Aus der Klinik für Psychiatrie, Psychosomatik und Psychotherapie
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der Medizinischen Fakultät Charité – Universitätsmedizin Berlin

DISSERTATION

Nonsuicidal self-injury in youth inpatients with eating disorders: Lifetime prevalence, methods, clinical correlates, and suicidality

Nicht-suizidales selbstverletzendes Verhalten bei stationär behandelten Kindern und Jugendlichen mit Essstörung: Lebenszeitprävalenz, Methoden, klinische Korrelate und Suizidalität

zur Erlangung des akademischen Grades
Doctor rerum medicinalium (Dr. rer. medic.)

vorgelegt der Medizinischen Fakultät
Charité – Universitätsmedizin Berlin

von

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Datum der Promotion: 30.11.2023

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AN	anorexia nervosa
AN-BP	anorexia nervosa, binge-purge type
ANOVA	analysis of variance
AN-R	anorexia nervosa, restrictive type
BMI	body mass index
BN	bulimia nervosa
CBT	cognitive behavioral therapy
DBT	dialectic behavioral therapy
DSM-4	Diagnostic and Statistical Manual of Mental Disorders, Version 4
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Version 5
ED	eating disorder
EDNOS	eating disorders not otherwise specified
ICD-10	International Statistical Classification of Diseases and Related Health Problems, Version 10
ICD-11	International Statistical Classification of Diseases and Related Health Problems, Version 11
IQ	intelligence quotient
kgs	kilograms
M	mean
Mdn	median
N	total number
n	number of elements in subgroup
NSSI	nonsuicidal self-injury
OR	odds ratio
Q_1	first quartile
Q_3	third quartile
RCR	retrospective chart review
SD	standard deviation
SIQ-TR	Self-Injury Questionnaire - Treatment Related
SPSS	Statistical Package for the Social Sciences

Zusammenfassung

Die vorliegende Dissertation thematisiert nicht-suizidales selbstverletzendes Verhalten (NSSV) bei stationär-psychiatrisch behandelten Kindern und Jugendlichen mit Essstörungen. Für diese vulnerable PatientInnenpopulation[1] mangelte es bisher an epidemiologischen Daten zu NSSV, obwohl Essstörungen und NSSV beide selbstschädigende Verhaltensweisen darstellen, die mit einem erhöhten Mortalitäts- und Suizidrisiko einhergehen. Die vorliegende Arbeit gibt zunächst einen Überblick über relevante klinische Konzepte und den Forschungsstand zu NSSV bei Essstörungen. Anschließend wird eine empirische Studie vorgestellt, die im Rahmen der Dissertation durchgeführt wurde. Diese empirische Studie zielte darauf ab vorhandene Forschungslücken zu adressieren, indem Daten zu Lebenszeitprävalenz, Selbstverletzungsmethoden, klinischen Korrelaten und Suizidalität im Zusammenhang mit NSSV bei stationär behandelten Kindern und Jugendlichen mit Essstörung erhoben wurden. Bei dieser Studie handelt es sich um eine retrospektive Aktenanalyse, die PatientInnen ≤ 18 Jahren einschloss, die zwischen 1990 und 2015 in der Kinder- und Jugendpsychiatrie der Charité – Universitätsmedizin Berlin aufgrund der Diagnose restriktive Anorexia nervosa (AN-R), binge-purge AN (AN-BP) oder Bulimia nervosa (BN) entsprechend der *internationalen statistischen Klassifikation der Krankheiten und verwandter Gesundheitsprobleme* aufgenommen wurden. Die Stichprobe umfasste 382 PatientInnen, war überwiegend weiblich (97,1%), und hatte einen Altersmedian von 15,6 Jahren (Altersbereich 9–18 Jahre). Insgesamt wurde eine hohe Lebenszeitprävalenz von NSSV gefunden mit 47,6% bei BN, 39,3% bei AN-BP und 8,3% bei AN-R. Sich selbst schneiden stellte die häufigste Selbstverletzungsmethode dar, gefolgt von Kratzen, Schlagen und Verbrennen. Multivariable Regressionsanalysen zeigten, dass NSSV in allen Essstörungsgruppen mit einer signifikant erhöhten Anzahl psychiatrischer Komorbiditäten unabhängig korrelierte und zusätzlich mit einer geringeren Gewichtszunahme während des Klinikaufenthaltes bei AN-R und mit einer längeren Behandlungsdauer bei BN. Zudem ging NSSV in allen Essstörungsgruppen mit mehr Suizidgedanken einher, und bei AN-BP zusätzlich mit mehr Suizidversuchen. In der vorliegenden Dissertation werden diese empirischen Befunde vor dem Hintergrund des aktuellen Forschungsstandes zu NSSV bei Essstörungen diskutiert und Implikationen für klinische Praxis und zukünftige Forschung abgeleitet. Insgesamt unterstreichen die im Rahmen dieser Dissertation gewonnen empirischen Befunde die Relevanz von

[1] PatientInnen: Patienten und Patientinnen

Früherkennungsprogrammen und Behandlungsspezialisierung, um gefährdete Individuen rechtzeitig zu identifizieren, Hilfe anbieten und vollständige Genesung ermöglichen zu können. Der gefundene Zusammenhang zwischen NSSV und erhöhter Suizidalität weist auf die Notwendigkeit einer gesonderten Suizidprävention in der PatientInnenpopulation von stationär behandelten Kindern und Jugendlichen mit Essstörung und NSSV hin.

[1] PatientInnen: Patienten und Patientinnen

Abstract

This dissertation adresses nonsuicidal self-injury (NSSI) in youth inpatients with eating disorders (EDs). Even though EDs and NSSI both represent self-harming behaviors that are associated with an increased risk of mortality and suicide, epidemiological data on NSSI have been lacking for this vulnerable patient population. The present work first provides an overview of relevant clinical concepts and the current state of research on NSSI in EDs. An empirical study is then presented that was conducted as part of this dissertation to address an existing research gap by providing data on lifetime prevalence, methods used, clinical correlates, and suicidality associated with NSSI in youth inpatients with EDs. This empirical study is a retrospective chart review, which analyzed data from patients ≤ 18 years consecutively admitted between 1990–2015 to the Child and Adolescent Psychiatry Unit of the Charité University Hospital in Berlin, Germany, with a diagnosis of anorexia nervosa, restrictive type (AN-R), anorexia nervosa, binge-purge type (AN-BP), or bulimia nervosa (BN), according to the *International Statistical Classification of Diseases and Related Health Problems*. The sample consisted of 382 patients, was predominantly female (97.1%), and had a median age of 15.6 years (age range 9–18 years). Overall, a high lifetime prevalence of NSSI was found, with 47.6% in BN, 39.3% in AN-BP, and 8.3% in AN-R. Cutting was the most common NSSI method, followed by scratching, hitting, and burning. Multivariable regression analyses showed that NSSI independently correlated with a significantly higher number of psychiatric comorbidities in each ED subgroup and, in addition, with a lower weight gain during hospitalization in AN-R and with a longer duration of treatment in BN. Furthermore, NSSI was associated with more suicidal ideation in all ED subgroups, and additionally with more suicide attempts in AN-BP. In this dissertation, the obtained empirical findings are discussed against the background of the current state of research on NSSI in EDs, and implications for clinical practice and future research are derived. Overall, the empirical evidence gathered in this dissertation underscores the importance of early prevention programs and treatment specialization to identify at-risk individuals on time, provide help, and enable a full recovery. The association between NSSI and increased suicidality highlights the need for suicide prevention efforts in youth seeking inpatient care for an ED and engaging in NSSI.

1. Introduction

“Written in these scars are the stories I can’t explain” (1, p. 15) is what a girl suffering from an eating disorder (ED) expressed about engaging in nonsuicidal self-injury (NSSI). NSSI and EDs constitute self-harming behaviors associated with severe impairments, lower quality of life, and premature death by suicide (2–10). Further, NSSI and EDs are associated with stigma, making help-seeking more difficult (11–13). Critically, the prevalence of NSSI and EDs is increasing, particularly among youth and since the COVID-19 pandemic, making their study of societal relevance (14–18).
This chapter introduces key theoretical concepts combined with knowledge from clinical practice and recent study findings on NSSI in EDs. Research gaps are identified, and how this work aims to address them.

1.1 State of research

For the clinical understanding of NSSI in EDs, their definition, assessment, and treatment are outlined, as well as an integrated etiological model explaining NSSI in EDs. In addition, across studies with ED patients, data on NSSI lifetime prevalence, methods, clinical correlates, and suicidality are reviewed.

1.1.1 Conceptualization, assessment, and care of nonsuicidal self-injury

NSSI is conceptualized as direct and intentional damage of the own skin without lethal intent and for purposes socially unaccepted (19–22). According to this definition, NSSI does not cover body modifications as cultural expressions, like body piercings, or behaviors whose self-harming consequences were neither intended nor direct, such as lung cancer from smoking (20,22–24). The current NSSI conceptualization also does not comprise self-harm as part of neurological or genetic disorders, developmental disabilities, psychiatric conditions, such as psychosis, or when engaged exclusively during intoxication (21,24).
NSSI is particularly prevalent among youth (25–27). Specifically, youth creates a vulnerable period for the onset of NSSI, with the first phase between 12 and 14 years (2,19,28,29) and a second phase around age 17 (30–32). The body parts most commonly injured by NSSI are the arms and hands, whereas the face, abdomen, legs, and genitals are less frequently affected (19,24,30,33). While the injury severity varies,

NSSI mostly evokes bleeding and results in scars (22,34). Individuals take care of their wounds infrequently and rarely seek medical or psychological help (34,35). Immediately after NSSI, individuals describe relief from aversive emotions and inner tension, while a few hours later, a number of individuals describe feeling worse than before engaging in NSSI, with feelings of shame and guilt associated with NSSI (22,34,36). On average, NSSI is engaged in for nine years and is associated with severe role impairment in daily life (2,4,28,32).

In the *International Statistical Classification of Diseases and Related Health Problems* (ICD), Version 10 and 11 (37,38), NSSI is not a self-standing diagnosis but a psychiatric symptom. However, in the 5th version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) (39), *NSSI disorder* was introduced as a research diagnosis. A common diagnostic concern is that the clinical assessment would trigger NSSI in individuals who otherwise would not have considered NSSI. However, empirical evidence contradicts this concern (22,24,40), and from a medical and ethical point of view, assessing NSSI is mandatory to identify individuals at risk for NSSI and its negative consequences. According to clinical guidelines, NSSI assessment includes a comprehensive somatic examination, verification of immunization status, especially tetanus, and a full mental health review probing for suicidality (24,41).

Consensus-based treatment guidelines are available for NSSI (24,41). Cognitive behavioral therapy (CBT) and dialectic behavioral therapy (DBT) are found to effectively reduce NSSI (19,24,41). Specifically, psychoeducation, identifying factors triggering and maintaining NSSI, adaptive behavior alternatives to NSSI, and the treatment of psychiatric comorbidity and suicidality are assumed as crucial (24,41). In emergencies, an anxiolytic medication might be considered for individuals experiencing severe inner tension leading to NSSI when all other treatment approaches have been unsuccessful (24,42,43). For severe wounds from NSSI, surgical treatment is required (24,41).

Overall, NSSI constitutes a significant mental health concern, being associated with severe role impairment in daily life (2,4,28). Additionally, individuals with NSSI are more likely to suffer from a mental disorder with a relevant co-occurrence of NSSI with EDs (19,32,44–46).

1.1.2 Clinical picture, diagnostic, and treatment of eating disorders

"I've always been the happy one among my family and friends, […] but on the inside, I just feel like breaking down." (47, p. 141), reported a girl suffering from ED. Like NSSI, ED represents a self-harming behavior, but in contrast to NSSI, it is *indirect* without immediate destruction of body tissue (6,10).

Typical EDs include anorexia nervosa (AN) and bulimia nervosa (BN). AN is defined as self-induced underweight of more than 15% below a healthy body weight (37). In minors, age- and sex-related body mass index (BMI) percentiles determine the critical weight threshold, which is $<10^{th}$ BMI percentile (48–50). Body image distortion and weight phobia, defined as intrusive, overvalued fear of being "fat", trigger a very low weight limit. In addition, AN induces endocrine disruptions of amenorrhea, libido loss, and pubertal delay. AN comprises a restrictive (AN-R) and a binge-purge (AN-BP) subtype. While AN-R is characterized by dieting, AN-BP involves purging behaviors, like self-induced vomiting and laxative abuse (37). In contrast to AN, BN is not defined by being underweight but by binge eating and purging: Large amounts of food are consumed in a short time, and possible weight gain is counteracted with purging behaviors. Additionally, BN involves a preoccupation with and a craving for food and body image disturbance.

Similar to NSSI, the peak age of onset is during youth, specifically in early to mid-youth for AN and in mid-to-late youth for BN (51–54). Concerningly, AN and BN are associated with an increased risk of premature death, with medical complications representing one major cause (5,52,53,55–59). AN has the highest fatality rate of any mental disorder (5,58), with a more than 10-fold increased mortality risk in the 15–24 age group (60,61).

To assess an ED, a comprehensive somatic, dietary, and psychological examination is required (48,62). The first-line treatment for AN and BN is outpatient psychotherapeutic and behavioral therapy (48,63). However, severe clinical presentations require hospitalization, including seriously low body weight or rapid weight loss, medical instability, complex psychiatric comorbidity, and suicidality (53,60,62,63). Inpatient care for EDs addresses medical, nutritional, and psychological needs through multimodal, interdisciplinary treatment (52,56,60,64,65). Structured meals support patients with AN to restore their abnormally low body weight and patients with BN to break the cycle of hunger, binging, and purging (52,60,64,66). Inpatient care also includes individual and group psychotherapy, with CBT and family-

based treatment (FBT) as effective interventions for youth AN and BN (48,52,60,63,67). A psychiatric medication, like antidepressants, might be considered to treat severe depressive or obsessive-compulsive comorbidities in AN and to reduce severe binge-purging behaviors in BN (48,52,62,63,68–70). When ED symptoms, such as weight phobia, lead to severe agitation or take on a psychotic quality, antipsychotic medications might be considered carefully for individual patients (48,60,62,63,68,69,71).

Overall, EDs are serious psychiatric conditions that are associated with relapse and chronicity and impaired social functioning and quality of life (57,72,73). As aforementioned, EDs and NSSI frequently co-occur, exposing afflicted individuals to multiple risk factors for poor clinical outcomes. Given the comorbidity between EDs and NSSI, the following question arises: How does NSSI develop, and what functions does it serve in individuals with EDs?

1.1.3 Etiology of nonsuicidal self-injury in eating disorders

"[…] I turned to cutting for relief, so I didn't have to remember the nightmares I endured, […]" (74, p. 9), and *"it makes us feel better in the moment"* (75, p. 11) is how individuals described why they engage in NSSI. In this chapter, the etiology and function of NSSI are explained via the *integrated theoretical model of the development and maintenance of NSSI* that has been evidenced across various ED populations (20–22,30,34,35,76).

First, it is assumed that predisposing factors, such as a history of childhood abuse, create intra- and interpersonal vulnerabilities to cope with stressful situations in maladaptive ways, such as using NSSI (20–22). For example, in youth inpatients, NSSI was associated with more and severe childhood traumatic events and the feeling of helplessness in interpersonal conflicts, leading to attachment dysregulation (77). Specifically, in youth inpatients with EDs, unresolved attachment status was associated with NSSI (77).

In addition, specific factors explain why NSSI is chosen over other coping strategies (20–22): Generally, NSSI might be considered pragmatic, as it can be performed quickly and quietly with barely any procurement, cost, or legal obstacles. Further, in an environment unresponsive to verbal communication, NSSI might be used as physical communication to send a social signal. In addition, NSSI might be chosen as a means

of self-punishment for perceived wrongdoing (20–22). In patient samples with EDs, individuals reported the urge of self-punishment as a major reason for engaging in NSSI (6,30,34,35). Such self-punishment might be due to very high personal standards combined with overly high self-criticism and experience of guilt, which have been observed in individuals with AN and BN (6,33,78).

Moreover, NSSI is assumed to emerge and to be maintained in the context of reinforcement processes (20,22,29), which has been empirically evidenced in mixed samples of youth and adult in- and outpatients with EDs (30,34,35,76). In particular, patients with EDs described engaging in NSSI *"to avoid or suppress painful images or memories"* (35, p. 7) and to decrease *"feeling angry at myself"* and *"feeling anxious"* (35, p. 5), illustrating a negative internal reinforcement function of NSSI by reducing aversive emotions. Overall, more than two-thirds of patients with EDs reported feeling better immediately after NSSI (34).

While this chapter addressed the etiology of NSSI, the question remains about how common NSSI occurs in patients with EDs, what methods are used when engaging in NSSI, and which clinical variables are associated with NSSI in individuals with EDs. The following chapters will address each of these questions.

1.1.4 Lifetime prevalence of nonsuicidal self-injury in patients with eating disorders

As a key epidemiological measure, prevalence counts the number of people affected by a certain disease in a population (79,80). Evaluating prevalences is important to understand the burden of a specific disease (79,80). A total of seven studies were identified that provided records of lifetime NSSI in patients with AN-R, AN-BP, and BN. Specifically, in a mixed sample of youth and adults seeking treatment at a specialized inpatient unit for EDs, NSSI was assessed using the *Self-Injury Questionnaire - Treatment Related* (SIQ-TR) (81), with prevalence findings of 37.3% in AN-R (*n* = 169), 65.5% in AN-BP (*n* = 149), and 73.2% in BN (*n* = 112) (82) (see Appendix 1 for more sample characteristics). In another study of a mixed youth and adult inpatient sample relying on the SIQ-TR (81), lifetime NSSI was identified in 37.0% of AN-R (*n* = 189), 67.0% of AN-BP (*n* = 80), and 67.0% in BN (*n* = 113) (83). A further study using the SIQ-TR (81) examined a mixed sample of youth and adult in- and outpatients and found lifetime NSSI in 60.0% of AN-R (*n* = 20), 56.3% of AN-BP (*n* = 16), 63.4% of BN (*n* = 41) (30). In another cross-sectional design including youth and adult inpatients,

NSSI was found in 41.7% of AN-BP (*n* = 60) and 34.3% of BN (*n* = 137) as measured with an NSSI questionnaire developed by the study group (34).

In a previous study of youth and adult inpatients, in which medical files were screened, NSSI was recorded in 25.0% of AN-R (*n* = 21), 12.5% of AN-BP (*n* = 17), and 62.5% of BN (*n* = 20) (84). In a retrospective chart review of youth patients treated at an academic center, NSSI was documented in 32.4% of AN-R (*n* = 223), 43.2% of AN-BP (*n* = 47), and 20.8% of BN (*n* = 169) (85). A further retrospective chart review identified an NSSI history in 87.5% of youth patients with BN (*n* = 8) treated in a day clinic (86).

An overview of NSSI prevalence findings across studies and categorized by ED subgroups is presented in Figure 1. Overall, lifetime NSSI prevalence varied considerably between studies, with 25–60% in AN-R (weighted mean = 36%), 13–67% in AN-BP (weighted mean = 56%), and 21–88% in BN patient populations (weighted mean = 47%), which might be due to different NSSI assessment methods, age groups, and treatment settings. However, while data for mixed samples of youth and adult inpatients and youth treated in outpatient or day-hospital care settings were available, data on the lifetime prevalence of NSSI, particularly among youth inpatients and differentiating AN-R, AN-BP, and BN patient groups, are lacking.

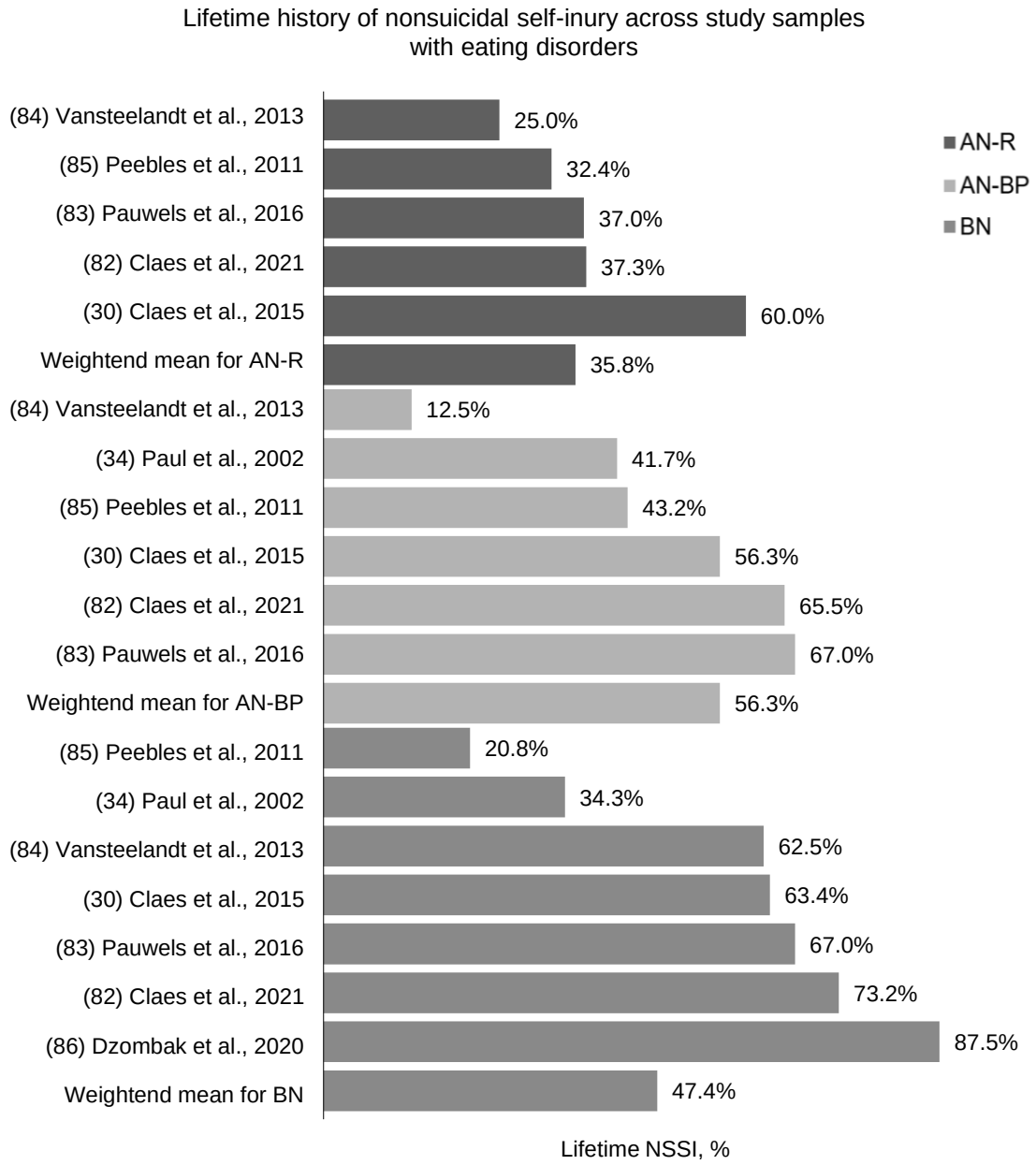


Figure 1: Lifetime prevalence of nonsuicidal self-injury in eating disorders across studies. AN-R: anorexia nervosa, restrictive type, AN-BP: anorexia nervosa, binge-purge type, BN: bulimia nervosa; lifetime NSSI: lifetime history of nonsuicidal self-injury; weighted mean: weighted mean lifetime NSSI prevalence across studies; Figure created by Sabine Arnold based on previous studies (30,34,82–86)

1.1.5 Methods used for nonsuicidal self-injury in patients with eating disorders

In addition to the prevalence of NSSI, it is crucial to examine the methods used for NSSI since different methods are associated with different types of injury and degrees of injury severity. From a clinical view, it is also critical to be familiar with NSSI methods that specific patient groups likely use in order to recognize NSSI preparations and tools and to be able to provide timely support.

A total of seven studies were identified, all of which included mixed patient samples from youth and adult age groups. Six studies relied on the SIQ (87) and the SIQ-TR (81) (31,33,35,76,88,89) to assess whether a patient has engaged in cutting, scratching, bruising, burning, or hair pulling. Specifically, in patients admitted at a specialized ED inpatient unit, hair pulling was most common, followed by cutting, scratching, bruising, and burning (*N* = 134; AN-R: *n* = 36, AN-BP: *n* = 58, BN: *n* = 40) (88). Compared to patients with AN-BP, cutting was less frequent in the AN-R patient group (88). Yet, another study of inpatients showed cutting as most common, followed by scratching, hair pulling, burning, and bruising, with no significant associations between specific NSSI methods and ED subtypes (*N* = 70; AN-R: *n* = 23, AN-BP: *n* = 18, BN: *n* = 29) (33,89). In addition, two further studies revealed a similar pattern, with cutting as the most frequent method, followed by scratching, bruising, and burning (*N* = 422; AN-R: *n* = 140, AN-BP: *n* = 138, BN: *n* = 124, eating disorders not otherwise specified/EDNOS: *n* = 20) (31) (*N* = 173; AN-R: *n* = 48, AN-BP: *n* = 34, BN: *n* = 72, EDNOS: *n* = 19) (76).

Furthermore, in a study of a mixed sample of in- and outpatients who were treated at two specialized ED centers, in which any NSSI methods used could be described in addition to the five main categories of the SIQ-TR (81), cutting was the most common, followed by scratching, bruising, biting, burning, hair-pulling and hitting (*N* = 136; AN: *n* = 98, EDNOS: *n* = 38) (35). In a further inpatient sample, cutting was most common, followed by hitting and scratching, evaluated by a questionnaire developed by the study group (*N* = 376; AN-R: *n* = 59, AN-BP: *n* = 60, BN: *n* = 137, EDNOS: *n* = 120) (34).

Taken together, a similar pattern of NSSI methods was found across studies, with cutting being the most common across various ED patient populations. However, it remains unclear whether specific NSSI methods are associated with ED subtypes because (a) either the studies did not investigate this association, or (b) those studies investigating the effect of ED subtype yielded contradictory results (33,88,89). While NSSI methods have been analyzed for mixed samples of youth and adults, in- and outpatients, data on NSSI methods, particularly among youth inpatients, comparing AN-R, AN-BP, and BN patient groups, are lacking.

1.1.6 Clinical correlates of nonsuicidal self-injury in patients with eating disorders

In addition to the prevalences and methods of NSSI, it is important to gain insights into clinical variables that are associated with NSSI to deepen the understanding of NSSI psychopathology in specific patient populations, which is required to tailor prevention and treatment approaches.

A narrative review of NSSI in EDs, including youth and adults from in- and outpatient settings, identified that NSSI was associated with a history of abuse, obsessive-compulsiveness, depression, and substance abuse (*N* = 66 studies, 2005-2013) (46). Specifically, in a sample of 70 youth and adults treated in a specialized ED program, patients who engaged in NSSI were significantly more likely to report a history of physical, emotional, and sexual abuse (33). In addition, NSSI was associated with more generalized and phobic anxiety, depression, identity confusion, borderline and antisocial personality traits, and negative body esteem (AN-R: *n* = 23, AN-BP: *n* = 18, BN: *n* = 29) (33).

Furthermore, in a retrospective chart review, youth outpatients with NSSI were more likely to be female, older, and had a longer duration of illness compared to those without NSSI (AN-R: *n* = 223, AN-BP: *n* = 47, BN: *n* = 169, EDNOS: *n* = 905) (85). In addition, this study revealed an association between NSSI and abuse, comorbid affective disorders, and substance use (85). Further, in a mixed sample of youth and adult inpatients, those with NSSI had experienced more traumatic events, showed more obsessive-compulsive thoughts and behaviors, and more severe ED pathology (AN-R: *n* = 59, AN-BP: *n* = 60, BN: *n* = 137, EDNOS: *n* = 120) (34). In another study involving a mixed sample of youth and adults seeking in- and outpatient care, individuals with NSSI had a significantly longer treatment history for their ED and more often had a secondary psychiatric disorder, with a personality disorder not otherwise specified as one of the three most common comorbidities (AN: *n* = 98, EDNOS: *n* = 38) (35).

Clinical correlates of NSSI across different studies of ED populations are summarized in Figure 2. Overall, NSSI was associated with severe general and ED-specific psychopathology. However, while previous research provided clinical correlates of NSSI among mixed samples of youth and adult in- and outpatients with pooled ED subtypes, clinical correlates of NSSI specifically for youth inpatients and distinguishing between AN-R, AN-BP, and BN are lacking.

1.1.7 Suicidality in patients with eating disorders and nonsuicidal self-injury

“I was waiting for the right moment when I could commit suicide [...] I knew for sure that I could not go on living if things were to continue to be like this.” (90, p. 5) a young woman suffering from BN disclosed. Globally, nearly one million people commit suicide each year – in other words, someone takes their life every 30 seconds (91). Especially in youth and young adults between the ages of 15–29, suicide is the second most common cause of premature death (92). The vast majority of suicides are associated with mental disorders (92), while precursors of suicide are suicidality in terms of suicidal ideation and suicide attempts (22,93).

In particular, a recent review of ED populations of different ages and treatment settings identified one-quarter to one-third of patients with AN and BN experiencing suicidal ideation (94). Concerning suicide attempts, individuals with vs. without ED during youth had a substantially increased risk of attempting suicide during early adulthood (95). In addition, a comprehensive review demonstrated a lifetime history of suicide attempts of 3–20% in AN and 25–35% in BN patient populations (8).

In addition, NSSI has been recognized as a clinically significant risk factor for future suicidal ideation, suicide attempts, and death from suicide (44,96). NSSI, suicidal ideation and suicide attempts might exist along a self-harm continuum, with NSSI being hypothesized to be a *gateway* to more severe forms of self-harm (7).

According to the *Interpersonal Theory of Suicide* (97,98), both EDs and NSSI increase the capability to commit suicide because they accustom an individual to fear and pain associated with self-harm, which is why their co-occurrence is thought to be linked with increased suicidality. However, data on suicidality are lacking for the vulnerable youth seeking inpatient care for AN-R, AN-BP, or BN who also engage in NSSI.

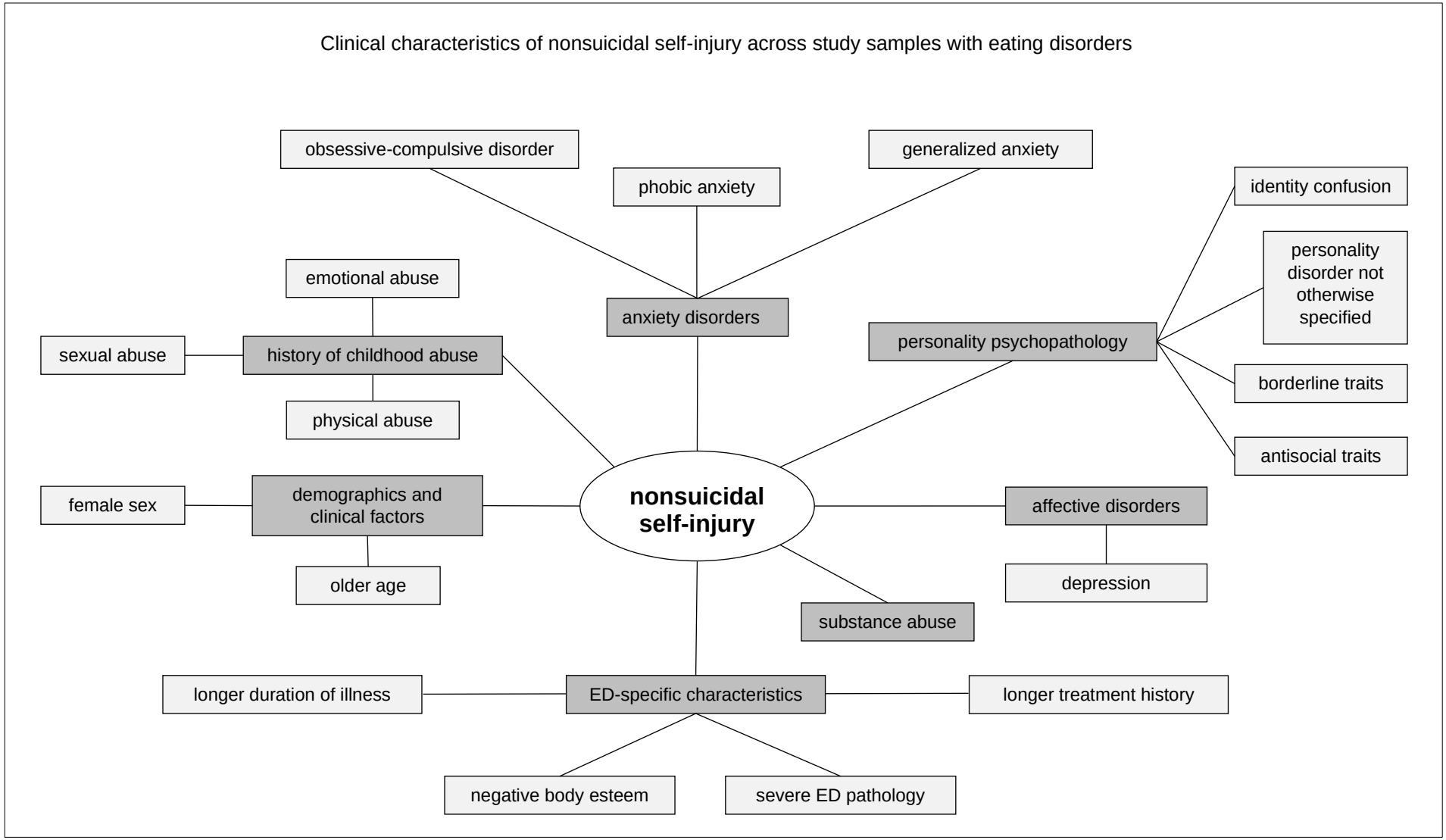


Figure 2: Clinical correlates of nonsuicidal self-injury in eating disorders across studies. ED: eating disorder; Figure created by Sabine Arnold based on previous studies (33–35,46,85)

1.2 Study aims

Taken together, insights into the lifetime prevalence of NSSI, methods used, clinical correlates, and suicidality associated with NSSI are needed to identify individuals at risk and tailor prevention and treatment approaches to offer the best possible care for those in need. However, corresponding NSSI data are lacking for youth inpatients with AN-R, AN-BP, and BN. Therefore, this study addressed the following four research questions:

Research question 1: What is the lifetime prevalence of NSSI in youth inpatients with AN-R, AN-BP, and BN?

Research question 2: What are the most common methods for NSSI in youth inpatients with AN-R, AN-BP, and BN?

Research question 3: What are the clinical correlates of NSSI in youth inpatients with AN-R, AN-BP, and BN?

Research question 4: Is NSSI associated with increased suicidality in youth inpatients with AN-R, AN-BP, and BN?

Based on the weighted mean lifetime NSSI prevalences across previous studies (30,34,82–86), the lifetime prevalence of NSSI in youth inpatients was expected to be higher in binge-purging EDs compared to AN-R. According to prior studies (31,33–35,76,89), cutting was assumed to be the most common NSSI method, while NSSI methods were compared between ED subgroups to examine potential between-group differences. In line with earlier findings (33–35,46,85), NSSI in youth inpatients with EDs was expected to be associated with severe ED psychopathology and more psychiatric comorbidity, and, accordingly, more psychiatric medication prescriptions. Aligning with the *Interpersonal Theory of Suicide* (97,98) and previous research on EDs and suicidality and NSSI and suicidality (7,8,44,94–96), suicidality was assumed to be increased in youth inpatients with AN-R, AN-BP, and BN, who were also engaging in NSSI.

2. Methods

This chapter outlines how the study was conducted. First, the study design and sample are described. Next, the study variables are defined, and the coding procedure is presented. In addition, the statistical methods for analyzing the research questions are explained, and the ethical standards that this study followed are outlined.

2.1 Study design and sample

This study was a retrospective chart review (RCR) (99,100) evaluating prerecorded data from patients consecutively admitted to the Child and Adolescent Psychiatry Unit of the Charité University Hospital in Berlin, Germany. The RCR relied on convenience sampling (99–101), selecting consecutively hospitalized study cases from the target population according to the inclusion criteria of (1) inpatient care between 1990–2015, (2) initial admission in case of multiple hospitalizations, (3) age ≤ 18 years (collectively called *youth*), and (4) a psychiatric diagnosis of an ED, including F50.00 AN-R, F50.01 AN-BP, or F50.2 BN (37). Exclusion criteria were day hospital or outpatient treatment, inpatient care before 1990 or after 2015, hospital readmissions, age > 18 years, non-typical ED diagnoses of ICD-10 (37) “F50.1 atypical AN”, “F50.3 atypical BN”, “F50.4 overeating associated with other psychological disturbances”, “F50.5 vomiting associated with other psychological disturbances”, “F50.8 other EDs”, and “F50.9 unspecified EDs”, or insufficient data to verify inclusion criteria. See Figure 3 for more details on the sampling procedure.

All patients received multimodal and ED-specific inpatient care. Medical, psychological, and nutritional needs were treated according to clinical guidelines (24,41,48) by psychiatrists, psychotherapists, dieticians, nurses, and, as needed by pediatricians, as the core treatment team. Each patient's diet was planned individually based on weight status, medical stability, activity level, caloric requirements, and weight gain progress, and the body weight course was supervised. Patients received psychoeducation, individual and group psychotherapy, body therapy, and family/caregivers psychoeducation/therapy, complemented by psychiatric medications where indicated.

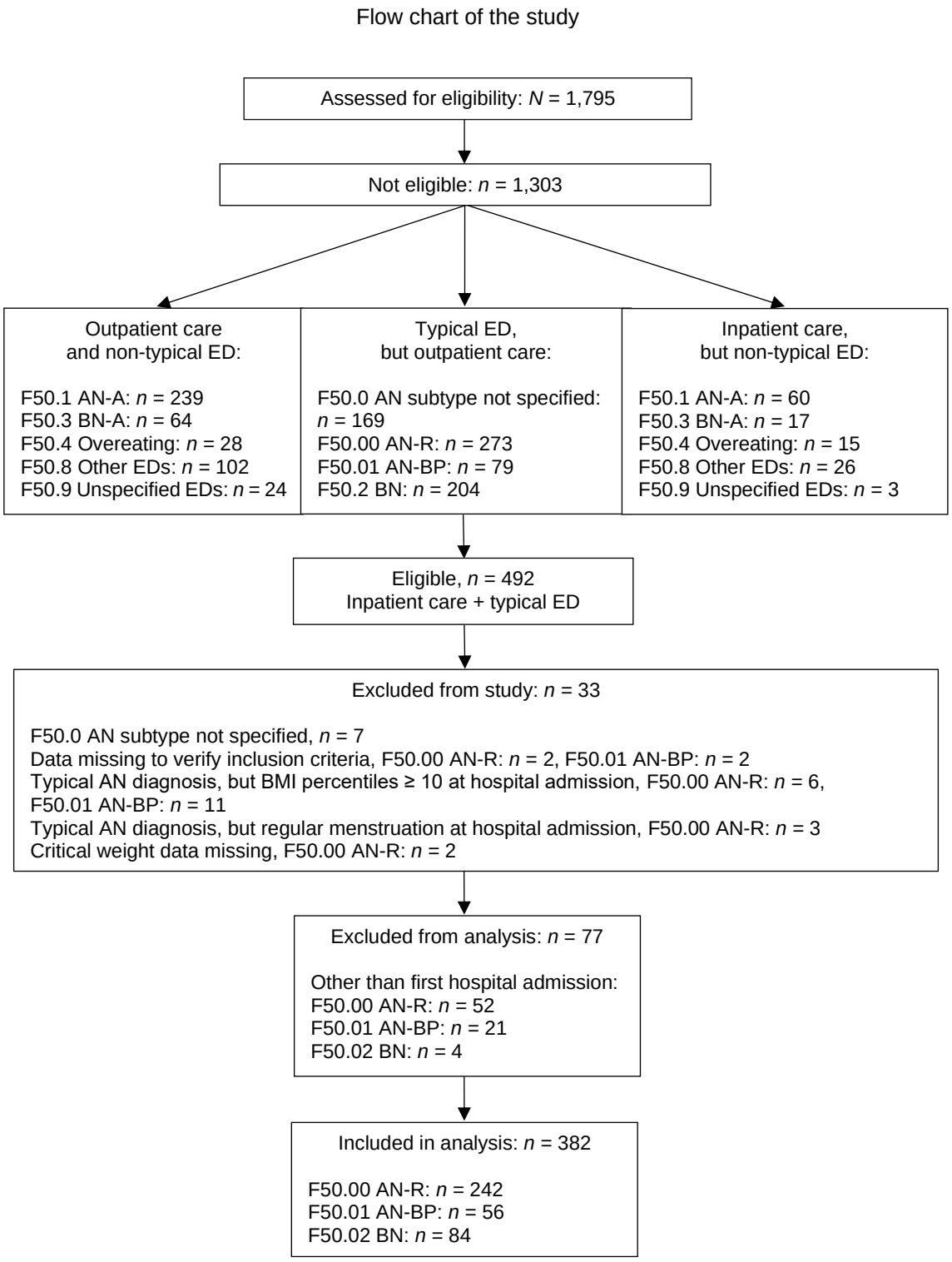


Figure 3: Study flow chart. ED: eating disorder; International Statistical Classification of Diseases and Related Health Problems, Version 10 (37) diagnosis of F50.00 AN-R: anorexia nervosa, restrictive type, F50.01 AN-BP: anorexia nervosa, binge-purge type, F50.1 AN-A: atypical anorexia nervosa, F50.2 BN: bulimia nervosa, F50.3 BN-A: atypical bulimia nervosa, F50.4 overeating associated with other psychological disturbances, F50.8 other EDs, F50.9 unspecified EDs; there was no diagnosis of F50.5 vomiting associated with other psychological disturbances; n: number; Figure created by Sabine Arnold

2.2 Study variables

All study variables were retrospectively collected from patient records. NSSI was set as the outcome variable, defined as direct and intentional harm of one's skin, without suicidal intent, and for purposes socially unaccepted (19–22). In the clinical setting, NSSI was evaluated by multiple informants at various times: Upon admission, NSSI was systematically assessed as part of the psychopathological history with a structured guide by a psychiatrist or psychotherapist, who interviewed the patient and caregivers. In addition, a somatic examination documented potential skin damage and scars by NSSI. If NSSI was reported during the hospital stay to any treatment team member, this was added to the patient chart as crucial biographical information.

Further, demographic variables and clinical patient data were collected, namely sex, age at hospital admission (years), duration of the ED (months), and hospital stay (days). During inpatient care, the patient's intellectual capacity was evaluated by clinical judgment, which was categorized in the RCR as above average (intelligence quotient (IQ) > 115), average (IQ 85–115), or below average (IQ 70–84) (37). Body weight in kilograms (kgs) and height in meters were gathered from the patients' physical assessment documentation to calculate weight change in kgs during treatment and BMI percentiles at hospital admission and discharge (49,102). The presence of any psychiatric diagnosis in a biological or non-biological parent or sibling of the patient was coded as part of the variable *family psychopathology*. If a patient's friend, classmate, teacher, neighbor, family friend, or relative attempted or committed suicide, this information was coded into the variable *suicide (attempt) environment*.

In addition, a history of childhood abuse was assessed (103). Sexual abuse was defined as exploitation through sexual means, for example, between an adult and a minor (104). Emotional abuse was understood as destructive behavior affecting mental health, like intentional rejection, and physical abuse as violent behavior, such as beating (105,106). A patient's history of suicidal ideation and attempted suicide, defined as having thoughts of or having tried to take their own life, was also assessed (107,108). Psychiatric comorbidities were diagnosed by clinical assessment based on ICD criteria (37) at hospital admission and coded in the RCR. If diagnostic criteria for a personality disorder (37) were met, except for age, *personality disorder traits* were documented. Further, in the RCR, psychiatric medication prescriptions during inpatient care were coded. Appendix 2 provides an overview of all variable definitions.

2.3 Coding procedure

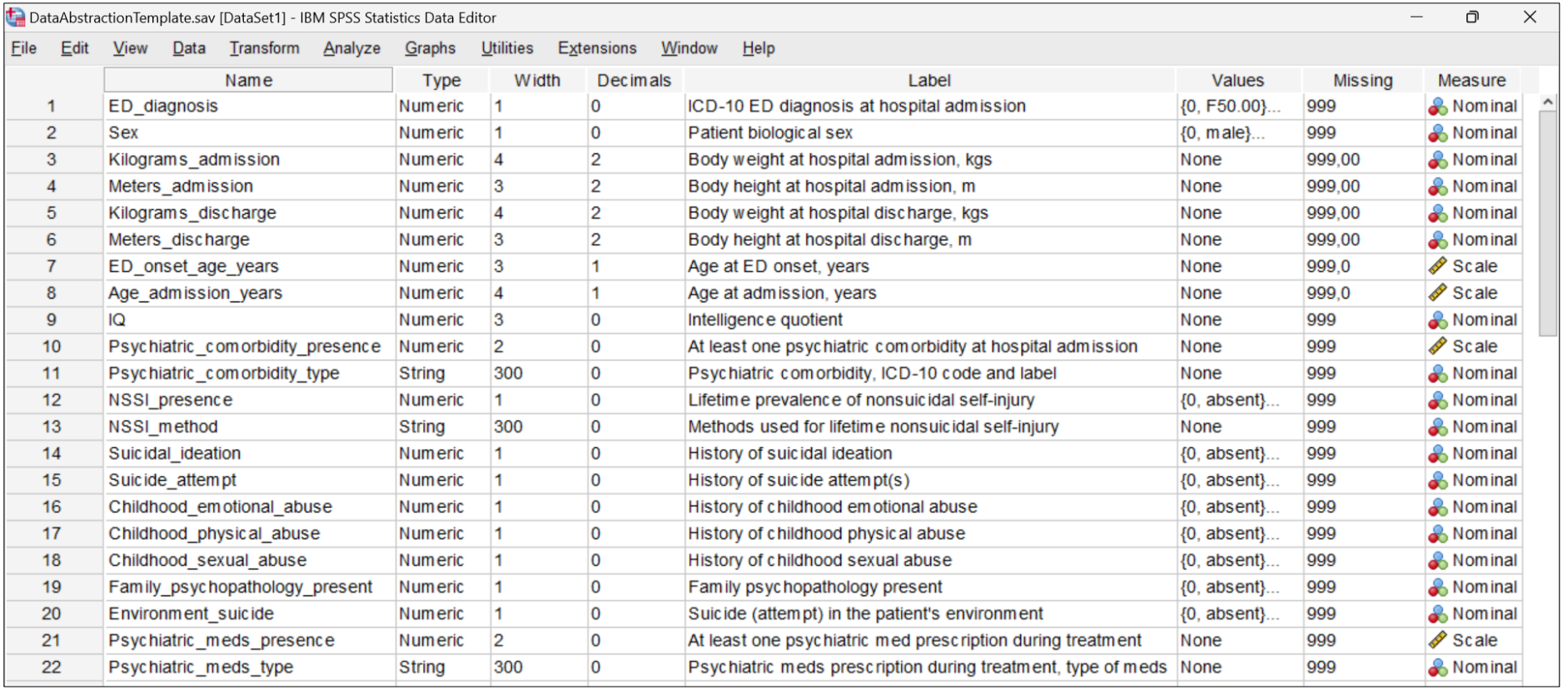
Data were coded from paper-based patient files, which comprised interdisciplinary documentation from hospital admission, treatment, and discharge. The electronic database from the Child and Adolescent Inpatient Unit holding basic patient information was used to verify study inclusion criteria. Patient files were individually requested from the hospital archive.

Four raters were chosen for data coding with the professions of a psychologist, psychotherapist, or physician with clinical and research expertise in child and adolescent psychiatry. All data were coded pseudonymized, with personal identifiers replaced by a study code. For systematic data collection, all raters applied a standardized and study-specific template (see Figure 4). The digital form was set up using SPSS software (109) and organized according to the flow of a patient file. The string type was predetermined for each study variable, with only a corresponding entry possible. In addition, a coding manual was used, which included a glossary of variable definitions, syntaxes for computing numerical variables, and study-specific coding rules (see Table 1 and Appendix 3). In particular, coding rules determined how to categorize extracted data, interpret missing documentation and decide in ambiguous coding situations. For example, if no information on NSSI was documented, NSSI was coded as absent. Yet, if NSSI was denied in the admission letter but described by inpatient documentation, the presence of lifetime NSSI was coded.

For certain variables, raters could directly code the relevant information from the file without further processing, such as in the case of the ICD-10 (37) code for the variable *psychiatric comorbidity*. Other target variables were more complex and required specific categorization or calculations. Raters were carefully trained, for example, in calculating the variable *BMI percentiles* using a standardized online tool (49,102). The principal investigator Charlotte Jaite monitored the coding procedure by reviewing data codings, providing feedback to the raters, and holding weekly meetings to discuss questions.

Prior to study implementation, the chart retrieval and coding procedure were piloted to evaluate practicability and accuracy. For accurate coding, the raters had to read the complete patient file, which comprised around 20 to 500 pages, depending on the duration of the hospital stay and the case complexity, with the coding taking several days to weeks. After piloting, the study procedure was discussed, the coding of all raters jointly reviewed, and the extraction template and coding manual revised.

Screenshot of the SPSS data extraction template



DataAbstractionTemplate.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

	Name	Type	Width	Decimals	Label	Values	Missing	Measure
1	ED_diagnosis	Numeric	1	0	ICD-10 ED diagnosis at hospital admission	{0, F50.00}...	999	Nominal
2	Sex	Numeric	1	0	Patient biological sex	{0, male}...	999	Nominal
3	Kilograms_admission	Numeric	4	2	Body weight at hospital admission, kgs	None	999,00	Nominal
4	Meters_admission	Numeric	3	2	Body height at hospital admission, m	None	999,00	Nominal
5	Kilograms_discharge	Numeric	4	2	Body weight at hospital discharge, kgs	None	999,00	Nominal
6	Meters_discharge	Numeric	3	2	Body height at hospital discharge, m	None	999,00	Nominal
7	ED_onset_age_years	Numeric	3	1	Age at ED onset, years	None	999,0	Scale
8	Age_admission_years	Numeric	4	1	Age at admission, years	None	999,0	Scale
9	IQ	Numeric	3	0	Intelligence quotient	None	999	Nominal
10	Psychiatric_comorbidity_presence	Numeric	2	0	At least one psychiatric comorbidity at hospital admission	None	999	Scale
11	Psychiatric_comorbidity_type	String	300	0	Psychiatric comorbidity, ICD-10 code and label	None	999	Nominal
12	NSSI_presence	Numeric	1	0	Lifetime prevalence of nonsuicidal self-injury	{0, absent}...	999	Nominal
13	NSSI_method	String	300	0	Methods used for lifetime nonsuicidal self-injury	None	999	Nominal
14	Suicidal_ideation	Numeric	1	0	History of suicidal ideation	{0, absent}...	999	Nominal
15	Suicide_attempt	Numeric	1	0	History of suicide attempt(s)	{0, absent}...	999	Nominal
16	Childhood_emotional_abuse	Numeric	1	0	History of childhood emotional abuse	{0, absent}...	999	Nominal
17	Childhood_physical_abuse	Numeric	1	0	History of childhood physical abuse	{0, absent}...	999	Nominal
18	Childhood_sexual_abuse	Numeric	1	0	History of childhood sexual abuse	{0, absent}...	999	Nominal
19	Family_psychopathology_present	Numeric	1	0	Family psychopathology present	{0, absent}...	999	Nominal
20	Environment_suicide	Numeric	1	0	Suicide (attempt) in the patient's environment	{0, absent}...	999	Nominal
21	Psychiatric_meds_presence	Numeric	2	0	At least one psychiatric med prescription during treatment	None	999	Scale
22	Psychiatric_meds_type	String	300	0	Psychiatric meds prescription during treatment, type of meds	None	999	Nominal

Figure 4: Data extraction template. Screenshot of the SPSS variable view of the data extraction template; the values of the following variables are not fully depicted on the screenshot: ED_diagnosis: 0 = F50.00, 1 = F50.01, 2 = F50.1; sex: 0 = male, 1 = female; the variables *NSSI*, *suicidal_ideation*, *suicide_attempt*, *childhood_emotional_abuse*, *childhood_physical_abuse*, *childhood_sexual_abuse*, *family_psychopathology_present*, *environment_suicide* were coded with 0 = absent, 1 = present; Figure created by Sabine Arnold

Table 1: Coding rules

SPSS variable name	Variable	Coding rule
ED_diagnosis	ED diagnosis	If F50.00 Anorexia nervosa, restrictive type was documented -> code 0 If F50.01 Anorexia nervosa, binge-purge type was documented -> code 1 If F50.2 Bulimia nervosa was documented -> code 2
Sex	Sex	If the biological sex of the patient was male -> code 0 If the biological sex of the patient was female -> code 1
Age_admission_years	Age at hospital admission, years	If the patient's age (years + months) at hospital admission was documented, copy that age, for example, 15.6 years. If the age at hospital admission was not documented or without specifying months, use the online calculator under the link *https://www.pedz.de/en/bmi.html*, and insert the values of the variables *date_birth* and *date_admission* (as current date) to calculate the variable.
BMI_percentiles_admission	BMI percentiles at hospital admission	Calculate the BMI percentiles at hospital admission by using the online calculator under the link *https://www.pedz.de/en/bmi.html* and insert the values of the variables *sex, date_birth, date_admission* (as current date), *kilograms_admission,* and *meters_admission.*
BMI_percentiles_discharge	BMI percentiles at hospital discharge	Calculate the BMI percentiles at hospital discharge by using the online calculator under the link *https://www.pedz.de/en/bmi.html* and insert the values of the variables *sex, date_birth, date_discharge* (as current date), *kilograms_discharge,* and *meters_discharge.*
Treatment_duration_days	Treatment duration, days	Calculate the duration of inpatient care in days using the following SPSS Syntax: COMPUTE treatment_duration_days = datediff(date_admission,date_discharge,'days'). EXECUTE.
Treatment_duration_weeks	Treatment duration, weeks *This variable was created as means to calculate the variable of *average weight change in kgs per week*	Calculate the duration of inpatient care in weeks using the following SPSS Syntax: COMPUTE treatment_duration_weeks=datediff(date_admission,date_discharge,'weeks'). EXECUTE.
Weight_change_kgs_total	Weight change in kgs, total *This variable was created as means to calculate the variable of *average weight change in kgs per week*	Calculate the total weight change in kilograms during inpatient care using the following SPSS Syntax: *COMPUTE* *Weight_change_kgs_total=kilograms_discharge-kilograms_admission.* *EXECUTE.*

Table 1: Coding rules (continued)

SPSS variable name	Variable	Coding rule
Weight_change_kgs_average	Weight change in kgs per week	Calculate the average weight change in kilograms per week during inpatient care using the following SPSS Syntax: *COMPUTE* *Weight_change_kgs_average=weight_change_kgs_total/treatment_duration_weeks* *EXECUTE.*
ED_onset_date	Date of ED onset *This variable was created as means to calculate the variables *age of ED onset* and *duration of illness at hospital admission*	If documented, copy the month and year of the eating disorder onset, and assume the first of a month as onset date. If no date of onset of the eating disorder was documented but a season, code the second month that belongs to the onset season as categorized below: Spring: March (3), April (4), May (5) Summer: June (6), July (7), August (8) Autumn: September (9), October (10), November (11) Winter: December (12), January (1), February (2)
ED_onset_age_years	Age of ED onset	If the age of onset of the eating disorder was documented, copy that age, for example, 13.6 years. If the age of onset of the eating disorder was not documented, but the date of the eating disorder onset, calculate the age of ED onset, with the values of the variables *age_admission_years*, *date_admission* and *ED_onset_date*.
ED_duration_months	Duration of illness at hospital admission	If the duration of the eating disorder at hospital admission was documented, copy that duration, for example, 10 months. If the duration of illness at hospital admission was not documented, calculate this variable using the following SPSS Syntax: COMPUTE ED_duration_months = CTIME.DAYS (date_admission-ED_onset_date) EXECUTE.
IQ	Intelligence	Take the IQ as coded by the clinician and categorize it as follows: If the IQ was above 115 -> code 1 If the IQ was between 85 and 115 -> code 2 If the IQ was between 70 and 84 -> code 3 If the IQ was under 70 -> code 4

Note. Table 1 shows an excerpt of the coding rules for the study variables. The coding rules are continued in Appendix 3; Table created by Sabine Arnold

2.4 Statistical analysis

Statistical analyses were performed using the SPSS software version 27.0 (109). Prior to data analysis, parametric test assumptions of interval scaling, homogeneity of variance, and normality of distribution were tested. In particular, variance homogeneity was examined using the Levene test, and normal distribution using the Kolmogorov-Smirnov test (110). For continuous variables, *t*-tests and analyses of variance (ANOVAs) were applied when parametric assumptions were met, and nonparametric Kruskal-Wallis and Mann-Whitney-U tests when violated (110). For categorical variables, χ^2-tests and Fisher's exact test were used (110). For all tests, the significance level was set at ≤ 0.05. Cases with missing values were handled by including cases only in those analyses for which data were available (see Appendix 4 for missing values).

For the sample description and to address research question 1 on NSSI lifetime prevalence and research question 2 on NSSI methods, the sample was split into patient subgroups of AN-R vs. AN-BP vs. BN. χ^2-tests evaluated differences between ED subgroups in categorical sample characteristics, NSSI prevalences, and NSSI methods. For χ^2-tests, number (*n*) and percentage (*%*) were depicted. χ^2-tests were applied conservatively with a continuity correction for cell sizes < 10 and Fisher's exact test for cell sizes < 5. For significant results, pairwise χ^2-tests were employed as post-hoc tests indicating which ED subgroups differed significantly.

ANOVAs probed differences between ED subgroups in continuous variables. For ANOVAs, mean (*M*) and standard deviation (*SD*) were depicted, with *M* representing the distribution center and *SD* indicating the average distance of all measured values from *M*. For ANOVAs, the Tukey HSD test was used for post-hoc testing. As the nonparametric equivalent of the ANOVA, the Kruskal Wallis test was applied with median (*Mdn*) and quartiles (Q) as statistical parameters. The *Mdn* represents the midpoint of ordered data, above and below which half of the data lie. Qs divide data into four equal parts, with the first and third Q (Q_1, Q_3) setting the interquartile range (110). For the Kruskal Wallis test, Mann-Whitney U tests (*Mdn,* Q_1, Q_3) were applied for post-hoc testing. As effect sizes, Cramer's phi (Φ) was calculated for χ^2-tests and Cohen's d for ANOVAs, Kruskal–Wallis tests, *t*-tests, and Man-Whitney-U-tests, and interpreted according to Cohen's classification (0.0–0.1 = no effect, 0.2–0.4 = small, 0.5–0.7 medium, 0.8–1.0 large) (111).

To address research question 3 on clinical correlates of NSSI and research question 4 on suicidality associated with NSSI, the sample was split into patient subgroups with AN-

R vs. AN-BP vs. BN and further categorized into subsamples with NSSI (NSSI+) vs. without (NSSI-) within each ED subgroup. χ^2-tests (*n, %*) were used for categorical variables, and *t*-tests (*M, SD*) or Mann-Whitney-U tests (*Mdn,* Q_1, Q_3) for continuous variables in the comparison between NSSI+ vs. NSSI- groups. In addition, a binary logistic regression model was used to identify independent clinical correlates of NSSI, including suicidality, for each ED subgroup. NSSI was set as the binary outcome variable, and all variables that differed significantly between the NSSI+ vs. NSSI- group within the respective ED subgroup were stepwise included as potential independent correlates. To avoid multicollinearity, only one variable was included in the regression model when variables were calculated from other dataset variables or based on the same construct. For an overview of the variables excluded from or included in the ED-specific regression models, see Appendix 5-7. Nagelkerke's r^2 was used to evaluate the explanatory power of the total model, namely, the variance of NSSI as the outcome explained by all independent factors retained in the final regression model (r^2 <0.1 = poor, 0.1–0.3 = small, 0.3–0.5 = medium, >0.5 large) (112).

2.5 Ethics

This RCR was performed under the legal and ethical requirements of the Declaration of Helsinki (113), the General Data Protection Regulation (114), and the Berlin Hospital Data Act (115). The Ethics Committee of the Charité University Hospital in Berlin, Germany, approved the study (approval number: EA2/112/19), waving patient consent due to study compliance with the following ethical obligations: First, this RCR relied on data routinely collected and stored by the clinic for the primary purpose of patient care. From an ethical point of view, the purpose of data use by an RCR must be compatible with the primary purpose of data use. This RCR met purpose compatibility very well, as it aimed to improve the epidemiological understanding of NSSI in youth inpatients with EDs to improve inpatient care for youth with EDs. A further ethical consideration relates to the confidentiality and security of data processing. In this RCR, patient data were anonymized before any analysis for research to ensure patient privacy. In addition, the RCR was in-house research, as this study was conducted in the same clinic where patients were treated, with only authorized staff permitted to access data. Moreover, the data were protected from unauthorized access by being kept in a locked cabinet in a locked room accessible only to designated staff. Of ethical relevance, this study addressed a critical

public health concern since minors hospitalized for an ED with co-occurring NSSI pathology represent a highly vulnerable population with an increased risk of suicide.

3. Results

First, this chapter describes the study sample. Next, data on the lifetime prevalence of NSSI and methods used for NSSI are presented. In addition, results are introduced on clinical correlates of NSSI for the AN-R, AN-BP, and BN patient groups, followed by findings on the association between NSSI and suicidality.

3.1 Sample description

The sample included 382 patients, 242 with AN-R (63.4%), 56 with AN-BP (14.7%), and 84 with BN (22.0%) (see Table 2). The sample was predominantly female (97.1%) with no sex differences across ED subgroups [$\chi^2(2,382) = 1.7$, $p = 0.426$]. 11.5% of the sample reported a history of childhood abuse which was more prevalent in the AN-BP and BN patient groups than in AN-R [$\chi^2(2,382) = 18.4$, $p < 0.001$], specifically, emotional abuse [$\chi^2(2,382) = 11.3$, $p = 0.004$] and sexual abuse [$\chi^2(2,382) = 9.4$, $p = 0.009$].
Concerning ED-specific characteristics, patients with AN-R had an earlier ED onset [$H(2) = 17.0$, $p < 0.001$], were younger [$H(2) = 58.2$, $p < 0.001$], and had a shorter duration of illness upon admission [$F(2,367) = 12.7$, $p < 0.001$] than patients with AN-BP or BN. Compared to the BN patient group, patients with AN-R and AN-BP had a lower weight at admission [$H(2) = 239.6$, $p < 0.001$] and discharge [$H(2) = 53.8$, $p < 0.001$] and gained more weight during inpatient care [$H(2) = 80.4$, $p < 0.001$]. Moreover, the treatment duration was longer in AN-R and AN-BP patients than in the BN patient group [$F(2,367) = 7.9$, $p < 0.001$]. Table 1 of the journal publication[2] (116) provides post-hoc tests for statistically significant comparisons. More details and sample characteristics that did not reach statistical significance are displayed in Table 2 below.

[2] I could not display all results of my study in full length due to a limited word count of the "Manteltext", issues of self-plagiarism, and the journal's rights to my doctorate's publication, which is why I refer to Tables of the journal publication (116), holding all results, at certain points in the results section.

Table 2: Demographics, eating-disorder-specific variables, and childhood history

	Total (*N* = 382)	**AN-R** (*n* = 242)	**AN-BP** (*n* = 56)	**BN** (*n* = 84)	**ANOVA Kruskal-Wallis-test χ^2-test**		
Sex, *n* (%)	-	-	-	-	2	1.7	0.426
Female	371 (97.1)	233 (96.3)	55 (98.2)	83 (98.8)	-	-	-
Male	11 (2.9)	9 (3.7)	1 (1.8)	1 (1.2)	-	-	-
History of childhood abuse, at least one type, *n* (%)	44 (11.5)	15 (6.2)	11 (19.6)	18 (21.4)	2	18.4	**<0.001**
Emotional abuse	18 (4.7)	5 (2.1)	4 (7.1)	9 (10.7)	2	11.3	**0.004**
Physical abuse	15 (3.9)	7 (2.9)	5 (8.9)	3 (3.6)	2	4.4	0.109
Sexual abuse	13 (3.4)	3 (1.2)	4 (7.1)	6 (7.1)	2	9.4	**0.009**
Family psychopathology present, *n* (%)	241 (63.1)	155 (64.0)	41 (73.2)	45 (53.6)	2	5.8	0.054
Suicide (attempt) environment, *n* (%)	38 (9.9)	24 (9.9)	7 (12.5)	7 (8.3)	2	0.7	0.722
Age of ED onset, years, *Mdn* (Q_1, Q_3)	14.1 (13.2,15.3)	14.0 (12.9,15.0)	14.7 (13.6,15.9)	14.6 (13.5,15.7)	2	17.0	**<0.001**
Duration of illness, months, *M* ± *SD*	13.9 ± 12.5	11.6 ± 11.0	16.6 ± 15.1	19.1 ± 13.0	2,367	12.7	**<0.001**
Age at hospital admission, years, *Mdn* (Q_1, Q_3)	15.6 (14.3,16.7)	14.9 (13.8,16.3)	16.4 (15.3,17.1)	16.4 (15.5,17.2)	2	58.2	**<0.001**
BMI percentiles at hospital admission, *Mdn* (Q_1, Q_3)	1.0 (1.0,5.0)	1.0 (1.0,1.0)	1.0 (1.0,2.0)	43.5 (19.5,73.5)	2	239.6	**<0.001**
BMI percentiles at hospital discharge, *Mdn* (Q_1, Q_3)	11.0 (6.0,18.0)	10.0 (5.0,16.5)	10.0 (4.0,16.0)	38.8 (17.0,74.3)	2	53.8	**<0.001**
Weight change, kgs/week, *Mdn* (Q_1, Q_3)	0.5 (0.3,0.7)	0.5 (0.4,0.7)	0.5 (0.3,0.6)	0.0 (-0.3,0.2)	2	80.4	**<0.001**
Treatment duration, days, *M* ± *SD*	92.0 ± 50.9	96.6 ± 42.5	100.5 ± 50.2	72.8 ± 67.3	2,376	7.9	**<0.001**

Note. AN-R: anorexia nervosa, restrictive type, AN-BP: anorexia nervosa, binge-purge type, BN: bulimia nervosa; *M*: mean, *Mdn*: median, *n*: number, Q_1: first quartile, Q_3: third quartile, *SD*: standard deviation, significant *p*-values are bold; Table created by Sabine Arnold; Table 2 contains data also presented in Table 1 of the journal article (116) of this publication-based doctoral thesis

Moreover, compared to the AN-R patient group, those with AN-BP and BN had more psychiatric comorbidities at hospital admission, depicted in a higher median of psychiatric comorbidities [$H(2) = 23.0$, $p < 0.001$] and a higher prevalence of at least one psychiatric comorbidity [$\chi^2(2,382) = 20.6$, $p < 0.001$], namely substance abuse [$\chi^2(2,382) = 13.4$, $p = 0.002$], affective disorders [$\chi^2(2,382) = 9.2$, $p = 0.010$], specifically persistent affective disorders [$\chi^2(2,382) = 15.0$, $p = 0.001$], and personality disorder traits [$\chi^2(2,382) = 35.4$, $p < 0.001$], specifically borderline [$\chi^2(2,382) = 37.2$, $p < 0.001$].

Furthermore, compared to patients with AN-R and BN, patients with AN-BP were more often prescribed psychiatric medication during inpatient care, depicted in a higher median

of psychiatric medication prescriptions [$H(2) = 73.6$, $p = 0.001$] and a higher prevalence of at least one psychiatric medication prescription during inpatient care [$\chi^2(2,382) = 9.2$, $p = 0.010$], particularly antidepressants [$\chi^2(2,382) = 15.1$, $p = 0.001$]. See Table 1 of the journal publication (116) for post-hoc results of statistically significant comparisons and Table 3 for more details on psychiatric comorbidities and psychiatric medication, including results that did not research statistical significance.

3.2 Lifetime prevalence of nonsuicidal self-injury in patients with eating disorders

A lifetime history of NSSI was recorded in 21.5% of the total sample, specifically in 8.3% of AN-R, 39.3% of AN-BP, and 47.6% of BN. Compared to patients with AN-R, the AN-BP and BN patient groups engaged in NSSI more often, depicted in a higher median of NSSI [$H(2) = 10.5$, $p = 0.005$, $d = 0.97$] and a higher prevalence of at least one NSSI method engaged in [$\chi^2(2,382) = 69.6$, $p < 0.001$, $\Phi = 0.43$]. For more details, see Figure 5 below and Table 1 of the journal publication (116).

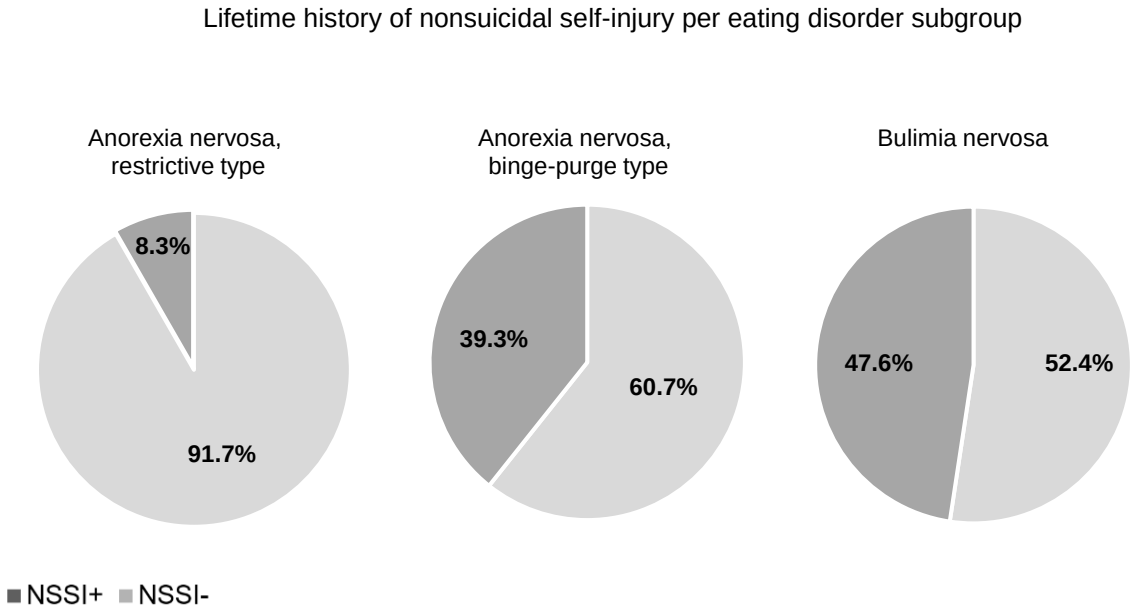


Figure 5: Lifetime prevalence of nonsuicidal self-injury per eating disorder subgroup. NSSI+: lifetime history of nonsuicidal self-injury, NSSI-: no history of nonsuicidal self-injury; Figure created by Sabine Arnold

Table 3: Psychiatric comorbidities and psychiatric medication prescriptions

	Total (*N* = 382)	**AN-R** (*n* = 242)	**AN-BP** (*n* = 56)	**BN** (*n* = 84)	**Kruskal-Wallis-test χ^2-test**		
Psychiatric comorbidities, number, *Mdn* (Q_1, Q_3), F10-98	0.0 (0.0,1.0)	0.0 (0.0,1.0)	1.0 (0.0,1.0)	1.0 (0.0,1.0)	2	23.0	**<0.001**
Psychiatric comorbidities, at least one, *n* (%), F10-98	185 (48.4)	96 (39.7)	34 (60.7)	55 (65.5)	2	20.6	**<0.001**
F10-19 Substance abuse	7 (1.8)	0 (0.0)	3 (5.4)	4 (4.8)	2	13.4	**0.002**
F30-39 Affective disorders, at least one	117 (30.6)	61 (25.2)	22 (39.3)	34 (40.5)	2	9.2	**0.010**
F32 Depressive episode	61 (16.0)	37 (15.3)	12 (21.4)	12 (14.3)	2	1.5	0.471
F33 Recurrent depressive disorder	2 (0.5)	0 (0.0)	1 (1.8)	1 (1.2)	2	3.7	0.157
F34 Persistent affective disorder	62 (16.2)	26 (10.7)	13 (23.2)	23 (27.4)	2	15.0	**0.001**
F40-41 Anxiety disorders, at least one	11 (2.9)	8 (3.3)	2 (3.6)	1 (1.2)	2	1.1	0.574
F40 Phobic anxiety disorders	8 (2.1)	6 (2.5)	1 (1.8)	1 (1.2)	2	0.5	0.765
F41.0 Panic disorder	4 (1.0)	2 (0.8)	1 (1.8)	1 (1.2)	2	0.4	0.808
F41.1 Generalized anxiety disorder	1 (0.3)	1 (0.4)	0 (0.0)	0 (0.0)	2	0.6	0.748
F41.2 Mixed anxiety and depression	2 (0.5)	1 (0.4)	0 (0.0)	1 (1.2)	2	1.1	0.586
F42 Obsessive-compulsive disorder	30 (7.9)	23 (9.5)	5 (8.9)	2 (2.4)	2	4.5	0.107
F43.1 Post-traumatic stress disorder	2 (0.5)	1 (0.4)	1 (1.8)	0 (0.0)	2	2.2	0.331
F43.2 Adjustment disorder	7 (1.8)	5 (2.1)	1 (1.8)	1 (1.2)	2	0.3	0.875
F60 Personality disorder (traits)	48 (12.6)	13 (5.4)	10 (17.9)	25 (29.8)	2	35.4	**<0.001**
F60.3 Borderline	27 (7.1)	3 (1.2)	7 (12.5)	17 (20.2)	2	37.2	**<0.001**
F60.4 Histrionic	5 (1.3)	3 (1.2)	0 (0.0)	2 (2.4)	2	1.5	0.473
F60.5 Anankastic	4 (1.0)	4 (1.7)	0 (0.0)	0 (0.0)	2	2.3	0.311
F60.6 Anxious	3 (0.8)	1 (0.4)	1 (1.8)	1 (1.2)	2	1.3	0.515
F61 Mixed and other	2 (0.5)	0 (0.0)	1 (1.8)	1 (1.2)	2	3.7	0.157
F61.0 Combined	7 (1.8)	2 (0.8)	1 (1.8)	4 (4.8)	2	5.3	0.068
F90-98 Disorders with onset in childhood/adolescence	7 (1.8)	4 (1.7)	1 (1.8)	2 (2.4)	2	0.2	0.912
Psychiatric medications, number, *Mdn* (Q_1, Q_3)	0.0 (0.0,1.0)	0.0 (0.0,0.0)	0.0 (0.0,1.0)	0 (0.0,0.8)	2	73.6	**0.001**
Psychiatric medications, at least one *n* (%)	101 (26.4)	56 (23.1)	24 (42.9)	21 (25.0)	2	9.2	**0.010**
Antidepressants	76 (19.9)	36 (14.9)	21 (37.5)	19 (22.6)	2	15.1	**0.001**
Antipsychotics	51 (13.4)	32 (13.2)	12 (21.4)	7 (8.3)	2	5.0	0.082
Anxiolytics	2 (0.5)	2 (0.8)	0 (0.0)	0 (0.0)	2	1.2	0.559

Note. F-diagnoses according to the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10) (37)*;* personality disorder *traits* were diagnosed if personality disorder criteria except age were met; AN-R: anorexia nervosa, restrictive type, AN-BP: anorexia nervosa, binge-purge type, BN: bulimia nervosa; *Mdn*: median, *n*: number, Q_1: first quartile, Q_3: third quartile, significant *p*-values are bold; Table created by Sabine Arnold; Table 3 contains data also presented in Table 1 of the journal article (116) of this publication-based doctoral thesis

3.3 Methods used for nonsuicidal self-injury in patients with eating disorders

Across ED subgroups, 18.6% of all patients used cutting for NSSI, 5.8% in AN-R, 37.5% in AN-BP, and 42.9% in BN. In particular, the AN-BP and BN patient groups engaged in cutting more often than the AN-R group [$\chi^2(2,382) = 72.1$, $p < 0.001$, $\Phi = 0.44$]. Moreover, 2.6% of patients reported scratching [$\chi^2(2,382) = 4.7$, $p = 0.095$], 1.8% hitting [$\chi^2(2,382) = 1.9$, $p = 0.390$], and 1.0% burning [$\chi^2(2,382) = 4.4$, $p = 0.111$], with no significant difference in these NSSI methods between ED subgroups (see Figure 6 below and Table 1 of the journal publication (116)).

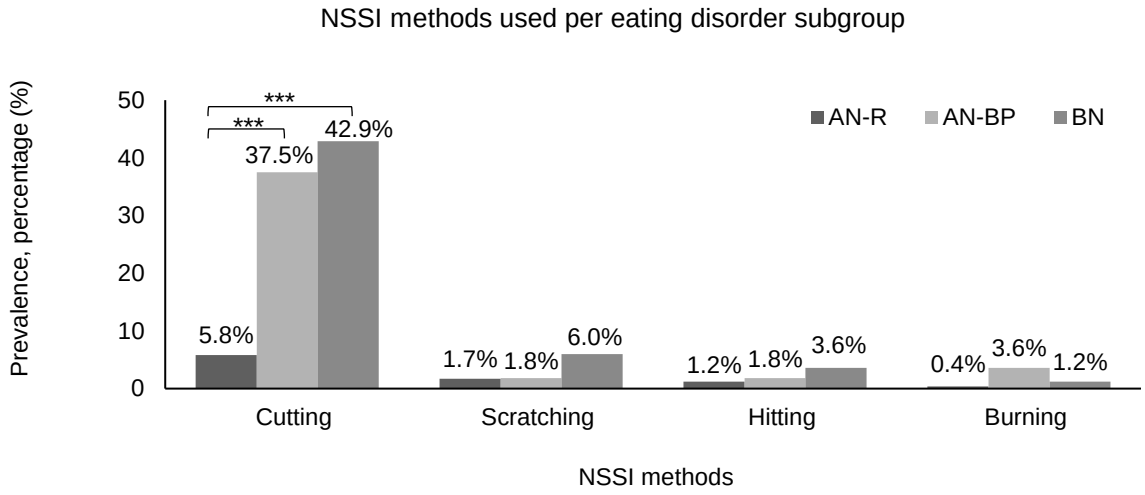


Figure 6: Methods used for nonsuicidal self-injury per eating disorder subgroup. AN-R: anorexia nervosa, restrictive type, AN-BP: anorexia nervosa, binge-purge type, BN: bulimia nervosa, NSSI: nonsuicidal self-injury ***p<0.001; Figure created by Sabine Arnold

3.4 Clinical correlates of nonsuicidal self-injury in patients with eating disorders

The following chapters outline clinical correlates of NSSI separately for the ED subgroups of AN-R, AN-BP, and BN.

3.4.1 Clinical correlates of nonsuicidal self-injury in anorexia nervosa, restrictive type

Compared to patients without NSSI, in the AN-R patient group, a history of NSSI was associated with more psychiatric comorbidities at hospital admission, shown by a higher

median of psychiatric comorbidities [U(-4.8) = 980.0, p < 0.001, d = 0.55] and a higher prevalence of at least one psychiatric comorbidity [χ^2(1,242) = 16.7, p < 0.001, Φ = 0.28]. In particular, NSSI in AN-R patients was associated with a higher prevalence of affective disorders [χ^2(1,242) = 16.1, p < 0.001, Φ = 0.28], namely depressive episodes [χ^2(1,242) = 5.0, p = 0.026, Φ = 0.16], and persistent affective disorders [χ^2(1,242) = 16.3, p < 0.001, Φ = 0.28], anxiety disorders [χ^2(1,242) = 5.8, p = 0.021, Φ = 0.20], and personality disorder traits [χ^2(1,242) = 6.3, p = 0.015, Φ = 0.20], specifically histrionic personality disorder traits [χ^2(1,242) = 7.0, p = 0.019, Φ = 0.23].

In addition, NSSI was associated with less weekly weight gain during treatment [NSSI+: 0.4 kgs/week (Q_1 = 0.3, Q_3 = 0.4) vs. NSSI-: 0.6 kgs/week (Q_1 = 0.4, Q_3 = 0.7)] [U(-3.4) = 1184.5, p = 0.001, d = 0.45], and longer duration of treatment (NSSI+: 119.3 ± 35.7 days vs. NSSI-: 94.5 ± 42.5) [t(239) = -2.5, p = 0.012, d = 0.59]. Further, NSSI in the AN-R patient group was associated with more psychiatric medication prescriptions during inpatient care, depicted by a higher median of psychiatric medication prescriptions [U(-2.5) = 1670.5, p = 0.013, d = 0.23] and a higher prevalence of at least one psychiatric medication prescription [χ^2(1,242) = 4.6, p = 0.032, Φ = 0.16], particularly antidepressants [χ^2(1,242) = 5.3, p = 0.021, Φ = 0.17] (see Figure 7).

Additionally, the binary logistic regression model revealed more psychiatric comorbidities at admission [OR = 2.93, 95%CI = 1.42-6.04, p = 0.004] and a lower weekly weight gain during hospitalization [OR = 0.03, 95%CI = 0.02-0.43, p = 0.001] as independent correlates of NSSI in the AN-R patient group (Nagelkerkes r^2 = 0.39). For more details on clinical correlates of NSSI in AN-R patients and for correlates that did not reach statistical significance, see Tables 2–4 of the journal publication (116).

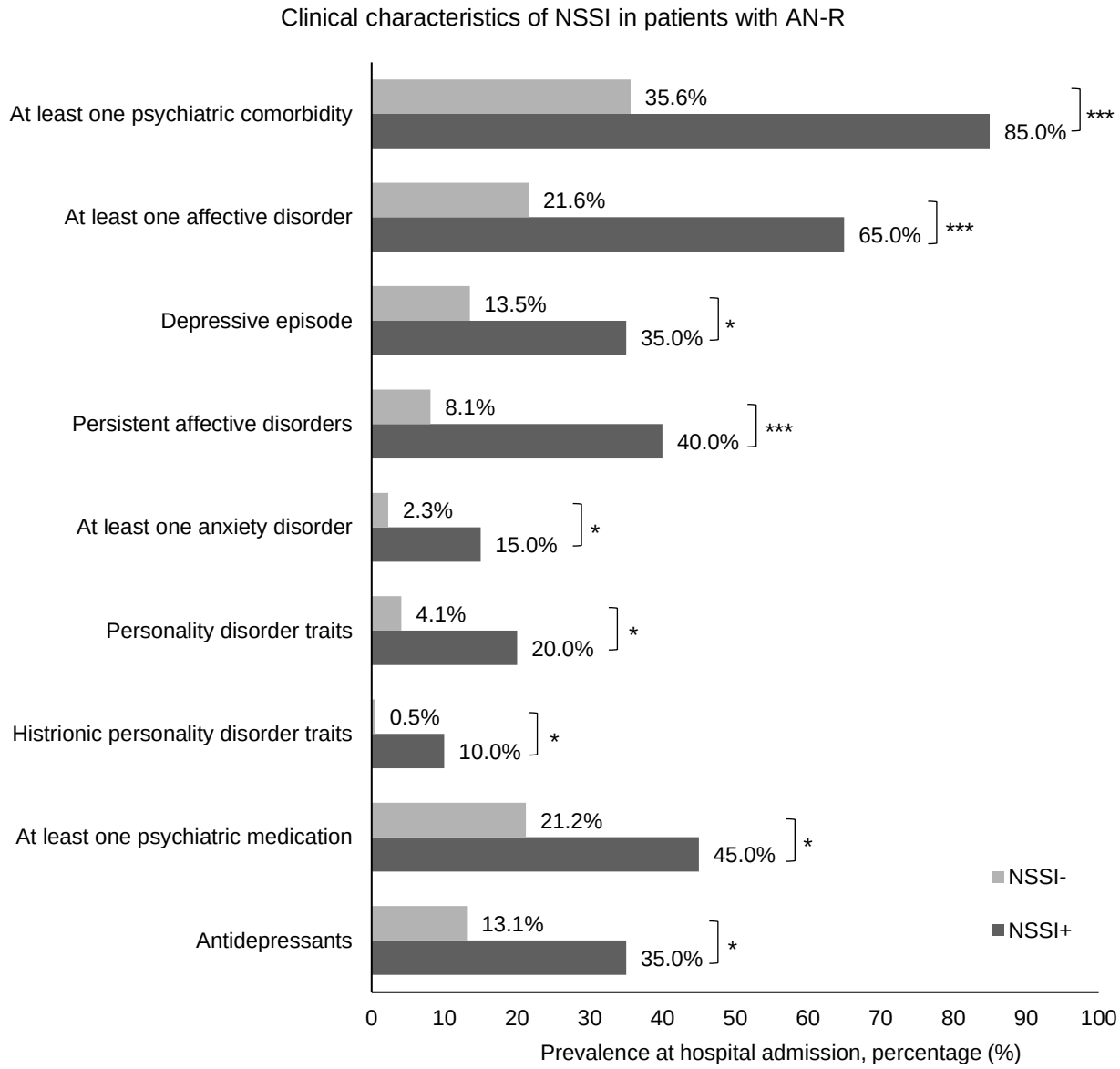


Figure 7: Clinical correlates of nonsuicidal self-injury for anorexia nervosa, restrictive type. AN-R: anorexia nervosa, restrictive type, NSSI+: lifetime history of nonsuicidal self-injury, NSSI-: no history of nonsuicidal self-injury, ***p < 0.001, *p ≤ 0.05; Figure created by Sabine Arnold

3.4.2 Clinical correlates of nonsuicidal self-injury in anorexia nervosa, binge-purge type

Compared to patients without NSSI, in the AN-BP patient group, lifetime NSSI was associated with a history of childhood sexual abuse [$\chi^2(1,56) = 4.2$, $p < 0.020$, $\Phi = 0.35$]. Further, NSSI was associated with more psychiatric comorbidities at hospital admission, depicted in a higher median of psychiatric comorbidities [$U(-2.6) = 228.0$, $p = 0.009$, $d = 0.69$] and a higher prevalence of at least one psychiatric comorbidity [$\chi^2(1,56) = 5.4$, $p =$

0.012, Φ = 0.35], particularly personality disorder traits [$\chi^2(1,56) = 3.4$, $p = 0.038$, Φ = 0.29]. In addition, in patients with AN-BP, NSSI was related to more psychiatric medication prescriptions during inpatient care, as shown by a higher median of psychiatric medication prescriptions [$U(-2.5) = 239.0$, $p = 0.011$, $d = 0.64$] and a higher prevalence of at least one medication prescription [$\chi^2(1,56) = 5.1$, $p = 0.024$, Φ = 0.34], specifically antipsychotics [$\chi^2(1,56) = 3.5$, $p = 0.045$, Φ = 0.29].

The logistic regression model for the AN-BP group revealed more psychiatric comorbidities at hospital admission as the independent correlate of NSSI [OR = 2.67, 95%CI = 1.13-6.31, $p = 0.025$] (Nagelkerkes $r^2 = 0.45$). For more details on clinical correlates of NSSI in patients with AN-BP, see Tables 2-4 of the journal publication (116) and Figure 8 below.

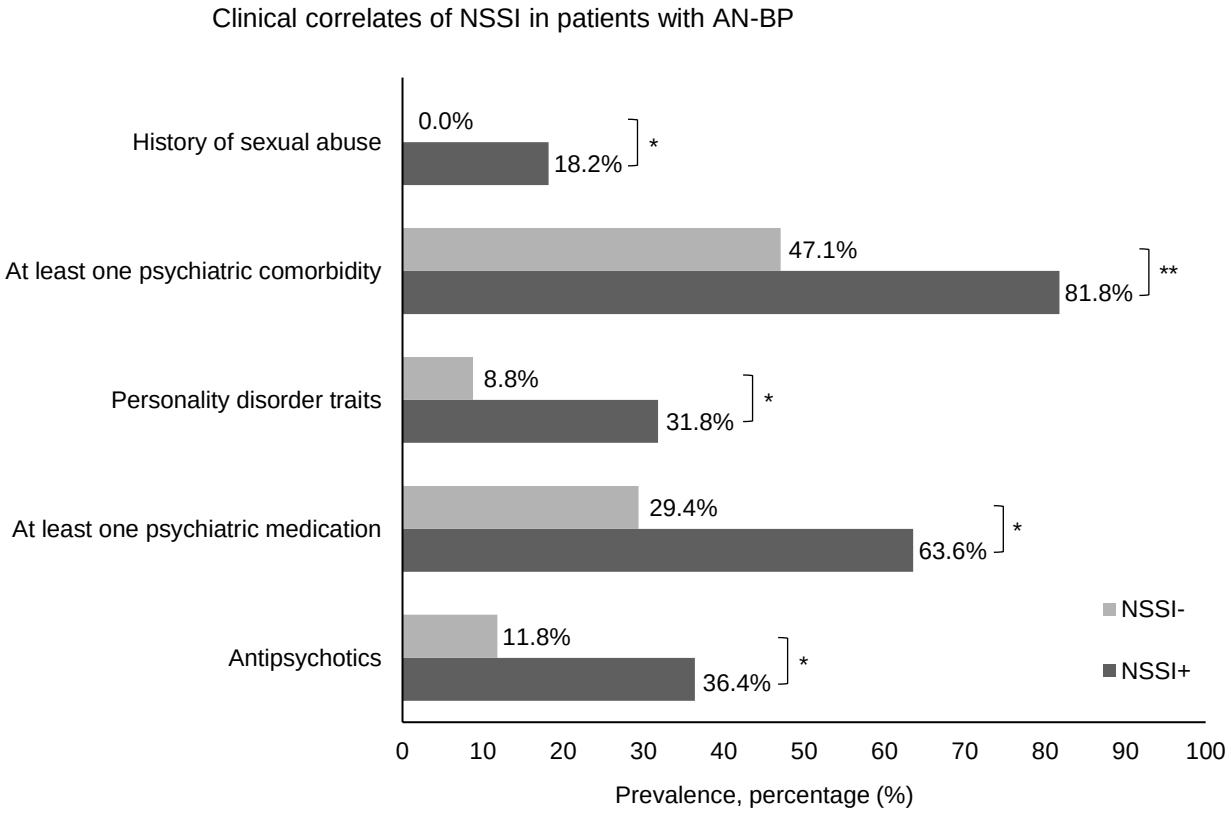


Figure 8: Clinical correlates of nonsuicidal self-injury for anorexia nervosa, binge-purge type. AN-BP: anorexia nervosa, binge-purge type, NSSI+: lifetime history of nonsuicidal self-injury, NSSI-: no history of nonsuicidal self-injury, **p ≤ 0.01, *p ≤ 0.05; Figure created by Sabine Arnold

3.4.3 Clinical correlates of nonsuicidal self-injury in bulimia nervosa

Compared to patients without NSSI, in the BN patient group, NSSI was associated with more psychiatric comorbidities at hospital admission, shown by a higher median of psychiatric comorbidities [$U(-3.6) = 507.0$, $p < 0.001$, $d = 0.78$] and a higher prevalence of at least one psychiatric comorbidity [$\chi^2(1, 84) = 9.8$, $p = 0.002$, $\Phi = 0.34$], in particular, affective disorders [$\chi^2(1,84) = 4.6$, $p = 0.032$, $\Phi = 0.23$] and personality disorder traits [$\chi^2(1,84) = 9.9$, $p = 0.002$, $\Phi = 0.37$], namely combined personality disorder traits [$\chi^2(1,84) = 2.7$, $p = 0.047$, $\Phi = 0.24$]. In addition, NSSI was associated with a longer inpatient care duration (NSSI+: 93.6 ± 86.1 vs. NSSI-: 52.9 ± 32.6 days) [$t(49.5) = -2.8$, $p = 0.007$, $d = 0.63$].

Moreover, NSSI in the BN group was associated with more psychiatric medication prescriptions during inpatient care, represented by a higher median of psychiatric medication prescriptions [$U(-3.5) = 586.0$, $p = 0.001$, $d = 0.60$], and a higher prevalence of at least one medication prescription [$\chi^2(1,84) = 10.8$, $p = 0.001$, $\Phi = 0.39$], in particular, antidepressants [$\chi^2(1,84) = 8.1$, $p = 0.003$, $\Phi = 0.34$], and antipsychotics [$\chi^2(1,84) = 2.9$, $p = 0.050$, $\Phi = 0.23$]

The logistic regression analysis revealed more psychiatric comorbidity [OR = 3.75, 95%CI = 1.71-8.23, $p = 0.001$] and longer treatment duration [OR = 1.01, 95%CI = 1.00-1.02, $p = 0.033$] as independent correlates of NSSI in the BN patient group (Nagelkerkes $r^2 = 0.33$). For more details on clinical correlates of NSSI in BN, including non-significant findings, see Tables 2–4 of the journal publication (116) and Figure 9 below.

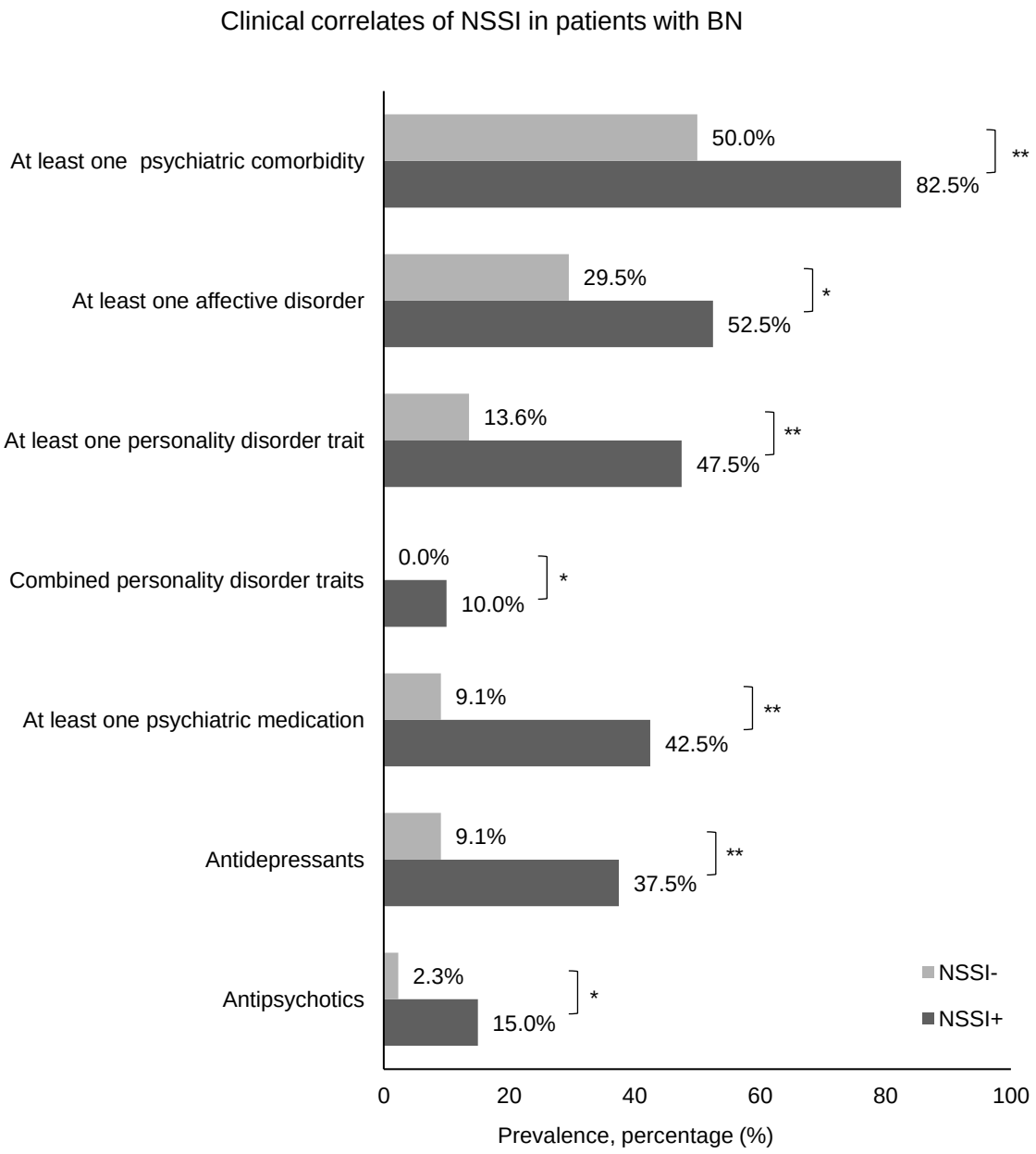


Figure 9: Clinical correlates of nonsuicidal self-injury for bulimia nervosa. BN: bulimia nervosa, NSSI+: lifetime history of nonsuicidal self-injury, NSSI-: no history of nonsuicidal self-injury, **p ≤ 0.01, *p ≤ 0.05; Figure created by Sabine Arnold

3.5 Suicidality in patients with eating disorders and nonsuicidal self-injury

Among all patients, 30.6% reported a history of suicidal ideation, specifically 19.8% of AN-R, 44.6% of AN-BP, and 52.4% of BN. Compared to the AN-R patient group, lifetime suicidal ideation was significantly more prevalent in the BN and AN-BP patient groups [$\chi^2(2,382) = 37.2$, $p < 0.001$, $\Phi = 0.31$] (see Table 1 of the journal publication (116)).

Across ED subgroups, the prevalence of suicidal ideation was significantly higher among patients with vs. without NSSI [AN-R: $\chi^2(1,242) = 19.5$, $p < 0.001$, $\Phi = 0.30$; AN-BP: $\chi^2(1,56) = 6.6$, $p = 0.010$, $\Phi = 0.38$; BN: $\chi^2(1,84) = 7.0$, $p = 0.008$, $\Phi = 0.29$] (see Figure 10). In addition, the binary logistic regression analysis revealed suicidal ideation as an independent correlate of NSSI in the AN-R patient group (OR = 0.21, 95%CI = 0.07-0.64, $p = 0.006$) (116).

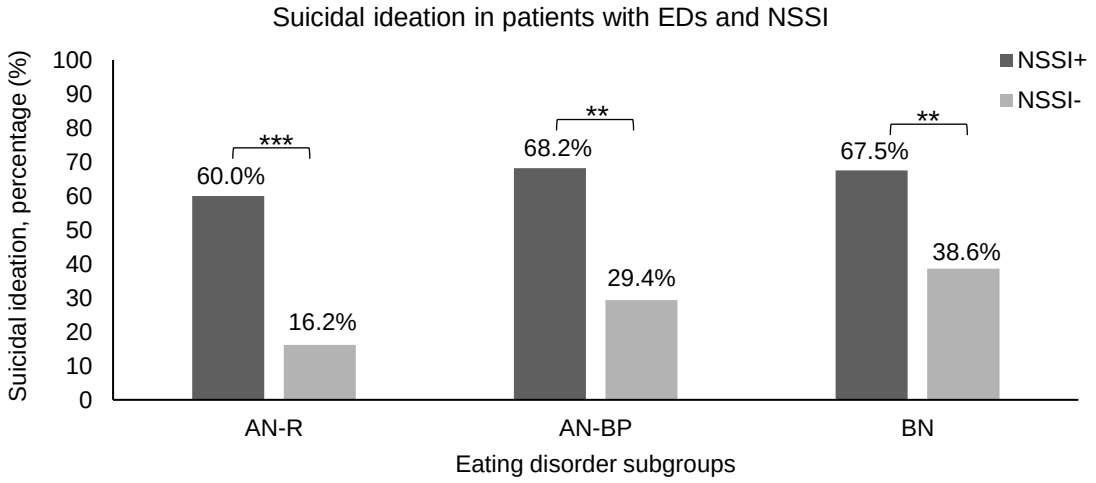


Figure 10: Suicidal ideation in patients with eating disorders and nonsuicidal self-injury. AN-R: anorexia nervosa, restrictive type, AN-BP: anorexia nervosa, binge-purge type, BN: bulimia nervosa; NSSI+: lifetime history of nonsuicidal self-injury, NSSI-: no history of nonsuicidal self-injury; suicidal ideation: lifetime history of suicidal ideation; ***p < 0.001, **p ≤ 0.01; Figure created by Sabine Arnold

Concerning suicide attempts, 3.4% of all patients reported having attempted suicide, specifically 1.7% of AN-R, 8.9% of AN-BP, and 4.8% of BN. A history of suicide attempts was significantly higher in the AN-BP patient group compared to AN-R, with no significant differences between the AN-BP and BN or the AN-R and BN groups [$\chi^2(2,382) = 7.9$, $p = 0.019$, $\Phi = 0.14$] (see Table 1 of the journal publication (116)).

In the AN-R and BN patient groups, no significant difference was found in the reported prevalence of suicide attempts between patients with vs. without NSSI [AN-R: $\chi^2(1,242) = 1.5$, $p = 0.239$; BN: $\chi^2(1,84) = 0.4$, $p = 0.343$]. However, in the AN-BP patient group, the prevalence of suicide attempts was significantly higher among patients with vs. without NSSI [$\chi^2(1,56) = 5.9$, $p = 0.007$, $\Phi = 0.39$] (see Figure 11).

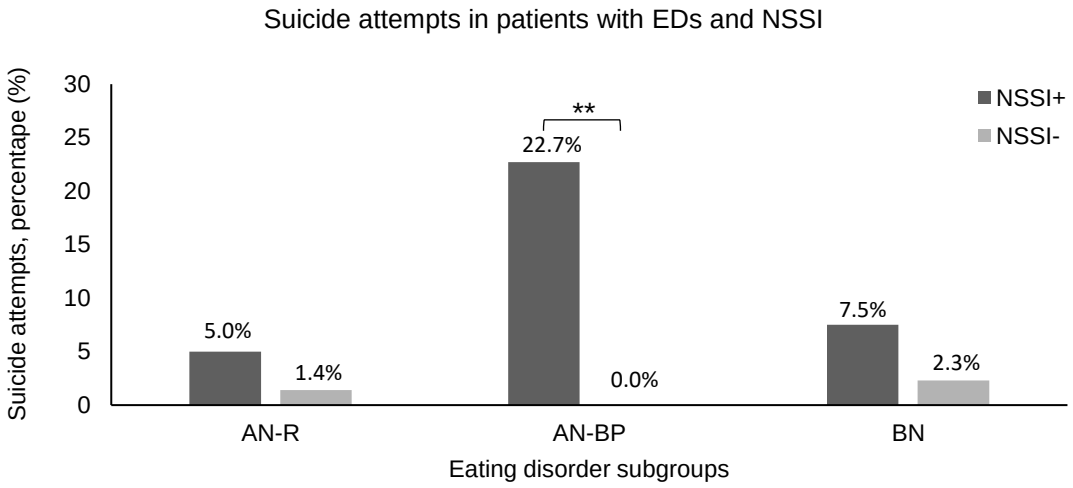


Figure 11: Suicide attempts in patients with eating disorders and nonsuicidal self-injury. AN-R: anorexia nervosa, restrictive type, AN-BP: anorexia nervosa, binge-purge type, BN: bulimia nervosa; NSSI+: lifetime history of nonsuicidal self-injury, NSSI-: no history of nonsuicidal self-injury; suicide attempts: lifetime history of suicide attempts; **p ≤ 0.01; Figure created by Sabine Arnold

4. Discussion

Youth seeking psychiatric inpatient care for an ED who are also engaging in NSSI represent a particularly vulnerable patient group. However, key epidemiological data on NSSI were lacking, which is helpful information to identify individuals at risk. To address this gap, this study of almost 400 youth inpatients assessed the lifetime prevalence of NSSI, methods used, clinical correlates, and suicidality associated with NSSI, providing data separately for AN-R, AN-BP, and BN subgroups.

In this chapter, the study results are summarized and discussed in the context of the current state of research. Further, the strengths and limitations of this study are reviewed, and implications for clinical practice and ideas for future research are outlined.

4.1 Summary of results

Almost one in two individuals in the AN-BP and BN patient groups engaged in NSSI, and about one in ten in the AN-R patient group, with cutting being most commonly used, followed by scratching, hitting, and burning. Compared to AN-R, the lifetime prevalence of NSSI was significantly higher in patients with binge-purging EDs, specifically cutting.

Across ED subgroups, patients with vs. without NSSI had significantly more psychiatric comorbidities at hospital admission, especially personality disorder traits, more suicidal ideation, and more psychiatric medication prescriptions during inpatient care. Particularly, in inpatients with AN-R and BN, NSSI was associated with significantly more comorbid affective disorders and longer treatment duration. In addition, in the AN-R patient group, NSSI was related to comorbid depressive episodes, persistent affective disorders, anxiety disorders, histrionic personality disorder traits, lower weight gain during treatment, and more antidepressant medication prescriptions. In the AN-BP patient group, NSSI was associated with a history of childhood sexual abuse, more suicide attempts, and more antipsychotic medication prescriptions. In the BN patient group, NSSI was associated with combined personality disorder traits and more antidepressant and antipsychotic medication prescriptions.

Multivariable logistic regression analyses revealed more psychiatry comorbidities at hospital admission as an independent correlate of NSSI among all three examined ED subgroups. In addition, lower weight gain and suicidal ideation were independently

correlated with NSSI in patients with AN-R and longer duration of treatment in patients with BN.

4.2 Interpretation of the study findings

In the following chapters, the study results on NSSI lifetime prevalence, methods, clinical correlates, and suicidality in youth inpatients with EDs are interpreted in the context of previous research.

4.2.1 Lifetime prevalence of nonsuicidal self-injury in patients with eating disorders

Although previous research has shown that individuals make great efforts to resist the urge to engage in NSSI (117), in the youth inpatient sample of this study, a high NSSI prevalence was found, with one in five individuals engaging in NSSI across ED subgroups. As hypothesized, BN and AN-BP patient groups showed a higher NSSI prevalence than the AN-R subgroup, possibly related to higher impulsivity in binge-purging EDs (6,46,118).

In particular, the 48% NSSI prevalence in the BN patient group of the current study corresponds well with the weighted mean NSSI prevalence of 47% across previous studies (range across studies: 21–88%; see Figure 1) (30,34,82–86). However, comparing the observed 48%-prevalence of the current study to specific previous studies, a considerably lower NSSI prevalence estimate of 21% can be noted in an RCR of a youth BN population treated at an academic center (85), possibly reflecting higher general and ED-specific psychopathology of the inpatient sample. By contrast, the 48% NSSI prevalence finding of the current study is below the 88% prevalence estimate from an RCR of a youth day clinic sample with BN (86). Because different degrees of psychopathology are associated with different treatment settings (48), a higher NSSI prevalence in an inpatient vs. day hospital sample can be assumed. However, the BN sample of Dzombak and colleagues (86) included only eight patients, which limits the representativeness of these study results.

Regarding the AN-BP and AN-R patient groups, the prevalence findings of the current study, overall, were lower than the NSSI prevalence estimates from previous studies: While the 39% NSSI prevalence in the AN-BP patient group of the present study falls within the 13–67% range of NSSI estimates from previous studies (30,34,82–85) and specifically corresponds to the 42% prevalence of a mixed youth and adult inpatient

sample (34), it was lower than the weighted mean NSSI prevalence of 56% across previous studies (30,34,82–85). Furthermore, the 8% NSSI prevalence detected in the AN-R patient group of the current study did not fall within the 25%–60% prevalence range of previous studies (30,82–85).

Assuming that patients with AN and NSSI use their body for emotion regulation and self-punishment (6,30,34,35,46), the high symptom severity of the AN-BP and AN-R samples, which is reflected in very low body weight, might indicate that individuals engaged in self-punishment through starvation, thereby decreasing the urge to engage in self-punishment through NSSI. Another explanation for the relatively low lifetime prevalence of NSSI in the AN-BP and AN-R samples of the current study could be the lower age compared to previous studies (30,34,82–84) since lifetime prevalence is a cumulative estimate that increases with age.

Finally, a more conclusive comparison of prevalence data of the current study and previous research is complicated by differences in sample characteristics and research methods. Overall, the high prevalence results are concerning, as exposure to NSSI and ED is associated with poor health outcomes, more years of life lost, and increased mortality risk (3). Further epidemiological studies are needed to better understand lifetime NSSI in youth patients seeking inpatient care for EDs.

4.2.2 Methods used for nonsuicidal self-injury in patients with eating disorders

Consistent with the study hypothesis, cutting was the most common method for NSSI, extending research to the specific population of youth inpatients with AN-R, AN-BP, and BN. In the current study, scratching, hitting, and burning were also engaged in, however, less frequently, corresponding to previous studies of mixed samples of youth and adult inpatients with EDs (31,33–35,76,88,89).

The result of the current study that patients with AN-BP and BN engaged in cutting significantly more often compared to patients with AN-R replicates a previous finding of a mixed sample of youth and adult inpatients with AN-R, AN-BP, and BN (88). The association between cutting and binge-purging EDs could reflect higher impulsivity in patients with AN-BP and BN compared to AN-R (6,46,118). Yet, AN is related to high levels of perfectionism and cognitive rigidity (65,119), which, according to clinical experience, could specifically make patients with AN-R more consciously evaluate rather

than impulsively engage in a particular NSSI method. Perhaps patients with AN-R decide against cutting because the scars cutting leaves behind contradict their body ideal.
Overall, the NSSI methods identified in the current sample align with previous findings that patients with EDs inflict primarily mild to moderate-severe injuries by NSSI. In addition, NSSI methods appear to be similar across ED subtypes, age groups, and treatment settings. From a clinical view, it is crucial to be aware that the absence of cutting cannot be equated with the absence of NSSI since scratching, hitting, and burning can also be used.

4.2.3 Clinical correlates of nonsuicidal self-injury in patients with eating disorders

In the current study of youth inpatients, in all ED subgroups, NSSI was associated with more psychiatric comorbidities at hospital admission, specifically personality disorder traits, and more psychiatric medication prescriptions during treatment. These results align with previous findings in mixed samples of youth and adult in- and outpatients with EDs (33–35,46,85) and may reflect an association between disease severity and complexity with NSSI.
In particular, in the AN-R patient group, NSSI was associated with comorbid depressive episodes, persistent affective disorders, and anxiety disorders, which is in line with previous findings in mixed samples of youth and adult in- and outpatients with AN-R, AN-BP, BN, EDNOS and binge-eating disorder (33,46,85), with the current study specifying the comorbidity for youth age group, inpatient status, and ED subtype. The association between NSSI and affective and anxiety disorders may reflect NSSI being performed to reduce aversive emotions and inner tension associated with these disorders (20,37,120). Increased antidepressant medication prescriptions in AN-R patients with vs. without NSSI are likely mediated by the increased depressive and anxiety comorbidity for which treatment antidepressants might be used.
While a previous study showed an association between NSSI and borderline and antisocial personality traits in a mixed sample of youth and adult inpatients with pooled AN-R, AN-BP, and BN subgroups (33), the current study identified NSSI as being related to histrionic personality disorder traits specifically in the AN-R patient group. This finding raises the question of whether NSSI has been interpreted as a histrionic behavior, and further research is needed. In addition, NSSI in the AN-R patient group was associated with less weight gain during hospitalization and longer treatment duration, corresponding

with previous findings of the association between NSSI and more severe ED pathology in a mixed sample of youth and adult inpatients with AN-R, AN-BP, BN, and EDNOS (34) and a longer duration of illness in a sample of youth outpatients with AN-R, AN-BP, BN and EDNOS (85), while the current study specified the clinical correlates for inpatients status, youth age, and the AN-R subtype. Further, this finding links NSSI to greater symptom severity and poorer outcome in the AN-R patient group.

In the patient group with AN-BP, about one in five patients with NSSI had experienced childhood sexual abuse, while none without NSSI reported childhood sexual abuse. This finding aligns with the results of mixed samples of youth and adult in- and outpatients with EDs (33,85), while the current study specified the abuse subtype and the ED subgroup of youth inpatients. In particular, the relationship between NSSI and childhood abuse could be explained by assuming that a history of abuse creates a vulnerability to emotional dysregulation when confronted with stressful events, which individuals might attempt to cope with via NSSI (2,20–22). A further explanation could be that individuals self-direct and repeat the abuse they experienced as victims through actively engaging in NSSI (20). The higher antipsychotic medication prescription in AN-BP patients with vs. without NSSI might suggest narrow preoccupations with the ED-related contents or even psychotic symptoms associated with co-occurring childhood sexual abuse, personality disorder traits, AN-BP, and NSSI.

In the inpatient group with BN of the current study, combined personality disorder traits were 10-fold higher in individuals with vs. without NSSI, linking the development of multiple personality disorder traits to NSSI. Longer treatment duration was also associated with NSSI in the BN patient group, corroborating earlier findings from a mixed sample of youth and adult in- and outpatients with AN and EDNOS (35). The current study demonstrated this correlation for youth inpatients with BN. Moreover, in the current study, antidepressants were prescribed four times more frequently and antipsychotics six times more often in the BN patient population with vs. without NSSI, again suggesting an association between NSSI and more severe psychopathology.

Taken together, the current study identified clinical correlates of NSSI separately for youth inpatients with AN-R, AN-BP, and BN, adding specificity to their co-occurring psychopathology. These findings can be well applied to tailor prevention and treatment approaches. Yet, further research is needed to gain more insights into the etiology underlying the co-occurrence of specific ED subtypes, certain psychiatric comorbidities, and NSSI.

4.2.4 Suicidality in patients with eating disorders and nonsuicidal self-injury

In accordance with the study hypothesis, suicidality was significantly increased in youth ED inpatients with vs. without NSSI. Specifically, in the AN-R patient group of the current study, NSSI was independently associated with suicidal ideation and was reported by 60% of patients with NSSI, which was about four times more likely than in AN-R inpatients without NSSI. Similarly, a history of suicidal ideation in the AN-BP and BN patient groups with NSSI of around 70% was approximately twice as likely as in patients without NSSI. Due to a lack of previous research results, this concerningly high suicidal ideation in AN-R, AN-BP, and BN youth inpatients with NSSI cannot be compared to prior findings. However, the association between NSSI and suicidal ideation is consistent with previous research showing NSSI as a risk factor or *gateway* to suicidality in a self-harm continuum (7,44,96).

In addition, in the current study, NSSI was significantly associated with suicide attempts in patients with AN-BP: About one in five minors with AN-BP and NSSI had attempted suicide, whereas none without NSSI had. Binge-purging behavior is associated with impulsivity and may explain the increased likelihood of acting on suicidal ideation leading to suicide attempts (6,46,93,97,118). NSSI was also associated with suicide attempts in the BN patient group, while results did not reach statistical significance, even if the sample size and, thereby, the statistical power for BN was larger than for AN-BP. More research is needed in this field. Overall, the association between NSSI and suicide attempts is alarming and calls for targeted suicide prevention efforts, especially in youth inpatients with AN-BP.

4.3 Limitations and strengths of the study

This study is subject to several limitations. First, the RCR relies on a cross-sectional design, allowing for associative but not causal inferences. For example, the clinical correlates of NSSI cannot be interpreted as predictive factors in this cross-sectional study since their temporal antecedence remains unclear. In addition, this RCR depends on the accuracy of patient records, which cannot be verified retrospectively.

Second, this study included a specific sample of primarily female youth seeking inpatient care for AN-R, AN-BP, and BN diagnosed according to ICD-10 (37) at a psychiatric department of a university hospital in a major city in Germany between 1990–2015.

Hence, the representativeness of the sample is limited, and it remains unclear to what extent the study results can be generalized to patient populations with the following characteristics: (a) ED diagnosis according to ICD-11 or DSM-5 criteria (38,39), (b) non-typical ED diagnoses, (c) outpatient or day hospital treatment, (d) individuals <9 years or >18 years, (e) males, (f) rural areas, (g) non-university hospital settings, or (h) other countries than Germany.

Third, this RCR relied on a single coding of each patient record. Therefore, the interrater reliability of the data coding could not statistically be determined, representing a methodological gap in this study. Fourth, it cannot be ruled out that this study might have been subject to systematic biases (121–124). For example, a *recall bias*, defined as memory distortion of past events (123), could have manifested when patients who engaged in NSSI several years ago could not recall that point, possibly leading to an underestimation of NSSI lifetime prevalences. Another bias that could have emerged is *interviewer bias,* defined as systematic differences in how an interviewer obtains, records, or interprets information, for example, based on a patient's disease status (122). For example, suppose clinicians had systematically interviewed patients with BN and borderline comorbidity about NSSI history more in-depth than patients with AN-R. This could have distorted patient disclosure and, thereby, affected prevalence estimates. Also, *observer bias*, such as focusing on the initial and neglecting later, conflicting information, cannot be excluded either (121,124). This error could have occurred, for example, if a rater had neglected a patient's history of NSSI when the admission report denied NSSI, but the intra-treatment documentation affirmed NSSI.

Nevertheless, despite these limitations, to the best of my knowledge, this is the first study assessing NSSI lifetime prevalence, methods, clinical correlates, and suicidality in youth seeking inpatient care for EDs, providing data separately for AN-R, AN-BP, and BN subgroups, and thereby providing previously unavailable information. An advantage of this RCR is that it relies on real-life clinical data acquired by licensed psychotherapists and psychiatrists, who legally follow mandated documentation and due diligence responsibilities, with ED diagnosis and NSSI assessments being genuinely made for clinical purposes, ensuring highly valid documentation.

A further advantage of this RCR is that multiple informants evaluated NSSI at hospital admission, discharge, and during treatment, assuring a comprehensive NSSI assessment, making errors of omission less likely. In particular, NSSI was systematically assessed by a semi-structured hospital interview guide upon admission by

psychotherapists and psychiatrists based on the patient self-report and report of the caregivers, supplemented by intra-treatment information of all treatment team members. Moreover, this study was designed and conducted adhering to established guidelines for RCRs (99–101,125). Clinical professionals experienced in research and practice in child and adolescent psychiatry were chosen as study raters. Further, raters received expert training in data coding and were provided with a coding manual, including explicit variable definitions and coding rules to deal with missing data or ambiguous coding situations (see Table 1 and Appendix 3). In addition, raters received supervision and weekly meetings to clarify emerging questions. The entire data coding procedure was highly standardized, with digital coding templates, which specified input parameters and only allowed matching input, making transcription errors unlikely. Also, the data coding procedure was piloted, allowing for refinement prior to study implementation. Based on all of these factors, this RCR is thought to provide reliable and valid clinical data.

4.4 Clinical implications and future research

The results of the current study have various implications for clinical practice. First, it is crucial to educate clinicians about the relatively high lifetime prevalence of NSSI in youth seeking inpatient care for EDs, especially those with BN and AN-BP, to identify at-risk individuals and provide timely assessment and care. In particular, an interprofessional and systematic evaluation of NSSI is crucial for early detection. Awareness of NSSI among youth ED inpatients could be raised by scientific and clinical literature, treatment manuals, and clinical education.

In addition, clinicians should be regularly trained managing NSSI, with particular emphasis on psychiatric comorbidities associated with NSSI in different ED subgroups, since appropriate treatment and monitoring are required to prevent symptom shifting between NSSI, ED psychopathology, and further psychiatric comorbidities or even suicide attempts, aiming for full and long-term recovery. Moreover, clinicians need to be aware that youth seeking inpatient care for EDs, especially those with BN, who also engage in NSSI, are likely to be suicidal and, therefore, in need of suicide prevention efforts. Further, clinicians should provide the patient and caregivers with appropriate psychoeducation about NSSI in EDs, taking into account ED-specific NSSI prevalences, methods, clinical correlates, and suicide risk data.

In addition to the implications for clinical practice, the current study encourages future research in several ways. First, an ideal study design would be longitudinal, following one or more birth cohorts throughout the lifespan, allowing the study of interactions between onset, course, chronification, and recovery of EDs and NSSI. Potential predisposing and maintaining factors, such as social media use of pro-ED and NSSI content (126,127), could be explored. Also, the pathway from NSSI-related thoughts to actual NSSI behavior could be the subject of future research, as well as the examination of factors increasing or mitigating the risk of suicidal ideation, suicide attempts, and suicide in individuals with EDs and NSSI. For evaluation, structured clinical interviews, standardized questionnaires, and ecological momentary assessment for real-time assessment could be applied (128,129).

In pursuit of high sample representativeness and broad generalizability of study results, a large international, multicenter study would be desirable, including (a) specialized vs. non-specialized ED treatment in inpatient vs. outpatient vs. day-hospital settings in urban vs. rural areas, (b) typical vs. non-typical ED diagnosis according to DSM-5 and ICD-11 (38,39), (c) patients with EDs vs. patients with other psychiatric disorders than EDs vs. healthy controls, and (d) diverse ethnic, sex, and age groups.

In addition, future research might seek to replicate this study to obtain up-to-date results, with more than one rater coding a patient record, to calculate interrater reliability, such as Cohen's Kappa (130). Current research on NSSI in youth with EDs is of particular relevance due to two major world events: (a) the outbreak of the COVID-19 pandemic, associated with increased ED diagnoses and hospitalizations for severe EDs among youth (15–17), and (b) the outbreak of war in Ukraine, with many youth refugees arriving in Germany (131), without the health system having any information on NSSI and ED health status in that specific population to offer targeted care.

5. Conclusion

This study identified a high lifetime prevalence of NSSI in youth patients seeking inpatient care for an ED, particularly in the BN and AN-BP subgroups, with about one in two patients reporting NSSI. Further, in all ED subgroups, NSSI was associated with more psychiatric comorbidities and psychiatric medication prescriptions, suggesting an association between NSSI and higher symptom severity and illness complexity. In addition, NSSI was associated with specific psychiatric comorbidities per individual ED subgroup. These findings can be applied to tailor assessment and treatment strategies in order to prevent symptom shifting between NSSI, EDs, psychiatric comorbidities, and suicidality in pursuit of facilitating full recovery. Alarmingly, NSSI was associated with significantly more suicidal ideation in all ED subgroups and suicide attempts in patients with AN-BP. Hence, it is time to move forward with the development of targeted, group-specific suicide prevention programs to provide help to minors in need who have EDs plus NSSI, with or without relevant psychiatric comorbidities and suicidality.

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Appendix

Appendix 1: Sample characteristics of studies on nonsuicidal self-injury in eating disorders

Reference	ED subgroup								Treatment setting		Age in years
	AN (*n*)	**AN-R** (*n*)	**AN-BP** (*n*)	**BN** (*n*)	**EDNOS** (*n*)	**BED** (*n*)	**ARFID** (*n*)	**OSFED** (*n*)	**inpatient**	**outpatient**	*M* ± *SD*
(30) Claes et al. (2015)	0	20	16	41	0	22	0	0	x	x	27.8 ± 9.3
(33) Claes et al. (2003)	0	23	18	29	0	0	0	0	x		21.7 ± 6.2
(34) Paul et al. (2002)	0	59	60	137	120	0	0	0	x		24.3 ± 7.1
(35) Smithuis et al. (2018)	98	0	0	0	38	0	0	0	x	x	25.4 ± 8.6
(82) Claes et al. (2021)	0	169	149	112	0	0	0	0	x		20.9 ± 5.8
(83) Pauwels et al. (2016)	0	189	80	113	109	0	0	0	x		21.4 ± 5.9
(84) Vansteelandt et al. (2013)	0	21	17	20	0	0	0	0	x		21.3 ± 5.6
(85) Peebles et al. (2011)	0	223	47	169	905	0	0	0		x	15.4 ± 1.9
(86) Dzombak et al. (2020)	100	0	0	8	0	0	13	34		*	14.3 ± 1.7
(88) Claes et al. (2001)	0	36	58	40	0	0	0	0	x		AN-R: 19.1 ± 4.9 AN-BP: 25.0 ± 9.6 BN: 21.0 ± 5.6
(89) Claes & Vandereycken (2007)	0	23	18	29	0	0	0	0	x		21.7 ± 6.2

Note. AN: anorexia nervosa, AN-R: AN, restrictive type, AN-BP: AN, binge-purging type, BN: bulimia nervosa, EDNOS: eating disorders not otherwise specified, BED: binge-eating disorder, ARFID: Avoidant restrictive food intake disorder, OSFED: Other Specified Feeding and Eating Disorder*; M*: median, *SD*: standard deviation; *partially hospitalized; Table created by Sabine Arnold

Appendix 2: Variable definitions

Variable	Definition
Adjustment disorder	According to ICD-10 criteria, *F43.2 Adjustment disorder* describes a state of emotional disturbance and distress arising in the period of adaptation to a significant life change, interfering with social functioning and performance (37).
Affective disorders	Diagnoses of the ICD-10 categories *F30-F39 Affective disorders* summarize disorders with changes in affect and mood as primary symptoms (37).
Age at hospital admission	Patient age in years upon their first admission to the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany
Age of eating disorder onset	Patient age in years when their eating disorder started
Anankastic personality disorder	According to ICD-10 criteria, *F60.5 Anankastic personality disorder* is characterized by perfectionism, preoccupation with details, excessive conscientiousness, feelings of doubt, caution, stubbornness, and rigidity (37).
Antidepressant medication	This variable records antidepressant medication prescriptions during the first stay at the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany. Antidepressants address mood, affect, and motivation (70).
Antipsychotic medication	This variable records antipsychotic medication prescriptions during the first stay at the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany. Antipsychotics address the control of impaired reality testing, namely severely disorganized thinking, speech, and behavior (71).
Anxiety disorders	In this study, this category summarizes ICD-10 diagnoses of *F40 Phobic anxiety disorders* and *F41 Other anxiety disorders* (37)
Anxiolytic medication	This variable records anxiolytic medication prescriptions during the first stay at the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany. Anxiolytics address reducing anxiety, agitation, restlessness, and insomnia (43).
Anxious personality disorder	According to ICD-10 criteria, *F60.6 Anxious personality disorder* is characterized by a feeling of inferiority, insecurity, tension, hypersensitivity to criticism, rejection, limited personal attachments, and avoiding activities due to overestimating potential risks (37).
BMI percentiles at hospital admission and discharge	Patient age- and sex-adjusted body mass index (BMI) upon admission to or release from their first stay at the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany BMI = weight (kilograms)/ [height(meters)]^2 (49,50)
Borderline personality disorder	According to ICD-10 criteria, *F60.3 Emotionally unstable personality* disorder is characterized by instability in affect, identity, and relationships, involving emotional crises, self-harm, and suicidality (37).
Burning	According to clinical experience, burning is used as a method of nonsuicidal self-injury, for example, by pressing a glowing cigarette into the own forearm to burn the skin.

Appendix 2: Variable definitions (continued)

Variable	Definition
Combined personality disorder	According to ICD-10 criteria, *F61.0 Combined personality disorder* is characterized by traits of various personality disorders but without a predominant symptom picture that would justify a specific personality disorder diagnosis (37).
Cutting	According to clinical experience, cutting is used as a method for nonsuicidal self-injury, for example, by cutting the skin of the own forearm with an object such as a razor blade, scissor, knife, or shard.
Depressive episode	According to ICD-10 criteria, *F32 Depressive episode* is characterized by depressed mood, loss of interest and enjoyment, and reduced energy as core symptoms, accompanied by symptoms like reduced appetite, pessimistic view of the future, and ideas or acts of self-harm or suicide (37).
Disorders with onset in childhood/adolescence	According to ICD-10 criteria, *F90-F98 Behavioural and emotional disorders with onset usually occurring in childhood and adolescence* include hyperkinetic disorders, conduct disorders, mixed disorders of conduct and emotions, emotional disorders, disorders of social functioning, and tic disorders (37).
Duration of illness at hospital admission	Time in months, the patient already had the eating disorder upon their first admission to the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany
Family psychopathology present	Presence of a psychiatric diagnosis of a biological or non-biological parent or sibling
Generalized anxiety disorder	According to ICD-10 criteria, *F41.1 Generalized anxiety disorder* is characterized by persistent and generalized anxiety, which is „free-floating“ and not limited to any particular situation and accompanied by symptoms such as palpitations and nervousness (37).
History of childhood abuse	Childhood experience of cruel or invasive interaction, namely, emotional, physical, or sexual maltreatment (103)
History of childhood emotional abuse	Childhood experience of intentional psychological acts impairing mental well-being, such as being degraded, humiliated, or intimidated (105)
History of childhood physical abuse	Childhood experience of aggressive or violent behavior, such as being beaten up, shaken, or kicked (106)
History of childhood sexual abuse	Childhood experience of a violation or exploitation by sexual means, such as sexual contact between an adult and the minor (104)
Histrionic personality disorder	According to ICD-10 criteria, *F60.4 Histrionic personality disorder* is characterized by egocentricity, theatricality, exaggerated expression of emotions, suggestibility, unstable affectivity, over-concern with physical attractiveness, inappropriate seduction, and by seeking activities in which the patient is the center of attention (37).
Hitting	According to clinical experience, hitting is used as a method of nonsuicidal self-injury, for example, by beating the own face with palms, boxing the thighs, or banging the head against a wall.
Intelligence	Intellectual capacity, which was evaluated by clinical judgment and depicted in the intelligence quotient (IQ), categorized as *above average* (IQ > 115), *average* (IQ 85-114), or *below average* (IQ 70-84) (37).

Appendix 2: Variable definitions (continued)

Variable	Definition
Mixed and other personality disorders	According to ICD-10 criteria, *F61 Mixed and other personality disorders* are described as other personality traits and patterns, often troublesome but not meeting the diagnosis of a specific personality disorder (37).
Mixed anxiety and depression	According to ICD-10 criteria, the diagnosis *F41.2 Mixed anxiety and depressive disorder* is characterized by anxiety and depressive symptoms, which are both present, but not to a degree to justify a separate diagnosis (37).
Nonsuicidal self-injury	Patient lifetime history of direct and intentional harm to their skin, without suicidal intent, and for purposes socially unaccepted (19-22)
Obsessive-compulsive disorder	According to ICD-10 criteria, *F42 Obsessive-compulsive disorder* is characterized by recurrent obsessive thoughts (recognized as the own) and compulsive acts performed stereotypically, not enjoyable, causing distress, and which the patient unsuccessfully tries to resist (37).
Panic disorder	According to ICD-10 criteria, *F41 Panic disorder* is characterized by recurrent attacks of severe anxiety, not restricted to a specific situation, accompanied by symptoms like depersonalization and secondary fears, such as the fear of dying (37).
Persistent affective disorder	According to ICD-10 criteria, *F34 Persistent affective disorders* are characterized by persistent and fluctuating disorders of mood with episodes less severe to justify another mood disorder diagnosis (37).
Personality disorder	According to ICD-10 criteria, *F60 Specific personality disorders* are characterized as severe disturbances in personality and behavioral tendencies affecting multiple areas of life, which usually are manifested since childhood or adolescence (37).
Phobic anxiety disorders	According to ICD-10 criteria, *F40 Phobic anxiety disorders* is characterized by anxiety evoked by specific situations, which are avoided or only endured with fear, accompanied by symptoms like palpitations and secondary fears, such as the fear of losing control (37).
Post-traumatic stress disorder	According to ICD-10 criteria, *F43.1 Post-traumatic stress disorder* is characterized as a reaction to a threatening or catastrophic event, likely to cause profound distress in almost everyone, with core symptoms such as repeated re-living the trauma in intrusive memories or nightmares, avoidance of activities, and situations reminiscent of the trauma, and autonomic hyperarousal with hypervigilance (37).
Psychiatric comorbidities at hospital admission	Psychiatric diagnosis according to ICD-10 (37) criteria in addition to the eating disorder diagnosis upon the first admission to the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany
Psychiatric medication prescription during treatment	This variable records psychiatric medication prescriptions during the first stay at the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany. Psychiatric medications aim to alleviate a mental condition and can be categorized into groups, including antidepressants, anxiolytics, and antipsychotics (43,70,71).
Recurrent depressive disorder	According to ICD-10 criteria, *F33 Recurrent depressive disorder* is defined as recurring depressive episodes (37)

Appendix 2: Variable definitions (continued)

Variable	Definition
Scratching	According to clinical experience, scratching is used as a method of nonsuicidal self-injury, for example, by scratching the forearm with the fingernails until the skin is injured and bleeding.
Sex	The biological sex of the patient
Substance abuse	According to ICD-10 criteria, diagnoses of *F10-F19 Mental and behavioral disorders* are characterized by the use of psychoactive substances (37)
Suicide attempt	Lifetime history of intentional actions aiming to end the own life (108)
Suicide (attempt) environment	A friend, classmate, teacher, neighbor, family friend, or relative tried to take or took their own life.
Suicidal ideation	Lifetime history of thoughts on taking the own life (107)
Treatment duration	Number of days of the first stay at the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany
Weight change	Body weight gain or loss in kilograms per week during the first stay at the Child and Adolescent Psychiatry Inpatient Unit of the Charité University Hospital in Berlin, Germany

Note. This table lists the study variables with their respective definition; Table created by Sabine Arnold

Appendix 3: Coding rules

SPSS variable name	Variable	Coding rule
NSSI_prevalence	At least one type of NSSI	If a history of nonsuicidal self-injury of the patient was documented -> code 1 If nonsuicidal self-injury was not documented, it is assumed as absent -> code 0
NSSI_cutting	Cutting	If cutting was documented as a method of nonsuicidal self-injury -> code 1 If cutting was not documented as a method of nonsuicidal self-injury -> code 0
NSSI_scratching	Scratching	If scratching was documented as a method of nonsuicidal self-injury -> code 1 If scratching was not documented as a method of nonsuicidal self-injury -> code 0
NSSI_hitting	Hitting	If hitting was documented as a method of nonsuicidal self-injury -> code 1 If hitting was not documented as a method of nonsuicidal self-injury -> code 0
NSSI_burning	Burning	If burning was documented as a method of nonsuicidal self-injury -> code 1 If burning was not documented as a method of nonsuicidal self-injury -> code 0
Suicidal_ideation	Suicidal ideation	If suicidal ideation of the patient was documented -> code 1 If suicidal ideation was not documented, it is assumed as absent -> code 0
Suicide_attempt	Suicide attempt	If a suicide attempt of the patient was documented -> code 1 If no suicide attempt was documented, it is assumed as absent -> code 0
Childhood_abuse	History of childhood abuse	If childhood emotional, physical, or sexual abuse was documented -> code 1 If no documentation mentioned childhood emotional, physical, or sexual abuse, it is assumed as absent -> code 0
Childhood_emotional_abuse	History of childhood emotional abuse	If childhood emotional abuse was documented -> code 1 If childhood emotional abuse was not documented, it is assumed as absent -> code 0
Childhood_physical_abuse	History of physical abuse	If childhood physical was documented -> code 1 If childhood physical abuse was not documented, it is assumed as absent -> code 0
Childhood_sexual_abuse	History of sexual abuse	If childhood sexual abuse was documented -> code 1 If childhood sexual abuse was not documented, it is assumed as absent -> code 0
Psychiatric_comorbidity	At least one psychiatric comorbidity at hospital admission	If at least one diagnosis of ICD-10 (37) categories *F00-F09* was documented in addition to the eating disorder diagnosis -> code 1 If no diagnosis of ICD-10 (37) categories *F00-F09* was documented in addition to the eating disorder diagnosis -> code 0
F10_F19_Substance	Substance abuse	If a diagnosis of ICD-10 (37) categories *F10-F19 Mental and behavioral disorders due to psychoactive substance use* was documented -> code 1 If no diagnosis of ICD-10 (37) categories *F10-F19 Mental and behavioral disorders due to psychoactive substance use* was documented -> code 0
F30_F39_Affective_disorders	Affective disorders	If a diagnosis of ICD-10 (37) categories *F30-F39 Affective disorders* was documented -> code 1 If no diagnosis of ICD-10 (37) categories *F30-F39 Affective disorders* was documented -> code 0
F32_Depressive_episode	Depressive episode	If ICD-10 (37) *F32 Depressive episode* was documented -> code 1 If ICD-10 (37) *F32 Depressive episode* was not documented -> code 0

Appendix 3: Coding rules (continued)

SPSS variable name	Variable	Coding rule
F33_Recurrent_depressive _disorder	Recurrent depressive disorder	If ICD-10 (37) *F33 Recurrent depressive disorder* was documented -> code 1 If ICD-10 (37) *F33 Recurrent depressive disorder* was not documented -> code 0
F34_Persistent_affective _disorders	Persistent affective disorder	If ICD-10 (37) *F34 Persistent affective disorders* was documented -> code 1 If ICD-10 (37) *F34 Persistent affective disorders* was not documented -> code 0
F40_F41_Anxiety_disorders	Anxiety disorders	If ICD-10 (37) *F40 Phobic anxiety disorders* or *F41 Other anxiety disorders* of were documented -> code 1 If ICD-10 (37) *F40 Phobic anxiety disorders* or *F41 Other anxiety disorders* were not documented -> code 0
F40 Phobic_anxiety_disorders	Phobic anxiety disorders	If ICD-10 (37) *F40 Phobic anxiety disorder* was documented -> code 1 If ICD-10 (37) *F40 Phobic anxiety disorder* was not documented -> code 0
F41_Panic_disorder	Panic disorder	If ICD-10 (37) *F41 Panic disorder* was documented -> code 1 If ICD-10 (37) *F41 Panic disorder* was not documented -> code 0
F41_1_Generalized_anxiety	Generalized anxiety disorder	If ICD-10 (37) *F41.1 Generalized anxiety disorder* was documented -> code 1 If ICD-10 (37) *F41.1 Generalized anxiety disorder* was not documented -> code 0
F41_2_Mixed_anxiety_depressi on	Mixed anxiety and depression	If ICD-10 (37) *F41.2 Mixed anxiety and depressive disorder* was documented -> code 1 If ICD-10 (37) *F41.2 Mixed anxiety and depressive disorder* was not documented -> code 0
F42_OCD	Obsessive-compulsive disorder	If ICD-10 (37) *F42 Obsessive-compulsive disorder* was documented -> code 1 If ICD-10 (37) *F42 Obsessive-compulsive disorder* was not documented -> code 0
F43_1_PTSD	Post-traumatic stress disorder	If ICD-10 (37) *F43.1 Post-traumatic stress disorder* was documented -> code 1 If ICD-10 (37) *F43.1 Post-traumatic stress disorder* was not documented -> code 0
F43_2_Adjustment_disorder	Adjustment disorder	If ICD-10 (37) *F43.2 Adjustment disorders* was documented -> code 1 If ICD-10 (37) *F43.2 Adjustment disorders* was not documented -> code 0
F60_Personality_disorders	Personality disorder traits	If ICD-10 (37) *F60 Specific personality disorders* were documented -> code 1 If ICD-10 (37) *F60 Specific personality disorders* were not documented -> code 0
F60_3_BPD	Borderline	If ICD-10 (37) *F60.3 Emotionally unstable personality disorder* was documented -> code 1 If ICD-10 (37) *F60.3 Emotionally unstable personality disorder* was not documented -> code 0
F60_4_Histrionic_personality	Histrionic	If ICD-10 (37) *F60.4 Histrionic personality disorder* was documented -> code 1 If ICD-10 (37) *F60.4 Histrionic personality disorder* was not documented -> code 0
F60_5_Anakastic_personality	Anankastic	If ICD-10 (37) *F60.5 Anankastic personality disorder* was documented -> code 1 If ICD-10 (37) *F60.5 Anankastic personality disorder* was not documented -> code 0
F60_6_Anxious_personality	Anxious	If ICD-10 (37) *F60.6 Anxious personality disorder* was documented -> code 1 If ICD-10 (37) *F60.6 Anxious personality disorder* was not documented -> code 0
F61_Mixed_personality	Mixed and other	If ICD-10 (37) *F61 Mixed and other personality disorder* was documented -> code 1 If ICD-10 (37) *F61 Mixed and other personality disorder* was not documented -> code 0

Appendix 3: Coding rules (continued)

SPSS variable name	Variable	Coding rule
F61_0_Combined_personality	Combined	If ICD-10 (37) *F61.0 Combined personality disorder* was documented -> code 1 If ICD-10 (37) *F61.0 Combined personality disorder* was not documented -> code 0
F90_F98_Disorders_childhood_adolescence	Disorders with onset in childhood/adolescence	If a diagnosis of ICD-10 (37) *F90-F98 Behavioural and emotional disorders with onset usually occurring in childhood and adolescence* was documented -> code 1 If a diagnosis of ICD-10 (37) *F90-F98 Behavioural and emotional disorders with onset usually occurring in childhood and adolescence* was not documented -> code 0
Psychiatric_meds	At least one psychiatric medication prescription during inpatient care	If at least one psychiatric medication prescription during inpatient care was documented -> code 1 If no psychiatric medication prescription during inpatient care was documented -> code 0
Antidepressants	Antidepressants	If an antidepressant medication prescription during inpatient care was documented -> code 1 If no antidepressant medication prescription during inpatient care was documented -> code 0
Antipsychotics	Antipsychotics	If an antipsychotic medication prescription during inpatient care was documented -> code 1 If no antipsychotic medication prescription during inpatient care was documented -> code 0
Anxiolytics	Anxiolytics	If an anxiolytic medication prescription during inpatient care was documented -> code 1 If no anxiolytic medication prescription during inpatient care was documented -> code 0

Note. Appendix 3 continues Table 1 and depicts study-specific coding rules; Table created by Sabine Arnold

Appendix 4: Missing values

Variables	Missing values			
	Total (*N* = 382)	**AN-R** (*n* = 242)	**AN-BP** (*n* = 56)	**BN** (*n* = 84)
	n (%)	*n* (%)	*n* (%)	*n* (%)
Sex	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Age of ED onset, years	11 (2.9)	0 (0.0)	0 (0.0)	11 (13.1)
Duration of illness at hospital admission, months	12 (3.1)	3 (1.2)	0 (0.0)	9 (10.7)
Age at hospital admission, years	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
BMI percentiles at hospital admission	8 (2.1)	0 (0.0)	0 (0.0)	8 (9.5)
BMI percentiles at hospital discharge	47 (12.3)	2 (0.8)	1 (1.8)	44 (52.4)
Weight change during inpatient care, kg/week	38 (9.9)	2 (0.8)	1 (1.8)	35 (41.7)
Treatment duration, days	3 (0.8)	1 (0.4)	0 (0.0)	2 (2.4)
Intelligence, above average	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Intelligence, average	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Intelligence, below average	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Family psychopathology present	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Suicide (attempt) environment	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
History of childhood abuse, at least one	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Emotional childhood abuse	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Physical childhood abuse	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Sexual childhood abuse	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Psychiatric comorbidity at hospital admission, at least one	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Psychiatric comorbidities at hospital admission, number	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Substance abuse	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Affective disorders, at least one	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Depressive episode	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Recurrent depressive disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Persistent affective disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Anxiety disorders, at least one	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Phobic anxiety disorders	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Panic disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Generalized anxiety disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Mixed anxiety and depression	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Obsessive-compulsive disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Post-traumatic stress disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Adjustment disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Personality disorder traits, at least one	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Borderline personality disorder traits	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Histrionic personality disorder traits	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Anankastic personality disorder traits	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Anxious personality disorder traits	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Mixed and other personality disorder traits	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Combined personality disorder traits	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Disorders with onset in childhood/adolescence	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
NSSI types, at least one	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
NSSI types, number	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Cutting	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Scratching	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Hitting	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Burning	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Suicidal ideation	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Suicide attempt(s)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Psychiatric medication prescription during treatment, at least one	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Psychiatric medication prescription during treatment, number	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Antidepressants	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Antipsychotics	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Anxiolytics	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Note. AN-R: anorexia nervosa, restrictive type, AN-BP: anorexia nervosa, binge-purge type, BN: bulimia nervosa; NSSI: lifetime history of nonsuicidal self-injury; *n* depicts the number of missing values and % the percentage of missings per variable; Table created by Sabine Arnold

Appendix 5: Regression for nonsuicidal self-injury in anorexia nervosa, restrictive type

Statistically significant variables in the comparison between AN-R-NSSI+ vs. AN-R-NSSI-	**Inclusion or exclusion of a significant variable in the regression model for AN-R**
Weight change, kg/week	Included
Treatment duration, days	Included
Psychiatric comorbidities, number	Included
Psychiatric comorbidities, at least one	To avoid multicollinearity, the variable *at least one psychiatric comorbidity* was excluded since this variable relied on the same construct as the variable *number psychiatric comorbidities.*
Affective disorders, at least one	To avoid multicollinearity, the variable *at least one psychiatric affective disorder* was excluded since this variable relied on the same data as the specific variables *persistent affective disorders* and *depressive episodes.*
Persistent affective disorders	Included
Depressive episode	Included
Anxiety disorders, at least one	Included
Personality disorder traits, at least one	To avoid multicollinearity, the variable *at least one personality disorder trait* was excluded since this variable relied on the same data as the specific variable *histrionic personality disorder traits.*
Histrionic personality disorder traits	Included
Suicidal ideation	Included
Psychiatric medication prescriptions, number	Included
Psychiatric medication prescriptions, at least one	To avoid multicollinearity, the variable *at least one psychiatric medication* was excluded since this variable relied on the same construct as the variable *number psychiatric medications.*
Antidepressants	Included

Note. Variables considered in the regression model for AN-R: anorexia nervosa, restrictive type; NSSI+: lifetime history of NSSI, NSSI-: no lifetime history of NSSI; Table created by Sabine Arnold

Appendix 6: Regression for nonsuicidal self-injury in anorexia nervosa, binge-purge type

Statistically significant variables in the comparison between AN-BP-NSSI+ vs. AN-BP-NSSI-	Inclusion or exclusion of a significant variable in the regression model for AN-BP
History of childhood sexual abuse	Included
Psychiatric comorbidities, number	Included
Psychiatric comorbidities, at least one	To avoid multicollinearity, the variable *at least one psychiatric comorbidity* was excluded since this variable relied on the same construct as the variable *number psychiatric comorbidities.*
Personality disorder traits, at least one	Included
Suicidal ideation	Included
Suicide attempt	Included
Psychiatric medication prescriptions, number	Included
Psychiatric medication prescriptions, at least one	To avoid multicollinearity, the variable *at least one psychiatric medication* was excluded since this variable relied on the same construct as the variable *number psychiatric medications.*
Antipsychotics	Included

Note. Variables considered in the regression model for AN-BP: anorexia nervosa, binge-purge type; NSSI+: lifetime history of NSSI, NSSI-: no lifetime history of NSSI; Table created by Sabine Arnold

Appendix 7: Regression for nonsuicidal self-injury in bulimia nervosa

Statistically significant variables in the comparison between BN-NSSI+ vs. BN-NSSI-	Inclusion or exclusion of the significant variable in the regression model for BN
Treatment duration	Included
Psychiatric comorbidities, number	Included
Psychiatric comorbidities, at least one	To avoid multicollinearity, the variable *at least one psychiatric comorbidity* was excluded since this variable relied on the same construct as the variable *number psychiatric comorbidities.*
Affective disorders, at least one	Included
Personality disorder trait, at least one	To avoid multicollinearity, the variable at *least one personality disorder trait* was excluded since this variable relied on the same data as the specific variable *combined personality disorder traits.*
Combined personality disorder traits	Included
Suicidal ideation	Included
Psychiatric medication prescriptions, number	Included
Psychiatric medication prescriptions, at least one	To avoid multicollinearity, the variable *at least one psychiatric medication* was excluded since this variable relied on the same construct as the variable *number psychiatric medications.*
Antidepressants	Included
Antipsychotics	Included

Note. Variables considered in the regression model for BN: bulimia nervosa; NSSI+: lifetime history of NSSI, NSSI-: no lifetime history of NSSI; Table created by Sabine Arnold

Eidesstattliche Versicherung

Ich, Sabine Arnold, versichere an Eides statt durch meine eigenhändige Unterschrift, dass ich die vorgelegte Dissertation mit dem Thema: „Nonsuicidal self-injury in youth inpatients with eating disorders: Lifetime prevalence, methods, clinical correlates, and suicidality“ (deutsch: “Nicht-suizidales selbstverletzendes Verhalten bei stationär behandelten Kindern und Jugendlichen mit Essstörung: Lebenszeitprävalenz, Methoden, klinische Korrelate und Suizidalität“) selbständig und ohne nicht offengelegte Hilfe Dritter verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel genutzt habe.
Alle Stellen, die wörtlich oder dem Sinne nach auf Publikationen oder Vorträgen anderer Autoren/innen beruhen, sind als solche in korrekter Zitierung kenntlich gemacht. Die Abschnitte zu Methodik (insbesondere praktische Arbeiten, Laborbestimmungen, statistische Aufarbeitung) und Resultaten (insbesondere Abbildungen, Graphiken und Tabellen) werden von mir verantwortet.
Ich versichere ferner, dass ich die in Zusammenarbeit mit anderen Personen generierten Daten, Datenauswertungen und Schlussfolgerungen korrekt gekennzeichnet und meinen eigenen Beitrag sowie die Beiträge anderer Personen korrekt kenntlich gemacht habe (siehe Anteilserklärung). Texte oder Textteile, die gemeinsam mit anderen erstellt oder verwendet wurden, habe ich korrekt kenntlich gemacht.
Meine Anteile an etwaigen Publikationen zu dieser Dissertation entsprechen denen, die in der untenstehenden gemeinsamen Erklärung mit dem/der Erstbetreuer/in, angegeben sind. Für sämtliche im Rahmen der Dissertation entstandenen Publikationen wurden die Richtlinien des ICMJE (International Committee of Medical Journal Editors; www.icmje.og) zur Autorenschaft eingehalten. Ich erkläre ferner, dass ich mich zur Einhaltung der Satzung der Charité – Universitätsmedizin Berlin zur Sicherung Guter Wissenschaftlicher Praxis verpflichte.
Weiterhin versichere ich, dass ich diese Dissertation weder in gleicher noch in ähnlicher Form bereits an einer anderen Fakultät eingereicht habe.
Die Bedeutung dieser eidesstattlichen Versicherung und die strafrechtlichen Folgen einer unwahren eidesstattlichen Versicherung (§§156, 161 des Strafgesetzbuches) sind mir bekannt und bewusst.

Ort, Datum Unterschrift der Doktorandin

Anteilserklärung an der erfolgten Publikation

Ich, Sabine Arnold, hatte folgende Anteile an der folgenden Publikation:

Arnold S, Wiese A, Zaid S, Correll CU, Jaite C. Lifetime prevalence and clinical correlates of nonsuicidal self-injury in youth inpatients with eating disorders: A retrospective chart review. Child Adolesc Psychiatry Ment Health. 2022;16(1):17.

Konzeptualisierung: Die Idee zur Untersuchung von Lebenszeitprävalenz, Selbstverletzungsmethoden, klinischen Korrelaten und Suizidalität im Zusammenhang mit nicht-suizidalem selbstverletzenden Verhalten in einer Stichprobe von Kindern und Jugendlichen mit einer Essstörung stammte von mir. Ich führte eigenständig eine Literaturrecherche durch und verfasste den theoretischen Hintergrund des Journal Artikels eigenständig.

Datengewinnung: Ich gab mehr als ein Drittel des Datensatzes ein, auf dem die Analysen des Journal Artikels basierten. Für die Eingabe von Variablen im Zusammenhang mit nicht-suizidalem selbstverletzenden Verhalten war ich alleinig verantwortlich. Ich bestellte PatientInnenakten aus dem Archiv der Charité und extrahierte alle relevanten Variablen. Für die Datenextraktion las ich entsprechenden Aufnahme- und Entlassberichte sowie Aufzeichnungen der Verlaufsdokumentation. Ich verfasste den Methodenteil des Journal Artikels eigenständig.

Datenanalyse: Ich arbeitete den Datensatz eigenständig auf, indem ich Datenpunkte zu Variablen aggregierte, und auf fehlende Werte prüfte. Alle statistischen Analysen des Artikels wurden selbständig von mir durchgeführt und interpretiert. Ich verfasste Ergebnisteil und Diskussion des Journal Artikels eigenständig. Alle Tabellen und Abbildungen der Publikation wurden von mir erstellt.

Manuskriptanfertigung und Publikation: Ich verfasste die erste Version des Manuskripts des Journal Artikels eigenständig. Ich arbeitete die Hinweise meines Erstbetreuers Prof. Dr. Christoph U. Correll und meiner Erstbetreuerin Dr. Charlotte Jaite ein. Ich reichte den Artikel als Beitrag für ein Journal ein und überarbeitete das Manuskript nach Begutachtung im Peer Review System bis zur Veröffentlichung.

Ort, Datum Unterschrift der Doktorandin

Auszug aus der Journal Summary List

Die Fachzeitschrift, in der meine promotionsrelevante Publikation erschien, ist unter den nach Impact Factor in absteigender Reihenfolge (Journal Citation Reports SCIE, SSCI) gelisteten Fachzeitschriften des Fachgebietes Psychiatrie in den oberen 50 Prozent angesiedelt. Entsprechend der Liste, die zu dem Zeitpunkt gültig war, als ich den promotionsrelevanten Artikel beim Journal einreichte, befand sich die Zeitschrift auf Rang 33/157 (bitte siehe unten).

Journal Data Filtered By: **Selected JCR Year: 2021** Selected Editions: SCIE,
Selected Categories: **"PSYCHIATRY"** Selected Category
Scheme: WoS
Gesamtanzahl: 157 Journale

Rank	Full Journal Title	Total Cites	Journal Impact Factor	Eigenfaktor
1	World Psychiatry	11,951	79.683	0.01984
2	Lancet Psychiatry	21,986	77.056	0.05118
3	JAMA Psychiatry	22,150	25.911	0.04888
4	PSYCHOTHERAPY AND PSYCHOSOMATICS	6,813	25.617	0.00683
5	AMERICAN JOURNAL OF PSYCHIATRY	48,015	19.242	0.02865
6	BRAIN BEHAVIOR AND IMMUNITY	31,770	19.227	0.03902
7	Asian Journal of Psychiatry	8,251	13.890	0.01303
8	JOURNAL OF ANXIETY DISORDERS	11,739	13.711	0.01029
9	JOURNAL OF NEUROLOGY NEUROSURGERY AND PSYCHIATRY	38,495	13.654	0.02508
10	Evidence-Based Mental Health	1,711	13.538	0.00417
11	MOLECULAR PSYCHIATRY	33,324	13.437	0.04914
12	JOURNAL OF THE AMERICAN ACADEMY OF CHILD AND ADOLESCENT PSYCHIATRY	25,754	13.113	0.01707
13	BIOLOGICAL PSYCHIATRY	51,087	12.810	0.03831
14	NEUROPSYCHOBIOLOGY	3,757	12.329	0.00343
15	PSYCHIATRY AND CLINICAL NEUROSCIENCES	6,445	12.145	0.00577
16	International Journal of Mental Health and Addiction	7,217	11.555	0.00984
17	PSYCHIATRY RESEARCH	44,374	11.225	0.05407
18	BRITISH JOURNAL OF PSYCHIATRY	29,701	10.671	0.01613
19	PSYCHOLOGICAL MEDICINE	39,479	10.592	0.03773
20	INTERNATIONAL JOURNAL OF SOCIAL PSYCHIATRY	5,776	10.461	0.00751

Rank	Full Journal Title	Total Cites	Journal Impact Factor	Eigenfaktor
21	Psychological Trauma-Theory Research Practice and Policy	6,742	9.398	0.01130
22	NEUROPSYCHOPHARMACOLOGY	34,562	8.294	0.03279
23	JOURNAL OF CHILD PSYCHOLOGY AND PSYCHIATRY	26,220	8.265	0.01951
24	DEPRESSION AND ANXIETY	13,886	8.128	0.01344
25	Current Psychiatry Reports	8,862	8.081	0.01249
26	AMERICAN JOURNAL OF GERIATRIC PSYCHIATRY	10,616	7.996	0.00957
27	Translational Psychiatry	17,701	7.989	0.03190
28	Epidemiology and Psychiatric Sciences	3,610	7.818	0.00790
29	Journal of Behavioral Addictions	5,223	7.772	0.00779
30	ACTA PSYCHIATRICA SCANDINAVICA	16,752	7.734	0.01046
31	GENERAL HOSPITAL PSYCHIATRY	8,319	7.587	0.00681
32	JOURNAL OF ABNORMAL PSYCHOLOGY	19,201	7.507	0.01289
33	Child and Adolescent Psychiatry and Mental Health	2,294	7.494	0.00301
34	SCHIZOPHRENIA BULLETIN	21,684	7.348	0.01963
35	ADDICTION	24,933	7.256	0.02648
36	Clinical Psychological Science	4,719	7.216	0.00911
37	COMPREHENSIVE PSYCHIATRY	9,771	7.211	0.00750
38	INTERNATIONAL PSYCHOGERIATRICS	11,007	7.191	0.00956
39	EUROPEAN PSYCHIATRY	8,554	7.156	0.00886
40	Revista de Psiquiatria y Salud Mental	807	6.795	0.00095
41	JOURNAL OF AFFECTIVE DISORDERS	59,622	6.533	0.06912
42	CNS DRUGS	6,627	6.497	0.00642
43	JMIR Mental Health	3,310	6.332	0.00661

Quelle: https://intranet.charite.de/fileadmin/user_upload/microsites/sonstige/medbib/Impact_Faktoren_2021/ISI-WEB-Liste-Kategorie-Psychiatry.p

Druckexemplar der Publikation

Quellenangabe: Arnold, S., Wiese, A., Zaid, S., Correll, C. U., & Jaite, C. (2022). Lifetime prevalence and clinical correlates of nonsuicidal self-injury in youth inpatients with eating disorders: A retrospective chart review. *Child and Adolescent Psychiatry and Mental Health, 16*(1), 17-17. https://doi.org/10.1186/s13034-022-00446-1

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Lebenslauf

Mein Lebenslauf wird aus datenschutzrechtlichen Gründen in der elektronischen Version meiner Arbeit nicht veröffentlicht.

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Komplette Publikationsliste

Publikationen in peer-reviewed Journals

(1) **Arnold, S.**, Wiese A., Zaid, S., Correll, C. U., Jaite, C. (2022). Lifetime prevalence and clinical correlates of nonsuicidal self-injury in youth inpatients with eating disorders: A retrospective chart review. *Child and Adolescent Psychiatry and Mental Health,* https://doi.org/10.1186/s13034-022-00446-1, IF2021: 7.494

(2) Spiegel, J.*, **Arnold, S.***, Salbach, H., Gotti, E. G., Pfeiffer, E., Lehmkuhl, U., Correll, C. U., & Jaite, C. (2021). Emotional abuse interacts with borderline personality in adolescent inpatients with binge-purging eating disorders. *Eating and Weight Disorders,* https://doi.org/10.1007/s40519-021-01142-3, IF2021: 3.008

*geteilte Erstautorenschaft

Kongressbeiträge

(1) Spring, J.-S., Pintsch, J., **Arnold, S.**, Müller, A. E., Correll, C. U., Jaite, C. Orthorektische Verhaltensweisen bei Jugendlichen mit Anorexia nervosa: Zusammenhang mit psychiatrischer Symptomatik und Belastung. Poster präsentiert auf dem Kongress der Deutschen Gesellschaft für Psychiatrie und Psychotherapie, Psychosomatik und Nervenheilkunde (DGPPN) in Berlin, 2020.

(2) Pintsch, J., Spring, J.-S., **Arnold, S.**, Müller, A. E., Correll, C. U., Jaite, C. Orthorektische Verhaltensweisen bei Jugendlichen mit Anorexia nervosa: Zusammenhang mit Persönlichkeitsstilen. Poster präsentiert auf dem Kongress der Deutschen Gesellschaft für Psychiatrie und Psychotherapie, Psychosomatik und Nervenheilkunde (DGPPN) in Berlin, 2020.

(3) Spring, J.-S., Pintsch, J., **Arnold, S.**, Correll, C. U., Jaite, C. Zusammenhang zwischen orthorektischen Verhaltensweisen, depressiver Symptomatik und Lebensqualität bei adoleszenten Patienten mit Anorexia nervosa. Poster präsentiert auf dem Kongress der Deutschen Gesellschaft für Psychiatrie und Psychotherapie, Psychosomatik und Nervenheilkunde (DGPPN) in Berlin, 2019.

(4) **Arnold, S.**, Correll, C. U., Jaite, C. Self-injurious and suicidal behavior in child and adolescent inpatients with eating disorders. Poster präsentiert auf dem 9. World Congress of Behavioural and Cognitive Therapies (WCBCT) in Berlin, 2019.

(5) **Arnold, S.**, Winkelmann, L., Pfeiffer, E., Lehmkuhl, U., Salbach, H., Correll, C. U., Jaite, C. The short-term course of anorexia nervosa in adolescent inpatients: A follow-up study. Poster präsentiert auf dem 9. World Congress of Behavioural and Cognitive Therapies (WCBCT) in Berlin, 2019.

(6) **Arnold, S.**, Correll, C.U., Jaite, C. Self-injurious and suicidal behavior in child and adolescent inpatients with eating disorders. Poster präsentiert auf dem 37. Symposium der Fachgruppe für Klinische Psychologie und Psychotherapie der deutschen Gesellschaft für Psychologie (DGPS) in Erlangen, 2019.

(7) **Arnold, S.**, Spiegel, J., Salbach, H., Pfeiffer, E., Lehmkuhl, U., Correll, C.U., Jaite, C. Zusammenhang zwischen emotionalem Kindesmissbrauch und spezifischen Persönlichkeitsstilen bei Jugendlichen mit Essstörungen. Poster präsentiert auf dem 36. Kongress der Deutschen Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie e.V. (DGKJP) in Mannheim, 2019.

(8) **Arnold, S.**, Müller, A. E., Correll, C.U., Jaite, C. Klinische Charakteristika von männlichen im Vergleich zu weiblichen Patienten mit Anorexia nervosa. Poster präsentiert auf dem 36. Kongress der Deutschen Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie e.V. (DGKJP) in Mannheim, 2019.

(9) **Arnold, S.**, Winkelmann, L., Pfeiffer, E., Lehmkuhl, U., Salbach, H., Correll, C.U., Jaite, C. The short-term course of anorexia nervosa in adolescent inpatients: A follow-up study. Poster präsentiert auf dem Kongress der Deutschen Gesellschaft für Psychiatrie und Psychotherapie, Psychosomatik und Nervenheilkunde (DGPPN) in Berlin, 2018.

(10) Spiegel, J., **Arnold, S.**, Salbach, H., Pfeiffer, E., Lehmkuhl, U., Jaite, C. Personality styles in adolescents with anorexia nervosa: The role of trauma. Poster präsentiert auf dem Kongress der Deutschen Gesellschaft für Psychiatrie und Psychotherapie, Psychosomatik und Nervenheilkunde (DGPPN) in Berlin, 2018.

Veröffentlichte Abschlussarbeiten

(1) **Arnold, S.** (2015). Evaluation of a coding system for a smartphone-based visual food record. Masterarbeit, Universität Konstanz.

(2) **Arnold, S.** (2011). Internalisierte Homonegativität: Konzeptuelle Begriffsbestimmung und diagnostische Erfassung. Bachelorarbeit, Universität Trier.

Danksagung

Ich bedanke mich herzlich bei Herrn Prof. Dr. Christoph U. Correll, dem Leiter der Klinik für Psychiatrie, Psychosomatik und Psychotherapie des Kindes- und Jugendalters der Charité – Universitätsmedizin Berlin. Trotz vielfältiger hochrangiger Positionen und wichtiger Aufgaben erklärte Herr Prof. Correll sich bereit, die Erstbetreuung meiner Promotion zu übernehmen. Herr Prof. Correll unterstütze mich stets mit höchster fachlicher und methodischer Expertise. Von seiner klaren und fokussierten wissenschaftlichen Arbeitsweise konnte ich viel lernen, wofür ich mich aufrichtig bedanke.

Mein besonderer Dank gilt Frau Dr. Charlotte Jaite, der Leiterin der Sektion Essstörungen, der Klinik für Psychiatrie, Psychosomatik und Psychotherapie des Kindes- und Jugendalters der Charité – Universitätsmedizin Berlin. Frau Dr. Jaite ermöglichte es mir, meine Promotion auf das Themenfeld der Selbstverletzung bei Kindern und Jugendlichen auszurichten, was mir sehr am Herzen liegt. Sie unterstützte mich nicht nur durch Ihre große Expertise im Bereich Essstörungen und Kinder- und Jugendpsychiatrie, sondern auch durch Ihr Vertrauen, Ihre Geduld und Ihre Ermutigung. Von Frau Dr. Jaite konnte ich fachlich und menschlich viel lernen, wofür ich ihr danke.

Ich bedanke mich ebenfalls bei allen, die im BaDo Projekt mitwirkten für die freundliche, kollegiale und produktive Zusammenarbeit. Mein persönlicher Dank gilt meiner Familie und meinen guten Freunden und Freundinnen, die mich während der Promotion unterstützten.

Ich widme diese Arbeit meiner verstorbenen Freundin Marlene Flögel.