Self-Harm Subscale of the Schedule for Nonadaptive and Adaptive Personality (SNAP): Predicting Suicide Attempts Over 8 Years of Follow-Up

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ABSTRACT

Objective: We examined the predictive power of the self-harm subscale of the Schedule for Nonadaptive and Adaptive Personality (SNAP) to identify suicide attempters in the Collaborative Longitudinal Study of Personality Disorders (CLPS).

Method: The SNAP, a self-report personality inventory, was administered to 733 CLPS participants at baseline, of whom 701 (96%) had at least 6 months of follow-up data. Cox proportional hazards regression analyses were performed to examine the SNAP–self-harm subscale (SNAP-SH) in predicting the 129 suicide attempters over 8 years of follow-up. Possible moderators of prediction were examined, including borderline personality disorder, major depressive disorder (MDD), and substance use disorder. We also compared baseline administration of the SNAP-SH to subsequent administrations more proximal to the suicide attempt, and to a higher-order SNAP-negative temperament (SNAP-NT) subscale. Receiver operating characteristic analyses were conducted using suicide attempts (n = 58) over the first year of follow-up to provide reference points for sensitivity and specificity.

Results: The SNAP-SH demonstrated good predictive power for suicide attempts (hazard ratio = 1.28, $P < .001$) and appeared relatively consistent across borderline personality disorder, MDD, and substance use disorder diagnoses. Using more proximal scores did not increase predictive power. The SNAP-SH compared favorably to the predictive power of the higher-order SNAP-NT. Receiver operating characteristic analyses indicate several cutoff scores on the SNAP-SH that yield moderate to high sensitivity and specificity for predicting suicide attempts over the first year of follow-up.

Conclusions: The SNAP-SH may be a useful screening instrument for risk of suicide attempts in nonpsychotic psychiatric patients.

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Suicide accounts for 1.3% of all deaths and ranks as the 11th leading cause of death in the United States.[1] Thus, improving detection of suicide risk through identification of risk factors and use of screening mechanisms bears paramount importance. Predicting suicide *completion* is particularly difficult, as it is, fortunately, a relatively rare event. People who have *attempted* suicide are 38 times more likely to complete suicide compared with the general population,[2] making this a particularly high-risk sample for future suicide completion. Suicide attempts represent a significant public health concern in their own right, with estimated medical costs of $7,234 for each nonfatal self-inflicted injury resulting in hospitalization and $9,726 in lost productivity.[3] Suicide attempts occur more frequently than completed suicides but are considered infrequent relative to the prevalence of suicide risk factors. Therefore, although the relatively low base rate of suicide attempts complicates prediction, the higher frequency of observations allows a statistical testing of assumptions that is rarely possible for completed suicide.

Brief screening inventories aimed at predicting risk for future suicidal behaviors can have enormous value in clinical settings. Receiver operating characteristic (ROC) analysis, based in signal detection theory, is often used in medical research to evaluate the efficacy of diagnostic tests, and its use can be extended to analyze the performance of psychological tests or screening inventories for binary classification. Receiver operating characteristic curves generated from such analyses are graphic plots of *sensitivity*, defined as the proportion of true positives correctly identified (true positive/prevalence), versus the inverse of *specificity*, defined as true negatives correctly identified as such (true negative/1 – prevalence).[4] The extent to which the ROC curve nests in the upper left corner of the plot assesses the predictive power of the test.

Another indicator of the accuracy of a measure is the *positive predictive value*, defined as the proportion of patients with positive test results who are correctly diagnosed (true positive/all test positive).[4] Each of these values is influenced by prevalence rates. Thus, particularly in low base rate behaviors such as suicide or suicide attempts, instruments with good sensitivity unsurprisingly suffer from poor specificity. In a low specificity situation, many patients screening positive would have negligible risk for an actual suicide attempt, yielding an overidentification of the risk group. Conversely, screening instruments for suicidal *ideation*, which occurs more frequently, report higher predictive values. Few studies have examined screening instruments for suicide *attempts*, the behavior most consistently associated with increased risk of suicide completion.

The scale most widely examined as a screener for both suicidal and nonsuicidal self-harm[5] is the Beck Hopelessness Scale (BHS).[6] Hopelessness is a crucial long-term risk factor for suicidal behavior in clinical populations,[7] and the Beck Hopelessness Scale is considered the gold

standard in assessing hopelessness. Five studies have examined the BHS in relation to suicide attempts in adults; 4 of these reported a maximum 1 year of follow-up,[8–11] and the remaining study had 7 years of follow-up.[12] In general, when sensitivity was adequate (range, 0.71–0.81), specificity was fairly low (range, 0.28–0.54). Among studies that used the BHS to screen for suicide completion,[13–16] follow-up ranged from 5 to 12 years, sensitivity ranged from 0.60 to 0.91, and specificity ranged from 0.41 to 0.52. The trade-off between high sensitivity and low specificity is common in relatively low-frequency occurrences. It remains problematic, however, and could discourage screener use in clinical settings, particularly those with acutely severe patients such as psychiatric inpatient units.

Another instrument identified as a screening instrument for suicidal behaviors is the Suicide Intent Scale,[17] which assesses level of suicidal intent during the most recent episode of deliberate self-harm. A study[18] examined its power as a predictor of eventual suicide over 2 years of follow-up of patients who presented to the hospital after deliberate self-harm. Positive predictive value was low (4%).[18] Beck and colleagues[14] reported that a scale assessing suicide ideation at the worst point in the patient's life (Scale for Suicide Ideation-Worst) had a sensitivity of 0.80 and specificity of 0.78 in identifying eventual suicides over 4 years of follow-up of 3,701 psychiatric outpatients, outperforming current suicidal ideation and hopelessness.

The present study aimed to determine whether the self-harm subscale of the Schedule for Adaptive and Nonadaptive Personality (SNAP) may identify risk for future suicide attempts. The subscale, part of a larger self-report personality assessment, consists of 2 highly related subscales: 9 items assessing suicide proneness and 7 items assessing low self-esteem. Together these items reflect the tendency toward self-harm in the context of self-loathing (Clark[29]). The Schedule for Adaptive and Nonadaptive Personality-self harm (SNAP-SH) is considered a lower-order pathological trait under the 28-item higher-order factor of the Schedule for Adaptive and Nonadaptive Personality-negative temperament (SNAP-NT), although items in these subscales are mutually exclusive. Furthermore, higher-order SNAP scales, such as SNAP-NT, assess broad, normative traits, while lower-order subscales, such as SNAP-SH, assess the pathological features of these domains. No prior research has empirically examined the SNAP-SH as a potential screener for suicidal behavior. We believe that its dual focus on past suicidal behaviors and present self-dissatisfaction distinguishes the SNAP-SH from other, more narrowly focused screening assessments (eg, hopelessness, suicide ideation).

To this end, we examined baseline scores on the SNAP-SH among the 701 participants of the Collaborative Longitudinal Study of Personality Disorders (CLPS) with follow-up data, 129 of whom attempted suicide over 8 years of follow-up. The CLPS is a multisite, naturalistic, prospective study of patients with 4 different personality disorders: schizotypal personality disorder, borderline personality disorder, avoidant personality disorder, or obsessive-compulsive personality disorder, and a comparison group of major depressive disorder (MDD) without personality disorder. Annual assessments were conducted; the present study is based on 8 years of follow-up data. The overall aims, design, assessment methodology, and demographic characteristics of the sample are detailed elsewhere.[19]

One CLPS aim is to identify predictors of clinical outcomes such as suicidal behavior. Other investigations of suicidal behavior from CLPS have examined predictive models and have found that (1) worsening of MDD and substance use disorders predicted suicide attempts in the following month[20]; (2) life events related to crime, legal matters, and relationship loss predicted suicide attempts in the following month[21]; (3) of the borderline personality disorder criteria, only affective instability prospectively predicted suicide attempts[22]; and (4) the personality trait of negative affectivity (assessed by SNAP) predicted suicide attempts more robustly than disinhibition or facets of impulsivity.[23]

In contrast, the present objective was to focus specifically on the predictive utility of the SNAP-SH, a set of brief self-report items with the potential for use in various clinical settings. The present study focuses on suicide attempts because behaviors associated with intent to die (ie, attempts) are more clinically severe and carry a higher likelihood of eventual death by suicide.[2] Specifically, we examine whether the baseline SNAP-SH scale predicts suicide attempts over 8 years of follow-up, after controlling for borderline personality disorder, MDD, and substance use disorder. We also examine whether a SNAP-SH assessment more proximal to the suicide attempt or a higher-order SNAP scale has higher predictive value than baseline SNAP-SH. Using ROC analysis, we sought to identify the cutoff score that optimized sensitivity and specificity for predicting suicide attempts within the first year of follow-up.

METHOD

Participants

Participants between the ages of 18 and 45 years were recruited from treatment clinics affiliated with the 4 CLPS sites. Fliers and advertisements recruited additional individuals in current or past treatment. Recruitment occurred in 2 waves resulting in a baseline sample of 733 participants: an original cohort of 668 participants supplemented with 65 minority participants to broaden the ethnic base. Individuals with acute substance intoxication or withdrawal, active psychosis, cognitive impairment, or a history of schizophrenia, schizophreniform, or schizoaffective disorders were excluded. Individuals were eligible to participate if they met diagnostic criteria assessed by the Diagnostic Interview for *DSM-IV* Personality Disorders[24] for at least 1 of the 4 personality disorders targeted in the CLPS or if they met criteria for the comparison group, MDD assessed by the Structured Clinical Interview for *DSM-IV* Axis I Disorders, Research Version, Patient Edition (SCID-I/P)[25] without personality disorder. The 4 targeted personality disorders are schizotypal personality disorder (n = 105), borderline personality

disorder (n = 264), avoidant personality disorder (n = 357), and obsessive-compulsive personality disorder (n = 287). Due to diagnostic comorbidity, the total across these 4 personality disorder groups exceeds the study sample size.[26] For generalizability purposes, personality disorder participants could also have other Axis I and Axis II comorbidities. The MDD comparison group (n = 95), however, was restricted from meeting more than 2 criteria on any personality disorder. Interviewers had master's- or doctoral-level training (or equivalent clinical experience) in a mental health–related discipline. Participants were interviewed at 6 months, 1 year, and then annually following the baseline assessment. Each participant signed informed consent, and the study was approved by the institutional review board at the respective sites/institutions.

For inclusion in data analyses, participants had to have at least 6 months of follow-up data. This yielded a sample of 701 participants, 129 (18%) of whom made a suicide attempt during follow-up. Eight years of follow-up data are available for the original cohort (n = 640, 95% of sample), and up to 4 years of follow-up data are available for the second cohort of minority participants (n = 61, 94% of sample), who had at least 6 months of follow-up data. Retention analyses found no statistically significant differences in SNAP-SH scores between subjects who did and did not provide follow-up information. There were also no significant differences in baseline MDD or substance use disorder. However, subjects diagnosed with borderline personality disorder were significantly more likely to drop out by 6 months ($\chi^2 = 7.9$, $P < .005$). We will examine the impact of borderline personality disorder diagnosis on the predictive utility of the SNAP-SH by examining their interaction in statistical analysis.

Measures

Longitudinal Interval Follow-Up Evaluation. The Longitudinal Interval Follow-Up Evaluation (LIFE)[27] is a semistructured interview rating system for assessing the longitudinal course of psychiatric disorders and functioning, including suicidal behaviors. This report focuses on suicidal behaviors during follow-up assessed by the LIFE. Participants are asked whether they have engaged in any suicidal behavior, and episodes are coded by month of occurrence. Each reported suicidal behavior is rated for intent on a 6-point continuum (obviously no intent, only minimal intent, definite but ambivalent, serious, very serious, and extreme) and medical threat (no danger, minimal, mild, moderate, severe, and extreme). This study distinguished suicide attempts from self-harm on the basis of ratings of suicidal intent. Consonant with calls for a consistent definition of suicide attempts as self-injurious behaviors with nonfatal outcome involving some (nonzero) intent to kill oneself,[28] we defined *attempts* as events with at least minimal intent to die. Participants who completed suicide (n = 6) were analyzed with attempters. Participants who reported suicidal behaviors with no intent to die (n = 14) were classified as nonattempters.

Schedule for Nonadaptive and Adaptive Personality. The SNAP[29] is a 425 true-false item self-report questionnaire designed to assess both normal and abnormal personality characteristics. Twelve lower-order trait dimensions load primarily onto 1 of 3 higher-order factors: positive temperament, negative temperament, and disinhibition, each of which also has a corresponding subscale. Self-harm contains 2 highly related subcomponents: low self-esteem (7 items) and suicide proneness (9 items). The low self-esteem scale assesses the tendency for self-loathing or strong self-dissatisfaction. The suicide proneness scale assesses self-destructive thoughts and behaviors. Together these scales assess the tendency for an individual to do self-harm in the context of self-loathing. High scorers blame themselves for problems in their lives and deal with frustration and tension through self-harm. They may feel suicide provides the only escape from their situation and may previously have attempted suicide. Internal consistency estimates in our study sample for the scales of interest are 0.87 (SNAP-SH) and 0.90 (SNAP-NT). The SNAP was administered at every follow-up interval through year 3 and subsequently in years 5 and 7.

Diagnostic Interview for* DSM-IV *Personality Disorders. Questions on this semistructured interview[24] assess each criterion of the 10 *DSM-IV* personality disorders. CLPS interrater values and test-retest reliability (κ) of the Diagnostic Interview for *DSM-IV* Personality Disorders were 0.68 and 0.69 for borderline personality disorder, 0.68 and 0.73 for avoidant personality disorder, and 0.71 and 0.74 for obsessive-compulsive personality disorder, respectively. The interrater reliability sample was insufficient to calculate κ for schizotypal personality disorder; test-retest κ for schizotypal personality disorder was 0.64.[30]

Structured Clinical Interview for* DSM-IV *Axis I Disorders-Patient Version. The SCID-I/P[25] is a semistructured interview of demonstrated reliability used to diagnose major *DSM-IV* Axis I disorders. In the CLPS, interrater reliability of SCID-I/P diagnoses ranged from 0.57 to 1.00 depending on the disorder, with a median κ of 0.76. Test-retest reliability ranged from 0.35 to 0.78, with a median κ of 0.64. Interrater reliability κ and test-retest κ for MDD are 0.80 and 0.61, respectively.[30]

Data Analyses

Cox proportional hazards regression analyses were conducted to determine whether SNAP-SH scores administered at baseline significantly predicted suicide attempts during 8 years of follow-up (n = 129). Further analyses compared predictive ability at baseline versus an assessment more proximal to the suicide attempt. (For nonattempters, only the baseline SNAP-SH score was used.) Additional analyses assessed whether the SNAP-SH baseline score remained significant in predicting follow-up suicide attempts after controlling for borderline personality disorder, MDD, substance use disorder, and the interaction of borderline personality disorder and SNAP-SH. Using Cox proportional hazards regression, we compared the SNAP-SH score with the higher-order factor of SNAP-NT, previously identified as a significant predictor in this same sample,[23] to determine whether a broader instrument with more items would

Table 1. Demographic Variables Between Suicide Attempters and Nonattempters (N = 701)

Variable	Attempters (n = 129)	Nonattempters (n = 572)	χ^2 Statistic
Age, mean, y	32.5	32.5	0.06[a]
Women, n (%)	95 (74)	352 (62)	6.68**
White, n (%)	94 (73)	394 (69)	0.79
Married or cohabiting, n (%)	33 (26)	141 (25)	0.05
Education (highest level obtained), n (%)			
High school or GED	43 (33)	146 (26)	3.26
Employed, n (%)	39 (30)	229 (40)	4.28*

[a]*t* Test statistic.
*$P < .05$. **$P < .01$.
Abbreviation: GED = General Education Development.

increase predictive utility. Finally, we compared the predictive utility of the SNAP-SH to each of its subscales (low self-esteem and suicide proneness) using Cox proportional hazards regression analyses.

Cox proportional hazards regression allows use of all available data, including censored observations (eg, data from participants who made no suicide attempt) during the 8-year follow-up interval. For participants in the second cohort with 4 years of follow-up data, the remainder of the interval was censored. To mitigate problems with associated events, only the first suicide attempt of each participant was used as the outcome.

To obtain a more robust estimate of the predictive value of the scale, ROC analysis was used to examine the association between baseline SNAP-SH scores and suicide attempts during the first follow-up year (n = 58). We limited this analysis to the first year of follow-up to assure that each SNAP-SH administration was within 1 year of a suicide attempt to mitigate censoring issues and for greater ease in interpreting the results. Participants who attempted suicide in subsequent intervals were excluded from analyses, resulting in a total sample of 628. Sensitivity, specificity, and positive predictive value are generated for each value of the SNAP-SH. Further, in order to provide reference points for settings in which sensitivity and specificity may be differentially important, we assessed these values across all possible SNAP-SH scores.

RESULTS

During the first year of follow-up, 58 participants (8%) reported a suicide attempt. Over all 8 years of follow-up, 129 participants (18%) reported a suicide attempt. This included 6 completed suicides reported to us by a family member and/or verified by death certificate. Seventy-four attempters (58% of attempters) reported attempts in multiple intervals. The mean age at recruitment among both attempters and nonattempters was 32.5 (SD = 8.1) years. As Table 1 shows, the majority of suicide attempters were white, female, not married or cohabitating at intake, and employed at intake and had at least some college education. Significant demographic differences emerged between suicide attempters and nonattempters on gender ($\chi^2_1 = 6.8$, $P = .01$) and employment ($\chi^2_1 = 4.3$, $P = .038$).

Table 2. Cox Proportional Hazards Regression Analyses of Baseline Schedule for Nonadaptive and Adaptive Personality–Self-Harm (SNAP-SH) Scores Predicting Suicide Attempt Status Over 8-Year Follow-Up

Model	B	SE(B)	χ^2	*P*	HR	95% CI for OR
Model 1						
SNAP-SH baseline	0.25	0.03	101.73	<.001	1.28	1.22–1.35
Model 2						
SNAP-SH proximal	0.23	0.02	93.07	<.001	1.26	1.21–1.33
Model 3						
SNAP-SH baseline	0.18	0.03	44.31	<.001	1.20	1.14–1.27
BPD baseline	1.14	0.23	25.61	<.001	3.12	2.01–4.84
Model 4						
SNAP-SH baseline	0.25	0.03	101.34	<.001	1.28	1.22–1.35
MDD baseline	0.02	0.21	0.01	.93	1.02	0.67–1.54
Model 5						
SNAP-SH baseline	0.24	0.03	90.68	<.001	1.27	1.21–1.33
SUD baseline	0.38	0.19	3.92	.05	1.47	1.00–2.14
Model 6						
SNAP-SH baseline	0.19	0.05	18.41	<.001	1.21	1.11–1.33
BPD baseline	1.30	0.62	4.45	.04	3.67	1.10–12.23
SNAP-SH*BPD[a] (baseline)	−0.02	0.06	0.08	.78	0.98	0.88–1.10
Model 7						
SNAP-SH	0.25	0.03	101.73	<.001	1.28	1.22–1.35
SNAP-NT	0.02	0.02	1.06	.30	1.02	0.98–1.06
Model 8						
Low self-esteem	0.23	0.04	27.95	<.001	1.26	1.15–1.37
Model 9						
Suicide proneness	0.44	0.04	129.24	<.001	1.54	1.43–1.67

[a]Interaction between SNAP-SH and BPD.
Abbreviations: BPD = borderline personality disorder, HR = hazard ratio, MDD = major depressive disorder, OR = odds ratio, SNAP-NT = Schedule for Nonadaptive and Adaptive Personality-negative temperament, SUD = substance use disorder.

Results from Cox proportional hazards regression analyses, based on data from 701 participants, indicated that for each point increase in SNAP-SH score, the risk for suicide attempt over 8 years of follow-up increased by 2.8% (Table 2, model 1). Each standard deviation of change on the SNAP-SH (SD = 4.4) translates into a 3-fold risk for suicide attempt status (hazard ratio [HR] = 3.0). We also examined the SNAP-SH score from the assessment proximally preceding the suicide attempt (as opposed to using baseline score for all participants). For most attempter participants (91%), the SNAP-SH assessment occurred within a year of their attempt. Using the most recent assessment, we found the HR remained relatively unchanged (1.26 vs 1.28; Table 2, model 2). In a multivariate Cox proportional hazards regression with baseline self-harm score, the score from the most recent assessment lost statistical significance. Therefore, subsequent analyses focused on baseline SNAP-SH assessment.

Cox proportional hazards regression analyses were also conducted to determine whether the SNAP-SH predicted suicide attempts above and beyond the diagnoses of borderline personality disorder, MDD, and substance use disorder. When controlling for baseline borderline personality disorder, baseline SNAP-SH remained significant, as was borderline personality disorder (Table 2, model 3). When controlling for baseline diagnosis of MDD, baseline SNAP-SH again remained significant, with results essentially unchanged compared to the univariate model. However, MDD was

Figure 1. Receiver Operating Characteristic Curve Analyses of the Association Between Baseline Schedule for Adaptive and Nonadaptive Personality-Self Harm Scores and Suicide Attempt Status Over First Year of Follow-Up (n = 58; area under the curve = 0.855)

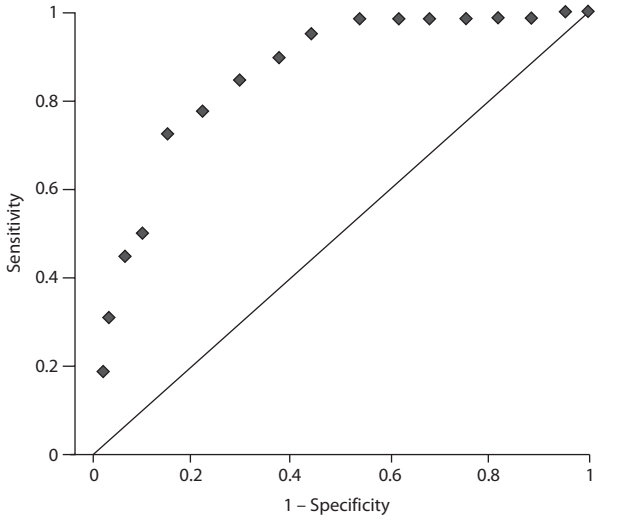

Table 3. Sensitivity and Specificity by Each Baseline Schedule for Nonadaptive and Adaptive Personality–Self-Harm Cutoff Score

Score	Sensitivity	Specificity	Positive Predictive Value
0	0	1	0.09
1	1	0.05	0.10
2	0.98	0.11	0.10
3	0.98	0.18	0.11
4	0.98	0.25	0.12
5	0.98	0.32	0.13
6	0.98	0.38	0.14
7	0.98	0.46	0.16
8	0.95	0.56	0.18
9	0.90	0.62	0.19
10	0.84	0.70	0.22
11	0.78	0.77	0.26
12	0.72	0.85	0.33
13	0.50	0.89	0.33
14	0.45	0.93	0.40
15	0.31	0.96	0.46
16	0.19	0.98	0.52

not significant (Table 2, model 4). Similarly, when controlling for baseline substance use disorder, baseline SNAP-SH remained significant and substance use disorder was marginally significant in this model (Table 2, model 5). A model with the interaction term of borderline personality disorder and SNAP-SH was tested to determine whether the SNAP-SH predicted equally well for individuals with and without borderline personality disorder. This interaction term was not significant, and baseline SNAP-SH remained significant (Table 2, model 6).

We compared baseline SNAP-SH to its higher-order factor, SNAP-NT, in predicting suicide attempts during follow-up. The baseline score for SNAP-NT was significant (HR = 1.10; 95% CI, 1.06–1.14; and $P < .001$), but in a multivariate Cox proportional hazards regression model with the baseline SNAP-SH, SNAP-NT lost significance (Table 2, model 7).

We examined the 2 SNAP-SH subscales, low self-esteem and suicide proneness, using separate Cox proportional hazards regression analyses. Both low self-esteem and suicide proneness significantly predicted suicide attempts over 8 years of follow-up (Table 2, models 8 and 9).

Finally, we conducted ROC analyses to robustly estimate the predictive value of the SNAP-SH, using only the first year of data to mitigate the effects of censoring. Figure 1 depicts the ROC curve of baseline SNAP-SH scores predicting suicide attempt status over the first year of follow-up based on the 628 participants with available data, 58 of whom reported a suicide attempt. The area under the curve (AUC) is 0.855, which is high, comparable to a very large Cohen *d* effect size of 1.50.[31] Sensitivity and specificity of each cutoff of the baseline SNAP-SH score for predicting suicide attempts appear in Table 3. Receiver operating characteristic analyses commonly use the point of furthest displacement on the ROC curve as the "optimal" cutoff score.[32] In our analyses, that point indicates a SNAP-SH cutoff score of 12, yielding a sensitivity of 0.72, specificity of 0.85, positive predictive value of 0.33, and accuracy of 0.84. The serious morbidity associated with suicide attempt makes it reasonable to consider a cutoff score that optimizes sensitivity while maintaining respectable specificity (at least 0.70). Here, our analyses indicate a SNAP-SH score of 10, for which sensitivity is 0.84; specificity, 0.70; positive predictive value, 0.22; and accuracy, 0.71.

DISCUSSION

This is the first study to examine the SNAP-SH as a possible screening assessment for risk of suicide attempts. Our findings suggest that the 16-item SNAP-SH subscale may be a useful clinical tool in assessing risk for suicide attempts in a clinical sample of individuals with personality disorder and/or MDD. We do not suggest that the SNAP-SH replace in-person clinical assessment of suicide risk; however, it could efficiently provide valuable supplemental information that might enhance clinical decision making. Furthermore, a self-report assessment might have advantages in identifying risk for individuals reluctant to directly endorse suicidal ideation or intent during a clinical interview for fear of its consequences, such as involuntary psychiatric inpatient admission or removal of implements that could be used for suicide. Some chronically suicidal individuals cling to the concept of suicide as an escape and may be particularly reluctant to disclose their ideation to others. An advantage of the SNAP-SH self-report items is that not all items pertain to current suicidal thoughts, which may make them seem "safer" to endorse.

As noted, SNAP-SH items constitute 2 subscales, with 7 items assessing low self-esteem and 9 items assessing suicide proneness. Both were significant prospective predictors of suicide attempts in our sample, with suicide proneness yielding a stronger odds ratio than low self-esteem or the combined SNAP-SH. Among the suicide proneness items, 3 assess past history of attempts or self-harm, while the

remainder assess passive and active ideation in the context of experiencing distress. Although it may be tempting to conclude that the 9-item suicide proneness subscale more efficiently predicts suicide attempts, many completed suicides are first attempts. The low self-esteem subscale items, in addition to core self-esteem items, also address disappointment about current life circumstances. Low self-esteem has been associated with depression and suicide[33] and with other risk factors for suicidality, such as diagnostic comorbidity[12] and childhood sexual abuse.[34] Furthermore, the balance between assessing past behaviors and present disappointments, particularly as they relate to self-esteem issues, and the wording of these items (many are reverse scored), may help to mitigate an overly defensive response style. We cannot ascertain how these items would perform if presented consecutively rather than dispersed within a lengthy instrument assessing many other traits. It is possible that embedding suicide-related items among other items could also mitigate a defensive response style against endorsing suicide risk.

Results from the ROC analysis indicate that the baseline administration of the SNAP-SH had high accuracy in predicting suicide attempts in the following 12 months. The SNAP-SH performed favorably compared to published results for the BHS, the most researched instrument to predict suicide attempts. Selecting an optimal cutoff score may depend on several factors, including the target population and the risks associated with overidentification or underidentification. The convention of selecting the furthest point of displacement on the ROC curve yields a cutoff of 12, which correctly predicted 42 of the 58 suicide attempters (0.72 sensitivity) over the first year of follow-up but incorrectly identified 87 participants (15% of entire sample; 0.85 specificity) as attempters. An AUC of 0.86, corresponding to a Cohen *d* effect size of 1.50, is remarkable for the prediction of suicide attempts. Nonetheless, given the severe risk of the behavior we are trying to predict, clinicians may opt for a different balance between sensitivity and specificity, prioritizing the former at the expense of the latter. A cutoff score of 10 would maximize sensitivity without severely compromising specificity, correctly identifying 49 participants (0.84 sensitivity) and incorrectly identifying 170 (30%; 0.70 specificity) as attempters. These statistics compare favorably to other questionnaires that have been used to screen for suicide risk and approximate those from a study using the Scale for Suicide Ideation-Worst to predict suicide completion.[14]

We found no incremental predictive value in using an assessment more proximal to the suicide attempt. Baseline SNAP-SH assessment significantly predicted suicide attempts over 8 years of follow-up. However, most of our participants' initial attempts occurred within the first 2 years of follow-up (72%). Therefore, we cautiously interpret our results to suggest that the SNAP-SH remains fairly stable over time and that clinicians need not administer it repeatedly. Data from the present sample indicate a correlation of 0.69 for both baseline to 2 year and baseline to 4 year for the SNAP-SH.[35] On the other hand, obtaining current data for such a high-risk assessment may well warrant the minimal inconvenience involved in responding to 16 true-false items. Our inability to discriminate between baseline administration and the administration preceding the suicide attempt may indicate that the SNAP-SH is useful to identify who is at risk for suicidal behavior, but not when they are at risk. As such, it is possible that the false-positives identified in our sample may remain at risk for future suicidal behavior.

Prior investigations found the SNAP-NT robustly predicted suicide attempts in this sample, outperforming measures of disinhibition and impulsivity, and after controlling for numerous risk factors, such as childhood sexual abuse, sex, borderline personality disorder, MDD, and substance use disorders.[23] Thus, it is noteworthy that the SNAP-SH, a lower-order facet trait, outperformed the higher-order factor of SNAP-NT, a scale with almost twice its items. This suggests the potential clinical utility of examining facet traits (vs broad dimensions) in capturing personality psychopathology.

As the goal of our study was to determine whether the SNAP-SH had clinical utility, we wanted to determine whether the SNAP-SH had additional predictive power beyond specific psychiatric disorders. We controlled for borderline personality disorder, MDD, and substance use disorders because these disorders are heavily represented in the CLPS sample (borderline personality disorder and MDD were recruitment targets) and because each has associations with suicidal behaviors. Our results indicated significant incremental predictive utility beyond expertly and systematically determined clinical diagnoses of borderline personality disorder, MDD, and substance use disorder in a sample with high rates of these diagnoses. Again, we suggest SNAP-SH as a potential supplement to clinical assessment. Indeed, our data from prior investigations suggest that recent worsening course for some disorders, more than psychiatric diagnoses themselves, predicts imminent risk for suicidal behaviors.[20]

This study has several limitations. Our sample largely comprises individuals with personality disorders (and a comparison group of MDD without personality disorder features), thereby limiting generalizability to other (non–personality disorder) disorders. However, finding significant effects within a high-risk, treatment-seeking sample is noteworthy. Our study was limited to participants who provided follow-up data. Our retention analyses found no statistically significant differences in SNAP-SH scores between subjects who did and did not provide follow-up information but did identify a significant difference with regard to borderline personality disorder. However, results from interaction analyses indicate that the SNAP-SH results apply to subjects with and without borderline personality disorder. More importantly, we do not know whether subjects who dropped out after the baseline assessment attempted suicide. Finally, although a 16-item assessment represents an efficient means of obtaining suicide risk information, it is uncertain how these items would perform outside of the larger SNAP instrument.

In conclusion, our results demonstrate that the SNAP-SH can identify individuals at high risk for making a suicide attempt. Furthermore, the SNAP-SH proved equally effective

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in predicting suicide attempts over 1 to 8 years of follow-up, strongly suggesting that the SNAP-SH is a trait indicator of suicide propensity. Our findings are fairly generalizable in that results were robust after controlling for borderline personality disorder, MDD, and substance use disorder diagnoses. The brevity of the SNAP-SH (16 true/false items) makes it transportable across clinical settings: eg, primary care, outpatient psychotherapy, and inpatient. Future research should examine whether the SNAP-SH would be effective as a stand-alone measure in detecting risk for suicidal behaviors.

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