

Seasonal Differences in Psychopathology of Male Suicide Completers

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Suicide is known to vary according to season, with peaks in the spring and troughs in the winter. The presence of psychopathology is a significant predictor of suicidality, and it is possible that the seasonal variation of suicide completion may be related to seasonality in the manifestation of psychiatric disorders common to suicide completers. In the current study, we evaluated 115 French-Canadian male suicide completers from the Greater Montreal Area for DSM-IV psychiatric disorders using proxy-based diagnostic interviews. Subjects were assessed for seasonal differences in the prevalence of DSM-IV psychiatric diagnoses just before their deaths. Diagnoses of major depressive disorder (MDD) without comorbid cluster B personality disorders, and schizophrenia were differently distributed between seasons. Most (63.4%) subjects with MDD committed suicide in the spring/summer ($P = .038$). However, closer examination re-

vealed that depressed suicides with comorbid cluster B personality disorders did not show seasonality, while 83.3% of depressed suicides without comorbid cluster B personality disorders committed suicide in the spring/summer ($P = .019$). 87.5% of those suicides with schizophrenia committed suicide in the fall/winter ($P = .026$), and the only suicide with schizophrenia who died in the spring/summer was also the only one without positive symptomology. Our study is limited to male suicide completers, and results should not be generalized to women. We conclude that seasonal variation in suicide manifests itself differently in patients with different psychopathology. These findings indicate that assessment of suicide risk may need to include consideration of possible seasonal effects, depending on psychopathology.

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THE SEASONAL variation of suicide completion, with a trend in the general population of a peak in the spring/summer and a trough in the winter, is a phenomenon that has been observed by many different groups.¹⁻⁴ Studies have also revealed variations within annual rhythmicity when subjects are stratified by gender,^{1,3,5,6} age,^{1,7} and method (violent/nonviolent) of suicide.^{1,3,5-9}

Previous studies have proposed different social, environmental, biological, and psychological factors as possible causes of the seasonal fluctuations in suicide. As early as the 1890s, Durkheim attributed the seasonality of suicide to seasonal changes in social life. More recent studies have suggested that the modality of suicide can vary according to social⁷ and marital status,¹⁰ and even type and social status of employment.^{7,11} The seasonal variation in availability of health services could also be put forward as a potential sociological basis for the circ-annual rhythmicity of suicide completion. Other studies have proposed a role for environmental factors, reporting significant association with suicide and temperature, humidity, or weather conditions^{4,12} in seasonal suicide. Seasonal fluctuation at the neurochemical level has also been associated with suicide completion and behavior. For example, levels of serum cholesterol, which have been linked to behaviors related to suicide, such as violence, impulsivity, and aggression,¹³ exhibit seasonal variation¹⁴ that is similar to the

observed circ-annual changes in suicide rate.¹⁵⁻²⁰ Similarly, studies have implicated seasonality in serotonin function in seasonal suicide.^{21,22} Finally, it has been hypothesized that the seasonal variation of suicide is linked to the seasonal variation of violent behavior as measured by the number of violent incidents,²³ and a comparison of nonviolent to violent suicide completers found that only violent suicide completions exhibit seasonality.⁹ These possible explanations of seasonality in suicide are not necessarily mutually exclusive and correlations between some factors, such as weather conditions and biological rhythms, have been suggested.¹²

Presence of psychopathology is known to be the largest single predictor of suicidality, and it is possible that the spring/summer peak and winter trough of suicides may be related to seasonal variation in incidence, severity, or clinical features associated with the psychiatric disorders common

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to suicide completers. If this were true, the psychopathology of suicide completers (just before their deaths) would vary according to season. In the present study, we investigated this hypothesis by analyzing the seasonal distribution of psychiatric diagnoses in a sample of consecutively recruited French-Canadian male suicide completers.

METHOD

Subjects

Subjects were French-Canadian male suicide completers collected from the domiciled in the Greater Montreal area at the time of death. Subjects were steadily recruited throughout the year to the maximum of our recruiting capacity. We recruited subjects primarily in the morning, when most of the paperwork is carried out by the families at the Montreal Morgue, and therefore, we could not recruit cases that arrived at the Morgue in the afternoon and were released soon after or those that arrived over weekends. As our resources remained constant, we were unable to increase recruitment appropriately when case availability increased in the spring. However, we had a constant representation of cases throughout the year and the time of arrival at the Morgue (AM v PM) is not likely to correlate with any clinical feature, as it is dependent on time of body retrieval and not time of suicide event. Only males were investigated, as this study is part of a larger project attempting to investigate risk factors for suicide in males. Subjects were identified through the Montreal Central Morgue under a collaborative agreement with the Quebec Coroner's Office. This study was approved by our local institutional review board and written informed consent was obtained from all participating families.

Diagnosis

Psychiatric diagnoses in suicides were made by means of the psychological autopsy method, and using the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition* (DSM-IV).²⁴ Informants included mother, father, sibling, significant other, friend, or other relative. We have previously reported data on part of this sample suggesting that the type of informant makes no significant difference in the rate of specific disorders identified using our methodology.²⁵ Structured interviews were performed by trained clinicians with informants best acquainted with the subject.

The Kiddie Schedule of Affective Disorders and Schizophrenia (K-SADS) instrument²⁶ was adapted for informants and used to systematically collect information about the lifetime history (including childhood) of mental disorders of the deceased and controls. The K-SADS was chosen because it is particularly useful to carry out interviews with informants, it allows the assessment of childhood psychiatric disorders, and finally, because our group has experience with this instrument. A subsample of 11 random cases was also interviewed using the SCID-I for DSM-IV to obtain diagnoses as detailed below. Diagnoses made from case histories written based on clinical information obtained with the K-SADS were identical to those made from case histories based on Structured Clinical Interview for DSM (SCID)²⁷ interviews.

The K-SADS interviews were modified to include questions

assessing the presence of schizotypal, schizoid, borderline, antisocial, and obsessive-compulsive personality disorders, which were adapted from the Interview Schedule for Children (ISC).²⁸ Following the interview, coroner's notes and all relevant medical records were reviewed. The information collected through the K-SADS interviews, from the coroner's notes, and from medical records, was used by interviewers to write a case history for each subject. A subset of interviews was performed in pairs and the K-SADS results were rated independently. The rate of agreement on items coded as present by at least one interviewer ranged between 84.2% and 94.3%. Case histories were purged from all references to outcome (suicide or not) and then analyzed by a panel of psychiatrists (A.L., C.V., O.L., and G.T.) who reached a consensus regarding DSM-IV diagnoses for each subject. Members of the panel were asked to make individual diagnoses before the consensus meeting so that the agreement between panel members could be determined. Kappa coefficients for key diagnoses were calculated for a previously studied subset of the sample,²⁵ and are as follows: major depression, 0.98; alcohol dependence, 0.94; schizophrenia, 0.98; and borderline personality disorder, 0.81. In our analyses for this study we used psychiatric diagnoses present during the last 6 months prior to the assessment or to death, with the exception of axis II disorders and childhood disorders. The former were used to assess the subject's state at the time of death or assessment, whereas the latter were used to identify more persistent problems and any manifestation thereof in childhood.

A number of subjects met most, but not all, criteria for either antisocial personality disorder or borderline personality disorder. These subjects are referred to collectively as subjects with "cluster B not otherwise specified (NOS)," and were considered as being diagnosed with cluster B personality disorders in our analyses.

Season of Death

Season of death was defined according to calendar month of death, "fall/winter" being from October to March, and "spring/summer" being from April to September. This classification corresponds well to perceived major weather changes in Quebec, with October being the beginning of cooler temperatures, and April the start of the spring thaw.²⁹ Accordingly, in Montreal there are primarily two major seasons. For instance, in March and April, the average temperatures are, respectively, -2.4°C and 5.7°C with average snow precipitation of 35 cm and 12.4 cm, whereas in May daily temperatures commonly reach 20°C .²⁹

Statistical Analysis

DSM-IV axis I and II psychiatric diagnoses were included as variables in the analysis. Descriptive variables were age, level of education, marital status, and household income. Other variables included in the analysis were the number of comorbid diagnoses. Method of death (violent/nonviolent) was included as a descriptive variable for preliminary analyses. We classified as "violent" the following methods: hanging, firearms, cutting, jumping, drowning, gas. Drug intoxication was considered a nonviolent suicide method.

Pearson's chi-squares, Fisher's exact test, and *t* tests were used to test whether variables were significantly related to a particular season of death. The SPSS Statistical Package version

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