


RESEARCH ARTICLE

# Explaining suicide attempt with personality traits of aggression and impulsivity in a high risk tribal population of India

Piyooosh Kumar Singh<sup>1</sup> , V. R. Rao<sup>1,2,3</sup> \*

**1** Department of Psychiatry, All India Institute of Medical Sciences, New Delhi, India, **2** ICMR Emeritus Medical Scientist, Dept of Genetics, Osmania University, Hyderabad, India, **3** Honorary Research Professor, Genome Foundation, Hyderabad, India

 These authors contributed equally to this work.

\* [profraovr@gmail.com](mailto:profraovr@gmail.com)



## Abstract

### Introduction

Suicide is a spectrum of behavior including suicide ideation and suicidal attempt and is undoubtedly the outcome of the interaction of several factors. The role of two main constructs of human nature, aggression and impulsivity, has been discussed broadly in relation to suicide, as endophenotypes or traits of personality, in research and in clinical practice across diagnoses. The objective of our study was to assess impulsive and aggressive behaviors among primitive people of the Idu Mishmi tribe, who are known for high suicide completion and attempt rates.

### Methods

The study group was comprised of 177 unrelated Idu Mishmi participants divided into two sets: 39 suicide attempters and 138 non-attempters. Data on demographic factors and details of suicide attempts were collected. Participants completed a set of instruments for assessment of aggression and impulsivity traits.

### Results

In the Idu Mishmi population we screened ( $n = 177$ ), 22.03% of the individuals had attempted suicide, a high percentage. The suicide attempters also showed a significant sex difference: 35.9% were male and 64.10% were female ( $p = .002^*$ ). The suicide attempters (A) scored significantly higher than non-attempters (NA) on aggression ( $A = 23.93, NA = 18.46$ ) and impulsivity ( $A = 75.53, NA = 71.59$ , with  $p$  value = 0.05). The trait impulsiveness showed a significantly higher difference ( $F(1, 117) = 7.274$ ) in comparison to aggression ( $F(1, 117) = 2.647$ ), suggesting a profound role of impulsiveness in suicide attempts in the Idu Mishmi population. Analysis of sub-traits of aggression and impulsivity revealed significant correlations between them. Using different models, multivariate logistic regression implied roles of gender ( $OR = 1.079(0.05)$ ) and impulsiveness ( $OR = 3.355(0.013)$ ) in suicide attempts.

## OPEN ACCESS

**Citation:** Singh PK, Rao VR (2018) Explaining suicide attempt with personality traits of aggression and impulsivity in a high risk tribal population of India. PLoS ONE 13(2): e0192969. <https://doi.org/10.1371/journal.pone.0192969>

**Editor:** Gurudutt Pendyala, University of Nebraska Medical Center, UNITED STATES

**Received:** April 28, 2017

**Accepted:** February 1, 2018

**Published:** February 15, 2018

**Copyright:** © 2018 Singh, Rao. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**Data Availability Statement:** All relevant data are within the paper and its Supporting Information files.

**Funding:** We are thankful to University of Delhi for financial assistance (R & D Grant for the year 2013) to VR and ICMR Research Fellowship (Ref 3/1/3/17 (HRD) DT 3rd September 2010) to PKS. Fund were provided only for performing field and collecting data.

**Competing interests:** The authors have declared that no competing interests exist.

## Conclusion

Results demonstrate that gender and impulsivity are strong risk factors for suicide attempts in the Idu Mishmi population.

## Introduction

Many attempts have been made to define the complex behavior of suicide. A number of predictors have been implicated in suicidal behavior from different social, psychological, and biological dimensions. Across cultures, the most robust findings in suicide research are the differences between genders and age groups [1]. The most dramatic increase overtime in suicide mortality rate has been observed in the third world countries India and China, due to their unique socioeconomic and behavioral patterns [2]. Current research indicates that the presence of psychopathology is probably the single most important predictor of suicide and approximately 90% of suicide cases meet criteria for at least one psychiatric abnormality [3]. The high prevalence of psychiatric disorders among suicide deaths and attempts has been observed and implicated as one of the best indicators of complex suicide behavior [4][5]. JJ Mann et al. (2003) proposed the stress-diathesis model to investigate the role of other factors over and above psychopathology [6]. Two main constructs of human nature, aggression and impulsivity, have been discussed broadly as endophenotypes or traits of personality, in relation to suicide, in research and in clinical practice across diagnoses [7, 8, 9]. Previous studies have established them as risk factors for suicide but it remains uncertain whether their effect on suicide is cumulative or independent. Current research indicates that the overlap between these constructs is robust, and they should be considered together, as a single “Impulsive-Aggression” phenotype [10]. However, other viewpoints emphasize their distinct latent dimensions [11].

Aggression refers to a wide spectrum of behaviors. It is an action intended to harm and identifies people who are predisposed to involve physical punishment, restriction, or verbal attacks like insults, threats, and sarcasm in actions or situations that are aversive or stressful [10]. It has been associated with suicidal behaviour in previous clinical, epidemiological, and family-based studies [12].

Impulsivity is a prominent construct of personality and embraces a multitude of behaviors that include responding prematurely, before considering the consequences, or action without foresight, poor planning, impaired self-regulation, sensation seeking, inhibitory control, risk taking, and preference for immediate over delayed rewards [13,14,15] that normally result in undesirable or deleterious outcomes. It is an adaptive dimension of personality and believed to stem from deficits in the self-regulation of affect, motivation arousal, working memory, and higher order cognitive functions [16]. Other abnormal behavioural manifestations of impulsivity have been found in attention deficit hyperactivity disorder (ADHD), addictions, and violent criminality, as well as antisocial personality disorder (ASPD), borderline personality disorder (BPD), and intermittent explosive disorder (IED) [17].

Studies assessing the prevalence of depressive traits have also found that attempters are more likely to be impulsive and aggressive [18]. Further, some have postulated the role of impulsivity in nonlethal suicide attempts or suicide gestures [19] and others found that the act of completed suicide is often not made impulsively [20].

The idea of an impulsive attempt, an attempt that is abrupt or that lacks planning, has been mentioned in the literature since at least the nineteenth century [21], and over the last decade

research stirred by this idea has increased markedly [22]. In this line of thought, ethnographic accounts and monographs published by anthropologists highlight the presence of impulsivity and aggression, and their correlation, in indigenous people [23, 24, 25, 26, 27]. The presence of high rates of impulsivity and aggression in Indian tribes has also been discussed [28, 29, 30, 31]. Further, some ethnographers and scholars have mentioned the Idu (*Choolkatta*) as a warrior-like, aggressive, comparatively offensive, and barbaric clan of Mishmi [32, 33]. The Idu Mishmi, a Tibeto-Burman speaking tribe is the largest subgroup of Mishmi located in the Dibang Valley and Lower Dibang Valley districts of Arunachal Pradesh. It is a major sub tribe of Mishmi tribes of Arunachal Pradesh along with the Misu and Digaru Mishmi. The Idu population is distributed in about seventy-six clans and holds a distinctive identity due to their typical hairstyle, unique costumes, and the artistic patterns emblazoned on their cloths. They practice animism and souls for all activities are defined. They are mainly engaged in agriculture and its allied activities for their livelihood but the practice of hunting is still prevalent in the society.

The objective of our study was to assess personality traits, specifically impulsive and aggressive behavior, among the primitive people of the Idu Mishmi who are known for high rates of suicide completers and attempters [34, 35]. The present study could be apprehended as an attempt to observe a less-studied association between personality traits and suicide attempts in a high suicide risk solitary population. Our investigation of aggression, impulsivity, and suicide attempts in light of demographic factors will contribute knowledge to suicidology, toward a more comprehensive image of how these personality traits impact the risk of suicide across genders in the general population.

## Materials and methods

The study design of the present study is cross-sectional and the data set is comprised of 177 Idu Mishmi participants, of both sexes, aged 15–70 years (data in [S1 Text](#)), from families known to be suicide affected and un-affected, from Anini town, in the Dibang Valley district (altitude 1,968 m or 6,457 ft), Arunachal Pradesh state, India. Data were recorded using closed questionnaires and well-validated psychological tools in 30-minute-long, face to face, structured, in-depth interviews, after obtaining written consent. Participation was voluntary and no compensation was given to study participants. Demographic details including age, sex, marital status, education, and employment were collected by structured questionnaire. A psychiatric diagnosis of suicide attempts was based on the Columbia Suicide Severity Rating Scale (C-SSRS). Assessment of personality traits, aggression and impulsivity, was performed using the Modified Overt Aggression Scale (MOAS) and Barratt Impulsiveness Scale, 11th version (BIS-11) respectively. All the employed tools were used after pilot testing them in the Idu population and no modification was made to the schedules. Each participant's responses were recorded in their preferred language (Hindi or English) by a trained anthropologist (PKS), as the population is multilingual.

The schedule C-SSRS (Columbia Suicide Severity Rating Scale) baseline Hindi/English version that was used to assess suicide attempts was developed to address inconsistencies in nomenclature and accurate identification of suicide behavior, as well as to be used in different settings [36]. Previous studies have examined the C-SSRS's specificity, its sensitivity, and its convergent, divergent, and predictive interpreter validity. It is found to be sensitive to any change, and to be internally consistent (Cronbach's alpha of 0.937) in various multisite studies [36, 37].

The BIS-11, which was used to assess the spectrum of impulsivity, is a 30-item gold standard measure [38]. It is designed to be a "multifaceted" measure of impulsivity including

attentional, motor, and non-planning impulsiveness elucidating its biological, social-interpersonal, and cognitive-emotional dimensions. Its three subscales include cognitive, motor, and non-planning impulsiveness, where Cognitive/Attentional Impulsiveness denotes the tendency to make quick decisions, Motor Impulsiveness denotes acting without thinking, and Non-Planning Impulsiveness indicates lack of forethought. Respondents answer each item on a 4-point scale (“1 = never/rarely”, “2 = sometimes”, “3 = often”, and “4 = almost always/always”), and totals range from 0–120. Several studies, including studies conducted in India, have used the BIS-11 indifferent cultural settings [39] to explore the social significance and behavioral correlates of variability in impulsivity [40]. Published reliability coefficients for the BIS-11 total score (Cronbach’s) range from 0.72 to 0.83 [37].

Aggression assessment was performed with the widely-used, reliable, 25-item Modified Overt Aggression Scale (MOAS) [41], which is adapted and modified from the Overt Aggression Scale [42]. It provides a weekly assessment of aggressiveness and was developed to assess four forms of aggressive behavior: verbal aggression, aggression against property, auto-aggression, and physical aggression. Each dimension was measured separately on the basis of behavior in the previous 15 days. Respondents were asked in a personal interview to report their behaviors over the past two weeks. Each domain was scored on a 5-point scale and total scores could range from 0 to 20, with higher scores indicating more aggression. The final score was produced by adding a single multiple of the verbal aggression score, two multiples of the aggression against property score, three multiples of the auto-aggression score, and four multiples of the physical aggression score. It also comprises important forms of aggression, like attempted suicide and intimidation. The psychometric properties of the Modified Overt Aggression Scale have been established by analyzing its inter-rater reliability and predictive power [43].

Statistical analysis included Chi-square and Student’s t test to analyze categorical and continuous variables respectively. The study population was screened for suicide attempt behaviour and the presence of a previous suicide attempt among individuals was considered for case and control classification. More explicitly, this study inspected personality traits, impulsivity and aggression, among Idu Mishmi suicide attempters and compared them to age- and sex-matched non-attempter control individuals. Sex wise interaction between sub-traits of studied variables was examined with the use of Pearson correlation coefficient. Multivariate analyses of variance (MANOVAs) were used for association analysis. Bivariate logistic regression was used to examine the joint effect of traits on suicide attempts using different models. All analyses were performed with SPSS version 16.0 (SPSS, Chicago). The study was approved by the Institutional Ethics Committee of the Department of Anthropology, University of Delhi. All the participants were informed about the study details and methods in their familiar language before giving their consent.

## Results

In the Idu Mishmi population we identified suicide attempters who had made one attempt ( $n = 31$ , 17.51%), two attempts ( $n = 5$ , 2.82%), and three attempts ( $n = 3$ , 1.69%) in their lifetime. Among attempters Hanging ( $n = 20$ , 64.52%) and consumption of pesticide ( $n = 7$ , 22.58%) were the most preferred modes of both sexes.

Table 1 presents the demographic characteristics of the presence or absence of suicide attempts among the Idu Mishmi participants. A high prevalence (22.03%) of suicide attempts is found in the population. There are no significant differences in age, marital status, or education. However, the data show a high frequency of suicide attempts in the groups who are above 19 years old, married, and high school educated (studied & currently studying). The study

Table 1. Demographic characteristics of the Idu Mishmi suicide attempters (Univariate chi square ( $\chi^2$ ) Test analysis).

	Suicide Attempt			
	Absent		Present	
	N = 138	77.97%	N = 39	22.03%
<b>Sex</b>				
Male (N = 101)	87	63.00%	14	35.90%
Female (N = 76)	51	37.00%	25	64.10%
	$\chi^2$	<b>9.145</b>	<b>Sig.</b>	<b>.002*</b>
<b>Age</b>				
<19 (N = 37)	29	21.00%	8	20.50%
≥19 (N = 140)	109	79.00%	31	79.50%
	$\chi^2$	<b>0.005</b>	<b>Sig.</b>	<b>0.946</b>
<b>Marital Status</b>				
Married	78	56.50%	21	53.80%
Unmarried/single	60	43.50%	18	46.20%
	$\chi^2$	<b>0.088</b>	<b>Sig.</b>	<b>0.766</b>
<b>Education</b>				
Illiterate	17	12.41%	5	12.82%
Middle	28	20.44%	11	28.21%
high school	49	35.77%	13	33.33%
Intermediate & above	43	31.39%	10	25.64%
	$\chi^2$	<b>1.214</b>	<b>Sig.</b>	<b>.750</b>
<b>Occupation</b>				
Unemployed	21	15.22%	6	15.38%
Housewife	15	10.87%	13	33.33%
Employed	64	46.38%	8	20.51%
Student	38	27.54%	12	30.77%
	$\chi^2$	<b>14.813</b>	<b>Sig.</b>	<b>0.002*</b>

\* p value<0.05

<https://doi.org/10.1371/journal.pone.0192969.t001>

finds significant differences using chi-square statistics between sexes ( $p = .002^*$ ) and occupations ( $p = .002^*$ ), with a high prevalence of female housewives and students in the suicide attempter's category. However, in all interviewed female and male participants, the prevalence of suicide attempters is found to be 32.89% and 13.86% respectively.

The mean  $\pm$  SD of scores on tests for personality traits, like aggression and impulsivity, in each subcategory among suicide attempters and non-attempters, sex wise, are depicted in Table 2. Significant differences are found between all suicide attempters and non-attempters in Total Aggression, and female attempters and non-attempters differ significantly in Auto-aggression. The BIS-11 produced impulsivity score analysis also shows a significant difference between suicide attempters and non-attempters in Total Impulsivity and in subcategories Non-planning and Motor impulsivity. Whereas, in sex-based analysis, only males show significant differences in the subcategories motor and cognitive impulsiveness.

A Pearson's coefficient of correlation analysis, between all subcategories and total impulsivity and aggression scores, shows high intra-correlation between traits of aggression and impulsivity in both sexes, whereas inter-correlation between categories of aggression and impulsivity is only observed in males (Table 3). In all screened males, non-planning and cognitive impulsiveness is found to be correlated with auto-aggression, motor impulsivity is correlated with physical aggression, and both total aggression and total impulsivity establish a correlation with

Table 2. Status of aggression and impulsivity among Idu Mishmi suicide attempters in males and females (Univariate t Test analysis).

Aggression									
	Male (N = 76)			Female (N = 58)			Total (N = 134)		
	Present (N = 11)	Absent (N = 65)	t Test	Present (N = 18)	Absent (N = 40)	t Test	Present (N = 29)	Absent (N = 105)	t Test
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Verbal aggression	2.45±1.21	2.58±1.48	0.318	3±1.78	2.85±1.72	0.300	2.79±1.59	2.69±1.57	0.323
Aggression against property	2.36±1.91	1.45±1.82	1.482	1.56±1.53	1.25±1.55	0.686	1.86±1.73	1.37±1.72	1.356
Auto-aggression	1.55±2.54	1.06 ±1.71	0.608	1.28±1.21	0.45±0.88	<b>2.503*</b>	1.38±1.82	0.83±1.48	1.498
Physical aggression	3.64±2.66	2.69±2.12	1.12	3.33±1.75	2.58±1.82	1.507	3.45±2.10	2.65±2.00	1.837
<b>Total Aggression</b>	<b>25.18±16.14</b>	<b>19.4±13.46</b>	<b>1.124</b>	<b>23.17±10.04</b>	<b>16.92±8.65</b>	<b>2.283*</b>	<b>23.93±12.46</b>	<b>18.46±11.87</b>	<b>2.116*</b>
Impulsivity									
	Male (N = 79)			Female (N = 56)			Total (N = 134)		
	Present (N = 10)	Absent (N = 69)	t Test	Present (N = 19)	Absent (N = 37)	t Test	Present (N = 29)	Absent (N = 105)	t Test
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Non-Planning	29.8±3.68	27.9±5.15	1.443	30.42±2.87	29.49±3.88	1.019	30.42±2.87	28.72±3.91	<b>2.137*</b>
Motor	26.1±5.15	23.23±4.81	<b>2.302*</b>	25.63±4.67	24.22±3.80	1.141	25.63±4.67	23.8±3.87	<b>2.076*</b>
Cognitive/ Attentional	20±1.63	18.42±3.76	<b>2.425*</b>	19.47±2.61	19.57±2.29	0.133	19.47±2.61	19±2.81	1.289
<b>Total Impulsivity</b>	<b>75.9±7.11</b>	<b>69.55±11.14</b>	<b>1.746</b>	<b>75.53±6.13</b>	<b>73.46±6.33</b>	<b>1.181</b>	<b>75.53±6.13</b>	<b>71.59±7.06</b>	<b>2.973*</b>

\* p value < 0.05

<https://doi.org/10.1371/journal.pone.0192969.t002>

aggression against property, physical aggression, and total aggression. In sex wise analysis, males show better correlation among the subcategories of aggression, whereas, in females, we record some negative correlation and could not find any significant correlation between the subcategories of impulsivity. The results imply that the traits of impulsivity and aggression are deeply correlated among males.

Table 4 shows an association analysis using Multivariate analysis of variance (MANOVA) between and among personality factors and the outcome of suicide attempts in the Idu Mishmi population. A one-way between-groups multivariate analysis of variance was performed to investigate the relationship between suicide attempts and personality traits. Two dependent variables were used: aggression and impulsiveness. The independent variable was suicide attempt. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance and covariance matrices, and multicollinearity, with no serious violations noted.

There was a statistically significant difference between suicide attempters and non-attempters on the combined dependent variables,  $F(2, 116) = 4.102, p = 0.019$ ; Wilks' Lambda = 0.934; partial eta squared = 0.66. When the results for dependent variables were considered separately, the only difference reached to statistical significance, using a Bonferroni adjusted alpha level of 0.025, was impulsiveness,  $F(1, 117) = 7.274, p = 0.008$ , partial eta squared = 0.59. The significant value of impulsiveness implies the profound role of impulsiveness more than aggression, in suicide attempts in the Idu Mishmi population of the Dibang Valley.

Table 5 depicts the results of three separate regression models with potential predictors of suicide attempts. In Model1, aggression, Impulsiveness, gender, and age were analyzed separately in association with suicide attempts and the results establish separate roles of aggression, impulsiveness and gender in suicide attempts. In Model2, when only aggression, Impulsiveness, and suicide attempts were entered simultaneously to control for the impact of gender and age, Impulsiveness remained significant. Whereas in Model 3, demographic variables like

Table 3. Inter- correlations among traits of aggression and impulsivity in males and females of Idu Mishmi suicide attempters (Univariate Pearson correlation analysis).

Categories /Subcategories		Verbal aggression	Aggression against property	Auto aggression	Physical aggression	Total Aggression	Non-Planning	Motor	Cognitive/ Attentional	Total Impulsivity
<b>MALE</b>										
Verbal Aggression	Pearson Correlation		0.099	0.021	.340**	.393**	0.059	-0.004	0.164	0.095
	N		58	58	58	58	50	50	50	50
Aggression against property	Pearson Correlation	.287*		.272*	0.111	.517**	0.191	-0.126	0.058	0.047
	N	76		58	58	58	50	50	50	50
Auto aggression	Pearson Correlation	.233*	.357**		0.123	.457**	0.03	0.06	0.071	0.082
	N	76	76		58	58	50	50	50	50
Physical aggression	Pearson Correlation	.274*	.364**	.336**		.832**	0.15	-0.063	0.102	0.081
	N	76	76	76		58	50	50	50	50
Total Aggression	Pearson Correlation	.386**	.675**	.680**	.842**		0.157	-0.024	0.202	0.15
	N	76	76	76	76		50	50	50	50
Non-Planning	Pearson Correlation	-0.072	0.187	.267*	0.193	0.232		0.092	-0.032	.566**
	N	71	71	71	71	71		56	56	56
Motor	Pearson Correlation	0.028	0.227	0.073	.252*	.242*	.401**		0.205	.759**
	N	71	71	71	71	71	79		56	56
Cognitive/ Attentional	Pearson Correlation	0.137	0.208	.240*	0.127	0.23	.541**	.488**		.517**
	N	71	71	71	71	71	79	79		56
Total Impulsivity	Pearson Correlation	0.024	.255*	0.233	.243*	.290*	.819**	.797**	.799**	
	N	71	71	71	71	71	79	79	79	
<b>FEMALE</b>										

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

<https://doi.org/10.1371/journal.pone.0192969.t003>

gender and age were entered as independent correlates along with aggression and Impulsiveness, and we find a significant role of gender (adjusted Odds Ratio = 3.355 (0.013)\* Confidence Interval = 1.289–8.738)and Impulsiveness (adjusted Odds Ratio = 1.079 (0.05)\* Confidence Interval = 1.000–1.164)in suicide attempts. Although Impulsiveness remained significantly

Table 4. Association analysis between among personality factors and outcome of suicide attempt multivariate analyses of variance (MANOVA analysis).

	Wilks' Lambda	F	Hypothesis df	Error df	Sig.	Partial eta squared
<b>Cumulative effect</b>						
Aggression Impulsiveness (Combined)	.934	4.102	2.000	116.00	.019*	0.66
<b>Individual Effect</b>						
Aggression		2.647	1	117	.106	0.22
Impulsiveness		7.274	1	117	.008*	0.59

\* p value <0.05

<https://doi.org/10.1371/journal.pone.0192969.t004>

**Table 5. Association between gender, age, personality factors with suicide attempt among Idu Mishmi (Multivariate logistic regression analysis).**

	Model-1	Model-2*	Model -3*
	Unadjusted Odds Ratio (Sig.) 95%CI	Adjusted Odds Ratio (Sig.) 95%CI	Adjusted Odds Ratio (Sig.) 95%CI
Aggression	<b>1.044 (0.017)*</b> <b>1.008–1.082</b>	1.019 (0.348) 0.980–1.060	1.026 (0.235) 0.983–1.072
Impulsiveness	<b>1.091 (0.008)*</b> <b>1.024–1.164</b>	<b>1.087 (0.023)*</b> <b>1.011–1.167</b>	<b>1.079 (0.05)*</b> <b>1.000–1.164</b>
Gender 1 = Female	<b>3.046 (0.003)*</b> <b>1.453–6.384</b>		<b>3.355 (0.013) *</b> <b>1.289–8.738</b>
Age 1 = 19 and above	1.030 (0.946) 0.428–2.482		0.838 (0.816) 0.190–3.708

Adjusted variables in Model 2 = Impulsiveness, Aggression. Adjusted variables in Model 3 = Gender, age, Impulsiveness, Aggression

\* p value <0.05

<https://doi.org/10.1371/journal.pone.0192969.t005>

associated with an increased likelihood of suicide attempts, gender (being female) contributed significantly to the relationship.

## Discussion

This study reports a high rate of suicide attempts (22.03%) in the Idu Mishmi tribe of the Dibang Valley district of Arunachal Pradesh, India. The issue of suicide in the Idu Mishmi came to light with media reporting of suicide deaths in the Dibang Valley and Lower Dibang Valley, and was later validated by a scientific study in which 218 cases of suicide were reported, over four decades, in this tiny tribe numbering 15,000 [44]. Further, our group has published the presence of high suicide attempt rates and psychiatric traits like depression, anxiety, and eating disorders among Idu Mishmi school children and family members in the lower Dibang district of Arunachal Pradesh [34]. Ethnographic, anthropological, and sociological accounts of indigenous people from India and around the globe have posited the frequent presence of suicide behavior among primitive people [30, 31 45, 46, 47]. Several attempts have been made to unmask the causative and risk factors like psychiatric abnormality, positive family history, alcoholism, depression, having a friend who has attempted suicide, history of physical abuse and sexual abuse, female sex, etc. [48,49]. The stress-diathesis model, which includes the role of childhood trauma and personality traits like impulsivity and aggression, is another attempt to illuminate the complex behavior of suicide [4]. The population aggression score mean recorded in the Idu Mishmi population was 21.20. In a sex wise comparison, the male sex recorded a high mean value. In females, auto-aggression was found to be high. Research indicates that females were less likely to opt for direct physical violence and they can express their aggression through non-physical behaviour. Males, are quicker to show physical aggression and aggression against property. The outcome of this study, the significant differences shown between suicide attempters and non-attempters in the total aggression category, is validated by the shared neurobiology that has been proposed for suicide and aggressive behavior [8]. Aggression has been observed to be concomitant with lowered serotonin-mediated brain activity, and a pattern of emotional dysregulation in the context of interpersonal difficulties and other stressful life events, all of which can result in suicide [10, 50].

The impulsivity trait evaluation among the Idu Mishmi tribal population recorded it to be quite high with a mean of 73.56, compared with other population studies in India [51] which have recorded means of 61.71 in rural and 62.65 in urban samples. Sex wise comparison in the total population shows elevated female impulsivity, with an average 74.5 score, while males



mean score was 72.73. However in the suicide attempter category, males' impulsivity scores were found to be high. Global studies support the higher Impulsiveness scores found in females [40]. However, findings from other indigenous population based studies support the notion of high impulsivity in indigenous people. Doyle et al. (2015) recorded that 42% of non-indigenous inmates and 53% of indigenous inmates screened positive for impulsive personality [52]. A Commission for Children and Young People and Child Guardian Queensland (2009) report noted that suicide impulsivity is frequently reported more among aboriginal youth than the wider Australian youth population [53]. Impulsiveness symptoms have been implicated across neuropsychiatric disorders, with important consequences for everyday activity and quality of life. Studies have explained the variability in impulsive behaviors as stemming from genetic or temperamental roots that interact with psychological and environmental experiences [54, 55, 56,57]. The present population study was an attempt to substantiate earlier findings. Simon et al. (1994) reported that 24% of near-lethal suicide attempt survivors had thought about their suicide attempt for less than 5 minutes [58]. The present study further reports the interplay between categories and subcategories of aggression and impulsivity. Some recent studies have suggested the interplay of aggressive and impulsive behavior to be the underlying link between family history of suicide committers and new suicide attempts [59, 60]. Menon et al., 2015 listed causes of suicide death among Indians and found males' modes differed from those of females, which could also be explained by the differences in personality characteristics [1].

The outcome of our study suggests that impulsivity and gender (being female) may contribute significantly as risk factors for suicide attempts with variability in the category and subcategories of aggression and impulsivity across sexes. Kumar et al. 2013 also observed a difference between male and female suicide attempters with respect to concurrent diagnoses, mode of attempt, and stressful life situations encountered [2]. To summarize, it can be stated that in the stress-diathesis model, aggression and impulsivity are important components of the diathesis for suicidal behavior. Inference from this study suggests that suicide behaviour needs multidisciplinary understanding and it should involve knowledge from psychologists, anthropologists, and ethnographers. The magnitude of socio-cultural factors in the cultural personality background should be studied so that a sound suicide prevention program can be planned.

## Conclusion

The present study among the Idu Mishmi, an isolated endogamous tribal group, focuses on the presence of a high suicide attempt rate and sex variability. High scores on measures of aggression and impulsivity traits were recorded, with significant differences among suicide attempters and non-attempters. Male attempters were more at risk of impulsivity, whereas females showed greater risk for aggression, but in the total studied population, the suicide risk was almost three times higher with higher aggression, and almost twice as high with higher impulsivity. The subcategories of impulsivity were deeply correlated among themselves and with subcategories of aggression. Most of the previous studies emphasized considering suicide attempts to be the best diagnostic trait of suicidal behavior [61] and that it should possess the qualities of being self-initiated, potentially injurious behavior with the presence of intent to die and nonfatal outcome [62]. This study validates a suspicion raised by earlier scholars, as the high intensity of aggression and impulsivity in indigenous populations and their association with suicide behavior was re-witnessed in the present population-specific study.

## Limitations

The limitation of small sample size is due to the small population size, low density, and difficult terrain of their habitation. We could not observe the interplay of psychiatric abnormalities and the traits of aggression or impulsivity due to the absence of a psychiatric clinic in the study area. Further, deaths due to suicide could not be quantified in the absence of postmortem based data.

## Supporting information

**S1 Text. Idu Mishmi Dataset.**  
(XLSX)

## Acknowledgments

We acknowledge the role of the District Commissioner and Medical Officer, Dibang Valley District, Arunachal Pradesh, India for their support during field work in hilly, tough terrain. We deeply convey our thanks to our fieldguides, *nata, naya* (elder members of the Society) and study participants.

## Author Contributions

**Conceptualization:** Piyoosh Kumar Singh, V. R. Rao.

**Data curation:** Piyoosh Kumar Singh.

**Formal analysis:** Piyoosh Kumar Singh, V. R. Rao.

**Funding acquisition:** V. R. Rao.

**Investigation:** Piyoosh Kumar Singh, V. R. Rao.

**Methodology:** Piyoosh Kumar Singh, V. R. Rao.

**Software:** Piyoosh Kumar Singh.

**Supervision:** V. R. Rao.

**Validation:** V. R. Rao.

**Writing – original draft:** Piyoosh Kumar Singh, V. R. Rao.

**Writing – review & editing:** V. R. Rao.

## References

1. Menon V, Kattimani S, Sarkar S, Muthuramalingam A. Gender differences among suicide attempters attending a Crisis Intervention Clinic in South India. *Industrial psychiatry journal*. 2015 Jan; 24(1):64. <https://doi.org/10.4103/0972-6748.160936> PMID: 26257486
2. Kumar S, Verma AK, Bhattacharya S, Rathore S. Trends in rates and methods of suicide in India. *Egyptian Journal of Forensic Sciences*. 2013 Sep 30; 3(3):75–80.
3. Cavanagh JT, Carson AJ, Sharpe M, Lawrie SM. Psychological autopsy studies of suicide: a systematic review. *Psychological medicine*. 2003 Apr 1; 33(03):395–405.
4. Mann JJ. "Neurobiology of suicidal behavior." *Nature Reviews Neuroscience* 4.10 (2003): 819–828. <https://doi.org/10.1038/nrn1220> PMID: 14523381
5. Brent DA, Johnson B, Bartle S, Bridge J, Rather C, Matta J, et al. Personality disorder, tendency to impulsive violence, and suicidal behavior in adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*. 1993 Jan 31; 32(1):69–75.

6. Carballo JJ, Oquendo MA, Giner L, Zalsman G, Roche AM, Sher L. Impulsive-aggressive traits and suicidal behavior in adolescents and young adults with alcoholism. *International journal of adolescent medicine and health*. 2006; 18(1):15–20. PMID: [16639853](#)
7. Dumais A, Lesage AD, Alda M, Rouleau G, Dumont M, Chawky N, et al. Risk factors for suicide completion in major depression: a case-control study of impulsive and aggressive behaviors in men. *American Journal of Psychiatry*. 2005 Nov 1; 162(11):2116–24. <https://doi.org/10.1176/appi.ajp.162.11.2116> PMID: [16263852](#)
8. Mann JJ, Currier D. Biological predictors of suicidal behavior in mood disorders. In: Wasserman D, & Wasserman C, editors. *Oxford Textbook of Suicidology and Suicide Prevention: A Global Perspective*. Oxford: Oxford University Press; 2009: 335–41.
9. Critchfield KL, Levy KN, Clarkin JF. The relationship between impulsivity, aggression, and impulsive-aggression in borderline personality disorder: an empirical analysis of self-report measures. *Journal of Personality Disorders*. 2004 Dec 1; 18(6):555. <https://doi.org/10.1521/pepi.18.6.555.54795> PMID: [15615667](#)
10. Buss AH, Perry M. The aggression questionnaire. *Journal of personality and social psychology*. 1992 Sep; 63(3):452. PMID: [1403624](#)
11. Conner KR, Swogger MT, Houston RJ. A test of reactive aggression- suicidal behavior hypotheses: Is there a case for proactive aggression? *J Abnorm Psychol* 2009; 118:235–40. <https://doi.org/10.1037/a0014659> PMID: [19222330](#)
12. Whiteside SP, Lynam DR. Understanding the role of impulsivity and externalizing psychopathology in alcohol abuse: application of the UPPS impulsive behavior scale. *Exp Clin Psychopharmacology* 2003; 11:210–7.
13. Evenden J. Impulsivity: a discussion of clinical and experimental findings. *Journal of Psychopharmacology*. 1999 Mar 1; 13(2):180–92. <https://doi.org/10.1177/026988119901300211> PMID: [10475725](#)
14. Barkley RA. Behavioral inhibition, sustained attention, and executive functions: constructing a unifying theory of ADHD. *Psychological bulletin*. 1997 Jan; 121(1):65. PMID: [9000892](#)
15. Bevilacqua L, Doly S, Kaprio J, Yuan Q, Tikkanen R, Paunio T, et al. A population-specific HTR2B stop codon predisposes to severe impulsivity. *Nature*. 2010 Dec 23; 468(7327):1061–6. <https://doi.org/10.1038/nature09629> PMID: [21179162](#)
16. Weissman M, Fox K, Klerman GL: Hostility and depression associated with suicide attempts. *Am J Psychiatry* 1973; 130:450–455. PMID: [4691302](#)
17. Pendse B, Westrin Å, Engström G. Temperament traits in seasonal affective disorder, suicide attempters with non-seasonal major depression and healthy controls. *Journal of affective disorders*. 1999 Jul 31; 54(1):55–65.
18. Soloff PH, Lis JA, Kelly T, Cornelius J, Ulrich R. Risk factors for suicidal behavior in borderline personality disorder. *American Journal of Psychiatry*. 1994 Sep 1; 151(9):1316–23. <https://doi.org/10.1176/ajp.151.9.1316> PMID: [8067487](#)
19. Baca-Garcia E, Diaz-Sastre C, Basurte E, Prieto R, Ceverino A, Saiz- Ruiz J, et al. A prospective study of the paradoxical relationship between impulsivity and lethality of suicide attempts. *J Clin Psychiatry* 2001; 62:560–5. PMID: [11488369](#)
20. Anestis MD, Selby EA, Joiner TE. The role of urgency in maladaptive behaviors. *Behav Res Ther* 2007; 45:3018–29. <https://doi.org/10.1016/j.brat.2007.08.012> PMID: [17923108](#)
21. Durkheim E. *Le suicide: étude de sociologie*. F. Alcan; 1897.
22. Rimkeviciene J, De Leo D. Impulsive suicide attempts: A systematic literature review of definitions, characteristics and risk factors. *Journal of affective disorders*. 2015 Jan 15; 171:93–104. <https://doi.org/10.1016/j.jad.2014.08.044> PMID: [25299440](#)
23. Anderson I. Understanding indigenous violence. *Australian and New Zealand journal of public health*. 2002 Oct 1; 26(5):408–9. PMID: [12413279](#)
24. Spillane NS, Smith GT. Individual Differences in Problem Drinking Among Tribal Members from One First Nation Community. *Alcoholism, clinical and experimental research*. 2010; 34(11):1985–1992.
25. Al-Yaman F, Van Doeland M, Wallis M. *Family violence among Aboriginal and Torres Strait Islander peoples*. Canberra, ACT: Australian Institute of Health and Welfare; 2006.
26. Hodgins DC, Holub A. Components of Impulsivity in Gambling Disorder. *International journal of mental health and addiction*. 2015 Dec 1; 13(6):699–711. <https://doi.org/10.1007/s11469-015-9572-z> PMID: [26568706](#)
27. Odden HL. *Intersections of Samoan Ethno psychology, Adolescent Impulsivity and Maladaptive Behavior*, 2010.
28. Mills JP. *The Lothas Nagas*. Macmillan & Co. Ltd, Londo, 1922.

29. Margolin SG. A consideration of constitutional factors in aggressivity. *American Indian and Alaska Native Mental Health Research*. 1988; 2(2):41–57. PMID: [3154876](#)
30. Metz F. *The Tribes Inhabiting the Neilgherry Hills: Their Social Customs and Religious Rites: from the Rough Notes of a German Missionary*. Basel Mission Press; 1864.
31. Verrier Elwin. *Maria Murder and Suicide*. Oxford University Press, Bombay. 1943.
32. Dutt SC. *The Wild Tribes of India*. BR Publishing Corporation; 1882.
33. Waddell LA. *Tribes of the Brahmaputra Valley (the): A Contribution of Their Physical Types and Affinities*. Concept Publishing Company; 1999.
34. Singh PK, Singh RK, Biswas A, Rao VR. High rate of suicide attempt and associated psychological traits in an isolated tribal population of North-East India. *Journal of affective disorders*. 2013 Nov 30; 151(2):673–8. <https://doi.org/10.1016/j.jad.2013.07.018> PMID: [23978684](#)
35. Mene T. Attitude towards death and suicide among the Idu Mishmi Tribe of Arunachal Pradesh India. *Asian Journal of Multidisciplinary Studies*. 2014 May 25; 2(6).
36. Posner K, Brent D, Lucas C, Gould M, Stanley B, Brown G, et al. *Columbia-suicide severity rating scale (C-SSRS)*. New York, NY: Columbia University Medical Center. 2008.
37. Mundt JC, Greist JH, Jefferson JW, Federico M, Mann JJ, Posner K. Prediction of suicidal behavior in clinical research by lifetime suicidal ideation and behavior ascertained by the electronic Columbia-Suicide Severity Rating Scale. *The Journal of clinical psychiatry*. 2013 Sep; 74(9):471–478.
38. Patton JH, Stanford MS. Factor structure of the Barratt impulsiveness scale. *Journal of clinical psychology*. 1995 Nov 1; 51(6):768–74. PMID: [8778124](#)
39. Stanford MS, Mathias CW, Dougherty DM, Lake SL, Anderson NE, Patton JH. Fifty years of the Barratt Impulsiveness Scale: An update and review. *Personality and Individual Differences*. 2009 Oct 31; 47(5):385–95.
40. Carlson M, Miller N. Bad experiences and aggression. *Sociology & Social Research*. 1988 Apr 155–158.
41. Kay SR, Wolkenfeld F, Murrill LM. Profiles of aggression among psychiatric patients: II. C2 variates and predictors. *The Journal of nervous and mental disease*. 1988 Sep 1; 176(9):547–57. PMID: [3418328](#)
42. Yudofsky SC, Silver JM, Jackson W, Endicott J, Williams D. The Overt Aggression Scale for the objective rating of verbal and physical aggression. *The American journal of psychiatry*. 1986 Jan
43. Margari F, Lorusso M, Matera E, Pastore A, Zagaria G, Bruno F, Puntillo F et al. aggression, impulsivity, and suicide risk in benign chronic pain patients—a cross-sectional study. *Neuropsychiatric disease and treatment*. 2014; 10:1613. <https://doi.org/10.2147/NDT.S66209> PMID: [25214787](#)
44. Mene, T., 2011. *Suicide Among the Idu Mishmi Tribe of Arunachal Pradesh (Ph.D. thesis)*. Rajiv Gandhi University, Itanagar.
45. Steinmetz SR. *Suicide among primitive peoples*. *American Anthropologist*, 1984.
46. Van Winkle N, May P. Native American suicide in New Mexico, 1957–1979: A comparative study. *Human Organization*. 1986 Dec 1; 45(4):296–309. PMID: [11617165](#)
47. Kirmayer LJ. *Suicide among Canadian aboriginal peoples*. *Transcultural Psychiatry*. 1994 Mar 1; 31(1):3–58.
48. Grossman DC, Milligan BC, Deyo RA. Risk factors for suicide attempts among Navajo adolescents. *American Journal of Public Health*. 1991 Jul; 81(7):870–4. PMID: [2053663](#)
49. Earls F, Escobar JI, Manson SM. Suicide in minority groups: epidemiologic and cultural perspectives. In: Blumenthal S.J., Kupfer D.J. (Eds.), *Suicide Over the Lifecycle*. American Psychiatric Press, Washington, D.C, 1991 pp.571–598.
50. Conner KR, Duberstein PR, Conwell Y, Caine ED. Reactive aggression and suicide: Theory and evidence. *Aggression and violent behavior*. 2003 Aug 31; 8(4):413–32.
51. Singh P, Solanki RK, Bhatnagar PS. BIS-11A -Hindi version: A preliminary study of impulsivity in rural and urban Indian adolescents. *Indian J Psychiatry* 2008; 50:96–9. <https://doi.org/10.4103/0019-5545.42395> PMID: [19742223](#)
52. Doyle MF, Butler TG, Shakeshaft A, Guthrie J, Reekie J, Schofield PW. Alcohol and other drug use among Aboriginal and Torres Strait Islander and non-Aboriginal and Torres Strait Islander men entering prison in New South Wales. *Health & Justice*. 2015 Dec 1; 3(1):1–0.
53. Commission for Children and Young People and Child Guardian Queensland. 2009. *Reducing youth suicide in Queensland discussion paper*. Brisbane: Commission for Children and Young People and Child Guardian.
54. Derryberry D, Rothbart MK. Reactive and effortful processes in the organization of temperament. *Development and psychopathology*. 1997 Dec 1; 9(04):633–52.

55. Cadoret RJ, Yates WR, Woodworth G, Stewart MA. Genetic-environmental interaction in the genesis of aggressivity and conduct disorders. *Archives of General Psychiatry*. 1995 Nov 1; 52(11):916–24. PMID: [7487340](#)
56. Millon T, Millon CM, Meagher S, Grossman S, Ramnath R. *Personality disorders in modern life*. John Wiley & Sons; 2012 Jun 12.
57. Paris J. Social factors in the personality disorders. *Transcultural psychiatry*. 1997 Dec 1; 34(4):421–52.
58. Simon OR, Swann AC, Powell KE, Potter LB, Kresnow MJ, O'Carroll PW. Characteristics of impulsive suicide attempts and attempters. *Suicide Life Threat Behav*. 2001; 32(1 Suppl):49–59. PMID: [11924695](#)
59. Brent DA, Melhem N. Familial transmission of suicidal behavior. *Psychiatric Clinics of North America*. 2008 Jun 30; 31(2):157–77. <https://doi.org/10.1016/j.psc.2008.02.001> PMID: [18439442](#)
60. Diaconu G, Turecki G. Family history of suicidal behavior predicts impulsive–aggressive behavior levels in psychiatric outpatients. *Journal of affective disorders*. 2009 Feb 28; 113(1):172–8.
61. Beautrais AL. Suicide and serious suicide attempts in youth: a multiple-group comparison study. *American Journal of Psychiatry*. 2003 Jun 1; 160(6):1093–9. <https://doi.org/10.1176/appi.ajp.160.6.1093> PMID: [12777267](#)
62. Van Orden KA, Witte TK, Cukrowicz KC, Braithwaite SR, Selby EA, Joiner TE Jr. The interpersonal theory of suicide. *Psychological review*. 2010 Apr; 117(2):575. <https://doi.org/10.1037/a0018697> PMID: [20438238](#)