

Suicide in the Old Elderly: Results From One Italian County

Marco Innamorati, Psy.D., Maurizio Pompili, M.D., Ph.D., Cristina Di Vittorio, M.D., Stefano Baratta, M.D., Vittoria Masotti, J.D., Annalisa Badaracco, M.D., Yeates Conwell, M.D., Paolo Girardi, M.D., Mario Amore, M.D.

Objectives: *To investigate factors differentiating old-old elderly (those aged 75 years and older) who died by suicide from middle-aged (those aged 50–64 years) and young-old (aged 65–74 years) adults who took their own lives, and from living psychiatric outpatients 75 years and older who had no suicidal behaviors in the last 12 months before assessment. Methods:* *Cases for psychological autopsy interviews were 117 old-old elderly who died by suicide between 1994 and 2009. Comparisons were 97 young-old adult and 98 middle-aged suicide victims and 117 psychiatric outpatients admitted to the Department of Psychiatry of the University of Parma (Parma, Italy) between 1994 and 2009. Information for suicide decedents was gathered through proxy-based interviews, and data regarding living comparison subjects were extracted from medical records. Results:* *A high number of old-old elderly were widowed and lived alone before death; widowhood was more prevalent in the old-old elderly than in the younger suicide groups and the psychiatric outpatients. In addition, old-old elderly were more frequently characterized by the presence of life stressors in the few months before death compared with the psychiatric outpatients. Conclusions:* *Clinicians involved in the prevention of suicide in older adults should pay particular attention to loneliness and lack of social support, two conditions that may push the individual to feel hopeless, especially in those individuals who are facing stressful life events.* (Am J Geriatr Psychiatry 2013; ■:■–■)

Key Words: life stressors, mental illness, old age, physical illness, psychological autopsy, suicide

For many decades, men aged 75 years and older had the highest rates of suicide in nearly all industrialized countries.¹ More recently, suicide rates among older adults have started to decrease, and

rates among young people have been increasing to such an extent that they are now the group at highest risk in one-third of countries, in both developed and developing countries.^{2,3} Nevertheless, older male

Received December 26, 2012; revised February 28, 2013; accepted March 4, 2013. From the Department of Neurosciences Division of Psychiatry (MI, CDV, SB), University of Parma, Parma, Italy; Department of Neurosciences, Mental Health and Sensory Functions, Suicide Prevention Center, Sant'Andrea Hospital, Sapienza University of Rome, Rome, Italy; Department of Anatomy, Pharmacology and Forensic Sciences (MP, VM, AB, PG), Section of Legal Medicine, University of Parma, Parma, Italy; Department of Psychiatry (YC), University of Rochester School of Medicine, Rochester, NY; and Department of Neurosciences (MA), Rehabilitation, Ophthalmology and Genetics, Section of Psychiatry, University of Genova, Genova, Italy. Send correspondence and reprint requests to Maurizio Pompili, M.D., Ph.D., Department of Neurosciences, Mental Health and Sensory Functions, Suicide Prevention Center, Sant'Andrea Hospital, Sapienza University of Rome, Via di Grottarossa 1035, 00189 Roma, Italy. e-mail: maurizio.pompili@uniroma1.it

The first two authors contributed equally to this work.

© 2013 American Association for Geriatric Psychiatry

<http://dx.doi.org/10.1016/j.jagp.2013.03.003>

Suicide in the Old Elderly

residents of many Western countries still have a high risk of dying a violent death.^{4,5}

Several research studies investigating risk factors for suicide in those aged 65 years and older have been published.^{6–14} However, studies focusing specifically on old-old adulthood (aged 75 years and older) are scarce. Evidence indicates that risk factors associated with suicide may differ between young-old adults (those aged 65–74 years) and the old-old elderly. For example, Waern et al.¹⁵ investigated predictors for suicide among the adults aged 75 years and older in 38 consecutive suicide deaths that occurred in western Sweden. The authors reported that one-half of the suicide victims had required outside assistance with daily living (e.g., shopping, cooking, cleaning, personal hygiene) and that having such assistance was a significant predictor of suicide in this age group compared with young-old adult suicides. However, family conflict, serious physical illness, loneliness, and both major and minor depression were the strongest factors associated with suicide in this group. Major depression affected 42% of the old-old elderly, constituting a very strong risk factor for suicide. However, fewer old-old elderly suicide victims than younger suicide victims had been treated for depression during the year that preceded their deaths.

Because there are few studies focusing on specific characteristics of old-old elderly suicide victims, the objective of the current study was to investigate factors differentiating suicides in the old-old elderly compared with middle-aged and young-old adults who died in the same geographic region. Furthermore, due to the fact that previous literature has reported that approximately 71% to 95% of elderly suicide decedents may have a diagnosable Axis I condition,¹⁶ we investigated those factors differentiating old-old elderly suicides from a gender-matched sample of psychiatric patients 75 years and older living in the same area who had no history of suicidal behaviors in the last 12 months.

METHODS

Suicide Cases

Cases for psychological autopsy interviews were suicide victims aged 75 years or older (range: 75–96

years) who died between 1994 and 2009 and who resided in the province of Parma, Italy. Comparison was made with two younger groups of suicide victims: a group of middle-aged adults (50–64 years old) and a group of young-old adults (65–74 years old). A third comparison group included a sample of psychiatric outpatients aged 75 years and older who were admitted to the Department of Psychiatry of the University of Parma (Parma, Italy) between 1994 and 2009 and who had not committed any suicidal act in the last 12 months. All psychiatric living comparisons were resident in the province of Parma. The psychiatric outpatients were gender-matched with the old-old elderly suicide victims.

In the time span of the study, 312 records were compiled of suicides at age 50 years and older. They included 117 old-old elderly (86 men and 31 women), 97 young-old adults (78 men and 19 women), and 98 middle-aged suicides (79 men and 19 women). The psychiatric living comparison subjects included 117 old-old elderly (86 men and 31 women).

Measures

Suicide cases. Information about the manner of death was collected from official records of the coroner's office of the county of Parma. These data were cross-referenced to the registered persons database, which provided demographic information for residents. One of the senior authors (M.A.) contacted relatives and physicians of decedents judged to have died by suicide to obtain their informed consent for a telephone proxy-based interview. Interviews were conducted by clinical psychologists and psychiatrists extensively trained in interviewing techniques and psychopathology.

The information gathered during the interview was systematically recorded. Suicide methods were grouped into two categories: violent methods (hanging, jumping, shooting or stabbing, drowning, and burning) and nonviolent methods (poisoning and gassing). The proxy-based interview with physicians documented physical illness in the 6 months before the date of death. As markers for the presence of physical illness, we used physician diagnosis and prescribed drugs or drug combinations dispensed in the index period of time, as described elsewhere.¹⁷ Psychoactive drugs prescribed in the 6 months before the date of death were noted, as was

contact with the family physician that occurred in the last 6 months.

The proxy-based interview with relatives included the following items: demographic factors such as employment status, marital status, educational status, and living arrangements; psychosocial factors present in the last 6 months before the date of death, such as lack of social support, financial problems, and life and loss events; past suicide attempt, defined as self-inflicted, potentially injurious behavior with a nonfatal outcome for which there is evidence (either explicit or implicit) of intent to die; and whether the victims left suicide notes. To indicate mental illness present in the 6 months before the date of death, the interviewers inquired about the presence of the following conditions: depressed mood or loss of interest or pleasure; hopelessness; abnormally and persistently elevated, expansive, or irritable mood; recurrent alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance; delusions; hallucinations; disorganized or catatonic behavior; negative symptoms, such as affective flattening, alogia, or avolition; or enduring pattern of inner experience and behavior that deviated markedly from the expectations of the individual's culture as evidenced by the ways of perceiving and interpreting self, other people, and events. Also noted were mood, impaired interpersonal functioning, and poor impulse control. When any condition was revealed, the interviewer conducted a semistructured interview based on the *Diagnostic and Statistical Manual of Mental Disorders*.^{18–20}

Psychiatric outpatients. Data regarding living comparisons were extracted from medical records by two researchers using the same checklist used for suicide decedents. When the data extracted from researchers were discordant, a third party was consulted.

Researchers included in their search all files of patients aged 75 years and older admitted between 1994 and 2009. Successively, they retained only files in which: 1) there was complete information regarding diagnosis according to *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition/Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*,^{19,20} as assessed by structured interview^{21,22}; 2) past suicide behavior, defined as any self-injurious behavior with the

intention to take one's own life, was clearly investigated and suicide behaviors in the past 12 months before admission were excluded; and 3) sociodemographic and clinical information had been assessed and reported in the medical files. As for suicide cases, as an indicator for the presence of physical illness, we used physicians' diagnoses and prescribed drugs or drug combinations dispensed in the 6 months before admission.

The study was approved by the local committee of bioethics.

Statistical Analyses

χ^2 tests with Yates's correction and one-way Fisher's exact tests were used to perform two-way analyses. Benjamini and Hochberg's correction was used to correct for multitesting.²³ All the variables assessed that were statistically significant ($p < 0.05$) after multitesting were selected for inclusion in a series of log-linear models. Odds ratios (ORs) and 95% confidence intervals (95% CIs) were calculated as measures of association. Likelihood ratio χ^2 indices are reported as measure of fit of the log-linear models. All statistical analyses were performed by using SPSS version 19.0 (IBM SPSS Statistics, IBM Corporation, Armonk, NY).

RESULTS

Characteristics of Suicides by Age

Statistics broken down by age group are listed in Table 1. All differences are corrected for multiple testing (uncorrected p values are reported in the text).

Compared with younger suicides, the old-old elderly had the same rates of diagnosed major psychiatric illness ($\chi^2_2 = 3.68$; $p = 0.16$), major depressive disorder ($\chi^2_2 = 0.49$; $p = 0.78$), past suicide attempts ($\chi^2_2 = 5.00$; $p = 0.08$), and prescribed psychoactive drugs ($\chi^2_2 = 3.17$; $p = 0.21$), but they less frequently had a diagnosis of personality disorders ($\chi^2_2 = 22.32$; $p < 0.001$) or alcohol use disorders ($\chi^2_2 = 10.13$; $p < 0.01$). In their families (compared with the families of younger suicides), there was less frequently a history of psychiatric illness among their members ($\chi^2_2 = 20.85$; $p < 0.001$) but the same rates of past suicidal behavior ($\chi^2_2 = 2.19$; $p = 0.33$).

TABLE 1. Differences Between Suicide Victims Grouped According to Age

	1:	2:	3:	1 Versus 2 Versus 3 ^a		4:	1 Versus 4 ^c	
	Old-Old Elderly (≥75 Years Old; n = 117)	Young-Old Adults (65–74 Years Old; n = 97)	Middle-Aged Adults (50–64 Years Old; n = 98)	Tests ^b	Uncorrected p Value	Living Psychiatric Comparison Subjects Aged ≥75 Years (n = 117)	Tests ^d	Uncorrected p Value
Men	73.5%	80.4%	80.6%	2.09	0.35	73.5%	—	—
Age, mean (SD), years	81.30 (5.07)	69.30 (2.84)	57.05 (4.42)	—	—	79.57 (4.70)	t ₂₃₂ = 2.70	0.01 ^e
Marital status				46.97 (df = 4)	<0.001 ^e		χ ₃ ² = 12.65	0.01 ^e
Widowed	45.1%	27.7%	4.2%			23.1%		
Married	42.2%	53.0%	49.3%			53.8%		
Other	12.7%	19.3%	46.5%			23.1%		
Living alone	51.0%	33.7%	37.1%	6.38	0.05	22.2%		<0.001 ^e
Retired	96.2%	89.4%	38.8%	89.98	<0.001 ^e	100.0%		0.05
Financial problems	7.0%	2.8%	12.5%	4.80	0.09	5.1		0.40
Poor social support	72.7%	53.5%	65.6%	6.37	0.05	44.4%		<0.001 ^e
Education				35.74 (df = 4)	<0.001 ^e		χ ₂ ² = 23.68	<0.001 ^e
≤5 years	79.2%	54.2%	27.1%			43.1%		
8 years	13.9%	30.5%	45.8%			34.5%		
≥13 years	6.9%	15.3%	27.1%			22.4%		
History of psychiatric illness in the family	9.3%	35.9%	56.1%	20.85	<0.001 ^e	35.0%		0.001 ^e
Suicidal behavior in the family members	2.4%	10.5%	7.3%	2.19	0.33	4.3%		0.50
Physical illness	64.3%	58.0%	36.4%	14.34	0.001 ^e	83.8%		0.001 ^e
Recent life stressors	78.0%	61.8%	62.7%	5.80	0.06	31.6%		<0.001 ^e
Life stressors 0–15 years old	4.5%	3.6%	17.6%	8.92	0.05 ^f	17.1%		0.01 ^e
Psychiatric disorders								
MDD	45.3%	50.0%	48.4%	0.49	0.78	47.0%		0.45
Personality disorders	0.0%	1.0%	11.8%	22.32	<0.001 ^e	19.7%		<0.001 ^e
Any mental disorders	47.0%	54.2%	60.2%	3.68	0.16	100.0%		<0.001 ^e
Alcohol use disorders	0.0%	5.4%	10.8%	10.13	0.01 ^e	13.7%		<0.001 ^e
Onset of mental disorder AT age ≥46 years	93.3%	90.0%	42.4%	27.05	<0.001 ^e	66.7%		0.01 ^e
Family physician contact <6 months	93.7%	92.0%	81.1%	4.43	0.11	38.5%		<0.001 ^e
Past suicide attempts	3.0%	8.6%	11.5%	5.00	0.08	4.3%		0.45
Prescribed psychoactive drugs assumed before suicide	13.0%	22.0%	20.5%	3.17	0.21	100.0%		0.001 ^e
Place of death: home	81.9%	53.8%	58.3%	12.94	0.01 ^e			
Violent methods	94.9%	96.9%	91.8%	2.47	0.29			

Notes: Benjamini and Hochberg correction for multitestings: ^atest significant for p <0.01; ^ftest significant for p <0.05. P values were corrected for the number of tests performed (n = 22 for the comparisons between groups of suicides, and n = 20 for the comparisons between old-old elderly suicides and living comparisons). MDD = major depressive disorder.

^aDifferences between groups of suicide victims.

^bχ₂² tests with 2 df where not otherwise specified.

^cDifferences between old-old elderly suicides and living comparison subjects.

^dOne-way Fisher's exact tests where not otherwise specified.

Among those subjects in each group with a diagnosable psychiatric illness (55 in the old-old elderly group, 52 in the young-old group, and 56 in the middle-aged group), old-old elderly more frequently experienced the onset of the mental disorder at a later age (46 years and older; $\chi^2_2 = 27.05$; $p < 0.001$) than younger suicide victims.

The old-old elderly were more frequently diagnosed with at least one physical illness ($\chi^2_2 = 14.34$; $p < 0.001$) than younger suicide victims. More than 64% had received a diagnosis of an organic illness, compared with 58% of young-old adults and 36% of middle-aged adults. When analyzing how frequently suicide victims faced life events in their life, the old-old elderly (compared with younger suicides) had fewer life stressors in their childhood ($\chi^2_2 = 8.92$; $p < 0.05$) but the same amount of stressors in the 6 months before death ($\chi^2_2 = 5.80$; $p = 0.06$).

At the sociodemographic level, old-old elderly suicides (compared with younger suicides) were more frequently widowed and less frequently married ($\chi^2_4 = 46.97$; $p < 0.001$). They were more often retired ($\chi^2_2 = 6.38$; $p < 0.001$) and had lower school attainment ($\chi^2_4 = 35.74$; $p < 0.001$).

When analyzing the suicidal act, more of the old-old elderly died in their homes ($\chi^2_2 = 12.94$; $p < 0.01$) than the other age groups. A large proportion of subjects in all three groups used a violent method to take their lives (94.9%, 96.9%, and 91.8%, respectively, for the old-old elderly, the young-old adults, and the middle-aged adults; $\chi^2_2 = 2.47$; $p = 0.29$). The groups did not differ in the likelihood of contact with a family physician in the last 6 months ($\chi^2_2 = 4.43$; $p = 0.11$): between 8 and 9 suicides (of 10) had a contact with a family physician in the last 6 months before suicide (93.7%, 92.0%, and 81.1%, respectively, for the old-old elderly, the young-old adults, and the middle-aged adults).

All the variables significant at the bivariate analyses were inserted in a log-linear model, except for the variables personality disorders, alcohol use disorders, and job because of low variability of the data in some of the categories (Table 2). The final model fitted the data well (likelihood ratio $\chi^2_{556} = 37.46$; $p = 1.00$).

Compared with middle-aged suicide victims, the old-old elderly were: 1) 253.4 times more likely to have an onset of mental disorder at age 46 years or older (95% CI: 4.36–14735.28; $z = 2.67$; $p < 0.01$); 2) 444.1

times more likely to be widowed (95% CI: 6.20–31856.60; $z = 2.80$; $p < 0.01$); and 3) 87.7 times more likely to have attended school for ≤ 5 years (95% CI: 1.29–5949.13; $z = 2.08$; $p < 0.05$). The young-old adults (compared with middle-aged suicide victims) were: 1) 118.2 times more likely to have an onset of mental disorder at age 46 years or older (95% CI: 2.31–6051.13; $z = 2.38$; $p < 0.05$); 2) 57.2 times more likely to be widowed (95% CI: 1.24–2633.32; $z = 2.07$; $p < 0.05$); and 3) 87.5 times more likely to have a diagnosed organic illness (95% CI: 2.91–2630.69; $z = 2.58$; $p < 0.01$).

Differences Between Old-Old Elderly Suicides and Living Psychiatric Patients 75 Years and Older

Table 1 lists differences between old-old elderly suicide victims and the living psychiatric outpatients aged 75 years and older. All differences are corrected for multiple testing (uncorrected p values are reported in the text).

Compared with the psychiatric outpatients, the old-old elderly suicide victims less frequently had a diagnosis of major psychiatric illness (Fisher's exact test: $p < 0.001$), including personality disorders (Fisher's exact $p < 0.001$) and alcohol use disorders (Fisher's exact test: $p < 0.001$). Nevertheless, they had the same frequency of major depressive disorder (Fisher's exact test: $p = 0.45$) and past suicide attempts (Fisher's exact test: $p = 0.45$) of the psychiatric outpatients. The old-old elderly suicide victims had also less frequently been prescribed psychoactive drugs (Fisher's exact test: $p = 0.001$) than the psychiatric outpatients. In their families (compared with the families of the psychiatric outpatients), there was less frequently a history of psychiatric illness among their members (Fisher's exact test: $p = 0.001$) but the same rate of past suicidal behavior (Fisher's exact test: $p = 0.50$).

Among those subjects in each group with a diagnosable psychiatric illness (55 among old-old elderly suicide victims, and 117 among the psychiatric outpatients), the old-old elderly more often had onset of mental illness at a later age (46 years and older; Fisher's exact test: $p < 0.01$) than the psychiatric outpatients.

The old-old elderly suicide victims less frequently had physical illness (Fisher's exact test: $p = 0.001$) than the psychiatric living comparison subjects 75 years and older. In fact, $>83\%$ of the psychiatric

*Suicide in the Old Elderly***TABLE 2. Log-linear Model**

	OR	95% CI OR		z	p
		Lower Bound	Upper Bound		
Old-old elderly suicides (aged ≥ 75 years)					
Widowed	444.08	6.20	31856.60	2.80	0.01
Married	29.28	0.92	928.90	1.91	0.06
Education ≤ 5 years	87.71	1.29	5949.13	2.08	0.05
Education = 8 years	1.43	0.05	38.32	0.21	0.83
History of psychiatric illness in the family	0.09	0.00	3.48	-1.29	0.20
Physical Illness	22.13	0.69	711.23	1.75	0.08
Life stressors 0–15 years old	3.35	0.05	208.51	0.57	0.57
Onset of mental disorder at age ≥ 46 years	253.41	4.36	14735.28	2.67	0.01
Place of death: home	0.37	0.01	12.19	-0.56	0.58
Young-old adult suicides (aged 65–74 years)					
Widowed	57.17	1.24	2633.32	2.07	0.05
Married	2.82	0.12	66.09	0.64	0.52
Education ≤ 5 years	6.55	0.13	324.08	0.94	0.35
Education = 8 years	0.35	0.01	8.65	-0.64	0.52
History of psychiatric illness in the family	4.73	0.16	143.31	0.89	0.37
Physical illness	87.53	2.91	2630.69	2.58	0.01
Life stressors 0–15 years old	0.07	0.00	4.71	-1.24	0.21
Onset of mental disorder at age ≥ 46 years	118.16	2.31	6051.13	2.38	0.05
Place of death: home	0.04	0.00	1.07	-1.92	0.06

Notes: Reference group was middle-aged suicide victims (50–64 years old). Model fit: likelihood ratio $\chi^2_{556} = 37.46$; $p = 1.00$. The variables personality disorders, alcohol use disorders, and job status were not inserted in the model because of the low number of cases in some categories. CI = confidence intervals; OR = odds ratio.

outpatients have had a diagnosis of an organic illness in the past, versus 64% of the old-old elderly suicide victims. When analyzing other life events suicide victims faced in their life, the old-old elderly (compared with the psychiatric outpatients) more often lived alone (Fisher's exact test: $p < 0.001$), had poor social support (Fisher's exact test: $p < 0.001$), and faced life stressors in the 6 months before death (Fisher's exact test: $p < 0.001$). Furthermore, old-old elderly suicide victims less often faced life stressors in their childhood (Fisher's exact test: $p < 0.01$) than the psychiatric outpatients.

Compared with the psychiatric outpatients, the old-old elderly suicide victims were younger (Cohen's $d = 0.35$; $t_{232} = 2.70$; $p < 0.01$), were more frequently widowed and less frequently married ($\chi^2_3 = 12.65$; $p < 0.01$), and more frequently had lower school attainment (education ≤ 5 years: 79.2% versus 43.1%; $\chi^2_2 = 23.68$; $p < 0.001$).

In contrast to the psychiatric living comparison subjects 75 years and older, almost all old-old elderly suicide victims had contacted their family physicians in the last 6 months (Fisher's exact $p < 0.001$), and the number of those suicides who contacted their family physician doubled that of the psychiatric living comparisons.

We performed two log-linear model analyses (variables significant in the bivariate analyses were more than the limit of independent variables to enter into one single log-linear model analysis). The variables personality disorders, mental disorders, alcohol use disorders, and prescribed psychoactive drugs were not inserted in the model because of lack of variability or low number of cases in at least one of the groups (Table 3). The models fitted the data well (first model fit: likelihood ratio $\chi^2_{27} = 8.80$; $p = 1.00$; second model fit: likelihood ratio $\chi^2_{57} = 11.77$; $p = 1.00$). For the second model, it was not possible to estimate all the parameters, probably due to an overparametrization problem. Thus, we performed an alternative analysis, deleting from the model the variable family physician contact in the last 6 months. The reduced model fitted the data well and was more parsimonious than the complete model (Likelihood ratio $\chi^2_{26} = 17.14$; $p = 0.91$; χ^2 difference for the alternative models = 5.37, $df = 31$, $p = 1.00$).

The old-old elderly suicide victims (compared with the psychiatric outpatients) were: 1) 5.2 times more likely to have been living alone (95% CI: 1.34–20.07; $z = 2.38$; $p < 0.05$); 2) 4.9 times more likely to have an education attainment of ≤ 5 years (95% CI: 1.31–18.21; $z = 2.36$; $p < 0.05$); 3) 8.2 times more likely to have been

TABLE 3. Log-linear Models

	OR	95% CI OR		z	p
		Lower Bound	Upper Bound		
Old-old elderly suicides (aged ≥ 75 years)					
Age ^a	1.04	0.98	1.11	1.28	0.20
Widowed ^a	3.26	0.90	11.79	1.80	0.07
Married ^a	8.17	1.96	34.09	2.88	0.01
Living alone ^a	5.19	1.34	20.07	2.38	0.05
Poor social support ^a	1.81	0.73	4.46	1.28	0.20
Education ≤ 5 years ^a	4.88	1.31	18.21	2.36	0.05
Education 8 years ^a	0.94	0.24	3.71	-0.10	0.92
History of psychiatric illness in the family ^b	0.17 (0.31)	0.02 (0.06)	1.88 (1.52)	-1.44 (-1.45)	0.15 (0.15)
Physical illness ^b	0.58 (1.22)	0.09 (0.34)	3.82 (4.46)	-0.57 (0.31)	0.57 (0.76)
Recent life stressors ^b	4.94 (4.81)	0.92 (1.70)	26.60 (13.61)	1.86 (2.96)	0.06 (0.01)
Life stressors 0–15 years old ^b	2.42 (1.22)	0.30 (0.26)	19.67 (5.76)	0.83 (0.25)	0.41 (0.80)
Onset of mental disorder at age ≥ 46 years ^b	0.69 (3.24)	0.07 (0.59)	6.49 (17.80)	-0.32 (1.36)	0.75 (0.18)
Family physicians contact < 6 months ^{b,c}	607583395.32	0.00	–	0.008	0.99

Notes: Reference group was living psychiatric comparison subjects 75 years and older. The variables personality disorders, mental disorders, alcohol use disorders, and prescribed psychoactive drugs were not inserted in the models because of the low number of cases in some categories. First model fit: likelihood ratio $\chi^2_{27} = 8.80$; $p = 1.00$; second model fit: likelihood ratio $\chi^2_{57} = 11.77$; $p = 1.00$ (reduced model fit: likelihood ratio $\chi^2_{26} = 17.14$; $p = 0.91$; χ^2 difference for the alternative models = 5.37, $df = 31$, $p = 1.00$). OR = odds ratio; CI = confidence intervals.

^aVariables inserted in the first model.

^bVariables inserted in the second model (^cdue to a possible overparametrization problem with the model, we performed an alternative analysis deleting from the model the variable “family physician contact”). Reported statistics for the reduced model are given in parentheses.

married (95% CI: 1.96–34.09; $z = 2.88$; $p < 0.01$); and 4) 4.8 times more likely to have faced life stressors in the 6 months before death (95% CI: 1.70–13.61; $z = 2.96$; $p < 0.01$).

DISCUSSION

Our results point to the fact that major depression and undertreatment of psychiatric symptoms are not characteristic only of old-old elderly suicide victims. In our study, factors differentiating old-old elderly suicides from psychiatric living comparison subjects 75 years and older were marital status and living situation: a high number of suicide victims were widowed (45% versus 23%) and lived alone (51% versus 22%) at the time of death. Widowhood also distinguished old-old elderly from younger suicides, even from the young-old adults (45% versus 28%); although the differences between groups of suicides were not significant after correction for multiple testing, the old-old elderly had the highest percentage of people living alone among all three groups of suicides. These figures may indirectly support the statement of Waern et al.,¹⁵ who indicated loneliness as a potent risk factor for suicide in

the old-old elderly, and are in line with the results from Wiktorsson et al.,²⁴ who investigated factors associated with attempted suicide in Swedish people 70 years and older.

Another characteristic specifically associated with suicide in older adults is the onset of mental illness at a late age: around 9 of 10 older adults 65 years and older had onset of mental disorder at 46 years and older versus only 42% of middle-aged suicides and 67% of psychiatric living comparison subjects 75 years and older. Conversely, having had contact with family physicians in the last months before suicide was a characteristic shared by suicide victims of all age groups, although it differentiated old-old elderly suicide victims from the psychiatric outpatients.

Lastly, old-old elderly suicides more often experienced life stressors in the few months before death than the psychiatric outpatients, and they had the highest percentage of recent life stressors among all the suicide groups (although the difference was not significant). Nevertheless, physical illness, considered as one of the strongest risk factors for suicide in the elderly,^{15,16} was more frequent in the older suicide groups compared with middle-aged suicides, but it was less frequent in the old-old elderly who committed suicide than in the living comparison subjects. Thus, this result is

Suicide in the Old Elderly

consistent with that of Turvey et al.,²⁵ who reported that medical illness and physical impairment are not more prevalent in suicides, whereas it is the subjective perception of one's health status that is predictive of late-life suicide. This is in contrast with the findings of Juurlink et al.,¹⁷ who indicated that most medical illnesses investigated in their study were associated with a significantly increased risk of suicide.

Conversely, suicide victims aged 65 years and older had the lowest rates of life stressors in childhood compared with middle-aged suicides and psychiatric living comparison subjects 75 years and older. Furthermore, diagnosis of personality disorders was almost absent in the older groups of suicide victims but not in the middle-aged suicide victims and in the psychiatric outpatients. This is somewhat concordant with recent studies, which found that approximately 8% of cohorts of adults 65 years and older had personality disorders.²⁶

The number of old-old elderly suicide victims we included in the analyses is large compared with other studies.¹⁵ Nonetheless, there are limitations to the generalizability of the current study. First, we used information collected through proxy-based sources of information, which is often incomplete or biased due to social desirability and personal attitudes toward suicide.²⁷ Second, living comparisons were not recruited from the general population, and the conclusions we reached about the association between psychiatric illness or treatments and suicide in the old-old elderly could be not confirmed when comparing old-old elderly suicides with a matched sample of old-old elderly extracted from the general population. Third, some of the variables investigated in the bivariate analyses were characterized by low numbers of individuals in some subgroups or low variability, which was either reflected in the wide CIs or the impossibility to enter the variables into the multivariate analyses.

Occurrence of life stressors in people with untreated psychiatric illness may be a particularly common precipitant for suicide in the old-old elderly.^{15,28} Those characteristics of the younger elderly suicides that usually are reported in the literature are more common in those 75 years and older due to the age of the subject (e.g., loneliness, widowhood, physical illness), whereas it is less easy to use history of mental illness in family members or previous suicide behavior as markers of suicide risk in this age group

even when compared with suicides in those aged 65 to 74 years. In fact, almost all old-old elderly suicides are successful at their first attempt to take their life, even though they do not use violent methods for suicide more frequently than younger people. Thus, community programs to prevent suicide in the old-old elderly should involve primary care physicians and enhance their ability to recognize and treat mood disorders. Primary care physicians should also monitor suicide ideation in the elderly, which is strongly determined by the course of their depression symptoms.²⁹ Old-old elderly at risk of suicide also require an integrated model of healthcare, targeting the presence of the multiple comorbid mental and physical pathologies.³⁰ Furthermore, clinicians involved in the prevention of suicide in older adults should pay particular attention to loneliness and lack of social support, especially in those individuals who are facing stressful life events. These conditions may push the individual to feel hopeless and consider suicide as a way—despite being maladaptive—of coping with their psychache. When assessing psychopathology and suicide ideation in the elderly, it is important for the clinicians to use sound psychometric instruments, with extensive research supporting their validity in the geriatric population, such as the Geriatric Depression Scale,^{31–33} the Geriatric Suicide Ideation Scale,³⁴ and the Beck Hopelessness Scale.³⁵ Furthermore, it is also necessary to explore resiliency factors such as reasons for living.³⁶

To date, few studies have investigated efficacy of suicide prevention programs in the elderly, and even fewer have used methodologically sound research designs (e.g., randomized controlled trials).³⁷ However, some evidence suggests that community-based depression-screening programs may have some efficacy in the reduction of completed suicide among older adults, especially when mental health specialists are conducting the main follow-up activity for at-risk individuals.³⁸ Another preventive strategy supported by some evidence is the treatment of depressive symptoms by using a standardized algorithm-driven care that may include antidepressants.^{39–42} However, the studies supporting use of antidepressants to reduce suicidal ideation in the elderly are limited by exclusion from the samples of the more seriously suicidal subjects. Emphasis should be placed on the role of undiagnosed personality disorders.⁴³

CONCLUSIONS

Distal factors such as life events in childhood, diagnosis of personality disorder, and history of psychiatric illness in the family are rarely present in the old-old elderly, in contrast with proximal factors such as recent life events, difficult social circumstances, and late-onset psychiatric disorders, which

are common. Our results support the view that no single proximal stressor is sufficient to precipitate suicide in the old-old elderly, but it could be the overloading of several stressful life events and difficult social circumstances that act to increase risk.

Disclosures: No disclosures to report.

References

- World Health Organization: Figures and Facts About Suicide. Geneva, World Health Organization, 1999
- World Health Organization: Suicide Prevention (SUPRE). Geneva, World Health Organization, 2012
- Innamorati M, Tamburello A, Lester D, et al: Inequalities in suicide rates in the European Union's elderly: trends and impact of macro-socioeconomic factors between 1980 and 2006. *Can J Psychiatry* 2010; 55:229–238
- Innamorati M, Serafini G, Lester D, et al: Violent deaths among the Russian and EU male older adults. *Int J Soc Psychiatry* 2013 Jan 1 [E-pub ahead of print]
- Centers for Disease Control and Prevention (CDC): Suicide. Facts at a Glance. Atlanta, Centers for Disease Control and Prevention, 2010
- Chiu HF, Yip PS, Chi I, et al: Elderly suicide in Hong Kong—a case-controlled psychological autopsy study. *Acta Psychiatr Scand* 2004; 109:299–305
- Pompili M, Innamorati M, Masotti V, et al: Suicide in the elderly: a psychological autopsy study in a north Italy area (1994–2004). *Am J Geriatr Psychiatry* 2008; 16:727–735
- Conwell Y, Olsen K, Caine ED, et al: Suicide in later life: psychological autopsy findings. *Int Psychogeriatr* 1991; 3:59–66
- Conwell Y, Rotenberg M, Caine ED: Completed suicide at age 50 and over. *J Am Geriatr Soc* 1990; 38:640–644
- Conwell Y, Lyness JM, Duberstein P, et al: Completed suicide among older patients in primary care practices: a controlled study. *J Am Geriatr Soc* 2000; 48:23–29
- Carney SS, Rich CL, Burke PA, et al: Suicide over 60: the San Diego Study. *J Am Geriatr Soc* 1994; 42:174–180
- Beautrais AL: A case control study of suicide and attempted suicide in older adults. *Suicide Life Threat Behav* 2002; 32:1–9
- Harwood D, Hawton K, Hope T, et al: Psychiatric disorder and personality factors associated with suicide in older people: a descriptive and case-control study. *Int J Geriatr Psychiatry* 2001; 16:155–165
- Rubenowitz E, Waern M, Wilhelmson K, et al: Life events and psychosocial factors in elderly suicides—a case-control study. *Psychol Med* 2001; 31:1193–1202
- Waern M, Rubenowitz E, Wilhelmson K: Predictors of suicide in the old elderly. *Gerontology* 2003; 49:328–334
- Conwell Y, Thompson C: Suicidal behavior in elders. *Psychiatr Clin North Am* 2008; 31:333–356
- Juurlink DN, Herrmann N, Szalai JP, et al: Medical illness and the risk of suicide in the elderly. *Arch Intern Med* 2004; 164:1179–1184
- American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. Third Edition, Revised. Washington, DC, American Psychiatric Association, 1987
- American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. Fourth Edition. Washington, DC, American Psychiatric Association, 1994
- American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders. Fourth Edition, Text Revision. Washington, DC, American Psychiatric Association, 2000
- Sheehan DV, Lecrubier Y, Sheehan KH, et al: The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry* 1998; 59(Suppl 20):22–33; quiz 34–57
- First MB, Spitzer RL, Gibbon M, et al: Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version (SCID-CV). Washington, DC, American Psychiatric Press, Inc., 1996
- Benjamini Y, Hochberg Y: Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J Royal Statistical Soc Series B* 1995; 57:289–300
- Wiktorsson S, Runeson B, Skoog I, et al: Attempted suicide in the elderly: characteristics of suicide attempters 70 years and older and a general population comparison group. *Am J Geriatr Psychiatry* 2010; 18:57–67
- Turvey CL, Conwell Y, Jones MP, et al: Risk factors for late-life suicide: a prospective, community-based study. *Am J Geriatr Psychiatry* 2002; 10:398–406
- Schuster JP, Hoertel N, Le Strat Y, et al: Personality disorders in older adults: findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Am J Geriatr Psychiatry* 2013 Feb 6 [E-pub ahead of print]
- Beskow J, Runeson B, Asgard U: Psychological autopsies: methods and ethics. *Suicide Life Threat Behav* 1990; 20:307–323
- Cattell H, Jolley DJ: One hundred cases of suicide in elderly people. *Br J Psychiatry* 1995; 166:451–457
- Vannoy SD, Duberstein P, Cukrowicz K, et al: The relationship between suicide ideation and late-life depression. *Am J Geriatr Psychiatry* 2007; 15:1024–1033
- Hendrie HC, Lindgren D, Hay DP, et al: Comorbidity profile and healthcare utilization in elderly patients with serious mental illnesses. *Am J Geriatr Psychiatry* 2012 Sep 21 [E-pub ahead of print]
- Cheng ST, Yu EC, Lee SY, et al: The Geriatric Depression Scale as a screening tool for depression and suicide ideation: a replication and extension. *Am J Geriatr Psychiatry* 2010; 18:256–265
- Herrmann N, Mittmann N, Silver JL, et al: A validation study of The Geriatric Depression Scale short form. *Int J Geriatr Psychiatry* 1996; 11:457–460
- Yesavage JA, Brink TL, Rose TL, et al: Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res* 1982; 17:37–49

Suicide in the Old Elderly

34. Heisel MJ, Flett GL: The development and initial validation of the geriatric suicide ideation scale. *Am J Geriatr Psychiatry* 2006; 14: 742–751
35. Beck AT, Weissman A, Lester D, et al: The measurement of pessimism: the hopelessness scale. *J Consult Clin Psychol* 1974; 42:861–865
36. Britton PC, Duberstein PR, Conner KR, et al: Reasons for living, hopelessness, and suicide ideation among depressed adults 50 years or older. *Am J Geriatr Psychiatry* 2008; 16:736–741
37. Innamorati M, Pompili M, Amore M, et al: Suicide prevention in late life: is there sound evidence for practice?, in *Evidence-Based Practice in Suicidology: A Source Book* Edited by Pompili M, Tatarelli R. Cambridge, MA, Hogrefe, 2011, pp 211–232
38. Oyama H, Sakashita T, Ono Y, et al: Effect of community-based intervention using depression screening on elderly suicide risk: a meta-analysis of the evidence from Japan. *Community Ment Health J* 2008; 44:311–320
39. Nelson JC, Delucchi K, Schneider L: Suicidal thinking and behavior during treatment with sertraline in late-life depression. *Am J Geriatr Psychiatry* 2007; 15:573–580
40. Eli Lilly and Company: Duloxetine Versus Placebo in the Treatment of Elderly Patients with Major Depressive Disorder. Clinical Study Summary: Study F1J-MC-HMBV, 2005. Available at: <http://www.lillytrials.com/results/Cymbalta.pdf>
41. Bruce ML, Ten Have TR, Reynolds CF 3rd, et al: Reducing suicidal ideation and depressive symptoms in depressed older primary care patients: a randomized controlled trial. *JAMA* 2004; 291:1081–1091
42. Unutzer J, Tang L, Oishi S, et al: Reducing suicidal ideation in depressed older primary care patients. *J Am Geriatr Soc* 2006; 54: 1550–1556
43. Pompili M, Ruberto A, Girardi P, Tatarelli R: Suicidality in DSM IV cluster B personality disorders. An overview. *Ann Ist Super Sanita* 2004; 40:475–483