

Table 1. A summary of the prevalence of suicidal ideation and suicide attempts in chronic non-malignant pain

Author(s), year, and country	Sample size	Recruitment/Data collection method	Sample characteristics	Suicidality assessment method	Prevalence (people with chronic pain)	Prevalence (controls without chronic pain)
<b>Part I. Suicidal ideation</b>						
Breslau (1992) (USA)	128	Participants were recruited from a large health maintenance organization. Data were drawn from a large-scale epidemiological study of 1007 young adults	<ul style="list-style-type: none"> <li>● Patients diagnosed with migraine</li> <li>● Age range = 21–30 years</li> <li>● % of migraine with aura = 46 %</li> </ul>	One item from the NIMH Diagnostic Interview Schedule <sup>a</sup>	20.6% (lifetime)	12.8% (lifetime)
Hinkley <i>et al.</i> (1994) (USA)	241	Participants were consecutive referrals to an out-patient pain assessment service	<ul style="list-style-type: none"> <li>● Orthopaedic patients who had pain for <math>\geq 7</math> months</li> <li>● Mean age = 34 years</li> <li>● Mean duration of pain = 1 year</li> <li>● % of females = 57 %</li> </ul>	A 10-item structured face-to-face interview that included an item that asked about 'current suicidal intention or ideation'	5% (current)	0.8% (current)
Hitchcock <i>et al.</i> (1994) (USA)	204	Participants were recruited via a national self-help organization	<ul style="list-style-type: none"> <li>● Individuals with chronic non-malignant pain</li> <li>● Mean age = 47 years (19–90)</li> <li>● Mean duration of pain = 9.5 years</li> <li>● % of back pain = 47 %</li> </ul>	A single item in a questionnaire: 'Have you ever felt so hopeless about your pain that you have seriously considered suicide?'	50% (lifetime)	N.R.
Magni <i>et al.</i> (1998) (USA)	289	Data were drawn from a systematic epidemiological survey of 4964 American Hispanics, the Hispanic Health and Nutrition Examination Survey	<ul style="list-style-type: none"> <li>● Individuals (American Hispanic) with chronic abdominal pain</li> <li>● Age range = 20–74 years</li> <li>● Duration of pain = at least 30 days in the last 12 months</li> <li>● % of females = 68 %</li> </ul>	One item from the NIMH Diagnostic Interview Schedule <sup>a</sup>	21.6% (lifetime)	10.6% (lifetime)
Trehanne (2000) (UK)	123	Participants were recruited from a hospital out-patient rheumatology clinic.	<ul style="list-style-type: none"> <li>● Patients with rheumatoid arthritis</li> </ul>	Items from the Nottingham Health Profile	11% (N.S.)	N.R.
Fisher <i>et al.</i> (2001) (USA)	200	Participants were recruited from a hospital multidisciplinary chronic pain in-patient rehabilitation program	<ul style="list-style-type: none"> <li>● Chronic pain patients</li> <li>● Mean age = 46 years</li> <li>● Mean duration of pain = 8 years</li> <li>● % of females = 65 %</li> <li>● % of whites = 89 %</li> <li>● % of low back pain = 42 %</li> </ul>	Beck Depression Inventory Item 9 with reference to the previous week <sup>b</sup> . Score of 2 or 3 = suicidal ideation	6.5% (current)	N.R.
Smith <i>et al.</i> (2004a) (USA)	51	Participants were recruited via newspaper and pain clinic advertisement	<ul style="list-style-type: none"> <li>● Non-cancer chronic pain patients</li> <li>● Mean age = 44 years (18–70)</li> <li>● Mean duration of pain = 10 years</li> <li>● % of females = 69 %</li> <li>● % of back pain = 64 %</li> </ul> Substance misusers excluded	Beck Depression Inventory Item 9 with reference to the previous 2 weeks <sup>b</sup> . Score of 1 = passive suicidal ideation. Score of 2 or 3 = active suicidal ideation	24% (current passive) 0% (current active)	N.R.

Table 1. (cont.)

Author(s), year, and country	Sample size	Recruitment/Data collection method	Sample characteristics	Suicidality assessment method	Prevalence (people with chronic pain)	Prevalence (controls without chronic pain)
Smith <i>et al.</i> (2004b) (USA)	153	Participants were recruited from a tertiary out-patient pain treatment centre	<ul style="list-style-type: none"> <li>● Non-malignant pain patients</li> <li>● Mean age = 45 years (15–93)</li> <li>● Mean duration of pain = 5 years</li> <li>● % of females = 67%</li> <li>● % of whites = 83%</li> <li>● % of back pain = 42%</li> </ul>	A 42-item Structured Clinical Interview for Suicide History in Chronic Pain that included a section to assess 'current suicidality' in the previous 2 weeks. Passive suicidal ideation = 'the presence and frequency of thoughts about death'. Active suicidal ideation = 'specific thoughts about committing suicide'	19% (current passive) 18.4% (current active)	N.R.
<b>Part 2. Suicide attempt</b>						
Breslau (1992) (USA)	128	Participants were recruited from a large health maintenance organization. Data were drawn from a large-scale epidemiological study of 1007 young adults	<ul style="list-style-type: none"> <li>● Patients diagnosed with migraine</li> <li>● Age range = 21–30 years</li> <li>● % of migraine with aura = 46%</li> </ul>	One item from the NIMH Diagnostic Interview Schedule <sup>c</sup>	5.2% (lifetime)	2.2% (lifetime)
Hinkley <i>et al.</i> (1994) (USA)	241	Participants were consecutive referrals to an out-patient pain assessment service	<ul style="list-style-type: none"> <li>● Orthopaedic patients with pain for ≥ 7 months</li> <li>● Mean age = 34 years</li> <li>● Mean duration of pain = 1 year</li> <li>● % of females = 57%</li> </ul>	A 10-item structured face-to-face interview that included an item that asked about 'past suicide attempts'	9% (lifetime)	5.6% (lifetime)
Magni <i>et al.</i> (1998) (USA)	289	Data were drawn from a systematic epidemiological survey of 4964 American Hispanics, the Hispanic Health and Nutrition Examination Survey	<ul style="list-style-type: none"> <li>● Individuals (American Hispanic) with chronic abdominal pain</li> <li>● Age range = 20–74 years</li> <li>● Duration of pain = at least 30 days in the last 12 months</li> <li>● % of females = 68%</li> </ul>	One item from the NIMH Diagnostic Interview Schedule <sup>c</sup>	13.7% (lifetime)	5.6% (lifetime)
Smith <i>et al.</i> (2004b) (USA)	153	Participants were recruited from a tertiary out-patient pain treatment centre	<ul style="list-style-type: none"> <li>● Non-malignant pain patients</li> <li>● Mean age = 45 years (15–93)</li> <li>● Mean duration of pain = 5 years</li> <li>● % of females = 67%</li> <li>● % of whites = 83%</li> <li>● % of back pain = 42%</li> </ul>	A 42-item Structured Clinical Interview for Suicide History in Chronic Pain that included a section to assess 'past suicidality' in the whole lifetime except the most recent 2 weeks	5.3% (lifetime)	N.R.

N.R., Not reported; N.S., not specified.

<sup>a</sup> NIMH, National Institute of Mental Health: 'Have you ever felt so low you thought of committing suicide?' (suicidal ideation).

<sup>b</sup> Beck Depression Inventory item 9 is anchored: 0, 'I do not have any thoughts of killing myself'; 1, 'I have thoughts of killing myself but I would not carry them out' (passive suicidal ideation); 2, 'I would like to kill myself' (active suicidal ideation); 3, 'I would kill myself if I had the chance' (active suicidal ideation).

<sup>c</sup> 'Have you ever attempted suicide?' (suicide attempt).

Table 2. A summary of the evidence for the risk factors predicting suicidality in chronic non-malignant pain

Risk factor	For the prediction of ...	Source of evidence	Sample size and characteristics	Suicidality assessment method	Brief summary of results	
1	Family history of suicide	Suicidal ideation	Smith <i>et al.</i> (2004b) (USA)	<i>n</i> = 153 chronic pain out-patients	A 42-item Structured Clinical Interview for Suicide History that included a section to assess 'current suicidality' in the previous 2 weeks. Passive suicidal ideation = 'the presence and frequency of thoughts about death'. Active suicidal ideation = 'specific thoughts about committing suicide'	A family history of suicide attempts/completions was associated with a 7.5-fold increase in risk of passive suicidal ideation ( $p=0.001$ ) and a 6.6-fold increase in risk of active suicidal ideation ( $p=0.003$ ), after adjusting for significant covariates (e.g. pain and depression)
2	Previous suicide attempt	Suicidal ideation	Fisher <i>et al.</i> (2001) (USA)	<i>n</i> = 39 chronic pain in-patients (from 200 patients evaluated) <ul style="list-style-type: none"> <li>● 13 patients (depressed/suicidal)</li> <li>● 13 matching patients (depressed/non-suicidal)</li> <li>● 13 matching patients (non-depressed/non-suicidal)</li> </ul>	Beck Depression Inventory Item 9 with reference to the previous week <sup>a</sup> . Score of 2 or 3 = 'suicidal intent'	Compared to the depressed/non-suicidal (23%) and the non-depressed/non-suicidal (0%) groups, the depressed/suicidal group (54%) was more likely to have made a previous suicide attempt ( $p=0.007$ )
3	Being female	Suicidal ideation	Treharne <i>et al.</i> (2000) (UK)	<i>n</i> = 123 hospital out-patients with rheumatoid arthritis	Items from the Nottingham Health Profile	14% of female patients reporting suicidal ideation compared to 3% among male patients
	Being female	Completed suicide	Timonen (2003) (Finland)	<i>n</i> = 1585 suicide victims <ul style="list-style-type: none"> <li>● 19 who had rheumatoid arthritis</li> <li>● 49 who had osteoarthritis</li> <li>● 1571 with neither rheumatoid nor osteoarthritis</li> </ul>	Official death certificate	18.2% of the suicide victims were females. The proportion of female suicide victims in the rheumatoid arthritis population (52.6%) was significantly higher when compared with victims who had suffered from neither rheumatoid arthritis nor osteoarthritis (17.3%) ( $p<0.001$ )
4	Presence of co-morbid depression	Suicidal ideation	Breslau (1992) (USA)	<i>n</i> = 1007 young adults <ul style="list-style-type: none"> <li>● 51 individuals with migraine without aura</li> <li>● 33 individuals with migraine with aura</li> <li>● 91 individuals with major depressive disorder (MDD)</li> <li>● 18 individuals with migraine (without aura) and MDD</li> <li>● 26 individuals with migraine (with aura) and MDD</li> <li>● 788 individuals with no migraine or MDD</li> </ul>	One item from the NIMH Diagnostic Interview Schedule <sup>b</sup>	The presence of MDD in individuals who had migraine with aura significantly increased odds for suicidal ideation (adjusted OR 19.6) that exceeded the odds associated with migraine with aura alone (adjusted OR 2.4), and that associated with MDD alone (adjusted OR 7.4). Likewise, the presence of MDD in individuals who had migraine without aura also significantly increased odds for suicide ideation (adjusted OR 13) that exceeded the odds associated with migraine without aura alone (adjusted OR 1.7) and that associated with MDD alone (adjusted OR 7.4)
	Presence of co-morbid depression	Suicidal ideation	Treharne <i>et al.</i> (2000) (UK)	<i>n</i> = 123 hospital out-patients with rheumatoid arthritis	Items from Nottingham Health Profile	30% of those reporting depression also experienced suicidal ideation, compared to 7% seen in those who were not depressed. The presence of clinical depression was predictive of suicidal ideation (OR 4.47, $p<0.05$ ).

Table 2. (cont.)

Risk factor	For the prediction of ...	Source of evidence	Sample size and characteristics	Suicidality assessment method	Brief summary of results
Presence of co-morbid depression	Suicide attempt	Breslau (1992) (USA)	$n = 1007$ young adults (see above for a breakdown of the sample)	One item from the NIMH Diagnostic Interview Schedule <sup>c</sup>	The presence of MDD in individuals who had migraine with aura significantly increased odds for suicide attempt (adjusted OR 23.2) that exceeded the odds associated with migraine with aura alone (adjusted OR 4.3), and that associated with MDD alone (adjusted OR 7.8). Likewise, the presence of MDD in individuals who had migraine without aura also significantly increased odds for suicide attempt (adjusted OR 10.9) that exceeded the odds associated with migraine without aura alone (adjusted OR 2.7), and that associated with MDD alone (adjusted OR 7.8)
Presence of co-morbid depression	Completed suicide	Timonen <i>et al.</i> (2003) (Finland)	$n = 1585$ suicide victims (see above for a breakdown of the sample)	Official death certificate	58% of all rheumatoid arthritis suicide victims were found to have suffered from co-morbid depression. In females, the proportion of co-morbid hospital-treated depression was higher in rheumatoid arthritis suicide victims (80%) relative to osteoarthritis suicide victims (31.3%, $p = 0.016$ ) and suicide victims with neither rheumatoid arthritis nor osteoarthritis (30.8%, $p = 0.001$ )
5 Location and type of pain	Suicidal ideation	Breslau (1992) (USA)	$n = 1007$ young adults (see above for a breakdown of the sample)	One item from the NIMH Diagnostic Interview Schedule <sup>b</sup>	In contrast with the findings for migraine without aura (adjusted OR 1.7), migraine with aura alone (i.e. without co-existing MDD) was associated with significantly increased odds (adjusted OR 2.4) for suicidal ideation.
Location and type of pain	Suicidal ideation	Smith <i>et al.</i> (2004b) (USA)	$n = 153$ chronic pain out-patients	A 42-item Structured Clinical Interview for Suicide History (see above for details of this interview)	Having abdominal pain was associated with an adjusted 5.5-fold greater risk of passive suicidal ideation (PSI, $p = 0.05$ ) and a 4.2-fold greater risk of active suicidal ideation (ASI, $p = 0.01$ ). Neuropathic pain was associated with a lessened risk for both PSI ( $p = 0.002$ ) and ASI ( $p = 0.01$ )
Location and type of pain	Suicide attempt	Breslau (1992) (USA)	$n = 1007$ young adults (see above for a breakdown of the sample)	One item from the NIMH Diagnostic Interview Schedule <sup>c</sup>	In contrast with the findings for migraine without aura (adjusted OR 2.7), migraine with aura alone (i.e. without co-existing MDD) was associated with significantly increased odds (adjusted OR 4.3) for suicide attempt

	Location and type of pain	Suicide attempt	Magni <i>et al.</i> (1998) (USA)	<i>n</i> = 4964 adult participants (289 of these participants had chronic abdominal pain)	One item from the NIMH Diagnostic Interview Schedule <sup>c</sup>	The presence of chronic abdominal pain was one of two most significant predictive variables for suicide attempt ( $p < 0.001$ in the Mexican–Cuban subsample; $p < 0.05$ in the Puerto Rican subsample). The rate of suicide attempts was 2–3 times higher in individuals with chronic abdominal pain compared to those without chronic abdominal pain
	Location and type of pain	Completed suicide	Penttinen (1995) (Finland)	<i>n</i> = 4199 male farmers	Official death certificate	Compared with farmers with no symptoms, those reporting back pain during the year before baseline had a significantly increased risk of committing suicide during the 10-year follow-up. The finding remained significant even when age (OR 9.2), smoking and social status (OR 9.1) were -controlled for
	Location and type of pain	Completed suicide	Macfarlane <i>et al.</i> (2001) (UK)	<i>n</i> = 6569 individuals ● 1005 participants had widespread pain ● 3176 had regional pain ● 2388 had no pain	Office for National Statistics data (which provided information about the cause of death coded according to ICD-9)	Individuals with regional pain and widespread pain were, respectively, 3 times and 5 times more likely to die from causes not related to disease (e.g. accidents, suicide, violence) during the follow-up period 8 years later.
6	High pain intensity	Suicidal ideation	Smith <i>et al.</i> (2004a) (USA)	<i>n</i> = 51 chronic pain out-patients	Beck Depression Inventory Item 9 with reference to the previous week <sup>a</sup> . Score of 1 = 'passive suicidal ideation'. Score of 2 or 3 = 'active suicidal ideation'	High pain intensity was one of the two significant independent discriminators of the presence and absence of passive suicidal ideation ( $p < 0.001$ )
7	Long pain duration	Suicidal ideation	Hinkley <i>et al.</i> (1994) (USA)	<i>n</i> = 635 chronic pain out-patients (241 of these patients had chronic pain for $\geq 7$ months)	A 10-item structured face-to-face interview that included an item that asked about 'current suicidal intention or ideation'	Compared to patients with shorter periods of pain, a significantly greater percentage of patients with longer pain duration reported to be experiencing current suicidal ideation ( $p < 0.05$ ).
	Long pain duration	Suicidal ideation	Treharne <i>et al.</i> (2000) (UK)	<i>n</i> = 123 hospital out-patients with rheumatoid arthritis	Items from the Nottingham Health Profile	Patients with longstanding rheumatoid arthritis (of > 4 years' duration) were more likely to report suicidal ideation (12%) than those with early rheumatoid arthritis of < 2 years' duration (7%).
8	Presence of co-morbid insomnia	Suicidal ideation	Smith <i>et al.</i> (2004a) (USA)	<i>n</i> = 51 chronic pain out-patients	Beck Depression Inventory Item 9 with reference to the previous week <sup>a</sup> (see above for details of scoring)	Sleep-onset insomnia severity was one of the two significant independent discriminators of the presence and absence of passive suicidal ideation ( $p < 0.001$ )

OR, Odds ratio; ICD-9, International Classification of Diseases (9th edn).

<sup>a</sup> Beck Depression Inventory item 9 is anchored: 0, 'I do not have any thoughts of killing myself'; 1, 'I have thoughts of killing myself but 'I would not carry them out' (passive suicidal ideation); 2, 'I would like to kill myself' (active suicidal ideation); 3, 'I would kill myself if I had the chance' (active suicidal ideation).

<sup>b</sup> NIMH, National Institute of Mental Health: 'Have you ever felt so low you thought of committing suicide?' (suicidal ideation).

<sup>c</sup> 'Have you ever attempted suicide?' (suicide attempt).