Poor social integration and suicide: fact or artifact? A case-control study

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ABSTRACT

Background. Sociological studies have shown that poor social integration confers suicide risk. It is not known whether poor integration amplifies risk after adjusting statistically for the effects of mental disorders and employment status.

Method. A case-control design was used to compare 86 suicides and 86 living controls 50 years of age and older, matched on age, gender, race, and county of residence. Structured interviews were conducted with proxy respondents for suicides and controls. Social integration was defined in reference to two broad levels of analysis: family (e.g. sibship status, childrearing status) and social/community (e.g. social interaction, religious participation, community involvement).

Results. Bivariate analyses showed that suicides were less likely to be married, have children, or live with family. They were less likely to engage in religious practice or community activities and they had lower levels of social interaction. A trimmed logistic regression model showed that marital status, social interaction and religious involvement were all associated with suicide even after statistical adjusting for the effects of affective disorder and employment status. Adding substance abuse to the model eliminated the effects of religious involvement.

Conclusions. The association between family and social/community indicators of poor social integration and suicide is robust and largely independent of the presence of mental disorders. Findings could be used to enhance screening instruments and identify problem behaviors, such as low levels of social interaction, which could be targeted for intervention.

INTRODUCTION

Controlled studies have shown that mental disorders amplify suicide risk in older adults (Conwell *et al.* 2000; Harwood *et al.* 2001; Beautrais, 2002; Waern *et al.* 2002). However, most older adults with mental disorders do not take their lives and some suicide decedents have no diagnosable mental disorder (Conwell *et al.* 2000; Harwood *et al.* 2001; Waern *et al.* 2002). Other risk factors must be identified.

A central tenet in the sociological literature on suicide is that poor social integration confers risk (Durkheim, 1897/1951). Although there is some support for this idea, particularly for marital status (Luoma & Pearson, 2002), social variables may not confer risk after adjusting for the effects of mental disorder and employment status. Some indices of poor social integration can be a consequence of mental disorder (Lara & Klein, 1999; Crisp *et al.* 2000) and unemployment (Turner *et al.* 1991). We used data collected via the psychological autopsy method (Hawton *et al.* 1998; Cavanagh *et al.* 2003) to examine this issue, as it has implications for risk identification and the development of suicide prevention programs.

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METHOD

Cases

Methods have been described elsewhere (Duberstein *et al.* 2004) and will be reviewed briefly here. We used a case-control design to compare suicides and living, community-dwelling controls aged 50 years and over. Cases were drawn from a consecutive series of suicides 50 years of age and older who had been living in Monroe (Rochester area) or Onondaga (Syracuse area) counties, New York, USA, between 11 December 1996 and 20 January 2001. The study region is predominantly urban or suburban, but it includes farmland as well. Medical Examiners made all determinations regarding manner of death. Requirements for inclusion were written informed consent of next-of-kin and the availability of one or more proxy respondents who had knowledge of the decedent's background and symptomatic state during the last weeks of life.

After the Medical Examiner mailed a letter to the decedent's next-of-kin informing them of the study, a member of the research team contacted the next-of-kin to explain the study and request their participation. Next-of-kin declined to participate in 37 (27%) cases and no phone numbers or forwarding addresses for suitable proxy respondents could be identified for 14 (10%) others. There were no statistically significant age or gender differences between included (mean = 68·2 years, s.d. = 13·2 years; 73% male) and excluded (mean = 64·3 years, s.d. = 11·5 years; 78% male) suicides. After obtaining informed consent, interviews were conducted with proxy respondents for 86 out of 137 (63%) suicides aged 50 years and over an average of 14·2 weeks (s.d. = 8·1 weeks) after the death; all but two interviews were conducted in person. Although interviews were occasionally conducted with more than one proxy respondent, the present analyses report solely on the data from only one, prioritized as follows: spouses, children aged 18 years and older, grandchildren aged 18 years and older, parents, siblings, other relatives, friends. Consistent with prior research in this age group (Harwood *et al.* 2001), nearly three-quarters (72%) of the respondents were either spouses (n = 30) or children (n = 32). Thirty-three respondents (39%) lived with and 69 (80%) spoke with the decedent in the week prior to death; 35 (41%) saw the decedent within 24 hours of the suicide.

Controls

Controls were individually matched to suicides on the basis of age (±5 years), gender, race, and county of residence. A marketing and opinion research company identified community controls using a random digit dialing procedure. Controls provided the names of individuals who could serve as proxy respondents. Approximately three-quarters of the proxy respondents were first-degree relatives of the control (44 spouses, 21 children). Many respondents (n = 54, 63%) lived with and most (n = 84, 98%) spoke with the control during the week prior to the research interview.

Instruments

In the present article, we report data on socio-economic variables (years of education completed, employment status, and total annual household income before taxes) and social integration. Social integration was defined in reference to two broad domains: family and social/community. The family items include data on sibship status (full or half siblings in family of origin), childrearing (birth or adoptive) history, number of living siblings and children, and living arrangements (with family *versus* other). Social/community integration was assessed via the social interaction and instrumental support subscales of the Duke Social Support Index (DSSI; Landerman *et al.* 1989). Previous research has established the accuracy of proxy respondents' reports of social support (Conner *et al.* 2001*b*). The social interaction subscale consists of three items pertaining to frequency of social contact within a week of the interview (or death for cases) and one item pertaining to non-family supports within an hour's travel. Each item is scored on a scale of 1–3. In the present analyses, this summed score was dichotomized at the sample median, 8. Instrumental support refers to the extent to which the subject received help from friends or relatives such as shopping, transportation, and household chores. Each item is rated dichotomously (1 = no, 2 = yes) and the 12 items are summed. In the present analyses, this score was

dichotomized at 14, the sample median. We also coded attendance or other active involvement in a senior center, social or work group, self-help group, charity, public service, or community group during the past year. To assess religious involvement, interviewers asked: 'Did the deceased/Does the subject practice a particular religion?' Those responding affirmatively were asked about the extent to which the subject actively contributed to the life of the religious organizations with which they were affiliated.

Best-estimate psychiatric diagnoses were established via consensus based on all-sources (Maziade *et al.* 1992), including SCID (Spitzer *et al.* 1990) research interviews and records from primary care, mental health, and other specialty providers whenever available. Research has established the validity of proxy respondents' reports of mental disorder (Kelly & Mann, 1996; Conner *et al.* 2001*a*). The database also includes information on physical health, life events, firearms, and, for suicides, findings from a physical autopsy and toxicological analysis. These data were not used in the present analysis and are described elsewhere (Conwell *et al.* 2002; Conner *et al.* 2004; Duberstein *et al.* 2004).

Data analyses

Paired (conditional) analyses for bivariate comparison of groups, with odds ratios (OR) and 95% confidence intervals (CI) were derived by a series of univariate paired logistic regression analyses. Next, two series of paired (conditional) multivariate logistic regressions were conducted (Breslow & Day, 1980). In one series of analyses, we controlled for the effects of employment status and the presence of an active affective disorder; in another, we controlled for these variables as well as the presence of an active alcohol or substance disorder. We then built a trimmed model as follows. Three separate regressions were conducted. One included demographic variables, another included family background variables, and the third focused on social/community involvement. All of the variables that were associated with suicide in these models ($p < 0.10$) were then entered simultaneously in a combined model. SAS (1999) software was used.

Table 1. *Socio-economic characteristics*: *conditional logistic regressions*

	Suicides		Controls			
	n	%	*n*	%	OR	95% CI
Educational level						
> High school	33	39·8	45	52·3		
High school	32	38·6	30	34·9	1·39	0·71–2·76
< High school	18	21·7	11	12·8	2·14	0·89–5·57
Annual household income						
> $50 000	16	20·5	36	44·4		
$25 000 to $50 000	23	29·5	34	42·0	2·11	0·88–5·54
< $25 000	39	50·0	11	13·6	15·87	4·80–75·64
Employment status						
Full or part time	16	18·6	36	41·9		
Retired	43	50·0	44	51·2	2·29	0·72–8·20
Disabled/unemployed	27	31·4	6	7·0	8·27	2·90–31·61

Column *n*'s do not add to 86 for each group due to missing data.

RESULTS

There are 86 suicides and 86 age-, gender-, and race-matched controls aged 50 years or older in our database; 63 men and 23 women are in each group, and nearly all (97·6%) are white; 88% of suicides and controls were either Catholic or Protestant. The mean (S.D.) ages of cases and controls were 68·3 (13·2) and 67·2 (12·6) years respectively. Table 1 reports socio-economic data. Suicides had lower annual household incomes and were more likely to have been unemployed and/or receiving disability benefits. Table 2 shows that suicides were less likely to have had siblings, less likely to have ever been married, and less likely to have ever had children. When suicides did have offspring, they were just as likely as controls to have had more than one child [78·5% *v.* 87·5%, OR (95% CI) = 1·92 (0·79–4·67)]. Suicides were more likely to have been widowed or single/divorced, more likely to have fewer than three living siblings and children, less likely to have been living with a family member, but just as likely to have been living with one of their children (18·6% *v.* 22·1%).

Data on social support and organizational involvement are reported in Table 3. Suicides had lower levels of social interaction. They were less likely to have attended or been actively involved in a senior center, social or work group, self-help group, charity, or public service or community group. They were also less

Table 2. *Family indicators of social integration: conditional logistic regressions*

	Suicides		Controls			
	n	%	*n*	%	OR	95% CI
Ever have siblings						
Yes	74	87·1	81	95·3		
No	11	12·9	4	4·7	4·50	1·16–29·41
Ever married						
Yes	77	89·5	85	98·8		
No	9	10·5	1	1·2	9·00	1·69–165·91
Ever have children						
Yes	65	76·5	80	93·0		
No	20	23·5	6	7·0	3·33	1·42–9·09
Current marital status						
Married	33	38·4	61	70·9		
Widowed	25	29·1	12	14·0	4·81	1·82–15·61
Single/divorced	28	32·6	13	15·1	5·18	2·00–16·56
Number of living siblings and children						
>2	54	63·5	66	77·6		
≤2	31	36·5	19	22·3	2·62	1·21–6·29
Live with family member						
Yes	42	48·8	70	81·4		
No	44	51·2	16	18·6	4·50	2·20–10·42

Column *n*'s do not add to 86 for each group due to missing data.

Table 3. *Social and community indicators of social integration: conditional logistic regressions*

	Suicides		Controls			
	n	%	*n*	%	OR	95% CI
Duke social interaction						
>8	25	30·1	46	54·1		
≤8	58	69·9	39	45·9	2·12	1·21–3·86
Duke instrumental support						
>14	35	42·2	23	26·7		
≤14	48	57·8	63	73·3	1·80	0·97–3·47
Organizational participation						
Yes	17	20·0	39	45·3		
No	68	80·0	47	54·7	3·10	1·57–6·66
Religious practice						
Yes	28	32·9	50	58·1		
No	57	67·1	36	41·9	2·91	1·51–6·04

Column *n*'s do not add to 86 for each group due to missing data.

Table 4. *Multivariate conditional logistic regression analyses*

	Model 1		Model 2	
Variable	OR	95% CI	OR	95%CI
Never had siblings	4·27	0·81–41·67	4·08	0·78–37·03
Never married	10·04	1·10–281·05	9·69	1·10–261·77
Never had children	3·75	1·24–13·89	3·52	1·19–12·66
Widowed *v.* Married	4·71	1·63–16·75	4·35	1·48–15·55
Single/divorced *v.* Married	6·15	1·71–28·93	6·69	1·71–37·22
Does not live with family	2·96	1·32–7·41	2·78	1·23–6·99
<3 Living siblings and children	2·66	1·04–7·69	2·88	1·11–8·55
Duke social integration ≤8	3·65	1·69–9·01	5·29	2·13–16·67
Duke instrumental support ≤14	1·68	0·80–3·68	1·67	0·76–3·64
No organizational participation	2·92	1·29–7·28	3·39	1·41–9·44
No religious involvement	3·58	1·57–9·34	3·40	1·47–8·91

The presence of an active mood disorder and employment status was controlled statistically in Model 1; Model 2 also controlled for the effects of an active alcohol or substance disorder. With the exception of marital status, all predictors were dichotomous. Each predictor was entered individually.

likely to practice a religion. When they did engage in religious practice, they were less likely to take an active role in the life of their congregation [3/28 *v.* 20/49, OR (95% CI) = 6·36 (1·66–24·39)].

Multivariate analyses are shown in Table 4. Suicides were less likely to have ever been married, had children, been living with family, involved in religion, interacted with a social network, or engaged in community activities. The same pattern of findings emerged when we also controlled for the presence of an active alcohol or substance disorder. The following predictors emerged in the trimmed model, over and above the effects of affective disorder, and employment status: single [OR (95% CI) = 11·78 (2·14–131·27)] and widowed [OR (95% CI) = 9·51 (1·93–76·06)] marital status, Duke Social Interaction [OR (95% CI) = 5·62 (1·85–25·00)], and religious involvement [OR (95% CI) = 3·08 (1·03–10·79)]. Controlling for the effects of an active alcohol or substance disorder yielded similar findings. Again, single [OR (95% CI) = 14·21 (2·06–264·17)] and widowed [OR (95% CI) = 8·11 (1·58–67·44)] marital status and Duke Social Interaction [OR (95% CI) = 7·35 (2·20–38·46)] were associated with suicide. Religious involvement was not [OR (95% CI) = 2·73 (0·86–9·90)], however.

DISCUSSION

Research on the relationship between social integration and suicide has often controlled inadequately for the effects of mental disorder. We showed that lack of social interaction and religious involvements confer suicide risk over and above the effects of active mood disorders and occupational status. The relationship between indicators of social integration and suicide is a fact, not an artifact of unmeasured mental disorder. Salutary effects of religious involvement are often ascribed to social integration, and other mechanisms have been considered (McCullough *et al.* 2000) including self-selection, religious proscription of suicide and high-risk behaviors such as alcohol intake, and the promotion of good health habits. Whether these or other mundane mediators (Joiner *et al.* 2002) can explain the effect of religion on suicide and other health outcomes is a task for future research. Our data suggest that alcohol or substance use is a partial mediator, given that the effect of religious involvement was diminished when the alcohol/substance variable was added to the model.

The finding that social interaction was associated with lower risk is consistent with findings from studies of suicide (Rubenowitz *et al.* 2001; Beautrais, 2002; Turvey *et al.* 2002) and suicidal ideation and behavior (Alexopoulos *et al.* 1999). The psychophysiological consequences of positive social interactions (Uchino *et al.* 1996) may serve to decrease risk for depression and suicide. Although high levels of social engagement are probably related to longstanding personality traits, such as extraversion (Hooker *et al.* 1998), it may also be modifiable. Social activation programs have not been well-studied, but there is some preliminary evidence for their efficacy (Arnetz, 1985). Visiting nurse interventions represent another promising means by which social interaction can be facilitated, particularly for the homebound (Rabins *et al.* 2000; Bruce *et al.* 2002), recognizing that nurses provide more than emotional support and an opportunity for social activation.

Family members may be well-positioned to intervene and prevent suicides by acting as gatekeepers. They could identify problems, encourage treatment and thereby assist overburdened primary-care physicians (Rost *et al.* 2000). But people who die by suicide have relatively small social networks and family sizes; 15 suicides (17·4%) in our database did not have a spouse or child. Difficulties in mounting intervention programs that require the active involvement of close family could be anticipated.

Other gatekeepers, perhaps clergy (Larson *et al.* 2000), are needed. Involving clergy may be feasible. Suicides that had practiced a religion could be distinguished from religious controls on the basis of their level of activity in the congregation. Clergy may support suicide prevention efforts by allowing mental-health professionals to offer workshops and lectures in houses of worship. Clergy who are so inclined may also wish to speak more openly and freely from the pulpit about the value of mental-health treatment.

Suicides were less likely to have children but just as likely to have been living with one of their offspring. Data are unavailable on the reasons why parents and their adult children shared living quarters, the extent to which children burdened or felt burdened by the parent, or generated family discord. Although 'intergenerational burden' has, to our knowledge, not been examined in retrospective suicide research, family discord is a documented risk marker (Rubenowitz *et al.* 2001; Duberstein *et al.* 2004). The collection of data on intergenerational relations could inform treatment and prevention efforts.

The association between suicide risk and living arrangements also warrants more cross-cultural research. At least one other study has shown that living alone confers suicide risk in an older sample (Harwood *et al.* 2000), but others have not (Cattell & Jolley, 1995; Rubenowitz *et al.* 2001; Beautrais, 2002). The mixed findings may reflect the fact that living arrangements are products of local not universal conditions, reflecting population density, housing prices, and other economic indicators.

Our findings must be interpreted in the context of the study's design features. First, although the sample size is comparable to other studies of suicides in older adults, it precluded the multivariate analysis of data in age-defined strata. Second, the participation rate is in line with rates reported in community studies of depression in later life (Thompson *et al.* 1994) but the possibility of sample bias cannot be

definitively ruled out. Third, controls that declined may have been more likely to experience adverse social relations, which may have led to an overestimate of the effects of indices of poor social integration. Fourth, a marketing and opinion research firm recruited the controls. We have inadequate data for the calculation of a reliable participation rate among controls, and no data on their reasons for non-participation. Fifth, results may have differed had we used an at-risk control sample; low levels of social interaction and lack of religious participation confer risk for all-cause mortality (Berkman, 1995; McCullough *et al.* 2000), not just suicide. Indeed, decreasing the prevalence of a risk factor on a population basis could have effects that extend well beyond suicide (Knox *et al.* 2003). Finally, findings may not generalize to other demographic subgroups, particularly ethnic minorities.

The current data could be used to identify contexts of intervention (e.g. places of worship), and problem behaviors (e.g. low levels of social interaction) that could be targeted for intervention. With respect to enhancing screening instruments, responses to simple questions such as 'Do you practice a particular religion?' could provide additional clues to risk for suicide (Kehoe & Gutheil, 1994) at minimal cost. Whether this question provides valid data on suicide risk in people of various cultural and ethnic backgrounds remains to be determined. Moreover, the low base rate of suicide precludes accurate prediction, and questions about social integration and religious practice must not displace queries about established risk factors, such as suicidal ideation.

DECLARATION OF INTEREST

None.

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