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Childhood maltreatment increases the risk of suicide attempt in schizophrenia

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ABSTRACT

Objectives: In this study, we evaluated the effect of several types of childhood trauma on lifetime suicide attempt in patients with schizophrenia spectrum disorders.
Methods: We interviewed 361 participants with schizophrenia. Childhood trauma was collected using the Childhood Trauma Questionnaire (CTQ). Suicidal attempts were confirmed using subjective and objective validated scales. We applied an observational study design using propensity scores to match individuals with history of childhood trauma to those without past history of trauma. We used logistic regression models to estimate the effect of each type of childhood maltreatment on suicidal attempts controlling for demographics and known suicidal risk factors.
Results: In our sample, 39.1% of the subjects had lifetime suicide attempt. After matching the two groups and controlling for demographics and clinical confounders, total trauma score and the majority of childhood maltreatment subtypes predicted suicide attempt (odds ratios ranged from 1.74 to 2.49 with p-values ranging from 0.001 to 0.02). Physical neglect was not significantly associated with suicide attempt in our sample ($p = 0.94$).
Conclusion: Childhood maltreatment is confirmed to be a strong independent risk factor for suicidal attempts in schizophrenia. The risk is probably aggravated by the development of depressive symptoms and feeling of hopelessness in the adult life. Early screening and modified psychosocial treatment are recommended for psychotic individuals with trauma history.

1. Introduction

The rate of suicide completion within schizophrenia is approximately 5% (Palmer et al. 2005) and suicidal attempts occur at a much higher rate, ranging from 30% to 49% (Montross et al. 2008, Gupta et al. 1998, Ran et al. 2008). Just like in the general population, the best predictor for suicide completion in schizophrenia is a previous suicidal attempt (Wichstrom 2000; Sinclair et al. 2004, Reutfors et al. 2009).

Previous studies have confirmed several clinical and demographic features that can increase the risk of suicide attempts in schizophrenia patients. Several studies reported that young age, male gender and high level of education increase the risk for suicidal attempts (Ran et al. 2008, Conwell et al. 1996, Krausz et al. 1995, Drake et al. 1984, Alaräisänen et al. 2006). The presence of depressive symptoms and hopelessness have robust association with suicidal attempts (Montross et al. 2008, Gupta et al. 1998, Sinclair et al. 2004, Tarrier et al., 2006, Klonsky et al., 2012). Suicide is more frequent in first-degree relatives of patients with schizophrenia (Trémeau et al. 2001). The comorbidity of psychosis with substance abuse can lead to more impulsivity and suicidal attempt, especially in young men (Conwell et al. 1996, Tarrier et al., 2006, Gut-Fayand et al. 2001). Long hospital admissions, young age of psychosis onset and long duration of illness were also found to be associated with increased risk of suicide (Modestin et al. 1992).

On the other hand, childhood trauma has been reported to have a "weak" association with suicidal attempts in schizophrenia (Hor and Taylor 2010). This was based on one case-control study conducted by Roy (Roy 2005). In Roy's study, 50 chronic schizophrenic patients who attempted suicide were compared to 50 chronic schizophrenic patients who never attempted suicide (Roy 2005). It was found that patients with a history of suicidal attempts scored higher on the Childhood Trauma Questionnaire (CTQ) for each trauma subtype than patients without history of suicidal attempts (Roy 2005). The authors reported that childhood trauma is considered to be a "distal" risk factor and it is probably leading to suicidal behaviors through other "proximal" risk factors such as depressive symptoms (Roy 2005). However, this study might have been confounded by the other suicidal risk factors in schizophrenia. Three other studies examined this association but only in first

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episode psychosis patients with short duration of illness. One found that only childhood sexual abuse predicted suicidal attempts among the subtypes of childhood maltreatment (Ucok and Bikmaz 2007). The second study reported an association of both sexual and physical childhood trauma with suicidal attempts by conducting a chart review (Conus et al. 2010) and the last one did not find any association between CTQ subscales and suicidal attempts (Togay et al. 2015).

Therefore, in this study, we aim to estimate the causal effect of all types of childhood trauma on suicidal attempt in schizophrenia patients using the propensity score statistics that takes in account the confounding effect of other risk factors associated with suicide attempt.

2. Methods

To assess the causal effect of childhood trauma on suicide attempt, we applied an observational cohort study design using propensity score matching methods to ensure balanced observed covariates between two groups of schizophrenics with and without significant trauma history (Rosenbaum and Rubin 1983).

2.1. Population sample

Our sample included schizophrenia spectrum patients consecutively recruited from the Centre for Addiction and Mental Health (CAMH), a Canadian teaching hospital located in Toronto. Inclusion criteria were age older than 18, diagnosis of schizophrenia or schizoaffective disorder and English fluency. Exclusion criteria were the following: (a) participants with psychosis NOS or psychosis due to general medical condition (i.e. traumatic brain injury), (b) patients with active psychosis at the time of the interview or (c) missing major information.

2.2. Measurement scales

2.2.1. Independent variables

The Childhood Trauma Questionnaire (CTQ) is a 28-item self-report inventory that provides a brief, reliable and valid screening for childhood maltreatment (Bernstein and Fink 1998). Each question consists of a five-item likert-type scale. The questionnaire covers five different aspects: physical abuse, emotional abuse, emotional neglect, sexual abuse, and physical neglect. This measure provides a picture of the nature, severity, duration, and frequency of abuse during childhood (Bernstein and Fink, 1998).

We divided the score of each subscale into binary variables: high trauma or low/no-trauma depending on previous studies definition of clinical significance (Walker et al. 1999, Bruce et al. 2013). These cutoffs had very good to excellent specificity and sensitivity (Walker et al. 1999). Significant sexual abuse was defined as a score of eight or higher, physical abuse as a score of eight or higher, physical neglect as a score of eight or higher, emotional abuse as a score of ten or higher and emotional neglect a score of 15 or higher. The effect of each trauma subtype was evaluated separately. The total trauma score was divided into "high" or "low" trauma based on the median score (≥46).

2.2.2. Dependent variable

We chose the presence of at least one lifetime suicide attempt as our primary outcome. We used a binary indicator for this outcome. Lifetime suicidal attempt was chosen as main outcome because suicidal attempts are unpredictable in schizophrenia and have a strong association with suicidal completion (Wichstrom 2000; Sinclair et al. 2004, Reutfors et al. 2009). This outcome has been used as primary outcome in other studies as well (Togay et al. 2015, Roy 2005). This information was initially obtained from the Beck Scale for Suicidal Ideation (BSS) (Beck and Steer 1991) then verified using the Columbia-Suicide Severity Rating Scale (C-SSRS) (Posner et al. 2011). The BSS is a self-reported validated scale highly sensitive for the clinical population (Cochrane-Brink et al. 2000). The C-SSRS can define suicidal behaviors and was administered during the research interview by the project staff. It was reported to have good validity and specificity toward suicidal ideation and attempts (Posner et al. 2011).

2.2.3. Other measurement scales

We assessed hopelessness at the time of the interview using the self-reported Beck Hopelessness Scale (BHS) (Beck et al. 1974). This scale was found to be reliable and valid in assessing hopelessness in suicide attempters (Zhang et al. 2015). The diagnosis of schizophrenia or schizoaffective disorder was confirmed using the Structured Clinical Interview for *DSM-IV* Axis I Disorders (First et al. 1997).

2.3. Matching variables

We used a set of covariates in our matching process to estimate the propensity score. These variables were related to either suicidal attempt in schizophrenia or childhood maltreatment or both in previous studies. Demographics such as migration status or ethnicity have been associated with increased risk of exposure to childhood maltreatment (Euser et al. 2011, Marie et al. 2009). Furthermore, other variables such as age, gender, education and family history of suicide have been found associated with suicidal attempts by other investigators. Therefore, the matching variables were age, gender, education, family history of suicide, ethnicity (coded as White ethnicity, African ethnicity or other ethnicity) and migration status (coded as born in Canada, moved to Canada at the age of 1–9 year-old, moved to Canada at the age of 10–19 year-old or moved to Canada any time after 19-year-old).

2.4. Propensity score matching

In this study, we compared the risk for lifetime suicide attempt in the group exposed to childhood trauma with the risk that the same group would have experienced if not exposed to childhood trauma (Stuart 2010).

We implemented a full matching approach, which includes all trauma exposed and unexposed individuals into a series of matched sets (Stuart and Green 2008). Full matching is a flexible propensity score approach that analyzes all the individuals in the sample placing them into matched sets based on their propensity score (Stuart and Green 2008). The full matching allows the use of the data from all individuals (Stuart 2010) and yields good covariate balance. For each trauma type, we calculated its propensity score using a logistic regression with the trauma indicator as an outcome and the chosen covariates as predictors. The propensity score estimated the probability of experiencing trauma for each individual. Based on the estimated propensity score, subjects were grouped into series of matched sets. The analysis was performed "with replacement" which means that each individual can be used more than once for matching (Stuart 2010). Weights were used to account for subjects used multiple times. Each set consisted of one exposed and multiple unexposed subjects or one unexposed and multiple exposed subjects.

After matching, we assessed the balance using the standardized bias between exposed and unexposed group as difference in means divided by standard deviations. We aimed for a standardized bias lower than 0.25 for all the covariates, which implies that the standardized difference in means between the exposed and unexposed group is <0.25 standard deviations apart (Ho et al. 2007), assuring that the matching is successful at balancing the observed covariates.

The propensity score was estimated using MatchIt package for R (Ho et al. 2006).

2.5. Analysis of the outcome

We used logistic regression models in the matched sample therefore the analyses were already controlled for the matching variables. In addition, we controlled for the clinical variables that are known to increase

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