

What cognitive functions are associated with passive suicidal ideation? Findings from a national sample of community dwelling Israelis

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SUMMARY

Purpose To identify the specific cognitive domains associated with passive suicidal ideation (e.g. thoughts of being better off dead).

Methods A cross sectional, national based study of 1,712 individuals over the age of 50. Outcome measure, passive suicidal ideation, was evaluated by the question, ‘in the past month, have you felt that you would rather be dead?’, taken from the Euro-D. Cognitive domains assessed were time orientation, verbal learning, verbal recall, word fluency, and arithmetic.

Results After adjusting for demographic and clinical information, those reporting passive suicidal ideation were significantly more likely to have impaired performance on the time orientation task. None of the other cognitive domains were associated with passive suicidal ideation.

Conclusions Clinicians working with older adults need to be aware not only of demographic and clinical information, but also of cognitive functioning and more specifically, time orientation, as a potential determinant of passive suicidal ideation. Possibly, cognitive domains that are less affected by education and prior learning (e.g. time orientation) have a unique association with passive suicidal ideation. Copyright © 2008 John Wiley & Sons, Ltd.

KEY WORDS — suicidality; risk; death; epidemiology; affect

INTRODUCTION

Research has shown that older adults are at a substantially greater risk of dying by suicide than younger adults (Center for Disease Control, 2007), with the ratio of actual death as a result of suicide to attempted suicide being highest among this age group (Beck *et al.*, 1999). Death wishes (i.e. both passive, such as thoughts of being better off dead and active, such as thoughts of taking one’s life), suicide attempts, and complete suicide often co-occur, but should not be equated (Paykel *et al.*, 1974). Yet, death wishes

are considered a red flag that necessitates clinical intervention. Hence, it is important to identify potential signs and indicators of death wishes in this high-risk population of older adults.

Common risk factors for suicidal ideation in late life include medical illness and disability (Hirsch *et al.*, 2006a), affective illness (Barnow *et al.*, 2004; Pfaff and Almeida, 2004), and past history of suicide attempts (Alexopoulos *et al.*, 1999). Low future orientation and hopelessness have also been associated with suicidal ideation and past attempts (Rifai *et al.*, 1994; Uncapher *et al.*, 1998; Alexopoulos *et al.*, 1999; Hirsch *et al.*, 2006b).

Cognitive function

The literature on cognitive function and suicidal ideation is limited and the majority of research has

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focused on suicidal acts. It has been maintained that suicidal individuals suffer from cognitive rigidity that leads them to believe that suicide is their only option. This hypothesis has received support in several studies that found a link between cognitive functioning and suicide ideation or attempts (King *et al.*, 2000; Kellip *et al.*, 2001; Jollant *et al.*, 2005; Ayalon *et al.*, 2007). It was further argued that individuals who present with limited problem solving ability are also more likely to report a sense of hopelessness and dysphoria and, as a result, resort to suicidal ideation and attempts (Schotte and Clum 1987; Schotte *et al.*, 1990; Dixon *et al.*, 1994; Heisel *et al.*, 2002). However, other studies have found no such a relationship between cognitive functioning and suicidality (Ellis *et al.*, 1992; Potkin *et al.*, 2003).

The present study

To date, most of the studies that have examined cognitive functioning as a predictor of suicidality have employed case control designs and were based on small or non-representative samples (Kelip *et al.*, 2001; Heisel *et al.*, 2002; Jollant *et al.*, 2005). In addition, many of these studies employed cognitive screens that were not sufficiently sensitive to detect domain-specific cognitive functions that may indicate a specific suicide risk (Upadhyaya *et al.*, 1999; Heisel *et al.*, 2002; Ayalon *et al.*, 2007). Finally, despite the well documented link between cognitive impairment and age (Lyketsos *et al.*, 2002) and between suicidality and age (Center for Disease Control, 2007), only a small fraction of these studies has focused specifically on older adults (Upadhyaya *et al.*, 1999; Heisel *et al.*, 2002; Ayalon *et al.*, 2007).

The present study adds to the current body of research by identifying those specific cognitive functions associated with passive suicidal ideation in a national sample of older adults. Based on past research, we expected more complex executive tasks, such as arithmetic ability and word fluency, to be associated with passive suicidal ideation, even after controlling for all other socio demographic and clinical characteristics. We had no specific hypotheses with regard to the role of the other cognitive tasks as predictors of passive suicidal ideation.

METHODS

The analysis uses data from SHARE-Israel, the Israeli component of the Survey of Health, Aging and Retirement in Europe (Börsch-Supan *et al.*, 2005), which is a multidisciplinary study of people age

50 years and older that is based on the US Health and Retirement Study. The sample was a cluster sample of the Israeli population over the age of 50, stratified by ethnicity, religion, immigrant status and region. Within each stratum, the clustering was hierarchical: subjects within households within statistical regions within strata. Questionnaires were administered by trained interviewers in Hebrew, Arabic and Russian, according to the language preferences of participants. The main survey was executed by means of computer-assisted personal interviews. Specific training was given to interviewers regarding the administration of the cognitive measures. A supplementary drop off questionnaire was also completed and returned by respondents. The study was approved by the Institutional Review Board of the Hebrew University of Jerusalem. All participants gave informed consent prior to taking part in the interview. Participation was voluntary.

Overall, 1,774 households participated in the study (68.6% response rate), with responses received from 2,603 individuals. Because the primary sampling unit was households, the base sample included a small number of younger spouses. In the present study, we included only respondents who were 50 years and older at the time of the interview and who also completed the drop-off questionnaire portion of the survey ($n = 1,712$; 66.2% response rate to the drop off questionnaire). Of this sample, 46% were between 50–59, 26.9% were between 60–69 and 27% were 70 or older. The majority of the sample had a secondary level of education or less (76%) and women constituted 48.4% of the sample (Table 1).

Dependent variable

Passive suicidal ideation. The passive suicidal ideation indicator is an item taken from the Euro-D measure, which is a face-to-face measure of depression (Prince *et al.*, 1999): ‘in the past month, have you felt that you would rather be dead?’. Response options are: ‘yes’ (1)—participant has mentioned passive suicidal ideation vs ‘no’ (0)—no passive suicidal ideation mentioned. A similar question was used in past research as an indicator of passive suicidal ideation (Ayalon *et al.*, 2007).

Independent variables

Cognitive functioning. As noted earlier, all cognitive measures were obtained in face-to-face interviews by

Table 1. Demographic and clinical characteristics of the sample by passive suicidal ideation ($n = 1,712$)

| Predictors | Overall Sample ^a | No passive suicidal ideation (1,481) | Passive suicidal ideation (134) | Chi-square/ <i>t</i> -test | <i>p</i> -value ^b |
|--|-----------------------------|--------------------------------------|---------------------------------|----------------------------|------------------------------|
| Gender ^c | | | | 5.6 | 0.22 |
| Female | 726 (48.4%) | 663 (47.7%) | 63 (57.4) | | |
| Education | | | | 123.9 | <0.001 |
| Primary | 411 (19.4%) | 350 (17.1%) | 61 (52.9%) | | |
| Secondary | 825 (56.5%) | 773 (57.8%) | 52 (37.5%) | | |
| Tertiary | 374 (24.0%) | 354 (25.0%) | 20 (9.4%) | | |
| Age | | | | 13.4 | 0.15 |
| 50–59 | 687 (46.0%) | 649 (46.4%) | 38 (40.4%) | | |
| 60–69 | 493 (26.9%) | 457 (27.3%) | 36 (20.2%) | | |
| 70+ | 435 (27.0%) | 375 (26.2%) | 60 (39.2%) | | |
| Marital status | | | | 21.9 | 0.02 |
| Married/living with a partner | 1300 (75.8%) | 1214 (76.9%) | 86 (60.5%) | | |
| Hope (1–35) | 25.4 (.25) | 25.8 (.26) | 22.1 (.69) | -4.86 | <0.001 |
| Depression (0–42) | 11.3 (.40) | 10.6 (.43) | 19.5 (.91) | 7.45 | <0.001 |
| Medical Conditions (0–8) | 1.15 (.07) | 1.10 (.08) | 1.83 (.24) | 2.92 | 0.004 |
| Activities of Daily Living (0–5) | .26 (.04) | 0.19 (.03) | .97 (.21) | 4.90 | <0.001 |
| Time Orientation (0–4) | 3.70 (.03) | 3.76 (.03) | 3.21 (.14) | -4.74 | <0.001 |
| Verbal Learning (0–10) | 4.54 (.11) | 4.61 (.12) | 3.92 (.29) | -2.13 | 0.03 |
| Verbal Recall (0–10) | 3.05 (.10) | 3.11 (.11) | 2.43 (.29) | -2.10 | 0.03 |
| Word Fluency (0–48) | 18.56 (.34) | 18.91 (.36) | 14.91 (1.23) | -2.64 | 0.008 |
| Arithmetic (0–4) | 2.49 (.06) | 2.54 (.06) | 1.94 (.15) | -3.53 | <0.001 |
| Composite Cognitive Functioning Score (0–76) | 32.41 (.50) | 32.98 (.51) | 26.78 (1.89) | -2.96 | 0.003 |

^aResults are presented as % for categorical variables and means (SD) for continuous variables. *N* varies between 1,712 to 1,537 due to missing values.

^bChi square analyses were conducted for categorical variables and *t*-test analyses for continuous variables.

^cAll analyses were weighted and stratified to account for complex sample design.

surveyors specifically trained in their administration. These included time orientation, arithmetic ability, verbal learning and recall, and word fluency.

Time orientation. The SHARE questionnaire assesses participants' knowledge of year, month, day of the month, and day of the week. To reflect overall time orientation, we summed up all accurate responses, with a higher score representing better performance (range 0–4).

Verbal learning. The SHARE questionnaire evaluates learning using the adapted Ten-Word Delay Recall Test. The measure has been previously used in several international studies (Prince *et al.*, 2003). The list of ten words was read to participants and the number of spontaneously recalled words from the list following the first read was documented. Score range was 0–10 with a higher score representing better performance.

Verbal recall. Five minutes following the verbal learning task, participants were asked to spontaneously recall the list of words. Score range was

0–10 with a higher score representing better performance.

Word fluency. The SHARE questionnaire evaluates word fluency using the animal fluency task. Participants were asked to name all the animals they can think of within a one-minute trial. Participants received one point for each correct animal name. In the present study the range was 0–48.

Arithmetic. Arithmetic ability was evaluated using 4 questions. A question example is: 'if the chance of catching a disease is 10%, how many people out of 1,000 are expected to catch the disease'. Response range was 0–4, with a higher score representing better performance.

Composite cognitive functioning. A composite score of all cognitive domains was calculated, ranging from 0–76, with a higher score representing better global cognitive functioning.

Covariates

Depression. We used the 14-item Center for Epidemiological Studies of Depression questionnaire (CES-D) as an indicator of overall depression level. The CES-D is a well-known measure frequently used to assess depressive symptomatology in the general population. Participants are asked to indicate the frequency with which they felt each of the symptoms within the past week. Scores range from 0–42 (Radloff, 1977).

The CES-D was used as an indicator of depression instead of the Euro-D score, in order to prevent multicollinearity between the suicide item taken from the Euro-D and overall depression. Relative to the Euro-D, the CES-D has the advantage of using a different response scale from the suicide item and of being administered in a paper-and-pencil format rather than an interview format.

Hope. The measure of hope was comprised of seven questions about one's expectations and beliefs about the future and perceived ability to cope with the future. Questions originate from the Life Orientation Test—Revised (Scheier *et al.*, 1994) and from the Hope scale (Snyder *et al.*, 1996). Items are ranked on a five-item agree-disagree scale. The range of scores is 7–35, the higher the score, the greater one's sense of hope.

Medical conditions. Respondents were asked whether a physician had told them they suffer from: arthritis, cancer, lung disease, diabetes, asthma, hypertension, stroke, or heart conditions. A composite score of overall number of medical conditions was constructed with a higher score representing more medical conditions (range 0–8).

Activities of Daily Living (ADL). Respondents were asked whether they are limited in performing every day activities, such as dressing up, showering, using the restroom, eating, or getting in and out of bed. A composite score ranging from 0–5 was calculated with a higher score representing greater impairment.

Demographic information. Age, gender, marital status, and level of education were gathered based on self-report.

Analysis

We first ran univariate and bivariate analyses. We then assessed for multicollinearity. Last, we entered all

cognitive predictors, controlling for age, gender, marital status, level of education, depression, hope, medical conditions, and ADL into the logistic regression, with passive suicidal ideation as the outcome variable. In an additional sensitivity analysis, we evaluated the relationship between the composite cognitive score and passive suicidal ideation, controlling for all other covariates.

RESULTS

Overall, 6.5% of the sample reported passive suicidal ideation. All cognitive domains, including the composite cognitive score had significant bivariate relationships with passive suicidal ideation; relative to those who did not report passive suicidal ideation, those who reported passive suicidal ideation had more impaired cognitive performance. As expected, those reporting passive suicidal ideation also had lower levels of hope and were more likely to be depressed than those who did not report passive suicidal ideation. In addition, those with passive suicidal ideation had more medical conditions and impaired ADL and were less likely to be married. They also had a lower level of education relative to those who did not report passive suicidal ideation (see Table 1).

Verbal learning and verbal recall were highly correlated ($r=0.73$, $p<0.001$). Hence, a composite score of verbal memory was calculated and entered into the multivariate regression analysis. We conducted a logistic regression analysis with all cognitive variables (e.g. time orientation, verbal learning, verbal recall, word fluency, and arithmetic ability), controlling for depression, age, gender, marital status, level of education, medical condition, and ADL. Table 2 summarizes the results. Those who reported passive suicidal ideation had a worse performance on the time orientation task than those who denied passive suicidal ideation. None of the other cognitive domains remained significant predictors of suicidal ideation in the fully adjusted model. As expected, those who reported greater depressive symptoms were significantly more likely to report passive suicidal ideation. Level of education was also a significant predictor, with those of tertiary level of education being less likely to report passive suicidal ideation than those of primary level of education. In an additional sensitivity analysis, the composite cognitive score [Odds Ratio (OR)=0.94, 95% Confidence Intervals (CI): 0.90–0.99, $p=0.03$] was a significant correlate of passive suicidal ideation once we adjusted for age, gender, marital status, ADL, medical conditions,

Table 2. Multivariate logistic regression predicting passive suicidal ideation ($n = 1,537$)^a

| | OR | 95% CI | <i>p</i> |
|----------------------------------|------|-----------|----------|
| Gender | | | |
| Female | 53 | 0.70–3.36 | 0.28 |
| Education | | | |
| Primary (reference) | | | |
| Secondary | 31 | 0.13–0.72 | 0.007 |
| Tertiary | 17 | 0.05–0.51 | 0.002 |
| Age | | | |
| 50–59 (reference) | | | |
| 60–69 | 0.72 | 0.30–1.68 | 0.45 |
| 70+ | 0.88 | 0.40–2.13 | 0.87 |
| Marital Status | | | |
| Not Married (reference) | | | |
| Married/living with a partner | 0.99 | 0.40–2.42 | 0.98 |
| | 0.96 | 0.89–1.04 | 0.41 |
| Hope (1–35) | | | |
| Depression (0–42) | 1.11 | 1.05–1.17 | <0.001 |
| Medical Conditions (0–8) | 1.12 | 0.83–1.49 | 0.44 |
| Activities of Daily Living (0–5) | 1.23 | 0.95–1.58 | 0.10 |
| Time Orientation (0–4) | 0.65 | 0.44–0.95 | 0.02 |
| Verbal Memory (0–20) | 1.08 | 0.98–1.19 | 0.08 |
| Word Fluency (0–48) | 0.94 | 0.89–1.00 | 0.09 |

^a*N* is reduced due to missing values on some of the variables. $F(14, 1091) = 7.03$, $p < 0.001$.

depression, and hope. However, in the fully adjusted model, once education was entered into the model, the composite cognitive score (OR = 0.97, 95%CI: 0.92–1.02, $p = 0.32$) was no longer a significant correlate of passive suicidal ideation.

DISCUSSION

The present study identified those specific cognitive domains that are associated with passive suicidal ideation. To our knowledge, this study is the first to evaluate this relationship using a variety of cognitive measures and a nationally representative sample. Overall, 6.5% of the sample reported passive suicidal ideation. This rate is only slightly higher than the rate of passive suicidal ideation reported for primary care older adults (Ayalon *et al.*, 2007). The only cognitive domain that maintained a significant relationship with passive suicidal ideation in the fully adjusted model was orientation to time, with those presenting with a more impaired performance on the time orientation task being more likely to report passive suicidal ideation.

Contrary to a prior prevailing hypothesis according to which confusion serves as a protective mechanism against suicidality in older adults (Conwell, 1995), our findings show that there is a positive relationship

between impaired orientation to time and passive suicidal ideation. This suggests that confusion is actually a risk factor for passive suicidal ideation. In support of this finding, we note that researchers have found that older adults who went on to develop clinical depression had an impaired orientation to time up to three years prior to their diagnosis of depression. These researchers suggested that impairment in orientation to time might be related to apathy or to lack of motivation (Berger *et al.*, 1998). An alternative possibility is that impairment in time orientation is associated with confusion and as a result may cause frustration and lead to passive suicidal ideation, especially among those with better insight into their cognitive state. Time orientation may also be indicative of a greater and more pervasive cognitive impairment than the other cognitive domains evaluated in the present study, such as arithmetic or verbal learning.

Contrary to our hypothesis, arithmetic ability and word fluency were not significant predictors of passive suicidal ideation in the fully adjusted model. In addition, we found that although the overall cognitive score was a significant correlate of passive suicidal ideation even after we adjusted for age, gender, marital status, medical condition, ADL, depression, and hope, it was no longer a significant correlate once education was entered into the model. Whereas time orientation can be considered as a fluid ability that is less affected by education or prior learning, other abilities evaluated in this study, such as arithmetic or word fluency are more affected by prior learning and education. Hence, the present study suggests that impairments in fluid abilities have a more unique association with passive suicidal ideation than crystallized abilities that were acquired through prior learning and education.

Interestingly, the only demographic variable that was associated with passive suicidal ideation in the present study was level of education. As has been the case in previous research (Abel and Kruger, 1997), we found that those of higher levels of education were less likely to report passive suicidal ideation. These individuals likely have greater cognitive and financial resources that potentially allow them to consider alternatives to suicide at times of distress.

Our findings have several clinical implications; as already noted by past research, paying attention to depression as a potential sign of passive suicidal ideation is of utmost importance. Clinicians can also use information about impairment in time orientation as a red flag that indicates the necessity of careful

suicidality assessment. However, in order to develop effective interventions on behalf of this population, further research is needed to identify the specific factors responsible for the association between orientation to time and suicidality.

Implications for future research

Future research that investigates the cognitive predictors of suicidal acts and completed suicide is much needed. A longitudinal study of cognitive functioning as a predictor of suicidal ideation and suicidality also is warranted. The use of cognitive measures of abilities that are less affected by educational level and prior learning in addition to more detailed measures of insight and confusion may assist in identifying the particular cognitive domains associated with suicidal ideation. Finally, evaluating structural changes in the brain can complement data from neuropsychological tests and improve our understanding of the relationship between cognition and suicidality.

The present study has a number of limitations that should be noted. First, we only evaluated passive suicidal ideation. Even though there is a link between passive suicidal ideation and acts, the two are not interchangeable and suicidal thoughts occur at a much higher frequency than the actual act (Paykel *et al.*, 1974). Second, a comprehensive measure of suicidality was not incorporated in the present survey and thus, our ability to capture different aspects of suicidality was limited. Yet, including a small number of items on suicidal ideation is a common practice in epidemiological studies (Paykel *et al.*, 1974; Ayalon *et al.*, 2007). Third, the data come from the first wave of the SHARE survey. Given the cross-sectional nature of a single wave of data collection, we cannot infer about cause and effect. Finally, this study is focused on community dwelling older adults. Hence, individuals institutionalized due to severe impairments were excluded.

Nevertheless, the present study has a number of unique strengths that outweigh its limitations. First, the study presents findings obtained from a large population-based sample of people aged 50 years and older. To our knowledge, this is the only study to evaluate the relationship between an array of cognitive domains and passive suicidal ideation using a national based sample. Our findings suggest that level of education, depression, and orientation to time are all associated with passive suicidal ideation. Clinicians working with older adults need to be aware of sociodemographic and clinical characteristics as

KEYPOINTS

- Old age is a major risk for suicide.
- Old age is also a risk for cognitive impairment.
- There is preliminary research demonstrating that cognitive impairment is associated with suicidal ideation.
- This study demonstrates an association between a specific cognitive domain- time orientation- and passive suicidal ideation. Hence, clinicians working with older adults need to be aware not only of demographic and clinical information, but also of cognitive functioning and more specifically, time orientation, as a correlate of passive suicidal ideation.

well as cognitive function as potential indicators of passive suicidal ideation. Attention has to be specifically focused on impairment in orientation to time as a potential predictor of suicidal ideation in older adults.

CONFLICT OF INTEREST

None known.

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