

Prediction of Lethality in Suicide Attempts: Gender Matters

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Abstract

This study explores gender differences in lethality of suicide attempts. Three years of medical records related to suicide attempters ($N = 666$) were subjected to analysis. Of the sample, 69.2% were female, 30.8% male; 63.8% Chinese, 15.8% Indian, and 15.0% Malay. Ages ranged from 10 to 85 years old ($M = 29.7$, $SD = 16.1$). More males than females made attempts with high perceived lethality ($\chi^2 = 12.10$, $p < .0001$) and high medical lethality ($\chi^2 = 10.59$, $p < .0001$). Available variables were subjected to regression analyses. The regression models predicted more than 60% of high medical lethality suicide attempts and more than 80% of high perceived lethality attempts. Suicide intent and opportunity for rescue were significant predictors for both measures of lethality. Gender differences were examined. Findings were discussed in regard to implications in suicide assessments and interventions.

Keywords

lethality, gender, suicide attempts, rescue, suicide intent

Worldwide trends reveal a consistently higher rate of completed suicide in males than females (WHO, 2016). This contrasts with hospital admission rates for suicide attempts, in which females predominate (e.g., Skogman, Alsen, & Ojehagen, 2004). They also have a higher prevalence of mental illness with a

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history of alcohol and drug abuse (e.g., LeardMann et al., 2013). Those prone to suicide attempts on the other hand are more likely to be young, female, and have a recent history of interpersonal conflicts and losses (Nock et al., 2008). Gender difference in suicide mortality has often been attributed to the usage of more lethal methods among males (Judd, Jackson, Komiti, Bell, & Fraser, 2012). Males tend to use more lethal methods, such as firearms and hanging, while the most frequent methods used by females are by overdosing, or self-cutting, which provides windows of opportunity for rescue and medical treatment (Maris, Berman, & Silverman, 2000).

The treatment of suicidal clients includes a comprehensive risk assessment that takes into account biopsychosocial factors (Sederer, 1994). Common assessment scales used by clinicians have good reliability and validity, including the Beck Scale of Suicide Ideation (Beck & Steer, 1991), Scale of Suicidal Ideation (Beck, Kovacs, & Weismann, 1979), Beck Hopelessness Scale (BHS; Beck & Steer, 1988; Beck, Weismann, Lester, & Trexler, 1974), Beck Depression Scale (Beck, Steer, & Brown, 1996; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961), and Risk-Rescue Rating Scale (Weisman & Worden, 1972). Brown, Beck, Steer, and Grisham (2000) found that the severity of depression, suicide ideation, and hopelessness as measured by the respective standardized scales of the Beck Depression Scale, Scale of Suicidal Ideation, and BHS predicted eventual suicide in adult psychiatric outpatients. However, self-reported scales (e.g., the BHS) have limitations that patients may attempt to mask or manipulate information, which may lead to false assumptions (Beck et al., 1974). The Risk-Rescue Rating Scale is a descriptive and not a predictive instrument (Weisman & Worden, 1972), and it has limited usefulness with adolescents (Spirito, Brown, Overholser, Fritz, & Bond, 1991).

When commonly recognized suicide risk factors were used to predict suicide, predictive power was found to be poor with low clinical utility (Pokorny, 1983). Goldney and Spence (1987) also found that the predictive ability of their model was poor. The predictors included the following: presence of depression or schizophrenia, history of previous admissions and involuntary admissions, substance abuse, and attempted suicide. Even in high-risk patients with affective disorders, prediction of suicide using the suicide risk factors was poor. The predictors used were as follows: the number of prior attempts, presence of a bipolar disorder, gender, and outcome at discharge (Goldstein, Black, Nasrallah, & Winokur, 1991).

Suicide attempts have been rated in terms of the medical consequences or medical lethality and seriousness of the intent of the individual to die (Beck, Weismann, Lester, & Trexler, 1976). Medical severity of suicide attempts is associated with greater risk of lethality and greater suicidality. The Beck Medical Lethality Scale measures the degree of the severity of medical injury resulting from the suicide attempt (Beck, Beck, & Kovacs, 1975). The suicidal behavior questionnaire (Linehan, 1981) asks for a count of previous self-injuries

and suicide attempts together with information about the medical treatment for each, but does not include other aspects of the attempt.

Lethality measures which are comparatively more comprehensive include the Lethality of Suicide Attempt Rating Scale, (Smith, Conroy, & Ehler, 1984), based on two composite assessments, namely the life-threatening impact of the methods and the circumstances surrounding the attempt. The Suicide Attempt Self-Injury Interview includes both suicide attempts and self-harming behavior with no intent to die, and measures the individual components of lethality, such as the lethality of the method, physical consequences, and medical treatment required, and it gathers related contextual information (Linehan, Comtois, Brown, Heard, & Wagner, 2006).

The literature suggests that the measurement of lethality needs to take into account a more comprehensive understanding of the contextual information about the attempt and not merely the medical severity of the attempt (Linehan et al., 2006). In addition, the multidimensional nature of lethality is also postulated by Silverman, Berman, Sanddal, O' Carroll, and Joiner (2007), who suggested that lethality may not be a true reflection of suicide intent, as there are many variables involved in lethality, such as the availability and familiarity of the method, personal knowledge of the lethality of the means, and other contributory factors such as presence of alcohol, discoverability, rescuability, timing, and sequencing.

The Suicide Intent Scale (SIS; Beck, Shuyler & Herman, 1974) has been widely tested and used in research to measure suicide intent. Factor analysis of the SIS revealed four factors: attitude toward the attempt, planning, precautions against intervention, and communication with others. Beck and Steer (1989) reported that although the total SIS score did not predict eventual suicide, the precautions subscale was able to differentiate between attempters who did and did not ultimately commit suicide, implying that attempters who took precautions against being discovered would be particularly at risk of eventual suicide. Wasserman and Stack (2008) also described the relationship between the lethal outcome of suicide with the suicide being located where there is low probability of the presence of a potential rescuer who is a significant other person, such as a spouse or a parent. This is applicable when the attempt involves cutting or poisoning, where death can be prevented if the attempt is discovered within a critical time span, hence the presence of rescuers is critical for suicide prevention. Jose, Sabu, and Renjith (2010) also suggested that suicide attempts can lead to severe medical outcomes if the suicide was attempted in the absence of people who could get medical assistance for the attempters, or if the suicide methods used were lethal or irreversible. Suicide attempts that are timed to exclude any possible external intervention and planned with precautions taken against possible rescue are associated with higher degree of suicide intent.

The above literature review reveals limitations in the usage of checklists and standardized assessments in suicide risk assessment. This study aims to refine

suicide risk assessment by exploring the construct of lethality and examining gender influences on the lethality of the suicide attempts. The potential risk and protective factors were based on their clinical utility and their prominence in research. The hypotheses are as follows: There will be gender differences in perceived lethality and medical lethality. More males than females will make attempts with high lethality (e.g., Judd et al., 2012). Available variables will be used to predict perceived lethality and medical lethality. Based on past evidence, the following variables are hypothesized to be important variables, namely older age (e.g., Chia, 2001), male gender (e.g., Judd et al., 2012), lower opportunity of rescue (e.g., Beck et al., 1976), effort to hide attempt (e.g., Beck & Steer, 1989), admission of suicide intent (e.g., Zhang & Xu, 2007), prior planning of attempt (e.g., Beck et al., 1976), presence of risk factors: living alone (e.g., Mann, 2002), unemployment (e.g., Chen et al., 2013), financial problem (e.g., Chong, Yeh, & Wen, 1992), physical illness (e.g., Chong et al., 1992), mental illness (e.g., Judd et al., 2012), alcohol (e.g., LeardMann et al., 2013), interpersonal conflict (e.g., Choprapawon & Viasalyaputra, 1992), and lack of protective factors: presence of dependents (e.g., Appleby & Turnbull, 1995), emotional support (e.g., Takahashi, 1998), willingness to seek help (e.g., Tiller et al., 1998), resolution of precipitants (e.g., Schneidman, 2001), religion (e.g., Kok & Tseng, 1992), regret of the attempt (e.g., Bhugra, 2002), and positive future planning (e.g., Williams & Pollock, 2000).

Method

Procedure

Ethics approval was obtained from the Domains-Specific Review Board of a large teaching hospital in Singapore and the Human Research Ethics Committee at James Cook University. This study is based on an archival retrospective review of de-identified hospital records of patients who were admitted for a suicide attempt from January 2004 to December 2006. Data was collected from multiple hospital databases related to the suicide attempters who were admitted over the 3-year period, and this data set is the most comprehensive data set available from the hospital, as such assessment data containing the variables of interest was not collected prior to 2004 or after 2006. Archival data were extracted from the patient psychiatric assessment form (PPAF) which includes the suicide risk assessment form. The PPAF includes information about the current suicide attempt, as well as information about the patient, and risk and protective factors.

All cases of attempted suicide were assessed by medical officers in the emergency department under the supervision of a consultant psychiatrist, and the interview took approximately 20 minutes. This assessment was part of the protocol standard operating procedure for patients admitted following a medically

treated suicide attempt. At the time of the evaluation, the medical officer made a formal psychiatric or medical diagnosis. After the assessment, a management plan was recommended.

The inclusion criterion for the current study was patients who were admitted to the emergency department from January 2004 to December 2006 and were assessed by medical officers using the PPAF. Data was extracted from multiple hospital databases in relation to the suicide attempt. A total of 671 cases were examined in the study. From the raw data, cases with more than 5% missing values were deleted. Of the final 666 cases, 69.2% were female, 30.8% were male; 63.8% were Chinese, 15.8% were Indian, 15.0% were Malay, and 5.4% were Eurasian. Ages ranged from 10 to 85 years old ($M=29.7$, $SD=16.1$). In this sample of suicide attempters, 94% did not have a formal diagnosis during the time of evaluation. The majority of them overdosed in the suicide attempt. Further data were extracted from multiple hospital databases about these suicide attempters and then subjected to analysis.

Materials

The suicide risk assessment form is a two-page questionnaire designed to be conducted as a semistructured interview by medical officers. The content of the assessment form includes demographic information such as gender, age, and ethnicity; qualitative details of the current and previous attempts; presence of substances in the bloodstream or urine samples; and psychiatric diagnosis. It documents presence of prior planning, efforts to hide the suicide attempt, admission of suicide intent, presence of last acts, and usage of alcohol with the attempt on dichotomous scales (yes and no). It records the presence of stressors (e.g., work, family, relationships, financial, and medical), mental status examination, risk and protective factors, as well as recommended management plan. The risk factors are recorded on discrete dichotomous scales (yes and no) and include lack of confidantes, living alone, unemployment, financial problem, mental illness or suicide in the family, alcohol or drug abuse, history of mental illness, interpersonal conflict, and poor coping; the protective factors are recorded on discrete dichotomous scales (yes and no) and include presence of dependents, emotional support, willingness to seek help, resolution of precipitant, religion, regret, and positive future planning. It assesses patient's perceived lethality of the attempt on a 3-point scale (*not lethal, moderately lethal, very lethal*), medical officer's clinical judgment of the medical severity of the attempt on a 4-point scale (*high, moderate, low, no actual attempt*), and opportunity for rescue on a 3-point scale (*high, moderate, low*). It measures the medical officer's clinical evaluation of current suicide risk on a 4-point scale (*low, low to moderate, moderate to high, high*). This checklist was devised for the collation of information deemed important for clinical usage in suicide risk assessment and recommendation of management plan, and psychometric properties were not available.

Results

Before the main analyses were conducted, the data were screened and examined for accuracy of data entry, missing values, and fit between its distribution and the assumptions of the analyses. Cases with more than 5% of missing values were deleted, leaving 666 cases for analysis. The remaining cases with missing values were imputed using the expectation maximization logarithm through SPSS.

Chi-square analysis was used to test the hypothesis that there are gender differences in lethality. To examine the prediction of medical lethality and perceived lethality, first, correlation analysis was used to examine the interrelationships between the scale and dichotomous variables. The dependent variables were perceived lethality and medical lethality. The independent variables included all available predictors. To arrive at a parsimonious model for the prediction of lethality, the variables that were significantly correlated with perceived and medical lethality at $p < .001$ were eligible for entry into a regression analysis model together with the demographic factors of age and gender (these demographic factors were well established in studies on both Asian and Western samples, e.g., Cheng & Lee, 2000; De Moore & Robertson, 1998).

Test assumptions were carefully checked and any violations noted where appropriate. The dependent variable was recoded into the dichotomous variable of 0 = low lethality and 1 = moderate and high lethality attempts. Logistic regression was used to assess the impact of available variables on prediction of attempts with high medical lethality. The final model was statistically significant, $\chi^2(5, N = 654) = 141.42, p < .0001$, indicating that the model was able to distinguish between attempts with high and low medical lethality. The model explained between 19.4% (Cox and Snell R^2) and 25.9% (Nagelkerke R^2) of the variance in medical lethality and correctly classified 71.9% of the cases; 83.6% of low lethality and 60.3% of high lethality attempts were correctly predicted. Table 1 shows that high severity attempts were predicted by less opportunity for rescue, admission of suicide intent, lack of resolution of precipitant, and younger age. Rescue recorded an odds ratio of .15, indicating that for every additional unit of opportunity for rescue, the individuals were .15 times as likely to make high lethality attempts. The odds ratio for admission of suicide intent was 2.01, indicating that individuals with suicide intent were about two times more likely to make high lethality attempts than those without suicide intent, controlling for other factors in the model. The odds ratio for resolution of precipitant was .55, indicating that individuals who had resolved the precipitant were .55 times as likely to make high lethality attempts compared with those who did not resolve the precipitant, controlling for other factors in the model. The odds ratio for age was .98, indicating that for every additional year of age, the individuals were .98 times as likely to make high lethality attempts, controlling for other factors in the model.

Table 1. Logistic Regression Predicting Likelihood of Suicide Attempts With High Medical Lethality (N = 654).

Predictor		95% CI for OR				
Variable	B	SE B	Wald	OR	LL	UL
Rescue	-1.90	.23	70.59****	0.15	0.10	0.23
Intent	0.71	.18	15.64****	2.01	1.43	2.88
Resolution	-0.60	.18	11.50*	0.55	0.39	0.78
Age	-0.02	.01	6.08*	0.98	0.97	0.99
Constant	3.88	.51	53.89****	48.47		

Note. CI = confidence interval; OR = odds ratio; LL = lower limit; UL = upper limit; Rescue = opportunity for rescue; Resolution = resolution of precipitant; Intent = admission of suicide intent; SE = standard error. **p* < .05. *****p* < .0001.

Logistic regression was used to assess the impact of available variables on the prediction of high perceived lethality attempts. The final model was statistically significant, $\chi^2(3, N=654) = 332.22, p < .0001$, indicating that the model was able to distinguish between attempts with high and low perceived lethality. The model explained between 39.8% (Cox and Snell R^2) and 53.7% (Nagelkerke R^2) of the variance in perceived lethality and correctly classified 82.9% of the cases; 84.6% of low lethality and 80.4% of high lethality attempts were correctly predicted. Table 2 shows that high perceived lethality was predicted by presence of prior planning, low opportunity of rescue, and admission of suicide intent. The odds ratio for suicide intent was 19.75, indicating that individuals who reported suicide intent were about 20 times more likely to make attempts with high perceived lethality than those who did not report suicide intent, controlling for other factors in the model. The odds ratio for rescue was .38, indicating that with every additional unit in opportunity for rescue, individuals were .38 times as likely to make attempts with high perceived lethality. The odds ratio for prior planning was 5.52, indicating that individuals who had prior planning were about six times more likely to make high perceived lethality attempts than those who did not have prior planning, controlling for other factors in the model.

Chi-square analysis was used to test the hypothesis that there are gender differences in perceived and medical lethality. More male than female attempters made attempts with high perceived lethality ($\chi^2 = 12.10, p < .0001$) and high medical lethality ($\chi^2 = 10.59, p < .0001$). Males and females were thus separated into two groups for further analyses.

Logistic regression was used to assess the impact of available variables on the likelihood that females and males would make attempts with high medical lethality. For females, the final model was statistically significant, $\chi^2(3, N=450) = 92.09, p < .0001$, indicating that the model was able to

Table 2. Logistic Regression Predicting Likelihood of Suicide Attempts With High Perceived Lethality (*N* = 654).

Predictor Variable	<i>B</i>	<i>SE B</i>	Wald	OR	95% CI for OR	
					LL	UL
Intent	2.98	.22	186.28****	19.75	12.87	30.30
Rescue	−0.98	.22	20.65****	0.38	0.25	0.57
Plan	1.71	.44	15.03***	5.52	2.32	13.10
Constant	−0.21	.43	0.29****	−0.82		

Note. CI = confidence interval; OR = odds ratio; LL = lower limit; UL = upper limit; Intent = admission of suicide intent; Rescue = opportunity for rescue; Plan = prior planning; SE = standard error.
 ****p* = .001. *****p* < .0001.

Table 3. Logistic Regression Predicting Likelihood of Suicide Attempts With High Medical Lethality by Gender.

	Predictor Variable	<i>B</i>	<i>SE B</i>	Wald	OR	95% CI for OR	
						LL	UL
Females (<i>N</i> = 450)							
	Rescue	−2.00	.30	45.92****	0.13	0.08	0.24
	Intent	0.98	.22	20.70****	2.66	1.75	4.06
	Constant	3.49	.63	30.97****	32.87		
Males (<i>N</i> = 204)							
	Rescue	−1.70	.35	24.35****	0.18	0.09	0.36
	Constant	3.24	.63	26.67****	25.45		

Note. CI = confidence interval; OR = odds ratio; LL = lower limit; UL = upper limit; Rescue = opportunity for rescue; Intent = admission of suicide intent; SE = standard error.
 *****p* < .0001.

distinguish between attempts with high and low medical lethality. The model as a whole explained between 18.5% (Cox and Snell *R*²) and 24.7% (Nagelkerke *R*²) of the variance in medical lethality and correctly classified 69.3% of the cases; 77.3% of low medical lethality and 60.1% of high medical lethality attempts were correctly predicted. Table 3 shows that high medical lethality in female suicide attempters was predicted by admission of suicide intent and low opportunity of rescue. The odds ratio for rescue was .13, indicating that with every additional unit of opportunity for rescue, females were .13 times as likely to make attempts with high medical lethality. The odds ratio for suicide intent was 2.66, indicating that females who reported suicide intent were about three

Table 4. Logistic Regression Predicting Likelihood of Suicide Attempts With High Perceived Lethality by Gender.

	Predictor		Wald	OR	95% CI for OR		
	Variable	B			SE B	LL	UL
Females (N = 450)							
	Intent	3.05	.27	129.90****	21.13	12.52	35.71
	Plan	1.68	.55	9.26*	5.36	0.22	0.68
	Rescue	-0.95	.28	11.10*	0.39	1.82	15.80
	Constant	-0.45	.52	0.76	0.64		
Males (N = 204)							
	Intent	3.08	.37	68.10****	21.65	10.43	44.95
	Constant	-1.30	.24	30.30****	0.27		

Note. CI = confidence interval; OR = odds ratio; LL = lower limit; UL = upper limit; Plan = prior planning; Rescue = opportunity for rescue; Intent = admission of suicide intent; SE = standard error.

* $p < .05$. **** $p < .0001$.

times more likely to make high medical lethality attempts, compared with those who did not report suicide intent, controlling for other factors in the model. For males, the final model was statistically significant, $\chi^2(1, N = 204) = 33.18$, $p < .0001$, indicating that the model was able to distinguish between high and low severity attempts. The model as a whole explained between 15.0% (Cox and Snell R^2) and 20.3% (Nagelkerke R^2) of the variance in medical lethality and correctly classified 66.7% of the cases; 87.8% of low severity and 52.5% of high lethality attempts were correctly predicted. Table 3 shows that high lethality attempts in males were predicted by less opportunity for rescue. The odds ratio for rescue was .18, indicating that with every additional unit in opportunity for rescue, males were .18 times as likely to make attempts with high medical lethality.

Logistic regression was used to assess the impact of available variables on the likelihood that females and males would make high perceived lethality attempts. For females, the final model was statistically significant, $\chi^2(3, N = 450) = 218.69$, $p < .0001$, indicating that the model was able to distinguish between attempts with high and low perceived lethality. The model explained between 38.5% (Cox and Snell R^2) and 52.7% (Nagelkerke R^2) of the variance in perceived lethality and correctly classified 82.9% of the cases; 84.3% of low lethality and 80.5% of high lethality attempts were correctly predicted. Table 4 shows that high perceived lethality in female suicide attempters was predicted by admission of suicide intent, presence of prior planning, and less opportunity for rescue. The odds ratio for suicide intent was 21.13, indicating that females who reported suicide

intent were about 21 times more likely to make high lethality attempts compared with those who did not report suicide intent, controlling for other factors in the model. The odds ratio for prior planning was 5.36, indicating that females who had prior planning were about five times more likely to make high lethality attempts than those who did not have prior planning, controlling for other factors in the model. The odds ratio for rescue was .39, indicating that with every additional unit in opportunity for rescue, females were .39 times as likely to make high lethality attempts. For males, the final model was statistically significant, $\chi^2(1, N=204)=56.61, p < .0001$, indicating that the model was able to distinguish between attempts with high and low perceived lethality. The final model explained between 28.9% (Cox and Snell R^2) and 39.0% (Nagelkerke R^2) of the variance in lethality and correctly classified 79.5% of the cases; 85.7% of low lethality and 70.6% of high lethality attempts were correctly predicted. Table 4 shows that high perceived lethality attempts for males were predicted by suicide intent. The odds ratio for suicide intent was 21.65, indicating that males who reported suicide intent were about 22 times more likely to make high perceived lethality attempts compared with those who did not report suicide intent, controlling for other factors in the model.

Discussion

The current study used a novel way to look at the concept of lethality by examining low and high lethality attempts using two different dimensions of lethality and explored gender differences in lethality of suicide attempts. Medical records of 666 suicide attempters were analyzed. The hypothesis on gender differences in lethality was supported. In this study, more males than females made attempts with high perceived lethality and medical lethality. This is consistent with previous studies reporting that females tended to use less lethal means (e.g., Judd et al., 2012). The hypothesis that perceived lethality and medical lethality will be predicted by combinations of demographic variables, features of the attempt, and risk and protective factors was supported. The regression models were able to accurately predict more than 60% of high medical lethality suicide attempts and more than 80% of high perceived lethality attempts. This proportion is higher than many prediction studies conducted on suicides. One important suicide prediction study was done by Pokorny (1983) but the model predicted only a little over half of the suicides. Goldney and Spence (1987) also reported that their prediction model had low predictive accuracy.

Most researchers and clinicians associate medical lethality with whether the suicide attempt has a lethal outcome; however, many attempts are intended and perceived by the attempter as lethal. This is possibly due to the attempter's lack of knowledge of the method used or by the ready availability of interventions and medical infrastructure. Perceived and medical lethality were predicted by

slightly different variables. These findings show that perceived lethality and medical lethality could be viewed as separate constructs. By obtaining both the clinician's rating on medical lethality and the suicide attempter's rating on perceived lethality, the construct of lethality can be measured using two different perspectives and dimensions, and more information can be elicited with the aim to improve our accuracy in suicide risk assessment.

In the models predicting both perceived and medical lethality, suicide intent was consistently a significant predictor. This finding is consistent with previous research: In the widely used SIS, low scores on the intention to die scale predicted nonfatal attempts (Hjelmeland, 1995). It is also consistent with previous research which found that attempter's own verbalization of an intention to die at the index attempt was a significant predictor for future suicide (Hjelmeland, 1996), and the strong association between verbalized intention to die and the seriousness of the attempt (Hjelmeland, 1995). Hjelmeland suggested that although it might be difficult in simply trusting the attempters' own verbal reports, as there might be tendency for them to justify or excuse their behavior, it is the most direct relevant evidence and deserved to be taken seriously. Thus, more attention could be given to discern suicide intent through detailed questioning (Hamdi, Amin, & Mattar, 1991) and to listen to what suicidal individuals actually say, rather than completely relying on checklists, questionnaires, or structured interviews in suicide assessment.

Schneidman (1985) postulated that accurately identifying the intentions of individuals ruminating about suicide is critical for assessing the risk of suicide and devising the appropriate method of intervention. The accurate assessment of intent is especially important as some suicides may be the result of feigned attempts gone wrong, and some nonfatal attempts may be the botched result of genuine suicidal plans, but there is evidence that the intentions of individuals in those scenarios are different (McAndrew & Garrison, 2007), thus accurate assessment of intent could greatly enhance our therapeutic and suicide prevention efforts to prevent eventual suicide in those who are vulnerable.

Besides suicide intent, opportunity for rescue was another significant predictor for both perceived and medical lethality. This finding is consistent with previous literature. In the SIS, the underlying variables in the scale include the perception of lethality, (medical) seriousness of the attempt, and opportunity for rescue (Beck & Steer, 1989). The finding highlighted the importance of incorporating the evaluation of suicide intent and opportunity for rescue in suicide risk assessment. It also supports previous research which showed that both medical lethality and opportunity for rescue are underlying components of suicide intent in the SIS (Beck & Steer, 1989). The results are consistent with the finding that the SIS correlated with clinician's judgment of lethality (Hamdi et al., 1991). In the current study, opportunity for rescue was measured based on clinical judgment and included elements of the precautions subscale in the SIS, for example, less opportunity for rescue would be inferred if the attempter took precautions

to avoid discovery and interference of the attempt and other rescue interventions by picking isolated places, or choosing a time and place when no one was expected, which are also captured by the precautions subscale in the SIS. The results support the findings by Beck and Steer (1989), who found significant relationships between the precautions subscale of the SIS and suicide attempts. The results also support the findings by Misson et al. (2010) who found that serious suicide attempts were characterized by more precautions taken against discovery of the attempt. Less opportunity for rescue also result in greater length of time between the suicide attempt and discovery, which is associated with higher medical lethality.

There were slight variations between the genders in the prediction of medical and perceived lethality. For males, the only significant predictor for medical lethality was opportunity for rescue. For females, high medical lethality was predicted by admission of suicide intent and less opportunity for rescue. For males, the only significant predictor for perceived lethality was suicide intent. Females who made attempts with high perceived lethality had prior planning, less opportunity for rescue, and admission of suicide intent.

The finding indicates that a comprehensive suicide risk assessment for females includes the assessment of suicide intent, prior planning, and opportunity for rescue. A lack of prior planning implies that the suicide attempt was done with little preparation; a lack of suicide intent implies that the attempter may not really want to die but to escape from external and internal pressure. This was highlighted in previous literature which described that impulsive nonserious overdoses were motivated by anger and frustration, where the interplay of low suicide intent, little conscious deliberation, and the circumstances of the discovery lessened the lethality of the attempt (Hamdi et al., 1991). These individuals are in a hypereridic state and are likely to make suicide attempts that are impulsive, poorly planned or unplanned, and therefore less lethal (Yap, 1958). Their mental state is overwhelmed with such emotional turmoil that they have little capacity for deliberation. In contrast, premeditation and preparation were associated with more serious suicide intent and could eventually lead to completed suicide (Suominin, Isometsa, Henrikson, Ostamo, & Lonngquist, 1997).

Suicide prediction is difficult because the suicide population is not homogeneous; causes of suicide are heterogeneous and diverse and determined by multiple intersecting factors (Misson et al., 2010), and it is difficult to predict what stressful life events a vulnerable individual will face (Chia, 1999). The current study is novel as it uses regression modeling in the prediction of two dimensions of lethality. Lethality is associated with greater suicidality, correlated with ultimate suicide (Blumenthal & Kupfer, 1988), and is a variable with important clinical utility. The current findings recommend that a comprehensive suicide assessment will include a clinical interview that uncovers the suicide intent of the client, as to whether the client's intention was to die, as well as an assessment

of the circumstances of the index attempt, as to whether the index attempt was planned to have taken place in circumstances that limit the chances for rescue.

The inadequate assessment of suicide intent is cited as one of the common errors of suicide interventionists (Neimeyer & Pfeiffer, 1994). Findings from the current study indicate that suicidal threats should be taken seriously with prompt and sensitive but thorough assessment of the level of suicide intent, lethality of the suicide plan (e.g., by enquiring about precautions against discovery and rescue), and perturbation associated with the client's suicide plan is consistent with previous literature (Neimeyer & Pfeiffer, 1994).

Limitations of the study include reliance on self-report and usage of dichotomous scales, which place constraints on the depth of information obtained. It might be possible for attempters to mask their suicide intent in their self-report. Future research could employ qualitative interviews to reveal the interplay of relationships and processes impacting on lethality, and suicide intent that might be relevant for understanding suicide attempts. Although the models demonstrated good clinical utility for our sample, further research to examine individual differences and intricacies of underlying patterns could be explored using in-depth interviews and qualitative methodology.

In conclusion, this study revealed gender differences in lethality of suicide attempts. The prediction of medical and perceived lethality was accomplished using parsimonious models, whereby multiple variables were entered into the regression models, from which parsimonious models emerged, with good clinical utility. The finding emphasizes that when conducting suicide risk assessment, the assessment of suicide intent and opportunity for rescue are important clinical measures to obtain. The ethical and legal considerations in working with suicidal clients include comprehensive suicide assessment and implementation of effective strategies. By using assessment and intervention strategies that are substantiated by empirical findings, the clinician would be taking a step forward in utilizing the scientist-practitioner model in their evidence-based practice. Although fatality of the outcome of a suicide attempt is determined by many external factors, such as access to medical interventions, it is the ethical standard of the duty of care of the clinician to ensure best practice in working with suicidal clients, and basing their practice upon current empirical evidence forms part of this standard.

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References

- Appleby, L., & Turnbull, G. (1995). Parasuicide in the first postnatal year. *Psychological Medicine*, 25, 1087.
- Beck, A., Beck, R., & Kovacs, M. (1975). Classification of suicidal behaviours: Quantifying intent and medical lethality. *American Journal of Psychiatry*, 132, 285–287.
- Beck, A., Kovacs, M., & Weismann, A. (1979). Assessment of suicidal intention: The scale of suicide ideation. *Journal of Consulting and Clinical Psychology*, 47, 343–352.
- Beck, A., Shuyler, D., & Herman, I. (1974). Development of Suicide Intent Scales. In A. Beck & D. Resnick (Eds.), *The prediction of suicide* (pp. 45–56). New York, NY: Charles Press.
- Beck, A., & Steer, R. (1988). *Manual for the Beck Hopelessness Scale*. San Antonio, TX: The Psychological Corporation.
- Beck, A., & Steer, R. (1989). Clinical predictors of eventual suicide: A 5-10 year prospective study of suicide attempters. *Journal of Affective Disorders*, 17, 203–209.
- Beck, A., & Steer, R. (1991). *Manual for the Beck Suicide Ideation Scale*. San Antonio, TX: The Psychological Corporation.
- Beck, A., Steer, R., & Brown, G. (1996). *Manual for the Beck Depression Inventory* (2nd ed.). San Antonio, TX: The Psychological Corporation.
- Beck, A., Ward, C., Mendelsohn, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561–571.
- Beck, A., Weismann, A., Lester, D., & Trexler, L. (1974). The measurement of pessimism: The hopelessness scale. *Journal of Consulting and Clinical Psychology*, 42, 861–885.
- Beck, A., Weismann, A., Lester, D., & Trexler, L. (1976). Classification of suicidal behaviors, II: Dimensions of suicidal intent. *Journal of Archives of General Psychiatry*, 33, 835–837.
- Bhugra, D. (2002). Suicidal behaviour in South Asians in the UK. *Crisis*, 23(3), 108–113.
- Blumenthal, S., & Kupfer, D. (1988). Overview and early detection and treatment strategies for suicidal behaviour in young people. *Journal of Youth and Adolescence*, 17, 1–23.
- Brown, G., Beck, A., Steer, R., & Grisham, J. (2000). Risk factors for suicide in psychiatric outpatients: A 20 year prospective study. *Journal of Consulting and Clinical Psychology*, 68(3), 371–377.
- Chen, V., Chou, J., Hsieh, T., Chang, H., Lee, C., Dewey, M., . . . Tan, H. (2013). Risk and predictors of suicide and non-suicide mortality following non-fatal self-harm in Northern Taiwan. *Social Psychiatry and Psychiatric Epidemiology*, 48(10), 1621–1627.
- Cheng, A., & Lee, C. (2000). Suicide in Asia and Far East. In K. Hawton & K. Van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp. 29–48). West Sussex, England: John Wiley & Sons.
- Chia, B. (1999). *Too young to die: An Asian perspective on youth suicide*. Selangor, Malaysia: Times.
- Chia, B. (2001). *Age of despair: A study of elderly suicide in Singapore*. Selangor, Malaysia: Times.
- Chong, M., Yeh, E., & Wen, J. (1992). Suicidal behaviour in Taiwan. In L. Kok & W. Tseng (Eds.), *Suicidal behaviour in the Asia Pacific region* (pp. 69–82). Kent Ridge, Singapore: Singapore University Press.

- Choprapawon, C., & Viasalyaputra, S. (1992). Suicidal behaviour in Thailand. In L. Kok & W. Tseng (Eds.), *Suicidal behaviour in the Asia Pacific region* (pp. 127–143). Kent Ridge, Singapore: Singapore University Press.
- De Moore, G., & Robertson, A. (1998). Suicide in the 18 years after deliberate self-harm: A prospective study. In R. Kosky, H. Eshkevari, R. Goldney & R. Hassan (Eds.), *Suicide prevention: The global context* (pp. 79–86). New York, NY: Plenum Press.
- Goldney, R., & Spence, N. (1987). Is suicide predictable? *Australian and New Zealand Journal of Psychiatry*, *21*, 3–4.
- Goldstein, R., Black, D., Nasrallah, A., & Winokur, G. (1991). The prediction of suicide. Sensitivity, specificity, and predictive value of a multi-variate model applied to suicide among 1,906 patients with affective disorders. *Archives of General Psychiatry*, *48*, 418–422.
- Hamdi, E., Amin, Y., & Mattar, T. (1991). Clinical correlates of intent in attempted suicide. *Acta Psychiatrica Scandinavica*, *83*(5), 225–233.
- Hjelmeland, H. (1995). Verbally expressed intentions of parasuicide I. Characteristics of patients with various intentions. *Crisis*, *16*(4), 176–180.
- Hjelmeland, H. (1996). Verbally expressed intentions of parasuicide II. Prediction of fatal and non fatal repetition. *Crisis*, *17*(1), 10–14.
- Jose, J., Sabu, K., & Renjith, R. (2010). Sociopsychological factors and suicide related behaviours among farmers. *Rajagiri Journal of Social Development*, *2*(1), 69–85.
- Judd, F., Jackson, H., Komiti, A., Bell, R., & Fraser, C. (2012). The profile of suicide: Changing or changeable? *Social Psychiatry and Psychiatric Epidemiology*, *47*(1), 1–9.
- Kok, L., & Tseng, W. (1992). Orientation to cross-society comparison. In L. Kok & W. Tseng (Eds.), *Suicidal behaviour in the Asia Pacific region* (pp. 1–14). Kent Ridge, Singapore: Singapore University Press.
- LeardMann, C., Powell, T., Smith, T., Bell, M., Smith, B., Boyko, E., . . . Hoge, C. (2013). Risk factors associated with suicide in current and former US military personnel. *JAMA – Journal of the American Medical Association*, *310*(5), 496–506.
- Linehan, M. (1981). *Suicidal behaviors questionnaire (SBQ)*. Seattle, WA: University of Washington.
- Linehan, M., Comtois, K. A., Brown, M. Z., Heard, H. L., & Wagner, A. (2006). Suicide attempt self-injury interview (SASII): Development, reliability, and validity of a scale to assess suicide attempts and intentional self-injury. *Psychological Assessment*, *18*(3), 303–312.
- Mann, J. (2002). A current perspective of suicide and attempted suicide. *Annals of Internal Medicine*, *136*, 302–311.
- Maris, R., Berman, A., & Silverman, M. (2000). *Comprehensive textbook of suicidology*. New York, NY: Guilford Press.
- McAndrew, F., & Garrison, A. (2007). Beliefs about gender difference in methods and causes of suicide. *Archives of Suicide Research*, *11*, 1–9.
- Misson, H., Mathieu, F., Jollant, F., Yon, L., Guillaume, S., Parmentier, C., . . . Courtet, P. (2010). Factor analyses of the Suicidal Intent Scale (SIS) and the Risk-Rescue Rating Scale (RRRS): Toward the identification of homogeneous subgroups of suicidal behaviors. *Journal of Affective Disorder*, *121*(1–2), 80–87.
- Neimeyer, R., & Pfeiffer, A. (1994). Errors in suicide intervention. In A. Leenaars, J. Maltsberger & R. Neimeyer (Eds.), *Treatment of suicidal people* (pp. 207–224). Washington, DC: Taylor and Francis.

- Nock, M., Borges, G., Bromet, E., Cha, C., Kessler, R., & Lee, S. (2008). Suicide and suicidal behavior. *Epidemiologic Review*, 30(1), 133–154.
- Pokorny, A. (1983). Prediction of suicide in psychiatric patients. *Archives of General Psychiatry*, 40, 249–257.
- Schneidman, E. (1985). *Definition of suicide*. New York, NY: Wiley Inter-Science.
- Schneidman, E. (2001). *Understanding suicide*. Washington, DC: American Psychological Association.
- Sederer, L. (1994). Managing suicidal inpatients. In A. Leenaars, J. Maltzberger & R. Neimeyer (Eds.), *Treatment of suicidal people* (pp. 167–176). Washington, DC: Taylor and Francis.
- Silverman, M. M., Berman, A. L., Sanddal, N. D., O' Carroll, P. W., & Joiner, T. E. (2007). Rebuilding the tower of Babel: A revised nomenclature for the study of suicide and suicidal behaviours part I: Backgrounds, rationale, and methodology. *Suicide and Life-Threatening Behaviour*, 37(3), 248–263.
- Skogman, K., Alsen, M., & Ojehagen, A. (2004). Sex differences in risk factors for suicide after attempted suicide. *Social Psychiatry and Psychiatric Epidemiology*, 39, 113–120.
- Smith, K., Conroy, R. W., & Ehler, B. D. (1984). Lethality of Suicide Attempt Rating Scale. *Suicide and Life-Threatening Behaviour*, 14, 215–242.
- Spirito, A., Brown, L., Overholser, J., Fritz, G., & Bond, A. (1991). Use of the Risk-Rescue Rating Scale with adolescent suicide attempters: A cautionary note. *Death Studies*, 15(3), 269–280.
- Suominen, K., Isometsa, E., Henrikson, M., Ostamo, A., & Lonngquist, J. (1997). Hopelessness, impulsiveness and intent among suicide attempters with major depression, alcohol dependence or both. *Acta Psychiatrica Scandinavica*, 96, 142–149.
- Takahashi, Y. (1998). Suicide in Japan: What are the problems? In R. Kosky, H. Eshkevari, R. Goldney & R. Hassan (Eds.), *Suicide prevention: The global context* (pp. 121–130). New York, NY: Plenum Press.
- Tiller, J., Krupinski, J., Burrows, G., Mackenzie, A., Hallenstein, H., & Johnstone, G. (1998). Youth suicide: The Victorian coroner's study. In R. Kosky, H. Eshkevari, R. Goldney & R. Hassan (Eds.), *Suicide prevention: The global context* (pp. 87–91). New York, NY: Plenum Press.
- Wasserman, I., & Stack, S. (2008). Lethal locations: An application of opportunity theory to motel suicide, a research note. *Death Studies*, 32, 757–767.
- Weisman, A., & Worden, W. (1972). Risk-rescue rating in suicide assessment. *Archives of General Psychiatry*, 26(6), 553–560.
- Williams, J. M., & Pollock, L. R. (2000). The psychology of suicidal behaviour. In K. Hawton & K. Van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp. 79–94). West Sussex, England: John Wiley & Sons.
- Yap, P. M. (1958). *Suicide in Hong Kong, with special reference to attempted suicide*. Hong Kong: Hong Kong University Press.
- Zhang, J., & Xu, H. (2007). Degree of suicide intent and the lethality of the means employed: A study of Chinese attempters. *Archives of Suicide Research*, 11(4), 343–350.
- World Health Organization. (2016). World Health Statistics 2016. Retrieved from http://apps.who.int/iris/bitstream/10665/206498/1/9789241565264_eng.pdf?ua=1.

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