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ORIGINAL PAPER

Michael Dennis · Sarah Baillon · Traolach Brugha · James Lindesay · Robert Stewart · Howart Meltzer

The influence of limitation in activity of daily living and physical health on suicidal ideation: results from a population survey of Great Britain

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■ **Abstract** *Background* Studying suicidal ideation (SI) has methodological advantages over examining completed suicide and may provide useful insight into suicidal behaviour. SI is not only strongly associated with mental disorder (particularly depression), but also disability. This article explores the relationship between SI and disability in greater detail. *Methods* In the survey of psychiatric morbidity in Great Britain, 8,580 randomly selected adults were interviewed. Three questions were asked to assess SI, and a set of questions identified ADL limitation. *Results* Data was available on SI and ADL limitation in 8,513 of those surveyed. The independent association between SI and specific ADL limitations was greatest in older people. The strength of association between SI and ADL limitation increased with the number of domains of ADL affected and was of similar magnitude for most individual domains. In those with limitation in ADL, limited social support remained independently associated with SI. *Conclusions* Disability is an important independent correlate of suicidal ideation, particularly in older people. Preventative programmes need to be considered for disabled older people.

■ **Key words** suicidal ideation – disability – general population

Dr. M. Dennis (✉)
Psychiatry for Older People, School of Medicine
Swansea University
Grove Building, Singleton Park
Swansea, SA2 8PP, UK
Tel.: +44-1792/602-145
Fax: +44-1792/513-430
E-Mail: m.s.dennis@swansea.ac.uk

S. Baillon · Prof. J. Lindesay
Psychiatry for the Elderly
Dept. of Health Sciences
University of Leicester
Leicester General Hospital
Leicester, UK

Prof. T. Brugha
Dept. of Health Sciences
University of Leicester
Leicester General Hospital
Leicester, UK

R. Stewart
Institute of Psychiatry, Section of Epidemiology
King's College London
London, UK

Prof. H. Meltzer
Dept. of Health Sciences
University of Leicester
Leicester, UK

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Introduction

Suicide is a tragic ending of life and is a cause of considerable distress for families, carers, and health professionals. Suicide reduction has therefore become an important target in health policy, and identifying patients who are at high risk of suicide is a key function of mental health services. Studying suicidal ideation is therefore important in terms of prevention, and in addition has particular methodological advantages over examining completed suicide; in particular suicidal thoughts are more common and can be elicited directly rather than relying on retrospective information post-mortem in psychological autopsies of completed suicide [25].

Cross-sectional and longitudinal population studies have found strong associations between psychiatric morbidity (particularly depression) and suicidal ideation [6, 10, 12, 25]. Studies concentrating on older people have found that other factors may be linked to suicidal thoughts, such as poor physical health and disability, and poor social support [1, 26].

The Office for National Statistics (ONS) survey of Psychiatric Morbidity, carried out in the year 2000,

collected information on a broad range of factors including suicidal ideation in a nationally representative sample in Great Britain. We have previously reported that limitation in activities of daily living (ADL) is independently associated with the presence of suicidal ideation, and in older people this association is stronger than all other social and health related factors with the exception of the presence of mental disorder [9]. This article further investigates the association between suicidal ideation, physical health difficulties and disability across the age spectrum.

Methods

Study sample

The methods used in the second National Survey of Psychiatric Morbidity of adults living in private households in Great Britain have been described in greater detail elsewhere [24]. To summarize, small area postcode units (postcode sectors) were randomly selected from a sampling frame stratified for region and social class composition to generate a nationally representative sample. Households were randomly selected from within each unit and, in each household containing at least one person aged between 16 and 74 years, one person was randomly selected and invited to participate. A total of 12,792 adults were approached, with 8,580 participants.

Definition of suicidal ideation

Three questions assessing suicidal ideation, past and current, were administered to all participants:

- Have you ever thought that life was not worth living?
- Have you ever wished that you were dead?
- Have you ever thought of taking your life, even if you would not really do it?

The subject was asked whether they had experienced these ideas in the previous week, the last year, or at any other time. For the purpose of this analysis, a positive response to one or more of the questions for the period of 12 months prior to the interview was considered to indicate the presence of suicidal ideation (SI).

Limitation in activities of daily living (ADLs)

Respondents were asked a set of questions to establish whether they had any difficulties in seven domains of activities of daily living [17]. These were:

1. personal care (such as dressing, bathing, washing, or dressing);
2. getting out and about or using transport;
3. medical care (such as taking medicines or pills, having injections or changes of dressing);
4. household activities (like preparing meals, shopping, laundry and housework);
5. practical activities (such as gardening, decorating, or doing household repairs);
6. paperwork (such as writing letters, sending cards, or filling in forms);
7. managing money (budgeting for food or paying bills).

To explore whether the risk associated with limitation in ADL was cumulative rather than specific to individual domains we categorized restriction in ADL into limitation of no (reference category), one, two, three, or four or more areas. In addition, limitation in ADL was also dichotomised into any limitation in one of more of the seven domains or absence of limitation in any domain.

Other measures

Psychiatric morbidity and depression

The revised clinical interview schedule (CIS-R) [16] was administered to all participants. This is a widely used fully-structured assessment of psychiatric morbidity [15]. Common mental disorder (CMD) was defined from the CIS-R applying algorithms based on ICD-10 diagnostic research criteria. Those not satisfying the diagnostic criteria but with a score of 12 or more on the CIS-R were also regarded as having a CMD described as mixed anxiety and depressive disorder.

Perceived social support

Perceived social support was assessed using a seven item questionnaire that had previously been used in the 1992 'Health Survey for England' [2] and ONS (OPCS) surveys of psychiatric morbidity among adults in private households and in institutions catering for people with mental disorder [17]. The maximum score of 21 suggests no lack of perceived support, scores 18–20 a moderate lack, and scores of 17 and below suggest a severe lack of social support.

Size of primary support group

The size of respondents' primary support group, i.e. the number of friends and relatives they felt close to, was calculated from responses to questions adapted from those used in other ONS (OPCS) surveys of psychiatric morbidity [17]. Previous research has suggested that adults with a primary support group of three or fewer are at greatest risk of psychiatric morbidity [3, 4].

Physical health

Respondents were asked if they had any long-standing illness, disability or infirmity and then asked to list these (if there were more than six, then the six most important were listed). The physical health complaints were then coded into a variety of disease system categories: musculoskeletal, respiratory, stroke and heart, gastrointestinal, nervous system, endocrine, genitourinary, blood disorder, skin, hearing and sight. A binary variable was also derived to denote the presence or absence of any physical complaint.

Social class

The Registrar General's classification was used, with a married or cohabiting women classified according to the partner's occupation unless he had never worked. Coding was based on current occupation or most recent occupation for the unemployed or economically inactive. A binary variable for social class I, II, III non-manual and III manual, IV, V was derived.

Statistical analysis

Data were analysed using STATA software. All prevalence data analyses were carried out using standard weighting procedures to allow for the stratified, clustered sampling and non-response.

Table 1 Association between specific limitations in activities of daily living (ADL) and suicidal ideation (SI) for all ages

Suicidal ideation		
Area of limitation in activity	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)
Personal care	3.62 (2.71–4.84)***	1.66 (1.18–2.34)**
Transport	4.06 (3.24–5.09)***	1.81 (1.35–2.42)***
Medical care	5.13 (3.02–8.70)***	2.02 (1.11–3.69)*
Household activity	4.28 (3.44–5.34)***	1.94 (1.49–2.52)***
Practical activity	2.99 (2.49–3.59)***	1.74 (1.39–2.18)***
Paperwork	3.33 (2.67–4.15)***	1.89 (1.43–2.49)***
Managing money	3.72 (2.88–4.81)***	1.52 (1.13–2.05)**

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$
[a]Adjusted for gender, presence of physical complaint, social class and common mental disorder (CMD)

The risk of presence of suicidal ideation and limitation in activities of daily living were determined by calculating the odds ratio (OR) by logistic regression with confidence intervals. Odds ratios were calculated unadjusted and controlling for the effects of gender, presence of physical complaint, and social class as well as common mental disorder as independent variables. As two items, death wishes and suicidal thoughts are normally contributory to the total CIS-R score, the analysis to determine CMD was conducted excluding these two variables from the algorithm throughout the analysis. Effect modification was tested by entering an interaction term between age group and the presence of impaired ADL for the presence of suicidal ideation to examine its independent significance.

We assessed the association of the following factors with the presence of suicidal ideation for the year prior to interview for the two groups with and without impairment of ADL:

- Size of primary support group
- Perceived social support
- Marital status

ORs were calculated by logistic regression unadjusted and controlling for the influences of gender, age, physical complaint, CMD, and adjusting each for all of the other social factors. Effect modification was tested by entering an interaction term between the presence of impaired ADL and the social factor (primary support group, perceived social support, and marital status) for the presence of suicidal ideation to examine its independent significance.

In addition, in the sub-group of subjects with impaired ADL unadjusted ORs were calculated by logistic regression for social factors stratified by age group.

Results

Data was available both on suicidal ideation (SI) and limitation in activities of daily living (ADL limitation) in 8,513 of those surveyed. Of these, a total of 685 people had experienced SI in the year preceding interview: 233 of 2,464 (9.5%) aged 34 and under; 290 of 3,370 (8.6%) aged 35–54 years, and 162 of 2,679 (6%) aged 55–74 years. Not surprisingly, the older age group were more likely to have disability with 34% having one or more areas of limitation in ADL compared to the 16–34 age group (14%) and the 35–54 age group (18%) (Pearson chi-square = 422, $P < 0.001$). All categories of limitation were significantly more common in the older age group apart from medical care where the distribution was more uniform, and difficulties managing money which was significantly more common in young people (Pearson chi-square = 47, $P < 0.001$).

In Table 1 the associations between SI and specific areas of limitation of ADL are described in detail. All areas of limitation in ADL were significantly associated with suicidal ideation, even after adjusting for gender, the presence of physical complaint, social class and common mental disorder (CMD).

In Table 2, odds ratios (OR) stratified by age are presented both unadjusted, and after controlling for gender, presence of physical complaint, social class and CMD. After adjustment only limitation in the areas of transport, and practical activity (at the $P < 0.05$ level) remain significantly associated with suicidal ideation in the youngest age group, though in older people all areas of limitation in ADL remain significantly associated with SI. Age differences were significant for medical care (OR for the interaction term 1.98, 95% CI 1.02–3.87, $P < 0.05$) and managing money (OR for the interaction term 1.77, 95% CI 1.27–2.47, $P < 0.01$); limitation in ability to manage medical care and inability to manage money were more strongly associated with suicidal ideation in older people than either of the other age groups.

Table 2 Association between specific limitations in activities of daily living (ADL) and suicidal ideation (SI) stratified by age group

Suicidal ideation						
	16–34 years		35–54 years		55–74 years	
Area of limitation in activity	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)
Personal care	4.52 (2.00–10.21)***	1.74 (0.68–4.58)	3.79 (2.36–6.09)***	1.44 (0.82–2.53)	5.26 (3.29–8.40)***	2.22 (1.30–3.81)**
Transport	6.52 (3.35–12.70)***	2.82 (1.13–7.06)*	4.60 (3.21–6.59)***	1.64 (1.07–2.52)*	5.75 (3.90–8.48)***	2.42 (1.52–3.83)***
Medical care	1.68 (0.32–8.81)	0.48 (0.06–3.80)	7.22 (3.57–14.62)***	2.31 (1.17–4.59)*	8.67 (3.85–19.55)***	4.36 (1.64–11.61)**
Household activity	4.41 (2.45–7.94)***	1.69 (0.83–3.44)	5.35 (3.76–7.62)***	2.18 (1.45–3.27)***	5.89 (3.96–8.76)***	2.34 (1.49–3.67)***
Practical activity	4.58 (2.79–7.51)***	1.86 (1.08–3.23)*	3.13 (2.30–4.24)***	1.51 (1.05–2.20)*	5.65 (3.94–8.12)***	3.38 (2.21–5.15)***
Paperwork	2.73 (1.62–4.62)***	1.82 (0.95–3.49)	4.11 (2.87–5.88)***	1.87 (1.27–2.80)**	4.54 (3.10–6.64)***	2.23 (1.42–3.51)***
Managing money	2.11 (1.38–3.22)**	0.82 (0.49–1.36)	5.80 (3.81–8.84)***	2.25 (1.40–3.61)**	5.81 (3.21–10.51)***	3.07 (1.66–5.68)***

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$
[a]Adjusted for gender, presence of physical complaint, social class and common mental disorder (CMD)

To investigate whether the risk associated with limitation in ADL was cumulative rather than specific to individual domains we categorized restriction in ADL into limitation of no (reference category), one, two, three, or four or more areas. After adjustment for gender, age, presence of physical complaint and CMD the odds ratios were: 1.52 (95% CI 1.13–2.05, $P < 0.01$) for limitation in one domain; 1.50 (95% CI 0.99–2.26) for two domains; 2.03 (95% CI 1.32–3.12, $P < 0.01$) for three domains; and 3.64 (95% CI 2.61–5.09, $P < 0.001$) for four or more domains.

Table 3 displays unadjusted and adjusted odds ratios of suicidal ideation in people with and without restriction of activities of daily living for different social characteristics. Associations between marital status and SI were stronger in those without limitation in ADL, whereas the associations between real and perceived social support and SI were stronger in people with limitation in ADL. However when investigating effect modification by calculating an interaction term between the presence of impaired ADL and the appropriate social factor, only the association with marital status was significantly different between those with and without restriction in ADL (OR for the interaction term 0.87, 95% CI 0.76–0.99, $P < 0.05$).

For people with limitation in one or more domains of activity of daily living we assessed the association of social factors with the presence of suicidal ideation, stratified by age (Table 4).

Musculoskeletal (OR 1.66, 95% CI 1.36–2.02, $P < 0.001$), respiratory (OR 1.46, 95% CI 1.08–1.96, $P < 0.05$), gastrointestinal (OR 1.50, 95% CI 1.04–2.16, $P < 0.05$), and neurological (OR 2.03, 95% CI 1.44–2.86, $P < 0.001$) problems were all associated with the presence of suicidal ideation. However after adjusting for the presence of other important demographic, health and social co-variables (age, gender, marital status, size of support group, perceived social support, limitation in ADL, and CMD), none of these physical health categories was significantly associated with suicidal ideation.

Discussion

We had previously found a significant independent association between limitation in activities of daily living (a proxy for disability), and suicidal ideation [9]. The strength of association between suicidal ideation (SI) and disability was particularly pro-

Table 3 Unadjusted and adjusted odds ratios of suicidal ideation in people with and without restriction of activities of daily living for different social characteristics

Suicidal ideation					
Social characteristic		With limitation in ADL		Without limitation in ADL	
		Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)
Primary support group	9+	1.00	1.00	1.00	1.00
	<9	2.70 (2.04–3.56)***	2.41 (1.79–3.25)***	2.22 (1.74–2.83)***	1.80 (1.38–2.34)***
Perceived social support	No lack	1.00	1.00	1.00	1.00
	Moderate lack	1.52 (1.10–2.11)*	1.40 (0.96–2.05)	1.51 (1.14–2.00)**	1.45 (1.08–1.96)*
	Severe lack	2.85 (1.94–4.18)***	2.51 (1.64–3.84)***	2.14 (1.53–3.01)***	2.11 (1.47–3.02)***
Marital status	Married/cohab	1.00	1.00	1.00	1.00
	Single	1.73 (1.18–2.52)**	1.83 (1.20–2.81)**	2.31 (1.71–3.13)***	2.14 (1.55–2.95)***
	Widowed	1.59 (1.06–2.40)*	1.78 (1.06–2.99)*	2.18 (1.36–3.49)**	3.68 (2.22–6.12)***
	Divorced/sep.	1.85 (1.27–2.68)**	1.53 (1.04–2.26)*	2.52 (1.90–3.36)***	2.23 (1.63–3.04)***

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$

[a]Adjusted for gender, age, presence of physical complaint, CMD, and other social characteristic in table

Table 4 Unadjusted odds ratios of suicidal ideation in people with restriction of activities of daily living for different social characteristics stratified by age

Age group							
Social characteristic		16–34 years		35–54 years		55–74 years	
		OR	95% CI	OR	95% CI	OR	95% CI
Primary support group	9+	1.00	–	1.00	–	1.00	–
	<9	3.16***	1.80–5.57	4.04***	2.47–6.60	2.22***	1.42–3.46
Perceived social support	No lack	1.00	–	1.00	–	1.00	–
	Moderate lack	1.48	0.71–3.10	1.51	0.87–2.62	2.08**	1.26–3.42
	Severe lack	3.80***	1.86–7.72	2.81***	1.58–4.99	3.77***	2.06–6.89
Marital status	Married/cohab	1.00	–	1.00	–	1.00	–
	Single	1.69	0.89–3.20	2.41**	1.35–4.29	0.28	0.06–1.18
	Widowed	–	–	5.46**	1.62–18.38	1.62*	1.01–2.60
	Divorced/sep.	2.07	0.80–5.36	2.09**	1.24–3.50	2.25**	1.26–4.04

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$

nounced, only surpassed by that between SI and depressive episode and common mental disorder in older people (ibid.). Other researchers have similarly highlighted the association between disability and suicidal behaviour. Qin et al. [22] found that the strongest risk factors for suicide in a nested case control study of all suicides in Denmark were: history of psychiatric admission, followed by disability (receipt of benefits) and then low income and being single. Pirkis et al. [21] found in the Australian National Survey of Mental Health and Wellbeing that SI was strongly associated with disability. However none of these studies examined the nature of the association between disability and SI in detail; the data collected in the second National Survey of Psychiatric Morbidity of adults living in private households in Great Britain allowed this.

It is not surprising that older people have the highest levels of disability, and this was true for all domains of activity of daily living with the exception of medical care and managing money (more common in younger people). The implication is that the skill of financial management and budgeting is acquired later in life compared to other instrumental activities. The association between limitation of ADL and SI generally increased with the number of domains of activity of daily living impaired, and the strength of association with individual domains were generally of a similar magnitude. The exception to this was medical care which had a stronger association than other domains. However, as limitation in the ability to manage medical care was much less commonly experienced than other limitations, the confidence intervals are wider.

When we controlled for physical health, gender, and the presence of CMD in particular, the associations between individual and cumulative limitations in ADL and SI remained though the strength of association was reduced. The presence of disability itself is therefore potentially important in influencing the occurrence of SI, and not entirely accounted for by poor physical or mental health. The potential importance of CMD as a factor that may confound the influence of disability is exemplified by the close relationship between mental disorder (in particular anxiety and depression) and disability in most domains [5]. The most common category of mental disorder in this survey was mixed anxiety and depressive disorder, followed by generalised anxiety and depressive episode [24].

When we had controlled for the presence of CMD and limitation in ADL no specific physical disorder was associated with suicidal ideation. It is possible therefore that limitation of ADL and co-morbid mental disorder influence suicidal ideation in people with poor physical health rather than the presence of ill-health alone. These findings have particular relevance to areas of clinical practice, in particular risk assessment and the importance of identification and adequate treatment of depression in those with poor physical health. Screening of populations at high risk of depression has been advocated by NICE [19]. Older people with poor physical health in the general hospital would be an example of such a group; in particular as the prevalence of depression in older people in this setting is approximately 20% and frequently missed [14, 20].

The associations between limitation in specific domains of ADL and SI were stronger in the older age group than in the younger age groups. This was particularly true for limitation in ability to manage medical care and inability to manage money. Both these factors reflect loss of control in important areas rather than purely physical limitations and this may have an important role in provoking feelings of helplessness and despair. In those with limitation in ADL social factors (poor perceived support and smaller support group) remained important, though the strength of the associations were generally not notably different from those previously reported for the whole sample [9]. The association between SI and being single, divorced, or widowed appeared greater in those without limitation in ADL compared to those with, suggesting a greater resilience to living alone in people with disability. Being single was significantly associated with SI in those with limitation in ADL when people of all ages were analysed together; however, the converse was true in the older age group alone. This may suggest 'life-long' resilience to difficulties in single older people, with a greater degree of self-reliance.

The main limitations of the study were the cross-sectional design which does not permit direction of causality to be inferred (for example whether people with hopeless ideation neglect themselves resulting in ADL impairment) or for effects on incidence or maintenance to be distinguished. The upper age limit of 74 years limits the generalisability of the study—particularly with respect to more advanced age groups where ADL impairment is particularly common. The advantages of the study design include the sampling techniques to provide a nationally representative sample, the large sample size, the diagnoses of mental disorder based on validated epidemiological methods, and the ability to control for important confounding factors.

Although the recognition and management of depression is fundamentally important in reducing suicidality, particularly in older people [7, 13]) the important role of disability (as measured by limitation in ADL) is highlighted by this analysis. Disability, in particular in multiple domains coupled with social factors carries significant risk. Shah et al. [23] have previously shown that suicidal ideation and functional disability may have a causal effect on mortality of elderly medically ill in-patients. These findings are useful in informing suicide preventative strategies, such as targeting functionally impaired older people

in community based programmes or the screening of high risk groups such as older people in general hospitals or rehabilitation settings.

With the increasing development of community-based intermediate care programmes, health and social care professionals need to be aware of the risks associated with suicidal ideation and co-morbid mental disorder in physically disabled older people. Educational programmes in primary care have been found to reduce suicide rates in Sweden [11]. Introduction and evaluation of education programmes directed at intermediate care teams are now required to determine their benefit for this group of high-risk patient. De Leo et al. [8] have already shown the benefit of a telephone helpline service targeting older people who were disabled and isolated in community residents in the Veneto region of northern Italy where there was significantly fewer suicides among service users (females in particular). Widespread introduction of similar schemes needs to be considered coupled with careful service evaluation. The identification of 'at-risk' individuals for this type of support need not be confined to primary, intermediate, and social care settings; other 'gate-keepers' may need to be recruited who are more likely to identify isolated and disabled people who are not in contact with care organisations [18]. In addition, befriending schemes, organised by voluntary agencies, need to be directed to those at most risk such as those known to be socially isolated and/or recently discharged from general hospitals.

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