



# Non-Suicidal Self-Injury and Eating Disordered Behaviors: An Update on What We Do and Do Not Know

Glenn Kiekens<sup>1,2</sup> · Laurence Claes<sup>1,3</sup>

Accepted: 25 September 2020 / Published online: 10 October 2020  
© Springer Science+Business Media, LLC, part of Springer Nature 2020

## Abstract

**Purpose of Review** The current report aims to summarize recent advances about the relationship between non-suicidal self-injury (NSSI) and eating disordered (ED) behaviors and highlights meaningful directions for future research.

**Recent Findings** While there is solid evidence indicating a robust cross-sectional association between NSSI and ED behaviors, emerging evidence suggests that the temporal relationship between these behaviors may be bidirectional. Shared functions and risk factors may explain why these behaviors often co-develop. At the same time, little is still known about the psychosocial consequences of comorbid NSSI and ED engagement, and there is a lack of intervention studies that target these behaviors simultaneously.

**Summary** It is well-established that NSSI and ED behaviors frequently co-occur. The field should now turn to longitudinal designs to advance our understanding of the *longer-term developmental* and the *shorter-term momentary* relationship of these behaviors in daily life. Providing insight into these areas will help guide the deployment of evidence-based interventions that match the needs of clients who report comorbid NSSI and ED behaviors.

**Keywords** Non-suicidal self-injury · Eating disorders · Self-injury · Comorbidity · Self-harm

## Introduction

Non-suicidal self-injury (NSSI) refers to the deliberate and direct damage to one's body tissue without suicidal intent [1]. Examples of NSSI include behaviors such as cutting, scratching, biting, or burning oneself. Adolescence and emerging adulthood are critical periods for NSSI, with approximately 20% of individuals reporting an onset before the age of 25 [2]. Reported gender differences in the prevalence of NSSI have been inconsistent; however, a recent meta-analysis found higher rates of NSSI in females compared with

those in males, especially in clinical samples [3]. DSM-5 recently included the Non-Suicidal Self-Injury Disorder (NSSI-D) as a condition requiring further study [4]. NSSI-D requires NSSI on at least 5 days in the past year, significant distress due to NSSI, as well as several other conditions (e.g., psychological precipitant, intense urges, and the expectation of a favorable outcome following NSSI). Approximately 7% of adolescents and 1% of emerging adults meet diagnostic criteria for 12-month NSSI-D [5, 6].

While the definition of NSSI excludes eating disordered (ED) behaviors (i.e., binge-eating, purging, and restrictive eating), there is a strong relationship between NSSI and ED behaviors and syndromes [7]. Anorexia nervosa (AN) is an eating disorder characterized by a restriction of food intake that results in underweight, coupled with an irrational fear of gaining weight, and a disturbed body image [8]. Depending on whether AN patients engage in compensatory behaviors or not, a binge-eating/purging (AN-BP) or restrictive specifier (AN-R) is given. Bulimia nervosa (BN) occurs at a healthy or elevated weight and is characterized by binge eating, followed by compensatory behaviors to avoid weight gain [8]. In addition, DSM-5 added the binge eating disorder (BED) as a diagnostic entity that is characterized by

---

This article is part of the Topical collection on *Eating Disorders*

✉ Glenn Kiekens  
Glenn.Kiekens@kuleuven.be

<sup>1</sup> Faculty of Psychology and Educational Sciences, KU Leuven, Tiensestraat 102, box 3720, 3000 Leuven, Belgium

<sup>2</sup> Department of Neurosciences, Center for Contextual Psychiatry, KU Leuven, Leuven, Belgium

<sup>3</sup> Faculty of Medicine and Health Sciences (CAPRI), University of Antwerp, Antwerp, Belgium

distressing, recurrent episodes of binge eating in the absence of compensatory behaviors [4]. As is the case for NSSI, ED behaviors and disorders often start in adolescence and emerging adulthood [9, 10], with the weighted mean lifetime prevalence of any eating disorder being estimated around 8% for females (disorder-specific pooled estimates AN: 1.4%, BN: 1.9%, BED: 2.8%) and 2% for males (disorder-specific pooled estimates AN: 0.2%, BN: 0.6%, BED: 1.0%) [11].

Eating disorders are highly disabling, deadly, and costly psychiatric disorders [8]. Addressing why so many people diagnosed with ED behaviors self-injure was recently put forward as an important research topic by patients, caretakers, and clinicians [12]. To this end, the present report aims to summarize recent advances in the literature regarding (1) how often NSSI and ED behaviors co-occur and the severity of these behaviors when they co-occur, (2) the relationship between these behaviors over time, (3) reasons for why they might co-develop, (4) the potential psychosocial consequences of their co-occurrence, and (5) the implications for evidence-based practice. In doing so, we also identified remaining gaps of knowledge and pointed out several critical open questions for future research.

## How Often Do NSSI and ED Behaviors Co-Occur?

In this section, we review studies that investigated the co-occurrence between NSSI and ED behaviors in individuals with a history of ED behaviors, NSSI, or both.

### NSSI in Individuals Who Engage in ED Behaviors

In a recent meta-analysis, Cucchi and colleagues found that 27.3% of individuals diagnosed with an eating disorder report comorbid NSSI, with higher lifetime estimates of NSSI for patients diagnosed with BN (32.7%) compared with AN (21.8%) [13••]. For BED patients, lifetime prevalence rates of NSSI have been observed close to 20% [14]. There is compelling evidence that NSSI is more strongly associated with eating disorders of the binge-eating/purging subtype than the restrictive subtype [15]. Dzombak and colleagues found that more than half of adolescent inpatients with binge-eating/purging behaviors report NSSI in the month before treatment compared with 17% of patients who only engage in restrictive eating behaviors [16]. Other researchers also observed higher lifetime and past-month prevalence rates (median: 35% and 20%) of different NSSI behaviors among inpatient adolescents who engage in binge-eating/purging behaviors than those who report only restrictive eating (median: 17% and 7%) [17]. Similar findings have been observed in (emerging) adults with eating disorders [18, 19]. Among college students, however, restrictive eating has been associated with higher

odds of NSSI beyond other ED behaviors [20]. NSSI should thus not be overlooked in individuals displaying only restrictive eating patterns as their susceptibility for NSSI may remain elevated compared with peers who do not report ED behaviors. Besides ED subtype, the treatment setting explains considerable variability in the presence of NSSI; more specifically within specialist/inpatient care facilities, estimates of NSSI are more than twice as high as non-specialist/outpatient settings [13••].

### ED Behaviors in Individuals Who Engage in NSSI

Conversely, high rates of ED behaviors have been observed among individuals with a history of NSSI [21, 22, 23••, 24, 25]. In one study, Yiu and colleagues found that nearly four out of five individuals who engage in NSSI report at least one ED behavior within the past week, with binge-eating (57.6%) being the most prevalent and diuretic/laxative misuse (15.3%) being the least prevalent behavior [26]. In another study, 42% of young adults with a history of NSSI reported ED behaviors during a 2-week observation period [27••]. While rates of (sub)threshold eating disorders are estimated in the 8–25% range among individuals with a history of NSSI [23••, 24], future work is needed to provide a clearer picture of the prevalence of eating disorders among individuals with NSSI(–D).

### Characteristics of NSSI/ED Severity in Individuals Who Engage in NSSI and ED Behaviors

Several researchers have evaluated the severity of NSSI and ED behaviors in individuals who engage in both behaviors. In a cross-sectional study, Sorgi and colleagues observed that the presence of binge-eating/purging behaviors among college students with a history of NSSI was associated with a greater variety of NSSI methods [28], which is, in turn, a reliable predictor of a more severe and chronic NSSI course [29–31]. Similar findings have been observed in clinical samples [32]. Conversely, a higher frequency of NSSI, a greater variety of NSSI methods, and a medical treatment history of NSSI have all been related to greater ED severity [23••, 26]. While these findings provide useful information about how the co-occurrence of NSSI/ED relates to the severity of NSSI and ED behaviors, this does not tell us how these behaviors, nor their characteristics, are related over time.

### Do NSSI and ED Behaviors Influence Each Other's Course?

The high co-occurrence between NSSI and ED raises questions about the directional nature of this comorbid relationship (i.e., NSSI increases risk of ED behaviors, ED behaviors increase risk of NSSI, or both behaviors reciprocally increase

risk of each other). Yet, only a handful of longitudinal studies have investigated the temporal relationship between NSSI and ED behaviors. We first review what we learned from these studies and then highlight directions for future research.

### The Temporal Relationship Between NSSI and Future ED Behaviors

In a cohort study, Wilkinson and colleagues found that the presence of repetitive NSSI, defined as two or more acts of NSSI in the past year, at age 14 predicted the onset of eating disorders by age 17 [33••]. No significant prospective association was found between a single act of NSSI and future eating disorders. In another prospective study, Riley and colleagues observed that the presence of lifetime NSSI at college entrance increased the risk of purging behaviors during the first year of college [34•]. Similar findings have previously been reported among female college students [35]. However, given that purging behaviors in both studies were assessed only in the past month, future work is needed to clarify whether NSSI is a risk factor for the onset and/or relapse of purging behaviors. Among individuals with a history of NSSI, Turner and colleagues investigated the temporal relationship with ED behaviors up to five times across 1 year, finding that an increase in NSSI frequency predicted greater ED severity 3 months later [23••].

### The Temporal Relationship Between ED Behaviors and Future NSSI

In the study of Riley and colleagues [34•], college students with past-month purging behaviors were also at increased risk for an onset of NSSI during the first year of college. Similar findings have recently been reported for ED behaviors across separate cohort studies among adolescents and emerging adults [36, 37]. However, some scholars also found ED behaviors to be unrelated to future NSSI among adult women [38], although it should be noted that the prospective analyses of this study were plagued by a 60% dropout ( $n = 109$ ). Finally, Turner and colleagues [33••] found that increases in ED symptoms also predicted more frequent NSSI at 3-month follow-up assessments. However, this relationship was moderated by emotion dysregulation, such that disordered eating was a risk factor of future NSSI among individuals scoring high on emotion dysregulation. Taken together, emerging evidence suggests that the NSSI-ED relationship may be bidirectional for some individuals.

### What We Still Need to Learn About the Temporal NSSI-ED Relationship

First, it is surprising that we still know little about the developmental order in which NSSI and ED behaviors typically

manifest [39]. In a cross-sectional study of patients with an eating disorder, the vast majority of those reporting comorbidities with NSSI indicated that they started to engage in NSSI after the onset of AN/BN, yet NSSI occurred for one in five before beginning ED behaviors [19]. Although this suggests that NSSI may often develop after the onset of eating disorders, longitudinal work is needed to determine the prevalence of different developmental patterns of NSSI and ED behaviors/disorders. Building upon these findings, it would be meaningful to clarify how long transitions within these patterns normatively take (weeks, months, or years) and what factors predict particular developmental patterns (i.e., that people develop one behavior before the other). Second, more work is needed teasing apart whether NSSI and ED behaviors also uniquely increase risk (i.e., onset, relapse, maintenance) of each other throughout adolescence and (emerging) adulthood. Third, apart from the developmental course, there is a lack of within-person studies that considered the temporal relationship between NSSI and ED behaviors in daily life [27••]. Providing greater clarity in each of these areas of investigation would not only advance our understanding of the temporal relationship between both behaviors but also provide meaningful information to help guide the deployment of targeted preventive interventions.

### Why Do NSSI and ED Behaviors Co-Occur?

Over the past 5 years, relevant studies along two different research lines have been published that aid our understanding of why ED and NSSI co-occur so often within people. The first line of research focused on whether similar functions may underlie NSSI and ED behaviors, whereas the second line identified shared risk factors that may account for the high comorbidity between these behaviors.

#### Shared Functions and Motives

Theoretical models of NSSI and ED suggest that the functions of both behaviors may overlap [40]. The recent study of Muehlenkamp, Takakuni, and colleagues is important in this context [41•], as these authors compared a broad range of behavioral functions among people reporting only NSSI or only ED behavior. Findings revealed that similar intrapersonal (e.g., affect regulation, marking distress) and interpersonal functions (e.g., interpersonal boundaries, autonomy) may motivate NSSI and ED behaviors. However, functions of the intrapersonal domain were found to be more salient in motivating NSSI than ED behaviors, whereas the opposite was observed for functions of the interpersonal domain. Providing further support to the notion of *functional equivalence*, Turner and colleagues found that when asked about the reasons underlying NSSI or ED behavior in daily

life, the majority of these instances (54.2–81.6% across behaviors) were reported to alleviate aversive feelings or thoughts [27•].

Beyond retrospective self-report, there is emerging evidence from ecological momentary assessment (EMA) that NSSI and ED behaviors are used to regulate both intrapersonal (i.e., mostly heightened negative affect) and interpersonal (e.g., perceived conflict and negative social appraisals) difficulties in daily life [42, 43]. Future prospective studies should clarify whether different functional profiles may explain why some individuals do, and others do not develop and maintain both harmful behaviors. Similarly, future work is needed to clarify the reinforcement processes and temporal unfolding of different functions in real-time. It may, for instance, be that interpersonal stressors lead to enhanced negative affect, which then more proximally increases the risk of NSSI and ED behaviors. Addressing both *why* and *how* different functional profiles relate to comorbid NSSI and ED engagement would provide important clues for the prevention and intervention of these behaviors.

Finally, a recent study of Fox and colleagues into underlying self-harming desires across NSSI and ED behaviors similarly revealed quantitative rather than qualitative differences [44••]. Specifically, individuals reported engaging in both types of behaviors with the intent of hurting oneself physically *in the moment*, but this desire appeared more central to NSSI than ED behaviors. Conversely, the desire to cause physical harm, in the long run, was also present across both behaviors, but this was most relevant in motivating restrictive eating behavior. In sum, these studies indicate that NSSI and ED behaviors can serve similar functions and motives to some degree, providing as such a first compelling reason for the high co-occurrence of these behaviors.

### Shared Etiology of NSSI and ED Behaviors

The conceptual model of Claes and Muehlenkamp (Fig. 1), which was introduced in 2014 [7], postulates that NSSI and ED behaviors are multi-determined by a range of similar individual, social, and cultural risk factors that interact with each other within and across distal and proximal dimensions. Predisposing the development of NSSI and ED behaviors, the proposed model highlights shared distal factors on the individual (i.e., temperament and personality) and social level (i.e., family environment, traumatic experiences, and cultural pressures). Longitudinal studies confirm that dispositional factors related to emotionality (e.g., negative affectivity [45, 46]), disinhibition (e.g., negative urgency [47, 48]), and cognitive liabilities (e.g., trait rumination [49, 50], self-critical perfectionism [51]) can predispose the development of NSSI and ED behaviors. Cross-sectional studies also linked both behaviors to higher levels of subjective emotional reactivity

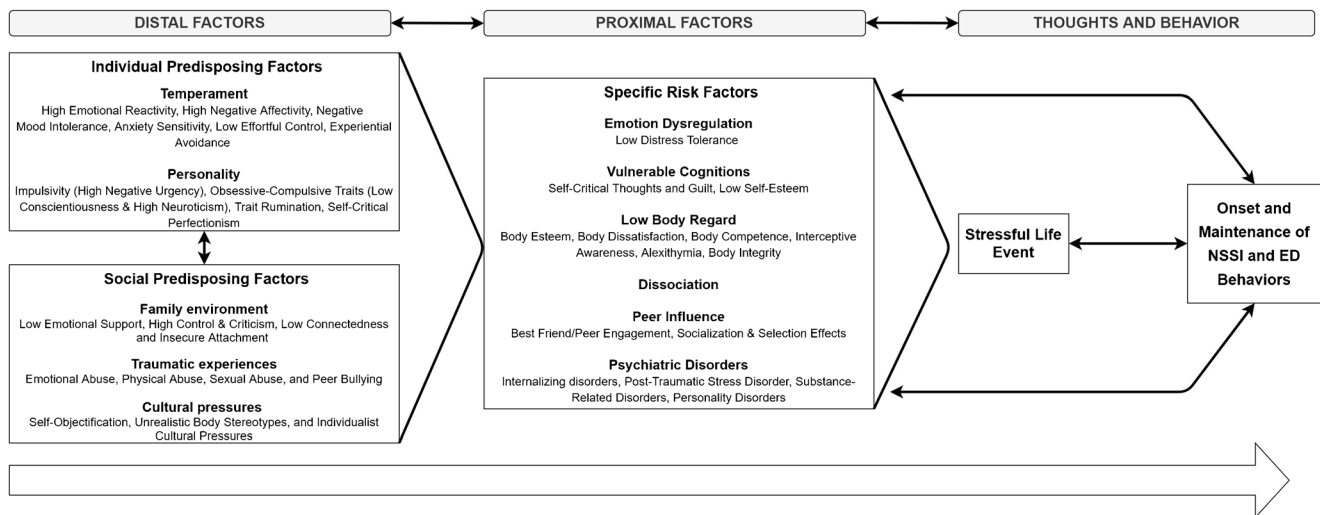
[52•], anxiety sensitivity [53], and avoidance [54] as well as to lower levels of effortful control [55].

On the social level, longitudinal studies have implicated childhood-adolescent traumatic experiences [56, 57], dysfunctional attachment or parenting style [58–61], and peer victimization [36, 61, 62] in the development of NSSI and ED behaviors. Researchers also found associations between difficulties in parent-child relationships [63, 64], higher perceived sociocultural pressures (e.g., thin-ideal), and body-objectification and the presence of NSSI and ED behaviors [46, 65]. Taken together, the evidence to date suggests that individuals prone to aversive emotions and self-negative thoughts—as a result of distal intrapersonal and/or interpersonal vulnerabilities—while having lower control and a tendency to act impulsively when distressed are developmentally susceptible for NSSI and ED behaviors.

The postulated model also highlights a range of shared risk factors that more proximally trigger the initial development and contribute to the maintenance of NSSI and ED behaviors [7]. Providing support to this notion, poor emotion regulation has been implicated in the development and maintenance of NSSI and ED behaviors [29, 66–68]. Additionally, studies have shown an indirect path from childhood-adolescent traumatic experiences via emotion-dysregulation and dissociation to NSSI and ED behaviors [69, 70]. Increased self-criticism and decreased self-esteem have also been associated with NSSI and ED [71], and there is emerging evidence from longitudinal studies that heightened self-criticism increases risk of ED behaviors [72•] and predicts NSSI among ED patients [73•]. In a similar vein, while it is known that negative body attitudes precipitate and perpetuate ED disorders [46, 74], body dissatisfaction was recently found to predict NSSI among women beyond ED comorbidity [38]. Scholars also observed selection and socialization effects [75–78], such that young individuals whose friends contemplate or engage in NSSI and ED behaviors may be more likely to develop these behaviors themselves. Finally, research indicates that NSSI and ED behaviors are associated with a range of psychiatric symptoms and disorders [6, 79], with internalizing symptoms precipitating the onset of both behaviors [36, 49, 80]. While borderline personality disorder (BPD) has been associated with greater psychiatric comorbidity [81], studies recently linked problems with identity formation to the onset of both behaviors [82•].

Taking stock of the available research supports the model of Claes and Muehlenkamp [7] that lays out shared individual, social, and cultural risk factors as a framework (and second compelling reason) for understanding the high co-occurrence of NSSI and ED behaviors. Future prospective studies are now needed that consider NSSI and ED behaviors *within the same cohorts* to confirm and expand upon this model. Such studies would be ideally suited also to clarify unique factors that differentiate





**Fig. 1** Conceptual NSSI-ED Risk Factor Model of Claes and Muehlenkamp (2014). Copyright © 2014 by Springer-Verlag. Adapted with permission from *Non-suicidal Self-Injury and Eating Disorders: Dimensions of Self-Harm*. In: Claes L., Muehlenkamp J. (Eds.) *Non-Suicidal Self-Injury in Eating Disorders*

Dimensions of Self-Harm. In: Claes L., Muehlenkamp J. (Eds.) *Non-Suicidal Self-Injury in Eating Disorders*

the development, maintenance, and course of both behaviors [83•].

## What Are the Psychosocial Consequences of Comorbid NSSI and ED Behaviors?

While the section above illustrates that we have acquired substantial knowledge about risk factors underlying NSSI and ED behaviors, several researchers have also investigated the potential developmental consequences of engaging in these harmful behaviors. In what follows, we provide an update on this literature and point to open questions for future research.

### NSSI and ED Behaviors: Double Trouble When It Comes to Suicide Risk?

Researchers have observed elevated rates of suicidal thoughts and behaviors among individuals who engage in NSSI and ED behaviors (especially binge-eating/purging subtypes) [6, 84], and recent meta-analyses found that both behaviors prospectively increase the risk of a future suicide attempt [85, 86]. Current theories suggest that people who engage in multiple self-damaging behaviors are at increased risk of suicide compared to those who engage in a single behavior [87], as repeated tissue damage and exposure to painful experiences might contribute to an enhanced capability for suicide. In a recent study, Brausch and Perkins observed that college students with a history of NSSI and ED behaviors (25%) were significantly more likely to have attempted suicide than those with only NSSI or ED behaviors (2–10% range) [88••]. Importantly, while the comorbid group did not report higher fearlessness of death, they did report lower fear about suicide

than individuals in the single behavior groups. Individuals in the comorbid group also reported a higher suicide severity than the NSSI only group, while the ED only group reported the greatest suicide-related concerns.

In the study of Fox and colleagues mentioned above [44••], NSSI was associated with higher levels of suicidal thoughts than any ED behavior. Within ED subtypes, restrictive eating was most strongly associated with suicide- and death-related thoughts. In line with these findings, a recent study also found that restrictive eating (but not binge-eating or purging) was uniquely associated with suicide ideation among young individuals with eating disorders [89]. However, given the lack of direct comparisons over time, longitudinal studies are needed to clarify whether comorbid NSSI and ED behaviors, or particular behavioral patterns (e.g., NSSI and restrictive eating), result in a higher combined risk of future suicidality than either NSSI or ED behaviors alone. If so, the next question then becomes how the interplay between NSSI and ED behaviors in terms of future suicide risk can mathematically be best described (i.e., sub-additive, additive, or synergistic effects) and theoretically explained (i.e., what psychological mechanisms account for the higher susceptibility).

### A Broader Developmental Perspective

Apart from the physical risk and societal burden associated with these behaviors, there is growing evidence that NSSI and ED behaviors may also negatively impact the psychosocial development of young people. Researchers have linked NSSI and/or ED behaviors with future risk of mental health problems (especially depression) [33••, 90], impaired family functioning [91, 92], decreased emotion regulation capabilities [67], identity issues [93, 94], lower self-esteem and quality of life [95, 96], stigma [97, 98], and academic failure [99,

[100]. Hence, much could be learned from future investigations that adopt a broader developmental framework in which risk factors, NSSI and ED behaviors/disorders, and developmental tasks (e.g., identity formation, graduating, and finding work) might influence each other reciprocally throughout adolescence and (emerging) adulthood. Addressing this gap of knowledge could elucidate developmental cascades, and, again, make clear whether individuals who report comorbid engagement are more likely to experience adverse longer-term outcomes than peers who report either behavior alone. Providing greater clarity to these questions would aid scientific understanding and provide valuable information for prevention efforts and clinical risk assessment.

## Evidence-Based Treatment of NSSI and ED Disorders

Several authors have examined best practice guidelines and interventions for the treatment of NSSI and ED disorders, which are first discussed. We then consider the added complexity of NSSI among eating disorder patients and reflect on the potential of emerging technological advances for the treatment and prevention of NSSI and ED behaviors.

### Currently Best Practice Guidelines

For both behaviors, guidelines recommend outpatient services as the first line of treatment when there is no immediate risk to the individual. Concerning psychotherapies, cognitive-behavioral therapy-enhanced (CBT-E) is the first choice of treatment of all eating disorders [101–103]. As an exception to this rule, family-based therapy (FBT) should be considered in the treatment of AN in young individuals [103]. Some guidelines have also recommended FBT for the treatment of BN in younger patients [101]. For the treatment of BN and BED, interpersonal psychotherapy (IPT) has been recommended as an alternative to CBT-E [104]. While there is a paucity of randomized control trials (RCTs) investigating treatment efficacy for NSSI, promising effects have been observed for dialectical behavioral therapy (DBT), emotion regulation group therapy (ERGT), manual-assisted cognitive therapy (MACT), and dynamic deconstructive therapy [105, 106]. Concerning pharmacological interventions, second-generation antidepressants (i.e., selective serotonin reuptake inhibitors; SSRIs) can be considered for BN (in combination with psychotherapy) and BED [101, 102], whereas the central nervous stimulant lisdexamfetamine also appears moderately effective in reducing binge-eating [102]. Based on the literature, specific psychopharmacological therapy cannot be recommended for AN and NSSI.

## Which Treatment to Use When ED Behaviors and NSSI Are Present Comorbidly?

Given the high comorbidity and observation that eating disorder patients who do—compared with those who do not—engage in NSSI present with a different, yet more complex, clinical profile that may affect the treatment response [14, 52•], it is problematic that RCTs typically do not include data on NSSI and suicidality. In the absence of clear guidelines, Marino and colleagues recently developed a decision-making model to aid clinicians in deciding which treatment (i.e., CBT-E or DBT) should be prioritized for adult clients with a complex eating disorder and comorbid conditions [107••]. The model directly refers to DBT when a client is diagnosed with BPD, functional assessment indicates that NSSI (or other harmful behaviors including ED behaviors) are engaged in for emotion regulation purposes, or when previous treatment attempts failed due to interfering behaviors. While future studies are needed to evaluate this novel decision-making model empirically, the clinical reality underlying this model illustrates the added complexity facing clinicians when treating clients with an ED who also self-injure.

At the same time, even though DBT also demonstrated effectiveness in reducing NSSI among adolescents with traits of BPD [108], not everyone needs and/or wants such specialized and intensive treatment. Limited resources, a lack of specialized therapists, and the finding that many (especially young people) do not find their way to conventional therapy [8, 109] call for an integrated stepped-care model in which the most effective, yet least resource-intensive intervention, is considered first [110].

## Novel Technology-Based Interventions: Towards an Integrated Stepped-Care Approach

The recent proliferation of digital technology offers new opportunities for scientist-practitioners to better match treatments to the needs and preferences of individual patients. In 2011, the MACT was adapted for adolescents in the Cutting Down Program (CDP), a low-intensity psychotherapeutic intervention of 8–12 sessions [111]. The online version is currently underway [112], but a recent RCT showed that the face-to-face version was as effective in reducing NSSI and achieved faster recovery compared with an intensive treatment as usual [113•]. Several other accessible digital interventions are under development and have shown promising results that require replication in future RCTs [114]. Of note, a recently developed online low-intensity emotion-regulation individual therapy reduced both NSSI and comorbid harmful behaviors (including binge-eating and purging behaviors) [115•].

While online therapeutic programs have demonstrated effectiveness in reducing ED symptoms [116], researchers in the ED field are now evaluating the potential of EMA to improve

clinical care by delivering Just-In-Time Adaptive Interventions (JITAs) in daily life [117]. To facilitate the clinical uptake of these promising developments, the RCTs should include data on NSSI and suicidality. Similarly, as emerging evidence demonstrates the feasibility of using technology to incorporate prevention into a stepped-care approach for these behaviors [e.g., 118], risk prediction models are warranted that consider multiple behaviors to develop an *integrated* approach in responding to NSSI and ED behaviors.

## Conclusion

Collectively, the reviewed literature provides solid evidence of a robust cross-sectional association between NSSI and ED behaviors, and indicates a significant step forward in addressing the question of why so many people engage in both behaviors. However, much remains to be learned about the joint course of NSSI and ED behaviors over time. Longitudinal studies are now needed to provide novel data on the longer-term developmental and the shorter-term momentary relationship of these behaviors in daily life. While the former will be crucial in clarifying *who* is at high risk to develop comorbid engagement and experience its potentially negative consequences (e.g., increased suicide risk), the latter will be needed to determine *when* in the flow of ordinary life clients are at imminent risk and intervention is most indicated [117].

Building upon these findings, intervention studies should target NSSI and ED behaviors simultaneously. Facilitating the uptake and making optimal use of the growing capacities of mobile technologies to facilitate the deployment of evidence-based interventions have become even more important than ever before, following recent abrupt changes in the delivery of clinical services due to COVID-19 restrictions [119]. While far from exhaustive, we hope that this review will be useful and helps to guide future work in addressing the comorbid NSSI-ED problem for the many individuals who struggle with these behaviors on a day-to-day basis.

**Funding** This work was supported by the Fonds Wetenschappelijk Onderzoek [FWO Postdoctoral Fellowship (12ZZM21N) to GK].

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Human and Animal Rights and Informed Consent** All reported studies/experiments with human or animal subjects performed by the authors have been previously published and complied with all applicable ethical standards (including the Helsinki declaration and its amendments, institutional/national research committee standards, and international/national/institutional guidelines).

## References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

1. International Society for the Study of Self-Injury. What is self-injury? <https://itriples.org/about-self-injury/what-is-self-injury>. Updated May 2018. Accessed 5-4-2020.
2. Gandhi A, Luyckx K, Baetens I, Kiekens G, Sleuwaegen E, Berens A, et al. Age of onset of non-suicidal self-injury in Dutch-speaking adolescents and emerging adults: an event history analysis of pooled data. *Compr Psychiatry*. 2018;80:170–8. <https://doi.org/10.1016/j.comppsy.2017.10.007>.
3. Bresin K, Schoenleber M. Gender differences in the prevalence of nonsuicidal self-injury: a meta-analysis. *Clin Psychol Rev*. 2015;38:55–64. <https://doi.org/10.1016/j.cpr.2015.02.009>.
4. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. 5th ed. ed. Washington, DC: American Psychiatric Press; 2013.
5. Buelens T, Luyckx K, Kiekens G, Gandhi A, Muehlenkamp JJ, Claes L. Investigating the DSM-5 criteria for non-suicidal self-injury disorder in a community sample of adolescents. *J Affect Disord*. 2020;260:314–22. <https://doi.org/10.1016/j.jad.2019.09.009>.
6. Kiekens G, Hasking P, Claes L, Mortier P, Auerbach RP, Boyes M, et al. The DSM-5 nonsuicidal self-injury disorder among incoming college students: prevalence and associations with 12-month mental disorders and suicidal thoughts and behaviors. *Depress Anxiety*. 2018;35(7):629–37. <https://doi.org/10.1002/da.22754>.
7. Claes L, Muehlenkamp JJ. Non-suicidal self-injury in eating disorders: Advancements in etiology and treatment. *Non-suicidal self-injury in eating disorders: Advancements in etiology and treatment*. New York, NY: Springer-Verlag Publishing; US; 2014. p. vi, 364.
8. Treasure J, Duarte TA, Schmidt U. Eating disorders. *Lancet*. 2020;395(10227):899–911. [https://doi.org/10.1016/S0140-6736\(20\)30059-3](https://doi.org/10.1016/S0140-6736(20)30059-3).
9. Volpe U, Tortorella A, Manchia M, Monteleone AM, Albert U, Monteleone P. Eating disorders: what age at onset? *Psychiatry Res*. 2016;238:225–7. <https://doi.org/10.1016/j.psychres.2016.02.048>.
10. Slane JD, Klump KL, McGue M, Iacono WG. Developmental trajectories of disordered eating from early adolescence to young adulthood: a longitudinal study. *Int J Eat Disord*. 2014;47(7):793–801. <https://doi.org/10.1002/eat.22329>.
11. Galmiche M, Dechelotte P, Lambert G, Tavolacci MP. Prevalence of eating disorders over the 2000–2018 period: a systematic literature review. *Am J Clin Nutr*. 2019;109(5):1402–13. <https://doi.org/10.1093/ajcn/nqy342>.
12. van Furth EF, van der Meer A, Cowan K. Top 10 research priorities for eating disorders. *Lancet Psychiatry*. 2016;3(8):706–7. [https://doi.org/10.1016/s2215-0366\(16\)30147-x](https://doi.org/10.1016/s2215-0366(16)30147-x).
13. Cucchi A, Ryan D, Konstantakopoulos G, Stroumpa S, Kacar AS, Renshaw S, et al. Lifetime prevalence of non-suicidal self-injury in patients with eating disorders: a systematic review and meta-analysis. *Psychol Med*. 2016;46(7):1345–58. <https://doi.org/10.1017/S0033291716000027> **This meta-analysis provides pooled prevalence rates and correlates of NSSI among eating disorder patients.**
14. Islam MA, Steiger H, Jimenez-Murcia S, Israel M, Granero R, Aguera Z, et al. Non-suicidal self-injury in different eating

- disorder types: relevance of personality traits and gender. *Eur Eat Disord Rev.* 2015;23(6):553–60. <https://doi.org/10.1002/erv.2374>.
15. Davico C, Amianto F, Gaiotti F, Lasorsa C, Peloso A, Bosia C, et al. Clinical and personality characteristics of adolescents with anorexia nervosa with or without non-suicidal self-injurious behavior. *Compr Psychiatry.* 2019;94:152115. <https://doi.org/10.1016/j.comppsy.2019.152115>.
  16. Dzombak JWP, Haynos AF, Rienecke RD, Van Huysse JL. Brief report: differences in nonsuicidal self-injury according to binge eating and purging status in an adolescent sample seeking eating disorder treatment. *Eat Behav.* 2020;37:101389. <https://doi.org/10.1016/j.eatbeh.2020.101389>.
  17. Buelens T, Luyckx K, Verschueren M, Schoevaerts K, Dierckx E, Depestele L, et al. Temperament and character traits of female eating disorder patients with(out) non-suicidal self-injury. *J Clin Med.* 2020;9(4). <https://doi.org/10.3390/jcm9041207>.
  18. Perez S, Marco JH, Canabate M. Non-suicidal self-injury in patients with eating disorders: prevalence, forms, functions, and body image correlates. *Compr Psychiatry.* 2018;84:32–8. <https://doi.org/10.1016/j.comppsy.2018.04.003>.
  19. Vieira AI, Machado BC, Machado PPP, Brandao I, Roma-Torres A, Goncalves S. Putative risk factors for non-suicidal self-injury in eating disorders. *Eur Eat Disord Rev.* 2017;25(6):544–50. <https://doi.org/10.1002/erv.2545>.
  20. Wang SB, Pisetsky EM, Skutch JM, Fruzzetti AE, Haynos AF. Restrictive eating and nonsuicidal self-injury in a nonclinical sample: co-occurrence and associations with emotion dysregulation and interpersonal problems. *Compr Psychiatry.* 2018;82:128–32. <https://doi.org/10.1016/j.comppsy.2018.02.005>.
  21. Shingleton RM, Eddy KT, Keshaviah A, Franko DL, Swanson SA, Yu JS, et al. Binge/purge thoughts in nonsuicidal self-injurious adolescents: an ecological momentary analysis. *Int J Eat Disord.* 2013;46(7):684–9. <https://doi.org/10.1002/eat.22142>.
  22. Washburn JJ, Potthoff LM, Juzwin KR, Styer DM. Assessing DSM-5 nonsuicidal self-injury disorder in a clinical sample. *Psychol Assess.* 2015;27(1):31–41. <https://doi.org/10.1037/pas0000021>.
  23. Turner BJ, Yiu A, Layden BK, Claes L, Zaitsoff S, Chapman AL. Temporal associations between disordered eating and nonsuicidal self-injury: examining symptom overlap over 1 year. *Behav Ther.* 2015;46(1):125–38. <https://doi.org/10.1016/j.beth.2014.09.002> **This study examined concurrent and temporal models between NSSI and ED behaviors among young adults and considered self-objectification, impulsivity, and emotion dysregulation as moderators in these relationships.**
  24. Taliaferro LA, Muehlenkamp JJ. Risk factors associated with self-injurious behavior among a national sample of undergraduate college students. *J Am Coll Heal.* 2015;63(1):40–8. <https://doi.org/10.1080/07448481.2014.953166>.
  25. Ross S, Heath NL, Toste JR. Non-suicidal self-injury and eating pathology in high school students. *Am J Orthop.* 2009;79(1):83–92. <https://doi.org/10.1037/a0014826>.
  26. Yiu A, Turner BJ, Layden BK, Chapman AL, Zaitsoff SL. Prevalence and correlates of eating disorder symptoms in a community sample with non-suicidal self-injury. *J Psychopathol Behav Assess.* 2014;37(3):504–11. <https://doi.org/10.1007/s10862-014-9470-x>.
  27. Turner BJ, Yiu A, Claes L, Muehlenkamp JJ, Chapman AL. Occurrence and co-occurrence of nonsuicidal self-injury and disordered eating in a daily diary study: Which behavior, when? *Psychiatry Res.* 2016;246:39–47. <https://doi.org/10.1016/j.psychres.2016.09.012> **This study investigated the co-occurrence of NSSI and ED behaviors in daily life and considered emotional, social, and environmental contexts in the manifestation of each behavior.**
  28. Sorgi KM, Ammerman BA, Cheung JC, Fahlgren MK, Puhalla AA, McCloskey MS. Relationships between non-suicidal self-injury and other maladaptive behaviors: beyond difficulties in emotion regulation. *Arch Suicide Res.* 2020:1–22. <https://doi.org/10.1080/13811118.2020.1715906>.
  29. Kiekens G, Hasking P, Bruffaerts R, Claes L, Baetens I, Boyes M, et al. What predicts ongoing nonsuicidal self-injury?: a comparison between persistent and ceased self-injury in emerging adults. *J Nerv Ment Dis.* 2017;205(10):762–70. <https://doi.org/10.1097/NMD.0000000000000726>.
  30. Turner BJ, Layden BK, Butler SM, Chapman AL. How often, or how many ways: clarifying the relationship between non-suicidal self-injury and suicidality. *Arch Suicide Res.* 2013;17(4):397–415. <https://doi.org/10.1080/13811118.2013.802660>.
  31. Kiekens G, Hasking P, Boyes M, Claes L, Mortier P, Auerbach RP, et al. The associations between non-suicidal self-injury and first onset suicidal thoughts and behaviors. *J Affect Disord.* 2018;239:171–9. <https://doi.org/10.1016/j.jad.2018.06.033>.
  32. Muehlenkamp JJ, Claes L, Smits D, Peat CM, Vandereycken W. Non-suicidal self-injury in eating disordered patients: a test of a conceptual model. *Psychiatry Res.* 2011;188(1):102–8. <https://doi.org/10.1016/j.psychres.2010.12.023>.
  33. Wilkinson PO, Qiu T, Neufeld S, Jones PB, Goodyer IM. Sporadic and recurrent non-suicidal self-injury before age 14 and incident onset of psychiatric disorders by 17 years: prospective cohort study. *Br J Psychiatry.* 2018;212(4):222–6. <https://doi.org/10.1192/bjp.2017.45> **This study provides evidence indicating that the presence of repetitive NSSI (i.e., at least two acts per year) in early adolescence is a prospective risk factor for the subsequent onset of eating disorders by late adolescence.**
  34. Riley EN, Davis HA, Combs JL, Jordan CE, Smith GT. Nonsuicidal self-injury as a risk factor for purging onset: negatively reinforced behaviours that reduce emotional distress. *Eur Eat Disord Rev.* 2016;24(1):78–82. <https://doi.org/10.1002/erv.2407> **The findings of this study indicate that there is a reciprocal temporal association between NSSI and purging behavior among female college students.**
  35. Peterson CM, Fischer S. A prospective study of the influence of the UPPS model of impulsivity on the co-occurrence of bulimic symptoms and non-suicidal self-injury. *Eat Behav.* 2012;13(4):335–41. <https://doi.org/10.1016/j.eatbeh.2012.05.007>.
  36. Kiekens G, Hasking P, Claes L, Boyes M, Mortier P, Auerbach RP, et al. Predicting the incidence of non-suicidal self-injury in college students. *Eur Psychiatry.* 2019;59:44–51. <https://doi.org/10.1016/j.eurpsy.2019.04.002>.
  37. Micali N, Horton NJ, Crosby RD, Swanson SA, Sonnevile KR, Solmi F, et al. Eating disorder behaviours amongst adolescents: investigating classification, persistence and prospective associations with adverse outcomes using latent class models. *Eur Child Adolesc Psychiatry.* 2017;26(2):231–40. <https://doi.org/10.1007/s00787-016-0877-7>.
  38. Black EB, Garratt M, Beccaria G, Mildred H, Kwan M. Body image as a predictor of nonsuicidal self-injury in women: a longitudinal study. *Compr Psychiatry.* 2019;88:83–9. <https://doi.org/10.1016/j.comppsy.2018.11.010>.
  39. Barrocas AL, Holm-Denoma JM, Hankin BL. Developmental influences in NSSI and eating pathology. *Non-suicidal self-injury in eating disorders.* 2014. p. 35–53.
  40. Wedig MM. Psychological meanings and functions of non-suicidal self-injury and eating disorders. *Non-suicidal self-injury in eating disorders.* 2014. p. 73–84.
  41. Muehlenkamp JJ, Takakuni S, Brausch AM, Peyerl N. Behavioral functions underlying NSSI and eating disorder behaviors. *J Clin Psychol.* 2019;75(7):1219–32. <https://doi.org/10.1002/jclp.22745> **This study directly compared behavioral functions underlying**



- NSSI and ED behaviors in adult samples that either reported recent NSSI or ED behaviors.**
42. Hepp J, Carpenter RW, Störkel LM, Schmitz SE, Schmahl C, Niedtfeld I. A systematic review of daily life studies on non-suicidal self-injury based on the four-function model. *Clin Psychol Rev.* 2020;82:101888. <https://doi.org/10.1016/j.cpr.2020.101888>.
  43. Mason TB, Smith KE, Crosby RD, Engel SG, Wonderlich SA. Examination of momentary maintenance factors and eating disorder behaviors and cognitions using ecological momentary assessment. *Eat Disord.* 2019;1–14. <https://doi.org/10.1080/10640266.2019.1613847>.
  44. Fox KR, Wang SB, Boccagno C, Haynos AF, Kleiman E, Hooley JM. Comparing self-harming intentions underlying eating disordered behaviors and NSSI: evidence that distinctions are less clear than assumed. *Int J Eat Disord.* 2019;52(5):564–75. <https://doi.org/10.1002/eat.23041> **This study provides novel evidence indicating that self-harming motives and intentions across NSSI and ED behaviors overlap for some individuals and are best assessed dimensionally in future research.**
  45. Nicolai KA, Wielgus MD, Mezulis A. Identifying risk for self-harm: rumination and negative affectivity in the prospective prediction of nonsuicidal self-injury. *Suicide Life Threat Behav.* 2016;46(2):223–33. <https://doi.org/10.1111/sltb.12186>.
  46. Dakanalis A, Clerici M, Bartoli F, Caslini M, Crocarno C, Riva G, et al. Risk and maintenance factors for young women's DSM-5 eating disorders. *Arch Womens Ment Health.* 2017;20(6):721–31. <https://doi.org/10.1007/s00737-017-0761-6>.
  47. Evans BC, Felton JW, Lagacey MA, Manasse SM, Lejuez CW, Juarascio AS. Impulsivity and affect reactivity prospectively predict disordered eating attitudes in adolescents: a 6-year longitudinal study. *Eur Child Adolesc Psychiatry.* 2019;28(9):1193–202. <https://doi.org/10.1007/s00787-018-01267-4>.
  48. Riley EN, Combs JL, Jordan CE, Smith GT. Negative urgency and lack of perseverance: identification of differential pathways of onset and maintenance risk in the longitudinal prediction of nonsuicidal self-injury. *Behav Ther.* 2015;46(4):439–48. <https://doi.org/10.1016/j.beth.2015.03.002>.
  49. Buelens T, Luyckx K, Gandhi A, Kiekens G, Claes L. Non-suicidal self-injury in adolescence: longitudinal associations with psychological distress and rumination. *J Abnorm Child Psychol.* 2019;47(9):1569–81. <https://doi.org/10.1007/s10802-019-00531-8>.
  50. Smith KE, Mason TB, Lavender JM. Rumination and eating disorder psychopathology: a meta-analysis. *Clin Psychol Rev.* 2018;61:9–23. <https://doi.org/10.1016/j.cpr.2018.03.004>.
  51. Kehayes I-LL, Smith MM, Shery SB, Vidovic V, Saklofske DH. Are perfectionism dimensions risk factors for bulimic symptoms? A meta-analysis of longitudinal studies. *Personal Individ Differ.* 2019;138:117–25. <https://doi.org/10.1016/j.paid.2018.09.022>.
  52. Smith KE, Hayes NA, Styer DM, Washburn JJ. Emotional reactivity in a clinical sample of patients with eating disorders and nonsuicidal self-injury. *Psychiatry Res.* 2017;257:519–25. <https://doi.org/10.1016/j.psychres.2017.08.014> **The findings of this study indicate that the presence of NSSI among eating disorder patients is associated with greater functional impairment during treatment.**
  53. Giner-Bartolome C, Mallorqui-Bague N, Tolosa-Sola I, Steward T, Jimenez-Murcia S, Granero R, et al. Non-suicidal self-injury in eating disordered patients: associations with heart rate variability and state-trait anxiety. *Front Psychol.* 2017;8:1163. <https://doi.org/10.3389/fpsyg.2017.01163>.
  54. Anderson NL, Smith KE, Mason TB, Crowther JH. Testing an integrative model of affect regulation and avoidance in non-suicidal self-injury and disordered eating. *Arch Suicide Res.* 2018;22(2):295–310. <https://doi.org/10.1080/13811118.2017.1340854>.
  55. Claes L, Norré J, Van Assche L, Bijttebier P. Non-suicidal self-injury (functions) in eating disorders: associations with reactive and regulative temperament. *Personal Individ Differ.* 2014;57:65–9. <https://doi.org/10.1016/j.paid.2013.09.022>.
  56. Fox KR, Franklin JC, Ribeiro JD, Kleiman EM, Bentley KH, Nock MK. Meta-analysis of risk factors for nonsuicidal self-injury. *Clin Psychol Rev.* 2015;42:156–67. <https://doi.org/10.1016/j.cpr.2015.09.002>.
  57. Johnson JG, Cohen P, Kasen S, Brook JS. Childhood adversities associated with risk for eating disorders or weight problems during adolescence or early adulthood. *Am J Psychiatry.* 2002;159(3):394–400. <https://doi.org/10.1176/appi.ajp.159.3.394>.
  58. Cassels M, Baetens I, Wilkinson P, Hoppenbrouwers K, Wiersema JR, Van Leeuwen K, et al. Attachment and non-suicidal self-injury among young adolescents: the indirect role of behavioral problems. *Arch Suicide Res.* 2019;23(4):688–96. <https://doi.org/10.1080/13811118.2018.1494651>.
  59. Gandhi A, Luyckx K, Molenberghs G, Baetens I, Goossens L, Maitra S, et al. Maternal and peer attachment, identity formation, and non-suicidal self-injury: a longitudinal mediation study. *Child Adolesc Psychiatry Ment Health.* 2019;13:7. <https://doi.org/10.1186/s13034-019-0267-2>.
  60. Zubatsky M, Berge J, Neumark-Sztainer D. Longitudinal associations between parenting style and adolescent disordered eating behaviors. *Eat Weight Disord.* 2015;20(2):187–94. <https://doi.org/10.1007/s40519-014-0154-z>.
  61. Victor SE, Hipwell AE, Stepp SD, Scott LN. Parent and peer relationships as longitudinal predictors of adolescent non-suicidal self-injury onset. *Child Adolesc Psychiatry Ment Health.* 2019;13:1. <https://doi.org/10.1186/s13034-018-0261-0>.
  62. Lee KS, Vaillancourt T. A four-year prospective study of bullying, anxiety, and disordered eating behavior across early adolescence. *Child Psychiatry Hum Dev.* 2019;50(5):815–25. <https://doi.org/10.1007/s10578-019-00884-7>.
  63. Monteleone AM, Ruzzi V, Patriciello G, Pellegrino F, Cascino G, Castellini G, et al. Parental bonding, childhood maltreatment and eating disorder psychopathology: an investigation of their interactions. *Eat Weight Disord.* 2020;25(3):577–89. <https://doi.org/10.1007/s40519-019-00649-0>.
  64. Baetens I, Claes L, Martin G, Onghena P, Grietens H, Van Leeuwen K, et al. Is nonsuicidal self-injury associated with parenting and family factors? *J Early Adolesc.* 2013;34(3):387–405. <https://doi.org/10.1177/0272431613494006>.
  65. Nelson A, Muehlenkamp JJ. Body attitudes and objectification in non-suicidal self-injury: comparing males and females. *Arch Suicide Res.* 2012;16(1):1–12. <https://doi.org/10.1080/13811118.2012.640578>.
  66. Mallorqui-Bague N, Vintro-Alcaraz C, Sanchez I, Riesco N, Aguera Z, Granero R, et al. Emotion regulation as a transdiagnostic feature among eating disorders: cross-sectional and longitudinal approach. *Eur Eat Disord Rev.* 2018;26(1):53–61. <https://doi.org/10.1002/erv.2570>.
  67. Robinson K, Garisch JA, Kingi T, Brocklesby M, O'Connell A, Langlands RL, et al. Reciprocal risk: the longitudinal relationship between emotion regulation and non-suicidal self-injury in adolescents. *J Abnorm Child Psychol.* 2018;47(2):325–32. <https://doi.org/10.1007/s10802-018-0450-6>.
  68. Hasking P, Claes L. Transdiagnostic mechanisms involved in nonsuicidal self-injury, risky drinking and disordered eating: impulsivity, emotion regulation and alexithymia. *J Am Coll Heal.* 2019;68:1–7. <https://doi.org/10.1080/07448481.2019.1583661>.
  69. Serra R, Kiekens G, Tarsitani L, Vrieze E, Bruffaerts R, Lorieo C, et al. The effect of trauma and dissociation on the outcome of cognitive behavioural therapy for binge eating disorder: a 6-month

- prospective study. *Eur Eat Disord Rev.* 2020;28(3):309–17. <https://doi.org/10.1002/erv.2722>.
70. Titelius EN, Cook E, Spas J, Orchowski L, Kivisto K, O'Brien KHM, et al. Emotion dysregulation mediates the relationship between child maltreatment and non-suicidal self-injury. *J Aggress Maltreat Trauma.* 2018;27(3):323–31. <https://doi.org/10.1080/10926771.2017.1338814>.
  71. Zerkowicz RL, Cole DA. Self-criticism as a transdiagnostic process in nonsuicidal self-injury and disordered eating: systematic review and meta-analysis. *Suicide Life Threat Behav.* 2019;49(1): 310–27. <https://doi.org/10.1111/sltb.12436>.
  72. Zerkowicz RL, Cole DA. Longitudinal relations of self-criticism with disordered eating behaviors and nonsuicidal self-injury. *Int J Eat Disord.* 2020. <https://doi.org/10.1002/eat.23284> **This study investigates cross-sectional and longitudinal associations of self-criticism with NSSI and ED behaviors among college students and community-based adults.**
  73. Perkins NM, Ortiz SN, Smith AR. Self-criticism longitudinally predicts nonsuicidal self-injury in eating disorders. *Eat Disord.* 2020;28(2):157–70. <https://doi.org/10.1080/10640266.2019.1695450> **This study found that levels of self-criticism at baseline predict NSSI frequency at a two-month follow-up among eating disorder patients.**
  74. Stice E, Gau JM, Rohde P, Shaw H. Risk factors that predict future onset of each DSM-5 eating disorder: predictive specificity in high-risk adolescent females. *J Abnorm Psychol.* 2017;126(1): 38–51. <https://doi.org/10.1037/abn0000219>.
  75. Hasking P, Andrews T, Martin G. The role of exposure to self-injury among peers in predicting later self-injury. *J Youth Adolesc.* 2013;42(10):1543–56. <https://doi.org/10.1007/s10964-013-9931-7>.
  76. Schwartz-Mette RA, Lawrence HR. Peer socialization of non-suicidal self-injury in adolescents' close friendships. *J Abnorm Child Psychol.* 2019;47(11):1851–62. <https://doi.org/10.1007/s10802-019-00569-8>.
  77. VanHuyse JL, Burt SA, O'Connor SM, Thompson JK, Klump KL. Socialization and selection effects in the association between weight conscious peer groups and thin-ideal internalization: a co-twin control study. *Body Image.* 2016;17:1–9. <https://doi.org/10.1016/j.bodyim.2016.01.005>.
  78. O'Connor SM, Burt SA, VanHuyse JL, Klump KL. What drives the association between weight-conscious peer groups and disordered eating? Disentangling genetic and environmental selection from pure socialization effects. *J Abnorm Psychol.* 2016;125(3): 356–68. <https://doi.org/10.1037/abn0000132>.
  79. Udo T, Grilo CM. Psychiatric and medical correlates of DSM-5 eating disorders in a nationally representative sample of adults in the United States. *Int J Eat Disord.* 2019;52(1):42–50. <https://doi.org/10.1002/eat.23004>.
  80. Schaumberg K, Zerwas S, Goodman E, Yilmaz Z, Bulik CM, Micali N. Anxiety disorder symptoms at age 10 predict eating disorder symptoms and diagnoses in adolescence. *J Child Psychol Psychiatry.* 2019;60(6):686–96. <https://doi.org/10.1111/jcpp.12984>.
  81. Claes L, Turner B, Dierckx E, Luyckx K, Verschueren M, Schoevaerts K. Different clinical presentations in eating disorder patients with non-suicidal self-injury based on the co-occurrence of borderline personality disorder. *Psychol Belg.* 2018;58(1):243–55. <https://doi.org/10.5334/pb.420>.
  82. Verschueren M, Claes L, Gandhi A, Luyckx K. Identity and psychopathology: bridging developmental and clinical research. *Emerging Adulthood.* 2019. <https://doi.org/10.1177/2167696819870021> **This theoretical paper discusses shared pathways linking identity to NSSI and ED behaviors.**
  83. Hasking P, Boyes M, Greves S. Self-efficacy and emotionally dysregulated behaviour: an exploratory test of the role of emotion regulatory and behaviour-specific beliefs. *Psychiatry Res.* 2018;270:335–40. <https://doi.org/10.1016/j.psychres.2018.09.045> **This study suggests that specific behavior-specific cognitions may help explain why someone engages in NSSI and/or ED behaviors.**
  84. Mandelli L, Arminio A, Atti AR, De Ronchi D. Suicide attempts in eating disorder subtypes: a meta-analysis of the literature employing DSM-IV, DSM-5, or ICD-10 diagnostic criteria. *Psychol Med.* 2019;49(8):1237–49. <https://doi.org/10.1017/S0033291718003549>.
  85. Franklin JC, Ribeiro JD, Fox KR, Bentley KH, Kleiman EM, Huang X, et al. Risk factors for suicidal thoughts and behaviors: a meta-analysis of 50 years of research. *Psychol Bull.* 2017;143(2):187–232. <https://doi.org/10.1037/bul0000084>.
  86. Smith AR, Velkoff EA, Ribeiro JD, Franklin J. Are eating disorders and related symptoms risk factors for suicidal thoughts and behaviors? A Meta-analysis *Suicide Life Threat Behav.* 2019;49(1):221–39. <https://doi.org/10.1111/sltb.12427>.
  87. Joiner TE. *Why people die by suicide.* Cambridge: Harvard University Press; 2005.
  88. Brausch AM, Perkins NM. Nonsuicidal self-injury and disordered eating: Differences in acquired capability and suicide attempt severity. *Psychiatry Res.* 2018;266:72–8. <https://doi.org/10.1016/j.psychres.2018.05.021> **This study compares individuals with NSSI alone, ED behavior alone, or comorbid engagement on components of acquired capability and suicide attempt severity. While groups did not differ on fearlessness about death, the comorbid group more often attempted suicide and reported fewer suicide-related concerns than the single behavior groups.**
  89. Wang SB, Mancuso CJ, Jo J, Keshishian AC, Becker KR, Plessow F, et al. Restrictive eating, but not binge eating or purging, predicts suicidal ideation in adolescents and young adults with low-weight eating disorders. *Int J Eat Disord.* 2020;53(3): 472–7. <https://doi.org/10.1002/eat.23210>.
  90. Puccio F, Fuller-Tyszkiewicz M, Ong D, Krug I. A systematic review and meta-analysis on the longitudinal relationship between eating pathology and depression. *Int J Eat Disord.* 2016;49(5): 439–54. <https://doi.org/10.1002/eat.22506>.
  91. Waals L, Baetens I, Rober P, Lewis S, Van Parys H, Goethals ER, et al. The NSSI family distress cascade theory. *Child Adolesc Psychiatry Ment Health.* 2018;12:52. <https://doi.org/10.1186/s13034-018-0259-7>.
  92. Fox JR, Dean M, Whittlesea A. The experience of caring for or living with an individual with an eating disorder: a meta-synthesis of qualitative studies. *Clin Psychol Psychother.* 2017;24(1):103–25. <https://doi.org/10.1002/cpp.1984>.
  93. Gandhi A, Luyckx K, Maitra S, Kiekens G, Verschueren M, Claes L. Directionality of effects between non-suicidal self-injury and identity formation: a prospective study in adolescents. *Personal Individ Differ.* 2017;109:124–9. <https://doi.org/10.1016/j.paid.2017.01.003>.
  94. Verschueren M, Claes L, Bogaerts A, Palmeroni N, Gandhi A, Moons P, et al. Eating disorder symptomatology and identity formation in adolescence: a cross-lagged longitudinal approach. *Front Psychol.* 2018;9:816. <https://doi.org/10.3389/fpsyg.2018.00816>.
  95. Espinoza P, Penelo E, Mora M, Francisco R, González ML, Raich RM. Bidirectional relations between disordered eating, internalization of beauty ideals, and self-esteem: a longitudinal study with adolescents. *J Early Adolesc.* 2018;39(9):1244–60. <https://doi.org/10.1177/0272431618812734>.
  96. Mitchison D, Morin A, Mond J, Slewa-Younan S, Hay P. The bidirectional relationship between quality of life and eating disorder symptoms: a 9-year community-based study of Australian

- women. *PLoS One*. 2015;10(3):e0120591. <https://doi.org/10.1371/journal.pone.0120591>.
97. Foran AM, O'Donnell AT, Muldoon OT. Stigma of eating disorders and recovery-related outcomes: a systematic review. *Eur Eat Disord Rev*. 2020;28(4):385–97. <https://doi.org/10.1002/erv.2735>.
  98. Burke TA, Piccirillo ML, Moore-Berg SL, Alloy LB, Heimberg RG. The stigmatization of nonsuicidal self-injury. *J Clin Psychol*. 2019;75(3):481–98. <https://doi.org/10.1002/jclp.22713>.
  99. Kiekens G, Claes L, Demyttenaere K, Auerbach RP, Green JG, Kessler RC, et al. Lifetime and 12-month nonsuicidal self-injury and academic performance in college freshmen. *Suicide Life Threat Behav*. 2016;46(5):563–76. <https://doi.org/10.1111/sltb.12237>.
  100. Serra R, Kiekens G, Vanderlinden J, Vrieze E, Auerbach RP, Benjet C, et al. Binge eating and purging in first-year college students: prevalence, psychiatric comorbidity, and academic performance. *Int J Eat Disord*. 2020;53(3):339–48. <https://doi.org/10.1002/eat.23211>.
  101. Hilbert A, Hoek HW, Schmidt R. Evidence-based clinical guidelines for eating disorders: international comparison. *Curr Opin Psychiatry*. 2017;30(6):423–37. <https://doi.org/10.1097/YCO.0000000000000360>.
  102. Hilbert A, Petroff D, Herpertz S, Pietrowsky R, Tuschen-Caffier B, Vocks S, et al. Meta-analysis of the efficacy of psychological and medical treatments for binge-eating disorder. *J Consult Clin Psychol*. 2019;87(1):91–105. <https://doi.org/10.1037/ccp0000358>.
  103. Resmark G, Herpertz S, Herpertz-Dahlmann B, Zeeck A. Treatment of anorexia nervosa-new evidence-based guidelines. *J Clin Med*. 2019;8(2). <https://doi.org/10.3390/jcm8020153>.
  104. Linardon J, Fairburn CG, Fitzsimmons-Craft EE, Wilfley DE, Brennan L. The empirical status of the third-wave behaviour therapies for the treatment of eating disorders: a systematic review. *Clin Psychol Rev*. 2017;58:125–40. <https://doi.org/10.1016/j.cpr.2017.10.005>.
  105. Turner B, Austin SB, Chapman AL. Treating non-suicidal self-injury: a systematic review of psychological and pharmacological interventions. *Can J Psychiatr*. 2014;59:576–85.
  106. Plener PL, Brunner R, Fegert JM, Groschwitz RC, In-Albon T, Kaess M, et al. Treating nonsuicidal self-injury (NSSI) in adolescents: consensus based German guidelines. *Child Adolesc Psychiatry Ment Health*. 2016;10:46. <https://doi.org/10.1186/s13034-016-0134-3>.
  107. Marino J, Hardin R, Gasbarro A, Dansereau VA, Fischer S. Outpatient treatment for adults with complex eating disorders and co-morbid conditions: a decision making model and case example. *Eat Disord*. 2020;28(2):171–83. <https://doi.org/10.1080/10640266.2020.1723372> **This article introduces a clinically relevant decision-making model for determining which treatment to use for adult clients who present with comorbid NSSI and ED behaviors.**
  108. Mehlum L, Ramberg M, Tormoen AJ, Haga E, Diep LM, Stanley BH, et al. Dialectical behavior therapy compared with enhanced usual care for adolescents with repeated suicidal and self-harming behavior: outcomes over a one-year follow-up. *J Am Acad Child Adolesc Psychiatry*. 2016;55(4):295–300. <https://doi.org/10.1016/j.jaac.2016.01.005>.
  109. Daukantaitė D, Lundh L-G, Wångby-Lundh M, Claréus B, Bjärehed J, Zhou Y, et al. What happens to young adults who have engaged in self-injurious behavior as adolescents? A 10-year follow-up. *Eur Child Adolesc Psychiatry*. 2020. <https://doi.org/10.1007/s00787-020-01533-4>.
  110. Plener PL. Tailoring treatments for adolescents with nonsuicidal self-injury. *Eur Child Adolesc Psychiatry*. 2020;29(6):893–5. <https://doi.org/10.1007/s00787-020-01523-6>.
  111. Taylor LM, Oldershaw A, Richards C, Davidson K, Schmidt U, Simic M. Development and pilot evaluation of a manualized cognitive-behavioural treatment package for adolescent self-harm. *Behav Cogn Psychother*. 2011;39(5):619–25. <https://doi.org/10.1017/S1352465811000075>.
  112. Kaess M, Koenig J, Bauer S, Moessner M, Fischer-Waldschmidt G, Mattern M, et al. Self-injury: Treatment, Assessment, Recovery (STAR): online intervention for adolescent non-suicidal self-injury - study protocol for a randomized controlled trial. *Trials*. 2019;20(1):425. <https://doi.org/10.1186/s13063-019-3501-6>.
  113. Kaess M, Edinger A, Fischer-Waldschmidt G, Parzer P, Brunner R, Resch F. Effectiveness of a brief psychotherapeutic intervention compared with treatment as usual for adolescent nonsuicidal self-injury: a single-centre, randomised controlled trial. *Eur Child Adolesc Psychiatry*. 2020;29(6):881–91. <https://doi.org/10.1007/s00787-019-01399-1> **This study provides initial evidence that the Cutting Down Program, a manualized brief psychotherapeutic intervention, is as effective (and potentially faster) in reducing NSSI among adolescents than regular psychotherapeutic treatment.**
  114. Arshad U, Farhat UI A, Gauntlett J, Husain N, Chaudhry N, Taylor PJ. A systematic review of the evidence supporting mobile- and internet-based psychological interventions for self-harm. *Suicide Life Threat Behav*. 2020;50(1):151–79. <https://doi.org/10.1111/sltb.12583>.
  115. Bjureberg J, Sahlin H, Hedman-Lagerlof E, Gratz KL, Tull MT, Jokinen J, et al. Extending research on Emotion Regulation Individual Therapy for Adolescents (ERITA) with nonsuicidal self-injury disorder: open pilot trial and mediation analysis of a novel online version. *BMC Psychiatry*. 2018;18(1):326. <https://doi.org/10.1186/s12888-018-1885-6> **This study provides initial evidence that a low-intensity online individual emotion-regulation therapy, which also included a parent component, was positively associated with abstinence and reductions in NSSI as well as other harmful behaviors among adolescents diagnosed with DSM-5 NSSI disorder.**
  116. Barakat S, Maguire S, Smith KE, Mason TB, Crosby RD, Touyz S. Evaluating the role of digital intervention design in treatment outcomes and adherence to eTherapy programs for eating disorders: a systematic review and meta-analysis. *Int J Eat Disord*. 2019;52(10):1077–94. <https://doi.org/10.1002/eat.23131>.
  117. Smith KE, Juarascio A. From ecological momentary assessment (EMA) to ecological momentary intervention (EMI): past and future directions for ambulatory assessment and interventions in eating disorders. *Curr Psychiatry Rep*. 2019;21(7):53. <https://doi.org/10.1007/s11920-019-1046-8> **This review article provides an overview of the current state of the art of ecological momentary assessment research in the eating disorder field and highlights the potential of using mobile technology in the treatment of ED behaviors.**
  118. Yan H, Fitzsimmons-Craft EE, Goodman M, Krauss M, Das S, Cavazos-Rehg P. Automatic detection of eating disorder-related social media posts that could benefit from a mental health intervention. *Int J Eat Disord*. 2019;52(10):1150–6. <https://doi.org/10.1002/eat.23148>.
  119. Fernandez-Aranda F, Casas M, Claes L, Bryan DC, Favaro A, Granero R, et al. COVID-19 and implications for eating disorders. *Eur Eat Disord Rev*. 2020;28(3):239–45. <https://doi.org/10.1002/erv.2738>.