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Research report

An examination of DSM-IV depressive symptoms and risk for suicide completion in major depressive disorder: A psychological autopsy study

Alexander McGirr [a], Johanne Renaud [a], Monique Seguin [a], Martin Alda [c], Chawki Benkelfat [c], Alain Lesage [a,b], Gustavo Turecki [a,*]

[a] *McGill Group for Suicide Studies, Douglas Hospital Research Center, McGill University, 6875 LaSalle Blvd., Montreal, QC, Canada H4H 1R3*
[b] *Department of Psychiatry, University of Montreal, Montreal, Canada*
[c] *Allan Memorial Research Institute, Department of Psychiatry, McGill University, Canada*

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Abstract

Background: It is unclear whether certain DSM-IV depressive symptoms are more prevalent among individuals who die in the context of a major depressive episode and those who do not, whether this is associated with proximal or distal suicide risk, and whether depressive symptoms cluster to indicate suicide risk.
Method: A psychological autopsy method with best informants was used to investigate DSM-IV depressive symptoms among 156 suicides who died in the context of a major depressive episode and 81 major depressive controls.
Results: Suicides' depressive symptoms were more likely to include weight or appetite loss, insomnia, feelings of worthlessness or inappropriate guilt as well as recurrent thoughts of death or suicidal ideation. Fatigue and difficulties concentrating or indecisiveness were less prevalent among depressed suicides. These associations were independent of concomitant axis I and II psychopathology. The concomitant presence of (a) fatigue as well as impaired concentration or indecisiveness and (b) weight or appetite gain and hypersomnia was associated with decreased suicide risk. Inter-episode symptom concordance suggests that insomnia is an immediate indicator of suicide risk, while weight or appetite loss and feelings of worthlessness or guilt are not.
Limitations: This study employed proxy-based interviews.
Conclusions: We found that discrete DSM-IV depressive symptoms and clusters of depressive symptoms help differentiate depressed individuals who die by suicide and those who do not. Moreover, some DSM-IV depressive symptoms are associated with an immediate risk for suicide, while others may result from an etiology of depression common to suicide without directly increasing suicide risk.

Keywords: Major depression; suicide; risk factors; depressive symptoms

1. Introduction

Studies have consistently demonstrated that depression is a considerable risk factor for suicide (Bostwick

* Corresponding author. Tel.: +1 514 761 6131x2369; fax: +1 514 762 3023.
E-mail address: gustavo.turecki@mcgill.ca (G. Turecki).

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and Pankratz, 2000), with approximately 50% of suicide completers meeting criteria for current depressive disorders (Marttunen et al., 1991). As such, the disorder is the primary psychiatric diagnosis associated with the greatest risk for suicide (Plutchik et al., 1989) with recent reports suggesting that suicide accounts for 4.2% of premature morbidity in uncomplicated major depression (Coryell and Young, 2005). However, not all depressed individuals die by suicide, and the refinement of suicide risk identification among depressed individuals is of tremendous importance for timely and appropriate intervention among this high-risk group.

Although it has long been suggested that major depression constitutes a heterogeneous disorder with qualitatively different manifestations among individuals meeting criteria for the same overarching psychiatric diagnosis, surprisingly few researchers have specifically addressed the characteristics and manifestations of major depression that are associated with completed suicide. While some important studies have examined completed suicide and depressive symptom profiles, they have done so among heterogeneous samples of individuals who met criteria for major affective disorders (Fawcett et al., 1987, 1990; Goldstein et al., 1991; Kessing, 2004; Nordstrom et al., 1995) and reported primarily null or conflicting findings. Such inconsistencies may, therefore, be due to diagnostic heterogeneity. A case-control design among diagnostically homogeneous samples of individuals who currently meet criteria for major depressive disorder of comparable episode severity may be more apt to reveal DSM-IV major depression symptoms differences, while reducing spurious positive findings due to sampling biases.

We investigated three hypotheses in this study. First, we hypothesized that individuals who commit suicide while in a depressive episode will differ from those who do not with respect to the prevalence of discrete DSM-IV depressive symptoms. Second, we hypothesized that specific DSM-IV depressive symptoms may aggregate to indicate an increased risk for suicide. Third, we hypothesized that some DSM-IV depressive symptoms are more prevalent among depressed suicides without themselves being symptomatic of an increased risk for suicide. In other words, some DSM-IV depressive symptoms may not indicate immediate suicide risk.

To this end, we examined DSM-IV major depression symptoms among a diagnostically homogeneous sample of living individuals meeting criteria for major depression, and suicides who died in the context of a major depressive episode.

2. Methods

2.1. Subjects

Our primarily Caucasian sample originates from the Greater Montreal area. Cases for this study were 156 individuals who died by suicide during an episode of major depressive disorder. Our group has an ongoing partnership with the Quebec Coroner's Office and suicides were chosen from unselected suicides from the general population. The inclusion of consecutive suicides is limited only by the participation of suicide families. Our processing capacity resulted in interviews taking place, on average, 4 months following suicide. Participating suicide families (75%) do not differ from nonparticipating families with regards to the age, race or gender of the deceased. Thirty two suicides had previously attempted suicide (self-injurious act with intention to die) and proxy-based structured interviews indicated that 50 had previously met criteria for a major depressive episode prior to that in the context of their death.

Controls were 81 living individuals of comparable age ($t(235)=.145$, ns) and gender ($\chi^2=3.277$, ns) who also met criteria for current unipolar major depressive disorder severe enough to require follow-up in a specialized psychiatric outpatient clinic. None of these individuals had previously attempted suicide, while structure interviews revealed that 40 had previously met criteria for a major depressive episode in their lifetime. The participation acceptance rate for controls was 90%; those who participated did not differ from those who did not.

To ensure comparability of the two groups, all controls were diagnosed by proxy-based interviews carried out, on average, 5 months following the recruitment of the control. Only individuals whose primary psychiatric diagnosis was that of major depression were included to maximize diagnostic homogeneity, such that the depressive symptom profile of suicide completers might emerge. Our local IRB approved the project and we obtained written informed consent from all informants and control subjects participating in this study.

2.2. Psychological autopsy

We used the psychological autopsy method, whereby the person best acquainted with the deceased (spouse, sibling, child or parent) is selected as an informant for suicides and controls to control for reporting artefacts. Psychological autopsies have been validated for psychiatric diagnoses (Conner et al., 2001; Kelly and Mann, 1996; Zhang et al., 2003). Our group has previously shown that the relationship between deceased and informant does

not influence the rate of specific disorders identified (Lesage et al., 1994), the information does not vary between multiple informants (Dumais et al., 2005a,b), nor does the information reported by living subjects and informants (Dumais et al., 2005a).

2.3. Validity of proxy-based symptom assessment and reliability

We used the SCID-I (First et al., 2001) and SCID-II (First et al., 1995), a measure with excellent inter-rater reliability and diagnostic validity for key axis I and II diagnoses ($\kappa > .95$) in a partially overlapping sample (Dumais et al., 2005a).

Depressive symptom information was obtained using the affective disorder section of the SCID-I. For depressive symptoms, we conducted analyses to compare symptom information obtained from the subjects themselves and from their proxies ($N=30$) and obtained overall good levels of agreement ($\kappa > .60$ for criterial symptoms, and $.74 > \kappa > .33$ for secondary symptoms). Two or more interviewers were asked to rate the same subject ($N=25$). Kappa coefficients for criterial symptoms were excellent ($\kappa > .91$), while kappa coefficients for secondary symptoms ranged from very good to excellent ($1.00 \geq \kappa \geq .75$).

2.4. Statistical analyses

Statistical analyses were performed using the SPSS statistical package version 11.5 (SPSS Inc., Chicago, IL). Chi-square analysis (odds ratio and 95% confidence interval) was used to compare categorical variables, while Student's *t*-test was used for continuous variables. For specific symptom comparisons, we began with subdivided symptoms (for example, feelings of worthless and inappropriate guilt examined separately) and, if no group differences were detected, we examined the DSM-IV symptom (i.e., feelings of worthlessness or inappropriate guilt). Where groups differed with respect to concomitant psychopathology, we re-examined discrete symptom prevalences using multiple logistic regressions while controlling for psychopathology. We used principal component analyses, with loading established at >.40 in the sample as a whole, to identify depressive symptom profiles. For subjects whose current depressive episode was not their first, we conducted multiple logistic regressions to determine whether suicide completion would be associated with inter-episode concordance, or symptom stability across depressive episodes, of individual depressive symptoms. In other words, we wished to examine the stability of depressive symptoms across depressive episodes in relation to suicide risk.

3. Results

Our suicides who met criteria for current major depression were similar to the currently depressed controls with respect to demographic characteristics (Table 1). They did not differ in their manifestation mood congruent psychotic features, nor did they have more depressive symptoms or a more severe depressive episode (Table 2).

In this sample, depressed suicides and depressed controls did not differ with respect to the current presence of anxiety disorders ($N=25$, 16.4% vs. $N=9$, 11.5%, $p=.321$). As expected, however, depressed suicides were more likely than depressed controls to meet criteria for current drug abuse ($N=30$, 19.7% vs. $N=7$, 9.0%, $p<.05$) and personality disorders ($N=22$, 28.2% vs. $N=73$, 48.0%, $p<.01$), while a trend emerged with respect to current alcohol abuse ($N=44$, 28.9%, vs. $N=14$, 17.9%, $p=.069$).

3.1. Symptom prevalence

We first examined the prevalence of specific symptoms amongst the suicide and controls groups (Table 2). Suicides were significantly more likely than controls to have lost weight or appetite (OR=2.564, 95% CI: 1.205–5.455), had insomnia (OR=2.371, 95% CI: 1.206–4.662), have experienced feelings or worthlessness or inappropriate guilt (OR=2.398, 95% CI: 1.337–4.301), and to have had recurrent thoughts of death or suicide (OR=12.585, 95% CI: 4.878–32.469). Suicides were significantly less likely to have felt fatigued (OR=.229, 95% CI: .066–.791), and to have difficulty concentrating or making decisions (OR=.493, 95% CI: .292–.926). They did not differ with respect to any other symptoms.

As depressed suicides were more likely to meet criteria for drug abuse and personality disorders than depressed controls, differential DSM-IV depressive symptoms

Table 1
Demographic characteristics of depressed suicide completers and controls

	Depressed Suicides (N=156)	*Depressed Controls (N=81)*	χ^2 *or t*	*OR*	*95% CI*
Age	42.44± 13.21	42.69± 11.16	.145		
Female	19.2%	29.6%	3.277	.565	.304-1.053
Married	42.3%	32.1%	2.340	1.551	.882-2.728
University Education	10.9%	17.3%	1.913	.585	.272-1.258
Living Alone	37.2%	42.0%	.516	.818	.473-1.415

* p<.05 ** p<.01.

Table 2
Depressive symptoms and characteristics of depressive episodes

Depressive episode characteristics	*Depressed Suicides*	*Depressed Controls*	*OR(95%CI)*	*AOR95% CI*
	N with (%)	*N with (%)*		
Depressed Mood	144(95.4%)	79(91.9%)	1.668 (.541-5.142)	1.271 (.713-2.266)
Anhedonia/Apathy	129(84.9%)	72(84.7%)	.863 (.387-1.925)	.933 (.616-1.413)
Weight or Appetite Loss	93(85.3%)	45(68.2%)	*2.564 (1.205-5.455)	**1.768 (1.183-2.641)
Weight or Apptetite Gain	14(14.3%)	13(19.7%)	.834 (.356-1.954)	.833 (.534-1.299)
Insomnia	84(80.8%)	47(60.3%)	*2.371 (1.206-4.662)	**1.777 (1.225-2.576)
Hypersomnia	26(21.0%)	26(33.3%)	*.531 (.280-1.005)	.801 (.562-1.144)
Psychomotor disturbance	89(61.0%)	41(49.4%)	1.583 (.907-2.764)	1.217 (.951-1.699)
Fatigue	125(84.5%)	79(95.2%)	*.229 (.066-.791)	*.503 (.267-.948)
Worthlessness or Guilt	97(69.8%)	42(53.2%)	**2.398 (1.337-4.301)	*1.480 (1.089-2.010)
Concentration or Indecisiveness	83(61.5%)	63(75.9%)	*.493 (.262-.926)	**.618 (.442-.866)
Thoughts of death or suicidal ideation	148(96.1%)	54(67.5%)	***12.585 (4.878-32.469)	***3.284 (2.023-5.331)
	N with (%)	N with (%)	χ^2 *or t*	OR (95%CI)
Severity of depressive episode			.427	
Mild	.7%	1.1%		
Moderate	20.0%	23.0%		
Severe	79.3%	75.9%		
Depressive episode with psychotic features	10(6.9%)	2(2.5%)	1.222	2.074 (.555-7.754)
Total Symptoms	6.58±1.31	6.48±1.37	.545	

* p<.05 ** p<.01 *** p<.001.

prevalence was re-examined while controlling for these disorders. Controlling for concomitant psychopathology did not influence our results (AORs, Table 2).

3.2. Principal symptom components

We conducted principal component analyses to determine specific symptom clusters in the pooled sample of depressed suicides and controls. The symptom 'recurrent thoughts of death or suicidal ideation' was excluded from these analyses, for fear that this would result in spurious symptom loading. Our analyses revealed four components with eigenvalues over 1.00. These components were characterized by (A) weight or appetite gain and hypersomnia, (B) weight or appetite gain, psychomotor disturbances and hypersomnia, (C) fatigue and difficulties concentrating or indecisiveness, and (D) depressed mood, psychomotor disturbances, feelings of worthlessness or inappropriate guilt and difficulties concentrating or indecisiveness. Suicides and controls were then compared as relates to the prevalence of these components (Table 3). Components B and D did not differentiate depressed suicides and depressed controls. Depressive symptom component C (OR=.352, 95% CI: .199–.623) was associated with a decreased risk for suicide, while component A (OR=.298, 95% CI: .069–1.280) was suggestive of a decreased risk for suicide.

3.3. Inter-episode depressive symptom concordance

We examined the inter-episode concordance of depressive symptoms for individuals who had had more than one

Table 3
Depressive symptom profiles of suicide completers and controls

Depressive Symptom Profile	*Depressed Suicides*	*Depressed Controls*	χ^2	*OR*	*95% CI*
	N with (%)	*N with (%)*			
Component A	3 (1.9)	5 (6.2)	§2.952	.298	.069-1.280
Component B	2 (1.3)	3 (3.7)	1.514	.338	.055-2.063
Component C	71 (45.5)	57 (70.4)	***13.263	.352	.199-.623
Component D	37 (23.7)	12 (14.8)	2.577	1.788	.874-3.656

Note: Component A is characterized by weight or appetite gain and hypersomnia. Component B is characterized by weight or appetite gain, psychomotor disturbances and hypersomnia. Component C is characterized by fatigue and difficulties concentrating or indecisiveness. Component D is characterized by depressed mood, psychomotor disturbances, feelings of worthlessness or inappropriate guilt and difficulties concentrating or indecisiveness.
§ p=.086 * p<.05 ** p<.01.

lifetime depressive episode (50 suicides and 40 controls). Logistic regressions revealed that suicides were more likely to have had inter-episode concordance for weight or appetite loss (OR = 9.167, 95% CI: 1.729–48.596, $p < .01$). Suicides were also more likely to have had inter-episode concordance for feelings of worthlessness or inappropriate guilt (OR = 3.158, 95% CI: 1.065–9.361, $p < .05$). No other inter-episode symptom concordance was associated with death by suicide ($.998 \geq p \geq .171$ for all regressions).

4. Discussion

Given that major depression is a considerable risk factor for suicide, the purpose of this study was to allow for more concise risk assessment within this group. We therefore examined the DSM-IV depressive symptom profiles 156 individuals who committed suicide during the context of a depressive episode and 81 individuals who currently met criteria for major depressive disorder and had never attempted suicide.

Our findings build on the already existing literature of suicide risk among individuals with major depression (Coryell and Young, 2005; Fawcett et al., 1987, 1990). As has often been reported, psychotic features, or psychotic thinking, was more prevalent among depressed suicides; however, this kind of thinking was rather rare (10 suicides and 2 controls) and as such did not reach significance. It is important to note that this difference emerged despite recruiting depressed controls from psychiatric services specializing in the treatment of depression, which otherwise annulled differences one would have expected with respect to episode severity or number of depressive symptoms (Angst and Merikangas, 2001).

Suicides' DSM-IV depressive symptoms during the depressive episode preceding their deaths were more likely to include insomnia, weight or appetite loss, recurrent thoughts of death or suicidal ideation as well as feelings of worthlessness or inappropriate guilt. At the same time, they were less often fatigued, indecisive or having had difficulties concentrating. These differences are in line with the common clinical notion of underlying agitation among depressed suicides (Akiskal et al., 2005). Moreover, all of these depressive symptom differences were independent of concomitant psychopathology.

Our study is, to our knowledge, the first to examine depressive symptom profiles and risk for completed suicide. Principal component analyses identified four symptom components, two of which [(1) fatigue and difficulties concentrating or indecisiveness and (2) weight or appetite gain and hypersomnia] were associated with a decreased risk of dying by suicide. Our analyses indicate that the former may be a protective factor against suicide in depression, while a trend in a similar direction also emerged with the latter.

Previous examinations of the characteristics of depression in suicide have provided support for two classes of risk factors for suicide: distal, or vulnerability for future suicide completion, and proximal, or indicators of immediate risk for suicide (Fawcett et al., 1990). Approximately one third of our depressed suicides suffered from recurrent major depression and some identified symptom differences may also have been present without resulting in suicide. We were thus able to identify several short-term and long-term depressive symptoms indicative of suicide risk by examining inter-episode symptom concordance. Though some studies have reported low levels of symptom stability between major depressive episodes (Oquendo et al., 2004), it is important to note that our analyses do not repose on such an assumption.

Our analyses suggest that insomnia serves as a factor indicating immediate suicide risk, as has also been reported using other methodologies (Barraclough and Pallis, 1975; Fawcett et al., 1990). Sleep disturbances, particularly insomnia, have frequently been implicated in suicide attempts (Agargun and Beisoglu, 2005; Bulik et al., 1990) and completion (Fawcett et al., 1990). Further, suicidal subjects have been found to have shorter sleep latency and higher REM percentage (Agargun and Cartwright, 2003). Interestingly, the neurobiology of sleep appears to implicate the serotonergic and noradrenergic systems, the dysregulation of which has been repeatedly associated with suicide and aggression (Asberg et al., 1976), a significant risk factor for suicide. Though sleep deprivation has received support as a treatment for depression (Wu and Bunney, 1990), chronic sleep deprivation and sleep fragmentation may contribute to the emotional exhaustion (Krakow et al., 2001) often reported by individuals having engaged in suicidal behaviour.

On the other hand, our results suggest that weight or appetite loss as well as feelings of worthlessness or inappropriate guilt are not associated with an immediate risk for suicide, for these DSM-IV depressive symptoms are characteristic of depressed individuals who go on to commit suicide, across depressive episodes. In other words, these symptoms may be associated with an underlying predisposition for suicide without themselves mediating suicide risk and these symptoms may be associated with an etiology of depression common to that of suicide in this population.

One of the major consequences of depression is decreased levels of self care. The recurrent presence of weight or appetite loss, therefore, may be indicative of a more 'biologically' determined depressive episode or, alternatively, of a decreased concern for one's wellbeing.

Additional investigations are required to determine whether this signals a predisposition towards active self-harm. Feelings of guilt or worthlessness, together with insomnia, suggest the implication of rumination. Examinations of the response styles' theory have confirmed that a ruminative response style is a vulnerability to depression and that rumination is the least adaptive response style (Nolen-Hoeksema, 1991). Thus, individuals who have a propensity to ruminate in the face of negative life events may be more likely to catastrophize or become hopeless, and consequently be more likely to engage in suicidal behaviour.

5. Limitations

As with all post-mortem proxy-based studies, these findings are subject to certain limitations. The family members of deceased subjects may exaggerate or overemphasise certain characteristics and traits. This potential limitation is most evident in the current study as relates to their recollection of recurrent thoughts of death or suicidal ideation, as informants' recollection of this symptom is invariably influenced by knowledge of suicide completion. Though the group difference may reflect a real finding, retrospective designs cannot decisively address the issue. Nevertheless, we had good concordance rates when comparing proxy-based information to directly obtained information as we (Dumais et al., 2005a), and other groups (Conner et al., 2001), have previously had. Medication history was not examined in the current study. Another limitation concerns the tainting of previous depressive episode's symptom recollection by current depressive symptoms. The effects of this limitation, however, are limited, for (a) it is likely to be exerted equally upon both groups and (b) suicides' and controls' symptom information was proxy-based, making the current depressive episode less likely to bleed into previous depressive episodes than had the information been obtained directly from the subject.

6. Conclusion

To our knowledge, this is the first study to investigate the relationships between completed suicide, discrete DSM-IV depressive symptoms, depressive symptom profiles and inter-episode symptom concordance among homogeneous samples of individuals who meet criteria for major depressive disorder. We did so among 237 individuals, 156 of whom died by suicide. Our analyses indicate that (a) weight or appetite loss, (b) insomnia, (c) feelings of worthlessness or inappropriate guilt and (d) recurrent thoughts of death are more prevalent among depressed suicides. Others are less prevalent among depressed suicides: (a) fatigue and (b) difficulties concentrating or indecisiveness. Moreover, the concomitant presence of feelings of (a) fatigue as well as difficulties concentrating and indecisiveness and (b) weight or appetite gain and hypersomnia are associated with a decreased risk for suicide in major depression. In addition, the onset of insomnia appears indicative immediate suicide risk, whereas weight or appetite loss and feelings of worthlessness or guilt are characteristic of a predisposition for suicide among individuals who meet criteria for major depression, without in and of themselves indicating an immediate risk for suicide.

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