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Abel S. Mathew

Taylor P. Davine

Ivar Snorrason

David C. Houghton

Douglas W. Woods

*See next page for additional authors*

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**Authors**

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# Body-Focused Repetitive Behaviors and Non-Suicidal Self-Injury: A Comparison of Clinical Characteristics and Symptom Features

Abel S. Mathew

Department of Psychology, University of Wisconsin-Milwaukee, WI

Taylor P. Davine

Department of Psychology, University of Wisconsin-Milwaukee, WI

Ivar Snorrason

Department of Psychiatry, McLean Hospital

David C. Houghton

Department of Psychiatry & Behavioral Sciences, University of Texas Medical Branch, USA

Douglas W. Woods

Department of Psychology, Marquette University, WI

Han-Joo Lee

Department of Psychology, University of Wisconsin-Milwaukee, WI

## Highlights

- There are debates on classification of BFRBs and non-suicidal self-injury (NSSI).
- There is a paucity of research that directly compared BFRBs and NSSI.
- We examined clinical features of BFRBs and NSSI from a large sample ( $N = 1523$ ).
- NSSI is performed less automatically with greater awareness than BFRBs.
- NSSI is performed more for gratifying social-affective needs than BFRBs.

## Abstract

Body-focused repetitive behaviors (BFRBs) and non-suicidal self-injury (NSSI) are recognized as distinct categories in the DSM-5. However, definitions and assessment of NSSI sometimes encompasses behaviors similar to BFRBs, and little data exist about their clinical differences. The current study examined clinical characteristics and symptom features associated with NSSI vs. BFRBs. The current sample included 1523 individuals who endorsed moderate to severe NSSI ( $n = 165$ ) or BFRBs: hair pulling group ( $n = 102$ ), skin picking group ( $n = 216$ ), nail picking group ( $n = 253$ ), nail biting group ( $n = 487$ ), and cheek biting group ( $n = 300$ ). Responders were asked to complete questionnaires on clinical features relevant for BFRBs and NSSI. NSSI and BFRBs had significant differences on several clinical features. Individuals in the NSSI group were more likely than individuals with BFRBs to report engaging in the behavior for social-affective reasons (i.e., to get out of doing something, or receive attention from others). Individuals in the NSSI group were also more likely to engage in the behavior to regulate tension and feelings of emptiness, and to experience relief during the act. In contrast, individuals in the BFRB groups were more likely to engage in the behavior automatically without reflective awareness, to reduce boredom, or to fix appearance. The NSSI group obtained significantly higher scores on questionnaires assessing stress, anxiety, depression, and harm avoidance. Overall, the results showed several notable differences between NSSI and BFRBs that are consistent with clinical literature and definitions of these problems in the DSM-5.

### 1. Body-focused repetitive behaviors (BFRBs)

Body-focused repetitive behaviors (BFRBs) are a group of conditions including, but not limited to, trichotillomania (TTM; hair pulling), excoriation (SPD; skin picking), nail biting, and cheek biting. Occasional engagement in mild BFRBs is common (Houghton et al., 2018) and rates of individuals with clinical levels of BFRBs are approximately 0.9–4.4% (Grant et al., 2005; Müller et al., 2011). Moderate to severe BFRBs can result in detrimental consequences such as bald spots, sores, wounds, infections at affected areas, experiences of shame, and psychosocial impairment (Wetterneck et al., 2006).

BFRBs are often characterized by (a) feelings of tension, anxiety or boredom before committing the behavior, (b) gratification or relief while engaging in the behavior, and (c) ensuing feelings of remorse or guilt (Diefenbach et al., 2008; Wilhelm et al., 1999). Although the etiology of BFRBs is unclear, research suggests that reduced impulse control and difficulty in emotion regulation may play a role in these behaviors (Diefenbach et al., 2008; Roberts et al., 2013; Shusterman et al., 2009). Given the compulsory characteristics of BFRBs, they are classified as Obsessive-Compulsive and Related Disorders (OCRD) in the DSM-5 (APA, 2013, p. 236).

## 2. Non-suicidal self-injury (NSSI)

Non-Suicidal Self Injury (NSSI) involves inflicting damage to one's own body *without suicidal intent*, such as cutting and burning oneself (Nock and Prinstein, 2004; Wilkinson et al., 2011). Currently, the behavior is listed as “conditions for further study” in the DSM-5 (APA, 2013, p. 803). A recent meta-analysis (Swannell et al., 2014) showed that the prevalence of NSSI is 17.2% among adolescents, 13.4% among young adults, and 5.5% among adults (Swannell et al., 2014). Women are more likely to engage in NSSI and prefer certain types of behavior, such as cutting, compared to men (Bresin and Schoenleber, 2015; Favazza and Conterio, 1989; Moran et al., 2012; Nock and Prinstein, 2004). Studies (Burke et al., 2015; Klonsky et al., 2015) show that NSSI can serve both (1) intrapersonal functions (e.g., affect regulation, anti-dissociation) and (2) social functions (e.g., interpersonal influence, peer bonding).

## 3. Controversy of OCDR classification for NSSI and BFRBs

Some researchers have adopted a broad definition of NSSI that includes skin picking, hair pulling, and other BFRBs (Favazza, 1998; McKay and Andover, 2012; Neziroglu and Mancebo, 2001; Kimbrel et al., 2014). However, these conditions are also considered to be distinct from NSSI in their clinical features, as reflected in the DSM-5. For example, SPD, TTM, and other BFRBs are not diagnosed if the behavior is better explained by NSSI. Additionally, the proposed criteria for NSSI list SPD and TTM as differential diagnoses.

## 4. Clinical features of BFRBs vs. NSSI

Research suggests that NSSI and BFRBs may have important differences in symptom presentations and clinical characteristics (Nock and Prinstein, 2004; Twohig and Woods, 2001; Wilhelm et al., 1999). First, those who engage in BFRBs often report a low level of awareness while engaging in the behavior, which may not be common in NSSI (Christenson and Mackenzie, 1994; Flessner et al., 2008a; Pacan et al., 2014; Walther et al., 2009), yet no study has compared awareness/automaticity between BFRBs and NSSI. Second, both NSSI and BFRBs occur in various emotional contexts, including boredom, intense distress, and anxiety (Teng et al., 2004; Nederkoorn et al., 2016). However, BFRBs may be more related to mundanely experienced negative emotions (e.g., daily stress, boredom, and anxiety); whereas NSSI is related to more intense and acutely distressing emotions (e.g., despair, crisis, intense feelings of emptiness). Nonetheless, research has yet to empirically determine specific and unique emotional antecedents differentiating BFRBs and NSSI.

Third, NSSI typically peaks in adolescence and declines by early adulthood (Hjelmeland and Groholt, 2005; Moran et al., 2012), while BFRBs tend to be chronic habits that persist for decades (du Toit et al., 2001; Grant and Odlaug, 2009). Neuropsychological studies have also shown that poor decision-making in adolescents with NSSI tends to improve in adulthood (Oldershaw et al., 2008). Deliberto and Nock (2008) found that individuals reported stopping their self-harm behavior for social reasons (e.g., shame, unwanted attention, upsetting family and friends), as well as understanding that it is an unhealthy and dangerous behavior. In contrast, while individuals with BFRBs reported similar social concerns, they are often unable to stop the behavior (Grant and Stein, 2014). However, the literature also suggests that addictive patterns of behavior play a significant role in NSSI (Guérin-Marion et al., 2018). Individuals who self-reported a more addictive pattern of NSSI were found to show increased frequency of the behavior, more extensive and serious self-injurious behavior, and a greater duration

of urges. Thus, it is important to further examine the addictive/compulsive pattern of BFRBs/NSSI across time.

Taken together, existing data and clinical observations have led to discussions of clinical similarities and differences between BFRBs and NSSI; however, there is a paucity of empirical data that directly compares their similarities and differences. There is debate as to whether NSSI needs to be included in the OCD category (see Favazza, 1998; McKay and Andover, 2012; Stanley and Cohen, 1999). Thus, a large-scale study comparing BFRBs and NSSI is important for research, diagnosis, and treatment. The current study sought to examine clinical features in BFRBs vs. NSSI in three important domains: behavioral patterns (e.g., performed automatically, in a trance, or to follow a routine), motivational factors (e.g., performed to relieve feelings of emptiness, communicate or get attention, or to avoid aversive situations), and typical consequences (e.g., reducing tension and anxiety, reducing boredom, gaining relief/gratification). We hypothesized that, relative to BFRBs, (1) behavioral patterns of NSSI would be characterized by greater awareness and deliberation, (2) individuals who engage in NSSI would be more motivated by reducing negative emotions and achieving social-affective goals (e.g., getting attention), and (3) consequences of NSSI would be characterized by greater relief and reductions of distress. Additionally, we predicted that individuals with NSSI would be characterized by greater negative affect (depression, anxiety, and stress) than individuals with BFRBs. Further, we explored whether individuals with NSSI and BFRBs would exhibit a different pattern of trait-level motivation in harm avoidance and a sense of incompleteness, which have been highlighted as important cognitive/motivational factors underlying conditions characterized by repetitive and compulsive behavioral problems like OCDs (Ecker and Gonner, 2008; Summerfield et al., 2004; Taylor et al., 2014).

## 5. Method

### 5.1. Participants

Participants recruited for the current study were 1634 undergraduate psychology students from two mid-sized universities in the United States. Both university institutional review boards approved the study. Participants were recruited from an online research study portal. The study was open to all students enrolled in undergraduate psychology classes. A description of the study was provided on the study portal. Individuals who reported current or past BFRB/NSSI behaviors were eligible to complete the study, and they provided electronic signed informed consent.

All responders completed the following six screening questions: “In your lifetime, have you ever had the habit of excessively (1) pulling out hairs on your body (e.g., from the scalp, eyebrows, eyelashes, legs, pubic region, or anywhere else), (2) picking at your skin, (3) picking at (not biting) your nails, (4) biting your nails, (5) biting, sucking, or chewing the inside your cheeks or lips, or (6) purposely hurting yourself (e.g., by cutting or burning your skin).” The response options included: (1) Never, (2) Sometimes, but not excessively, (3) Yes, currently, and (4) Yes, but not in the past month. Participants who endorsed option 3 or 4 were presented with additional questions regarding various clinical features of the endorsed problem. Given our interest in examining clinical characteristics and other relevant factors of moderate to severe levels of BFRBs and NSSI, we included only participants who reported excessive engagement in the target behavior. Thus, participants who endorsed option 1 or 2 for all BFRB/NSSI problems were excluded from the current study.

The final sample included 1523 individuals (male = 30.3% and female = 69.7%) age 18–54 years (*mean* age = 19.31, *SD* = 2.54). Fourteen percent of the participants were Hispanic/Latino. Racial composition of the sample was as follows: Caucasian/White (72.7%), African American/Black (3.5%), Asian (4.0%), Native American (0.7%), multi-racial (4.1%), and other (0.6%).

## 5.2. Procedures

Following the informed consent procedure, eligible participants underwent questionnaires about demographic information (e.g., sex, age, and race/ethnicity) and various emotional variables, as well as clinical features of BFRBs and NSSI. Among the included participants, we used the following approach to identify their primary problem for the purpose of group classification. First, a severity score was calculated by summing 3-items that assessed (1) damage caused by the behavior (e.g., for hair pulling, “*When the hair pulling problem was the worst (think of a 30 day period), did it cause any hair loss, or thinning?*” 1 = *None* ~ 5 = *Extreme hair loss/thinning*), (2) distress caused by the behavior (e.g., for skin picking, “*When the skin picking problem was the worst, did it cause you any distress?*” 1 = *No distress* ~ 5 = *Extreme distress*), and (3) functional impairment caused by the behavior (e.g., for self-injury “*When the self-harming problem was the worst, did it impair your functioning in any way?*” 1 = *No interference/impairment* ~ 5 = *Extreme interference/impairment*), based on a 1–5 point scale. Thus, severity scores ranged from 3 to 15, with higher scores indicating greater severity. Then, group classification was assigned based on the behavior with the highest severity score. Participants whose highest scores were the same for more than one category were assigned to the ‘tie’ group. The final groups included hair pulling (*n* = 102; severity score = 5.34 [*SD* = 2.48]), skin picking (*n* = 216; severity score = 6.06, [*SD* = 2.19]), nail picking (*n* = 253; severity score = 5.63, [*SD* = 1.97]), nail biting (*n* = 487; severity score = 5.65, [*SD* = 2.03]), cheek biting (*n* = 300; severity score = 5.41, [*SD* = 1.93]), and NSSI (*n* = 165; severity score = 8.30, [*SD* = 2.57]). There were 111 individuals in the ‘tie’ category, and their data were excluded from the analyses for the sake of ensuring the clarity of our findings in group comparisons and minimizing the impact of co-occurring BFRBs/NSSI on their clinical features.

## 5.3. Measures

### *BFRBs and NSSI.*

An 11-item questionnaire was developed to assess features of BFRBs and NSSI for the current study. The questionnaire assesses the extent to which an individual engages in the target behavior, and factors associated with the behavior. Three primary domains were assessed in this study: behavioral pattern, motivation, and consequences. *Behavioral pattern* consists of three items that evaluate the extent to which BFRBs/NSSI are completed (1) automatically without awareness, (2) while in a trance-like state, and/or (3) to follow a routine. *Motivation* consists of five items that assess the reasons why individuals engage in BFRBs/NSSI, including to (1) feel something (e.g., relieve feelings of emptiness), (2) communicate/get attention, (3) get away from something/someone, (4) fix appearance, and (5) achieve a “just right” feeling. *Consequence* consists of three items that address the perceived outcomes of BFRBs/NSSI, including (1) reduction in tension/anxiety, (2) reduction in boredom, and (3) relief/gratification. Internal consistency for the 11-items of the BFRB/NSSI questionnaire (see Table 1) was excellent ( $\alpha = 0.94$ ).

Table 1. Eleven items of clinical features in BFRB/NSSI questionnaires.

<b>Behavioral Pattern</b>
Did the behavior occur automatically?

Did the behavior occur in a trance-like state?
Was the behavior performed as part of a routine/ritual?
<b>Motivation</b>
Was the behavior performed to feel something?
Was the behavior performed to get attention?
Was the behavior performed to get out of doing things?
Was the behavior performed to fix your appearance?
Was the behavior performed to achieve a “just right” feeling?
<b>Consequences</b>
Did the behavior reduce tension/anxiety?
Did the behavior reduce boredom?
Did the behavior provide relief or gratification?

*Note.* These 11 items were assessed using the following 5-point scale: 1 = Never or Almost Never (0–10%); 2 = A little of the time (11–35%); 3 = Some of the time (30–70%); 4 = Most of the time (71–89%); 5 = All of the time (90–100%).

*Depression, Anxiety, and Stress Scales (DASS;*

Lovibond and Lovibond, 1995). The DASS-21 is a 21-item measure of emotional distress (depression, anxiety, and stress). Responses are anchored on a 4-point Likert-type scale with higher scores indicating greater emotional distress. The DASS-21 showed strong psychometric properties across subfactors, depression ( $\alpha = 0.94$ ), anxiety ( $\alpha = 0.87$ ), and stress ( $\alpha = 0.91$ ) among clinical and nonclinical samples (Antony et al., 1998). In the current sample, reliability was excellent for the total score ( $\alpha = 0.95$ ) and depression ( $\alpha = 0.92$ ), and good for the anxiety ( $\alpha = 0.86$ ) and stress ( $\alpha = 0.88$ ) scales.

*Obsessive-Compulsive Trait Core Dimensions Questionnaire (OC-TCDQ;*

Summerfeldt et al., 2014). The OC-TCDQ is a 20-item measure that assesses harm avoidance (HA) and incompleteness (INC). Each item is rated from 0 (never) to 4 (always). Summerfeldt et al. (2014) reported that confirmatory factor analysis supported a two-factor structure (HA and INC). The reliability of the two factors was excellent among the clinical sample for HA ( $\alpha = 0.92$ ) and INC ( $\alpha = 0.91$ ), and good among the nonclinical sample for HA ( $\alpha = 0.89$ ) and INC ( $\alpha = 0.88$ ). There was good convergent validity with other OC-symptom measures. The internal consistency of the OC-TCDQ in the current sample was excellent for HA ( $\alpha = 0.93$ ) and INC ( $\alpha = 0.93$ ).

## 6. Results

To test clinical similarities and differences between BFRBs and NSSI, a series of one-way ANOVAs were conducted to examine group differences between BFRBs and NSSI on each of the clinical characteristics of interest. Bonferroni correction was used to control for Type I error inflation in multiple comparisons (.05/11) with statistical significance at  $p = .004$ . Following up on a significant F-test result, we conducted Bonferroni post-hoc comparisons to identify the location of group differences.

### 6.1. Clinical characteristics

A chi-square test for gender by condition was statistically significant ( $\chi^2 = 32.11, p < .001$ ) (Table 2). Overall, the percentage of females appeared to be higher in the NSSI group (= 84.9% females, 15.1% males) than the average of the entire sample (= 69.7% females, 30.3% males). On average, the BFRB categories together included 68.5% of females and 31.5% of males. This pattern of gender distribution is largely consistent with the literature (Bresin and Schoenleber, 2015; Favazza and Conterio, 1989;



Moran et al., 2012; Nock and Prinstein, 2004, APA, 2013). Participants were placed in specific categories based on the primary problem endorsed. Table 3 shows the total number of individuals who reported BFRB/NSSI problems. The results reveal that 62% (n = 947) of the individuals reported a single BFRB/NSSI (as the primary problem) with no other co-occurring BFRB/NSSI, 26% (n = 398) had 1 additional BFRB/NSSI, 9% (n = 140) reported 2 additional BFRBs/NSSI, 2% (n = 35) endorsed 3 additional BFRBs/NSSI, 1% (n = 13) had 4 additional BFRBs/NSSI, and less than 1% (n = 2) reported 5 BFRBs/NSSI.

Table 2. Means and SDs of phenomenological measures of BFRBS and NSSI.

	HP		SP		NP		NB		CB		NSSI	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BFRB/NSSI Questionnaire												
Performed automatically	3.31	1.36	3.25	1.21	3.49	1.18	3.70	1.07	3.75	1.15	1.66	1.03
Performed while in a trance	2.71	1.32	2.41	1.25	2.43	1.20	2.49	1.25	2.47	1.29	2.38	1.39
Performed as a routine/ritual	1.54	1.02	1.50	0.96	1.28	0.69	1.21	0.63	1.25	0.72	1.82	1.29
Performed to feel something	1.81	1.18	1.45	0.86	1.38	0.80	1.36	0.83	1.50	1.01	3.93	1.10
Performed to get attention	1.32	0.83	1.10	0.43	1.20	0.63	1.11	0.42	1.16	0.58	1.95	1.23
Performed to 'get away'	1.39	0.86	1.20	0.64	1.22	0.63	1.16	0.55	1.15	0.60	1.44	0.95
Performed to fix appearance	2.31	1.48	2.56	1.50	1.70	1.09	1.44	0.83	1.29	0.75	1.35	0.91
Performed for 'just right' feeling	1.95	1.18	1.79	1.22	1.61	1.04	1.61	1.05	1.58	0.98	2.55	1.51
Reduced tension	2.38	1.14	2.18	1.20	2.33	1.15	2.53	1.19	2.58	1.22	3.70	1.17
Reduced boredom	2.96	1.28	2.84	1.30	2.87	1.15	2.95	1.16	2.68	1.22	1.79	1.17
Provided gratification/relief	2.57	1.33	2.42	1.24	2.15	1.13	2.18	1.19	2.25	1.26	3.70	1.15
OCTCDQ												
Harm Avoidance	20.97	8.11	23.14	9.16	21.48	8.99	21.94	9.07	22.59	9.22	26.09	9.92
Incompleteness	24.64	9.25	25.80	9.59	23.78	9.39	24.28	9.53	24.77	9.85	27.22	9.89
DASS												
Stress	26.88	9.55	27.06	9.02	25.11	9.16	24.89	9.04	26.91	9.64	33.37	11.03
Anxiety	22.14	9.25	21.38	8.01	20.68	7.94	20.08	7.18	21.50	8.18	27.35	11.16
Depression	23.80	9.96	22.99	8.10	22.58	8.91	21.73	8.64	23.73	10.30	31.88	12.73
Total	72.82	26.31	71.42	23.84	68.37	23.85	66.70	22.40	72.06	25.61	92.60	31.74
Age and Duration												
Age of Onset	13.57	4.23	12.77	4.29	11.14	4.44	9.76	3.61	13.11	4.21	14.36	2.76
Duration of Symptoms	3.27	3.40	5.82	4.52	6.73	4.12	7.65	4.40	5.24	3.97	3.40	2.87
% Symptom Free	45%		30%		37%		44%		29%		78%	
% Male	32%		26%		37%		35%		28%		31%	
% Female	68%		74%		63%		65%		72%		69%	

Note. HP = hair pulling, SP = skin picking, NP = nail picking, NB = nail biting, CB = cheek biting, NSSI = non-suicidal self-injury.

Table 3. The number of co-occurring BFRBs/NSSI per group.

Primary Category	No additional		1 additional		2 additional		3 additional		4 additional		5 additional		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n
HP	70	67.31	24	23.08	9	8.65	1	0.96	0	0.00	0	0.00	104
SP	136	62.39	50	22.94	22	10.09	7	3.21	2	0.92	1	0.45	218
NP	168	66.40	64	25.30	16	6.32	3	1.19	2	0.79	0	0.00	253
NB	315	64.29	130	26.53	36	7.35	6	1.22	2	0.41	1	0.20	490
CB	195	65.00	70	23.33	26	8.67	7	2.33	2	0.67	0	0.00	300
NSSI	63	37.95	60	36.14	29	17.47	9	5.42	5	3.01	0	0.00	166
Total	947	61.69	398	25.92	140	9.10	35	2.28	13	0.84	2	0.13	1535

Note. No additional = Having the primary problem with no other co-occurring BFRB/NSSI; 1 additional = Having the primary problem with one additional BFRB/NSSI ~5 additional = Having the primary problem with five additional BFRBs/NSSI.

*Behavioral pattern: Performed automatically without awareness.*

There was a significant group difference in behavioral automaticity,  $F(5, 1517) = 90.22, p < .001$ . The NSSI group ( $mean = 1.66, SD = 1.03$ ) reported less automaticity than individuals in the hair pulling group ( $mean = 3.31, SD = 1.36$ ), skin picking group ( $mean = 3.25, SD = 1.21$ ), nail picking group ( $mean = 3.49, SD = 1.18$ ), nail biting group ( $mean = 3.70, SD = 1.07$ ), and cheek biting group ( $mean = 3.75, SD = 1.15$ ),  $ps < .001$ .

*Behavioral pattern: Performed while in a trance.*

A one-way ANOVA revealed no significant differences between groups,  $F(5, 1517) = 1.03, p = .40$ .

*Behavioral pattern: Performed to follow routine before or after behavior.*

There was a significant group difference,  $F(5, 1517) = 16.80, p < .001$ . With the exception of the hair pulling group ( $p = .11$ ), the NSSI group ( $mean = 1.82, SD = 1.29$ ) reported greater routine behaviors than all other BFRB groups, skin picking group ( $mean = 1.50, SD = 0.96$ ), nail picking group ( $mean = 1.28, SD = 0.69$ ), nail biting group ( $mean = 1.21, SD = 0.63$ ), and cheek biting group ( $mean = 1.25, SD = 0.72$ ),  $ps < .004$ .

*Motivation: Performed to feel something (i.e., relieve feelings of emptiness).*

There was a significant group difference,  $F(5, 1517) = 216.53, p < .001$ . The NSSI group ( $mean = 3.93, SD = 1.10$ ) reported engaging in NSSI more to relieve feelings of emptiness, relative to the hair pulling group ( $mean = 1.18, SD = 1.18$ ), skin picking group ( $mean = 1.45, SD = 0.86$ ), nail picking group ( $mean = 1.38, SD = 0.80$ ), nail biting group ( $mean = 1.36, SD = 0.83$ ), and cheek biting group ( $mean = 0.50, SD = 1.01$ ),  $ps < .001$ .

*Motivation: Performed to communicate or to get attention.*

There was a significant group difference,  $F(5, 1517) = 46.32, p < .001$ . The NSSI group ( $mean = 1.95, SD = 1.23$ ) reported a greater motivation to communicate or seek attention than the hair pulling group ( $mean = 1.32, SD = 0.83$ ), skin picking group ( $mean = 1.10, SD = 0.43$ ), nail picking group ( $mean = 1.20, SD = 0.63$ ), nail biting group ( $mean = 1.11, SD = 0.42$ ), and cheek biting group ( $mean = 1.16, SD = 0.58$ ),  $ps < .001$ .

*Motivation: Performed to get away from something or someone.*

There was a significant group difference,  $F(5, 1517) = 6.65, p < .001$ . The NSSI group ( $mean = 1.44, SD = 0.95$ ) reported a greater intention for "getting away from something/someone" than the nail biting group ( $mean = 1.16, SD = 0.55$ ) and cheek biting group ( $mean = 1.15, SD = 0.60$ ),  $ps < .001$ , but not the hair pulling group ( $mean = 1.39, SD = 0.86$ ), skin picking group ( $mean = 1.20, SD = 0.64$ ), and nail picking group ( $mean = 1.22, SD = 0.63$ ),  $ps > .004$ .

*Motivation: Performed to fix aspect of appearance.*

There was a significant group difference,  $F(5, 1517) = 55.13, p < .001$ . The NSSI group ( $mean = 1.35, SD = 0.91$ ) reported less intention for altering appearance, relative to the hair pulling group ( $mean = 2.31, SD = 1.48$ ) and skin picking group ( $mean = 2.56, SD = 1.50$ ),  $ps < .001$ , but not the nail picking group ( $mean = 1.70, SD = 1.09$ ), nail biting group ( $mean = 1.44, SD = 0.83$ ), and cheek biting group ( $mean = 1.29, SD = 0.75$ ),  $ps > .004$ .

*Motivation: When performing, trying to achieve a “just right” feeling.*

There was a significant group difference,  $F(5, 1517) = 90.22, p < .001$ . The NSSI group ( $mean = 2.55, SD = 1.51$ ) had greater intentions to gain a “just right” feeling relative to the hair pulling group ( $mean = 1.95, SD = 1.18$ ), skin picking group ( $mean = 1.79, SD = 1.22$ ), nail picking group ( $mean = 1.16, SD = 1.04$ ), nail biting group ( $mean = 1.61, SD = 1.05$ ), and cheek biting group ( $mean = 1.58, SD = 0.98$ ),  $ps < .004$ ).

*Consequence: Reduction in tension and anxiety.*

There was a significant group difference,  $F(5, 1517) = 37.38, p < .001$ . The NSSI group ( $mean = 3.70, SD = 1.17$ ) reported more engagement in NSSI to reduce tension and anxiety than the hair pulling group ( $mean = 2.38, SD = 1.14$ ), skin picking group ( $mean = 2.18, SD = 1.20$ ), nail picking group ( $mean = 2.33, SD = 1.19$ ), nail biting group ( $mean = 2.53, SD = 1.19$ ), and cheek biting group ( $mean = 2.58, SD = 1.22$ ),  $ps < .001$ .

*Consequence: Reduction in boredom.*

There was a significant group difference,  $F(5, 1517) = 25.23, p < .001$ . The NSSI group ( $mean = 1.79, SD = 1.17$ ) reported less reduction in boredom than the hair pulling group ( $mean = 2.96, SD = 1.28$ ), skin picking group ( $mean = 2.84, SD = 1.30$ ), nail picking group ( $mean = 2.87, SD = 1.15$ ), nail biting group ( $mean = 2.95, SD = 1.16$ ), and cheek biting group ( $mean = 2.68, SD = 1.22$ ),  $ps < .001$ .

*Consequence: Relief or gratification.*

There was a significant group difference,  $F(5, 1517) = 44.70, p < .001$ . The NSSI group ( $mean = 3.70, SD = 1.15$ ) reported greater experience of relief or gratification than the hair pulling group ( $mean = 2.57, SD = 1.33$ ), skin picking group ( $mean = 2.42, SD = 1.24$ ), nail picking group ( $mean = 2.15, SD = 1.13$ ), nail biting group ( $mean = 2.18, SD = 1.19$ ), and cheek biting group ( $mean = 2.25, SD = 1.26$ ),  $ps < .001$ .<sup>2</sup>

*Age of onset.*

There was a significant group difference in age of onset,  $F(5, 1494) = 54.17, p < .001$  (Table 2). The NSSI group reported that symptoms emerged at older age ( $mean\ age = 14.36, SD = 2.76$ ) than the skin picking ( $mean\ age = 12.77, SD = 4.29$ ), nail picking ( $mean\ age = 11.14, SD = 4.44$ ), and nail biting ( $mean\ age = 9.76, SD = 3.61$ ) groups,  $ps < .004$ . There was no significant difference between the NSSI group and the hair pulling ( $mean\ age = 13.57, SD = 4.23$ ) and cheek biting groups ( $mean\ age = 13.11, SD = 2.53$ ),  $ps > .004$ .

*Emotional distress: Depression, anxiety, and stress.*

There were significant differences between groups across DASS-Depression  $F(5, 1504) = 28.11, p < .001$ , DASS-Anxiety  $F(5, 1504) = 19.76, p < .001$ , and DASS-Stress,  $F(5, 1504) = 21.33, p < .001$ . The NSSI group reported significantly higher levels of depression ( $mean = 31.88, SD = 12.73$ ) than the BFRB groups ( $means\ range = 21.73\ to\ 23.8, SDs\ range = 8.64\ to\ 9.96$ ),  $ps < .001$ , higher levels of anxiety ( $mean = 27.35, SD = 11.16$ ) than the BFRB groups ( $means\ range = 20.08\ to\ 22.14, SDs\ range = 7.18\ to\ 9.25$ ), and higher levels of stress ( $mean = 33.37, SD = 11.03$ ) than the BFRB groups ( $means\ range = 24.86\ to\ 27.06, SDs\ range = 9.02\ to\ 9.64$ ).

### Obsessive-Compulsive Trait Dimensions.

There were significant group differences in Harm Avoidance,  $F(5, 1503) = 6.77, p < .001$ . The NSSI group reported significantly higher scores ( $mean = 26.09, SD = 9.92$ ) of harm avoidance than the BFRB groups ( $means\ ranged = 20.97\ to\ 23.14, SDs = 8.11\ to\ 9.22$ ),  $ps < .05$ . There was no significant difference in harm avoidance scores among the various BFRBs. There were also significant group differences in incompleteness scores,  $F(5, 1502) = 3.36, p = .005$ . Bonferroni post-hoc analysis showed that the NSSI group was significantly higher than nail picking ( $mean = 23.78, SD = 9.39$ ) and nail biting ( $mean = 24.28, SD = 9.53$ ), but not hair pulling, skin picking, and cheek biting groups. Table 4 provides a summarized result of the similarities and differences between NSSI and BFRBs.

Table 4. Summary of results for one-way ANOVAs comparing BFRBs and NSSI.

Clinical Features	BFRBs	NSSI	Notes
Reduced tension	Lower	Higher	
Reduced boredom	Higher	Lower	
Produced gratification/relief	Lower	Higher	
Performed automatically	Higher	Lower	
Performed while in a trance	No difference	No difference	
Performed to feel something	Lower	Higher	
Performed to get attention	Lower	Higher	
Performed to 'get away'	Lower	Higher	No differences between NSSI and HP
Performed to fix appearance	Higher	Lower	No differences between NSSI and NB, NP, and CB
Performed as a routine/ritual	Lower	Higher	No differences between NSSI and HP
Performed for 'just right' feeling	Lower	Higher	
Stress	Lower	Higher	
Anxiety	Lower	Higher	
Depression	Lower	Higher	
Harm Avoidance	Lower	Higher	NSSI greater than NP and NB
Incompleteness	Mixed	Mixed	No differences between NSSI and HP, SP, CB

Note: HP = hair pulling; SP = skin picking; NB = nail biting; NP = nail picking; CB = cheek biting; NSSI = non-suicidal self-injury.

## 7. Discussion

Given uncertainty about the classification of BFRBs and NSSI (Klonsky, 2011; McKay and Andover, 2012; Nock and Favazza, 2009; Sacks et al., 2008), this study sought to acquire empirical data to compare clinical features between BFRBs and NSSI to better understand their similarities and differences. Our data demonstrated that BFRBs and NSSI can be distinguished across important clinical features. In terms of the overall behavioral pattern, BFRBs were more likely than NSSI to be performed with reduced awareness. Thus, automaticity does not appear to be a prominent feature of NSSI compared

to various BFRBs. Relative to BFRBs, NSSI was also more strongly associated with specific social-affective goals aimed at gratifying one's emotional needs (e.g., to feel something/reduce feelings of emptiness, to communicate/receive attention, to avoid unwanted circumstances, and/or to gain a “just right” feeling). Similarly, other studies showed that individuals with NSSI report engaging in self-harm to reduce negative affect, signal personal distress to others, express anger, punish oneself, generate normal feelings, and distract oneself (Brown et al., 2002; Lloyd-Richardson et al., 2007; Wilkinson and Goodyer, 2011). In contrast, those with BFRBs endorsed wanting “to fix aspects of appearance” more than those with NSSI, which may reflect their urges to perform body-focused behaviors (e.g., the need to smooth out skin imperfections, pull out hair that appears out of place, or bite irregularities on nails or skin). Thus, NSSI is more likely to be related to affective reasons, whereas BFRBs are more likely to be linked to appearance-related reasons.

Additionally, regarding emotional consequences and correlates, NSSI is characterized by the reduction in tension or anxiety, and experiences of relief and gratification. Conversely, BFRBs are characterized more by a reduction in boredom. Relatedly, our data showed that NSSI is associated with higher levels of depression, stress, and anxiety than BFRBs. Existing findings also support that BFRBs occur for a variety of reasons including boredom, as well as anxiety/tension (Penzel, 2003; Snorrason et al., 2010). Thus, overall findings indicate that one's negative affective state (i.e., depression and anxiety) is greatly pronounced in NSSI, and reducing such negative emotions is a more important consequence intended by NSSI, relative to BFRBs. Additionally, we found that those with NSSI reported a higher level of harm avoidance than those with BFRBs. Harm avoidance is a personality trait strongly associated with the experience of negative affect, especially depressive symptoms (Abrams et al., 2004; Brown et al., 1992; Cloninger et al., 2006; Elovainio et al., 2004; Hansenne et al., 1999). In sum, these data suggest the possibility that NSSI is more strongly related to down-regulation of negative affect, relative to BFRBs.

Taken together, the current data indicate that NSSI is clearly distinguished from BFRBs in several aspects. Relative to BFRBs, NSSI is less automatic, and oriented toward emotional goals (e.g., reducing negative feelings) and social-affective goals (e.g., getting attention/avoiding someone).

This distinctive pattern of clinical features yields important implications for clinical intervention. For example, since NSSI rarely occurs without *awareness*, habit reversal training (HRT), a therapeutic technique that focuses on awareness training (Azrin et al., 1980) may not be appropriate for this problem, whereas awareness training evaluating the antecedents, emotions, and consequences of the behavior would be crucial in addressing BFRBs. In contrast, focusing directly on emotional dysregulation and maladaptive motivations of the behavior (e.g., Dialectical Behavior Therapy) may be a more important treatment approach for NSSI (Hawton et al., 1998; Muehlenkamp, 2005; Suyemoto, 1998). NSSI is employed heavily in the presence of negative affect to cope with both internalizing and externalizing disorders (Peterson et al., 2008).

There are several limitations that should be noted. First, the current study relied on self-report measures for classification of BFRB/NSSI problems. Although we assessed multiple domains of target symptoms (i.e., damage, distress, and impairment) to identify one's primary BFRB/NSSI problem, the exclusive reliance on self-report measures for classification is clearly a limitation of the study. Future research may employ clinical interview-based measures to assess individuals with BFRBs/NSSI. Second, the current data were obtained from a large student sample, although we included only individuals who clearly endorsed the experience of BFRBs/NSSI through a prescreening procedure. Replication is

required to further evaluate the pattern of findings, using a clinical sample that display moderate to severe levels of BFRB/NSSI symptoms with marked distress and impairment in functioning. Third, in order to compare their clinical features across well-recognized BFRB/NSSI categories, we classified individuals into discrete BFRB/NSSI groups based on their primary condition. Nevertheless, this may not be the most ideal analytic approach given many individuals reported co-occurring BFRBs/NSSI across multiple categories and a single primary category may not adequately represent clinical manifestations. Future research may include an advanced analytic technique (e.g., latent class model) to identify the subgroups of BFRB/NSSI, which more accurately reflect the underlying pattern of complex multivariate data among the affected individuals. Fourth, we treated NSSI as a single category, although there may be heterogeneous subgroups of NSSI with different functions or clinical features (e.g., deliberate vs non-deliberate self-harm, Jacobson et al., 2008; positively-reinforcing vs. negatively-reinforcing NSSI, Zetterqvist et al., 2013). It is important to assess different types of NSSI as they can show different clinical features, including endorsement rates (Robinson and Wilson, 2019). Future investigations should systematically examine potentially diverse clinical features within various patterns of NSSI. Fifth, in order to include a variety of individuals with NSSI and BFRBs, inclusion criteria were based on a limited scope of these problems (i.e., the frequency of engagement within one's lifetime), not taking into account severity or impairment. However, it should be noted that our screening question was asking them to indicate the frequency of "excessive" engagement of NSSI or BFRBs. Further, we subsequently considered severity and impairment caused by these problems, which enabled us to identify the primary problems distributed across all BFRB/NSSI categories. Future studies need to consider developing a more comprehensive approach to screen and identify individuals presenting with clinical levels of NSSI/BFRB problems. Sixth, severity scores, which were used to identify one's primary behavior, revealed that the NSSI group showed an overall greater level of severity, relative to the BFRB groups. It is beyond the scope of the current study to systematically assess and compare overall clinical severity across various BFRB/NSSI conditions. Evidence suggests that clinical severity could significantly vary even within the NSSI group as a function of the type of behaviors (e.g., picking vs. cutting; Croyle and Waltz, 2007). It is important for future research to examine the overall clinical severity of various BFRB/NSSI problems more adequately, while systematically addressing the clinical heterogeneity within these conditions. Finally, we did not directly assess appearance concerns related to body dysmorphic disorder (BDD) in this study, so we are not able to tell if elevated appearance concerns in BFRBs (such as skin picking) were indeed reflective of the symptoms of BDD. Studies have shown that individuals with BDD often pick skin in order to correct perceived flaws in appearance (Grant et al., 2006). However, the prevalence of BDD appears to be relatively low among those with skin picking problems (Grant et al., 2010), which suggests that BDD-related skin picking may represent a relatively distinct clinical phenomenon compared to skin picking in SPD (Snorrason et al., 2013). Nevertheless, we cannot rule out the possibility that the elevated appearance concerns in BFRBs within the current study was to some degree accounted for by BDD-related concerns. Future research should systematically assess BDD-related concerns and its comorbidity, to better understand the distinctive features of BFRBs that involve concerns about appearance (APA, 2013). Despite the limitations, the current data are expected to contribute to the literature by demonstrating important differences in clinical features between BFRB and NSSI conditions. Improved knowledge of their distinctive clinical features will likely help the field accurately identify, assess, and treat individuals displaying these problems.

## Declaration of competing interest

The authors of the current manuscript have no conflict of interest to report.



## CRedit authorship contribution statement

**Abel S. Mathew:** Conceptualization, Writing - original draft. **Taylor P. Davine:** Conceptualization, Writing - original draft. **Ivar Snorrason:** Conceptualization, Writing - original draft, Data curation, Writing - review & editing. **David C. Houghton:** Writing - original draft, Writing - review & editing. **Douglas W. Woods:** Conceptualization, Writing - review & editing. **Han-Joo Lee:** Conceptualization, Writing - original draft.

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<sup>1</sup>Both authors contributed equally to this manuscript.

<sup>2</sup>We conducted additional analyses including individuals with BFRBs who reported heightened symptom severity at a comparable level to that of the NSSI group ( $n = 165$ ; severity  $M = 8.70$ ,  $SD = 2.55$ ). The selected BFRB groups included individuals with hair pulling ( $n = 47$ ; severity  $M = 8.66$ ,  $SD = 2.00$ ), skin picking ( $n = 92$ ; severity  $M = 8.67$ ,  $SD = 1.71$ ), nail picking ( $n = 46$ ; severity  $M = 8.70$ ,  $SD = 1.44$ ), nail biting ( $n = 126$ ; severity  $M = 8.67$ ,  $SD = 1.78$ ), and cheek biting ( $n = 61$ ; severity  $M = 8.67$ ,  $SD = 1.91$ ). The selected BFRB sample included 371 individuals (= approximately the top 28% of the original BFRB sample). Thus, all BFRB and NSSI groups had equivalent severity scores (=approximately 8.70). Using these samples, we repeated our main analyses on the 11 key clinical features across the three domains. The overall findings remained largely identical to those based on the entire study sample. We also repeated the same analyses by collapsing all the BFRB groups ( $n = 371$ , severity  $M = 8.67$ ,  $SD = 1.77$ ) in comparison to the NSSI group. The overall pattern of findings remained unchanged. In summary, compared to the BFRB groups, the NSSI group reported significantly lower automatic behaviors, lower trance-like behavior, and greater routine/ritualistic behavior ( $ps < .001$ ). The NSSI group also reported significantly greater motivation to relieve feelings of emptiness or feel something, communicate or seek attention, and achieve a “just right” feeling, but lower motivation to alter appearance ( $ps < .001$ ). As a consequence of engaging in the behavior, the NSSI also reported a significantly greater reduction in tension or anxiety, greater gratification, but lower reduction in boredom ( $ps < .001$ ). These results suggest that the observed differences in clinical features between the NSSI and the BFRB groups are not merely due to the different levels of overall symptom severity.