A short-term longitudinal examination of the relations between depression, anhedonia, and self-injurious thoughts and behaviors in adults with a history of self-injury

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Abstract

Background: Limited research has addressed the role of anhedonia in predicting suicidality and/or nonsuicidal self-injury (NSSI) in adults, despite evidence suggesting that loss of interest or pleasure may increase vulnerability for self-inflicted harm, even beyond other depressive symptoms.
Methods: In the current study, we explored the role of symptoms of depression and recent changes in anhedonia in predicting suicidality, NSSI ideation, and perceptions of NSSI helpfulness among individuals with a history of NSSI or suicide attempts ($N = 187$).
Results: We found that changes in anhedonia partially mediated the effect of depression on suicidality, and fully mediated the effect of depression on perceptions of NSSI helpfulness. Anhedonia did not predict NSSI ideation above and beyond depression symptoms, and did not significantly predict NSSI frequency when accounting for suicidality. Compared to individuals with a history of NSSI only or suicide attempt only, people with a history of both NSSI and suicide attempt evidenced greater risk and symptomatology.
Conclusions: Results confirm the relation between anhedonia and suicidality evidenced in past research, but suggest a complex relationship between anhedonia, depression, and facets of non-suicidal self-injury.
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1. Introduction

Suicidal behaviors and non-suicidal self-injury (NSSI) are significant public health problems in the United States [1,2]. Research suggests that intentionally causing bodily harm without the desire to cause death, or NSSI, should be examined separately from suicide due to distinct motivations for each behavior [3] and distinct features of individuals who engage in suicidal behaviors versus individuals who engage in NSSI only [4]. However, individuals who have a history of suicide attempts often also have a history of NSSI, and NSSI is a risk factor for suicide attempts [5,6].

Past research indicates that suicidal behaviors and NSSI are both associated with deficits in emotion regulation abilities, and especially the ability to access regulation strategies [7,8]. Self-injurious behavior may become an attractive option when individuals are unable to identify and utilize strategies that lessen unbearable distress (e.g., positive imagery [9]). The desire to "feel something, even if it was pain" is also a commonly reported motivation for engaging in NSSI [1] and there is preliminary evidence that NSSI may function to alleviate emotional numbness [10]. Alterations in one's ability to access positive emotional states thus appear to be intertwined with self-harm. Therefore, we explored anhedonia, or the loss of interest and/or pleasure, as one potential pathway by which depressive symptoms might lead to suicidality (i.e., the spectrum of suicide-related thoughts and behaviors, from ideation to attempts) and to behaviors and thoughts about NSSI.

1.1. NSSI and suicidality are linked to depressive symptoms

Although research suggests that increases in state negative affect occur just before episodes of NSSI [11], individuals engaging in self-injurious behaviors also

experience higher levels of general negative mood [12]. Depressive symptoms are elevated among self-injurers compared to non-self-injurers, and repetitive self-injurers report more severe depressive symptoms than individuals who report less frequent NSSI [13]. Additionally, in a multinational study examining adolescent NSSI and a variety of psychosocial factors, only depressive symptoms were associated with a greater likelihood of engagement in NSSI in all countries assessed [14]. The relation between NSSI and depression demonstrated in past research thus aligns with existing theories that NSSI functions as a way to alter one's mood. However, factors that drive the relation between depression and NSSI remain unclear.

Suicidal ideation is defined as a symptom of depression by the DSM-5, tautologically linking suicidal thoughts with depressive symptoms [15]. However, depressive symptoms aside from suicidal thoughts and behaviors are robustly predictive of suicide risk [16]. Therefore, while depressive symptoms and diagnoses are sensitive in predicting suicidal thoughts, they are not very specific [17] and could be driven by other factors (e.g., hopelessness [18]). It is vital to identify candidate variables that remain predictive of suicidality when accounting for other depressive symptoms to focus future research investigations. One symptom that is particularly promising as a key predictor of suicide risk is recent change in anhedonia (cf. [19]), which has been identified as a core symptom of depression and psychopathology [20].

1.2. Anhedonia might link depressive symptoms to self-injurious behaviors

Beyond its status as a core symptom of major depressive disorder [15], anhedonia is associated with feelings of numbness and emptiness [21] and suicidality [22]. A growing body of evidence has established a link between anhedonia and suicidality, including risk of suicide attempts [23–26], even when accounting for other depressive symptoms [27]. Beyond loss of physical energy and sexual activity, loss of interest and loss of pleasure are incrementally predictive of greater suicidal ideation [22]. Even research examining the effect of antidepressants found that pre-treatment anhedonia predicted risk of suicide-related events at treatment termination [28].

Research directly examining the relationship between NSSI and anhedonia among adults is virtually nonexistent. Adolescents with a history of NSSI and no suicide attempts evidence lower levels of anhedonia than those with a history of both behaviors [4,29]. However, anhedonia is a risk factor for co-occurring NSSI and suicide attempts in this age group [30]. NSSI sometimes functions to generate affective states, including positive affect [31], and physiological sensations instead of numbness [1,10], perhaps suggesting a deficit of positive feelings (i.e., anhedonia) among individuals engaging in NSSI. Moreover, NSSI positively associates with posttraumatic stress symptoms similar to anhedonia (i.e., numbing and dissociation [10]). Directly examining the association between NSSI and anhedonia would constitute

an investigation into the automatic positive reinforcement component of the four factor model of NSSI [32,33], an influential theory regarding why people engage in this damaging behavior, which has been under evaluated. Engaging in NSSI for the purposes of feeling generation has also demonstrated a strong relation with suicide attempts [34], further bolstering the importance of this investigation.

1.3. Current study

Our study examined the relations between depressive symptoms, anhedonia, and the spectrum of self-harm among a sample of individuals with a history of self-injurious behaviors. Consistent with previous research, we expected that depressive symptoms would be positively associated with anhedonia, and that anhedonia would be associated with suicidality, NSSI behaviors, and NSSI thoughts. Because behavioral engagement does not always align with internal urges [35], we also examined the perception of NSSI as helpful in down-regulating negative emotions in relation to anhedonia. We anticipated that greater anhedonia would be associated with stronger beliefs that NSSI is a helpful emotion regulation strategy.

This study also built upon past research demonstrating a connection between depression and both NSSI and suicidality by examining anhedonia as a potential mechanism in these associations. We aimed to prospectively predict engagement in cognitive and behavioral components of NSSI and suicide by (1) examining NSSI ideation and perceived NSSI helpfulness in addition to NSSI behavior and (2) using a suicidal behavior measure that encompasses both ideation and attempts (herein referred to as "suicidality"). We anticipated that anhedonia would mediate the relation between depressive symptoms and our four outcome measures (i.e., suicidality, NSSI behaviors, NSSI ideation, and NSSI helpfulness beliefs) given evidence that anhedonia is predictive of the ability to harm oneself [23–26] and may also cause NSSI to be perceived as more attractive in context of decreased emotional arousal/engagement (i.e., because NSSI involves introducing a stimuli that will cause sensation or pain). While NSSI and suicidal behaviors certainly serve a variety of functions, anhedonia may be a mechanism by which depressive symptoms (which not all individuals with a history of suicidality or NSSI experience) associate with suicidality and NSSI behaviors and cognitions more generally.

2. Methods

2.1. Participants and procedure

Participants for this short-term longitudinal study were recruited via Amazon Mechanical Turk (MTurk), where workers are paid small amounts of money to complete online tasks. Importantly, data gathered from MTurk have been empirically evaluated to determine its utility as a recruitment tool and has been found to be of the quality of more traditional self-report methods (e.g., college student samples

[36]). Extant research also suggests that samples recruited through MTurk are more diverse than samples who participate in research via more traditional methods [37], and may be more representative of the US population as a whole [38]. Moreover, studies have also supported its use to recruit specific clinical populations of interest [39]. Data collection occurred in two waves, which are elaborated upon further below. Our predictor variables (i.e., depressive symptoms and anhedonia) were assessed during Wave 1 and our outcome variables (i.e., NSSI ideation, behavior, and perceived helpfulness, and suicidality) were assessed during Wave 2.

2.1.1. Wave 1

First, a large sample of participants ($N = 1128$, $M_{age} = 34.41$, 59% women) was paid to complete several self-report measures (Wave 1; $3 USD). Participant responses were screened, and those who endorsed having injured themselves with at least some intent to die or a history of NSSI ($n = 315$; see Suicide and NSSI Screeners) were invited to complete a second round of data collection for additional compensation ($3 USD).

2.1.2. Wave 2

A total of 218 participants were eligible for and completed Wave 2 (median time between waves = 11 days). Data collection at Wave 2 included more extensive measures about emotion, symptoms of distress, suicidal ideation, and NSSI.

2.2. Measures

2.2.1. Suicide and NSSI screeners (Wave 1)

Participants completed several brief screening questions during Wave 1 of data collection to determine if they had a history of suicidal behavior or NSSI, as this was our population of interest. To determine eligibility to complete Wave 2 based on suicide history, participants were asked "Over the course of your entire life, how many times have you intentionally harmed yourself with at least some intention of causing your own death?" [40]. Participants who reported self-harm that was intended to cause death on one or more occasions were considered eligible. To determine eligibility to complete Wave 2 based on NSSI history, participants completed selected items from the Deliberate Self Harm Inventory [41]. Items assessed past year and lifetime NSSI engagement and the number of times they had engaged in any method of NSSI endorsed. Participants who had engaged in NSSI through skin cutting, carving or burning or self-punching were considered eligible for Wave 2. The NSSI screener was also re-administered at Wave 2 to aid in reliability analyses.

2.2.2. Depression (Wave 1)

The Depression subscale of the 21-item Depression Anxiety Stress Scale (DASS-21 [42]) was used to assess depressive symptoms (e.g., dysphoria, low energy, hopelessness). Example items include "I felt down-hearted and blue" and "I felt I wasn't worth much as a person." Items are rated on a four-point scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*), with higher summed scores indicating higher levels of depression. Raw scores, which can range from 0 to 21, are doubled prior to analysis to arrive at subscale scores comparable to those calculated by the full version of the DASS (i.e., 0–42 [42,49]). Internal consistency in our sample was good ($\alpha = .83$).

2.2.3. Recent changes in anhedonia (Wave 1)

The 23-item Specific Loss of Interest and Pleasure Scale (SLIPS [19]) assesses recent changes in anhedonia using a scoring system that controls for trait anhedonia. More specifically, participants rate a variety of experiences and activities on a 4-point Likert scale from 0 to 3. A score of 0 indicates no loss of interest/pleasure, a score of 1 indicates some loss of interest/pleasure, a score of 2 indicates marked loss of interest/pleasure, and a score of 3 indicates that there has never been interest or pleasure derived from the experience inquired about by the item. Scores of 3 are recoded to be scores of 0 to control for responses based on trait anhedonia, rather than recent changes in anhedonia. Higher scores indicate recent increases in anhedonia and total scores on the SLIPS can range from 0 to 46. Internal consistency in our sample was excellent ($\alpha = .94$).

2.2.4. Suicidality (Wave 2)

The 4-item Suicide Behaviors Questionnaire-Revised (SBQ-R [43]) assesses several dimensions of suicidality, including lifetime history of suicide ideation and attempts, past-year frequency of suicidal ideation, communication of suicidal intent to others, and perceived likelihood of a future suicide attempt. Participants respond using a Likert scale that varies in the number of scale points for each item (e.g., Item 1 is scored on a 4-point scale from 1 to 4 while Item 4 is scored on a 6-point scale from 0 to 6). The total score on the measure ranges from 3 to 18, with higher scores indicating greater levels of suicidality. Internal consistency in our sample was adequate ($\alpha = .74$).

2.2.5. NSSI thoughts and behaviors (Wave 2)

Selected items (1a, 1b, and 16) from the Ottawa Self-Injury Inventory-Clinical (OSI [44]) were used to assess NSSI ideation, behavior, and perceived helpfulness. Responses on the NSSI ideation and behavior items were dichotomized such that individuals either did (coded 1) or did not (coded 0) endorse recent NSSI behavior and thoughts. Perceived NSSI helpfulness scores ranged from 0 to 20 and consisted of a summed score across 5 sub-items which ask participants about their beliefs that self-injury is helpful for releasing a variety of negative emotions and emotional states (e.g., unbearable tension, anger, sadness). Higher summed scores, which can range from 0 to 20, indicate a greater belief that NSSI is helpful. Internal consistency in our sample was excellent ($\alpha = .92$).

Table 1
Descriptive data for demographic data and baseline questionnaires.

	Participant Group		
	Not eligible for Wave 2 *M or n (SD or %) n = 760*	*Eligible for Wave 2, Did not complete* *M or n (SD or %) n = 150*	*Completed Wave 2* *M or n (SD or %) n = 218*
Demographics			
Age	35.75 (12.74)	30.47 (10.47)	32.36 (9.58)
Sex			
Male	338 (44.5%)	49 (32.7%)	73 (33.5%)
Female	419 (55.1%)	99 (66%)	144 (66.1%)
Transgender	1 (0.1%)	2 (1.3%)	–
No response	2 (0.2%)	–	1 (0.5%)
Race			
White (non-Hispanic)	587 (77.2%)	117 (78.0%)	172 (78.9%)
African American	72 (9.5%)	13 (8.7%)	13 (6.0%)
Hispanic/Latino	44 (5.8%)	10 (6.7%)	13 (6.0%)
Asian American	34 (4.5%)	6 (4.0%)	9 (4.1%)
Other/No Response	23 (3.0%)	4 (2.7%)	11 (5.0%)
Marital Status			
Never married	394 (51.8%)	86 (57.3%)	131 (60.1%)
Married	272 (35.8%)	43 (28.7%)	64 (29.4%)
Divorced/Separated	85 (11.1%)	20 (13.3%)	20 (9.2%)
Widowed/No response	9 (1.2%)	1 (0.7%)	3 (1.4%)
Employment Status			
Unemployed	201 (26.4%)	50 (33.3%)	68 (31.2%)
Part time employment	198 (26.1%)	42 (28.0%)	59 (27%)
Full time employment	360 (47.4%)	58 (38.7%)	91 (41.7%)
No response	1 (0.1%)	–	–
Region of U.S.			
Northeast	178 (23.4%)	27 (18.0%)	39 (17.9%)
Southeast	183 (24.1%)	43 (28.7%)	58 (26.6%)
Midwest	162 (21.3%)	30 (20.0%)	52 (23.9%)
Southwest	72 (9.5%)	22 (14.7%)	18 (8.3%)
West	164 (21.6)	28 (18.7%)	51 (23.4%)
No response	1 (.1%)	–	–
Outcome Measures			
Depression (DASS Subscale)	8.23 (9.61)	15.08 (11.41)	15.99 (12.34)
Anhedonia (SLIPS)	7.68 (9.07)	14.57 (11.28)	14.55 (11.56)

2.3. Data analysis

Data analyses were performed using SPSS, along with the PROCESS macro [45] for examining the proposed mediational models. PROCESS tests indirect effects using 95% bootstrapped confidence intervals of 5000 bootstrapped samples. Using this analytic method, 95% confidence intervals that do not include zero are considered statistically significant.

3. Results

3.1. Data preparation

Participants' responses to the NSSI screener at Wave 1 and Wave 2 were compared as part of the data preparation process. Individuals who did not report matching responses to whether they had self-injured via cutting, carving, burning, or self-punching in the past year at these two time points were excluded ($n = 31$), leaving a total sample of 187 participants that were used in analyses on Wave 2 data.

3.2. Descriptive statistics

Because our study utilized multi-wave data collection methods, we first examined sample characteristics (see Table 1). Participants who were eligible for Wave 2 were significantly younger, $t(908.80) = 5.99$, $p < .001$, and had more symptoms of depression, $t(604.06) = 10.35$, $p < .001$, and anhedonia, $t(597.75) = 10.10$, $p < .001$, than participants who were not eligible.[1] Importantly, there were no significant differences in terms of age, depressive symptoms, or levels of anhedonia between participants who were eligible for Wave 2 but did not complete follow-up and those who completed Wave 2 (all ps > .05).

Descriptive statistics and group comparisons are reported in Table 2 by participant recruitment type (i.e., suicidality history only [SH], NSSI history only [NSSI], or both suicidality and NSSI history [SH + NSSI]). One-way ANOVAs revealed a significant effect of recruitment type

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[1] Adjusted t-test values are reported due to lack of equal variance between groups.

Table 2
Outcome variables by self-harm category.

	Recruitment Group				
	Suicide History Only [SH] n = 35 M (SD) or n (%)	NSSI History Only [NSSI] n = 91 M (SD) or n (%)	History of Suicide and NSSI [SH + NSSI] n = 61 M (SD) or n (%)	Significance test	p
Depression	13.14 (10.81)	14.02 (11.88)	20.32 (12.94)	$F = 6.14$	<.01**
Anhedonia	14.74 (11.26)	11.65 (9.77)	18.03 (12.97)	$F = 5.99$	<.01**
Suicidality	7.51 (3.07)	5.97 (2.78)	10.33 (3.50)	$F = 36.59$	<.01**
Endorsed >1 suicide attempt	10 (28.6%)	–	36 (59.0%)	$\chi^2 = 8.26$	<.01**
NSSI ideation (prior month)	5 (14.3%)	14 (15.6%)[b]	18 (29.5%)	$\chi^2 = 5.29$	.07
NSSI behavior (prior month)	1 (2.9%)	3 (3.3%)[b]	6 (9.8%)	$\chi^2 = 3.56$	.17
NSSI behavior (past year)	–	12 (13.2%)[b]	13 (21.3%)	$\chi^2 = 1.72$	.19
NSSI frequency[a]	–	13.18 (24.23)	28.70 (40.01)	$F = 2.72$	<.01**
NSSI helpfulness	–	1.09 (1.11)[b]	1.48 (1.23)[b]	$t = 1.93$	.06

* $p < .05$, **$p < .01$.

  [a] NSSI frequency refers to the number of times that participants reported engaging in self-injury over their lifetime. The top 5% of scores were replaced with the next highest score (i.e., lifetime frequency = 115) to adjust for extreme outliers. Due to skewness, frequency was log-transformed prior to analyses. Non-transformed scores (i.e, raw values) are reported here for ease of interpretation.

  [b] Sample size adjusted due to missing data. From the SH + NSSI group, four participants were missing data on NSSI helpfulness. From the NSSI group, 13 participants were missing data on NSSI helpfulness, one participant was missing data on past month NSSI behavior and ideation, and two participants were missing data on past year NSSI behavior.

on depression, anhedonia, and suicidality. Post hoc comparisons using the Bonferroni correction revealed that SH + NSSI participants evidenced significantly greater depressive symptoms and suicidality than both SH and NSSI participants. SH participants evidenced greater suicidality than NSSI participants ($p = .04$), but did not differ in terms of depressive symptoms ($p > .99$). Regarding anhedonia, SH + NSSI participants evidenced greater anhedonia than NSSI participants ($p < .01$) but no different than SH participants ($p = .50$). Independent samples t-tests revealed that while SH + NSSI participants reported more frequent self-injury over their lifetime compared to NSSI participants ($p < .01$), the difference in ratings of NSSI helpfulness between the two groups fell just below significance ($p = .056$). Across our final sample, approximately 20% ($n = 37$) reported thoughts about self-injury in the past month, but only 5% ($n = 10$) reported engaging in self-injury in the past month. Participants with a history of both suicide attempts and NSSI were significantly more likely to report having attempted suicide more than once than participants with a history of suicide attempts only (see Table 2 for chi-square analyses).

Prior to mediational analyses, we examined bivariate correlations between study variables (see Table 3). As predicted, depression was positively correlated with changes in anhedonia, as well as all outcome variables. Anhedonia was also positively correlated with all outcome variables, which were significantly intercorrelated with one another (all ps < .01), aside from NSSI behavior and perceived NSSI helpfulness ($p > .05$).

3.3. Mediational analyses

Using three separate models (see Figs. 1–3), we examined the indirect effects of our predictor variable (depression) on our criterion variables (suicidality, NSSI thoughts, perceived NSSI

helpfulness) via the mediator (anhedonia). The very low endorsement of NSSI behavior in the past month prevented us from examining NSSI behavior as an additional outcome variable. Model 1 examined whether anhedonia mediated the relation between depression and suicidality. With the mediator of anhedonia in the model, there was still a direct effect of depression on suicidality (direct effect = .12, $SE = .02$, LLCI = .07, ULCI = .16). However, there was also a significant indirect effect of depression on suicidality via the mediator of anhedonia (indirect effect = .05, $SE = .01$, LLCI = .02, ULCI = .08), suggesting partial mediation. Model 2 examined whether anhedonia mediated the relation between depressive symptoms and NSSI ideation. Depression demonstrated a significant direct effect on NSSI ideation (direct effect = .08, $SE = .02$, LLCI = .04, ULCI = .12), but there was not a significant indirect effect of depression through anhedonia (indirect effect = .02, $SE = .01$, LLCI = − .01, ULCI = .04). Finally, Model 3 examined whether anhedonia mediated the relation between depressive symptoms and perceived helpfulness of NSSI. The sample for this analysis was restricted to only those participants who endorsed a history of NSSI, given that the outcome variable specifically inquired to changes in negative affect associated with NSSI engagement. With the mediator of anhedonia in the model, there was not a significant direct effect of depression symptoms on NSSI helpfulness (direct effect = .00, $SE = .01$, LLCI = − .02, ULCI = .02). However, there was a significant indirect effect of anhedonia (indirect effect = .02, $SE = .01$, LLCI = .01, ULCI = .04) indicating full mediation.

3.4. Post-hoc analyses

The present investigation is the third study (see also [4,29]) to find that individuals with an NSSI history and no suicidal behavior evidence significantly lower anhedonia

Table 3
Correlations on study variables.

	1.	2.	3.	4.	5.	6.
1. Depression	–					
2. Anhedonia	.62**	–				
3. Suicidality	.56**	.50**	–			
4. NSSI Behavior (Past Month)	.25**[a]	.17*[a]	.23**[a]	–		
5. NSSI Ideation (Past Month)	.45**[a]	.36**[a]	.52**[a]	.30**[a]	–	
6. NSSI Frequency	.21**	.13	.25**	.20**	.18*	–
7. NSSI Helpfulness	.26**	.36**	.29**	.11*[a,b]	.21*[a,b]	.43**

$*p < .05$, $**p < .01$.
[a] Point-biserial correlation reported for dichotomous variables.
[b] Sample restricted to individuals with an NSSI history.

compared to individuals with both an NSSI history and suicidal behaviors. Therefore, we wondered whether suicidality might account for the relation between anhedonia and NSSI behavior, rather than our initial prediction that there would be a direct relation between anhedonia and NSSI. To evaluate the influence of anhedonia and suicidality on NSSI frequency, we conducted a multiple regression with a Poisson distribution because NSSI frequency is an unbounded count variable and is thus not appropriate for typical linear regression. We found the model to be significant (Likelihood Ratio Chi-Square of 3083.37, $p < .001$). In terms of specific parameters, suicidality was a significant predictor of NSSI Frequency ($B = .18$, $SE = .09$, Wald $\chi^2 = 4.37$, $p = .04$).

However, anhedonia was not a significant predictor of NSSI frequency with suicidality in the model ($B = -.01$, $SE = .04$, Wald $\chi^2 = .04$, $p = .84$).

4. Discussion

This study evaluated the relation between depression and anhedonia in a sample of adults with a history of self-injury, and examined recent changes in anhedonia as a potential mechanism through which depressive symptoms might predict suicidality and non-suicidal self-injurious thoughts and behaviors. Our findings replicated research which found a significant positive relation between suicidality and anhedonia (e.g., [22]). We also found that greater depression directly predicted greater suicidality, *and* predicted suicidality indirectly via increases in anhedonia. Therefore, loss of interest appears to be one mechanism through which depressive symptoms predict increased suicidality.

Relations between NSSI variables and anhedonia were less prominent. The correlations between NSSI and anhedonia were modest, and individuals with a history of NSSI only evidenced significantly lower anhedonia than individuals with a history of both NSSI and suicide attempts. While anhedonia mediated the relationship between depression and perceived NSSI helpfulness, it was not directly associated with NSSI ideation in our mediational model. Further, anhedonia was not significantly associated with

Fig. 1. Mediated model with suicidality as outcome.[a]
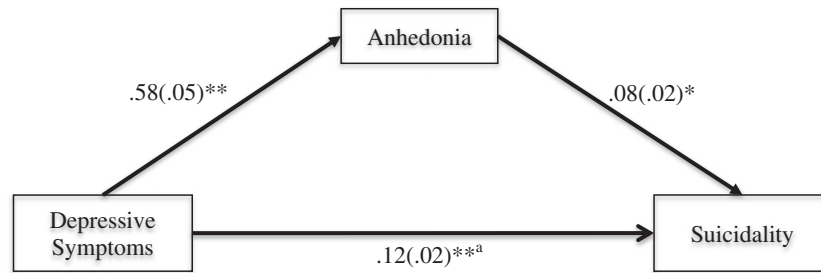
$R^2 = .35$, $F(2,184) = 49.57$, $p < .001$

Fig. 2. Mediated model with self-injury ideation as outcome.[a]
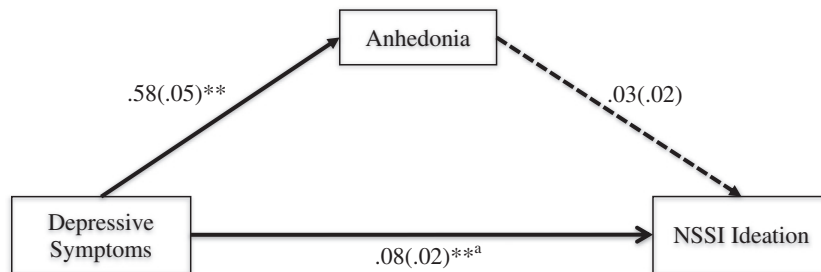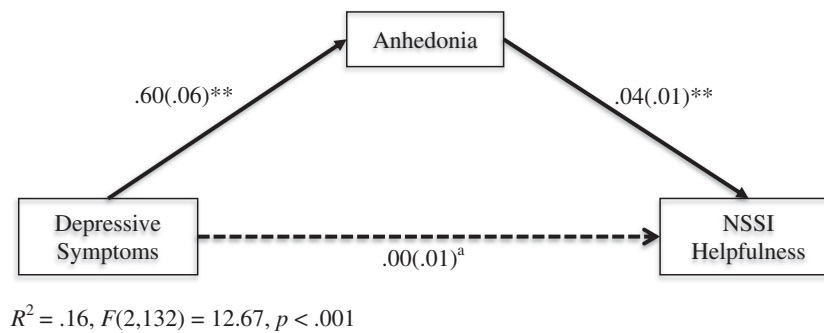
$\chi^2(1, N = 186) = 39.65$, Nagelkerke $R^2 = .30$

Fig. 3. Mediated model with NSSI helpfulness as outcome.[a]

Notes for Figures:
**= p < .001, *= p < .01.
[a]Path represents the effect of the predictor variable on the outcome variable with the mediator in the model.

NSSI frequency when accounting for suicidality (which did significantly predict frequency) in our post-hoc multiple regression analysis. Taken together, the results of this study suggest that anhedonia is not a major determinant of NSSI sequela, and that first-order relations between NSSI and anhedonia may be due to greater suicidality. This finding warrants additional consideration in future research given that literature often explores NSSI as a risk factor for suicidality, rather than the other way around.

Our results highlight the intertwined nature of affect and cognition. Low mood and cognitions associated with depression predict NSSI ideation, even after controlling for loss of interest and pleasure. Considered with the finding that anhedonia mediated the effect of depressive symptoms on perceptions of NSSI helpfulness, our analyses suggest that depressive symptoms may provide a vulnerability for NSSI-related thoughts, and that the loss of interest and pleasure may increase perceived utility of NSSI. More work is needed to explore whether perceived utility translates into greater behavioral engagement. Further, future research would also benefit from continuing to examine motivations for engaging in NSSI behaviors, in addition to examining presence and absence and/or behavioral frequency. Individuals often engage in NSSI for multiple reasons [1]; however, some individuals may have a primary motive to feel *something* (e.g., to decrease numbness [10]) or adjust to devaluation of reward [46], which might be associated with recent experience of anhedonia, whereas others might primarily use NSSI primarily to downregulate negative emotion [11].

The current study should be considered in context of strengths and weaknesses. We utilized a short-term longitudinal design in which depressive symptoms and anhedonia were measured prior to our outcome variables. However, the short follow-up window caused there to be overlap among the time frames of assessment measures. We also assessed lifetime history of suicidality, which is unlikely to have changed during our follow-up window. Results should thus be considered preliminary and causal conclusions are not appropriate.

Limited endorsement of past-month NSSI behavior, which we found even among a sample that was recruited specifically based on self-harm history, was an additional limitation. Findings related to NSSI behavior, such as the nonsignificant correlation with perceived NSSI helpfulness, should therefore not be over-interpreted. Relatedly, participants' reports of NSSI helpfulness have the potential to be systematically influenced by the amount of time that has passed since their last NSSI behavior. We would argue that the low endorsement of recent NSSI behavior found in this study is a highly important consideration for future research. NSSI research commonly utilizes convenience samples recruited on NSSI history, meaning that these samples may also include few individuals who have recently engaged in NSSI. Future studies would benefit from recruiting individuals who endorse current NSSI, as these individuals differ in important ways from individuals not currently engaging in NSSI (e.g., [47]). Finally, while the recruitment of a community sample was a strength, examination of our models in additional samples (e.g., adolescents, patients) recruited across a variety of methods would be beneficial and speak to the generalizability of our findings.

Despite the aforementioned limitations, this study represents an important contribution to the literature regarding the role of anhedonia in the relation between depression and self-harm. Given that NSSI and suicidality may increase an individual's capability to complete suicide over time (e.g., [48]), better understanding relevant mechanisms is paramount for improving available interventions. Future research would benefit from examining motivations for engaging in NSSI behaviors, in addition to examining presence and absence and/or behavioral frequency (which we were unable to do in this study due to the low base rate of past month NSSI). It is possible that, while individuals tend to engage in NSSI for multiple motives [1], some individuals more greatly identify with certain motives. That is, some people might use self-injury to "feel something" (e.g., to decrease numbness [10]) which might be associated with recent experience of anhedonia, while other people might

primarily use self-injury to lessen heightened negative emotion (e.g., to feel physical pain, have control, as opposed to the amorphous "emotional pain" [11]). Additional future work could also examine whether the relations between anhedonia, NSSI, and suicidality might vary depending upon an individual's primary motive for NSSI behavior, and how this ultimately relates to one's risk for suicide or other mental health difficulties.

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