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Comparing self-harming intentions underlying eating disordered behaviors and nonsuicidal self-injury: Replication and extension in adolescents

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Abstract

Objective: Eating disorder (ED) behaviors are often characterized as indirect forms of self-harm. However, recent research has found less clear demarcations between direct self-harming behaviors (e.g., nonsuicidal self-injury [NSSI], suicidal behaviors) than previously assumed. The aim of this study was to replicate findings of this prior research on adult populations in adolescents with a history of restrictive eating.

Method: A total of 117 adolescents between ages 12–14 were included in the study. Participants reported the presence and frequency of binge eating, compensatory, restrictive eating, and NSSI. Participants also reported thoughts of and intentions to hurt and kill themselves when engaging in each behavior on average. The *t*-tests and linear effects models were conducted to compare self-harming thoughts and intentions across behaviors.

Results: Participants reported at least some intent to hurt themselves physically in the moment and in the long-term when engaging in all ED behaviors and NSSI, and reported engaging in these behaviors while thinking about suicide. Direct self-harming knowledge and intentions were most frequently reported with NSSI and longer-term knowledge and intentions via NSSI and restrictive eating. Additionally, participants reported some suicidal thoughts and intentions across behaviors.

Discussion: This study replicates prior research, suggesting that adolescents engage in ED behaviors and NSSI with non-zero self-harming and suicidal thoughts and intentions. ED behaviors and NSSI may better be explained on a continuum. Implications include the recommendation of safety planning during ED treatment.

Public Significance Statement: This study highlights the overlap between eating disorder (ED) behaviors, nonsuicidal self-injury (NSSI), and suicide. Though clear distinctions typically exist for motives of self-harming behavior between ED behaviors (i.e., indirect, in the long run) and NSSI (i.e., direct, in the moment), this research suggests that intentions for self-harming and suicide may exist on a continuum. Clinical ED treatment should consider safety planning as part of routine interventions.

KEYWORDS
adolescents, eating disorder behaviors, nonsuicidal self-injury, replication, self-harm, suicide

1 | INTRODUCTION

Eating disorder (ED) behaviors are typically understood as behaviors enacted to control shape/weight and food intake and for emotion regulation. Regardless of these functions, ED behaviors cause physical harm and, in many instances, increase risk of long-term health problems. In line with this evidence, ED behaviors are often characterized as *indirect* forms of self-harm, as the harm enacted occurs downstream of the behaviors themselves and this harm is not assumed to be a primary intention of engagement (Claes & Muehlenkamp, 2014; St. Germain & Hooley, 2012, 2013).

ED behaviors, however, frequently co-occur with direct (i.e., intentional, immediate) self-harming behaviors such as nonsuicidal self-injury (NSSI; Germain & Hooley, 2012). Reflecting these high rates of co-occurrence, emerging evidence suggests self-harming intentions may provide less clear demarcations between NSSI and ED behaviors than previously assumed. Specifically, in a study on self-harming intentions underlying NSSI and ED behaviors among adults, Fox et al. (2019) found that many participants reported direct intention to hurt themselves physically, both in the short and in the long-term, via NSSI, restrictive eating, binge eating, and compensatory behaviors. Moreover, participants reported engaging in these behaviors (typically considered to be *non*suicidal) while thinking about suicide and even with suicidal intent, particularly in the context of NSSI and restrictive eating.

Given the novelty of this finding, alongside increasing interest and awareness of the importance of conducting replicable and reproducible work in the eating disorders field (and clinical science more broadly; Burke et al., 2021; Tackett et al., 2019), we aimed to replicate and extend this work in an adolescent population, given that ED behaviors and NSSI tend to onset in adolescence (Cipriano et al., 2017; Volpe et al., 2016). We aimed to: (1) examine whether adolescents report direct self-harming intentions and knowledge of harm across ED behaviors; (2) examine whether adolescents report engaging in NSSI and ED behaviors alongside cognitions and intentions of suicide; and (3) compare differences across direct and indirect self-harm and suicide-relevant intentions within NSSI and ED behaviors.

2 | METHOD

2.1 | Participants and procedures

Participants were recruited as part of a larger longitudinal study examining ED behaviors and NSSI in adolescents ($N = 457$; see Wang et al., 2021). Instagram advertisements were directed toward adolescents who engaged in restrictive eating by marketing algorithms based on ED behavior keywords (e.g., "restrict," "diet"). Participants were eligible if they were between the ages of 12–14 at the time of the assessment, able to read and write in English, lived within the United States, and indicated they engaged in two or more past month episodes of restrictive eating. Participant assent was obtained online, and parent consent was waived due to low risk of this study design (Smith et al., 2022), in accordance with ethical approval of study procedures from the Institutional Review Board of Harvard University. The present sample included participants at Time 2 of the longitudinal study ($n = 117$; three-month follow-up from baseline), as our primary outcome measure of self-harming and suicidal thoughts and behaviors was only included at this second timepoint.

2.2 | Measures

Assessment of eating disorder behaviors. We assessed the presence and frequency of restrictive eating with a modified version of the single-item dietary restriction screener (DRS; Haynos & Fruzzetti, 2015). The DRS first clearly defines restrictive eating, provides examples, and asks participants to indicate if they have engaged in restrictive eating in the past month. Similar to Wang et al. (2021), we adapted the DRS to assess past three-month frequency of restrictive eating (full measure in Supplemental Materials). The DRS shows strong predictive validity and reliability and predicts objective reduced in vivo food intake better than other measures of restrictive eating in adults (Haynos & Fruzzetti, 2015).

We assessed the presence and frequency of binge eating and compensatory behaviors using language adapted from the Eating Disorders Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 2008; full measure in Supplemental Materials). Like the structure of the DRS, we first defined binge eating and compensatory behaviors (vomited, taken laxatives, exercised in a "driven" or "compulsive" way) and asked participants to indicate if they engaged in this behavior in the past 3 months, and to report the frequency of these behaviors over the past 3 months.

Self-injurious thoughts and behaviors interview-revised (SITBI-R; Fox et al., 2020). History of suicidal and self-injurious thoughts and behaviors was assessed with an abbreviated version of the SITBI-R. The SITBI-R measures the presence and frequency of a range of self-injurious thoughts and behaviors, including nonsuicidal self-injury, suicide ideation, suicide plans, and suicide attempts. The SITBI-R has demonstrated strong interrater reliability, test-retest reliability, and construct validity for adolescent populations (Gratch et al., 2022), as well as when it is administered online (Fox et al., 2020).

Immediate and longer-term consequences from eating disorder behaviors and nonsuicidal self-injury (Fox et al., 2019). This measure was developed to assess relevant self-harming and suicide-relevant thoughts and intentions across average episodes of NSSI and ED behaviors. Specifically, participants indicate their knowledge of and intent to cause physical harm in the short and long-term, and their thoughts of suicide and intent to die/knowledge of lethality when engaging in NSSI, restrictive eating, binge eating, and compensatory behaviors. All questions are answered when considering the average episode using a Likert-type scale ranging from 0 (not at all often) to 6 (extremely often). The scale showed strong internal consistency (Cronbach's alpha = .93) and the full version is available in Fox et al. (2019).

2.3 | Data analytic plan

This study aimed to replicate Fox et al. (2019), and therefore the same analytic strategies were implemented. First, descriptive characteristics of the sample (e.g., age, race/ethnicity) were examined as well as history of SITBs and ED behaviors. Second, a series of one-Sample *t*-tests were conducted to assess whether mean scores on each item in the *Immediate and longer-term consequences from eating disorder behaviors and nonsuicidal self-injury* scale were significantly different from zero (i.e., "not at all"). Third, two linear mixed effects models were fit to examine whether (1) self-harming item scores and (2) suicide/death item scores were significantly different across behavior types (i.e., restrictive eating, compensatory behavior, binge eating, NSSI) while accounting for correlations across items and interdependencies across participants. Models were used to examine the relationship between (1) behavior type and self-harming cognitions and intentions, and (2) behavior type and suicide and death and related cognitions and intentions. For both models, fixed effects were entered as (1) behavior type and self-harming cognitions and intentions, and (2) behavior type and suicide and death related cognitions and intentions. Next, random effects were added including behavior type and item score. Likelihood ratio tests were used to determine whether these random effects improved model fit compared to models with fixed slopes only; in both cases, they did ($p < .001$); however, the fits were singular when random slopes were added to the models. Thus, fixed effects for both linear mixed effects models were used. Finally, a model was created including the interaction between (1) behavior type and self-harming cognitions and intentions and (2) behavior type and suicide and death related cognitions and intentions. Likelihood ratio tests were conducted to determine if interactions improved model fit. To test for differences in responses across behavior types, post hoc Holm-corrected tests were conducted.

Data were analyzed using R (R Core Team, 2012), using the lme4 (Bates et al., 2015), lsmeans (Lenth, 2016), sjPlot (Lüdecke, 2018), ggplot2 (Wickham, 2009), and ggstatsplot (Patil, 2018) packages.

3 | RESULTS

3.1 | Demographic and clinical characteristics

Age, race/ethnicity, and sexual orientation were determined based on participant self-report at Time 1 of the study. Among those who completed this assessment, the average age was 13.76 ($SD = .49$). Most participants reported being assigned female at birth ($n = 111$; 95%), as women/girl for gender ($n = 88$; 75%), and as White for race ($n = 69$; 59%). The most commonly reported sexual orientation was Bisexual ($n = 47$, 40%).

Participants reported ED and self-harm behaviors in the past 3 months. Participants indicated engaging in a total of 103 restrictive eating episodes with an average of 28.55 times ($SD = 27.26$), 66 binge-eating episodes with an average of 7.91 times ($SD = 13.19$), 31 compensatory behavior episodes with an average of 2.10 times ($SD = 6.41$), and 62 NSSI episodes with an average of 6.68 times ($SD = 14.24$). Many participants also reported a lifetime history of suicidal thoughts ($n = 113$, 97%) and suicide attempts ($n = 52$, 44%). Full demographic descriptions can be found in Table 1.

TABLE 1 Participant characteristics ($N = 117$).

Characteristic	*n*	%
Gender identity		
Woman/girl	88	75
Man/boy	16	14
Nonbinary	6	5
Not sure	5	4
Agender	1	1
Gender fluid	1	1
Sexual orientation		
Bisexual	47	40
Heterosexual	27	23
Gay or lesbian	15	13
Not sure	10	9
Pansexual	10	9
Asexual	5	4
Not listed/prefer not to say	3	2
Sex assigned at birth		
Female	111	95
Male	4	3
Prefer not to say	2	2
Race/ethnicity		
White	69	59
Multiracial	23	20
Hispanic/Latino	14	12
Asian	8	7
Black	6	5
Native American	2	2
Lifetime history self-injurious thoughts & behaviors		
Nonsuicidal self-injury	94	80
Suicide ideation	113	97
Suicide attempts	52	44

Characteristic	*n*	Min	Max	*M*	*SD*
Age, in years	117	12	14	13.76	.49
Frequency of direct and indirect self-arm in past 3 months					
Restrictive eating	103	2	60	28.55	27.26
Binge eating	66	0	35	7.91	13.19
Compensatory behaviors	31	0	60	2.10	6.41
Nonsuicidal self-injury	62	0	40	6.68	14.24

TABLE 2 Results of one-sample *t*-test for primary study outcomes.

	M	*SD*	*n*	95% CI	*t*	*df*
To hurt body moment						
Restrict	1.85	2.04	103	1.46, 2.25	9.24***	102
Binge	.46	1.00	66	.21, .70	3.71***	65
Compensatory behaviors	1.48	1.91	31	.78, 2.19	4.32***	30
NSSI	5.21	1.86	62	4.74, 5.68	22.1***	61
Knowing hurt body moment						
Restrict	2.87	2.30	103	2.42, 3.32	12.7***	102
Binge	2.21	2.18	66	1.68, 2.75	8.24***	65
Compensatory behaviors	2.61	2.35	31	1.75, 3.47	6.20***	30
NSSI	5.76	1.76	62	5.31, 6.21	25.7***	61
To hurt body long run						
Restrict	3.30	2.20	103	2.87, 3.73	15.3***	102
Binge	1.27	.73	66	1.09, 1.45	14.1***	65
Compensatory behaviors	1.68	1.19	31	1.24, 2.12	7.82***	30
NSSI	3.15	1.99	62	2.64, 3.65	12.4***	61
Knowing hurt body long run						
Restrict	4.34	2.36	103	3.88, 4.8	18.6***	102
Binge	3.45	2.35	66	2.88, 4.03	11.9***	65
Compensatory behaviors	3.32	2.56	31	2.38, 4.26	7.22***	30
NSSI	4.24	2.25	62	3.67, 4.81	14.8***	61
Think about suicide						
Restrict	2.19	2.16	103	1.77, 2.62	10.3***	102
Binge	1.52	2.12	66	.99, 2.04	5.8***	65
Compensatory behaviors	1.71	2.15	31	.92, 2.50	4.43***	30
NSSI	4.69	1.42	62	4.33, 5.05	26.00***	61
Hope to die sooner						
Restrict	2.22	2.39	103	1.76, 2.69	9.43***	102
Binge	.67	1.50	66	.30, 1.04	3.61***	65
Compensatory behaviors	.71	1.60	31	.12, 1.30	2.48*	30
NSSI	3.15	2.44	62	2.53, 3.76	10.2***	61
Knowledge die sooner						
Restrict	2.37	2.36	103	1.91, 2.83	10.2***	102
Binge	1.09	1.86	66	.63, 1.55	4.76***	65
Compensatory behaviors	1.81	2.43	31	.92, 2.70	4.14***	30
NSSI	2.44	2.41	62	1.82, 3.05	7.97***	61
Confidence could kill self						
Restrict	2.03	2.19	103	1.60, 2.46	9.41***	102
Binge	1.12	1.62	66	.72, 1.52	5.62***	65
Compensatory behaviors	.87	1.28	31	.40, 1.34	3.78***	30
NSSI	3.66	2.15	62	3.12, 4.21	13.4***	61
To kill self						
Restrict	1.30	1.71	103	.97, 1.64	7.70***	102
Binge	.24	.66	66	.08, .404	2.99***	65
Compensatory behaviors	.36	.71	31	.09, .62	2.79***	30
NSSI	3.55	2.10	62	3.01, 4.08	13.30***	61

Abbreviations: 95% CI = 95% confidence interval for mean differences; *M* = mean; NSSI, nonsuicidal self-injury; *SD* = standard deviation.
*$p > .05$; ***$p > .001$.

3.2 | Self-harming and suicidal knowledge and intentions across ED behaviors and NSSI

Results from one-sample *t*-tests revealed that participants reported non-zero (i.e., significantly more often than "never") self-harming thoughts and intentions and suicide/death-related thoughts and intentions across NSSI, restrictive eating, binge eating, and compensatory behaviors (see Table 2). In other words, participants reported some *intent* to hurt themselves physically in the moment and the long-run, and knowledge that these behaviors would cause short- and long-term harm across all studied behaviors. Similarly, participants reported non-zero levels of thoughts of suicide, suicide intentions, confidence in lethality, and both hope and knowledge that they may die prematurely because of each behavior.

3.3 | Comparisons of self-harming knowledge and intention across ED behaviors and NSSI

Results of the first linear mixed model are shown in Table 3. The interaction between behavior type and item score significantly improved the model, $\chi^2(9) = 145.95$, $p < .001$. The intra-class correlation (ICC) from this random effects model suggested that 25% (ICC = .25) of the variability in self-harming thoughts and intentions were due to variation across people within *behavior type*; 75% of the variability was due to variation within *participants* and across behaviors. Least square means and confidence intervals across behavior type and items are plotted in Figure 1 and Holm-corrected pairwise comparisons are listed in Table 4.

Replicating prior research (Fox et al., 2019), participants reported higher intentions to and knowledge of physical harm in the moment via NSSI compared to any ED behavior. Among ED behaviors, participants reported higher intentions to cause physical harm in the moment via restrictive eating compared to binge eating. Moreover, participants reported higher intentions to and knowledge of physical harm in the long run via restrictive eating relative to any ED behavior, with no differences between restrictive eating and NSSI. Participants also reported higher intentions to cause (but not knowledge of) physical harm in the long-run via NSSI compared to compensatory behaviors and binge eating.

3.4 | Comparisons of suicide and death related cognitions and intentions via ED behaviors and NSSI

Results of the second linear multilevel model are shown in Table 5. The interaction between behavior type and item score significantly

TABLE 3 Results of linear mixed effect model comparing self-harming knowledge and intention across NSSI and ED behaviors.

	DVs		
Predictors	**Estimates**	**CI**	***p***
(Intercept)	3.11	2.62–3.60	**<.01**
Behavior (reference = nonsuicidal self-injury)			
Binge	−1.93	−2.57 to −1.30	**<.01**
Compensatory behavior	−1.50	−2.29 to −.71	**<.01**
Restrict	.12	−.45–.70	.67
Outcome (reference = knowing hurt body in moment)			
To hurt body in moment	2.06	1.44–2.69	**<.01**
Know hurt body in long run	1.10	.47–1.72	**.01**
Knowing hurt body in moment	2.61	1.99–3.24	**<.01**
Interaction terms			
Binge × to hurt/moment	−2.88	−3.75 to −2.01	**<.01**
Compensatory behavior × to hurt/moment	−2.26	−3.34 to −1.17	**<.01**
Restrict × to hurt/moment	−3.51	−4.30 to −2.72	**<.01**
Binge × knowing hurt/long run	1.09	.21–1.96	**.02**
Compensatory behavior × knowing hurt/long run	.55	−.54–1.63	.32
Restrict × knowing hurt/long run	−.06	−.85–.73	.89
Random effects			
σ^2			3.16
$\tau_{00\ ID}$			1.04
ICC			.25
N_{ID}			117
Observations			1048
Marginal R^2/conditional R^2			.32/.49

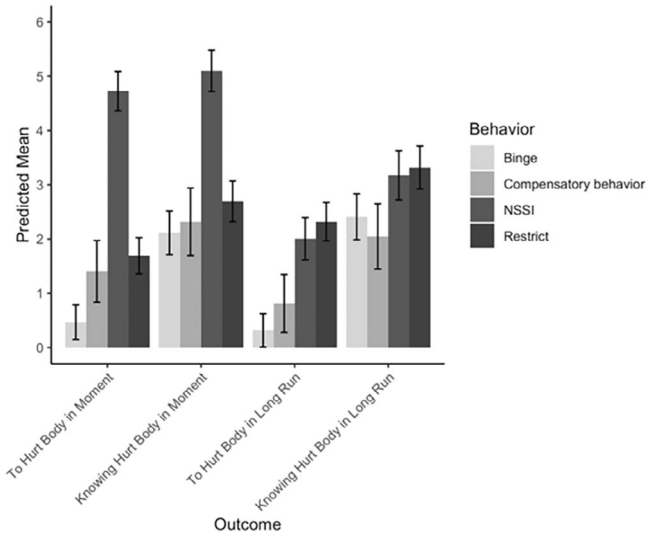

FIGURE 1 Least square mean responses and confidence intervals to self-harming cognitions and intentions across NSSI and ED behaviors.

improved the model, $\chi^2(12) = 72.29$, $p = .002$. The ICC from this random effects model suggested that 37% (ICC = .37) of the variability in suicide thoughts and intentions were due to variation across people within *behavior type*; 63% of the variability was due to variation within participants and across behaviors. Least square means and confidence intervals across behavior type and item scores are plotted in Figure 2 and Holm-corrected pairwise comparisons are listed in Table 6. Participants reported higher levels of thinking about suicide during episodes of NSSI compared to each ED behavior. Participants also reported higher levels of thinking about suicide during episodes of restrictive eating compared to binge eating, with no other significant differences across ED behaviors. Participants reported higher levels of hoping to die sooner via NSSI compared to all ED behaviors. Additionally, participants reported higher hopes of dying sooner due to restrictive eating compared to binge eating and compensatory behaviors; no differences between binge eating and compensatory behaviors emerged. Participants reported higher knowledge that they would die sooner due to NSSI and restrictive eating compared to binge eating. Finally,

TABLE 4 Results of Holm-corrected pairwise comparisons of self-harming knowledge and intentions across NSSI and ED behaviors.

Contrast	Estimate	*SE*	*df*	t.ratio	*p*.value
To hurt body in the moment					
NSSI—binge	4.81	.32	968	14.84	<.01
NSSI—compensatory behavior	3.76	.40	957	9.33	<.01
NSSI—restrict	3.39	.29	955	11.60	<.01
Binge—compensatory behavior	−1.06	.40	949	−2.67	.09
Binge—restrict	−1.43	.29	953	−4.99	<.01
Compensatory behavior—restrict	−.37	.37	953	−.99	1.00
Knowing hurt body in the moment					
NSSI—binge	3.61	.32	968	11.11	<.01
NSSI—compensatory behavior	3.18	.40	957	7.89	<.01
NSSI—restrict	2.92	.29	955	9.99	<.01
Binge—compensatory behavior	−.43	.40	949	−1.08	1.00
Binge—restrict	−.69	.29	953	−2.41	.14
Compensatory behavior—restrict	−.26	.37	953	−.70	1.00
To hurt body in the long run					
NSSI—binge	1.93	.32	968	5.95	<.01
NSSI—compensatory behavior	1.50	.40	957	3.72	.00
NSSI—restrict	−.13	.29	955	−.43	1.00
Binge—compensatory behavior	−.43	.40	949	−1.09	1.00
Binge—restrict	−2.06	.29	953	−7.19	<.01
Compensatory behavior—restrict	−1.62	.37	953	−4.34	<.01
Knowing hurt body in the long run					
NSSI—binge	.85	.32	968	2.61	.09
NSSI—compensatory behavior	.95	.40	957	2.36	.15
NSSI—restrict	−.07	.29	955	−.23	1.00
Binge—compensatory behavior	.10	.40	949	.26	1.00
Binge—restrict	−.91	.29	953	−3.19	.02
Compensatory behavior—restrict	−1.02	.37	953	−2.72	.08

Note: Degrees-of-freedom method: Kenward-Roger *p* value adjustment: holm method for 24 tests.
Abbreviations: *df*, degrees of freedom; NSSI, non-suicidal self-injury; *SE*, standard error.

TABLE 5 Results of linear mixed effect models comparing suicide and death related thoughts, confidence, knowledge, and intent across NSSI and ED behaviors.

	DVs		
Predictors	**Estimates**	**CI**	***p***
(Intercept)	3.57	3.10–4.04	**<.01**
Behavior (reference = nonsuicidal self-injury)			
Binge	−2.58	−3.16 to −2.01	**<.01**
Compensatory behavior	−2.84	−3.55 to −2.12	**<.01**
Restrict	−1.61	−2.13 to −1.09	**<.01**
Outcome (reference = confidence could kill self)			
Hope to die sooner	−.52	−1.08–.05	.07
To kill self	−.11	−.68–.45	.70
Knowing die sooner	−1.23	−1.79 to −.66	**<.01**
Think about suicide	1.03	.47–1.60	**<.01**
Interaction terms			
Binge × hope to die sooner	.06	−.73–.85	.88
Compensatory behavior × hope to die sooner	.35	−.63–1.34	.48
Restrict × hope to die sooner	.71	−.01–1.43	.05
Binge × to kill self	−.77	−1.56–.02	.06
Compensatory behavior × to kill self	−.40	−1.38–.58	.42
Restrict × to kill self	−.62	−1.33–.10	.09
Binge × knowing die sooner	1.20	.41–1.98	**<.01**
Compensatory behavior × knowing die sooner	2.16	1.18–3.14	**<.01**
Restrict × knowing die sooner	1.57	.85–2.28	**<.01**
Binge × thinking about suicide	−.64	−1.43–.15	.11
Compensatory behavior × thinking about suicide	−.19	−1.18–.79	.67
Restrict × thinking about suicide	−.87	−1.58 to −.15	**.02**
Random effects			
σ^2			2.59
$\tau_{00\ ID}$			1.54
ICC			.37
N_{ID}			117
Observations			1310
Marginal R^2/conditional R^2			.23/.52

participants reported higher levels of suicide intentions *and* confidence in the lethality of NSSI compared to each ED behavior, and higher levels of these intentions and confidence due to restrictive eating compared to binge eating and compensatory behaviors. No differences in either score differed between binge eating and compensatory behaviors.

4 | DISCUSSION

This study replicated findings from Fox et al. (2019) examining intentions underlying NSSI and ED behaviors in adults, and extended this work to an adolescent population. We found that adolescents reported at least some intent to hurt themselves physically in the moment and in the long-term via both NSSI and ED behaviors. Moreover, they reported engaging in these behaviors while thinking about suicide with some hope, knowledge of, and intent to die. Specifically, adolescents most frequently reported direct self-harming knowledge

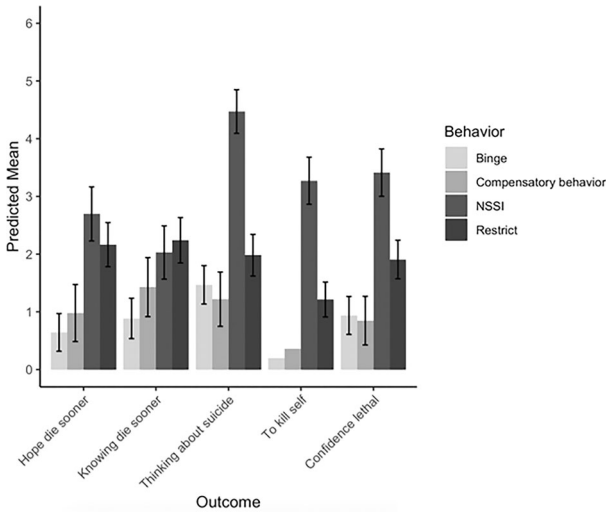

FIGURE 2 Least square mean responses and confidence intervals to suicide and death-related cognitions and intentions across NSS and ED behaviors.

TABLE 6 Results of Holm-corrected pairwise comparisons of suicide and death related thoughts, confidence, knowledge, and intent across NSSI and ED behaviors.

Contrast	Estimate	*SE*	*df*	*t*.ratio	*p*.value
Think about suicide					
NSSI—binge	3.22	.29	1208	10.96	<.01
NSSI—compensatory behavior	3.03	.36	1198	8.33	<.01
NSSI—restrict	2.48	.26	1199	9.37	<.01
Binge—compensatory behavior	−.19	.36	1193	−.53	1
Binge—restrict	−.74	.26	1198	−2.87	.04
Compensatory behavior—restrict	−.55	.34	1195	−1.64	.61
Hope to die sooner					
NSSI—binge	2.52	.29	1208	8.58	<.01
NSSI—compensatory behavior	2.48	.36	1198	6.82	<.01
NSSI—restrict	.90	.26	1199	3.40	.01
Binge—compensatory behavior	−.04	.36	1193	−.10	1
Binge—restrict	−1.62	.26	1198	−6.26	<.01
Compensatory behavior—restrict	−1.58	.34	1195	−4.68	<.01
Knowledge die sooner					
NSSI—binge	1.39	.29	1208	4.72	<.01
NSSI—compensatory behavior	.68	.36	1198	1.86	.49
NSSI—restrict	.04	.26	1199	.17	1
Binge—compensatory behavior	−.71	.36	1193	−1.98	.43
Binge—restrict	−1.34	.26	1198	−5.18	<.01
Compensatory behavior—restrict	−.63	.34	1195	−1.87	.49
To kill self					
NSSI—binge	3.35	.29	1208	11.40	<.01
NSSI—compensatory behavior	3.24	.36	1198	8.90	<.01
NSSI—restrict	2.22	.26	1199	8.42	<.01
Binge—compensatory behavior	−.11	.36	1193	−.30	1
Binge—restrict	−1.12	.26	1198	−4.34	<.01
Compensatory behavior—restrict	−1.02	.34	1195	−3.01	.03
Confidence could kill self					
NSSI—binge	2.58	.29	1208	8.79	<.01
NSSI—compensatory behavior	2.84	.36	1198	7.79	<.01
NSSI—restrict	1.61	.26	1199	6.10	<.01
Binge—compensatory behavior	.26	.36	1193	.72	1
Binge—restrict	−.97	.26	1198	−3.75	<.01
Compensatory behavior—restrict	−1.23	.34	1195	−3.63	<.01

Note: Degrees-of-freedom method: Kenward-Roger *p* value adjustment: holm method for 24 tests.
Abbreviations: *df*, degrees of freedom; NSSI, non-suicidal self-injury; *SE*, standard error.

and intentions via NSSI and longer-term knowledge and intentions via NSSI and restrictive eating. Nearly all suicide relevant knowledge and intentions were rated highest during NSSI compared to each ED behavior, except for restrictive eating, which had the greatest indications for knowledge of dying sooner.

Extending findings from Fox et al. (2019), results suggest that self-harm and ED behaviors may be viewed on a continuum. Current classifications of ED behaviors and NSSI as entirely distinct may hinder the importance of acknowledging the self-harm component that our study and others support as highly comorbid with ED behaviors (e.g., Germain & Hooley, 2012; Sohn et al., 2023). Moreover, the strong indications of suicidal cognitions when engaging in restrictive behaviors underline the elevated prevalence of suicide among those with eating disorders (Arcelus et al., 2011; Fichter & Quadflieg, 2016), as restrictive eating is transdiagnostic (Lowe et al., 2018), and associated suicide-related thoughts and intentions may be considered similarly.

Several aspects of study design strengthen the generalizability of findings, including that the study was conducted online without geographic restrictions, that parent/guardian consent requirements were waived, and that youth could participate near-anonymously, providing

only minimal identifiable information (i.e., an email address for payment and contact). Together, these decisions increase access to participation by groups who may be harder to reach using other recruitment methods (e.g., youth from rural areas or whose mental health or identity-related characteristics are stigmatized or undisclosed to parents or guardians; Kasson et al., 2021), particularly given the ubiquity of social media in adolescents across regional, socioeconomic, and other minoritized groups (Pew Research Center, 2022).

Though this study provides critical implications for our understanding of overlapping intentions of ED behaviors and self-harm, the primary measure for these cognitions and behaviors was only included at timepoint 2 of a larger longitudinal study, so possible changes among these variables over time were not assessed. Future research may explore temporal changes, especially during critical developmental periods such as adolescence where EDs and self-injurious behaviors have the highest rates of onset (Cipriano et al., 2017; Volpe et al., 2016). This study expands evidence that self-harming intentions may vary continuously—rather than with clear demarcations—across NSSI and ED behaviors. Implications for these findings may serve to inform potential limiting practices of clinical and therapeutic interventions for EDs that do not address potential underlying self-harming intentions. Treatment should include protocol for mitigating intentions for self-injury and safety planning for suicide risk.

AUTHOR CONTRIBUTIONS

Kiki M. Kline: Writing – original draft; writing – review and editing. **Saskia L. Jorgensen:** Writing – original draft. **W. Cole Lawson:** Writing – original draft. **Yuri-Grace B. Ohashi:** Data curation; investigation; writing – review and editing. **Shirley B. Wang:** Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; supervision; validation; writing – review and editing. **Kathryn R. Fox:** Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; supervision; validation; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data may be available upon request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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