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Dimensions of Suicidality: Analyzing the Domains of the SIS-MAP Suicide Risk Assessment Instrument and the Development of a Brief Screener

Megan E. Johnston, Charles Nelson, and Amresh Shrivastava

This study aimed at validating the domains of suicidality assessed by the Scale for Impact of Suicidality—Management, Assessment and Planning of Care (SIS-MAP) and creating a brief screener based on the full scale. A total of 50 individuals with suicidal ideation were given the SIS-MAP interview. Support was found for these domains of suicide risk; in particular, the subscales of ideation and protective factors for suicide risk were highly reliable. For each domain of suicidality, items most predictive of total risk index scores were selected to create a brief screener aimed at expediting the assessment process. The screener was reliable, predicted overall suicide risk index scores, and approached significance in predicting subsequent suicide attempts.

Keywords crisis services, mental health, suicide, suicide risk assessment, validation study

Suicide is one of the leading causes of death and is a global health problem affecting more than a million people worldwide. The World Health Organization projects that over the coming decades suicide will become an even greater contributor to the global burden of disease (Mathers & Loncar, 2006). Further, there is an estimated 100–200 suicide attempts for every completed suicide (Centers for Disease Control and Prevention, 2010). The widespread effects of suicide highlight the need for increased prevention and intervention attempts. Critical to the prevention of suicide are ways to identify high-risk individuals. Past research suggests that clear

indicators do exist to aid in the detection of individuals at high-risk for suicidal behavior, and ultimately the prevention of this behavior (e.g., Kessler, Borges, & Walters, 1999). Although a number of suicide risk assessment tools are currently available, the development of assessment instruments that can successfully differentiate between individuals who are at serious risk for attempting suicide and those who are not still appears to be an absolute priority (Kreitman & Foster, 1991; Pompili, Amador, Girardi et al., 2007).

Recently, a new scale was designed to improve upon current suicide risk assessment tools called the *Scale for Impact*

of *Suicidality—Management, Assessment and Planning of Care* (SIS-MAP; Nelson, Johnston, & Shrivastava, 2010). This clinician-administered scale was designed as a comprehensive clinical scale for assessment of suicidality in order to better predict level of risk as well as to guide the development of a care management plan (treatment planning and management of individuals at risk for suicide to protect their lives and promote their well-being). A stress-diathesis model forms the theoretical context from which the scale was developed, as this has proven useful when predicting suicidality in previous research (e.g., Hewitt, Flett, & Turnbull-Donovan, 1992). The scale is based upon the theory of a balance between suicide risk and resilience factors and incorporates aspects of individuals lives known to contribute to suicide from a wide variety of domains, such as family history, biological, and psychological factors. The theory is that suicidal ideation or attempts occur when an individual's resilience is compromised by various risk factors, making an individual more vulnerable; additionally, recent events and stressors can increase the intensity and severity of the ideation.

The SIS-MAP was developed with consideration of the most prominent suicide risk and resilience factors identified by 16 experts in the field (Pope & Vasquez, 2007). Sixteen experts were interviewed and asked to report the most common indicators of suicide risk they have extrapolated from their professional, research, or clinical experience and this list that was used as a base for constructing the SIS-MAP. These experts included suicidologists, clinicians, professors, researchers, and directors of suicide prevention organizations. The factors identified by these experts regarding identifying and responding to suicide risk informed the construction of the scale.

The SIS-MAP measures an individual's current level of suicide risk in eight different domains: demographic, psychological,

comorbidities, family history, biological, protective factors, clinical ratings/observations, and psychosocial and environmental problems. The psychological domain is further divided into four subscales: ideation, management of ideation, assessment of current suicidality, and planning for a subsequent attempt. A particular strength of the SIS-MAP is its assessment of protective factors such as self-esteem and stability of the home environment. Previous research on suicide risk assessment has highlighted the need to evaluate protective factors, as they play an important role in assessing suicide risk (Pompili, Amador, Girardi et al., 2007). In this way, the SIS-MAP goes beyond the assessment tools that focus narrowly on depressive symptoms (e.g., Beck Depression Inventory-II; Beck, Steer & Brown, 1996) or a small number of constructs (see Jobes, Eyman, & Yufit, 1995) to consider all of the influencing factors which converge to create suicide risk.

Previous research has demonstrated both the inter-rater reliability and the predictive validity of the SIS-MAP (Nelson, Johnston, & Shrivastava, 2010). The inter-rater reliability of the scale was assessed by videotaping a case vignette in which a therapist administers the structured interview to a mock client. Clinicians familiarized with the SIS-MAP were asked to score a video of a therapist administering the SIS-MAP to a mock client and the scale was found to have moderately high inter-rater reliability, with reliability scores between 0.70 and 0.81 (Nelson, Johnston, & Shrivastava, 2010). Further, the SIS-MAP was demonstrated to have good predictive validity; 74% participants' admission statuses were predicted by their scores on a SIS-MAP assessment that did not impact their level of care decisions (Nelson, Johnston, & Shrivastava, 2010). Although predictive validity is clearly important, further research is needed to examine the reliability of the subscales that comprise this

instrument. The suicide risk assessment dimensions embodied by the subscales were chosen with an expert criterion methodology, but the items used to represent these constructs need to be assessed to determine whether these items do form a reliable subscale. This was one goal of the present research. This research also explored these subscales as predictors of psychiatric hospital re-admission, as an additional means to determining the clinical utility of this instrument.

Further, this research was aimed at the development of a brief screener comprised of selected items from the SIS-MAP in order to further facilitate and expedite the assessment process. A screener would allow for a prompt initial evaluation that would provide an indication of whether an individual should undergo further assessment. Additionally, a brief screener is more versatile in terms of the settings in which it can be used. Previous research has indicated that one half to two thirds of individuals who commit suicide visit a physician in the month prior to taking their lives (Luoma, Martin, & Pearson, 2002; Pirkis & Burgess, 1998). A brief screening tool for suicide risk may help detect suicidal ideation and behavior if used broadly in healthcare settings. In sum, the present research set out to condense the SIS-MAP into a brief screener of suicide risk that maintains the predictive validity of the original scale.

METHOD

Participants

Participants of the present sample ranged in age from 16 to 69 years old ($M=41$); 28 males and 22 females participated. Participants were individuals presenting to crisis services at Regional Mental Health Care, St. Thomas, which is a general adult mental health inpatient

program in a regional psychiatric hospital serving a portion of Southwestern Ontario, Canada.

Scale

Developed in 2008, the *Scale for Impact of Suicidality—Management, Assessment and Planning of Care* (SIS-MAP) is composed of 108 items. The overall scale includes 8 subscales representing the key domains for suicide risk factors (demographics, psychological, co-morbidities, family history, biological, protective factors, clinical ratings/observations, and psychosocial and environmental problems). The psychological subscale is further broken down into items assessing: ideation, management of ideation, current state of suicidality, and planning. The majority of items require checking *yes* or *no* based on the presence or absence of the item, with most items scored as a *yes* receiving a score of 1 and items scored as a *no* receiving a score of 0. Examples from the psychological domain include “Do you get ideas to hurt yourself?” and “Do you believe in seeking help for suicidal thoughts?” (reverse scored). An example from the protective factors domain is “Have you succeeded when faced with similar life challenges?”.

After administering the SIS-MAP, an overall score can be determined by summing the subtotals for each domain. A total score is calculated by summing the subtotals for all domains except the protective factors domain, and then subtracting the subtotal for protective factors from this initial sum. The final score represents the level of suicide risk facing an individual across their key life domains after taking into account the protective factors which buffer their level of risk. Despite the number of items, the SIS-MAP can be administered in a relatively short period of time, usually taking approximately 20 minutes to complete.

Follow-Up Assessment

Six months after initial assessment with the SIS-MAP, data were collected from all available participants on three outcome measures: length of inpatient stay, re-admission to a psychiatric hospital, and subsequent suicide attempts. Length of inpatient stay referred to that resulting from the initial assessment and was available for all participants ($M = 6.18$ days, $SD = 12.15$, range = 0–58 days). Data on subsequent suicide attempts and re-admission were available for 19 of the original participants. Six of those 19 had made a subsequent suicide attempt and 3 had been re-admitted to a psychiatric hospital in the 6 months following initial assessment. Re-admission referred to psychiatric hospital admission for any diagnosis or symptoms (not necessarily related to suicidal thoughts and behavior). The remaining participants were no longer in contact with the Regional Mental Health Care program and could not be contacted.

Procedure

Individuals with suicidal ideation presenting to an outpatient crisis center were given the SIS-MAP interview as part of the triage process. The triage process involves prioritizing patients based on the severity of their symptoms, which facilitates the ability to treat as many patients as possible based on the resources available. Clinicians who were involved in this process for the present research included social workers, nurses, psychometrists, and psychologists. All of these individuals were trained by the SIS-MAP authors to conduct the structured SIS-MAP interview. Using traditional assessment techniques (e.g., clinical interview), a determination was made as to whether additional follow-up was required with outpatient services or whether inpatient hospitalization was necessary.

Screener Development. Following reliability analysis of the subscales contained in the full SIS-MAP, a brief screener was developed containing a subset of items. First, the items of each subscale were entered into stepwise regressions predicting total SIS-MAP risk index scores. This was done independently for each subscale and the four psychological scales (ideation, management of ideation, assessment of current suicidality, and planning for subsequent attempts) were also considered separately. From each regression, those items remaining in the final model predicting total suicide risk scores were included in the screener. One subscale, the biological domain, had no items that contributed to the prediction of total SIS-MAP scores so no items from this subscale were included in the screener. Using this method, 24 items were selected. An initial reliability analyses demonstrated that scale reliability could be improved through the removal of one item from the protection domain; subsequently, this item was removed resulting in a screener consisting of 23 items.

RESULTS

Reliability of the SIS-MAP Subscales

Reliability analyses (Cronbach's alpha) were conducted on the subscales of the full SIS-MAP using SPSS. The overall reliability of each subscale, as well as the correlations of the items with their respective subscale, is presented. As the four subscales within the psychological domain were evaluated independently, the reliabilities of ten subscales were assessed: ideation, management of ideation, current state of suicidality, planning, co-morbidities, family history, biological, protective factors, clinical ratings/observations, and psychosocial and environmental problems. The ten items comprising the ideation subscale were highly reliable (Cronbach's alpha = 0.801). The mean

item-subscale correlation was also high for these items ($M=0.473$, $SD=0.133$; see Table 1 for all reliability statistics). The management of ideation subscale was also fairly reliable ($N=10$; Cronbach's $\alpha=0.621$). Item correlations with the subscale had a mean of 0.292 ($SD=0.104$). The subscale of current state of suicidality had a reliability of Cronbach's $\alpha=0.656$ ($N=28$; $M=0.200$, $SD=0.385$). The five items comprising the subscale of planning for subsequent attempts had a Cronbach's α of 0.378, and item correlations had a mean of 0.204 ($SD=0.281$).

The co-morbidities subscale had a Cronbach's α of 0.600 ($N=10$). Correlations between each item and the subscale had a mean of 0.253 ($SD=0.155$). The four items assessing family history had a Cronbach's α of 0.695 and all items were highly correlated with the subscale ($M=0.487$, $SD=0.166$). Cronbach's α for the biological subscale was found to be 0.251 ($N=5$), and item correlations had a mean of 0.124 ($SD=0.134$). The subscale assessing protective factors for suicide risk has a Cronbach's α of 0.719 ($N=11$); item correlations with the subscale had a mean of 0.369 ($SD=0.174$). The clinical subscale was shown to have a Cronbach's α of 0.503 ($N=10$) and

item correlations had a mean of 0.198 ($SD=0.263$). Finally, the subscale assessing psychosocial and environmental problems had a Cronbach's α of 0.679 ($N=9$) and item correlations with the subscale had a mean of 0.357 ($SD=0.111$).

Predicting Psychiatric Hospital Re-Admission from the Subscales

A linear regression was used to predict whether patients were re-admitted in the 6 months following initial assessment with the subscales as predictors. All subscales (including the four scales within the psychological domain plus the total psychological domain score) were entered in a stepwise regression to see which subscales best predicted the outcome of psychiatric hospital re-admission within 6 months (yes or no). The final overall model was significant, $F(2, 16)=8.809$, $p=0.003$, and the significant predictors were both the demographic subscale ($\beta=.294$, $p=.002$) and the management of ideation subscale ($\beta=.068$, $p=.028$). This finding suggests that a higher demographic risk and a lower ability to manage ideation are associated with a greater likelihood of readmission within 6 months.

TABLE 1. Reliability Statistics for the SIS-MAP Subscales

Subscales	Cronbach's alpha		Item-subscale correlations
		M (SD)	Range
Ideation	0.801	0.473 (0.133)	0.18–0.61
Management of ideation	0.621	0.292 (0.104)	0.17–0.45
Current suicidality	0.656	0.200 (0.385)	0.03–0.89
Planning	0.378	0.204 (0.281)	0.11–0.54
Co-morbidities	0.600	0.253 (0.155)	0.03–0.45
Family history	0.695	0.487 (0.166)	0.32–0.70
Biological	0.251	0.124 (0.134)	0.003–0.27
Protective	0.719	0.369 (0.174)	0.007–0.61
Clinical	0.503	0.198 (0.263)	0.05–0.51
Psychosocial/environmental	0.679	0.357 (0.111)	0.17–0.50

As a further validation of the SIS-MAP, a one-way analysis of variance was used to predict total risk index scores based on whether participants had previously attempted suicide (yes or no). Twenty-two of the total 50 participants reported a previous suicide attempt, and this group had significantly greater SIS-MAP risk index scores ($M = 37.18$, $SD = 14.14$) than those who reported no previous suicide attempts ($M = 24.23$, $SD = 9.38$), $F(1, 48) = 14.37$, $p < .001$.

Development of Brief Screener

In order to develop a screener, the items of each subscale were entered into stepwise regressions predicting total SIS-MAP risk index scores, as described in the Method section. The final models for each subscale are presented in Table 2. An initial reliability analysis of a 24-item scale demonstrated a Cronbach's alpha of .68 and also indicated that scale reliability could be improved through the removal of one item from the protection domain. After removing this item, the screener consisted of 23 items and had a reliability of Cronbach's alpha = .73. These 23 items are presented in Table 3 along with each item's correlation with the screener scale.

Predicting Outcomes from the Screener

A linear regression was used to ensure that the screener was predictive of participants overall suicide risk index score obtained on the full SIS-MAP. Scores on the screener were significantly predictive of total SIS-MAP scores, $F(1, 48) = 168.77$, $p < 0.001$. The screener was shown to account for 77.90% of the variance in total suicide risk scores obtained using the full SIS-MAP. Regressions were also used to determine whether the screener was predictive of various outcomes. Data on the length of inpatient stay (not admitted = 0)

were available for all participants and a linear regression was used to predict length of stay from screener scores. This model was significant, $F(1, 48) = 7.36$, $p = 0.009$. Data on whether participants were re-admitted to the psychiatric hospital in the 6 months following initial assessment were available for 19 of the original participants and a binary logistic regression was used to predict psychiatric hospital re-admission from screener scores. The screener scores were not a significant predictor of re-admission, Wald's test (1) = 2.57, $p = .11$.

Predicting Subsequent Suicide Attempts. Data on whether patients attempted suicide in the six months following initial assessment was available for 19 participants and a binary logistic regression was used to predict subsequent suicide attempts (yes or no) from screener scores. The scores approached significance in this prediction, Wald's test (1) = 3.31, $p = 0.07$. In a comparison of these 19 participants to those who did not have follow-up data available, no differences were found in any demographic variables or subscales of the SIS-MAP other than the biological subscale, $F(1, 48) = 4.42$, $p = 0.04$. Those who did not have follow-up data available scored higher on biological risk factors ($M = 3.13$) than those who did have data available ($M = 2.42$).

DISCUSSION

The results of this analysis provide support for the domains of suicide risk assessed by the SIS-MAP. On many subscales, high reliability and high item-subscale correlations were observed. In particular, the subscales of ideation and protective factors for suicide risk were highly reliable. All other subscales demonstrated moderate reliabilities with the possible exception of the biological and planning subscales. These two subscales had reliability coefficients in

TABLE 2. Final Models in Stepwise Regressions Predicting Total SIS-MAP Scores from Subscales of Items

Subscale item	Standardized beta	t	P- value
Demographics (Overall Model: $F(1, 47) = 5.84, p = .02$)			
Is the individual an inpatient?	.33	2.42	.02
Ideation (Overall Model: $F(3, 44) = 16.35, p < .001$)			
Do you often hurt yourself by cutting or overdosing on pills?	.43	4.09	.00
Do you feel you are vulnerable to hurting yourself?	.33	2.99	.005
Do you think you would be better off dead?	.31	2.79	.008
Management (Overall Model: $F(3, 44) = 9.71, p < .001$)			
Do you fear losing control and attempting suicide?	.40	3.33	.002
Do you wish to die?	.29	2.44	.02
Can you control these (ideation) thoughts?	.28	2.25	.03
Assessment (Overall Model: $F(3, 43) = 21.34, p < .001$)			
Have you attempted to kill yourself?	.62	6.15	.00
Do you feel helpless?	.51	4.86	.00
Do you currently feel suicidal?	.21	2.10	.04
Planning (Overall Model: $F(1, 43) = 22.39, p < .001$)			
Do you think you will attempt suicide in the future?	.59	4.73	.00
Co-morbidities (Overall Model: $F(3, 43) = 8.30, p < .001$)			
History of drug abuse	.22	1.72	.09
Current alcohol abuse or dependence	.41	3.23	.002
History of sexual abuse	.41	3.10	.003
Family History (Overall Model: $F(1, 46) = 7.04, p = .01$)			
Family history of mental illness	.36	2.65	.01
Biological (no variables were entered into the equation)			
Protective Factors (Overall Model: $F(3, 40) = 15.73, p < .001$)			
Do you have good self-esteem (believe you are a worthwhile person)?	-.29	-2.38	.02
Is your family practically supportive of your problems and your recovery?	-.44	-3.90	.00
Do you savour life's satisfying moments?	-.40	-3.28	.002
Clinical Ratings (Overall Model: $F(4, 36) = 10.98, p < .001$)			
Is there evidence of a personality disorder or issues	.33	2.71	.01
Is there presence of psychosis?	.39	3.44	.001
Would you consider client vulnerable due to existential issues (i.e., no meaning in life)?	.29	2.38	.02
Would you consider client vulnerable due to a dysfunctional or chaotic home environment?	.28	2.29	.03
Psychosocial/Environmental (Overall Model: $F(2, 44) = 8.79, p = .001$)			
Problems with primary support group	.36	2.68	.01
Problems with access to health care services	.29	2.16	.04

TABLE 3. Brief Screener Items

Items	Correlation with full screener
Demographics	
Is the individual an inpatient?	.19
Psychological	
Ideation	
Do you think you would be better off dead?	.39
Do you feel you are vulnerable to hurting yourself?	.52
Do you often hurt yourself by cutting or overdosing on pills?	.46
Management	
Can you control these (ideation) thoughts?	.32
Do you wish to die?	.25
Do you fear losing control and attempting suicide?	.44
Assessment	
Do you currently feel suicidal?	.47
Do you feel helpless?	.38
Have you attempted to kill yourself?	.09
Planning	
Do you think you will attempt suicide in the future?	.56
Comorbidities	
Current alcohol abuse or dependence	.14
History of drug abuse	.30
History of sexual abuse	.30
Family History	
Family history of mental illness	.32
Protective	
Is your family practically supportive of your problems and your recovery?	-.37
Do you savour life's satisfying moments?	-.43
Clinical	
Is there evidence of a personality disorder or issues related to personality?	.43
Is there presence of psychosis?	.29
Would you consider client vulnerable due to a dysfunctional or chaotic home environment?	.23
Would you consider client vulnerable due to existential issues (i.e., no meaning in life)?	.43
Psychosocial	
Problems with primary support group	.45
Problems with access to health care services	.48

the 0.25 to 0.40 range; however, these subscales both have very few items, a likely explanation for the low alpha coefficients.

This analysis suggests that the SIS-MAP represents a concise suicide risk assessment instrument with internally consistent subscales. The domains measured

by the subscales are those nominated by experts in the field as contributors to suicide risk. The breadth of risk factors assessed by the SIS-MAP can be seen in its consideration of ten dimensions of suicide risk, as opposed to the typical five (e.g., Jobes, Eyman, & Yufit, 1995). In particular, the subscale of protective factors represents an important extension on current suicide risk assessment instruments. The protective factors items were found to be highly reliable in the present study, further demonstrating the utility of this construct.

This research further demonstrates the clinical utility of the SIS-MAP with the finding that psychiatric hospital re-admission is predicted by subscales of the full instrument. In particular, the demographic subscale and the management of ideation subscale were found to predict psychiatric hospital re-admission in the 6 months following initial assessment. In addition to highlighting the ability of the SIS-MAP to predict clinical outcomes, these results suggest that a focus on scores from these two subscales could be beneficial when re-admission is the outcome of interest. Demographic risk includes inpatient versus outpatient status and therefore our finding is consistent with previous research demonstrating a higher risk of re-admission for those with previous history of inpatient treatment (Hepp, Moergeli, Trier et al., 2004).

Brief Screener

The results of this research were also used to create a brief screener comprised of a subset of the total items (seen in Table 3). A meaningful reduction was demonstrated from the original 108 items of the full SIS-MAP to the new 23-item screener. The idea is that items endorsed on the screener would necessitate the completion of the more comprehensive SIS-MAP along with any other pertinent collateral information to support psychiatric/

psychological intervention for suicidal behavior. This screener provides a way to assess suicidal risk in a fast, efficient manner that would provide an indication whether further, more in-depth assessment is required. A brief screener of this sort could prove useful in many settings beyond the psychiatric intake process. In particular, primary healthcare settings may benefit from a brief means of assessing patients' suicide risk. In the United States, the Joint Commission's (2007) National Patient Safety goals made screening and assessment of suicide risk in medical settings a top priority. The Commission argues that identifying individuals at risk for suicide while under the care of a health care organization (or following discharge) is a critical first step in protecting individuals at risk for suicide and planning their care. A brief screener such as the one developed in this research provides a fast and accurate way to evaluate suicide risk in medical and health care settings.

In this research, the screener was demonstrated to predict scores on the full SIS-MAP and to account for a large proportion of the variance in these total suicide risk index scores. The brief screener provides a quick way to estimate an individual's score on the full clinical assessment. Additionally, the screener appears to be predictive of clinical outcomes. Scores on the screener were shown to predict the length of inpatient stay for the participants in this study. Data on psychiatric hospital re-admission and subsequent suicide attempts after 6 months were available for just under half of the full sample. Screener scores approached significance in the prediction of these two outcomes and a larger sample size may have resulted in statistical significance. Particularly in the prediction of subsequent suicide attempts, the screener scores were very close to statistical significance. The groups for whom follow-up was and was not available differed only on their biological risk factors and on no other variables assessed, including overall SIS-MAP scores.

Therefore, it seems plausible that a larger sample with follow-up data available would have led to significant findings.

An additional explanation for the ability of the full SIS-MAP to predict re-admission while the screener did not may result from the fact that re-admission to a psychiatric hospital could have been based on any number of factors not limited to suicidal thoughts and behavior (e.g., they may have been admitted for depression). Full scale SIS-MAP risk index scores may be more effective in predicting more generalized aspects of future mental health, while the screener appears to directly measure current suicidal risk—demonstrated by its ability to predict the length of inpatient stay at that initial assessment point.

Limitations

Further clinical trials among various subsets of the population are needed to enhance the predictive validity of this brief yet representative suicide screening tool. Ethnocultural data was not collected in this sample and it will be important for future research to validate the use of this screener across ethnic groups. It should also be noted that the present findings cannot be generalized beyond an adult population, as only seven of the participants in this study were under the age 25. Suicide risk in adolescents and young adults is just as important to identify, however, and future research with this screener is required to determine whether it is useful with younger populations as well, or whether a different subset of SIS-MAP items are required to screen for youth suicide risk.

Finally, further validation of this screener will require follow-up data from a greater proportion of individuals assessed at intake, as fewer than half of the original sample had follow-up data available in the present study. This is reflective of the often transient nature of individuals accessing

urgent services; while it is likely for some individuals that once a crisis stabilizes they decline further services, there remain other sectors of individuals who move frequently, are homeless, or have in fact died by suicide. While this is one of the limitations of the current study, it is highly unlikely that a substantial number of individuals unavailable for follow-up in fact died by suicide, as this would be far greater than the base rate in the population.

Conclusion

The present research provided validation for the various domains of suicidality assessed by the SIS-MAP. More importantly, a brief screener was developed by demonstrating a meaningful reduction from the original 108 items to 23 items. This screener was shown to be reliable and valid; scores on the screener predicted length of inpatient stay and marginally predicted subsequent suicide attempts. Additional research is required to further examine the predictive validity of this screener.

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