

Cognitive Functioning and Geriatric Suicide Ideation

Testing a Mediational Model

Marnin J. Heisel, Ph.D.

Gordon L. Flett, Ph.D.

Avi Besser, Ph.D.

The authors evaluated a structural model of the relationship between cognitive functioning and geriatric suicide ideation, mediated by Depression/Hopelessness, a latent construct characterized by a combination of the two. A heterogeneous sample of 90 elderly participants completed the Geriatric Suicide Ideation Scale, a new, multi-dimensional self-report measure of suicide ideation in seniors, and measures of cognitive functioning, depression, and both global and social forms of hopelessness. The results demonstrated significant associations between suicide ideation and the various predictor variables. The results of structural-equation modeling supported the proposed mediational model, indicating that the Depression/Hopelessness construct mediates the relationship between cognitive functioning and suicide ideation among older persons. These findings have implications for the conceptualization and treatment of potentially suicidal elderly persons. (Am J Geriatr Psychiatry 2002; 10:428-436)

It is well documented that senior citizens have one of the highest rates of suicide among all age-groups in North America and in many countries worldwide.¹⁻³ Data from the National Center for Health Statistics (NCHS) indicate that seniors complete suicide at a rate that nearly doubles their population representation in the United States, with approximately one completed suicide by a senior occurring every 84 minutes.³ These data mark geriatric suicide as a major public health concern and indicate the need for the development and

evaluation of conceptual models of geriatric suicidality so as to inform assessment and treatment considerations with potentially suicidal seniors.

Empirical and theoretical support links aspects of cognitive functioning with suicide;^{4,5} however, there have been relatively few investigations thus far of the role of cognitive functioning in geriatric suicidality. The present study investigated this issue by evaluating a proposed structural model of the relationship between cognitive functioning and suicide ideation in seniors, me-

Received October 31, 2001; revised February 2, March 8, 2002; accepted March 18, 2002. From the Department of Psychiatry, University of Toronto/St. Michael's Hospital, Toronto, Ontario, Canada (MJH), and the Department of Psychology, York University (GLEAB). Address correspondence to Dr. Heisel, Stephen Godfrey Fellow in Suicide Studies at the Arthur Sommer Rotenberg Chair in Suicide Studies, Department of Psychiatry, St. Michael's Hospital, 30 Bond Street, Suite 2004-2DS, Toronto, Ontario, M5B-1W8, Canada. e-mail: heiselm@smh.toronto.on.ca.

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diated by a latent construct termed Depression/ Hopelessness, comprising a combination of the two. First, however, we will provide a brief summary of existing research on cognitive functioning and aspects of geriatric suicidality.

Empirical Background

Research examining the potential link between cognitive functioning and suicidality in seniors has yielded equivocal findings, due, in part, to several possible factors, including differences in clinical and demographic features of the samples, the aspects of cognitive functioning and suicidality under investigation, and differences in the measurement characteristics of the assessment instruments. Some evidence for the potential association between cognitive functioning and suicidality has been provided by research with dementing seniors,⁶⁻⁸ despite the presentation of relatively low levels of suicidality among seniors with dementia. Rubio et al.⁸ reported significantly greater evidence of Alzheimer disease (AD) among seniors who died as a result of suicide than of natural causes. Draper et al.⁶ demonstrated an association between suicide ideation and comorbid depressive symptoms in participants with AD and concluded that the link between cognitive impairment and suicide ideation may be mediated by mood state. These conclusions are in keeping with evidence of significant associations among impairment of executive functioning, level of depression, and instrumental activities of daily living in depressed, nondementing seniors.⁹

Upadhyaya et al.¹⁰ conducted a case-control study exploring the relationship between cognitive functioning and suicidal behavior among 103 older depressed patients, 45 of whom had attempted suicide. From the literature demonstrating low levels of dementia and delirium among suicidal seniors, the authors hypothesized that cognitive functioning would positively predict the likelihood of having made a suicide attempt. The results demonstrated limited support for the hypothesis that cognitive impairment may mediate against suicidality in older adults; level of cognitive functioning did not discriminate the attempters from the non-attempters, and, although cognitive functioning demonstrated a positive association with suicide intent among those who had attempted suicide, there were no significant associations with either ratings of violence of methods utilized or of seriousness of injuries sustained. These results ap-

pear to contradict findings demonstrating that older suicide attempters had decreased cognitive functioning,¹¹ that dementia may increase the risk of suicide,⁸ and that suicide ideation may not be related to presence of insight into memory loss,⁶ a hypothesized linchpin for the theory that cognitive impairment may be protective against suicide. Moreover, cognitive impairment may hamper the successful treatment of geriatric depression,¹² thereby potentially increasing suicide risk. Indeed, Uncapher and colleagues^{13,14} reported that depressed and suicidal psychogeriatric inpatients endorsed significantly higher ratings of hopelessness, demonstrating relationships among depression, negative cognitions, and geriatric suicidality. Other research indicates that significant associations exist between geriatric suicidality and both depression¹⁵⁻¹⁷ and hopelessness.¹⁸⁻²⁰

To summarize, existing evidence indicates an association between cognitive functioning and both geriatric depression and suicidality, with mixed evidence regarding the direction of the relationship between cognitive functioning and aspects of geriatric suicidality, and some support for a possible link between dementia and geriatric suicidality. The present study evaluated the relationship among these variables in a geriatric sample, as described below.

The present study evaluated a structural model of the association between cognitive functioning and geriatric suicide ideation, mediated by Depression/Hopelessness, a latent factor comprising a combination of depression and hopelessness. We sought to expand research in this area by specifying a process through which cognitive functioning has an impact upon suicidal considerations and by exploring multiple measures of suicide ideation, including a new multidimensional measure of suicide ideation designed specifically to assess geriatric suicide ideation (the Geriatric Suicide Ideation Scale ([GSIS]; Heisel and Flett, unpublished data). We hypothesized that geriatric suicide ideation would have a significant negative association with cognitive functioning and that geriatric suicide ideation would be significantly positively associated with depression and hopelessness ratings. Finally, we hypothesized that the construct of Depression/Hopelessness might mediate the relationship between cognitive functioning and geriatric suicide ideation. The specified mediational model was tested against a model examining the direct effect of cognitive functioning on suicide ideation, and a model examining direct and indirect effects

of cognitive functioning and depression/ hopelessness on suicide ideation.

We focused on suicide ideation, rather than on suicidal behavior, given the difficulties associated with predicting extremely rare events, such as suicidal behavior, and because research has demonstrated significant associations between suicide ideation, on one hand, and both suicidal behavior and completed suicide, on the other.^{21,22} Moreover, the suicide attempt-to-completion ratio for seniors (of approximately 1-4:1)²³ demonstrates the extreme lethality of their suicidal behavior, necessitating the study of distal antecedent variables, and thereby affording clinicians early opportunity for treatment intervention.

METHODS

Participants

The participants were 90 seniors age 65 years or older, averaging 81.3 years old (standard deviation [SD]: 7.6); range: 67 to 98. Nineteen participants corresponded to the "young old" (65-74 years), 39 to the "old old" (75-84 years), and 31 to the "oldest old" (85 years and above) gerontological age-groups, with one participant having refused to reveal her age. There were no significant differences among these age-groups on overall suicide ideation scores, measured with either the GSIS or Scale for Suicide Ideation (SSI)²⁴ totals. The sample included 18 men (mean age: 80.0 years of age, SD: 6.0) and 72 women (mean age: 81.6 years of age, SD: 8.0), who were recruited from community centers or community-based seniors' programs ($n=8$), retirement residences ($n=9$), nursing residences ($n=35$), general hospital wards ($n=22$), and from psychogeriatric practices or psychogeriatric hospital wards ($n=16$). Inclusion criteria were quite broad, with potential participants including seniors above the age of 65 without neurological impairment who demonstrated an ability to understand and complete the study requirements. Those demonstrating significant cognitive impairment (operationalized as a score on the Mini-Mental State Exam (MMSE)²⁵ less than 20 and demonstrating an inability to understand and complete the study requirements), were excluded from participation in the study. The present study comprised part of a validation study of the GSIS (Heisel and Flett; unpublished).

Measures

Suicide ideation. Suicide ideation was measured with the Geriatric Suicide Ideation Scale (GSIS) and with the Scale for Suicide Ideation (SSI).²⁴ To our knowledge, the GSIS is the first multidimensional measure of suicide ideation developed among seniors. The GSIS is a 31-item, 5-point Likert-scored measure with impressive psychometric characteristics, including strong internal consistency ratings for the total scale (31 items: 0.93), and for its component subscales assessing Suicide Ideation (10 items, e.g., "I want to end my life.": 0.83), Life Orientation (8 items, e.g., "Life is extremely valuable to me.": 0.81), Loss of Personal and Social Worth (7 items, e.g., "I generally feel pretty worthless.": 0.82), and Death Ideation (5 items, e.g., "I often wish that I would pass away in my sleep.": 0.84) in the present study. Strong test-retest reliability over a 1-2 month period has also been demonstrated for GSIS Total ($r=0.86$; $p<0.001$) and subscale scores ($r=0.78, 0.75, 0.77$, and 0.76 , for Suicide Ideation, Life Orientation, Loss of Personal and Social Worth, and Death Ideation subscales, respectively, with all p values <0.001). The GSIS has demonstrated strong concurrent validity with measures of positive (e.g., life satisfaction and purpose in life), and negative (e.g., health problems, depression, and hopelessness) factors. These findings are recorded elsewhere (Heisel and Flett, unpublished data).

The SSI is a 19-item, clinician-administered scale designed to assess considerations of suicide. The SSI has demonstrated high reliability, with an internal-consistency coefficient (Cronbach's alpha) of 0.89 in the present study, and a reported interrater reliability coefficient of 0.83.²⁴ The SSI was included in the present study so as to provide quick feedback on a participant's suicide risk and for purpose of comparison with the GSIS.

Cognitive functioning. Cognitive functioning was assessed with the MMSE,²⁵ a brief global measure of an individual's cognitive state, commonly used as a screening measure for dementia and cognitive impairment. The MMSE has demonstrated strong psychometric properties, with a reported test-retest reliability coefficient of 0.89 over a 24-hour period and acceptable construct and concurrent validity.

Depression. Depression was measured with Yesavage et al.'s Geriatric Depression Scale (GDS),²⁶ a 30-item

screening measure of depression among seniors. The GDS has demonstrated high internal consistency (0.89) in the present study and a reported split-half reliability coefficient of 0.94 and test-retest reliability coefficient of 0.85 over a 1-week period.²⁶

Hopelessness. Hopelessness was measured with the Beck Hopelessness Scale (BHS),²⁷ a 20-item measure pertaining to the global experience of hopelessness, modified from a simple True/False format to a 5-point Likert-style rating system and presented interleaved with the Social Hopelessness Questionnaire (SHQ), as in Heisel et al.²⁸ The scoring system was so modified in order to increase the variability of possible BHS responses, and because it allows for more direct comparison with the similarly scored SHQ. The BHS has impressive psychometric properties, including strong internal consistency, in this study (0.82), concurrent validity with clinician ratings of hopelessness and with depression and suicide intent.

Social Hopelessness. Social hopelessness was measured with the Social Hopelessness Questionnaire (SHQ; Flett et al., unpublished data), a 20-item, 5-point Likert-scored measure of hopelessness regarding social and interpersonal cognitions and expectations for one's future interpersonal relationships. The SHQ has been found to be a unifactorial scale and has demonstrated high internal consistency in the present study (0.86). Significant associations with hopelessness, depression, and suicide ideation attest to the scale's validity (Heisel et al.²⁸ and Flett et al., unpublished data). This measure was included because of findings of a salient interpersonal element to geriatric suicidality.²⁹

Procedure

Participants were recruited by way of referral from healthcare providers or by self-referral during residence-community meetings. After informed consent was obtained, participants were administered a brief set of demographic questions, the MMSE, and the SSI, by the study investigator (MJH). Participants then completed the remaining measures in self-report fashion. Those with severe visual or motor limitations were given the measures verbally by the investigator. Participants were fully debriefed upon completion of the study and were referred for appropriate treatment if it was deemed necessary.

RESULTS

The present sample had relatively low scores on the GSIS and SSI; low-to-moderate depression and hopelessness as assessed with the GDS, the BHS, and the SHQ; and moderate cognitive functioning on the MMSE (see Table 1). The results demonstrated acceptable approximations of univariate normality for the present study's measures, with the exception of the SSI, which had a positively skewed distribution. Given that 76 participants (84%) scored below 2 points on the SSI, transformations of the distribution failed to fully rectify the abnormal distribution of SSI items, and so nontransformed SSI scores were entered into the correlational analyses.

The correlational analyses (see Table 1) revealed significant negative associations between geriatric Suicide Ideation (measured with the GSIS and SSI) and Cognitive Functioning (MMSE), and significant positive associations between Suicide Ideation and Depression (GDS), Global Hopelessness (BHS), and Social Hopelessness (SHQ). Further analyses showed that GSIS scores were significantly more strongly associated than SSI scores with Depression (GDS; $Z = 4.57$; $p < 0.001$) and Hopelessness (BHS; $Z = 4.24$; $p < 0.001$; and SHQ; $Z = 3.90$; $p < 0.001$), with no difference emerging for Cognitive Functioning (MMSE; $Z = -0.79$; NS).

Evaluation of a Structural Model of Cognitive Functioning and Geriatric Suicide Ideation

Structural-equation modeling (SEM³⁰) was utilized to test the hypothesized mediational role of Depression/Hopelessness in the relationship between Cognitive Functioning and geriatric Suicide Ideation. SEM permitted the simultaneous evaluation of both the direct and mediating effects of MMSE scores, while assessing measurement errors in the dependent and independent variables. All SEM analyses were performed with the AMOS software, based on the variance-covariance matrix (Version 4.0³¹). We tested the fit of the structural models using standardized maximum-likelihood estimations. We have reported the χ^2 as a fit index to evaluate how our proposed model fits the data compared with the baseline model representing perfect model fit. A nonsignificant χ^2 has traditionally been used as a criterion for not rejecting an SEM, because this statistic indicates that the discrepancy between the matrix of the parameters estimated on the basis of the model being evaluated is not different from the one based on the

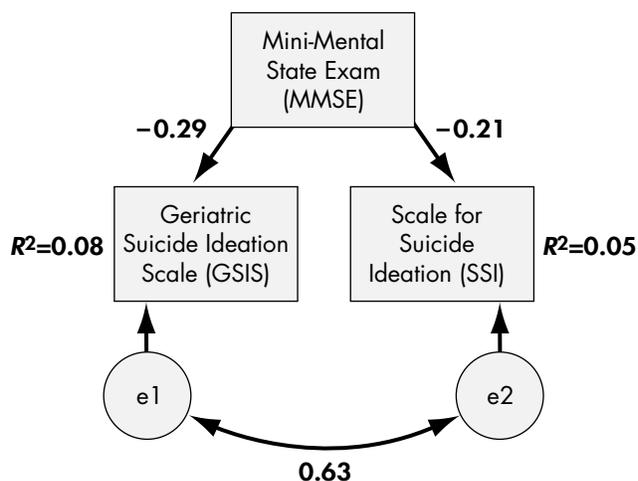
empirical data, and, thus, that the proposed model fits the empirical data well. However, the nonsignificant χ^2 criterion is overly strict and sensitive, and is influenced by the number of variables and participants examined.³² Therefore, we have also used alternate criteria that reflect the real-world conditions of clinical research, including the χ^2/df ratio, the Goodness of Fit Index (GFI), the Comparative Fit Index (CFI), and the Normed Fit Index (NFI). We have chosen to accept a model in which the χ^2/df ratio is less than 5, or in which the CFI, GFI, and NFI are greater than 0.90.³⁴ These moderately stringent acceptance criteria will clearly reject inadequate or poorly specified models, while accepting models that evidence reasonable fit and representation of the data. In the following analysis, we first tested the direct effect of MMSE scores on SSI and on GSIS scores and then specified the indirect effect model and the final mediational model.

Structural models specification. We followed Baron and Kenny's³³ criteria for mediation, according to which 1) There must be a significant association between the exogenous predictor (MMSE scores) and endogenous criterion variables (GSIS and SSI scores); and 2) There must be a significant association between the exogenous predictor and endogenous mediator (Depression/Hopelessness, determined by GDS, SHQ, and BHS scores), and the mediator must be a significant predictor of the endogenous criterion variable. The obtained pattern is said to be consistent with the mediation hypothesis if the significant direct relationship between the exogenous predictor and the endogenous criterion variables in the equation declines in the presence of the mediator. If the direct effect approaches zero, the mediator fully, although perhaps not exclusively, accounts for the relationship between predictor and outcome.

Analysis of the direct effects. We tested for mediation by first estimating the combined direct effects of MMSE scores on Suicide Ideation (estimated with SSI and GSIS scores); however, the specified model resulted in 0 df, thus preventing the estimation of fit indices. Hence, we evaluated the combined direct-effect path coefficients of the MMSE on both SSI and GSIS scores. The results (see Figure 1) demonstrated that low MMSE scores were associated with high SSI and GSIS scores (path coefficient: -0.21 ; $t_{[89]} = -2.05$; $p < 0.04$) and path coefficient: -0.29 ; $t_{[89]} = -2.87$; $p < 0.004$; respectively). This model accounted for 5% and 8% of the variance of SSI and GSIS scores, respectively.

Analysis of the mediational model. We hypothesized that depression/hopelessness mediates the effect of

FIGURE 1. The direct-effects model



Note: Bold estimates are statistically significant standardized maximum-likelihood parameters. Rectangles indicate measured variables, small circles (e1 and e2) represent residual variances, bidirectional arrow reflects correlations, and unidirectional arrows depict hypothesized directional, or "causal," links.

TABLE 1. Correlational matrix for included measures

	1	2	3	4	5	6	Mean	Standard Deviation
1. GSIS	1.00	0.65	-0.29**	0.74	0.70	0.53	58.0	16.2
2. SSI		1.00	-0.21*	0.43	0.39	0.17†	1.8	2.9
3. MMSE			1.00	-0.21*	-0.36	-0.30**	26.0	3.6
4. GDS				1.00	0.70	0.56	8.7	6.2
5. BHS					1.00	0.69	48.2	9.9
6. SHQ						1.00	52.2	11.6

Note: N=90. GSIS: Geriatric Suicide Ideation Scale; SSI: Scale for Suicide Ideation; MMSE: Mini-Mental State Exam; GDS: Geriatric Depression Scale; BHS: Beck Hopelessness Scale; SHQ: Social Hopelessness Questionnaire.

†Not significant. *p<0.05; **p<0.01. All other correlations were significant at the 0.001 level.

cognitive functioning on geriatric suicide ideation. The specified direct indirect mediation model had acceptable indices of fit ($\chi^2_{[6]}=17.0$; $N=90$; $\chi^2/df=2.8$; $p=0.009$; $GFI=0.94$; $NFI=0.94$; $CFI=0.96$). The results (see Figure 2) indicated that low MMSE scores were associated with increased Depression/Hopelessness (path coefficient: -0.36 ; $t_{[89]} = -3.31$; $p<0.001$) which was, in turn, associated with elevated SSI (path coefficient: 0.41 ; $t_{[89]}=3.55$; $p<0.0001$), and GSIS scores (path coefficient: 0.82 ; $t_{[89]}=8.41$; $p<0.0001$). Comparison of the associations of these measures with MMSE scores demonstrated that the association with

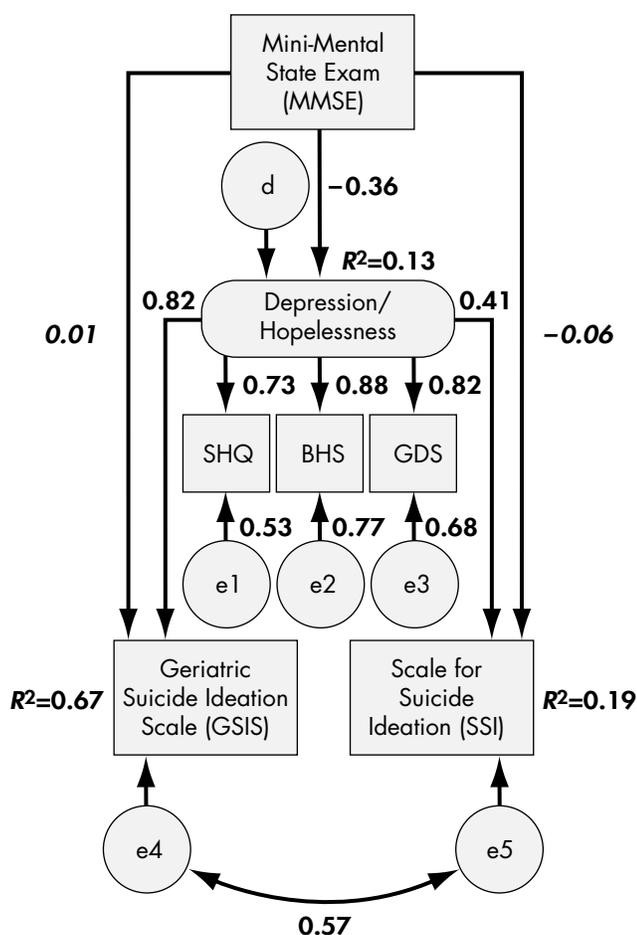
GSIS scores was significantly stronger than that with SSI scores ($t_{[89]}=8.57$; $p<0.0001$). The specified model accounted for 13% of the variance of Depression/Hopelessness and for 19% and 67% of the variance in the SSI and GSIS scores, respectively.

Mediation has occurred when the indirect effect of a predictor through a mediator significantly reduces the direct effect of a predictor.³³ As seen in Figure 1, the direct paths from MMSE scores to SSI and GSIS scores were significant (path coefficient: -0.21 ; $t_{[89]} = -2.05$; $p<0.05$ and path coefficient: -0.29 , $t_{[89]} = -2.87$; $p<0.01$, with SSI and GSIS, respectively). However, in Figure 2, these paths approached 0 (path coefficient: -0.06 ; $t_{[89]} = -0.61$; $p=0.54$, and path coefficient: 0.01 ; $t_{[89]}=0.08$; $p=0.94$, respectively). The drop in the coefficients of the direct paths from MMSE scores to SSI and GSIS scores, after controlling for the mediator, were significant according to Sobel's test ($Z = -2.25$; $p<0.05$, and $Z=2.06$; $p<0.05$, respectively).³³ Thus, Depression/Hopelessness is an almost full mediator of the association between decreased cognitive functioning and increased suicide ideation.

Next, we removed the nonsignificant direct paths from MMSE scores to SSI and GSIS scores, so as to obtain the most parsimonious model. The findings demonstrated acceptable fit for the final model ($\chi^2_{[8]}=17.69$; $N=90$; $\chi^2/df=2.2$; $p=0.02$; $GFI=0.94$; $NFI=0.94$; $CFI=0.96$). This model accounted for 13% of the variance in Depression/Hopelessness and for 19% and 67% of the variance in the SSI and GSIS scores, respectively (see Figure 3).

Given that depressed affect, cognitive difficulties, hopelessness, and suicide ideation are all symptomatic of unipolar depression, it is possible that the present findings were simply indicative of a broad underlying latent Major Depression variable. Hence, we conducted a confirmatory factor analysis, testing for a latent variable, termed "Major Depression," assessed by GDS, SHQ, BHS, SSI, and GSIS scores. The specified model for this latent construct did not fit the observed data: ($\chi^2_{[5]}=37.83$; $N=90$; $\chi^2/df=7.57$; $p=0.0001$; $GFI=0.85$; $NFI=0.86$; $CFI=0.87$), demonstrating the acceptability of separating mediator and outcome variables. These findings are discussed below.

FIGURE 2. The mediational-effects model



Note: SHQ: Social Hopelessness Questionnaire; BHS: Beck Hopelessness Scale; GDS: Geriatric Depression Scale. Bold estimates are statistically significant standardized maximum-likelihood parameters. Rectangles indicate measured variables; large oval represents latent construct, and small circles (e1 to e5) represent residual or disturbance (d) variances, bidirectional arrow reflects correlations, and unidirectional arrows depict hypothesized directional, or "causal," links.

DISCUSSION

The present study evaluated, in a sample of 90 senior citizens, a structural model of the relationship between

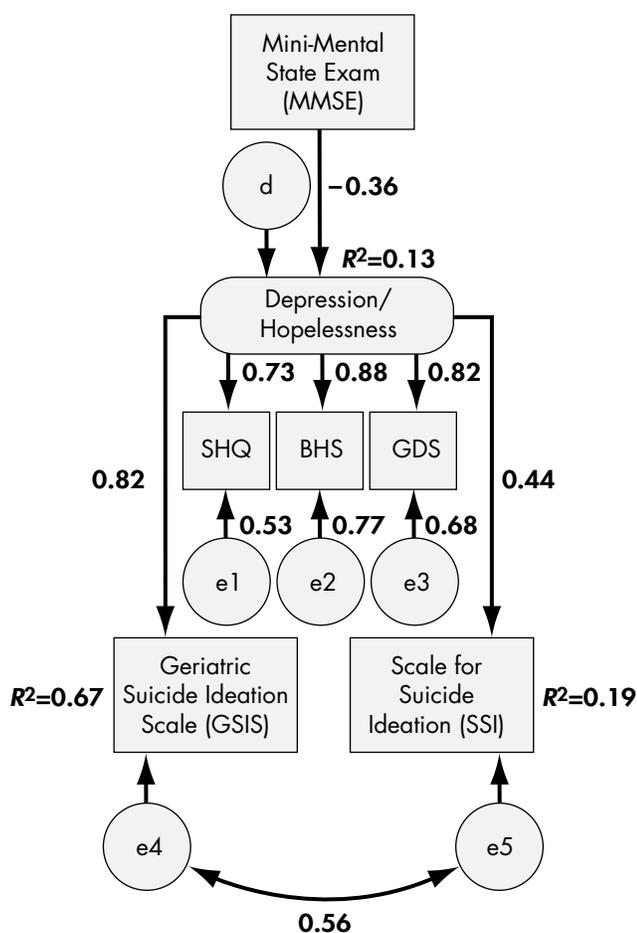
cognitive functioning and suicide ideation mediated by Depression/Hopelessness, a latent variable assessed by measures of depression, global hopelessness, and social hopelessness. The findings supported the hypothesized inverse relationship between cognitive functioning and geriatric suicide ideation, in keeping with most previous research that has found cognitive impairment to be a potential risk factor for suicidality among seniors.^{8,11} A notable exception is Upadhyaya et al.'s study,¹⁰ which found a positive association between cognitive functioning and geriatric suicidal intent, a discrepancy po-

tentially due to sampling characteristics of that study or to inherent differences between suicide ideation and suicidal intent, a variable more closely linked with ability to plan a potentially lethal suicide attempt, action requiring a high degree of cognitive complexity.

The findings further supported the proposed mediational model, demonstrating that the relationship between cognitive functioning and geriatric suicide ideation is mediated by a latent factor reflecting a combination of depression and hopelessness. This model proposes a psychological process wherein seniors with lower cognitive functioning are at an increased risk of experiencing intense psychological pain typified by depression and hopelessness which, in turn, may increase their risk of sinking into suicidal contemplations and considerations, thereby potentially increasing their risk of actual suicide. Among the active components conceivably involved in this process are negative judgments regarding the self⁴ and the future,³⁴ both of which represent important avenues of future exploration regarding risk factors for geriatric suicidality. These findings are consistent with those of researchers^{13,21} who have demonstrated a close link among depression, hopelessness, and suicidality among diverse populations, and with the "hopelessness depression" theory.³⁵ Baumeister's⁴ "escape from self" theory of suicide posits that cognitive deconstruction is a response to intense negative affect and painful self-awareness induced by the perception that one has failed to live up to one's self-expectations. Although the present study did not examine seniors' perceptions regarding their self-standards, our findings illustrated the relevance of Baumeister's theory to the suicidal senior, in terms of the association between decreased cognitive functioning and elevated Depression/Hopelessness, and a close link between this latent construct and geriatric suicide ideation. Replication studies will help to further clarify the active components of this latent construct. Future research should include measures of suicidality developed specifically among seniors so as to increase the sensitivity of the analyses to geriatric suicidality.

The present study is the first, to our knowledge, to utilize a multidimensional measure of suicide ideation developed specifically among seniors in an examination of geriatric cognitive functioning. The findings of both the correlational and SEM analyses demonstrated superiority for the GSIS as a measure of geriatric suicide ideation relative to the SSI, with significantly stronger associations between the GSIS and geriatric depression

FIGURE 3. The final model



Note: SHQ: Social Hopelessness Questionnaire; BHS: Beck Hopelessness Scale; GDS: Geriatric Depression Scale. Bold estimates are statistically significant standardized maximum-likelihood parameters. Rectangles indicate measured variables; large oval represents latent construct, and small circles (e1 to e5) represent residual or disturbance (d) variances, bidirectional arrow reflects correlations, and unidirectional arrows depict hypothesized directional, or "causal," links.

and hopelessness than those with the SSI. The present study is also the first, to our knowledge, to include a measure of a specific domain of hopelessness in studying cognitive functioning and correlates of suicidality in seniors. Although social hopelessness has been previously associated with suicide attempts,³⁶ the present findings demonstrated the relevance of hopelessness in the interpersonal domain to thoughts of suicide in seniors. The present study was limited, however, because of its use of the MMSE as the sole measure of cognitive functioning. Although it is useful as a brief screening measure for cognitive impairment and potential dementia, the MMSE is a rather nonspecific measure of cognitive functioning. Future research should include multiple measures of specific cognitive functions, in order to help specify those discrete cognitive operations most affected by depression and hopelessness, and most predictive of suicide ideation in seniors. Future research should also include raters of cognitive functioning and suicide ideation who are blind to the study's hypotheses.

Additional limitations to the present study relate to the use of SEM analyses. The present study was limited by its cross-sectional design, given that SEM can only effectively test causality in structural models in which the predictors, mediators, and criterion measures are assessed at different points in time. Thus, the present findings cannot rule out, conclusively, that suicide ideation is not the cause of decreased cognitive functioning or of increased depression and hopelessness. Hence, a replication of the present study is needed, utilizing a longitudinal design. A further limitation of the use of SEM analyses involves the relatively small sample size. However, it was sufficient for SEM analyses, given our use of relatively conservative fit criteria. Nevertheless, future research should use larger samples, with a larger proportion of men. Another limitation relates to the inclusion of highly intercorrelated measures, which may have increased the risk that our findings may have been influenced by multicollinearity. However, a confirmatory factor analysis disconfirmed that this was the case in this study. Although the SEM findings supported

a model of the relationship between cognitive functioning and geriatric suicide ideation, other models may fit the data as well. Hence, future researchers are encouraged to explore additional potential links between cognitive functioning and geriatric suicide ideation, including the exploration of personality factors that may contribute to geriatric suicide.³⁷ Such research may improve our understanding of causal factors in geriatric suicide, thereby influencing potential intervention efforts.

Finally, the findings have implications for geriatric treatment efforts. Rather than focusing exclusively on neuropsychological rehabilitation efforts, clinicians are advised to include a focus on salient affective factors linked with suicide among seniors with lowered cognitive functioning. Strong evidence exists that geriatric depression and hopelessness are amenable to psychotherapeutic and pharmacological treatment.^{18,38} Although the present study exclusively examined suicidal cognitions, studies have demonstrated a significant link between suicidal ideation, behavior, and completion.^{21,22} Also, the ratio of suicide attempts to completions for seniors demonstrates the clear need for an understanding of more distal predictive factors.²³ The findings of the present study suggest that attention to these factors may ultimately contribute to improved suicide prevention among elderly persons.

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