Method of Suicide Attempt and Reaction to Survival as Predictors of Repeat Suicide Attempts: A Longitudinal Analysis

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ABSTRACT

Objective: To evaluate whether reaction to survival of a suicide attempt and method of the index attempt predicted repeat suicide attempts within 6 months.

Method: Data came from the Suicide Assessment Form in Emergency Psychiatry (SAFE) Database Project, which contains information on all presentations to emergency psychiatric services at the 2 tertiary hospitals in Manitoba, Winnipeg, Canada (N = 7,007). During a 4-year period (2009–2012), 922 individuals presented with suicide attempts. Logistic regressions were used to examine whether a person's reaction to attempt survival and the method of attempt predicted repeat suicide attempt within 6 months.

Results: Of the 922 participants, 82 (8.8%) presented with another suicide attempt within 6 months. Ambivalence about attempt survival (adjusted odds ratio [OR] = 2.84; 95% CI, 1.45–5.54; $P < .01$) and wishing to be dead (adjusted OR = 2.68; 95% CI, 1.17–6.17; $P < .05$) predicted future attempts even when adjusted for age, sex, depression, substance abuse, and method of the initial attempt. Method of the index attempt did not predict future suicide attempts in adjusted models (adjusted OR = 0.66; 95% CI, 0.35–1.25; $P > .05$).

Conclusions: Assessment of the patient's reaction to survival, regardless of method of attempt, is important to identify risk of repeat attempts.

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Suicide is a substantial public health concern,[1] and accurate identification of individuals at risk is crucial to prevention of future suicide and reduction in suicidal behavior.[2] Prior self-harm behavior is an important factor in completed suicide.[3,4] The rate of suicide in individuals following self-harm is far greater than in the general population[5,6]; in addition, people with prior deliberate self-harm have a dramatically reduced life expectancy from both suicide and natural causes.[7] Therefore, suicide attempts give us cause for concern.

The emergency department is a critical point of treatment contact for suicide attempts. An estimated 60% of self-inflicted injuries that are treated in the emergency department are a result of failed suicide attempts,[8] and this confers a significant risk of completed suicide over time.[9–11] Emergency departments may therefore be a key setting for intervention given that more than 25% of people with self-harm presentations will present again with repeated self-harm within the next 6 months.[12] However, the highly stressful atmosphere and slim window of intervention in the emergency department render decisions regarding the management of suicidal individuals difficult.[13] Therefore, a critical aim for clinical research should be to pinpoint if certain factors increase the risk of repeat suicide attempt[14]; unfortunately, while many candidate risk factors have been identified, their positive predictive value for future suicidal behavior remains low.[15]

Two predictive variables that have received attention in previous literature are the lethality of suicide attempt and the individual's reaction to survival following the attempt.[16–20] Reaction to survival after the attempt has been associated with both repeat suicide attempts and eventual suicide.[16,18] Studies have shown as much as a 3-fold increase in eventual suicide risk in individuals who regretted survival after a suicide attempt compared to those who were glad to be alive or ambivalent about survival after a medically serious suicide attempt.[16,18] Despite studies demonstrating reaction to survival as a potentially important risk factor for future suicide, literature on the topic is extremely sparse. Existing studies have shown risk for suicide over long follow-up periods,[16,18] but short-term studies have not been conducted. Understanding repeat self-harm risk in the acute period of 6 months is important, as it can better inform clinical decisions at the index presentation, and this time frame has been adopted in several studies.[12,21] Furthermore, past studies have grouped ambivalence to suicide attempt survival along with "glad to be alive" as a reference group, despite evidence suggesting that ambivalence in a person's desire to live or die may present a unique risk factor for future suicide.[22]

In contrast to reaction to survival after an attempt, the method of attempt and intended lethality of the attempt have received much attention in the literature as characteristics that heighten risk for eventual suicide.[16,17,23] In a few studies, the method of attempt has also been associated with repeat suicide attempts.[24,25] Several studies have demonstrated the link between access to means and suicide rates including firearms,[26,27] poisonings,[28–34] and jumping.[35,36] Research has also found differential risk depending on attempt method.[23] This finding has prompted some to classify attempt methods as having high or low lethality.[23,37,38] Firearms,

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Clinical Points

- Emergency departments are critical points of treatment contact for suicidal individuals and represent an opportunity to intervene and diminish future risk.
- Thoughts of ambivalence about living and wishing to be dead following a suicide attempt are strong predictors of repeat suicide attempts in 6 months.
- Clinicians should consider assessing a person's reaction to suicide attempt survival as part of their suicide risk assessment.

hanging, drowning, and lying in front of a moving object are considered high-risk methods, whereas self-poisoning and cutting have been classified as low-risk methods.[23] Men are more likely than women to employ more lethal methods.[39,40] There are, however, mixed findings, with some studies showing that the risk of repeat self-harm or later suicide is not correlated with the method of initial suicide attempt.[41,42] Furthermore, the categorization of lethality is fraught with challenges, as perceived lethality and actual medical lethality often differ.[43] Additionally, there are very few studies that examine risk of repeat suicide attempt in conjunction with method of attempt, although this is a population in whom there is still opportunity to intervene. Moreover, much of the literature has focused on those hospitalized due to suicide attempts,[23] and although these hospitalizations represent serious attempts, some attempters may not make a serious enough attempt to warrant hospitalization, and, therefore, a large, yet important, sample is being excluded.

The objective of the current study was to examine 2 specific characteristics of suicide attempts as potential predictors of future repeat suicide attempts within 6 months: the lethality of the attempt method and the person's reaction to surviving the attempt. Whereas previous studies have focused on the reaction of wishing to be dead following an attempt, we sought to also separately examine the relationship between survival ambivalence and risk of future repeat suicide attempt. The use of a large sample and longitudinal design, along with standardized measures and physician assessment of all presentations, allowed this study to overcome many of the described limitations of prior research. On the basis of past literature, we hypothesized that the use of a method with high potential lethality, as well as a negative reaction to attempt survival, would be predictive of future suicide attempts within 6 months.

METHOD

Setting

The data used in this study came from the SAFE Database Project (Suicide Assessment Form in Emergency Psychiatry), a multisite project examining risk factors for suicide.[44] The SAFE data came from 3 sites: the emergency departments of 2 tertiary care hospitals (Health Sciences Centre and St Boniface General Hospital) in Manitoba, Canada, and the psychiatry consultation liaison service at the Health Sciences Centre. The consultation liaison service targeted people who bypassed the emergency room and were hospitalized due to their suicide attempts. Medically unstable persons who have attempted suicide are admitted directly to the intensive care unit or other medical wards in the hospital and are subsequently assessed by the psychiatric consultation service. The study period was 4 years, from January 1, 2009, to December 31, 2012. The emergency departments and the consultation service of these hospitals provide daily 24-hour psychiatric services by residents and staff psychiatrists associated with the Department of Psychiatry at the University of Manitoba, Winnipeg, Manitoba, Canada.

Study Population

The study population included all consecutive referrals to psychiatric services covering the 3 described sites during the study period (N = 7,007). Persons with missing health identification numbers were excluded from the analyses, as these individuals could not be connected to prior or subsequent presentations (n = 364). For the purposes of our study, the sample was restricted to people who presented to the emergency department or consult service with a suicide attempt. For people presenting with multiple suicide attempts during the study period, the first was considered the baseline attempt. In order to ensure at least 6 months for follow-up, individuals who made a suicide attempt between January 1, 2009, and June 30, 2012 were included (n = 909), and we excluded individuals who made a suicide attempt after June 31, 2012 (n = 119). However, individuals who made 2 suicide attempts between June 30, 2012, and December 31, 2012 (n = 13) were included, given that their index and second suicide attempts were made within the 6-month cutoff. These exclusion criteria yielded a final study sample of 922 individuals who had a baseline suicide attempt.

Baseline Patient Assessment

Psychiatric resident physicians supervised by an attending staff psychiatrist conducted the assessment of the patients. This assessment included a review of the presenting problem, assessment for psychiatric disorders, and review of current treatment and previous contact with mental health services. Demographic information, medical history, and social and development issues were also reviewed. The physician then completed the SAFE database study form. Residents and staff psychiatrists received specific training that included education about the SAFE form components and how to correctly complete the form.

Baseline Measures

Columbia Classification Algorithm of Suicide Assessment (C-CASA).[45] The C-CASA is a standardized scale developed to classify suicidal behavior into 8 mutually exclusive categories. The C-CASA distinguishes suicide attempts with intent to die from other deliberate self-harm behavior without suicidal intent.

Method of suicide attempt. Nine categories were listed on the SAFE form: prescription or over-the-counter medication overdose, alcohol or illicit drug overdose, carbon monoxide

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Table 1. Characteristics of People Who Presented With Index Suicide Attempts (N = 922)

Characteristic	n (%)
Demographic	
Sex (male)	411 (45.1)
Age (> 45 y)	544 (59.0)
Psychiatric	
Depression	623 (67.5)
Substance abuse	545 (59.1)
Suicide attempt	
Reaction to survival	
Glad to be alive	326 (35.4)
Ambivalent	335 (36.3)
Wished to be dead	136 (13.6)
Method of attempt[a]	
Gas poisoning	28 (3.0)
Firearm	13 (1.4)
Hanging	105 (11.4)
Jumping	31 (3.4)
Drowning	15 (1.6)
Electrocution	2 (0.2)
Fire	4 (0.4)
Traffic	20 (2.2)
Suffocation	9 (1.0)
Prescription medication or over-the-counter overdose	524 (56.8)
Alcohol or illicit drug overdose	86 (9.3)
Ingestion of household substances	12 (1.3)
Laceration	106 (11.5)
Lethality of attempt	
High risk	522 (56.6)
Low risk	265 (28.7)
Repeat suicide attempt within 6 mo	
Yes	82 (8.9)
No	840 (91.1)

[a]Percentages will not add up to 100%, as some people were present in more than 1 category.

or gas poisoning, laceration or stabbing, hanging, jumping, drowning, firearm usage, and "other." The "other" category was descriptive for attempts not fitting the previous 8 categories. The categories were not exclusive, and the assessor could code several attempt methods for a single suicide attempt if appropriate. For the purposes of this study, we created 5 more categories on the basis of information in the "other" category. These categories included "traffic" (person attempted to get hit by a moving object such as a train or car), "ingestion" (person ingested household substances such as bleach), "suffocation" (person attempted to suffocate himself/herself either through a ligature around the neck or by tying a plastic bag around the head), "fire" (person attempted to set themselves or their surroundings on fire), and "electrocution" (person exposed themselves to household current).

Lethality of suicide attempt method. On the basis of previous literature, over-the-counter and prescription medication overdose, alcohol and illicit drug overdose, ingestion, and laceration were classified as low risk of lethality methods.[37] Gas poisoning, traffic, firearm, drowning, jumping, suffocation, fire, and electrocution were classified as high-risk methods.[37,38] An attempt wherein more than one method was used was also classified as a high risk of lethality attempt.

Reaction to suicide attempt survival. Reaction to survival was determined using 3 categories: the person was classified as glad to be alive, still wished to be dead, or was ambivalent about the desire to live following the attempt. The residents and psychiatrists used their clinical judgment to determine which of the 3 categories they felt was best represented on the basis of the interview assessment.

Other baseline covariates. Four other measures were assessed at the baseline presentation: sex (male vs female), age (≤ 45 years), presence of depression (yes vs no), and presence of substance abuse (yes vs no).

Statistical Analysis

Descriptive prevalence rates for each of the variables at baseline were generated using SPSS 21.0 (SPSS Inc, Chicago, Illinois).[46] Binary logistic regressions were conducted to investigate if hypothesized predictors of repeat suicide attempt significantly differed between the 2 groups including reaction to survival, lethality of attempt, depression, presence of substance abuse, sex, and age. Following results from unadjusted analyses, an additional logistic regression was run for the reaction to survival predictor variable, adjusting for lethality, depression, substance abuse, age, and sex. Another logistic model examined lethality of attempt as the predictor variable, adjusting for reaction to survival, depression, substance abuse, age, and sex.

Ethical Approval

The study was approved by the Research Ethics Board at the University of Manitoba.

RESULTS

Over the course of the study period, 922 individuals presented with suicide attempts, and, of these, 82 presented again with a repeat attempt within 6 months. The characteristics of people with a baseline suicide attempt are presented in Table 1. Women accounted for 503 (55.1%) of the baseline presentations, and, of these, 51 (10.1%) presented with a repeat attempt after 6 months. Almost 70% of the people with baseline suicide attempts had depression, and 61.3% presented with substance abuse. A survival curve analysis of time to next attempt revealed that of people who made a repeat suicide attempt, 58.8% presented again to the hospital within 6 months of index attempt (Figure 1).

Prescription drug overdoses accounted for 524 of the 922 presentations. Of these, 53 (10.1%) made a repeat suicide attempt within 6 months. Lacerations or stabbings featured in 106 presentations, and, of these, 13 (12.3%) made a repeat suicide attempt within 6 months. Carbon monoxide or gas poisoning accounted for 28 index presentations, and 2 (7.1%) made a repeat suicide attempt within 6 months. Hanging accounted for 105 presentations, and 7 (6.7%) made a repeat suicide attempt within 6 months. Prevalence of index and repeat attempts for the other methods of attempt are detailed in Table 1 and Figure 2. It is important to note that these categories were not mutually exclusive, and a person could have presented with more than 1 method of attempt. Table 2 displays the relationship between baseline presentation correlates and the risk of repeat suicide attempt within

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Figure 1. Survival Curve of Time to Next Suicide Attempt After Index Attempt

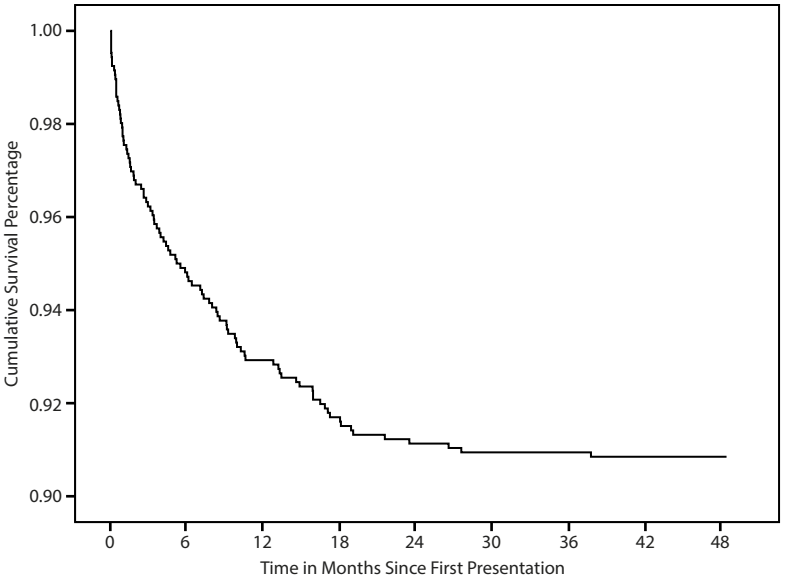
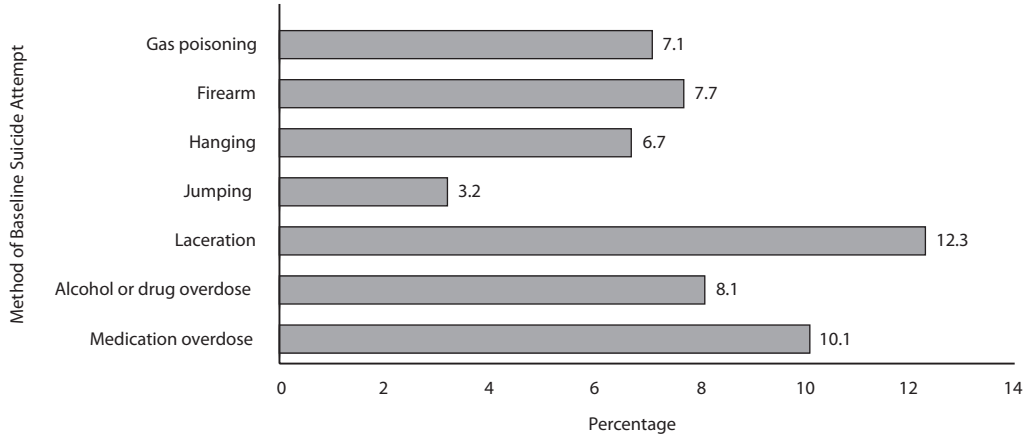


Figure 2. Proportions of People With Baseline Attempts by Method That Presented With Repeat Suicide Attempt Within 6 Months



6 months. If a high-lethality attempt was made, a repeat suicide attempt within 6 months was less likely than if a low-lethality attempt was made (odds ratio [OR] = 0.53; 95% CI, 0.29–0.94; $P < .05$). Depression, substance abuse, sex, and age did not significantly predict a repeat suicide attempt within 6 months. Reaction to survival after the initial attempt also predicted a repeat suicide attempt within 6 months, with the odds of a repeat suicide attempt being 2.97 times higher if the person was ambivalent (95% CI, 1.61–5.48; $P < .01$) about surviving the attempt. If the person wished to be dead after the initial attempt, the odds of a repeat suicide attempt were 2.54 times higher (95% CI, 1.19–5.37; $P < .05$).

Table 3 shows the relationship between lethality, reaction to survival, and risk of repeat suicide attempt after adjusting for demographic and mental disorder confounders. Once adjusted for age, sex, depression, substance abuse, and reaction to survival, the potential lethality of the method of attempt did not predict a repeat suicide attempt within 6 months (adjusted OR = 0.66; 95% CI, 0.35–1.25; $P > .05$). However, wishing to be dead (adjusted OR = 2.68; 95% CI, 1.17–6.17; $P < .05$) and ambivalence (adjusted OR = 2.84; 95% CI, 1.44–5.54; $P < .01$) remained strong predictors of a repeat suicide attempt within 6 months even when adjusted for lethality of the method of attempt, age, sex, substance abuse, and depression.

DISCUSSION

A patient's reaction to survival was revealed as an important predictor of future suicide risk within a short time frame, and the association remained after controlling for depression, substance abuse, age, sex, and lethality. Therefore, this finding has important clinical implications, as it provides a unique and identifiable risk factor that can help treatment providers target individuals who are at high risk for self-harm in the near future. If replicated, this finding

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Table 2. Associations Between Baseline Measures and Repeat Suicide Attempts Within 6 Months

Measure	No Repeat Suicide Attempt (n = 840), n (%)	Repeat Suicide Attempt (n = 82), n (%)	Odds Ratio (95% CI)
Sex			
Male	380 (45.7)	31 (37.8)	1.00
Female	452 (54.1)	51 (62.2)	1.38 (0.86–2.20)
Age, y			
>45	502 (61.5)	42 (52.5)	1.00
18–45	314 (38.5)	38 (46.3)	1.43 (0.90–2.3)
Lethality			
Low	468 (65.2)	54 (78.3)	1.00
High	250 (34.8)	15 (21.7)	0.53 (0.29–0.94)*
Presence of depression			
No	247 (30.6)	18 (22.2)	1.00
Yes	560 (69.4)	63 (77.8)	1.55 (0.90–2.67)
Presence of substance abuse			
No	310 (38.4)	32 (40.5)	1.00
Yes	498 (61.6)	47 (59.5)	0.87 (0.55–1.39)
Reaction to survival			
Glad to be alive	308 (42.8)	15 (20.8)	1.00
Ambivalent	290 (40.4)	42 (58.3)	2.97 (1.61–5.48)**
Wished to be dead	121 (16.8)	15 (20.8)	2.54 (1.19–5.37)*

*$P < .05$.
**$P < .01$.

Table 3. Adjusted Predictors of Repeat Suicide Attempt Within 6 Months

Predictor	No Repeat Suicide Attempt (n = 840), n (%)	Repeat Suicide Attempt (n = 82), n (%)	Odds Ratio (95% CI)
Lethality[a]			
Low	468 (65.2)	54 (78.3)	1.000
High	250 (34.8)	15 (21.7)	0.66 (0.35–1.25)
Reaction to survival[b]			
Glad to be alive	308 (42.8)	15 (20.8)	1.00
Ambivalent	290 (40.4)	42 (58.3)	2.84 (1.44–5.54)**
Wished to be dead	121 (16.8)	15 (20.8)	2.68 (1.17–6.17)*

[a]Adjusted for reaction to survival, sex, age, depression, and substance abuse.
[b]Adjusted for lethality of method of attempt, sex, age, depression, and substance abuse.
*$P < .05$.
**$P < .01$.

could contribute to improved risk assessment efforts and enhanced treatment services in emergency psychiatry.

Results were consistent with previous research suggesting that wishing to have died during the attempt may be a strong predictor for future repeat suicide attempts.[16,18–20] However, contrary to prior research, ambivalence about survival after a suicide attempt also increased risk for future attempt, a critical factor for clinicians to consider. This factor is especially important, as individuals presenting with suicide attempts already represent a group at increased risk for eventual suicide.[3,4,47,48] These results also indicate that a repeat attempt may be carried out in as early as 6 months, suggesting that an early intervention may be pivotal in preventing future completed suicide or a suicide attempt. Moreover, as suggested by Henriques et al,[18] unlike other demographic factors such as financial stress, reaction to survival is one that is amenable to change by a mental health intervention. Cognitive-behavioral therapy has been demonstrated to be effective in prevention of repeat suicide attempts,[49] and, thus, a period of follow-up for attempters at high risk may be effective in prevention of a repeated suicide attempt.

Our results suggest that the more lethal the method of index attempt, the less likely a repeat suicide attempt would be made within 6 months, which did not support our hypothesis. It is important to note that the significance of these results disappeared in adjusted models. Our findings may be explained by the possibility that those who attempt suicide using higher lethality methods may incur more concern in the clinician, leading to a higher likelihood of psychiatric treatment. This concern and subsequent attention from the clinician may in turn reduce the likelihood of a future attempt. However, some studies show a correlation between high-risk attempts and a higher likelihood of eventual completed suicide.[23] Persons with a history of self-harm are often reported to use a low lethality method for their index episode and a high lethality method for their fatal attempt.[25] Therefore, these individuals may have died during the study period. Examination of coroners' data in future studies would address the limited conclusions that can be drawn. Depression and substance abuse were likewise not associated with repeat attempts despite being frequently cited as risk factors for suicidal behavior in other studies.

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This finding is not surprising given that their prevalence is so common in this population as to be almost normative.

There are important limitations to consider when interpreting these results. The first is that this study did not assess completed suicide as an outcome. This factor may explain why high lethality methods were associated with a reduced likelihood of repeat suicide attempt; these people may have been more likely to have had a later fatal attempt given their propensity to use more lethal means. Whereas some characteristics are risk factors for both suicide attempts and completion, such as suicidal ideation,[48,50] others, such as sex, show different risk for these 2 outcomes.[48,51] Therefore, it is important to recognize that this study applies only to the risk of repeat attempt. In addition, we were limited in our assessment of age, as it was coded dichotomously in the study dataset. Different age groups have differing risk of suicidal behavior, and a continuous age measure or more narrow age categories may have provided further insight into the relationship between age and the other variables of interest. We were also limited to suicide attempt presentations at the 2 study hospitals. It is possible that a person had a repeat suicide attempt and presented to another hospital or, alternatively, did not present to treatment services. Future efforts to capture emergency psychiatric presentations that are more representative of the population would improve the understanding of repeat suicide attempt risk. Suicide attempt lethality can be assessed in many ways, and, in this study, we were limited to classification based on potential lethality associated with the method of attempt. We also did not assess the person's subjective perception of attempt lethality or intent to die. Nevertheless, the assessment of lethality in our study has been used in previous work.[37] Another drawback of the study is that there may be a difference between individuals who make a repeat suicide attempt once and individuals who reattempt several times, yet, we did not differentiate between the 2 suicidal behaviors and used only the index attempt and the repeat suicide attempt that occurred within 6 months due to limited incidences of repeat suicide attempts in a 6-month time frame.

Many individuals who present to health services following self-harm behaviors are discharged into the community, increasing the risk of completed suicide.[9] A simple appraisal of an individual's reaction to the survival of an attempt, regardless of lethality of attempt method, may be an important indicator of future suicidal behaviors. Mental health professionals should consider these questions as standard protocol in order to better determine which individuals may benefit from intervention. This assessment could provide clinicians with information that can guide the appropriate use of or referral to mental health resources in the community.

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Editor's Note: We encourage authors to submit papers for consideration as a part of our Focus on Suicide section. Please contact Maria A. Oquendo, MD, at moquendo@psychiatrist.com.

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