. (2012). Three cases of dissociative identity disorder and co-occurring borderline personality disorder treated with dynamic deconstructive psychotherapy. *American Journal of Psychotherapy*, *66*(2), 165-180.
- Christoforou, R. & Ferreira, N. (2020a). *The role of early life experiences, attachment and emotion regulation in predicting self-harm in adults: A systematic review and meta-analysis*. Manuscript submitted for publication.

- Christoforou, R. & Ferreira, N. (2020b). *The serial mediational role of Attachment and Emotion Regulation in the relationship between Early Life Experiences and Non-suicidal Self-injury: A Conceptual Model*. Manuscript submitted for publication.
- Cipriano, A., Cella, S., & Cotrufo, P. (2017). Nonsuicidal self-injury: A systematic review. *Frontiers in Psychology*, 8, 1946. <https://doi.org/10.3389/fpsyg.2017.01946>
- Claes L., & Muehlenkamp J. J. (2013). Non-suicidal Self-Injury and Eating Disorders: Dimensions of Self-Harm. In: Claes L., & Muehlenkamp J. (Eds.), *Non-Suicidal Self-Injury in Eating Disorders* (3-18). Berlin, Heidelberg: Springer.  
[https://doi.org/10.1007/978-3-642-40107-7\\_1](https://doi.org/10.1007/978-3-642-40107-7_1)
- Claes, L., De Raedt, R., Van de Walle, M., & Bosmans, G. (2016). Attentional bias moderates the link between attachment-related expectations and non-suicidal self-injury. *Cognitive Therapy and Research*, 40(4), 540-548.  
<https://doi.org/10.1007/s10608-016-9761-5>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Collins, N. L., & Read, S. J. (1990). Adult attachment, working models, and relationship quality in dating couples. *Journal of Personality and Social Psychology*, 58(4), 644-663.
- Copeland, W. E., Wolke, D., Lereya, S. T., Shanahan, L., Worthman, C., & Costello, E. J. (2014). Childhood bullying involvement predicts low-grade systemic inflammation into adulthood. *Proceedings of the National Academy of Sciences*, 111(21), 7570-7575.  
<https://doi.org/10.1073/pnas.1323641111>
- Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation*, 10(1), 7. <https://doi.org/10.7275/jyj1-4868>

- Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & behavior*, *106*(1), 29-39.  
<https://doi.org/10.1016/j.physbeh.2011.08.019>
- Davidson, R. J., & Irwin, W. (1999). The functional neuroanatomy of emotion and affective style. *Trends in cognitive sciences*, *3*(1), 11-21.
- Davis, T. S., Mauss, I. B., Lumian, D., Troy, A. S., Shallcross, A. J., Zarolia, P., ... & McRae, K. (2014). Emotional reactivity and emotion regulation among adults with a history of self-harm: Laboratory self-report and functional MRI evidence. *Journal of Abnormal Psychology*, *123*(3), 499-509. <https://doi.org/10.1037/a0036962>
- De Jong Gierveld, J., Van Tilburg, T., & Dykstra, P. A. (2006). Loneliness and social isolation. *Cambridge Handbook of Personal Relationships*, 485-500.
- Dixon-Gordon, K. L., Tull, M. T., & Gratz, K. L. (2014). Self-injurious behaviors in posttraumatic stress disorder: An examination of potential moderators. *Journal of Affective Disorders*, *166*, 359-367. <https://doi.org/10.1016/j.jad.2014.05.033>
- Dong, M., Giles, W. H., Felitti, V. J., Dube, S. R., Williams, J. E., Chapman, D. P., & Anda, R. F. (2004). Insights into causal pathways for ischemic heart disease: Adverse childhood experiences study. *Circulation*, *110*(13), 1761-1766.  
<https://doi.org/10.1161/01.CIR.0000143074.54995.7F>
- Dube, S. R., Anda, R. F., Felitti, V. J., Chapman, D. P., Williamson, D. F., & Giles, W. H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: findings from the Adverse Childhood Experiences Study. *Jama*, *286*(24), 3089-3096. <https://doi.org/10.1001/jama.286.24.3089>
- Dube, S. R., Felitti, V. J., Dong, M., Giles, W. H., & Anda, R. F. (2003). The impact of adverse childhood experiences on health problems: evidence from four birth cohorts



dating back to 1900. *Preventive medicine*, 37(3), 268-277.

[https://doi.org/10.1016/S0091-7435\(03\)00123-3](https://doi.org/10.1016/S0091-7435(03)00123-3)

Dwivedi, A. K., Mallawaarachchi, I., & Alvarado, L. A. (2017). Analysis of small sample size studies using nonparametric bootstrap test with pooled resampling method.

*Statistics in medicine*, 36(14), 2187-2205. <https://doi.org/10.1002/sim.7263>

Egeland, B., & Carlson, E. A. (2004). Attachment and psychopathology. In L. Atkinson, & S. Goldberg (Eds.), *Attachment issues in Psychopathology and Intervention* (pp. 27-48). Lawrence Erlbaum Associates.

Egeland, B., & Sroufe, L. A. (1981). Attachment and early maltreatment. *Child development*, 44-52.

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, 315(7109), 629-634.

El Mhamdi, S., Lemieux, A., Ben Fredj, M., Bouanene, I., Ben Salah, A., Abroug, H., ... & al'Absi, M. (2018). Social and early life adversity and chronic health conditions among Tunisian adults. *Translational Behavioral Medicine*, 1-10.

<https://doi.org/10.1093/tbm/iby126>

Emery, L. F., Gardner, W. L., Carswell, K. L., & Finkel, E. J. (2018). You can't see the real me: Attachment avoidance, self-verification, and self-concept clarity. *Personality and Social Psychology Bulletin*, 44(8), 1133-1146.

<https://doi.org/10.1177/0146167218760799>

Esposito, C., Bacchini, D., & Affuso, G. (2019). Adolescent non-suicidal self-injury and its relationships with school bullying and peer rejection. *Psychiatry Research*, 274, 1-6.

<https://doi.org/10.1016/j.psychres.2019.02.018>

Evren, C., & Evren, B. (2005). Self-mutilation in substance-dependent patients and relationship with childhood abuse and neglect, alexithymia and temperament and

- character dimensions of personality. *Drug and Alcohol Dependence*, 80(1), 15-22.  
<https://doi.org/10.1016/j.drugalcdep.2005.03.017>
- Evren, C., Dalbudak, E., Evren, B., Cetin, R., & Durkaya, M. (2011). Self-mutilative behaviours in male alcohol-dependent inpatients and relationship with posttraumatic stress disorder. *Psychiatry Research*, 186(1), 91-96.  
<https://doi.org/10.1016/j.psychres.2010.07.045>
- Evren, C., Kural, S., & Cakmak, D. (2006). Clinical correlates of self-mutilation in Turkish male substance-dependent inpatients. *Psychopathology*, 39(5), 248-254.  
<https://doi.org/10.1159/000094722>
- Ewing, L., Hamza, C. A., & Willoughby, T. (2019). Stressful experiences, emotion dysregulation, and nonsuicidal self-injury among university students. *Journal of Youth and Adolescence*, 48(7), 1379-1389. <https://doi.org/10.1007/s10964-019-01025-y>
- Farber, S. K. (2002). *When the body is the target: Self-harm, pain, and traumatic attachments*. Jason Aronson, Incorporated.
- Favazza, A. R. (1996). *Bodies under siege: Self-mutilation and body modification in culture and psychiatry* (2nd ed.). Baltimore: Johns Hopkins University Press.
- Favazza, A. R. (1998). The coming of age of self-mutilation. *The Journal of Nervous and Mental disease*, 186(5), 259-268.
- Favazza, A. R., & Rosenthal, R. J. (1990). Varieties of pathological self-mutilation. *Behavioural Neurology*, 3(2), 77-85.
- Favazza, A. R., & Rosenthal, R. J. (1993). Diagnostic issues in self-mutilation. *Psychiatric Services*, 44(2), 134-140.
- Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5<sup>th</sup> ed.). London: Sage Publications.

- Fliege, H., Lee, J. R., Grimm, A., & Klapp, B. F. (2009). Risk factors and correlates of deliberate self-harm behavior: A systematic review. *Journal of Psychosomatic Research*, 66(6), 477-493. <https://doi.org/10.1016/j.jpsychores.2008.10.013>
- Ford, J. D., & Gómez, J. M. (2015). The relationship of psychological trauma and dissociative and posttraumatic stress disorders to nonsuicidal self-injury and suicidality: A review. *Journal of Trauma & Dissociation*, 16(3), 232-271. <https://doi.org/10.1080/15299732.2015.989563>
- Fox, K. R., Franklin, J. C., Ribeiro, J. D., Kleiman, E. M., Bentley, K. H., & Nock, M. K. (2015). Meta-analysis of risk factors for nonsuicidal self-injury. *Clinical Psychology Review*, 42, 156-167. <https://doi.org/10.1016/j.cpr.2015.09.002>
- Fox, K. R., Huang, X., Linthicum, K. P., Wang, S. B., Franklin, J. C., & Ribeiro, J. D. (2019). Model complexity improves the prediction of nonsuicidal self-injury. *Journal of Consulting and Clinical Psychology*, 87(8), 684. <http://dx.doi.org/10.1037/ccp0000421>
- Fraley, R. C. (2002). Attachment stability from infancy to adulthood: Meta-analysis and dynamic modeling of developmental mechanisms. *Personality and Social Psychology Review*, 6(2), 123-151.
- Franzke, I., Wabnitz, P., & Catani, C. (2015). Dissociation as a mediator of the relationship between childhood trauma and nonsuicidal self-injury in females: A path analytic approach. *Journal of Trauma & Dissociation*, 16(3), 286-302. <https://doi.org/10.1080/15299732.2015.989646>
- Gentzler, A. L., Contreras- Grau, J. M., Kerns, K. A., & Weimer, B. L. (2005). Parent-child emotional communication and children's coping in middle childhood. *Social Development*, 14(4), 591-612.

- Gerdner, A., & Allgulander, C. (2009). Psychometric properties of the Swedish version of the childhood trauma Questionnaire—Short form (CTQ-SF). *Nordic Journal of Psychiatry*, 63(2), 160-170. <https://doi.org/10.1080/08039480802514366>
- Gholamrezaei, M., Heath, N., & Panaghi, L. (2017). Non-suicidal self-injury in a sample of university students in Tehran, Iran: prevalence, characteristics and risk factors. *International journal of culture and mental health*, 10(2), 136-149. <https://doi.org/10.1080/17542863.2016.1265999>
- Ghosh, D., & Vogt, A. (2012). Outliers: An evaluation of methodologies. *Joint Statistical Meetings*, 3455-3460.
- Gladstone, G. L., Parker, G. B., Mitchell, P. B., Malhi, G. S., Wilhelm, K., & Austin, M. P. (2004). Implications of childhood trauma for depressed women: an analysis of pathways from childhood sexual abuse to deliberate self-harm and revictimization. *American Journal of Psychiatry*, 161(8), 1417-1425.
- Goodman, M. L., Martinez, K., Keiser, P. H., Gitari, S., & Seidel, S. E. (2017). Why do Kenyan children live on the streets? Evidence from a cross-section of semi-rural maternal caregivers. *Child Abuse & Neglect*, 63, 51-60. <http://dx.doi.org/10.1016/j.chiabu.2016.10.018>
- Goodman, M., Carpenter, D., Tang, C. Y., Goldstein, K. E., Avedon, J., Fernandez, N., ... & Siever, L. J. (2014). Dialectical behavior therapy alters emotion regulation and amygdala activity in patients with borderline personality disorder. *Journal of Psychiatric Research*, 57, 108-116. <https://doi.org/10.1016/j.jpsychires.2014.06.020>
- Grandclerc, S., De Labrouhe, D., Spodenkiewicz, M., Lachal, J., & Moro, M. R. (2016). Relations between nonsuicidal self-injury and suicidal behavior in adolescence: A systematic review. *PloS One*, 11(4), e0153760.

- Gratz, K. L. (2001). Measurement of deliberate self-harm: Preliminary data on the Deliberate Self-Harm Inventory. *Journal of Psychopathology and Behavioral Assessment*, 23(4), 253-263.
- Gratz, K. L. (2003). Risk factors for and functions of deliberate self-harm: An empirical and conceptual review. *Clinical Psychology: Science and Practice*, 10(2), 192-205.  
<https://doi.org/10.1093/clipsy.bpg022>
- Gratz, K. L. (2006). Risk factors for deliberate self-harm among female college students: The role and interaction of childhood maltreatment, emotional inexpressivity, and affect intensity/reactivity. *American Journal of Orthopsychiatry*, 76(2), 238-250.  
<https://doi.org/10.1037/0002-9432.76.2.238>
- Gratz, K. L., & Chapman, A. L. (2007). The role of emotional responding and childhood maltreatment in the development and maintenance of deliberate self-harm among male undergraduates. *Psychology of Men & Masculinity*, 8(1), 1-14.  
<https://doi.org/10.1037/1524-9220.8.1.1>
- Gratz, K. L., & Gunderson, J. G. (2006). Preliminary data on an acceptance-based emotion regulation group intervention for deliberate self-harm among women with borderline personality disorder. *Behavior Therapy*, 37(1), 25-35.
- Gratz, K. L., & Roemer, L. (2008). The relationship between emotion dysregulation and deliberate self-harm among female undergraduate students at an urban commuter university. *Cognitive Behaviour Therapy*, 37(1), 14-25.  
<https://doi.org/10.1080/16506070701819524>
- Gratz, K. L., & Tull, M. T. (2010). The relationship between emotion dysregulation and deliberate self-harm among inpatients with substance use disorders. *Cognitive Therapy and Research*, 34(6), 544-553. <https://doi.org/10.1007/s10608-009-9268-4>

- Gratz, K. L., Bardeen, J. R., Levy, R., Dixon-Gordon, K. L., & Tull, M. T. (2015). Mechanisms of change in an emotion regulation group therapy for deliberate self-harm among women with borderline personality disorder. *Behaviour research and therapy*, 65, 29-35. <http://dx.doi.org/10.1016/j.brat.2014.12.005>
- Gratz, K. L., Conrad, S. D., & Roemer, L. (2002). Risk factors for deliberate self-harm among college students. *American journal of Orthopsychiatry*, 72(1), 128-140. <https://doi.org/10.1037//0002-9432.72.1.128>
- Gratz, K. L., Tull, M. T., & Levy, R. J. P. M. (2014). Randomized controlled trial and uncontrolled 9-month follow-up of an adjunctive emotion regulation group therapy for deliberate self-harm among women with borderline personality disorder. *Psychological Medicine*, 44(10), 2099-2112. <https://doi.org/10.1017/S0033291713002134>
- Greenberg, L. (2006). Emotion-focused therapy: A synopsis. *Journal of Contemporary Psychotherapy*, 36(2), 87-93. <https://doi.org/10.1007/s10879-006-9011-3>
- Greenberg, L. S., & Bolger, E. (2001). An emotion- focused approach to the overregulation of emotion and emotional pain. *Journal of Clinical Psychology*, 57(2), 197-211. [https://doi.org/10.1002/1097-4679\(200102\)57:2<197::AID-JCLP6>3.0.CO;2-O](https://doi.org/10.1002/1097-4679(200102)57:2<197::AID-JCLP6>3.0.CO;2-O)
- Gregory, R. J., & Remen, A. L. (2008). A manual-based psychodynamic therapy for treatment-resistant borderline personality disorder. *Psychotherapy: Theory, Research, Practice, Training*, 45(1), 15-27. <https://doi.org/10.1037/0033-3204.45.1.15>
- Groschwitz, R. C., Kaess, M., Fischer, G., Ameis, N., Schulze, U. M., Brunner, R., ... & Plener, P. L. (2015). The association of non-suicidal self-injury and suicidal behavior according to DSM-5 in adolescent psychiatric inpatients. *Psychiatry Research*, 228(3), 454-461. <https://doi.org/10.1016/j.psychres.2015.06.019>

- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85(2), 348-362. <https://doi.org/10.1037/0022-3514.85.2.348>
- Guérin-Marion, C., Martin, J., Lafontaine, M. F., & Bureau, J. F. (2019). Invalidating caregiving environments, specific emotion regulation deficits, and non-suicidal self-injury. *Child Psychiatry & Human Development*, 51(1), 39-47. <https://doi.org/10.1007/s10578-019-00908-2>
- Gunter, T. D., Chibnall, J. T., Antoniak, S. K., Philibert, R. A., & Hollenbeck, N. (2011). Predictors of suicidal ideation, suicide attempts, and self-harm without lethal intent in a community corrections sample. *Journal of Criminal Justice*, 39(3), 238-245. <https://doi.org/10.1016/j.jcrimjus.2011.02.005>
- Hallab, L., & Covic, T. (2010). Deliberate self-harm: The interplay between attachment and stress. *Behaviour Change*, 27(2), 93-103. <https://doi.org/10.1375/bech.27.2.93>
- Hamza, C. A., Stewart, S. L., & Willoughby, T. (2012). Examining the link between nonsuicidal self-injury and suicidal behavior: A review of the literature and an integrated model. *Clinical Psychology Review*, 32(6), 482-495. <https://doi.org/10.1016/j.cpr.2012.05.003>
- Hasking, P., Rees, C. S., Martin, G., & Quigley, J. (2015). What happens when you tell someone you self-injure? The effects of disclosing NSSI to adults and peers. *BMC Public Health*, 15(1), 1039. <https://doi.org/10.1186/s12889-015-2383-0>
- Hawton, K., Bergen, H., Kapur, N., Cooper, J., Steeg, S., Ness, J., & Waters, K. (2012). Repetition of self-harm and suicide following self-harm in children and adolescents: Findings from the Multicentre Study of Self-harm in England. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 53(12), 1212-1219. <https://doi.org/10.1111/j.1469-7610.2012.02559.x>

- Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. New York: Guilford Press.
- Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, 52(3), 511-524.
- Higgins, J. P., & Green, S. (Eds.). (2011). *Cochrane handbook for systematic reviews of interventions* (Vol. 4). England: John Wiley & Sons.
- Hirt, V., Schalinski, I., & Rockstroh, B. (2019). Decoding the impact of adverse childhood experiences on the progression of schizophrenia. *Mental Health & Prevention*, 13, 82-91. <https://doi.org/10.1016/j.mhp.2019.01.002>
- Ho, G. W., Chan, A. C., Chien, W. T., Bressington, D. T., & Karatzias, T. (2019). Examining patterns of adversity in Chinese young adults using the Adverse Childhood Experiences—International Questionnaire (ACE-IQ). *Child Abuse & Neglect*, 88, 179-188. <https://doi.org/10.1016/j.chiabu.2018.11.009>
- Howard, R., Karatzias, T., Power, K., & Mahoney, A. (2017). From childhood trauma to self-harm: An investigation of theoretical pathways among female prisoners. *Clinical Psychology & Psychotherapy*, 24(4), 942-951. <https://doi.org/10.1002/cpp.2058>
- Huedo-Medina, T. B., Sánchez-Meca, J., Marín-Martínez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: Q statistic or I<sup>2</sup> index?. *Psychological methods*, 11(2), 193.
- IBM Corp. (2017). IBM SPSS Statistics for Macintosh, Version 25.0. Armonk, NY: IBM Corp.
- Idig-Camuroglu, M., & Gölge, Z. B. (2018). Non-suicidal self-injury among university students in Turkey: The effect of gender and childhood abuse. *Psychiatria Danubina*, 30(4), 410-420.



- Jacobson, C. M., & Batejan, K. (2014). Comprehensive theoretical models of nonsuicidal self-injury. In M. K. Nock (Eds), *The Oxford Handbook of Suicide and Self-injury* (pp. 308-320). New York: Oxford University Press.
- Jacobson, C. M., & Gould, M. (2007). The epidemiology and phenomenology of non-suicidal self-injurious behavior among adolescents: A critical review of the literature. *Archives of Suicide Research, 11*(2), 129-147. <https://doi.org/10.1080/13811110701247602>
- Jacobvitz, D., Curran, M., & Moller, N. (2002). Measurement of adult attachment: The place of self-report and interview methodologies. *Attachment & Human Development, 4*(2), 207-215. <https://doi.org/10.1080/14616730210154225>
- Jarvi, S., Jackson, B., Swenson, L., & Crawford, H. (2013). The impact of social contagion on non-suicidal self-injury: A review of the literature. *Archives of Suicide Research, 17*(1), 1-19. <https://doi.org/10.1080/1381118.2013.748404>
- Johnstone, J. M., Carter, J. D., Luty, S. E., Mulder, R. T., Frampton, C. M., & Joyce, P. R. (2015). Childhood predictors of lifetime suicide attempts and non-suicidal self-injury in depressed adults. *Australian & New Zealand Journal of Psychiatry, 50*(2), 135-144. <https://doi.org/10.1177/0004867415585581>
- Kahan, J., & Pattison, E. M. (1984). Proposal for a distinctive diagnosis: The Deliberate Self-Harm syndrome (DSH). *Suicide and Life-Threatening Behavior, 14*(1), 17-35.
- Kazeem, O. T. (2015). A validation of the adverse childhood experiences scale in Nigeria. *Research on Humanities and Social Sciences, 5*(11), 18-23.
- Kidman, R., Smith, D., Piccolo, L. R., & Kohler, H. P. (2019). Psychometric evaluation of the Adverse Childhood Experience International Questionnaire (ACE-IQ) in Malawian adolescents. *Child abuse & Neglect, 92*, 139-145. <https://doi.org/10.1016/j.chiabu.2019.03.015>

- Kim, D., Bae, H., Han, C., Oh, H. Y., & MacDonald, K. (2013). Psychometric properties of the Childhood Trauma Questionnaire-Short Form (CTQ-SF) in Korean patients with schizophrenia. *Schizophrenia Research, 144*(1-3), 93-98.  
<http://dx.doi.org/10.1016/j.schres.2012.12.020>
- Kim, Y. H. (2017). Associations of adverse childhood experiences with depression and alcohol abuse among Korean college students. *Child Abuse & Neglect, 67*, 338-348.  
<http://dx.doi.org/10.1016/j.chiabu.2017.03.009>
- Kimball, J. S., & Diddams, M. (2007). Affect regulation as a mediator of attachment and deliberate self-harm. *Journal of College Counseling, 10*(1), 44-53.  
<https://doi.org/10.1002/j.2161-1882.2007.tb00005.x>
- Kleiman, E. M., & Beaver, J. K. (2013). A meaningful life is worth living: Meaning in life as a suicide resiliency factor. *Psychiatry Research, 210*(3), 934-939.  
<https://doi.org/10.1016/j.psychres.2013.08.002>
- Klonsky, E. D. (2007). The functions of deliberate self-injury: A review of the evidence. *Clinical Psychology Review, 27*(2), 226-239. <https://doi.org/10.1016/j.cpr.2006.08.002>
- Klonsky, E. D., & Moyer, A. (2008). Childhood sexual abuse and non-suicidal self-injury: Meta-analysis. *The British Journal of Psychiatry, 192*(3), 166-170.  
<https://doi.org/10.1192/bjp.bp.106.030650>
- Klonsky, E. D., May, A. M., & Glenn, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: Converging evidence from four samples. *Journal of Abnormal Psychology, 122*(1), 231-237. <https://doi.org/10.1037/a0030278>
- Klonsky, E. D., Oltmanns, T. F., & Turkheimer, E. (2003). Deliberate self-harm in a nonclinical population: Prevalence and psychological correlates. *American Journal of Psychiatry, 160*(8), 1501-1508.

- Kranzler, A., Fehling, K. B., Anestis, M. D., & Selby, E. A. (2016). Emotional dysregulation, internalizing symptoms, and self-injurious and suicidal behavior: Structural equation modeling analysis. *Death studies*, *40*(6), 358-366.  
<http://dx.doi.org/10.1080/07481187.2016.1145156>
- Kumar, S., Feldman, G., & Hayes, A. (2008). Changes in mindfulness and emotion regulation in an exposure-based cognitive therapy for depression. *Cognitive Therapy and Research*, *32*(6), 734-744. <https://doi.org/10.1007/s10608-008-9190-1>
- Lamb, M. E., Gaensbauer, T. J., Malkin, C. M., & Schultz, L. A. (1985). The effects of child maltreatment on security of infant-adult attachment. *Infant Behavior and Development*, *8*(1), 35-45.
- Lang, C. M., & Sharma-Patel, K. (2011). The relation between childhood maltreatment and self-injury: A review of the literature on conceptualization and intervention. *Trauma, Violence, & Abuse*, *12*(1), 23-37. <https://doi.org/10.1177/1524838010386975>
- Lear, M. K., & Pepper, C. M. (2016). Self-concept clarity and emotion dysregulation in nonsuicidal self-injury. *Journal of Personality Disorders*, *30*(6), 813-827.
- Lengel, G. J., & Mullins-Sweatt, S. N. (2013). Nonsuicidal self-injury disorder: Clinician and expert ratings. *Psychiatry Research*, *210*(3), 940-944.  
<https://doi.org/10.1016/j.psychres.2013.08.047>
- Levant, R. F., Hall, R. J., Williams, C. M., & Hasan, N. T. (2009). Gender differences in alexithymia. *Psychology of Men & Masculinity*, *10*(3), 190-203.  
<https://doi.org/10.1037/a0015652>
- Lindqvist, K., Mechler, J., Carlbring, P., Lilliengren, P., Falkenström, F., Andersson, G., ... & Midgley, N. (2020). Affect-Focused Psychodynamic Internet-Based Therapy for Adolescent Depression: Randomized Controlled Trial. *Journal of Medical Internet Research*, *22*(3), e18047. <https://doi.org/10.2196/18047>

- Liu, R. T., Scopelliti, K. M., Pittman, S. K., & Zamora, A. S. (2018). Childhood maltreatment and non-suicidal self-injury: A systematic review and meta-analysis. *The Lancet Psychiatry*, 5(1), 51-64. [https://doi.org/10.1016/S2215-0366\(17\)30469-8](https://doi.org/10.1016/S2215-0366(17)30469-8)
- Macrynika, N., Miranda, R., & Soffer, A. (2018). Social connectedness, stressful life events, and self-injurious thoughts and behaviors among young adults. *Comprehensive psychiatry*, 80, 140-149. <https://doi.org/10.1016/j.comppsy.2017.09.008>
- Mahtani, S., Hasking, P., & Melvin, G. A. (2019). Shame and non-suicidal self-injury: conceptualization and preliminary test of a novel developmental model among emerging adults. *Journal of Youth and Adolescence*, 48(4), 753-770. <https://doi.org/10.1007/s10964-018-0944-0>
- Maier, H. E., & Lachman, M. E. (2000). Consequences of early parental loss and separation for health and well-being in midlife. *International Journal of Behavioral Development*, 24(2), 183-189. <https://doi.org/10.1080/016502500383304>
- Main, M., & Weston, D. R. (1981). The quality of the toddler's relationship to mother and to father: Related to conflict behavior and the readiness to establish new relationships. *Child Development*, 932-940.
- Mall, S., Mortier, P., Taljaard, L., Roos, J., Stein, D. J., & Lochner, C. (2018). The relationship between childhood adversity, recent stressors, and depression in college students attending a South African university. *BMC Psychiatry*, 18(1), 63. <https://doi.org/10.1186/s12888-017-1583-9>
- Martin, A., White, H., Flanagan, T. J., Yensel, N. H., & Bloomberg, T. V. (2011). A multisite study of the association between emotion dysregulation and deliberate self-harm among substance use disorder inpatients: Replication and extension. *Addictive Disorders & Their Treatment*, 10(4), 191-198.

- Martin, J., Bureau, J. F., Cloutier, P., & Lafontaine, M. F. (2011). A comparison of invalidating family environment characteristics between university students engaging in self-injurious thoughts & actions and non-self-injuring university students. *Journal of Youth and Adolescence*, 40(11), 1477-1488. <https://doi.org/10.1007/s10964-011-9643-9>
- Martin, J., Bureau, J. F., Lafontaine, M. F., Cloutier, P., Hsiao, C., Pallanca, D., & Meinz, P. (2017). Preoccupied but not dismissing attachment states of mind are associated with nonsuicidal self-injury. *Development and Psychopathology*, 29(2), 379-388. <https://doi.org/10.1017/S0954579417000050>
- Martin, J., Bureau, J. F., Yurkowski, K., Fournier, T. R., Lafontaine, M. F., & Cloutier, P. (2016). Family-based risk factors for non-suicidal self-injury: Considering influences of maltreatment, adverse family-life experiences, and parent–child relational risk. *Journal of Adolescence*, 49, 170-180. <http://dx.doi.org/10.1016/j.adolescence.2016.03.015>
- Martin, J., Bureau, J. F., Yurkowski, K., Lafontaine, M. F., & Cloutier, P. (2015). Heterogeneity of relational backgrounds is associated with variation in non-suicidal self-injurious behavior. *Journal of Abnormal Child Psychology*, 44(3), 511-522. <https://doi.org/10.1007/s10802-015-0048-1>
- Matthews, T., Danese, A., Wertz, J., Odgers, C. L., Ambler, A., Moffitt, T. E., & Arseneault, L. (2016). Social isolation, loneliness and depression in young adulthood: A behavioural genetic analysis. *Social Psychiatry and Psychiatric Epidemiology*, 51(3), 339-348. <https://doi.org/10.1007/s00127-016-1178-7>
- McLafferty, M., Armour, C., Bunting, B., Ennis, E., Lapsley, C., Murray, E., & O'Neill, S. (2019). Coping, stress, and negative childhood experiences: The link to psychopathology, self-harm, and suicidal behavior. *PsyCh journal*, 8(3), 293-306. <https://doi.org/10.1002/pchj.301>

- McLaughlin, K. A. (2016). Future directions in childhood adversity and youth psychopathology. *Journal of Clinical Child & Adolescent Psychology*, 45(3), 361-382. <https://doi.org/10.1080/15374416.2015.1110823>
- McMahon, K., Hoertel, N., Olfson, M., Wall, M., Wang, S., & Blanco, C. (2018). Childhood maltreatment and impulsivity as predictors of interpersonal violence, self-injury and suicide attempts: a national study. *Psychiatry research*, 269, 386-393. <https://doi.org/10.1016/j.psychres.2018.08.059>
- Merrick, M. T., Ports, K. A., Ford, D. C., Afifi, T. O., Gershoff, E. T., & Grogan-Kaylor, A. (2017). Unpacking the impact of adverse childhood experiences on adult mental health. *Child Abuse & Neglect*, 69, 10-19. <https://doi.org/10.1016/j.chiabu.2017.03.016>
- Merza, K., Papp, G., Molnár, J., & Kuritárné Szabó, I. (2017). Characteristics and development of nonsuicidal self-injury among borderline inpatients. *Psychiatria Danubina*, 29(4), 480-489.
- Midkiff, M. F., Lindsey, C. R., & Meadows, E. A. (2018). The role of coping self-efficacy in emotion regulation and frequency of NSSI in young adult college students. *Cogent Psychology*, 5(1), 1520437. <https://doi.org/10.1080/23311908.2018.1520437>
- Mikulincer, M. (1995). Attachment style and the mental representation of the self. *Journal of Personality and Social Psychology*, 69(6), 1203-1215.
- Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and change*. London: The Guilford Press.
- Modesti, P. A., Reboldi, G., Cappuccio, F. P., Agyemang, C., Remuzzi, G., Rapi, S., ... & ESH Working Group on CV Risk in Low Resource Settings (2016). Panethnic differences in blood pressure in Europe: A systematic review and meta-analysis. *PloS one*, 11(1), e0147601. <https://doi.org/10.1371/journal.pone.0147601>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (The PRISMA Group) (2009). Preferred

- Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med*, 6(7), e1000097. <https://doi.org/10.1371/journal.pmed1000097>
- Molaie, A. M., Chiu, C. Y., Habib, Z., Galynker, I., Briggs, J., Rosenfield, P. J., ... & Yaseen, Z. S. (2019). Emotional Pain Mediates the Link Between Preoccupied Attachment and Non-suicidal Self-Injury in High Suicide Risk Psychiatric Inpatients. *Frontiers in Psychology*, 10, 289. <https://doi.org/10.3389/fpsyg.2019.00289>
- Muehlenkamp, J. J. (2005). Self- injurious behavior as a separate clinical syndrome. *American Journal of Orthopsychiatry*, 75(2), 324-333. <https://doi.org/10.1037/0002-9432.75.2.324>
- Muehlenkamp, J. J., & Brausch, A. M. (2019). Protective factors do not moderate risk for past-year suicide attempts conferred by recent NSSI. *Journal of Affective Disorders*, 245, 321-324. <https://doi.org/10.1016/j.jad.2018.11.013>
- Muehlenkamp, J. J., & Kerr, P. L. (2010). Untangling a complex web: How non-suicidal self-injury and suicide attempts differ. *The Prevention Researcher*, 17(1), 8-11.
- Muehlenkamp, J. J., Bagge, C. L., Tull, M. T., & Gratz, K. L. (2013). Body regard as a moderator of the relation between emotion dysregulation and nonsuicidal self- injury. *Suicide and Life- Threatening Behavior*, 43(5), 479-493. <https://doi.org/10.1111/sltb.12032>
- Muehlenkamp, J. J., Claes, L., Havertape, L., & Plener, P. L. (2012). International prevalence of adolescent non-suicidal self-injury and deliberate self-harm. *Child and Adolescent Psychiatry and Mental Health*, 6(1), 10.
- Muehlenkamp, J. J., Kerr, P. L., Bradley, A. R., & Larsen, M. A. (2010). Abuse subtypes and nonsuicidal self-injury: Preliminary evidence of complex emotion regulation patterns. *The Journal of Nervous and Mental Disease*, 198(4), 258-263. <https://doi.org/10.1097/NMD.0b013e3181d612ab>

- Nada-Raja, S., & Skegg, K. (2011). Victimization, posttraumatic stress disorder symptomatology, and later nonsuicidal self-harm in a birth cohort. *Journal of Interpersonal Violence*, 26(18), 3667-3681. <https://doi.org/10.1177/0886260511403757>
- Nagra, G. S., Lin, A., & Uptegrove, R. (2016). What bridges the gap between self-harm and suicidality? The role of forgiveness, resilience and attachment. *Psychiatry Research*, 241, 78-82. <http://dx.doi.org/10.1016/j.psychres.2016.04.103>
- Navarro-Haro, M. V., Wessman, I., Botella, C., & García-Palacios, A. (2015). The role of emotion regulation strategies and dissociation in non-suicidal self-injury for women with borderline personality disorder and comorbid eating disorder. *Comprehensive psychiatry*, 63, 123-130. <http://dx.doi.org/10.1016/j.comppsy.2015.09.001>
- NCCMH (2012). *Self-harm: Longer-term management. The NICE Guideline on longer-term management. National Clinical Guideline Number 133*. Leicester, UK: National Collaborating Centre for Mental Health, commissioned by the National Institute for Health and Clinical Excellence. The British Psychological Society & The Royal College of Psychiatrists.
- Nicolai, K. A., Wielgus, M. D., & Mezulis, A. (2016). Identifying risk for self-harm: Rumination and negative affectivity in the prospective prediction of nonsuicidal self-injury. *Suicide and Life-Threatening Behavior*, 46(2), 223-233. <https://doi.org/10.1111/sltb.12186>
- Nitkowski D, & Petermann F. (2011). [Non-suicidal self-injury and comorbid mental disorders: a review]. *Fortschritte der Neurologie-psychiatrie*, 79(1), 9-20. <https://doi.org/10.1055/s-0029-1245772>
- Nobakht, H. N., & Dale, K. Y. (2017). The prevalence of deliberate self-harm and its relationships to trauma and dissociation among Iranian young adults. *Journal of*



*Trauma & Dissociation*, 18(4), 610-623.

<https://doi.org/10.1080/15299732.2016.1246397>

Nock, M. K. (2009). *Understanding Non-suicidal Self-injury: Origins, Assessment, and Treatment*. Washington, DC: American Psychological Association.

Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology*, 72(5), 885-890.

<https://doi.org/10.1037/0022-006X.72.5.885>

O'Neill, S., McLafferty, M., Ennis, E., Lapsley, C., Bjourson, T., Armour, C., ... & Murray, E. (2018). Socio-demographic, mental health and childhood adversity risk factors for self-harm and suicidal behaviour in College Students in Northern Ireland. *Journal of affective disorders*, 239, 58-65. <https://doi.org/10.1016/j.jad.2018.06.006>

O'Keefe, D. J. (2000). Guilt and social influence. *Annals of the International Communication Association*, 23(1), 67-101. <https://doi.org/10.1080/23808985.2000.11678970>

Olson, S. L., Bates, J. E., & Bayles, K. (1990). Early antecedents of childhood impulsivity: The role of parent-child interaction, cognitive competence, and temperament. *Journal of abnormal child psychology*, 18(3), 317-334.

Oyefeso, A., Brown, S., Chiang, Y., & Clancy, C. (2008). Self-injurious behaviour, traumatic life events and alexithymia among treatment-seeking opiate addicts: Prevalence, pattern and correlates. *Drug and Alcohol Dependence*, 98(3), 227-234.

<https://doi.org/10.1016/j.drugalcdep.2008.06.004>

Paivio, S. C., & McCulloch, C. R. (2004). Alexithymia as a mediator between childhood trauma and self-injurious behaviors. *Child abuse & neglect*, 28(3), 339-354.

<https://doi.org/10.1016/j.chiabu.2003.11.018>

- Pascuzzo, K., Cyr, C., & Moss, E. (2013). Longitudinal association between adolescent attachment, adult romantic attachment, and emotion regulation strategies. *Attachment & Human Development, 15*(1), 83-103. <https://doi.org/10.1080/14616734.2013.745713>
- Peterson, R. A., & Brown, S. P. (2005). On the use of beta coefficients in meta-analysis. *Journal of Applied Psychology, 90*(1), 175-181. <https://doi.org/10.1037/0021-9010.90.1.175>
- Plener, P. L., Schumacher, T. S., Munz, L. M., & Groschwitz, R. C. (2015). The longitudinal course of non-suicidal self-injury and deliberate self-harm: A systematic review of the literature. *Borderline Personality disorder and Emotion Dysregulation, 2*(1), 2. <https://doi.org/10.1186/s40479-014-0024-3>
- Polanco-Roman, L., Tsypes, A., Soffer, A., & Miranda, R. (2014). Ethnic differences in prevalence and correlates of self-harm behaviors in a treatment-seeking sample of emerging adults. *Psychiatry Research, 220*(3), 927-934. <http://dx.doi.org/10.1016/j.psychres.2014.09.017>
- Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., ... & Duffy, S. (2006). Guidance on the conduct of narrative synthesis in systematic reviews. A Product from the ESRC methods programme, Version 1, b92.
- Quinn, M., Caldara, G., Collins, K., Owens, H., Ozodiegwu, I., Loudermilk, E., & Stinson, J. D. (2018). Methods for understanding childhood trauma: Modifying the adverse childhood experiences international questionnaire for cultural competency. *International Journal of Public Health, 63*(1), 149-151. <https://doi.org/10.1007/s00038-017-1058-2>
- Ravitz, P., Maunder, R., Hunter, J., Sthankiya, B., & Lancee, W. (2010). Adult attachment measures: A 25-year review. *Journal of Psychosomatic Research, 69*(4), 419-432. <https://doi.org/10.1016/j.jpsychores.2009.08.006>

- Rehkopf, D. H., Headen, I., Hubbard, A., Deardorff, J., Kesavan, Y., Cohen, A. K., ... & Abrams, B. (2016). Adverse childhood experiences and later life adult obesity and smoking in the United States. *Annals of Epidemiology*, 26(7), 488-492.  
<https://doi.org/10.1016/j.annepidem.2016.06.003>
- Reiser, S. J., McMillan, K. A., Wright, K. D., & Asmundson, G. J. (2014). Adverse childhood experiences and health anxiety in adulthood. *Child abuse & Neglect*, 38(3), 407-413. <http://dx.doi.org/10.1016/j.chiabu.2013.08.007>
- Ribeiro, J. D., Franklin, J. C., Fox, K. R., Bentley, K. H., Kleiman, E. M., Chang, B. P., & Nock, M. K. (2016). Self-injurious thoughts and behaviors as risk factors for future suicide ideation, attempts, and death: A meta-analysis of longitudinal studies. *Psychological Medicine*, 46(2), 225-236. <https://doi.org/10.1017/S0033291715001804>
- Richmond-Rakerd, L. S., Trull, T. J., Gizer, I. R., McLaughlin, K., Scheiderer, E. M., Nelson, E. C., ... & Statham, D. J. (2018). Common genetic contributions to high-risk trauma exposure and self-injurious thoughts and behaviors. *Psychological medicine*, 49(3), 421-430. <https://doi.org/10.1017/S0033291718001034>
- Rodham, K., & Hawton, K. (2009). Epidemiology and Phenomenology of Nonsuicidal Self-injury. In M. K. Nock (Eds.), *Understanding Nonsuicidal Self-Injury: Origins, Assessment, and Treatment* (pp. 37-62). Washington, DC: American Psychological Association.
- Rodriguez-Srednicki, O. (2002). Childhood sexual abuse, dissociation, and adult self-destructive behavior. *Journal of Child Sexual Abuse*, 10(3), 75-89.  
[https://doi.org/10.1300/J070v10n03\\_05](https://doi.org/10.1300/J070v10n03_05)
- Roe-Sepowitz, D. (2007). Characteristics and predictors of self-mutilation: A study of incarcerated women. *Criminal Behaviour and Mental Health*, 17(5), 312-321.  
<https://doi.org/10.1002/cbm.665>

- Sabo, A. N. (1997). Etiological significance of associations between childhood trauma and borderline personality disorder: Conceptual and clinical implications. *Journal of Personality Disorders, 11*(1), 50-70.
- Sansone, R. A., Sansone, L. A., & Wiederman, M. (1995). The prevalence of trauma and its relationship to borderline personality symptoms and self-destructive behaviors in a primary care setting. *Archives of Family Medicine, 4*(5), 439-442.
- Sansone, R. A., Wiederman, M. W., & Sansone, L. A. (1998). The self-harm inventory (SHI): Development of a scale for identifying self-destructive behaviors and borderline personality disorder. *Journal of Clinical Psychology, 54*(7), 973-983.
- Selby, E. A., Bender, T. W., Gordon, K. H., Nock, M. K., & Joiner Jr, T. E. (2012). Non-suicidal self-injury (NSSI) disorder: a preliminary study. *Personality Disorders: Theory, Research, and Treatment, 3*(2), 167-175. <https://doi.org/10.1037/a0024405>
- Serafini, G., Canepa, G., Adavastro, G., Nebbia, J., Belvederi Murri, M., Erbuto, D., ... & Amore, M. (2017). The relationship between childhood maltreatment and non-suicidal self-injury: A systematic review. *Frontiers in Psychiatry, 8*, 149. <https://doi.org/10.3389/fpsyt.2017.00149>
- Snilstveit, B., Oliver, S., & Vojtkova, M. (2012). Narrative approaches to systematic review and synthesis of evidence for international development policy and practice. *Journal of Development Effectiveness, 4*(3), 409-429. <https://doi.org/10.1080/19439342.2012.710641>
- Soares, A. L. G., Howe, L. D., Matijasevich, A., Wehrmeister, F. C., Menezes, A. M., & Gonçalves, H. (2016). Adverse childhood experiences: Prevalence and related factors in adolescents of a Brazilian birth cohort. *Child Abuse & Neglect, 51*, 21-30. <http://dx.doi.org/10.1016/j.chiabu.2015.11.017>

Sterne, J.A.C., Savović, J., Page, M.J., Elbers, R.G., Blencowe, N.S., Boutron, I., ... &

Sterne, J.A.C. (2019). RoB 2: A Revised tool for assessing risk of bias in randomised trials. *BMJ*, 366, 14898. Retrieved on 5<sup>th</sup> January 2020 from:

<https://sites.google.com/site/riskofbiastool/welcome/rob-2-0-tool?authuser=0>

Stone, A. A., Bachrach, C. A., Jobe, J. B., Kurtzman, H. S., & Cain, V. S. (Eds.). (1999). *The science of self-report: Implications for research and practice*. USA: Psychology Press.

Swannell, S., Martin, G., Page, A., Hasking, P., Hazell, P., Taylor, A., & Protani, M. (2012).

Child maltreatment, subsequent non-suicidal self-injury and the mediating roles of dissociation, alexithymia and self-blame. *Child abuse & neglect*, 36(7-8), 572-584.

<http://dx.doi.org/10.1016/j.chiabu.2012.05.005>

Takizawa, R., Maughan, B., & Arseneault, L. (2014). Adult health outcomes of childhood bullying victimization: evidence from a five-decade longitudinal British birth cohort.

*American Journal of Psychiatry*, 171(7), 777-784.

Talmon, A., & Ginzburg, K. (2018). The differential role of narcissism in the relations

between childhood sexual abuse, dissociation, and self-harm. *Journal of Interpersonal*

*Violence*, 00(0), 1-20. <https://doi.org/10.1177/0886260518799450>

Tatnell, R., Hasking, P., & Newman, L. (2018). Multiple mediation modelling exploring

relationships between specific aspects of attachment, emotion regulation, and non-suicidal self- injury. *Australian Journal of Psychology*, 70(1), 48-56.

<https://doi.org/10.1111/ajpy.12166>

Tatnell, R., Hasking, P., Newman, L., Taffe, J., & Martin, G. (2017). Attachment, emotion regulation, childhood abuse and assault: Examining predictors of NSSI among

adolescents. *Archives of Suicide Research*, 21(4), 610-620.

<https://doi.org/10.1080/13811118.2016.1246267>

- Tatnell, R., Kelada, L., Hasking, P., & Martin, G. (2014). Longitudinal analysis of adolescent NSSI: The role of intrapersonal and interpersonal factors. *Journal of Abnormal Child Psychology*, 42(6), 885-896. <https://doi.org/10.1007/s10802-013-9837-6>
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Taylor, P. J., Jomar, K., Dhingra, K., Forrester, R., Shahmalak, U., & Dickson, J. M. (2018). A meta-analysis of the prevalence of different functions of non-suicidal self-injury. *Journal of Affective Disorders*, 227, 759-769. <https://doi.org/10.1016/j.jad.2017.11.073>
- Taylor, P. J., McDonald, J., Smith, M., Nicholson, H., & Forrester, R. (2019). Distinguishing people with current, past, and no history of non-suicidal self-injury: Shame, social comparison, and self-concept integration. *Journal of Affective Disorders*, 246, 182-188. <https://doi.org/10.1016/j.jad.2018.12.033>
- Terzi, L., Martino, F., Berardi, D., Bortolotti, B., Sasdelli, A., & Menchetti, M. (2017). Aggressive behavior and self-harm in Borderline Personality Disorder: The role of impulsivity and emotion dysregulation in a sample of outpatients. *Psychiatry Research*, 249, 321-326. <http://dx.doi.org/10.1016/j.psychres.2017.01.011>
- Titelius, E. N., Cook, E., Spas, J., Orchowski, L., Kivisto, K., O'Brien, K., ... & Seymour, K. E. (2018). Emotion dysregulation mediates the relationship between child maltreatment and non-suicidal self-injury. *Journal of Aggression, Maltreatment & Trauma*, 27(3), 323-331. <https://doi.org/10.1080/10926771.2017.1338814>
- Tran, Q. A., Dunne, M. P., Vo, T. V., & Luu, N. H. (2015). Adverse childhood experiences and the health of university students in eight provinces of Vietnam. *Asia Pacific Journal of Public Health*, 27(8\_suppl), 26S-32S. <https://doi.org/10.1177/1010539515589812>

- Tresno, F., Ito, Y., & Mearns, J. (2013). Risk factors for nonsuicidal self-injury in Japanese college students: The moderating role of mood regulation expectancies. *International Journal of Psychology*, 48(6), 1009-1017.  
<https://doi.org/10.1080/00207594.2012.733399>
- Trujillo, N. P., & Servaty-Seib, H. (2018). Parental Absence and Non-Suicidal Self-Injury: Social Support, Social Constraints and Sense-Making. *Journal of Child and Family Studies*, 27(5), 1449-1459. <https://doi.org/10.1007/s10826-017-0976-1>
- Turner, B. J., Austin, S. B., & Chapman, A. L. (2014). Treating nonsuicidal self-injury: a systematic review of psychological and pharmacological interventions. *The Canadian Journal of Psychiatry*, 59(11), 576-585.
- Turner, B. J., Dixon-Gordon, K. L., Austin, S. B., Rodriguez, M. A., Rosenthal, M. Z., & Chapman, A. L. (2015). Non-suicidal self-injury with and without borderline personality disorder: differences in self-injury and diagnostic comorbidity. *Psychiatry Research*, 230(1), 28-35. <https://doi.org/10.1016/j.psychres.2015.07.058>
- Twomey, H. B., Kaslow, N. J., & Croft, S. (2000). Childhood Maltreatment, Object Relations, and Suicidal Behavior in Women. *Psychoanalytic Psychology*, 17(2), 313-335. <https://doi.org/10.1037/0736-9735.17.2.313>
- Van de Mortel, T. F. (2008). Faking it: social desirability response bias in self-report research. *Australian Journal of Advanced Nursing*, 25(4), 40-48.
- Van der Feltz-Cornelis, C. M., Potters, E. C., van Dam, A., Koorndijk, R. P., & Elfeddali, I. (2019). Adverse Childhood Experiences (ACE) in outpatients with anxiety and depressive disorders and their association with psychiatric and somatic comorbidity and revictimization. Cross-sectional observational study. *Journal of Affective Disorders*, 246, 458-464. <https://doi.org/10.1016/j.jad.2018.12.096>

- Van der Kolk, B. A., Perry, J. C., & Herman, J. L. (1991). Childhood origins of self-destructive behavior. *American journal of Psychiatry*, *148*(12), 1665-1671.
- Waals, L., Baetens, I., Rober, P., Lewis, S., Van Parys, H., Goethals, E. R., & Whitlock, J. (2018). The NSSI family distress cascade theory. *Child and Adolescent Psychiatry and Mental Health*, *12*(1), 52. <https://doi.org/10.1186/s13034-018-0259-7>
- Wachter, T., Murphy, S., Kennerley, H., & Wachter, S. (2009). A preliminary study examining relationships between childhood maltreatment, dissociation, and self-injury in psychiatric outpatients. *Journal of trauma & dissociation*, *10*(3), 261-275. <https://doi.org/10.1080/15299730902956770>
- Watson, D., & Clark, L. A. (1984). Negative affectivity: the disposition to experience aversive emotional states. *Psychological Bulletin*, *96*(3), 465-490.
- Weaver, T. L., Chard, K. M., Mechanic, M. B., & Etzel, J. C. (2004). Self-injurious behaviors, PTSD arousal, and general health complaints within a treatment-seeking sample of sexually abused women. *Journal of interpersonal violence*, *19*(5), 558-575. <https://doi.org/210.1177/0886260504262965>
- Weintraub, M. J., Van de Loo, M. M., Gitlin, M. J., & Miklowitz, D. J. (2017). Self-harm, affective traits, and psychosocial functioning in adults with depressive and bipolar disorders. *The Journal of Nervous and Mental Disease*, *205*(11), 896-899. <https://doi.org/10.1097/NMD.0000000000000744>
- Wester, K. L., & Trepal, H. C. (2015). Nonsuicidal self-injury: Exploring the connection among race, ethnic identity, and ethnic belonging. *Journal of College Student Development*, *56*(2), 127-139. <https://doi.org/10.1353/csd.2015.0013>
- Wester, K., Trepal, H., & King, K. (2018). Nonsuicidal self-injury: Increased prevalence in engagement. *Suicide and Life-Threatening Behavior*, *48*(6), 690-698. <https://doi.org/10.1111/sltb.12389>



- Wilcox, H. C., Arria, A. M., Caldeira, K. M., Vincent, K. B., Pinchevsky, G. M., & O'Grady, K. E. (2012). Longitudinal predictors of past-year non-suicidal self-injury and motives among college students. *Psychological medicine*, 42(4), 717-726.  
<https://doi.org/10.1017/S0033291711001814>
- Wolff, J. C., Thompson, E., Thomas, S. A., Nesi, J., Bettis, A. H., Ransford, B., ... & Liu, R. T. (2019). Emotion dysregulation and non-suicidal self-injury: A systematic review and meta-analysis. *European Psychiatry*, 59, 25-36.  
<http://dx.doi.org/10.1016/j.eurpsy.2019.03.004>
- Woodman, T., Hardy, L., Barlow, M., & Le Scanff, C. (2010). Motives for participation in prolonged engagement high-risk sports: An agentic emotion regulation perspective. *Psychology of Sport and Exercise*, 11(5), 345-352.  
<https://doi.org/10.1016/j.psychsport.2010.04.002>
- World Health Organization (WHO; 2018). *Adverse Childhood Experiences International Questionnaire (ACE-IQ)*. Geneva: WHO, 2018. Retrieved on 25<sup>th</sup> of March 2019 from:  
[https://www.who.int/violence\\_injury\\_prevention/violence/activities/adverse\\_childhood\\_experiences/en/](https://www.who.int/violence_injury_prevention/violence/activities/adverse_childhood_experiences/en/)
- Wrath, A. J., & Adams, G. C. (2019). Self-injurious behaviors and adult attachment: A review of the literature. *Archives of Suicide Research*, 23(4), 527-550.  
<https://doi.org/10.1080/13811118.2018.1486251>
- Wright, S. L., Firsick, D. M., Kacmarski, J. A., & Jenkins- Guarnieri, M. A. (2017). Effects of attachment on coping efficacy, career decision self- efficacy, and life satisfaction. *Journal of Counseling & Development*, 95(4), 445-456.  
<https://doi.org/10.1002/jcad.12159>

- Wu, C. H. (2009). The relationship between attachment style and self-concept clarity: The mediation effect of self-esteem. *Personality and Individual Differences*, 47(1), 42-46. <https://doi.org/10.1016/j.paid.2009.01.043>
- Yates, T. M. (2004). The developmental psychopathology of self-injurious behavior: Compensatory regulation in posttraumatic adaptation. *Clinical Psychology Review*, 24(1), 35-74. <https://doi.org/10.1016/j.cpr.2003.10.001>
- Yates, T. M., Carlson, E. A., & Egeland, B. (2008). A prospective study of child maltreatment and self-injurious behavior in a community sample. *Development and Psychopathology*, 20(2), 651-671. <https://doi.org/10.1017/S0954579408000321>
- Yong, A. G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in Quantitative Methods for Psychology*, 9(2), 79-94. <https://doi.org/10.20982/tqmp.09.2.p079>
- Yurkowski, K., Martin, J., Levesque, C., Bureau, J. F., Lafontaine, M. F., & Cloutier, P. (2015). Emotion dysregulation mediates the influence of relationship difficulties on non-suicidal self-injury behavior in young adults. *Psychiatry Research*, 228(3), 871-878. <http://dx.doi.org/10.1016/j.psychres.2015.05.006>
- Zanarini, M. C., Laudate, C. S., Frankenburg, F. R., Reich, D. B., & Fitzmaurice, G. (2011). Predictors of self-mutilation in patients with borderline personality disorder: A 10-year follow-up study. *Journal of psychiatric research*, 45(6), 823-828. <https://doi.org/10.1016/j.jpsychires.2010.10.015>
- Zelkowitz, R. L., Cole, D. A., Han, G. T., & Tomarken, A. J. (2016). The incremental utility of emotion regulation but not emotion reactivity in nonsuicidal self-injury. *Suicide and Life-Threatening Behavior*, 46(5), 545-562. <https://doi.org/10.1111/sltb.12236>
- Zeng, X., Zhang, Y., Kwong, J. S., Zhang, C., Li, S., Sun, F., ... & Du, L. (2015). The methodological quality assessment tools for preclinical and clinical studies, systematic

review and meta- analysis, and clinical practice guideline: A systematic review.

*Journal of Evidence-based Medicine*, 8(1), 2-10. <https://doi.org/10.1111/jebm.12141>

Zetterqvist, M., Lundh, L. G., Dahlström, Ö., & Svedin, C. G. (2013). Prevalence and function of non-suicidal self-injury (NSSI) in a community sample of adolescents, using suggested DSM-5 criteria for a potential NSSI disorder. *Journal of Abnormal Child Psychology*, 41(5), 759-773. <https://doi.org/10.1007/s10802-013-9712-5>

Zlotnick, C., Shea, M. T., Pearlstein, T., Simpson, E., Costello, E., & Begin, A. (1996). The relationship between dissociative symptoms, alexithymia, impulsivity, sexual abuse, and self-mutilation. *Comprehensive Psychiatry*, 37(1), 12-16.

Zweig-Frank, H., Paris, J., & Guzder, J. (1994a). Psychological risk factors for dissociation and self-mutilation in female patients with borderline personality disorder. *The Canadian Journal of Psychiatry*, 39(5), 259-264.

Zweig-Frank, H., Paris, J., & Guzder, J. (1994b). Psychological risk factors and self-mutilation in male patients with BPD. *The Canadian Journal of Psychiatry*, 39(5), 266-268.

## Appendices

### Appendix A. Ethical Approval Letter.



46 Makedonias Ave., CY-2417  
P.O. Box 24005, CY 1700, Nicosia, Cyprus  
T +357 22841500 F +357 22357481  
university@unic.ac.cy  
unic.ac.cy

20 June 2019

**Supervisor:** Dr. Nuno Ferreira

**Investigator:** Rania Christoforou

**Research Proposal title:**

*A conceptual model of Deliberate Self-Harm: The contribution of Early Life Experiences, Attachment, Emotional Regulation and the Interplay between them.*

The Social Sciences Ethics Review Board (SSERB) has reviewed your revised application and decided that the project can now be approved.

Your approval number is SSERB 45.

Please feel free to contact us if you have any questions.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'M Sullman'.

Mark Sullman, Ph.D.  
Chair

A handwritten signature in blue ink, appearing to read 'M Koushiou'.

Maria Koushiou, Ph.D.  
Co-chair



Participant Identification Number: [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

| When you were growing up, during the first 18 years of your life . . .         |   |             |
|--|---|-------------|
| 4.6<br>[F6]  | Did you see or hear a parent or household member in your home being yelled at, screamed at, sworn at, insulted or humiliated?                             | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| 4.7<br>[F7]  | Did you see or hear a parent or household member in your home being slapped, kicked, punched or beaten up?  | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| 4.8<br>[F8]  | Did you see or hear a parent or household member in your home being hit or cut with an object, such as a stick (or cane), bottle, club, knife, whip etc.? | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| <b>These next questions are about certain things YOU may have experienced.</b> |   |             |
| When you were growing up, during the first 18 years of your life . . .         |   |             |
| <b>5</b>   |   |             |
| 5.1<br>[A1]  | Did a parent, guardian or other household member yell, scream or swear at you, insult or humiliate you?   | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| 5.2<br>[A2]  | Did a parent, guardian or other household member threaten to, or actually, abandon you or throw you out of the house?                                     | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| 5.3<br>[A3]  | Did a parent, guardian or other household member spank, slap, kick, punch or beat you up?   | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| 5.4<br>[A4]  | Did a parent, guardian or other household member hit or cut you with an object, such as a stick (or cane), bottle, club, knife, whip etc?                 | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| 5.5<br>[A5]  | Did someone touch or fondle you in a sexual way when you did not want them to?  | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| 5.6<br>[A6]  | Did someone make you touch their body in a sexual way when you did not want them to?  | Many times  |
|  |   | A few times |
|  |   | Once        |
|  |   | Never       |
|  |   | Refused     |
| 5.7<br>[A7]  | Did someone attempt oral, anal, or vaginal intercourse with you when you did not want them to?  | Many times  |
|  |   | A few times |
|  |   | Once        |



Participant Identification Number: [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

|           |   |             |
|-----------|---|-------------|
| [V5]      | or shot in real life?   | A few times |
|           |   | Once        |
|           |   | Never       |
|           |   | Refused     |
| 7.3 [V6]  | Did you see or hear someone being threatened with a knife or gun in real life?  | Many times  |
|           |   | A few times |
|           |   | Once        |
|           |   | Never       |
|           |   | Refused     |
| <b>8</b>  | <b>EXPOSURE TO WAR/COLLECTIVE VIOLENCE</b>  |             |
|           | <p><b>These questions are about whether YOU did or did not experience any of the following events when you were a child. The events are all to do with collective violence, including wars, terrorism, political or ethnic conflicts, genocide, repression, disappearances, torture and organized violent crime such as banditry and gang warfare.</b></p> <p><b>When you were growing up, during the first 18 years of your life . . .</b></p> |             |
| 8.1 [V7]  | Were you forced to go and live in another place due to any of these events?   | Many times  |
|           |   | A few times |
|           |   | Once        |
|           |   | Never       |
|           |   | Refused     |
| 8.2 [V8]  | Did you experience the deliberate destruction of your home due to any of these events?  | Many times  |
|           |   | A few times |
|           |   | Once        |
|           |   | Never       |
|           |   | Refused     |
| 8.3 [V9]  | Were you beaten up by soldiers, police, militia, or gangs?  | Many times  |
|           |   | A few times |
|           |   | Once        |
|           |   | Never       |
|           |   | Refused     |
| 8.4 [V10] | Was a family member or friend killed or beaten up by soldiers, police, militia, or gangs?   | Many times  |
|           |   | A few times |
|           |   | Once        |
|           |   | Never       |
|           |   | Refused     |

Source: WHO (2018)



**Appendix C. Childhood Trauma Questionnaire – Short Form (CTQ-SF).**

**Child Trauma Questionnaire (CTQ) – Short form**

**Directions:** These questions ask about some of your experiences growing up as a child and a teenager. For each question, circle the number that best describes how you feel. Although some of these questions are of a personal nature, please try to answer as honestly as you can. Your answers will be kept confidential.

|  | Never<br>true | Rarely<br>true | Some<br>times<br>true | Often<br>true | Very<br>often<br>true |
|--|---------------|----------------|-----------------------|---------------|-----------------------|
| <b>When I was growing up, ....</b>   |               |                |                       |               |                       |
| 1. I didn't have enough to eat.  | 1             | 2              | 3                     | 4             | 5                     |
| 2. I knew that there was someone to take care of me and protect me.                            | 1             | 2              | 3                     | 4             | 5                     |
| 3. People in my family called me things like "stupid", "lazy", or "ugly".                      | 1             | 2              | 3                     | 4             | 5                     |
| 4. My parents were too drunk or high to take care of the family.                               | 1             | 2              | 3                     | 4             | 5                     |
| 5. There was someone in my family who helped me feel important or special.                     | 1             | 2              | 3                     | 4             | 5                     |
| <b>When I was growing up, ...</b>  |               |                |                       |               |                       |
| 6. I had to wear dirty clothes.  | 1             | 2              | 3                     | 4             | 5                     |
| 7. I felt loved.   | 1             | 2              | 3                     | 4             | 5                     |
| 8. I thought that my parents wished I had never been born.                                     | 1             | 2              | 3                     | 4             | 5                     |
| 9. I got hit so hard by someone in my family that I had to see a doctor or go to the hospital. | 1             | 2              | 3                     | 4             | 5                     |
| 10. There was nothing I wanted to change about my family.                                      | 1             | 2              | 3                     | 4             | 5                     |
| <b>When I was growing up, ...</b>  |               |                |                       |               |                       |
| 11. People in my family hit me so hard that it left me with bruises or marks.                  | 1             | 2              | 3                     | 4             | 5                     |
| 12. I was punished with a belt, a board, a cord (or some other hard object).                   | 1             | 2              | 3                     | 4             | 5                     |
| 13. People in my family looked out for each other.   | 1             | 2              | 3                     | 4             | 5                     |
| 14. People in my family said hurtful or insulting things to me.                                | 1             | 2              | 3                     | 4             | 5                     |
| 15. I believe that I was physically abused.  | 1             | 2              | 3                     | 4             | 5                     |

|  | Never true | Rarely true | Some times true | Often true | Very often true |
|--|------------|-------------|-----------------|------------|-----------------|
| <b>When I was growing up, ....</b>   |            |             |                 |            |                 |
| 16. I had the perfect childhood.   | 1          | 2           | 3               | 4          | 5               |
| 17. I got hit or beaten so badly that it was noticed by someone like a teacher, neighbor, or doctor. | 1          | 2           | 3               | 4          | 5               |
| 18. Someone in my family hated me.   | 1          | 2           | 3               | 4          | 5               |
| 19. People in my family felt close to each other.  | 1          | 2           | 3               | 4          | 5               |
| 20. Someone tried to touch me in a sexual way or tried to make me touch them.                        | 1          | 2           | 3               | 4          | 5               |
| <b>When I was growing up, ...</b>  |            |             |                 |            |                 |
| 21. Someone threatened to hurt me or tell lies about me unless I did something sexual with them.     | 1          | 2           | 3               | 4          | 5               |
| 22. I had the best family in the world.  | 1          | 2           | 3               | 4          | 5               |
| 23. Someone tried to make me do sexual things or watch sexual things.                                | 1          | 2           | 3               | 4          | 5               |
| 24. Someone molested me (took advantage of me sexually).   | 1          | 2           | 3               | 4          | 5               |
| 25. I believe that I was emotionally abused.   | 1          | 2           | 3               | 4          | 5               |
| <b>When I was growing up, ...</b>  |            |             |                 |            |                 |
| 26. There was someone to take me to the doctor if I needed it.                                       | 1          | 2           | 3               | 4          | 5               |
| 27. I believe that I was sexually abused.  | 1          | 2           | 3               | 4          | 5               |
| 28. My family was a source of strength and support.  | 1          | 2           | 3               | 4          | 5               |

**Source:** Bernstein et al. (2003)

## Appendix D. Adult Attachment Scale.

*Adult Attachment Scale Items and Factor Loadings*

| Item  | Factor 1 | Factor 2 | Factor 3 |
|---|----------|----------|----------|
| <b>Depend</b>   |          |          |          |
| 1. I find it difficult to allow myself to depend on others.* (Av)                         | .54      | -.18     | .06      |
| 2. People are never there when you need them.* (Av)                                       | .48      | .26      | .09      |
| 3. I am comfortable depending on others. (S)  | -.58     | .24      | -.09     |
| 4. I know that others will be there when I need them. (S)                                 | -.66     | -.18     | .03      |
| 5. I find it difficult to trust others completely.* (Av)                                  | .38      | .13      | .12      |
| 6. I am not sure that I can always depend on others to be there when I need them.* (Ax)   | .71      | .14      | -.10     |
| <b>Anxiety</b>  |          |          |          |
| 7. I do not often worry about being abandoned.* (S)                                       | .03      | -.48     | -.19     |
| 8. I often worry that my partner does not really love me. (Ax)                            | .09      | .64      | .21      |
| 9. I find others are reluctant to get as close as I would like. (Ax)                      | .10      | .47      | -.13     |
| 10. I often worry my partner will not want to stay with me. (Ax)                          | .10      | .62      | .15      |
| 11. I want to merge completely with another person. (Ax)                                  | -.11     | .49      | -.14     |
| 12. My desire to merge sometimes scares people away. (Ax)                                 | .05      | .55      | -.14     |
| <b>Close</b>  |          |          |          |
| 13. I find it relatively easy to get close to others. (S)                                 | -.16     | .02      | -.45     |
| 14. I do not often worry about someone getting too close to me. (S)                       | .07      | .01      | -.46     |
| 15. I am somewhat uncomfortable being close to others.* (Av)                              | .05      | .04      | .71      |
| 16. I am nervous when anyone gets too close.* (Av)  | -.02     | .20      | .77      |
| 17. I am comfortable having others depend on me. (S)                                      | -.03     | .08      | -.40     |
| 18. Often, love partners want me to be more intimate than I feel comfortable being.* (Av) | .07      | -.03     | .29      |
| Eigenvalue before rotation  | 3.49     | 1.80     | 1.01     |
| Percentage of variance after rotation <sup>b</sup>  | 11.30    | 11.50    | 10.80    |

*Note.* (S) Indicates items that originated from the "secure" description; (Av), items that originated from the "avoidant" description; and (Ax), items that originated from the "anxious" description.

Source: Collins & Read (1990)



**Appendix F. Self-harm Inventory (SHI).**

| <b>SELF-HARM INVENTORY</b>  |     |   |
|---|-----|---|
| <b>Instructions:</b> Please answer the following questions by checking either, "Yes," or "No." Check "yes" only to those items that you have done intentionally, or on purpose, to hurt yourself. |     |   |
| Yes   | No  | Have you ever intentionally, or on purpose, done any of the following:                  |
| ___   | ___ | 1. Overdosed? (If yes, number of times___)  |
| ___   | ___ | 2. Cut yourself on purpose? (If yes, number of times___)                                |
| ___   | ___ | 3. Burned yourself on purpose? (If yes, number of times___)                             |
| ___   | ___ | 4. Hit yourself? (If yes, number of times___)   |
| ___   | ___ | 5. Banged your head on purpose? (If yes, number of times___)                            |
| ___   | ___ | 6. Abused alcohol?  |
| ___   | ___ | 7. Driven recklessly on purpose? (If yes, number of times___)                           |
| ___   | ___ | 8. Scratched yourself on purpose? (If yes, number of times___)                          |
| ___   | ___ | 9. Prevented wounds from healing?   |
| ___   | ___ | 10. Made medical situations worse on purpose (e.g.,skipped medication)?                 |
| ___   | ___ | 11. Been promiscuous (i.e., had many sexual partners)? (If yes, how many?___)           |
| ___   | ___ | 12. Set yourself up in a relationship to be rejected?                                   |
| ___   | ___ | 13. Abused prescription medication?   |
| ___   | ___ | 14. Distanced yourself from God as punishment?  |
| ___   | ___ | 15. Engaged in emotionally abusive relationships? (If yes, number of relationships?___) |
| ___   | ___ | 16. Engaged in sexually abusive relationships? (If yes, number of relationships?___)    |
| ___   | ___ | 17. Lost a job on purpose? (If yes, number of times___)                                 |
| ___   | ___ | 18. Attempted suicide? (If yes, number of times___)                                     |
| ___   | ___ | 19. Exercised an injury on purpose?   |
| ___   | ___ | 20. Tortured yourself with self-defeating thoughts?                                     |
| ___   | ___ | 21. Starved yourself to hurt yourself?  |
| ___   | ___ | 22. Abused laxatives to hurt yourself? (If yes, number of times___)                     |
| <p>Have you engaged in any other self-destructive behaviors not asked about in this inventory? If so, please describe below.</p>  |     |   |

**Source:** Sansone, Sansone, & Wiederman (1995)



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#### TABLE OF CONTENTS

|                            |     |
|----------------------------|-----|
| • Description              | p.1 |
| • Audience                 | p.1 |
| • Impact Factor            | p.1 |
| • Abstracting and Indexing | p.2 |
| • Editorial Board          | p.2 |
| • Guide for Authors        | p.3 |



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## Appendix H. Journal of Suicide and Life-Threatening Behavior – Author Guidelines.

### Journal of Suicide and Life-Threatening Behavior

#### Author Guidelines

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## Appendix I. Journal of Child Abuse and Neglect – Author Guidelines.



# CHILD ABUSE & NEGLECT

The International Journal

## AUTHOR INFORMATION PACK

### TABLE OF CONTENTS

|                            |     |
|----------------------------|-----|
| • Description              | p.1 |
| • Audience                 | p.1 |
| • Impact Factor            | p.1 |
| • Abstracting and Indexing | p.2 |
| • Editorial Board          | p.2 |
| • Guide for Authors        | p.4 |



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### DESCRIPTION

*Child Abuse & Neglect* is an international and interdisciplinary journal publishing articles on child welfare, health, humanitarian aid, justice, mental health, public health and social service systems. The journal recognizes that child protection is a global concern that continues to evolve. Accordingly, the journal is intended to be useful to scholars, policymakers, concerned citizens, advocates, and professional practitioners in countries that are diverse in wealth, culture, and the nature of their formal child protection system. *Child Abuse & Neglect* welcomes contributions grounded in the traditions of particular cultures and settings, as well as global perspectives. Article formats include empirical reports, theoretical and methodological reports and invited reviews.

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