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The tide does turn: Predictors of remission from suicidal ideation and attempt among Canadians who previously attempted suicide

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ABSTRACT

The objectives of this study were to identify factors that contribute to (1) remission from suicidal ideation, and (2) remission from suicide attempt, among Canadians with a lifetime history of suicide attempt. Data for this study came from Statistics Canada's nationally representative 2012 Canadian Community Health Survey-Mental Health. A sample of 769 adult respondents who had ever attempted suicide was analyzed with remission from past year suicidal ideation and remission from past year suicide attempt as outcome variables. Of the 769 respondents who had ever attempted suicide, more than two-thirds (69%) were free from suicidal ideation within the past year, and approximately 87% were free from suicide attempts within the past year. Compared to men, odds were 2.66 times greater for women to be free of suicide attempt and 2.65 times greater to be free of suicidal ideation in the past year. Older age, being free of sleep problems and major depressive episode, having no history of chronic childhood physical abuse, and having two or fewer previous suicide attempts were associated with higher odds of remission from both suicide attempt and ideation in the past year.

1. Introduction

Suicide is one of the leading causes of death among individuals in North America (Centers for Disease Control and Prevention, 2015; Statistics Canada, 2017; Vogel, 2011). Among the most robust predictors of death by suicide are a history of suicidal ideation and prior suicide attempt (Blackmore et al., 2008; Bostwick et al., 2016; World Health Organization (WHO), 2014). In a longitudinal U.S. study involving over 3700 patients, Mundt et al. (2013) found that those with lifetime serious suicidal ideation or prior suicidal behaviors at baseline were four to nine times more likely to report suicidal behaviors at follow-up. The extant literature has identified a number of risk and protective factors to be associated with suicidal ideation and suicide attempt and they include demographic, socioeconomic, and mental health factors (Rodríguez-Cintas et al., 2018). Social support and religion have been identified as protective factors against many mental health outcomes including suicidal ideation and suicide attempt (Lawrence et al., 2016). Below, we briefly summarized the current literature on these risk and protective factors.

According to the WHO (2014), globally, suicide rates are highest among persons aged 70 years and older. However, in Canada, the highest rates of suicide occur during midlife (i.e., age 40–59) (Navaneelan, 2012). Robust evidence indicates that there is a gender paradox of suicidal behavior whereby women are at a higher risk of seriously considering and attempting suicide (Canetto and Sakinofsky, 1998; Schrijvers et al., 2012; Weissman et al., 1999), whereas mortality from suicide is higher among men (Schrijvers et al., 2012). This ostensive 'paradox' may be explained by several factors, including gender differences in psychopathology (Beautrais, 2002), help-seeking behavior (Schrijvers et al., 2012), suicidal intent (e.g., para-suicidal gesture, suicide attempt with intent to die, etc.) (Freeman et al., 2017), and lethality of chosen methods (Anestis, 2016; Callanan and Davis, 2012; Tsirigotis et al., 2011).

Research on the relationship between marital status and suicidal behavior is inconclusive. Whereas some studies have found that being married is protective against suicidal ideation and suicide attempt (Bernal et al., 2007; Handley et al., 2012; Kjøler and Helweg-Larsen, 2000; Weissman et al., 1999), others (e.g., Miret et al., 2014; Scocco et al., 2008; Vera et al., 2011) failed to find any significant association between marital status and suicidal ideation and other suicide-related

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behaviors. Likewise, research on the relationship between socio-economic status and suicide-related behaviors remains unclear. On the one hand, Cohen et al. (2010) found that educational attainment was not significantly associated with suicidal ideation in a sample of adults aged 65 years and over in Rochester, New York. Other scholars have reported similar results (e.g., Pan et al., 2013). However, Kessler et al. (2005) found a significant association between low educational level and suicidal ideation among a nationally representative sample of English-speaking U.S. residents aged 15–54 years. Likewise, Wiktorsson et al. (2010) found that low educational level was associated with suicide attempt among adults aged 70 years and older. A number of other studies have also found low education to be a significant risk factor for suicide attempt (e.g., Gouda and Rao, 2008; Srivastava et al., 2004). With respect to income, an inverse relationship between income and suicidal ideation has been reported in many other studies (e.g., Cohen et al., 2010; Lemstra et al., 2009; Pan et al., 2013).

Studies have also found that individuals with major depression, generalized anxiety disorder, bipolar disorder, and substance use problems are at increased risk of suicide attempt compared to those without these diagnoses (Ilgen et al., 2008; Simon et al., 2007). In fact, these mental health disorders, as well as previous suicidal ideation, are among the key risk factors for death by suicide (Brown et al., 2000; Cavanagh et al., 2003; Cheng et al., 2000; Rodríguez-Cintas et al., 2018; Wilcox et al., 2004). Adults with bipolar disorder (Baldessarini et al., 2006; Jamison, 2000) and those with co-morbid depression and anxiety are at particularly high risk for attempting suicide (Roy-Byrne et al., 2000; Sareen et al., 2005). Previous research has found that disordered sleep is associated with suicidal ideation and attempt (Ballard et al., 2016; Malik et al., 2014; Nadorff et al., 2013; Wong et al., 2011). Experience of childhood adversities, in particular childhood sexual abuse, has been found to be a strong predictor of recurrent suicidal ideation within the past year (Bahk et al., 2017; Enns et al., 2006), multiple lifetime suicide attempt (Bedi et al., 2011; Dube et al., 2001), and future death from suicide (Klonsky and Moyer, 2008; Rosenberg et al., 2005).

With respect to protective factors, social support, and having a confidant, appears to buffer individuals against suicidal ideation and suicide attempt (Teismann et al., 2016). For instance, Rowe et al. (2006) found that low perceived social support was associated with suicidal ideation among older adults receiving home healthcare services. Similarly, high-risk Holocaust survivors with a confidant were found to be less likely to exhibit suicidal ideation than those without a confidant (Clarke et al., 2004). This evidence is concordant with other social psychology research that has indicated that reliable social support is protective against psychological distress (Oishi et al., 2010; Siskind et al., 2012) and suicidal behaviors (Baiden and Fuller-Thomson, 2016; Johnson et al., 2011; Kleiman et al., 2014). This protective effect of social support has been found across diverse populations, including among college students (Gallagher and Vella-Brodrick, 2008), individuals with cancer (Ikeda et al., 2013), ethnically diverse LGBTQ women (Tabaac et al., 2016), and individuals with chronic conditions (Ryan et al., 2007). A systematic review on the relationship between religious and spiritual practices and suicidal behaviors also found consistent evidence of an inverse relationship between religious engagement and suicidal ideation and suicide attempt (Koenig et al., 2012). Religious involvement is also robustly associated with remission from depression (Bonelli et al., 2012; Koenig, 2007).

1.1. Current study

The extant literature has suggested substantial remission from suicidal behaviors (e.g., Baiden and Fuller-Thomson, 2016). A decade-long follow-up study of 897 adults with a history of suicidal ideation in a large U.S. nationally-representative survey found that almost two-thirds of the respondents (65%) had no suicidal thoughts in the intervening decade (Borges et al., 2008). Remission from other suicide-related outcomes (e.g., gestures, plans, and attempts) was even higher. For example, only about one in seven (15.4%) of those who had ever attempted suicide at baseline had a subsequent suicide attempt during the 10-year study period (Borges et al., 2008). Emerging research, while still sparse, points to factors that may support remission from suicidal thoughts and behaviors. For example, in a representative sample of young women, Teismann et al. (2016) found that factors such as social support and positive mental health outperformed psychopathology in predicting the course of suicidal ideation at 17-month follow-up. Whereas much attention has been paid to understanding and identifying risk factors that contribute to suicidal ideation and suicide attempt among Canadians, to date, little research has been undertaken to understand factors that predict remission from suicidal ideation and suicide attempt among formerly suicidal individuals. In order to target those Canadians most vulnerable to persistent suicidality, it is important to identify predictors of remission from suicidal ideation and suicide attempts among community-dwelling Canadians. Therefore the main objectives of this study are to investigate among Canadians with a lifetime history of suicide attempt: (1) factors that contribute to remission from suicide attempt; and (2) factors that contribute to remission from suicidal ideation.

2. Methods

2.1. Data

As has been provided elsewhere by the authors (Baiden et al., 2017; Baiden and Fuller-Thomson, 2016; Fuller-Thomson, Agbeyaka, Land & Bern-Klug, 2016), data for this study were obtained from Statistics Canada's 2012 Canadian Community Health Survey-Mental Health (CCHS-MH). A detailed description of the 2012 CCHS-MH is also available at Statistics Canada's website at http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5015. Briefly, the CCHS-MH is a cross-sectional survey that gathers information on factors that influence mental health focusing on social and economic determinants of health (Statistics Canada, 2013). This population-based survey covers individuals, aged 15 and above, living in the 10 provinces in Canada. There were 25,113 (unweighted) respondents representing 28,314,716 Canadians in the 2012 CCHS-MH dataset. The analyses presented in this study focused on 769 respondents aged 18 years and above who reported that they had attempted suicide at some point in their lives. Respondents who had only one lifetime suicide attempt and that attempt occurred in the past year were excluded, due to the fact that they would not have had the sufficient time to remit. Only 10% of the respondents were excluded due to missing data on some of the included variables, and thus, it is unlikely that missing data would have substantially biased the analyses. To take into account the complex sampling design and in keeping with the weighting requirement by Statistics Canada, we computed an adjusted weight by dividing each respondent's raw weight value by the mean weight of the sample. The adjusted weight was used in all the analyses.

2.2. Variables

2.2.1. Outcome variables

Past year remission from suicide attempt and suicidal ideation were the outcome variables of interest investigated in this study. For suicidal ideation, respondents who reported that they had “seriously thought about committing suicide or taking (their) own life” within the preceding 12 months were coded as 0; and those who did not were coded as 1. Respondents who answered yes to the question “have you attempted suicide or tried to take your own life” within the preceding 12 months were coded as 0; otherwise they were coded as 1.

2.2.2. Explanatory variables

Explanatory variables examined include demographic factors: age

(measured in years in the univariate and bivariate analyses, and in decades in the logistic regression analyses) gender (female versus male), and marital status (married/common-law, formerly married, and single/never married). Under socioeconomic factors, we took into account income measured as poor (bottom 10%), middle (10%–90%), and rich (top 10%) and whether the respondent had a post-secondary education (no versus yes). Confidant was measured as a binary variable (no versus yes) based on response to the question "I have close relationships that provide me with a sense of emotional security and well-being." Respondents who have trouble sleeping at night "most of the time" and "all of the time" were coded as 0 and compared to respondents who indicated "none of the time", "a little of the time", and some of the time" who were considered as having no trouble sleeping at night and were coded as 1. We also took into account past year diagnosis of bipolar disorder, major depressive episode, generalized anxiety disorder, and substance dependence disorder with each coded as a binary variable. These mental health and substance use diagnoses were based on the World Health Organization standardized diagnostic criteria (World Health Organization, 1990). Respondents who answered "not at all" to the question "To what extent do your religious or spiritual beliefs give you the strength to face everyday difficulties?" were coded as 0, whereas respondents answered "a little/somewhat/a lot" were coded as 1. Self-reported childhood physical and sexual abuse were coded as binary variables (no versus yes). Respondents were considered as having experienced chronic childhood physical abuse if they were kicked, bitten, punched, choked, burnt, or physically attacked by an adult 10 or more times before age 16. Childhood sexual abuse was defined based on response to the question before you were 16 in your school, in your neighborhood, or in your family, "How many times did an adult force you or attempt to force you into any unwanted sexual activity, by threatening you, holding you down or hurting you in some way?" (never vs ever). Number of suicide attempts was measured as an ordinal variable coded "0 = one attempt', "1 = two attempts", and "2 = three or more attempts". Respondents whose most recent suicide attempt required medical attention were coded as 1, otherwise they were coded as 0.

2.3. Statistical analyses

Data were analyzed using univariate, bivariate, and multivariate analytic techniques. Univariate analysis was conducted using percentage for the nominal and ordinal variables and mean and standard deviation (SD) for age. Next, we examined the bivariate association between the two outcome variables and the categorical explanatory variables using Pearson chi-square test of association. Binary logistic regression was then conducted to identify the predictors of remission from suicidal ideation and suicide attempt. Model fitness was assessed using the Nagelkerke pseudo R square and the omnibus chi-square test statistic. Adjusted odds ratios are reported together with their 95% Confidence Intervals (95% C.I.). Alpha level was set at $p < 0.05$. All statistical analyses were conducted using SPSS version 24 for Windows (SPSS Inc., Chicago, IL, USA).

3. Results

3.1. Sample characteristics

The general distribution of the variables investigated is presented in Table 1. Of the 769 respondents who had ever attempted suicide, 69% experienced no suicidal ideation within the past year and about 87% did not attempt suicide within the past year. The average age of the respondents was 43 years (SD = 14.8) and 62% were females. About one-third (33%) of the respondents were single/never married, 20% were formerly married, and 47% were married or in a common-law relationship. The majority of the respondents 88% had a confidant and 40% had trouble sleeping at night. With respect to past year diagnosis of mental health problems, 27% were diagnosed with major depressive episode, 12% were diagnosed with generalized anxiety disorder, 12% were diagnosed with bipolar disorder, and 7% were diagnosed with substance dependence disorder. Two out of three respondents (67%) endorsed using religion to cope with life challenges. A little over one in six respondents (17%) experienced chronic childhood physical abuse before age 16 and one in three respondents (34%) was sexually abused before age 16. About half of the respondents (50%) had attempted suicide once, 20% had attempted suicide twice, and 30% had attempted suicide on three or more occasions. More than half (57%) of the respondents' most recent suicide attempt had resulted in an injury that was severe enough to require medical attention.

Table 1
Sample characteristics of individuals who had ever attempted suicide in the 2012 CCHS-MH (N = 769).

Characteristic	% or mean (SD)
Outcome variables	
Past year suicide attempt	
Yes	13.0
No	87.0
Past year suicidal ideation	
Yes	31.0
No	69.0
Explanatory variables	
Age in years, Mean (SD)	43.0 (14.8)
Gender	
Female	62.0
Male	38.0
Marital status	
Married/common-law	47.0
Formerly married	20.0
Single/never married	33.0
Post-secondary graduate	
Yes	57.0
No	43.0
Income	
Rich	12.0
Middle	64.0
Poor	24.0
Has a confidant	
No	12.0
Yes	88.0
Trouble sleeping	
No	60.0
Yes	40.0
Bipolar disorder – past year	
Not diagnosed	88.0
Diagnosed	12.0
Major depressive episode – past year	
Not diagnosed	73.0
Diagnosed	27.0
Generalized anxiety disorder – past year	
Not diagnosed	88.0
Diagnosed	12.0
Substance dependence disorder – past year	
Not diagnosed	93.0
Diagnosed	7.0
Religious coping	
Yes	67.0
No	33.0
Childhood physical abuse	
No	83.0
Yes	17.0
Childhood sexual abuse	
No	66.0
Yes	34.0
Number of suicide attempts	
One attempt	50.0
Two attempts	20.0
Three or more attempts	30.0
Suicide attempt required medical attention	
No	43.0
Yes	57.0

Table 2
Bivariate association between categorical explanatory variables and past year suicide attempt and past year suicidal ideation among individuals who had ever attempted suicide (N = 769).

Characterisitc	Suicide attempt			Suicidal ideation		
	No (%)	Yes (%)	Chi-square; sig	No (%)	Yes (%)	Chi-square; sig
Total	87.0	13.0		69%	31%	
Gender			0.99; $p = 0.32$			10.88; $p = 0.001$
Female	88.0	12.0		73.0	27.0	
Male	86.0	14.0		62.0	38.0	
Marital status			18.12; $p < 0.001$			0.68; $p = 0.71$
Married/common-law	92.0	8.0		70.0	30.0	
Formerly married	78.0	22.0		67.0	34.0	
Single/never married	86.0	14.0		69.0	31.0	
Post-secondary graduate			2.67; $p = 0.10$			2.48; $p = 0.12$
Yes	89.0	11.0		71.0	29.0	
No	85.0	15.0		66.0	34.0	
Income			17.47; $p < 0.001$			11.12; $p = 0.004$
Rich	98.0	2.0		73.0	27.0	
Middle	88.0	12.0		72.0	28.0	
Poor	80.0	20.0		59.0	41.0	
Has a confidant			0.91; $p = 0.34$			11.13; $p = 0.001$
No	84.0	16.0		54.0	46.0	
Yes	88.0	12.0		71.0	29.0	
Trouble sleeping			27.49; $p < 0.001$			29.51; $p < 0.001$
No	92.0	8.0		76.0	24.0	
Yes	79.0	21.0		58.0	42.0	
Bipolar disorder – past year			11.05; $p = 0.001$			5.86; $p = 0.016$
Not diagnosed	89.0	11.0		70.0	30.0	
Diagnosed	76.0	24.0		58.0	43.0	
Major depressive episode – past year			88.46; $p < 0.001$			92.53; $p < 0.001$
Not diagnosed	94.0	6.0		79.0	21.0	
Diagnosed	68.0	32.0		43.0	57.0	
Generalized anxiety disorder – past year			4.59; $p = 0.03$			10.74; $p = 0.001$
Not diagnosed	88.0	12.0		71.0	29.0	
Diagnosed	80.0	20.0		54.0	46.0	
Substance dependence disorder			0.02; $p = 0.89$			0.13; $p = 0.72$
Not diagnosed	87.0	13.0		69.0	31.0	
Diagnosed	87.0	13.0		66.0	34.0	
Religious coping			0.23; $p = 0.63$			0.59; $p = 0.44$
Yes	87.0	13.0		68.0	32.0	
No	86.0	14.0		71.0	29.0	
Childhood physical abuse			8.34; $p = 0.004$			9.79; $p = 0.002$
No	89.0	11.0		71.0	29.0	
Yes	79.0	21.0		57.0	43.0	
Childhood sexual abuse			28.57; $p < 0.001$			17.62; $p < 0.001$
No	92.0	8.0		74.0	26.0	
Yes	78.0	22.0		59.0	41.0	
Number of suicide attempts			142.61; $p < 0.001$			79.85; $p < 0.001$
One attempt	100.0	0.0		83.0	17.0	
Two attempts	85.0	15.0		59.0	41.0	
Three or more attempts	67.0	33.0		51.0	49.0	
Suicide attempt required medical attention			28.05; $p < 0.001$			6.93; $p = 0.008$
No	80.0	20.0		64.0	36.0	
Yes	93.0	7.0		73.0	27.0	

The average age among respondents who experienced suicidal ideation within the past year was significantly lower (39 years) than the average age among respondents who were free of suicidal ideation within the past year (45 years; $F(1, 794) = 24.79$, $p < 0.001$). Similarly, the average age among respondents who attempted suicide within the past year was significantly lower (36 years) than the average age among respondents who had not (44 years; $F(1, 794) = 32.22$, $p < 0.001$).

3.2. Bivariate results

Table 2 shows the bivariate results between past year remission from suicide attempt, past year remission from suicidal ideation, and the categorical explanatory variables examined. Respondents were more likely to be free of suicide attempts in the past year if they: were married/common-law (92%) or single/never married (86%) compared to respondents who were formerly married (78%; $\chi^2 = 18.12$, $p < 0.001$); were rich (98%) or had a medium income (88%) compared to those who were poor (80%; $\chi^2 = 17.47$, $p < 0.001$); had no trouble sleeping at night (92% versus 79%; $\chi^2 = 27.49$, $p < 0.001$); or were free of past year diagnoses of the following mental health disorders: bipolar disorder (89% versus 76%; $\chi^2 = 11.05$, $p < 0.001$); major depressive episode (94% versus 68%; $\chi^2 = 88.46$, $p < 0.001$); or generalized anxiety disorder (88% versus 80%; $\chi^2 = 4.59$, $p = 0.03$). Freedom from chronic childhood physical abuse (89% versus 79%; $\chi^2 = 8.34$, $p = 0.004$) and any childhood sexual abuse (92% versus 78%; $\chi^2 = 28.57$, $p < 0.001$) were also associated with past year remission from suicide attempt.

We found that about 62% of males compared to 73% of females experienced no suicidal ideation within the past year ($\chi^2 = 10.88$, $p = 0.001$); 71% of those with a confidant experienced no suicidal ideation within the past year compared to 54% of those who did not have a confidant ($\chi^2 = 11.13$, $p < 0.001$). Respondents were also more likely to be free of suicidal ideation in the past year if they had no trouble sleeping at night, and had no past year diagnosis of bipolar disorder, major depressive episode, or generalized anxiety disorder.

Table 3
Multivariate logistic regression analyses predicting past-year remission from suicide attempt and past-year remission from suicidal ideation among individuals who had ever attempted suicide (N = 769).

Characterisitcs	No suicide attempt OR (95% C.I.)	Sig	No suicidal ideation OR (95% C.I.)	Sig
Age in decades	1.69 (1.31–2.18)	< 0.001	1.47 (1.26–1.72)	< 0.001
Gender (Male)				
Female	2.66 (1.44–4.93)	0.002	2.65 (1.77–3.97)	< 0.001
Marital status (Formerly married)				
Married/common-law	3.00 (1.41–6.37)	0.004	0.92 (0.56–1.53)	0.76
Single/never married	3.20 (1.42–7.21)	0.005	1.56 (0.88–2.76)	0.13
Post-secondary graduate (No)				
Yes	0.71 (0.38–1.33)	0.29	0.80 (0.54–1.19)	0.28
Income (Poor)				
Rich	3.90 (0.71–21.44)	0.12	1.15 (0.59–2.23)	0.68
Middle	2.14 (1.15–3.98)	0.016	1.61 (1.05–2.48)	0.030
Has a confidant (No)				
Yes	0.73 (0.32–1.65)	0.44	1.65 (0.95–2.86)	0.08
Trouble sleeping (Yes)				
No	2.03 (1.13–3.63)	0.018	1.74 (1.19–2.54)	0.004
Bipolar disorder – past year (Diagnosed)				
Not diagnosed	0.71 (0.32–1.60)	0.41	0.70 (0.38–1.28)	0.28
Major depressive episode – past year (Diagnosed)				
Not diagnosed	3.49 (1.84–6.61)	< 0.001	3.76 (2.38–5.93)	< 0.001
Generalized anxiety disorder – past year (Diagnosed)				
Not diagnosed	1.54 (0.74–3.21)	0.25	1.16 (0.67–2.01)	0.60
Substance dependence disorder (Diagnosed)				
Not diagnosed	0.46 (0.17–1.24)	0.12	0.60 (0.30–1.20)	0.15
Religious coping (No)				
Yes	0.78 (0.41–1.48)	0.45	0.53 (0.34–0.82)	0.004
Childhood physical abuse (Yes)				
No	1.88 (0.92–3.85)	0.09	1.79 (1.10–2.90)	0.019
Childhood sexual abuse (Yes)				
No	1.38 (0.72–2.66)	0.33	1.41 (0.92–2.17)	0.12
Number of suicide attempts (3 or more)				
2 or fewer	6.72 (3.69–12.25)	< 0.001	2.08 (1.39–3.12)	< 0.001
Suicide attempt required medical attention (No)				
Yes	2.93 (1.61–5.30)	< 0.001	1.42 (0.98–2.05)	0.06
Pseudo R square	0.475		0.308	
Omnibus chi-square	366.4	< 0.001	764.7	< 0.001

Similar to the results on suicide attempt, both freedom from chronic childhood physical abuse and childhood sexual abuse were associated with past year remission from suicidal ideation. Also, those who had multiple lifetime suicide attempts, or who were poor, were more likely to have experienced suicidal ideation within the past year.

3.3. Predictors of remission from past year suicidal ideation and suicide attempt among individuals who had ever attempted suicide

Table 3 shows the multivariate logistic regression results predicting remission from past year suicide attempt and past year suicidal ideation among respondents who had ever attempted suicide. The results indicate that each additional decade increase in age increased the odds of remission from past year suicide attempt by 69% (AOR = 1.69; 95% C.I. = 1.31–2.18) and that of remission from suicidal ideation by 47% (AOR = 1.47; 95% C.I. = 1.26–1.72). Compared to men, women had 2.66 times higher odds of remission from suicide attempt in the past year (AOR = 2.66; 95% C.I. = 1.44–4.93) and 2.65 times higher odds of remission from suicidal ideation (AOR = 2.65; 95% C.I. = 1.77–3.97). Compared to respondents who were poor, those who had medium level of income had 2.14 times higher odds of remission from suicide attempt (AOR = 2.14; 95% C.I. = 1.15–3.98) and 61% higher odds of remission from suicidal ideation in the past year (AOR = 1.61; 95% C.I. = 1.05–2.48). Compared to those who were formerly married, those who were married/common-law were three times more likely to be in remission from suicide attempt (AOR = 3.00; 95% C.I. = 1.41–6.37) and those who were single/never married were 3.2 times more likely to be in remission from suicide attempt (AOR = 3.20; 95% C.I. = 1.42–7.21). Absence of sleep problems was associated with remission from both suicide attempt (AOR = 2.03; 95% C.I. = 1.13–3.63) and suicidal ideation (AOR = 1.74; 95% C.I. = 1.19–2.54). Having no history of childhood chronic physical abuse was significantly associated with remission from suicidal ideation (AOR = 1.79; 95% C.I. = 1.10–2.90), whereas religious coping was associated with 47% lower odds of remission from suicidal ideation (AOR = 0.53; 95% C.I. = 0.34–0.82). Respondents with no past year diagnosis of major depressive episode had 3.49 times higher odds of remission from suicide attempt within the past year (AOR = 3.49; 95% C.I. = 1.84–6.61) and 3.76 times higher odds of remission from suicidal ideation within the past year (AOR = 3.76; 95% C.I. = 2.38–5.93).

4. Discussion

We found evidence of substantial recovery from suicide attempts. Roughly seven in eight Canadians with a history of suicide attempt had no attempts in the past year (87%). Approximately two out of three (69%) respondents with a history of suicide attempt did not experience any suicidal ideation in the past year. These findings suggest considerable remission from both suicidal thoughts and behaviors. These results are highly consistent with previous longitudinal U.S. representative research by Borges et al. (2008), which found almost 85% of those with a baseline history of suicide attempt had no further suicide attempts during the study timeframe. Similarly, almost two-thirds of those with lifetime suicidal ideation at baseline had no ideation during the follow-up period (Borges et al., 2008). Notably, these findings suggest substantially higher rates of recovery than those found in clinical samples, underscoring the need for research using representative community-based samples. For instance,

Johnsson et al. (1996) report a 40% non-fatal reattempt rate during the study period among participants admitted to a Swedish suicide research center following an index suicide attempt. Gibb et al. (2005) report a slightly lower, yet still very high, non-fatal reattempt rate of approximately 28% in a New Zealand clinical sample.

Our bivariate analyses suggest that those most likely to be free of either attempts or ideation in the past year tended to be wealthy, and free of insomnia and mental illness (i.e., bipolar disorder, major depressive episode, generalized anxiety disorder). They were also more likely to have a confidant and no history of childhood physical or sexual abuse. Being married was predictive of freedom from attempts in the past year but was not associated with remission from suicidal ideation; whereas having a confidant was predictive of remission from ideation but not attempt. Surprisingly, female gender was predictive of freedom from ideation in the past year.

Even after adjustment for a wide range of known risk factors for suicidal ideation and suicide attempt, the logistic regression analyses showed that older age, female gender, freedom from insomnia or a major depressive episode in the past year, having a middle income, and having fewer than three previous suicide attempts, were associated with remission from both suicidal ideation and suicide attempt. In addition, the logistic regression analysis for remission from suicide attempt identified that being married and having received medical attention for previous suicide attempts were associated with past-year remission from suicide attempt.

Our findings indicated an association between freedom from insomnia and remission from suicide attempt and ideation. The association between insomnia and suicidal ideation and behaviors is well established (Ballard et al., 2016; Malik et al., 2014; Nadorff et al., 2013); however, the mechanisms underlying this relationship are not well understood. In a systematic review of the role of psychological factors in the relationship between sleep disturbances and suicide, Littlewood et al. (2017) found convergent evidence of mediating or moderating effects of cognitive appraisals, perceived social isolation, and maladaptive emotion regulation strategies. Neurobiological pathways including, for instance, serotonergic neurotransmission have also been explored (Bernert and Joiner, 2007; Kohyama, 2012; McCall and Black, 2013). Serotonergic dysregulation appears to be implicated in both sleep disturbances and suicide (Chatzittofis et al., 2013; Monti, 2011; Roman et al., 2005) and is hypothesized to mediate the relationship.

Insomnia and depression, likewise, share a number of neurobiological features, including hypothalamic-pituitary-adrenal (HPA) axis activation and elevated levels of proinflammatory cytokines (Pandey, 2015; Pigeon et al., 2012; Varghese and Brown, 2001). An emerging literature points to cytokines as potential biomarkers of suicidality, which may help to identify those at risk of initial and/or subsequent suicide attempt (Black and Miller, 2015; Brundin et al., 2015; Ganança et al., 2016; Pandey, 2015). Cognitive behavioral therapy (CBT) has been shown to be effective in the treatment of insomnia in patients with baseline depressive symptoms (Manber et al., 2011). CBT for insomnia is also associated with clinically significant remission from suicidal ideation, as well as improvement in measures of well-being, including hopefulness, coping with stress, and mood (Manber et al., 2011). Dysregulation of the HPA axis, as well as noradrenergic and other neurotransmitter systems, has also been speculated to mediate the inordinately high suicide risk among those with bipolar disorder (Mathews et al., 2013). These may, thus, prove to be fruitful therapeutic targets.

The findings regarding having a confidant are surprising. Social support has consistently been found to protect against suicide (Kleiman and Liu, 2013). Marver et al. (2017) report that friendship quality, more than quantity, was protective against suicide attempts during one-year follow-up of depressed persons. In the present study, however, having a confidant seemed to confer resiliency against suicidal ideation but not attempt in the logistic regression analyses.

Although the vast majority of our sample experienced remission from suicidal thoughts and attempts in the past year, our findings suggest that a sizeable minority had persistent ideation and attempts. In keeping with previous research, we found that among the most vulnerable to tenacious suicidality were those with a history of childhood abuse. The pathways between childhood maltreatment and later suicidal behavior are not fully understood; however, biological embedding, an enduring adaptational physiological response to homeostatic threats in early life, is one potential mechanism (Berens et al., 2017). A cascade of epigenetic changes as sequelae of early adversity have been observed across the neural, endocrine, immune and metabolic systems, as well as the gut microbial axis (Berens et al., 2017). For example, epigenetic modifications to glucocorticoid receptors (to which cortisol binds) have been observed in postmortem hippocampal samples of persons with a history of child abuse who completed suicide (McGowan et al., 2009). Braquehais et al. (2010) also suggest that serotonergic and HPA-axis dysfunction, consistent with the neurobiological features of impulsivity and suicidal behavior, may contribute to the relationship. Primary prevention and treatment for childhood abuse survivors is critical in order to curtail the pernicious effects of childhood maltreatment.

While we did not find statistically significant gender differences in remission from suicide attempt in our bivariate analysis, we did, perplexingly, find that females were more likely than males to remit from suicidal ideation at the bivariate level. Although, as noted above, the incidence of suicidal ideation tends to be higher in women, some previous research has found higher rates of persistent ideation in men (see e.g., Hintikka et al., 2001). In a sample of the Finnish general population, Hintikka et al. (2001) reported that 69% of men and 59% of women with baseline suicidal ideation continued to have suicidal thoughts at 12-month follow-up. In the multivariate logistic regression analysis in the present study, women had about 2.7 times higher odds than men of remission from both suicide attempt and ideation. We speculate that the higher odds of remission among women may be a function of the stronger degree of intent to die among men who attempt suicide compared to women who attempt suicide (Freeman et al., 2017). Men have much higher rates of completion than women, and may represent the most severe cases of despair. Women are much more likely than men to survive an attempt, and may, therefore, be more likely to receive help, thereby facilitating recovery.

In keeping with previous epidemiological research (Christiansen and Jensen, 2007; Corcoran et al., 2004; Gibb et al., 2005; Parra-Uribe et al., 2017), older age was associated with increased odds of remission from suicide attempt and ideation in the present study. Also consonant with the existing literature (e.g., Cohen et al., 2010; Lemstra et al., 2009; Pan et al., 2013), our findings suggest a link between poverty and suicide reattempt and persistent ideation. In contrast to previous research (e.g., Gouda and Rao, 2008; Srivastava et al., 2004), educational attainment was not a significant predictor of remission from suicidal ideation and attempts in the present study. The relationship between low socio-economic status and suicidality is complex and likely involves a number of factors. Poverty-related stress may play an etiological role in psychopathology (Wadsworth et al., 2005).

The findings about marital status were somewhat perplexing. A similar prevalence of respondents in each marital category were free of suicidal thoughts in the past year. However, formerly married respondents (i.e., divorced or widowed) were at a particularly high risk of suicide attempts in the past year in the present study, with more than one in five having attempted suicide in the preceding 12 months. It is distressing to note that two out of every three formerly married respondents who had any suicidal thoughts actually had attempted suicide. This suggests that the formerly married are an especially vulnerable group and should be closely monitored with regular screening.

Previous U.S. representative research by Kposowa (2000) found a higher risk of suicide among divorced than married persons; widowhood had no statistically significant effect on suicide. Other research,

however, has found excess risk of suicidality among the widowed (e.g., Luoma and Pearson, 2002; Stroebe et al., 2005). The present study did not distinguish between divorced and widowed respondents due to sample size issues and it is, thus, not clear if there were subgroup effects in our sample. For divorced or widowed participants in our sample, the timing of the dissolution of the marriage or bereavement was not known; however, recency of both divorce (Stack and Scourfield, 2015) and bereavement (Ajdacic-Gross et al., 2008) are reportedly associated with increased suicide risk. Future research on persistent suicidality would benefit from the inclusion of measures of recency of divorce and widowhood. Durkheim's (1897) theory of suicide may provide insight into the relationship between divorce and suicide. According to the Durkheimian perspective, divorce is an anomic condition characterized by low social integration, and represents a loss of the stability and moral cohesion that marriage provides.

4.1. Limitations

Caution is warranted in interpreting these findings due to several important limitations. First, retrospective self-report may introduce confounding and recall or response bias. While our findings are highly congruent with previous representative longitudinal research, future prospective studies would strengthen the evidence base. Second, this study used cross-sectional data which impedes our ability to make temporal or causal inferences with respect to the relationships between the explanatory and outcome variables. Finally, the use of secondary data limits our analyses to those factors for which information was available. Other relevant factors may, therefore, have been omitted from the model. In particular, there was no information available on the timing and severity of previous suicide attempt.

4.2. Study implications

In summary, we found strong evidence of substantial recovery from suicide attempts. Seven out of every eight (87%) participants with a history of suicide attempts reported no attempts in the past year. Likewise, more than two-thirds (69%) reported no suicidal ideation in the past year. Those most likely to have remitted from attempts and ideation in the past year tended to be older, women, wealthy, and free of insomnia and mental illness (i.e., bipolar disorder, major depressive episode, generalized anxiety disorder). They were also more likely to have no history of childhood physical or sexual abuse. Being married was associated with freedom from attempts in the past year; while, having a confidant were associated with freedom from ideation in the past year.

These findings should have particular resonance in light of the growing number of patients for whom mental illness is the sole underlying medical condition who are euthanized in the Netherlands and Belgium, and the ongoing Canadian parliamentary reviews regarding the expansion of the Canadian Medical Assistance in Dying (MAiD) legislation to such patients (Council of Canadian Academies, 2016; Ontario Ministry of Health and Long-Term Care, 2017). While mental illness may, indeed, be grievous to an individual, the present research adds to the literature which resoundingly indicates that suicidal thoughts and behaviors are largely remediable. Prior research has, likewise, pointed to promising interventions for those with treatment-resistant depression, providing hope to some of the most vulnerable who may otherwise see medically-assisted death as the only recourse to their suffering (e.g., Fekadu et al., 2012).

It is not currently possible to predict with accuracy who will remit from suicidal ideation and attempt. Even with a range of socio-demographic and health factors included, our model, nevertheless, yields a relatively small Nagelkerke R-Square (past year attempt Nagelkerke R-Square = 0.475; past year ideation Nagelkerke R-Square = 0.308), suggesting that there is likely a much wider constellation of important predictors not captured here. Our findings do lend support to the chorus of voices urging investment in the social determinants of health, and identifying and facilitating access to interventions that promote social connectedness for the most vulnerable.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.02.030.

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