Characterization of impulsivity in suicide completers: Clinical, behavioral and psychosocial dimensions

Hana Zouk, Michel Tousignant, Monique Seguin, Alain Lesage, Gustavo Turecki

Abstract

Background: Impulsivity is a personality trait thought to be linked to suicide. Yet, not all suicides are highly impulsive. We aimed to better understand clinical, behavioral and psychosocial correlates of the association between suicide and impulsive behavior.

Methods: One hundred sixty four suicide cases with impulsivity scores based on the Barratt Impulsivity Scale (BIS) were investigated. To examine the most extreme phenotypes, one hundred suicide cases, representing subjects with BIS scores above the 70th percentile and below the 30th percentile, were compared on clinical, behavioral and psychosocial suicide risk factors assessed by way of structured psychological autopsy methods with best informants.

Results: The impulsive suicide cases were significantly younger, exhibited higher measures of aggressive behavior, and were more likely to have a cluster B diagnosis as well as lifetime and 6-month prevalence of alcohol and drug abuse/dependence. They also differed significantly from their non-impulsive counterparts on all subscales of the TCI except for Harm Avoidance and Reward Dependence. Impulsive suicide completers were more likely to have had a history of childhood abuse and to have experienced a triggering life event up to a week preceding their death. A multivariate analysis indicated that 6-month prevalence of substance abuse/dependence and high aggressive behavior remained significant even after controlling for other significant variables.

Limitations: This study was carried out using proxy-based interviews.

Conclusions: Most of the known clinical and behavioral risk factors commonly associated with suicide are particularly valid for impulsive suicide completers. Further, triggering and adverse life events seem to play a role primarily in impulsive suicide.

Keywords: Suicide; Impulsivity; Psychological autopsy; Psychopathology; Life events
without reflection or consideration for the consequences of such behavior (Dawe and Loxton, 2004; Moeller et al., 2001). Hence, this concept spans a wide range of behaviors that are usually risky or inappropriate, with often undesirable outcomes (Evenden, 1999). There is considerable debate on how to best define and measure impulsivity, yet it is often understood as a continuum of a personality feature or trait.

Impulsivity has attracted much interest in suicide research over the last few years as it is regarded as a familial trait predisposing individuals to act out on their suicidal thoughts (Brodsky et al., 2001; Kim et al., 2005; Maser et al., 2002; Silverman et al., 1991). When impulsive subjects are depressed, disinhibited by substance use and under significant stress, they are more likely to attempt and ultimately die by suicide (Dumais et al., 2005a; Fawcett, 2001). Mann et al. consider this personality trait as part of a diathesis that interacts with stressors to trigger the suicidal event (Mann et al., 1999). Thus, not only is impulsivity recognized as a main dimension of suicidality, but it is also seen as a trait that characterizes individuals at risk for suicide attempts, regardless of psychiatric diagnosis (Mann et al., 1999).

Yet, one cannot argue that suicide only falls within impulsive behaviors, as the drive to end suffering often requires premeditation (Evenden, 1999). Moreover, suicide is not always associated with impulsive behavior. A question that remains unexplored is which characteristics of suicides are mediated by impulsivity, and conversely, what characterizes suicides that are not impulsive.

A few groups (Brent et al., 1993a; Oquendo et al., 2000; Suominen et al., 1997) have failed to report an association between suicide attempts and impulsive behavior. However, most studies found a significant role of impulsivity in suicidal behavior, particularly among attempters (Brent et al., 2003; Brodsky et al., 1997; Hull-Blanks et al., 2004; Mann et al., 1999; Soloff et al., 1994; Yen et al., 2004). Conceptually, the relationship between impulsive behavior and suicide attempts has two dimensions: the impulsivity of the act, and the characteristics of the attempter (Baca-Garcia et al., 2004). More than half of suicide attempters may be characterized as impulsive (Baca-Garcia et al., 2001), with disagreements between studies on the direction of the relationship between impulsive attempts and lethality (Baca-Garcia et al., 2001; Plutchik et al., 1989). Impulsive subjects are also more likely to have suicidal ideation (Hull-Blanks et al., 2004) and impulsivity correlates positively with the number of previous suicide attempts among borderline patients (Brodsky et al., 1997), depressed inpatients (Corruble et al., 2003), and suicide attempters (Dougherty et al., 2004). The relationship between impulsive behavior and suicide is less well characterized in suicide completers, as only a few studies have been carried out (Brent et al., 1994; Dumais et al., 2005a; Maser et al., 2002; Phillips et al., 2002). These studies, however, have primarily investigated whether suicides have increased levels of impulsivity as compared to normal controls. Given the importance frequently attributed to impulsivity when assessing suicide risk, it is important to investigate on whom, among suicide completers, impulsivity plays an important role.

The purpose of this study was to better understand clinical, behavioral and psychosocial correlates of impulsivity in suicide completers.

2. Methods

2.1. Subjects

Consecutive suicide cases, recruited primarily from 2000 to 2004, were collected as part of an ongoing collaboration with the Coroner’s Office of the Montréal Central Morgue. Subjects were predominantly Caucasians of French Canadian origin, and were representative of suicide cases in the Québec general population. The participation rate by suicide families was 75%. Suicide cases from families that did not accept to participate were not different from those included in the study with regard to age, race, and gender. Of 413 suicide cases that were investigated by our laboratory, 164 had valid information on impulsivity measured according to the Barratt Impulsivity Scale, Version 11 (BIS-11) (Barratt, 1965). Those on whom impulsivity scores were available were not different from the remaining suicides with regard to demographic variables or prevalence of psychopathology. This study was approved by our local IRB and written informed consent was obtained from next of kin.

2.2. Impulsive and non-impulsive suicide group definitions

The BIS-11 scale consists of 30 items divided into 3 subscales (Barratt, 1965). A total score was calculated, and the mean of the distribution of the impulsivity scores among our suicides was 66.95 (SD±5.23). Barratt measured impulsivity in a male prisoner sample and suggested that a score of 75 and above on the BIS-11 scale is indicative of highly impulsive behavior (Barratt, 1996). This observation is consistent with data from a recent study carried out by our group in a prospective cohort of subjects representative of the
Québec general population, indicating that individuals who have a BIS score of 75 or higher lie within the upper end of the distribution (13% of the representative sample and above one standard deviation from the mean) (Brezo et al., 2006). In our suicide sample, subjects with BIS scores greater or equal to 75 corresponded to the 70th percentile of the BIS score distribution. Therefore, to define the impulsive and non-impulsive suicide groups, we decided to focus on the end points of the BIS score distribution, i.e., subjects with BIS scores equal to or above the 70th percentile and equal to or below the 30th percentile were, respectively, our impulsive and non-impulsive groups.

As an external point of comparison, a recent study by Jallade et al. examined the improvement of clinical psychometric variables following suicidal catharsis. The mean BIS score in their control group comprising victims of accident-induced trauma who were never suicidal and were admitted to the surgical ward of a hospital was 59.34 (SD ± 10.5) (Jallade et al., 2005): lower than our impulsive group [84.49 (SEM ± 0.75)] but not our non-impulsive group [50.34 (SEM ± 0.89)].

2.3. Instruments and assessments

An average of four months following death, families of the suicide cases were contacted to proceed with a psychological autopsy, a well-validated proxy-based diagnostic technique used to obtain diagnoses and other phenotypic information (Brent et al., 1993b; Conner et al., 2001a, b). Informants included the mother, father, sibling, significant other, friend, or other relatives. Psychiatric diagnoses were obtained using the SCID I (Spitzer et al., 1992) interview for axis I DSM-IV diagnoses, as well as the SCID II (Williams et al., 1992) for axis II (personality disorders) diagnoses. Prior to the SCID, we used the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS) interview (Chambers et al., 1985), modified to incorporate questions adapted from the Interview Schedule for Children (ISC) (Kovacs, 1985), to assess personality disorders for twenty-one cases. Our group has previously reported that the diagnoses obtained using these two different methods have excellent concordance rates (Kim et al., 2003). This information was complemented by the Coroner’s notes and medical records. Clinical vignettes were then assessed by a panel of clinicians to reach a consensus regarding DSM-IV diagnosis for each subject. Inter-rater reliability was calculated for a sample comprising part of the individuals included in this study and proved to be excellent, as reported elsewhere (Dumais et al., 2005a). Personality traits were evaluated using the informant version of the following instruments: Brown Goodwin History of Aggression [BGHA] (Brown and Goodwin, 1986), an 11-item interview used to assess lifetime history of aggression. The Buss–Durkee Hostility Inventory [BDHI] (Buss and Durkee, 1957), comprised of 75 items, was used to measure aggressive behavior. The Temperament and Character Inventory version 9 [TCI] (Cloninger et al., 1994) was used to complete information obtained by the previously listed instruments by assessing 4 temperament and 3 character dimensions.

Psychosocial measures were obtained with the Childhood Experience of Care and Abuse (CECA) and the Life Events and Difficulties Schedule (LEDS). As these are long, time-consuming interviews that typically require several appointments with each informant, only 32% of the subjects included in this study had complete data. These subjects were not different from the remaining cases with regard to psychopathology or demographic variables. The CECA (Bifulco et al., 1994) is a semi-structured retrospective measure of adverse childhood experience used with adults (Smith et al., 2002). The consensus method was used to assess various scales of parent–child relationships. An item was rated as severe when it was reported as occurring “always” or “most of the time”. Finally, the LEDS (Brown and Harris, 1978) was used to examine life events that occurred over the 12-month time frame preceding the suicide.

Internal consistency and concurrent and convergent validity measures for the informant version of instruments/scales used in our data are overall excellent and have been reported elsewhere for a different but overlapping sample of suicides (Dumais et al., 2005a). Briefly, estimates of internal consistency (α) were: BGHA, 0.88; BDHI between 0.66 and 0.89 for the 7 subscales of hostility; BIS, 0.89; and TCI, between 0.73 and 0.88 for the 4 temperament and 3 character scales. Overall, estimates were satisfactory and similar to those reported in other studies using informant versions of some of these instruments (Brent et al., 1993b). Moreover, we have previously reported no differences and good measures of symmetry in comparisons between assessments obtained from two different informants for each subject (Dumais et al., 2005a).

2.4. Statistical analysis

Statistical analyses were performed using the SPSS statistical package version 11.5 for chi-square analysis, Fisher’s exact test (2-tailed), and odds ratio for
categorical variables. Student’s t-test was used in the analysis of continuous variables. A stepwise forward logistic regression was performed to control for the effect of significant variables (including the concomitant effect of age) obtained in univariate analyses. Total N for each analysis may vary slightly as not all subjects had information on all variables included in this study, most notably for the structured psychosocial assessments (CECA and LEDS).

3. Results

Fifty suicide completers had impulsivity scores above the 70th percentile and fifty below the 30th percentile. The mean impulsivity scores were 84.49 (SEM±0.75) in the impulsive suicide group, and 50.34 (SEM±0.89) in the non-impulsive group (t=29.34, df=98, p<0.0001). Similar proportions were males and had at least one child, and almost all individuals from both groups were from the same ethnic and cultural/religious backgrounds (Table 1). In addition, the percentage of individuals who were involved in a romantic relationship, were employed or who had not completed their education was similar between groups. However, impulsive suicide completers had a lower personal income, were less likely to have been major income providers, and worked for fewer years compared to their non-impulsive counterparts (Table 1). In addition, they completed fewer years of schooling. Finally, as expected (Dumais et al., 2005a), the impulsive suicide completers were significantly younger than their non-impulsive counterparts (37.18 SEM±1.86 years vs. 44.68 SEM±2.12 years) (Table 1).

3.1. Psychopathology

Table 2 shows that last 6-month and lifetime prevalence of substance abuse and dependence were significantly higher in impulsive suicide completers as compared to the non-impulsive suicides. Interestingly, no differences were found in last 6-month or lifetime prevalence rates of depression (Table 2), or other major axis I diagnoses (data not shown). The mean number of personality traits according to SCID II assessment, grouped by personality disorder cluster, was compared between groups (Table 2). As expected, impulsive suicide completers met a greater number of criteria for cluster B disorders (OR=19.12, p<0.0001, 95% CI: 5.076–72.005), and were more likely to meet full criteria for cluster B diagnoses, particularly borderline (OR 13.60, 95% CI: 2.89–63.95) and antisocial personality disorders (OR 20.50, 95% CI: 2.55–164.90). Interestingly, mean cluster C, but not cluster A traits were increased among impulsive suicides (Table 3). At the same time, however, no individual cluster C personality disorder was significantly increased in the impulsive group. Comorbidity was significantly different between the groups: impulsive suicides were between 4.2 and 5.2 times more likely to

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Demographic characteristics of impulsive and non-impulsive suicide completers from the Quebec general population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impulsive suicide (N=50)</td>
</tr>
<tr>
<td></td>
<td>Mean age 37.18 SEM 1.86</td>
</tr>
<tr>
<td>Caucasian</td>
<td>96% / 100% / 0.097</td>
</tr>
<tr>
<td>Catholic</td>
<td>96% / 85% / 1.769</td>
</tr>
<tr>
<td>Male</td>
<td>90% / 84% / 0.769</td>
</tr>
<tr>
<td>Have at least 1 child</td>
<td>54% / 50% / 0.08</td>
</tr>
<tr>
<td>Employed at time of death</td>
<td>54% / 64% / 0.61</td>
</tr>
<tr>
<td>Incomplete education</td>
<td>50% / 36% / 1.25</td>
</tr>
<tr>
<td>Number of school years completed</td>
<td>9.88 / 12.70 / 0.49</td>
</tr>
<tr>
<td>Total number of working years</td>
<td>16.8 / 24.76 / 3.1</td>
</tr>
<tr>
<td>Intimate relationship</td>
<td>42% / 0.321</td>
</tr>
<tr>
<td>Conflict in love</td>
<td>19% / 21% / 0.04</td>
</tr>
<tr>
<td>Childhood problems</td>
<td>21% / 13% / N/A</td>
</tr>
<tr>
<td>Major income provider</td>
<td>58% / 82% / 3.87</td>
</tr>
<tr>
<td>Personal income</td>
<td>21,333.33 / 42,605.00</td>
</tr>
</tbody>
</table>

1Any academic level (school, college, university, etc.).

a p ≤ 0.01.
b p ≤ 0.05.
c Fisher’s Exact test.
have 2, 3, 4, and 5 or more comorbid axis I and axis II diagnoses (Table 2).

### 3.2. Personality trait measures

The mean BGHA and BDHI scores were significantly higher in impulsive suicide completers compared to their non-impulsive counterparts ($t=4.21$, $df=59$, $p<0.0001$; and $t=5.63$, $df=97$, $p<0.0001$, respectively) (Table 3). Comparisons of the TCI temperament subscale scores between both groups revealed that impulsive suicide completers had, as expected, significantly higher measures of novelty seeking ($t=13.46$, $df=98$, $p<0.0001$) and lower measures of persistence ($t=−5.34$, $df=98$, $p<0.0001$) (Table 3). There were no significant differences between both groups with respect to measures of harm avoidance or reward dependence. Interestingly, all 3 TCI character subscales were significantly different between groups. Impulsive suicide completers had lower measures of self-directedness ($t=−8.86$, $df=98$, $p<0.0001$), cooperativeness ($t=−3.67$, $df=91.65$, $p=0.001$), and surprisingly, higher measures of self-transcendence ($t=2.84$, $df=98$, $p=0.005$), as compared to their non-impulsive counterparts.

### 3.3. Psychosocial variables

Table 4 presents information obtained on history of family abuse and neglect, as well as life events or difficulties that occurred within 1 year of suicide. All data from the CECA and LEDS come from male suicide completers. Impulsive suicides were more likely to have experienced severe indifference ($p_{Fisher}=0.003$), rejection ($\chi^2=6.10$, $df=1$, $p=0.014$), and negligence ($\chi^2=5.72$, $df=1$, $p=0.017$) from either parent during their childhood. In addition, history of physical abuse ($p_{Fisher}=0.075$), lack of
affection, psychological violence, and sexual abuse during childhood from a parent did not differ significantly between groups (Table 4). Impulsive suicides were more likely to have experienced and to have been affected by a short duration trigger event, occurring within one week of their suicide, than non-impulsive suicides ($\chi^2 = 4.05$, df = 1, $p = 0.044$) (Table 4). In the vast majority of the cases, the triggering event was characterized by humiliation following a separation, or a serious threat of separation linked to the incapacity of the suicidal person to change his aberrant behavior or substance use. A few individuals experienced financial difficulties where they owed vast sums of money due to substance abuse or had a limited time to pay an accumulated debt, leading them to experience a sense of hopelessness. These types of difficulties were grouped into a super-category labeled as “threatening event leading to isolation”. Such a precipitating event was significantly more common among impulsive suicide completers (75%) than their non-impulsive counterparts (36%) (Table 4).

Table 3
Personality trait measures, TCI scores, and number of criteria of personality disorder clusters in impulsive and non-impulsive suicide completers from the Quebec general population

<table>
<thead>
<tr>
<th></th>
<th>Impulsive suicide</th>
<th>Non-impulsive suicide</th>
<th>t-test</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>SEM</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Personality trait measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown–Goodwin Lifetime Agression</td>
<td>28</td>
<td>19.73</td>
<td>3.02</td>
<td>33</td>
<td>6.89</td>
</tr>
<tr>
<td>Buss–Durkee Hostility Inventory</td>
<td>49</td>
<td>36.02</td>
<td>1.05</td>
<td>50</td>
<td>27.85</td>
</tr>
<tr>
<td>TCI subscale scores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novelty seeking1</td>
<td>50</td>
<td>28.33</td>
<td>0.74</td>
<td>50</td>
<td>15.22</td>
</tr>
<tr>
<td>Harm avoidance1</td>
<td>50</td>
<td>15.75</td>
<td>1.27</td>
<td>50</td>
<td>15.36</td>
</tr>
<tr>
<td>Reward dependence1</td>
<td>50</td>
<td>14.85</td>
<td>0.62</td>
<td>50</td>
<td>13.51</td>
</tr>
<tr>
<td>Persistence1</td>
<td>50</td>
<td>5.01</td>
<td>0.38</td>
<td>50</td>
<td>7.63</td>
</tr>
<tr>
<td>Self-directedness2</td>
<td>50</td>
<td>20.49</td>
<td>0.83</td>
<td>50</td>
<td>31.51</td>
</tr>
<tr>
<td>Cooperativeness2</td>
<td>50</td>
<td>24.20</td>
<td>0.94</td>
<td>50</td>
<td>28.55</td>
</tr>
<tr>
<td>Self-transcendence2</td>
<td>50</td>
<td>13.29</td>
<td>0.98</td>
<td>50</td>
<td>9.62</td>
</tr>
<tr>
<td>Personality disorders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Cluster A criteria</td>
<td>30</td>
<td>1.63</td>
<td>0.40</td>
<td>33</td>
<td>0.91</td>
</tr>
<tr>
<td>Number of Cluster B criteria</td>
<td>30</td>
<td>7.60</td>
<td>1.05</td>
<td>33</td>
<td>1.27</td>
</tr>
<tr>
<td>Number of Cluster C criteria</td>
<td>30</td>
<td>5.77</td>
<td>0.78</td>
<td>33</td>
<td>3.58</td>
</tr>
</tbody>
</table>

1Temperament subscales.
2Character subscales.
* $p \leq 0.01$.
b $p \leq 0.05$.

Table 4
Psychosocial variable measures in impulsive and non-impulsive suicide completers from the Quebec general population

<table>
<thead>
<tr>
<th></th>
<th>Impulsive suicide (n and %)</th>
<th>Non-impulsive suicide (n and %)</th>
<th>$\chi^2$</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of family abuse (CECA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe indifference from either parent</td>
<td>15 (75%)</td>
<td>4 (33%)</td>
<td>N/A</td>
<td>1</td>
<td>0.030*</td>
</tr>
<tr>
<td>Severe rejection from either parent</td>
<td>14 (70%)</td>
<td>3 (25%)</td>
<td>6.099</td>
<td>1</td>
<td>0.014*</td>
</tr>
<tr>
<td>Severe lack of affection from either parent</td>
<td>15 (75%)</td>
<td>8 (67%)</td>
<td>N/A</td>
<td>1</td>
<td>0.696*</td>
</tr>
<tr>
<td>Severe psychological violence from either parent</td>
<td>13 (65%)</td>
<td>5 (42%)</td>
<td>1.659</td>
<td>1</td>
<td>0.198</td>
</tr>
<tr>
<td>Severe negligence from either parent</td>
<td>12 (60%)</td>
<td>2 (17%)</td>
<td>5.723</td>
<td>1</td>
<td>0.017*</td>
</tr>
<tr>
<td>Presence of sexual abuse</td>
<td>7 (31%)</td>
<td>2 (17%)</td>
<td>N/A</td>
<td>1</td>
<td>0.418*</td>
</tr>
<tr>
<td>Presence of severe physical abuse</td>
<td>10 (50%)</td>
<td>2 (17%)</td>
<td>N/A</td>
<td>1</td>
<td>0.075*</td>
</tr>
<tr>
<td>Trigger event (last 6 months) LEDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threatening event leading to isolation</td>
<td>15 (75%)</td>
<td>4 (36%)</td>
<td>N/A</td>
<td>1</td>
<td>0.056*</td>
</tr>
<tr>
<td>Short duration event (1 week before suicide)</td>
<td>13 (65%)</td>
<td>3 (27%)</td>
<td>4.045</td>
<td>1</td>
<td>0.044*</td>
</tr>
</tbody>
</table>

* Fisher’s Exact test.
b $p \leq 0.05$. 
3.4. Contributors to impulsivity in suicide

Significant variables from univariate analyses that were entered into the stepwise logistic regression were age, gender, BDHI total score, 6-month and lifetime substance abuse/dependence, and the temperament and character subscales of the TCI with the exception of the novelty seeking temperament subscale (see below). For highly correlated measures, such as BGHA and BDHI ($r=0.482$, $p<0.001$), the most informative one was included. To avoid redundancy with the predicted outcome in the analysis, Cluster B and the TCI novelty seeking subscale were excluded from the analysis. Four variables, including aggressive behavior (OR 1.26, Wald=5.15, $df=1$, $p=0.023$, 95% CI: 1.03–1.54), lifetime substance abuse/dependence (OR 33.95, Wald=7.60, $df=1$, $p=0.006$, 95% CI: 7.77–416.26), as well as the persistence (OR 0.55, Wald=6.96, $df=1$, $p=0.008$, 95% CI: 0.35–0.86) and self-directedness (OR 0.77, Wald=6.39, $df=1$, $p=0.011$, 95% CI: 0.63–0.94) TCI subscales, made independent contributions to impulsivity in suicide.

4. Discussion

In this study, we characterized clinical, behavioral and psychosocial correlates of impulsivity in suicide completion by investigating suicides in the lower and higher end of the BIS-11 impulsivity score distribution. Impulsive suicides were characterized by higher measures of aggressive behavior, a higher prevalence of lifetime substance abuse/dependence, as well as high levels of comorbidity of axis I and II diagnoses. This is in line with other studies suggesting that suicide is a multifaceted illness with numerous interacting causes and risk factors that frequently co-occur (Henriksson et al., 1993; Kim et al., 2003; Moscicki, 1995) and seems to be particularly valid for impulsive suicide completers. Non-impulsive suicides presented higher measures of TCI persistence and self-directedness subscales. Unexpectedly, the rates of major depressive disorder were not different between the impulsive and non-impulsive groups. It has been suggested that impulsive attempters are more likely to manifest active suicidal behavior due to short-lived mood reactivity such as that seen in affective instability and not primarily because of full-blown depressive episodes in which mood is more constantly and persistently low (Yen et al., 2004). Our results suggest that lethal suicidal behavior is unlikely to occur as a result of emotional discontrol with rapid and abrupt shifts in mood levels as seen in clinical populations at risk of suicidal behavior, such as borderline personality patients.

Aggressive behavior, as measured by the BDHI, significantly differentiated both groups, even after controlling for other significant variables. Thus, in this impulsive subgroup of suicide completers, aggression is a risk factor of great importance. This is consistent with previous findings (Brent et al., 1994; Dumais et al., 2005a; Soloff et al., 1994) and corroborates the idea that trait impulsivity does not, per se, mediate suicide risk unless associated with aggressive behavior. Biological and genetic markers of impulsivity, especially serotonin and the serotonergic system, have been largely studied (Linnoila and Virkkunen, 1992; Roy and Linnoila, 1988), and implicate reduced serotonergic neurotransmission in impulsive behavior and trait impulsivity (Herpertz et al., 1997). Changes in the central serotonin neurotransmission have also been described to mediate risk for aggressive behavior and hostility (Coccaro et al., 1997a,b), as well as violent suicide and suicidal behavior (Asberg et al., 1976). Such studies suggest a common psychological and biological substrate for impulsivity, aggression, and suicide.

4.1. Psychosocial variables

There has been growing interest in the investigation of the relationship between history of childhood abuse and suicidal behavior (Dube et al., 2001; van der Kolk et al., 1991). We found that several classes of negative early life events may be more likely to play a role among those suicides with high levels of impulsivity. Though our design does not allow us to presume causality or the direction of the associations observed in this study, we might speculate that early life stressors, particularly rejection, negligence, and history of abuse, may probably contribute to the development of a platform for the abnormal expression of impulsivity in association with aggressive behavior. This is consistent with suggestions that impulsivity may be, at least in part, linked to negative early life experiences, including a history of physical or sexual abuse (Mann et al., 1999) which, in turn, may be associated with a risk of personality disorders (Johnson et al., 1999) and self-destructive behavior in adulthood (Brodsky et al., 2001; Soloff et al., 2002). Research suggests that violence, impulsivity, suicidality and substance abuse belong to a common early behavioral pathway that is somehow severely affected by the influence of negative life events (Grilo et al., 1999). Moreover, in a model of the development of borderline personality disorder, it has been speculated that the negative affect and reactivity
characteristics of borderline personality disorder seen in many of our impulsive suicides, interact with an environment involving childhood abuse, resulting in impulsive and self-destructive behavior (Clarkin and Posner, 2005), which may lead to hypersensitivity to future stressful events (Lieb et al., 2004). Further, the expression of such impulsive and suicidal behaviors in borderline personality disorder may be part of a mechanism to cope with the stress that is brought on by this innate hypersensitivity to interpersonal and environmental stimuli (Figueroa and Silk, 1997). Accordingly, in spite of the relatively low numbers of subjects in our study for whom data on the CECA was available, we were able to detect an association between negative life events and impulsive suicide, allowing us to speculate on the possibility that impulsive suicide could be a developmental problem associated with a dysfunctional developmental cascade. Recent studies by our group on developmental trajectories in suicide completers support this view (Seguin et al., 2005), and previous studies in suicide completers have consistently found an association with precipitating life events (Cavanagh et al., 1999; Cheng et al., 2000; Heikkinen et al., 1997).

However, the relationship between life events and suicide outcome has been poorly characterized. For instance, questions such as which and how life stressors mediate suicide risk, and who is particularly at risk, have remained unexplored. Our results suggest that the most recent life event prior to the suicide was the precipitant. Among the different classes of life events, those resulting from interpersonal conflict leading to rejection and isolation were the main triggering factors in our sample.

4.2. Non-impulsive suicides

Our findings suggest that most of the factors commonly recognized as increasing risk for suicide do so, primarily, among subjects with high levels of impulsivity. Then, the question that follows is what mediates suicide among non-impulsive subjects? When all variables are controlled for, non-impulsive suicide is associated with relatively higher measures of the TCI persistence temperament and self-directedness character. These, however, are probably personality traits that correlate with low levels of impulsivity rather than predictors of non-impulsive suicide, similar to the association between impulsive suicides and high levels of TCI novelty seeking scores. Our design prevents us from drawing further inferences about mediators of non-impulsive suicide risk. This is certainly a vital and interesting issue that should be better addressed by future research.

4.3. Limitations

The most important limitations of this study are inherent to the methodology employed in the postmortem investigation using proxy-based interviews. However, the validity of this procedure with regard to the type of variables used in the current study has been well demonstrated by previous work from our group (Dumais et al., 2005a,b; Lesage et al., 1994) and others (Conner et al., 2001a,b). Another limitation of this study is the lack of LEDS and CECA information for all subjects included in this report. In spite of the anticipated lack of power for the psychosocial analyses, there were marked and statistically significant differences when comparing groups for most of these variables, suggesting large attributable risks for these factors. Nevertheless, power issues may explain why certain variables such as history of sexual abuse, in spite of higher frequency among impulsive suicide, were not statistically significant.

4.4. Synthesis

Our findings support speculation about a developmental cascade that may begin with a biological predisposition, negative early life stressors and history of abuse, resulting in the expression of higher levels of impulsivity and aggressive behaviors. These behaviors in turn, may increase the risk of developing a cluster B personality disorder, which could subsequently lead to an increased risk of substance abuse/dependence (Johnson et al., 1999). The interplay of the above three factors could explain in part a developmental mechanism that may lead to increased predisposition to suicide, particularly following a triggering stressor and onset of depressive illness with suicidal ideation. Future studies should be carried out aiming at the identification and better understanding of risk factors for non-impulsive suicide.

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References


