Published in final edited form as:

J Affect Disord. 2011 July ; 132(1-2): 247–253. doi:10.1016/j.jad.2011.01.012.

Risk factors for suicide attempt in an Arab kindred

**Sami Hamdan, PhD^{1,2}, Nadine Melhem, PhD¹, Israel Orbach, PhD³, Ilana Farbstein, MD⁴,
Mohammad El-Haib, PhD⁵, Alan Apter, MD⁶, and David Brent, MD¹**

¹Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center, Pittsburgh, PA.

²Academic College of Tel-Aviv Jaffa, Israel.

³IDC - interdisciplinary Center, Herzliya, Israel.

⁴Department of Child and Adolescent Psychiatry, Ziv Hospital, Safed, Israel

⁵Ministry of Education, Jerusalem, Israel.

⁶Schneider Children's Medical Center, Israel

Introduction

Suicidal behavior is known to aggregate in families. The first-degree relatives of suicide attempters or completers have around a 4-fold increased risk for suicidal behavior (see Brent & Mann, 2005). While mood disorder is a strong risk factor for suicidal behavior, the familial transmission of suicidal behavior shows contributions above and beyond that of mood disorder. Additional explanatory factors for familial transmission of suicidal behavior include the transmission of liability to impulsive aggression and the intergenerational effects of abuse (Brent et al., 2002, 2004; Mann et al., 2005; Melhem et al., 2007). However, imitation does not appear to contribute strongly to the familial transmission of suicidal behavior, insofar as similar risks are found in family, twin, and adoption studies, the latter of which involve no contact between biological parent and child (Schulsinger et al. 1979; Burke et al., 2010; Statham et al., 1998).

However, our understanding of the mechanisms by which suicidal behavior is transmitted is incomplete. Because suicidal behavior is a complex trait, it is likely that no single mechanism explains its transmission, and therefore the mechanism may be different in different families. In addition, cultural factors, which may vary from family to family, are likely to modify the expression of the familial liability to suicidal behavior (Clarke et al., 2008). Reports of the familial transmission of suicidal behavior in large, extended, presumably homogenous pedigrees can allow for the detection of such mechanisms, but thus far such reports have been limited to studies of the Old Order Amish (Egeland et al., 1985). While family history of suicidal behavior has been reported as a risk factor in diverse ethnic groups (Liu et al., 2010; Cheng et al., 2000; Kar N., 2010; Nojomi et al., 2007; Nakagawa et al., 2009), the majority of the studies of the familial transmission of suicidal behavior have focused on populations of European origin (Brent & Mann, 2005),

© 2010 Elsevier B.V. All rights reserved.

¹For correspondence, please contact Sami Hamdan, Child and Adolescent Psychiatry, Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center, 3811 O'Hara St, Bellefield Towers Room FT 311, Pittsburgh, PA 15213, Telephone: (412)2465612, fax: (412) 2465344, hamdans@upmc.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Therefore, we wish to report on the risk factors for the familial transmission of suicidal behavior in large Arab kindred in Israel. Given the limitations of the literature noted above, this pedigree allows us to examine the familial transmission of suicidal behavior in a homogenous population of non-European origin. This family came to our attention it had experienced more than the number of suicides than would be expected from other population estimates. For example, during the last 10 years, there have been 8 suicides in this family of 1200 people. This is an annualized rate of 67 suicides per 100,000, which is 10 times the rate of suicide in Israel (6.2/100,000), and vastly greater than reported rates in neighboring Syria and Egypt (.1/100,000 and 0.05/100,000, respectively) (WHO,2010). In this paper, we test the following hypotheses: (1) the rate of attempted suicide in this family will also be higher than relevant population estimates; (2) the risk factors for attempted suicide will include mood and anxiety disorders, substance abuse, impulsivity, aggression, trauma, and family history of suicidal behavior; and (3) suicidal behavior will be familially transmitted via an increased risk in mood disorder, impulsivity, aggression, and trauma. Such information is critical to the understanding of the familial and genetic contributions to suicidal behavior and to the development of appropriate preventive strategies that encompass more diverse populations.

Methods

Sample

The study assessed 468 participants aged between 15 and 55 years of age which is around 40% of this extended Arab kindred that consists of five generations with a single paternal founder. The rate of consanguineous marriages in this kindred is 29.7%, of which 38.3% are marriages between third-degree relatives, 15% between fourth- and fifth- degree relatives, and 46.7% between distant relatives (>5th degree). First and second degree relatives of suicide attempter and completers and their spouses and offspring were prioritized to be included in the sample. The rate of refusal was low (less than 10%). Subjects voluntarily participated in the study after signing a consent form. In the case of adolescents under 18 year, they participated after we received their parent's or legal guardian's written consent and their informed assent. Subjects were directly interviewed by a trained Arab-speaking clinical psychologist. The study was approved by the Helsinki Committee of the Ministry of Health of Israel, the IRB in Schneider Children's Medical Center of Israel, and the IRB of the University of Pittsburgh.

Assessment—The presence of DSM-IV psychiatric disorders were assessed using the Arabic-language version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI) (APA, 1994; Kessler et al., 2003; Karam et al, 2006). We obtained the Arabic version from the Institute for Development, Research, and Applied Care (IDRAC) in Lebanon, the official training site for the Arabic versions of the WMH-CIDI and its parent version, the WHO-CIDI. Clinical calibration studies of DSM-IV diagnoses obtained from the WMH-CIDI in comparison to the Structured Clinical Interview for DSM-IV (SCID) resulted in good concordance for mood, anxiety, and substance use disorders with kappa ranging from .33 to .70 (Kessler et al, 2005; Kessler et al, 2004). The Arabic WHO-CIDI has been validated in a clinical sample (Karam et al 1996) and has been used in a national epidemiological survey of mental disorders in Lebanon (Karam et al, 2006). The prevalence, precipitants, medical severity, and intent of all lifetime suicide attempts were assessed using the Suicide History Form as Formal Part of the CIDI. A suicide attempt was defined as “self-destructive behavior” with explicit or inferred intent to die (O’Carroll et al, 1996).” Self-reported depression, anxiety, and hopelessness were obtained using the Beck Depression, Anxiety, and Hopelessness scales, respectively (Beck & Steer, 1988; Beck & Steer, 1990; Beck et al., 1974). Impulsivity and tendency to impulsive aggression were

assessed with the Barratt Impulsivity Scale (BIS) and the Buss-Perry Scale for Aggression, respectively (Barratt, 1965; Buss & Warren, 2000; Buss & Perry, 1992). The occurrence of sexual and physical abuse before and after the age of 16 years by someone who was at least five years older than the participant was assessed using a self-report measure, the Childhood Experiences Questionnaire (CEQ) (Wagner & Linehan, 1994)

Data Analysis—The analyses were conducted using the Statistical Package for the Social Sciences (SPSS), Version 18. Participant with and without suicide attempts were compared on socio demographic and clinical characteristics using *t*-tests and chi-square or Fisher's exact tests as appropriate. Except where otherwise noted, degrees of freedom=1 for chi-square tests. Logistic regression, with the backward stepwise approach, was used to select the most parsimonious set of correlates of suicide attempt. Hosmer-Lemeshow test for goodness-of-fit was used to assess the fit of the model to the data. There were missing data for some of the correlates: 49.5% of the sample had no missing data for any variable, 47.5% had missing data for 1 or 2 variables, 2.5% had missing data for 3 or 4 variables, and 0.5% had missing data for more than 4 variables. We applied Multiple Imputation by Chained Equations (MICE) (Royston & Patrick, 2010; Van Buuren et al, 1999), technique using STATA. This approach is based on each conditional density of a variable, given all other variables and does not require that the multivariate joint normal distribution assumption be met. MICE allows the conjoint imputation of variables based on a set of predictor variables by an appropriate regression model (Ordinary Least Square, logit, etc.). We used the multiple imputation approach with an inclusive strategy as recommended by Collins and Colleagues (2001) which makes use of auxiliary variables that are correlates of missingness and/or correlates of the variable of interest, to improve the missing data procedure. Using this approach, there is a reduced chance of inadvertently omitting an important cause of missingness, and noticeable gains in terms of increased efficiency and reduced bias. Multiple imputed data sets were created and combined using the "micombine" command for regression analysis. Convergence was observed after 5 imputations. Logistic regression on the imputed and the original datasets were conducted and similar results were obtained. We report here the results from the original dataset.

Results

Characteristics of the sample

Slightly over half (54%) of participants were female, and on average, participants were 26 years of age (SD=11).

Prevalence of Lifetime suicide attempts, psychiatric disorders, and psychosocial stressors. Of 468 individuals, 41 reported a history of a suicide attempt, which is a prevalence rate of 8.8% in this sample, and 3.4% in the total family. Both of these estimates are much higher than the reported prevalence rates of suicide attempts in Israel (1.4%) and in neighboring Lebanon (2.0%) (Nock et al., 2008). Around a quarter of the participants had diagnoses of major depressive disorder (26.6%), any anxiety disorder (25.7%), chronic health conditions (27.6%), or unemployment (28.5%). A smaller proportion of the sample reported post-traumatic stress disorder (PTSD) (5.2%), or history of childhood physical abuse (6.9%). Rates of reported alcohol, substance abuse, and bipolar disorder were rare (0.2–0.6%). Other results show that Unemployment was associated with psychiatric disorder as MDD, Anxiety and PTSD, especially in men. As result of our method of sampling, around one-fourth of the sample had a first-degree relative with a history of a suicide attempt. (Table 1.)

Characteristics of suicide attempters (Table 2)

Suicide attempters were older (29.6 ± 12.1 vs. 25.8 ± 11 years, $t = -1.9$, $df = 392$, $p = 0.05$), were more likely to be unemployed (51.2% vs. 28.1%, $\chi^2 = 10.2$, $df = 1$; $p = 0.002$), were evenly distributed between males and females (49.8% vs. 51.2%, $\chi^2 = .26$, $df = 1$, $p = .36$). Suicide attempters, compared to non-attempters were more likely to have a lifetime history of most psychiatric disorders (100% vs. 33.5%, $\chi^2 = 68.2$, $df = 1$, $p = .00$), including major depressive disorder (MDD) (70.7% vs. 21.2%, $\chi^2 = 46.2$, $df = 1$; $p = .000$), any anxiety disorder (70% vs. 22.2%, $\chi^2 = 68.2$, $df = 1$, $p = .000$), PTSD (12.5% vs. 4.6%, Fisher's $p = .05$), psychotic disorders (12.8% vs. 0%, Fisher's $p < .001$), and conduct disorder (8.9% vs. 1.2%, Fisher's, $p = .006$). Due to very low prevalence of reported alcohol and substance abuse and bipolar disorder, we were not able to assess the relationship of these conditions with attempted suicide in this sample.

In addition, subjects with lifetime history of a suicide attempt showed higher scores on self-reported depression (19.03 ± 15.71 vs. 9.25 ± 9.81 , $p = .000$), anxiety (27.37 ± 18.12 vs. 14.11 ± 13.21 , $p = .000$), hopelessness (10.26 ± 7.89 vs. 6.04 ± 6.07 , $p = .003$), impulsive aggression (89.5 ± 27.8 vs. 73 ± 22.3 , $p = .003$), and impulsivity (57.53 ± 15.19 vs. 48.16 ± 14.93 , $p = .001$), compared to those without a history of a suicide attempt. Finally, attempters were also more likely to have a 1st degree relative with a history of a suicide attempt (41.5% vs. 25.9%, $\chi^2 = 4.5$, $p = .03$), to have a history of physical abuse (18.2% vs. 7.1%, Fisher's, $p = 0.039$), and to report a chronic health condition (48.6% vs. 27.2%, $\chi^2 = 7.5$, $p = 0.007$).

Characteristics of Relatives of Suicide Attempters and Completers (Table 3.)

The characteristics of those who had a first-degree relative with a suicide attempt, those who only had a second-degree relative with a suicide attempt, and those with no family history of attempt were compared. There were differences among the groups with respect to age ($F = 14.7$, $df = 411$, $p < .001$), rate of unemployment (38.1% vs. 22.4%, $\chi^2 = 8.7$, $df = 2$, $p = .013$), and rates of chronic physical illness ($\chi^2 = 11.1$, $df = 2$, $p = .004$), MDD ($\chi^2 = 13.3$, $df = 2$, $p = .001$), anxiety ($\chi^2 = 11.8$, $df = 2$, $p = .003$), and suicide attempt ($\chi^2 = 6.0$, $df = 2$, $p = .05$). Post-hoc pair-wise comparisons showed that first-degree relatives of suicide attempters and completers were older, had higher rates of unemployment (38.1% vs. 22.4%, $\chi^2 = 8.7$, $df = 2$, $p = .013$), MDD (34.6%; 31.7% vs. 17.5%, $\chi^2 = 13.3$, $df = 2$, $p = .001$), anxiety (34.3%; 30.3% vs. 17.8%, $\chi^2 = 11.8$, $df = 2$, $p = .003$) and suicide ideation (23.3% vs. 11.2%, $\chi^2 = 7.8$, $df = 2$, $p = .02$) compared to those with a negative family history. Those who were had first-degree relatives with a suicide attempt vs. those who had only second degree relatives were more similar, but the former group was older (30.4 ± 11.8 vs. 25 ± 10.4 ; 23.6 ± 10.5 , $F = 14.7$, $df = 411$, $p = .000$).

The most parsimonious set of variables associated with suicide attempt included MDD (OR = 10.3; 95% CI, 3.1 – 34.7), 1st degree relative with a suicide attempt (OR = 4.7; 95% CI: 1.6 – 13.7), and aggression (OR = 1.025; 95% CI: 1 – 1.04). 2nd degree of relative with suicide attempt wasn't significant predictor (OR = 1.48, 95% CI, 0.39 – 5.71) (Table 4).

Discussion

This extended Arab kindred came to our attention because of a high rate of completed suicide. In addition, we found that the suicide attempt rate was much higher than the reported national lifetime rates in either Israel or Lebanon (Nock et al., 2008, WHO, 2009). This clinical profile of suicide attempters is similar to those reported in Western countries, named increased rates of mood and anxiety disorder, self-reported depression, anxiety, hopelessness, impulsivity, and impulsive aggression. Family history of suicidal behavior also conferred an increased risk for suicide attempt, and familial transmission of suicidal

behavior appeared to come mainly from increased rates of mood and anxiety disorder. We discuss these findings in the context of the extant literature and the limitations of this study, and conclude with the clinical, public health, and research implications of these results.

This report strongly supports the view that this family shows an increased risk for suicidal behavior compared to rates in both Israel and Lebanon. Like the large extended pedigree in the Old Order Amish, this pedigree shows high rates of mood disorder, although in that pedigree, higher rates of bipolar disorder were reported (Egeland et al., 1985). Similar, though to the reported Amish pedigree, family history of suicidal behavior conveyed an increased risk for suicide attempt above and beyond a history of mood disorder. Although other studies have shown that the familial transmission of suicidal behavior is mediated by the transmission of a liability to impulsive aggression (Brent et al., 2004; Kim et al., 2009), and impulsive aggression did make a contribution to suicidal risk in this pedigree, this domain did not account for familial transmission. Similarly, although physical abuse was associated with an increased risk of suicide attempt in this pedigree, it did not account for familial transmission of suicidal behavior, unlike findings in other family studies (Brent et al., 2002; Melhem et al., 2007; Mann et al., 2005). Therefore, within the limitations of this study, the most obvious explanation for the increased rate of suicidal behavior in this family is the increased rate of mood and anxiety disorders relative to similar populations (reviewed in Tanios et al., 2008). For example, the lifetime prevalence of major depression and anxiety disorders in Israel were 9.8% and 10.7% (Levinson et al, 2007) and in Lebanon were 9.9% and 16.7% (Karam et al., 2008), which is lower than a rate of 26.6% and 25.7% found in this family. Therefore, this family is at increased risk for suicidal behavior, in part because of higher rates of mood and anxiety disorders.

The demographic risk profile of suicide attempters in this sample is similar to that found in developing countries, since the rate of suicide attempts was similar between men and women; in Western samples, the rate of suicide attempts post-puberty is 3–4 times higher in females (Bjerkset et al, 2008). The relationship of a minority to majority ethnicity can also have strong effects on suicidality, as seen in other indigenous peoples, such as Native Americans and the Maori in New Zealand (Silviken et al, 2006; Annette et al, 2006; Nicholas, 2005; Hunter & Harvey, 2002). The rate of unemployment is high in this village, and it is possible that these economic stressors differentially affected men, who are traditionally expected to provide for their households. In this study, unemployment was associated with psychiatric disorder, especially in men. This positive and significant association between unemployment and suicide were found in many studies and may confer vulnerability by increasing the impact of stressful life events and mental illness, although the causal relationship between unemployment and psychiatric disorder is also known to be bi-directional (Blakely et al, 2003; Beautrais et al., 1998 Jones S, Forster D, Hassanyeh, 1991).

On the other hand, the psychiatric and psychological factors associated with attempted suicide were similar to those reported in developed, rather than developing countries, consistent with the view that, for the most part, risk factors for suicidal behavior are similar across cultures and ethnicities (reviewed in Nock et al, 2009) In this sample, 100% of attempters had at least one psychiatric disorder, and mood disorder made the single strongest contribution to risk. Disorders of that predispose to difficulties in emotion regulation and impulse control (PTSD, conduct disorder) made significant, but smaller contributions to risk for suicide attempt along with continuous measures of impulsivity and aggression. In the context of PTSD, about 73 percent of those diagnosed with PTSD reported the sudden death of a close relative or friend as the most traumatic event. 30 percent reported as being involved in a traffic accident as most traumatic event. A single case reported trauma associated with military service.

Alcohol and substance abuse and history of sexual abuse were rare, and not associated with suicide attempt unlike Western samples, although physical abuse was associated with suicidal behavior. This lack of association could be because, due to cultural norms, such behavior is indeed rarer, or alternatively, is under-reported because it is socially unacceptable.

This study has several limitations. Assessment of risk factors for the entire sample was limited to psychiatric and psychological risk factors. While the CIDI has international acceptance as a psychiatric assessment instrument, it does not offer detailed assessment of psychosis. Although an assessment of some protective factors was conducted on a small proportion of the sample, the cultural, economic, religious, and familial risk and protective factors that have been shown to be influential in other studies were not obtained in the majority of participants (Neeleman & Lewis, 1999). We chose to focus our resources on a more complete assessment of this family, and therefore, did not assess members of other large families in this village. This makes it difficult to assess why this family appears to be at higher risk for suicidal behavior, especially in the absence of similar assessments in comparison families. Since suicidal behavior is a complex behavior that is multi-factorial, it is likely that it is the interaction of multiple risk factors that results in a suicide attempt. However, in this sample, we have relatively little power to detect interactions that would reflect the conjoint effects of multiple risk factors. Finally, while it is important to investigate understudied populations, because we sampled from one large family, these findings are not readily generalizable to the Arab population either within, or outside of Israel. It is important to note that even in Israel, the Arab population is not homogenous, but consists of Druze, Christian, and Muslims. Even among the Bedouin groups, some live in urban villages, such as this family, and others are nomadic.

Further research is required to understand whether these findings are generalizable to these other groups, or are particular to this family. Since genetic material has been obtained on members of this pedigree, future genetic analyses can assess the extent to which genetic correlates of suicidal behavior, anxiety, and depression are similar to those reported in other samples (reviewed in Mann et al. 2009, Brent & Mann, 2005).

In this family, prevention of suicide and suicidal behavior should involve identification of those at greatest risk, and providing access to psychological services for the treatment of underlying disorders. To the extent that unemployment is contributing to an increased risk for suicide attempts, public investment in education and building economic infrastructure has been shown to have tangible mental health benefits (Costello;2003).

In summary, this family appears to be at increased familial risk for suicidal behavior, possibly due to an increased liability to anxiety and depression. In the future, we hope to identify some mechanisms by which suicidal behavior is familially transmitted, and having genotyped this sample, to report on possible genetic associations with suicidal risk as well.

References

1. Almasi K, Belso N, Kapur N, Webb R, Cooper J, Hadley S, Kerfoot M, Dunn G, Sotonyi P, Rihmer Z, Appleby L. Risk factors for suicide in Hungary: a case-control study. *BMC Psychiatry*. 2009; 28:9. 45.
2. Altindage A, Ozkan M, Otto R. Suicide in Batman, Southeastern Turkey. *Suicide Life Threat Behav*. 2005; 35(4)
3. American Psychiatric Association. Fourth Ed.. Washington, D.C.: American Psychiatric Association; 1994. *DSM-IV: Diagnostic and statistical manual of mental disorders*.

4. Annette L, Beautrais J, Elisabeth Wells, Magnus A McGee, Mark A. Oakley, Browne. Suicidal behaviour in Te Rau Hinengaro: The New Zealand Mental Health Survey. Australian and New Zealand Journal of Psychiatry. 2006; 40:10.
5. Barratt ES. Factor analysis of some psychometric measures of impulsiveness and anxiety. Psychol Rep. 1965; 16:547–554. [PubMed: 14285869]
6. Beautrais AL, Joyce PR, Mulder RT. Unemployment and serious suicide attempts. Psychol Med. 1998c; 28:209–218. [PubMed: 9483698]
7. Beck, AT.; Steer, RA. Manual for the Beck Anxiety Inventory. San Antonio, TX: Psychological Corporation; 1990.
8. Beck AT, Steer RA, Garbin GM. Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. Clin Psychol Rev. 1988; 8:77–100.
9. Beck AT, Weissman A, Lester D, et al. The measurement of pessimism: the hopelessness scale. J Consult Clin Psychol. 1974; 42:861–865. [PubMed: 4436473]
10. Bjerkeset O, Romundstad P, Gunnell D. Gender-specific associations of mixed anxiety and depression with suicide. Br J Psychiatry. 2008; 192:474–475. [PubMed: 18515904]
11. Brent DA, Mann JJ. Family genetic studies, suicide, and suicidal behavior. Am J Med Genet. 2005; 133:13–24. [PubMed: 15648081]
12. Brent DA, Oquendo M, Birmaher B, et al. Familial transmission of mood disorders: convergence and divergence with transmission of suicidal behavior. J Am Acad Child Adolesc Psychiatry. 2004; 43(10):1259–1266. [PubMed: 15381893]
13. Brent DA, Oquendo MA, Birmaher B, et al. Familial pathways to early-onset suicide attempt: risk for suicidal behavior in offspring of mood-disordered suicide attempters. Arch Gen Psychiatry. 2002; 59:801–807. [PubMed: 12215079]
14. Brezo J, Klempan T, Turecki G. The genetics of suicide: A critical review of molecular studies. Psychiatr Clin North Am. 2008; 31:179–203. [PubMed: 18439443]
15. Burke AK, Galfalvy H, Everett B. Effect of exposure to suicidal behavior on suicide attempt in a high-risk sample of offspring of depressed patients. J Am Acad Child Adolesc Psychiatry. 2010; 49(2):114–121. [PubMed: 20215933]
16. Burke A, Galfalvy H, Everett B, Currier D, Zelazny J, Oquendo M, Melhem N, Kolko D, Harkavy-Friedman J, Birmaher B, et al. Effect of Exposure to Suicidal Behavior on Suicide Attempt in a High-Risk Sample of Offspring of Depressed Parents. J Am Acad Child Adolesc Psychiatry. 2010; Volume 49(Issue 2):114–121. [PubMed: 20215933]
17. Buss AH, Perry M. The Aggression Questionnaire. J Pers Soc Psychol. 1992; 63:452–459. [PubMed: 1403624]
18. Buss, AH.; Warren, WL. “Aggression Questionnaire Manual”. Los Angeles, CA: Western Psychological Services; 2000.
19. Chen AT, Chen THCC, Jenkins R. Psychosocial and psychiatric risk factors for suicide. Case-control psychological autopsy study. Br J Psychiatry. 2000; 177:360–365. [PubMed: 11116779]
20. Clarke DE, Goodwin RD, Messias EL, Eaton WW. Asthma and suicidal ideation with and without suicide attempts among adults in the United States: what is the role of cigarette smoking and mental disorders? Ann. Allergy, Asthma, & Immun. 2008; 100:439–446.
21. Collins LM, Schafer JL, Kam CM. A comparison of inclusive and restrictive strategies in modern missing data procedures. Psychol Med. 2001; 6:330–351.
22. Costello EJ, Compton S, Keeler G, Angold A. elationships between Poverty and Psychopathology. JAMA. 2003; 290:2023–2029. [PubMed: 14559956]
23. Diana D, van Bergen DD, Eikelenboom M, Smit JH, van de Looij-Jansen PM, et al. Suicidal behavior and ethnicity of young females in Rotterdam, the Netherlands: rates and risk factors. Ethnicity and Health. 2010
24. Egeland JA, Sussex JN. Suicide and family loading for affective disorders. JAMA. 1985; 254:915–918. [PubMed: 4021024]
25. Hunter E, Harvey D. Indigenous suicide in Australia, New Zealand, Canada, and the United States. Emerg Med. 2002; 14:14–23.

26. Jones S, Forster D, Hassanyeh F. The role of unemployment in parasuicide. *Psychological Medicine*. 1991; 21:169–176. [PubMed: 2047493]
27. Kar N. Profile of risk factors associated with suicide attempts: A study from Orissa, India. *Indian J Psychiatry*. 2010; 52(1):48–56. [PubMed: 20174518]
28. Karam E, Yabroudi P, Karam A, Cordahi C, Mansour C, Saliba S, Tyan MG, Ramadan M, Melhem N. Arabic Composite International Diagnostic Interview (Version 1.1): Test-retest reliability and validity. Presented at the VIIth Pan Arab Congress of Psychiatry. 1996
29. Karam EG, Mneimneh Z, Karam AN, Fayyad J, Nasser S, et al. Prevalence and treatment of mental disorders in Lebanon: a national epidemiological survey. *Lancet*. 2006; 367:1000–1006. [PubMed: 16564362]
30. Karam EG, Hajjar RV, Salamoun MM. Suicidality in the Arab World, Part II, Community Studies. *the Arab Journal of Psychiatry*. 2008; 19:1.
31. Kessler RC, Abelson J, Demler O, Escobar JJ, Gibbon M, Guyer ME, Howes MJ, Jin R, Vega WA, Walters EE, Wang P, Zaslavsky A, Zheng H. Clinical calibration of DSM-IV diagnoses in the World Mental Health (WMH) version of the World Health Organization (WHO) Composite International Diagnostic Interview (WMHCIDI). *Int J Methods Psychiatr Res*. 2004; 13(2):122–139. [PubMed: 15297907]
32. Kessler RC, Berglund P, Demler O, Jin R, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry*. 2005; 62(6):593–602. [PubMed: 15939837]
33. Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E, Howes MJ, Normand S-LT, Manderscheid RW, Walters EE, Zaslavsky AM. Screening for serious mental illness in the general population. *Arch Gen Psychiatry*. 2003; 60(2):184–189. [PubMed: 12578436]
34. Levinson D, Haklai Z, Stein N, Polakiewicz J, Levav I. Suicide ideation, planning and attempts: results from the Israel National Health Survey. *Isr J Psychiatry Relat*. 2007; 44(2):136–143.
35. Levinson D, Zilber N, Lerner Y, Grinshpoon A, Levav I. Prevalence of Mood and Anxiety Disorders in the Community: Results from the Israel National Health Survey. *Isr J Psychiatry Relat*. 2007; 44(2):94–103.
36. Little, RJA.; Rubin, DB. *Statistical Analysis with Missing Data*. 2nd Edition. Hoboken, NJ: John W. Wiley and Sons; 2002.
37. Liu, Ka Y.; Chen, Eric YH.; Cheung, Ada SZ.; Yip, Paul SF. Psychiatric history modifies the gender ratio of suicide: an East and West comparison. *Soc Psychiatry Psychiatr Epidemiol*. 2009; 44:130–134. [PubMed: 18661085]
38. Mann JJ, Arango VA, Avenevoli S, Brent DA, Champagne FA, Clayton P, et al. Candidate endophenotypes for genetic studies of suicidal behavior. *Biol Psychiatry*. 2009; 65:556–563. [PubMed: 19201395]
39. Mann JJ, Bortinger J, Oquendo MA, Currier D, Li S, Brent DA. Family history of suicidal behavior and mood disorders in probands with mood disorders. *Am J Psychiatry*. 2005; 162:1672–1679. [PubMed: 16135627]
40. Melhem NM, Brent DA, Ziegler M, Iyengar S, Kolko D, Oquendo M, Birmaher B, Burke A, Zelazny J, Stanley B, et al. Familial pathways to early onset suicidal behavior: familial and individual antecedents of suicidal behavior. *Am J Psychiatry*. 2007; 164(9):1364–1370. [PubMed: 17728421]
41. Nakagawa M, Yamada T, Yamada S, Natori M, Hirayasu Y, Kawanishi C. Follow-up study of suicide attempters who were given crisis intervention during hospital stay: Pilot study. *Psychiatry Clin. Neurosci*. 2009; 63:122–123. [PubMed: 19154217]
42. Neeleman J, Lewis G. Suicide, religion, and socioeconomic conditions. An ecological study in 26 countries. *J Epidemiol Community Health*. 1999; 53:204–210. [PubMed: 10396545]
43. Nicholas, G Procter. Parasuicide, self-harm and suicide in Aboriginal people in rural Australia: A review of the literature with implications for mental health nursing practice. *International Journal of Nursing Practice*. 2005; 11:5. [PubMed: 15610339]
44. Nock MK, Hwang I, Sampson N, Kessler RC, Angermeyer M, Beautrais A, Williams DR. Cross-national analysis of the associations among mental disorders and suicidal behavior: Findings from

- the WHO World Mental Health Surveys. *PLoS Medicine*. 2009; 6:e1000123. [PubMed: 19668361]
45. Nock MK, Borges G, Bromet EJ, et al. Cross national prevalence and risk factors for suicidal ideation, plans and attempts. *Br J Psychiatry*. 2008; 192:98–105. [PubMed: 18245022]
  46. Nojomi M, Malakouti SK, Bolhari J, Poshtmashhadi M. A predictor model for suicide attempt: Evidence from a population-based study. *Archives of Iranian Medicine*. 2007; 10:452–458. [PubMed: 17903049]
  47. O'Carroll PW, Berman AL, Maris RW, Moscicki EK, Tanney BL, Silverman MM. Beyond the tower of Babel: A nomenclature for suicidology. *Suicide Life Threat Behav*. 1996; 26:237–252. [PubMed: 8897663]
  48. Pritchard C, Amanullah S. An analysis of suicide and undetermined deaths in 17 predominantly Islamic countries contrasted with the UK. *Psychological Medicine*. 2007; 37:421–430. [PubMed: 17176500]
  49. Royston, Patrick. ICE: Stata module for multiple imputation of missing values, Statistical Software Components. Boston College Department of Economics. 2010 <http://econpapers.repec.org/RePEc:boc:bocode:s446602>.
  50. Schulsinger, F.; Kety, S.; Rosenthal, D.; Wender, P. A family study of suicide. In: Schou, M., editor. *Origins, prevention and treatment of affective disorders*. Orlando: Academic Press; 1979.
  51. Silvikén A, Haldorsen T, Kvernmo S. Suicide among Indigenous Sami in Arctic Norway, 1970–1998. *European Journal of Epidemiology*. 2006; 21(9):707. [PubMed: 17048080]
  52. Statham DJ, Heath AC, Madden PAF, Bucholz KK, Bierut L, Dinwiddie SH, Slutske WS, Dunne MP, Martin NG. Suicidal behavior: an epidemiological and genetic study. *Psychological Medicine*. 1998; 28:839–855. [PubMed: 9723140]
  53. Tanios CY, Abou-Saleh MT, Karam AN, Salamoun MM, Mneimneh ZN, Karam EG. The epidemiology of anxiety disorders in the Arab world: A review. *J Anxiety Disord*. 2009; 23:409–419. [PubMed: 19091509]
  54. Van Bergen DD, Smit JH, van Balkom AJ, van Ameijden E, Saharso S. Suicidal ideation in ethnic minority and majority adolescents in Utrecht, the Netherlands. *Crisis*. 2008; 29:202–208. [PubMed: 19069612]
  55. Van Buuren S, Boshuizen HC, Knook DL. Multiple imputation of missing blood pressure covariates in survival analysis. *Stat Med*. 1999; 18:681–694. [PubMed: 10204197]
  56. Wagner AW, Linehan MM. Relationship between childhood sexual abuse and topography of parasuicide among women with borderline personality disorder. *J Pers Disord*. 1994; 8:1–9.
  57. Young Shin Kim YS, Leventhal BL, Koh YJ, Boyce WT. Bullying Increased Suicide Risk: Prospective Study of Korean Adolescents. *Arch Suicide Res*. 2009; 13(1):15–30. 1543–6136. [PubMed: 19123106]

Table 1

Demographic and Clinical characteristic of the Study Sample.

Total N= 468		
Age (Mean ; SD)	26.18	11.2
	N	%
Gender; N, % female	253	54.1
Unemployment (N, % unemployed)	132	28.5
Prevalence of Psychiatric Disorders		
Suicide attempt	41	8.9
Suicide Ideation	75	16.2
Age of onset of suicide attempt (Mean ; SD)	21.85	8.14
Lethality (N, %)		
Resulted in Injury or poisoning	19	42.2
Required medical attention	12	26.7
Required overnight hospitalization	14	31.1
Major Depressive Disorder (MDD)	123	26.6
Any Anxiety Disorder	119	25.7
PTSD	24	5.2
Psychotic Disorders *	5	1.1
Bipolar Disorder	3	0.6
Substance Abuse	1	0.2
Alcohol Abuse	3	0.6
ADHD	1	0.2
Conduct Disorder	9	1.9
Other Clinical Characteristics		
1st degree relative with family history of suicide	126	27.2
Chronic health condition	128	27.6
Seek Mental health Services	41	8.9
Sexual Abuse	15	3.2
Physical Abuse	32	6.9
Either physical or sexual abuse	36	7.8

* Psychotic Disorders include Schizophrenia, Schizoaffective Disorders or mood disorder with Psychotic features.

Table 2

Suicide Attempt by Demographic and Clinical Characteristics.

	Suicide Attempt N= 41	No Suicide attempt N= 442	test	df	P- value
Demographic:					
Gender -Female : (n %)	21 (51.2%)	220 (55.4%)	$\chi^2=.26$	1	.362
Unemployment (n; %)	21 (51.2)	107 (28.1%)	$\chi^2 = 10.2$	1	.002
Age (Mean ;SD)	29.6 (12.1)	25.8 (11)	t= -1.9	392	.050
Clinical :					
Any Psychiatric Disorder (n,%)	41 (100%)	(33.5%)	$\chi^2=68.2$	1	.000
Major Depression (n; %)	29; (70.7%)	85 (21.2%)	$\chi^2 =46.2$	1	.000
Age of onset of MDD (Mean, SD)	21.9 (8%)	23.51 (8.4)	t= .86	109	.85
Any Anxiety Disorder (n, %)	28 (70%)	86 (22.2%)	$\chi^2 =42.5$	1	.000
PTSD (n; %)	5 (12.5%)	18 (4.6%)	*Fisher's	1	.050
Psychotic Disorders (n, %)	5 (12.8%)	0 (0%)	*Fisher's	1	.000
Conduct Disorders	4 (9.8%)	5 (1.2%)	*Fisher's	1	.006
Aggression Questionnaire (self report) (Mean; SD)	89.5 (27.8)	73 (22.3)	t= -3.5	423	.001
BDI (Self report) (Mean, SD)	19.03, (15.7)	9.25 (9.8)	t= -3.8	424	.000
BAI (Self report) (Mean, SD)	27.37 (18.1)	14.1 (13.2)	t= -4.4	419	.000
Hopelessness (Self report) (Mean, SD)	10.26 (7.9)	6 (6.1)	t= -3.2	430	.003
Impulsivity (Self report) (Mean, SD)	57.5 (15.2)	48.2 (14.9)	t= -3.5	386	.001
Other Clinical and Family Characteristics (N, %)					
1 st degree relative with Suicide Attempt	17 (41.5)	104 (25.9)	$\chi^2 = 4.5$	1	.030
2 nd Degree relative with Suicide Attempt	14 (34.1)	136 (33.9)	$\chi^2 = 4.5$	1	.030
Chronic health condition	18 (48.6%)	104 (27.2%)	$\chi^2 = 7.5$	1	.007
Attend Mental health Services once	13 (40.7%)	22 (7.8%)	*Fisher's	1	.000

	Suicide Attempt N= 41	No Suicide attempt N= 442	test	df	P- value
at least					
Physical Abuse	6 (18.2%)	23 (7.1%)	*Fisher's	1	.039
Sexual Abuse	1 (2.9%)	11(3.4%)	*Fisher's	1	.660
Either physical or sexual abuse	6 (18.2%)	26 (8.4%)	*Fisher's	1	.072

Fisher's Exact Test

Table 3

Family History of Suicidal Behavior (Suicide Attempts or Completions) and Demographic and Clinical Characteristics.

	1 st Degree N=138 (29.8%)	2 nd Degree N=147 (31.7%)	No Relation N=157 (33.9%)	Test	df	p
Demographic						
Sex (Male) N; %	67 (48.6%)	73 (49.7%)	59 (38.1%)	$\chi^2=4.99$	2	.082
Unemployment (N; %)	51 (38.1%) ^a	44 (31.0%) ^{ab}	32(22.1%) ^b	$\chi^2=8.5$	2	.014
Age (M $\pm$ SD)	30.4 $\pm$ 11.8 ^a	25 $\pm$ 10.4 ^b	23.6 $\pm$ 10.5 ^b	F=14.7	41 1	.000
Clinical Diagnosis						
Depression (N; %)	46 (34.1%) ^a	46 (31.7%) ^a	27(18.1%) ^b	$\chi^2=10.7$	2	.005
Anxiety (N; %)	45 (33.8%) ^a	43 (30.3%) ^a	26(17.6%) ^b	$\chi^2=10.6$	2	.005
PTSD (N; %)	10 (7.5%)	8 (5.6%)	4(2.7%)	$\chi^2=3.5$	2	.176
Psychosis (N; %)	3(2.2%)	2(1.4%)	0	FET	2	.176
Conduct Disorder (N; %)	4(3%)	5 (3.5%)	0	FET	2	.079
Any Psychiatric Disorder (N; %)	68 (52.3%) ^a	65 (46.1%) ^a	41 (28.3%) ^b	$\chi^2=17.9$	2	.000
Other Characteristics						
Suicide Attempt	17 (12.9%)	14 (9.9%)	8 (5.4%)	$\chi^2=4.6$	2	.097
Suicide Ideation (N; %)	29(22.7%) ^a	26(18.2%) ^{ab}	17(11.4%) ^b	$\chi^2=6.3$	2	.043
Chronic Physical Illness	53 (39.3%) ^a	39 (28.1%) ^{ab}	33 (22.9%) ^b	$\chi^2=9.2$	2	.010
Either physical or sexual abuse	12 (11.0%)	10 (8.5%)	14 (12.0%)	$\chi^2=.81$	2	.665
Self Report Symptoms (M $\pm$ SD)						
BDI	10 $\pm$ 11.6	10.1 $\pm$ 10.9	10.5 $\pm$ 10.2	F=0.09	42 2	.913
BAI	17.8 $\pm$ 15.9	14.6 $\pm$ 13.8	14.2 $\pm$ 12.9	F=2.5	41 8	.079
Hopelessness	6.8 $\pm$ 6.1	5.9 $\pm$ 6.3	6.4 $\pm$ 6.5	F=0.7	42 8	.508
Impulsivity	50.4 $\pm$ 16.0	48.4 $\pm$ 15.2	49.3 $\pm$ 15.3	F=0.5	38 3	.627

	1 st Degree N=138 (29.8%)	2 nd Degree N=147 (31.7%)	No Relation N=157 (33.9%)	Test	df	p
Impulsive- Aggression	73.2±21.1	77.6±25.3	73.3±23.4	F=1.6	42 0	.201

Table 4

Logistic Regression of Clinical Variables on Suicide attempts*.

	OR	SE	T	P	95% CI
Depression	5.07	0.50	10.6	.000	1.91 – 13.4
1 st degree Relative with Suicide Attempt	7.01	0.69	8.01	.010	1.82 – 27.01
2 nd degree Relative with Suicide Attempt	1.48	0.69	0.33	.57	0.39 – 5.71
Aggression	1.03	0.01	9.2	.002	1.01–1.05

Hosmer& Lemeshow Test of goodness of fit: $\chi^2(8)=5.81$, $p=.663$