##### Predictors of suicidal ideation in social anxiety disorder – Evidence for the validity of the Interpersonal Theory of Suicide

## Man-Long Chunga, Andreas J. Forstnerb,c,d, Martin Mückee, Franziska Geisera, Johannes Schumacherd and Rupert Conrada,\*

a Department of Psychosomatic Medicine and Psychotherapy, University Hospital Bonn, Venusberg Campus 1, 53127 Bonn, Germany

b Institute of Human Genetics, University of Bonn, School of Medicine & University Hospital Bonn, Bonn, Germany

c Institute of Neuroscience and Medicine (INM-1), Research Center Jülich, Germany

d Centre for Human Genetics, University of Marburg, Marburg, Germany

e Center for Rare Diseases Bonn (ZSEB), University Hospital Bonn, Venusberg Campus 1, Bonn 53127, Germany

**\*Corresponding author**:

Rupert Conrad

Department of Psychosomatic Medicine and Psychotherapy, University Hospital Bonn

Venusberg Campus 1

53127 Bonn, Germany

Phone: ++49 228/287-16299

Fax: ++49 228/287-15382

Email: [Rupert.Conrad@ukbonn.de](mailto:Rupert.Conrad@ukbonn.de)

**Abstract**

*Background*

This study aims to identify covariates of suicidal ideation (SI) in a large sample of individuals diagnosed with social anxiety disorder (SAD).

*Methods*

In a cross-sectional design, 305 individuals (38.4±14.1 years, 59% female) with SAD were assessed by the Social Phobia Inventory, Beck Depression Inventory, Adverse Childhood Experience Questionnaire, State Trait Anger Expression Inventory, Beck Scale for Suicidal Ideation and the Interpersonal Needs Questionnaire.

*Results*

SAD individuals with SI (n = 142, 46.6%) reported higher SAD and depression symptoms, more adverse childhood experiences (ACE), higher state anger (SA), perceived burdensomeness (PB) and higher thwarted belongingness (TB) compared to SAD individuals without SI (n = 163, 53.4%). In binary logistic regression, PB (odds ratio (OR)=1.11, 95% confidence interval (CI)=1.06-1.15), TB (OR=1.05, 95% CI=1.02-1.07), SA (OR=1.07, 95% CI=1.01-1.13) and ACE (OR=1.18, 95% CI=1.03-1.35) emerged as significant covariates of acute SI (Nagelkerke’s *R*2 = .39). Receiver operating characteristic (ROC) curves showcased the following areas under the curve (AUC): PB (AUC=.78), TB (AUC=.76), SA (AUC=.62) and ACE (AUC=.62). Multinomial logistic regression (no SI = ref.) showcased similar results for passive and active SI (n = 42), with SA reaching significance only for active SI. The Youden index identified appropriate cut-off values for PB, TB, SA and ACEQ by maximizing sensitivity and specificity.

*Limitations*

Cross-sectional design and self-reporting measures limit generalization.

*Conclusion*

Our findings confirm the validity of the Interpersonal Theory of Suicide concerning SI in SAD. PB and TB with SA and ACE may support the valid assessment of SI in therapeutic settings.

Keywords: suicidal ideation, social anxiety disorder, depression, adverse childhood experiences, anger

**Highlights**

* Nearly half of individuals with social anxiety disorder reported suicidal ideation
* Logistic regression supports the Interpersonal Theory of Suicide in SAD
* Anger and adverse childhood experiences are associated with suicidal ideation
* Perceived burdensomeness and thwarted belongingness show good discrimination
* Calculated cut-off values for suicidal ideation should be used as a guidance

**1. Introduction**

Social anxiety disorder (SAD) is a common psychiatric disorder with an average lifetime prevalence of about 4% world-wide, ranging from 0.2% in Nigeria to 12,1% in the USA (Stein et al., 2017). Age of onset is early across the globe and SAD is associated with substantial impairment in multiple domains of role functioning, which is particularly high in the domains of relationships and social situations (Stein et al., 2017). Suicidality is of high clinical relevance in SAD as social anxiety symptoms are closely associated with suicidal ideation (SI) in adolescents (Gallagher et al., 2014) and SAD was found to be uniquely associated with more severe SI (Herres et al., 2019). In another recent study social anxiety was identified as a risk factor for SI in emerging adulthood (Pereira et al., 2018). A nationwide representative sample of adults aged between 18 and 64 in South-Korea (Cho et al., 2016) found a significant association between SAD and SI (Odds ratio (OR)=2.97, 95% confidence interval (CI): 1.27-6.94) as well as suicide attempts (OR=3.78, 95% CI=1.41-10.1). SI is also particularly prevalent in socially anxious older adults (Petkus et al., 2018).

To analyze SI in SAD there is preliminary evidence that the Interpersonal Theory of Suicide by Thomas Joiner Jr. (Joiner, 2005) may be useful (Buckner et al., 2017; Duffy et al., 2020). The theory describes two factors which together constitute the desire to die by suicide. The first factor is named „thwarted belongingness” (TB) and describes the belief of not being accepted by others and a feeling of social isolation, which counteracts the fundamental human need of social connectedness. The second factor is named „perceived burdensomeness“ (PB) which describes the inner belief, to be of no use for others or society, so that society would be better off without him or her. The presence of TB or PB alone are sufficient causes for passive SI, characterized by cognitions and thoughts such as “I wish I was dead” (Van Orden et al., 2010). The interaction between PB and TB, together with hopelessness regarding these two components, will lead from passive to active SI, revolving around thoughts about actively killing oneself. The third factor named „acquired capability of suicide“ enables a person to overcome the inborn fear of death and paves the path from active SI to a suicide attempt. Physical abuse or a history of self-harm are typical experiences, which may result in an increased capability to overcome the survival instinct. A recent systematic review and meta-analysis (Chu et al., 2017) analyzing 122 samples supported the Interpersonal Theory of Suicide and found that PB and TB individually as well as the interaction between the two was significantly associated with SI. Furthermore, the number of previous suicide attempts was significantly related to the interaction between PB, TB and acquired capability of suicide.

Two previous studies analyzed the usefulness of the Interpersonal Theory of Suicide regarding social anxiety. In a sample of 780 undergraduates (19.9±2.0 years, 80.5% female) social anxiety was indirectly related to SI via PB and TB highlighting that difficulties in interpersonal functioning may serve as pathways through which social anxiety leads to greater suicidality (Buckner et al., 2017). However, no structured diagnostic assessment of SAD was performed there. In another study respective associations were analyzed in 58 treatment-seeking SAD patients in their mid-twenties (25.6±10.5 years, 69% female) where PB was significantly positively related to SI severity above TB, which was not incremental (Duffy et al., 2020). The predominantly female sample size was small and results are limited to a certain age group. Establishing risk factors for suicidality is essential for an improved understanding of underlying mechanisms, identification of individuals at risk, and development of evidence-based prevention programs.

To meet these expectations, it is necessary to include other potentially relevant variables that could increase the risk of SI and to account for covariance between included predictors. One clinical symptom of interest among SAD individuals is depression. Depressive symptoms and their connection to SI as well as SAD are well established. Among college students, adolescents and outpatients with mood disorders, depressive symptoms was associated with the presence and intensity of SI (Beck et al., 1993; Farabaugh et al., 2012; Kandel et al., 1991). It is often one of the comorbidities in SAD patients (Schneier, 1992) and is important in differential diagnosis when diagnosing SAD. Although previous research showed that depression did not uniquely account for variance in SI among SAD individuals (Duffy et al., 2020), the analyzed sample was relatively small and predominantly female. Different results might be achieved in a bigger and more heterogenous sample of SAD individuals.

Additionally, SAD individuals showcased increased anger compared to non-anxious controls (Erwin et al., 2003) while non-clinical individuals with higher SAD symptoms experienced anger more often in daily social and non-social situations than those with low SAD symptoms (Kashdan & Collins, 2010) suggesting a link between SAD and anger. There is also evidence that anger increases the risk of SI (Dillon et al., 2020; Hawkins & Cougle, 2013; Jang et al., 2014). Since SAD individuals tend to suppress their anger compared to healthy controls (Conrad et al., 2021; Erwin et al., 2003), which makes it difficult to properly assess the extent of anger through behavioral measures, we have to resort to self-reporting measures of current anger to further shed light on the connection between anger and SI in SAD individuals.

Lastly, there is evidence that higher numbers of adverse childhood experiences (ACEs) increases the risk of not only SI (Thompson et al., 2019) but also suicide attempts (Choi et al., 2017), highlighting the relevance of the various adverse experiences one can make during childhood. As ACEs serve as risk factors for various disorders including SAD (Bishop et al., 2014; Bruce et al., 2012; Kuo et al., 2011), emphasis was put on them in order to analyze their influence on SI.

Against this backdrop the current study wanted to investigate the following hypotheses in a large group of SAD individuals: (i) SAD individuals with suicidal ideation display higher clinical and anger symptoms and report more ACEs, (ii) PB, TB and their interaction will independently showcase an association with the presence of SI together with (iii) depressive and SAD symptoms, current anger and the number of ACEs. Further differentiation between passive and active SI, which has not been researched in SAD in context of the Interpersonal Theory of Suicide before, is also investigated with the same set of covariates. We also calculated appropriate cut-off values for significant covariates of SI by maximizing sensitivity and specificity and discuss their clinical relevance.

**2. Methods**

**2.1. Participants**

The recruitment took place in the German research project “Social Phobia – Research on SAD” which is a collaboration between the Institute of Human Genetics and the Department of Psychosomatic Medicine and Psychotherapy at the University Hospital Bonn, Germany, and the Centre of Human Genetics at the University of Marburg, Germany (Ernstmann et al., 2021; Forstner et al., 2017; Rambau et al., 2018). Participants were enrolled for this project between January 2013 and June 2019 through advertisements, radio, television, newspaper articles or clinical services and provided informed consent. No compensation was given for participation. The study was approved by the ethics committee of the University of Bonn (No. 222/12). Participants were included in the study if they fulfill following criteria: age 18 years or older, lifetime diagnosis of SAD as confirmed by the Structural Clinical Interview DSM-IV Axis I disorders (SCID I, (First et al., 1996; Wittchen et al., 1997) and a filled out Beck Scale for Suicidal Ideation questionnaire (BSS, Beck et al., 1993; Kliem et al., 2017). Participants with bipolar disorders or schizophrenia as well as inadequate knowledge of the German language or mental and/or somatic difficulties which could lead to incomplete questionnaires were excluded. Overall, 305 individuals satisfy our inclusion criteria and their data were further evaluated in statistical analysis. Their age ranged from 18 to 76. Demographic characteristics of this sample are displayed in Table 1.

**2.2. Instruments**

*Demographics:* Clinical and sociodemographic data were documented using a questionnaire which, among other information, assessed sex, age, partnership status, level of education, ethnicity, treatment for mental disorders, and recall of parental psychopathology.

*Diagnoses:* Diagnoses of SAD and relevant SAD comorbidities were assigned by trained interviewers using the German version of the SCID-I (First et al., 1996; Wittchen et al., 1997). During their pre-study training, the interviewers observed multiple SCID interviews. They then proceeded to administering the SCID under the observation and supervision of a senior diagnostic rater. Throughout the study, the interviewers received weekly supervision. The SCID-I is a valid and reliable semi-structured diagnostic interview for the assignment of DSM-IV Axis I diagnoses showcasing kappa values ranging from 0.61 to 0.83, with social phobia at the top with an excellent kappa value of 0.83 (Lobbestael et al., 2011).

*Severity of social anxiety symptoms:* This was measured using the German version of the Social Phobia Inventory (SPIN, Connor et al., 2000; Sosic et al., 2008). The SPIN is a brief self-report questionnaire that measures the behavioral, physiological, and cognitive symptoms of social anxiety with 17 items on a 5-point Likert scale. The total sum score ranges between 0 and 68, where higher scores represent more severe symptom severity of social anxiety. The SPIN has good psychometric properties, and is a highly economical method of screening (Sosic et al., 2008). In our current sample, the internal consistency is good with a Cronbach’s α = .89.

*Severity of depressive symptoms:* The current severity of depressive symptoms was measured by the German version of the Beck Depression Inventory (BDI, Beck et al., 1961; Hautzinger et al., 1994). The BDI is a short, widely used and well-validated self-report questionnaire reflecting participants assessment regarding depressive symptoms over the past week. It consists of 21 items scored on a 4-point Likert scale (range 0-3), resulting in a possible sum score of 0-63 with higher sum scores indicating more severe depressive symptoms. To avoid an overlap with the construct of SI we subsequently excluded Item I from further analysis. The BDI has been extensively studied in a vast number of studies and shows very good reliability and validity, the former being replicated in our current sample with a Cronbach’s α = .90.

*Traumatic experiences:*The German version of the Adverse Childhood Experiences Questionnaire (ACEQ, Felitti et al., 1998; Wingenfeld et al., 2011) was used to assess the traumatic experience during childhood. The questionnaire consists of ten items that each describe a specific adverse childhood experience. Each item must be answered on a yes/no scale, resulting in a possible sum score of 0 to 10. Higher sum scores indicate more traumatic childhood experiences. Overall, the ACEQ proves to be a reliable and valid instrument for the assessment of adverse experiences during childhood (Wingenfeld et al., 2011). The internal reliability of our sample is satisfactory (Cronbach’s α = .68).

*Anger:*The German version of the State Trait Anger Expression Inventory (STAXI, Schwenkmezger et al., 1992) assessed anger and anger expression. Consisting of 44 items, which are rated on a 4-point Likert scale, the questionnaire measures both the current extent of anger (“state anger”, SA) as well as the disposition of anger (“trait anger”, TA). The other three subscales reflect whether individuals keep their anger inside and suppress it (“anger in”, AI), whether they express it openly (“anger out”, AO) or whether they maintain control over it (“anger control”, AC). In this study, only SA will be considered since it fits with the other assessed clinical symptoms as an acute state variable. Higher scores in SA represents a higher current experience of angry feelings. SA shows an excellent internal consistency in our sample (Cronbach’s α = .92).

*Suicidal Ideation:* The presence of SI was measured by the Beck Scale for Suicidal Ideation (BSS, Beck, 1991; Kliem et al., 2017). This instrument is one of the most widely used self-report questionnaires for the assessment of suicidal thinking. The routine screening (BSS-Screen) for the presence of SI consists of only five items and can be regarded as very time efficient. The instrument can also aid in a more extensive exploration of the severity of suicidal thoughts using the total score consisting of 19 items (BSS-total score). Each item can be rated on a scale from 0 to 2, resulting in a possible sum score of 0 to 38. The higher the score, the greater the suicidal ideation. Item 4 assessed the presence of active suicidal ideation. The scale has shown good reliability and validity and can be recommended for the assessment of SI in the general population as well as in clinical populations. The present study displays a Cronbach’s α = .85 which reflects a good internal consistency.

*Interpersonal Theory of Suicide:* The Interpersonal Theory of Suicide hypothesizes the significance of the two constructs “thwarted belongingness” and “perceived burdensomeness” for the development of SI. These factors can be assessed by the Interpersonal Needs Questionnaire (INQ, Hallensleben et al., 2016; Van Orden et al., 2012). The instrument consists of 15 items, 9 Items for TB (sum score range 9-63) and 6 items for PB (sum score range 6-42) rated on a 7-point Likert scale. Higher sum score in each subscale represents higher TB and PB. Previous studies revealed good reliability and validity of the questionnaire (Hallensleben et al., 2016; Hill et al., 2015; Van Orden et al., 2012) which prove to be true with our current sample, showing an excellent internal reliability for both TB and PB (Cronbach’s α =.90 and =.93, respectively)

**2.3. Statistical analyses**

Descriptive characteristics of the sociodemographic data as well as psychometric properties of questionnaires of interest were given for the examined sample. We divided our sample regarding SI, which was done through the sum of BSS items, where participants with a sum score of 0 were classified as without SI whereas a sum score ≥ 1 was regarded as having SI, which, therefore, includes individuals with passive and active SI. Categorical variables were displayed as frequencies and percentages while continuous variables were described with means and standard deviations. The latter were assumed as normally distributed as the sample size for each group was *n* > 30 (Kwak & Kim, 2017). Group differences regarding categorical variables were analyzed through chi-square tests or Fisher’s exact test while differences presented as mean differences were analyzed through *F*-tests. Significant continuous variables in univariate analysis were considered in the backward stepwise binary logistic regression analysis to identify statistically independent factors associated with the dependent dichotomous variable SI (no SI vs. present SI, as determined by the BSS sum score) with a removal threshold of *p* >.10. Linearity assumptions for logistic regression were assessed using the Box-Tidwell procedure (Box & Tidwell, 1962). Multicollinearity between included variables was detected with the variance inflation factor (VIF; (Field, 2017)).

An additional multinomial logistic regression model was calculated with no SI, passive SI and active SI as the dependent variables with the set of covariates as independent variables that emerged significant in the bivariate logistic regression. Active SI was determined by dichotomizing Item 4 of the BSS, where a score ≥ 1 in Item 4 represented the presence of active SI. Reference group was assigned to individuals without SI as the comparison between no SI and passive or active SI highlights the different contribution of covariates that affect either passive or active SI. ORs and their respective 95% confidence interval were calculated while the goodness-of-fit for the binary and multinomial logistic regression was determined through the Hosmer-Lemeshow-Test and Pearson’s-/Deviance chi-square test, respectively. For binary and multinomial logistic regression, the OR was converted to the effect size Cohen’s *d* (Sánchez-Meca et al., 2003).

Additionally, receiver operating characteristics (ROC) curves were computed for significant covariates in binary and multinomial logistic regression and their respective area under the curve (AUC) was evaluated in how good they distinguish between individuals with and without SI. The AUC was transformed to an effect size e.g. Cohen’s *d* (Salgado, 2018). Based on the Youden index (Youden’s J), which represents the maximized sensitivity and specificity of each covariate, an appropriate cut-off value was determined. Effect sizes calculated as Cohen’s *d* were characterized as small (.20 - <.50), moderate (.50 - <.79) or large (≥ .80) (Cohen, 1988). P values <.05 were considered statistically significant. Statistical analyses were done with the Statistical Package for the Social Sciences Version 27 (*IBM SPSS Statistics for Macintosh*, 2020).

**3. Results**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 1**  Demographic and clinical characteristics of study cohort | | | | | | | |
|  | |  | **Sample with suicidal ideation** |  | **Sample without suicidal ideation** |  | Test statistic (effect size if sig.) |
|  | |  | *n* = 142 |  | *n* = 163 |  |
| **Characteristics:** | |  | ***n* (%)** |  | ***n* (%)** |  |  |
| Sex | |  |  |  |  |  |  |
| Female | |  | 82 (57.7) |  | 65 (39.9) |  | *χ2* = .177 |
| Male | |  | 60 (42.3) |  | 98 (60.1) |  |
|  | |  |  |  |  |  |  |
| Age (in years) | |  |  |  |  |  |  |
| *M*  (*SD*) | |  | 38.49  (14.08) |  | 38.34  (14.14) |  | *t* = .08 |
|  | |  |  |  |  |  |  |
| Ethnic group | |  | *n =* 72 |  | *n =* 66 |  |  |
| Central Europe | |  | 69 (95.8) |  | 63 (95.5) |  | *Fisher’s exact test =* 2.01 |
| South-East/East Europe | |  | 2 (2.8) |  | 2 (3.0) |  |
| North America | |  | 0 (0.0) |  | 1 (1.5) |  |
| Asia | |  | 1 (1.4) |  | 0 (0.0) |  |
|  | |  |  |  |  |  |  |
| Partnership | |  | *n =* 127 |  | *n =* 149 |  |  |
| yes | |  | 58 (40.8) |  | 89 (54.6) |  | *χ2* = 5.45\* |
| no | |  | 69 (48.6) |  | 60 (36.8) |  | (φ = .14) |
|  | |  |  |  |  |  |  |
| Completed level of education | |  | *n =* 140 |  | *n =* 162 |  |  |
| Below high school | |  | 57 (40.1) |  | 35 (21.5) |  | *χ2* = 20.83\*\*\*  (φ = .26) |
| High school | |  | 54 (38.0) |  | 57 (35.0) |  |
| College level or above | |  | 29 (20.4) |  | 70 (42.9) |  |
|  | |  |  |  |  |  |  |
|  | |  | ***M (SD****)* |  | ***M (SD)*** |  |  |
|  | |  | *n =* 140 |  | *n =* 162 |  |  |
| Social Phobia Inventory (SPIN) | |  | 43.71 (11.01) |  | 37.73 (11.38) |  | *t* = 4.62\*\*\*  (*d =* .53) |
|  | |  |  |  |  |  |  |
| Adverse Childhood Experience Questionnaire (ACEQ) | |  | 3.06 (2.09) |  | 2.26 (1.99) |  | *t* = 3.39\*\*\*  (*d =* .39) |
|  | |  | *n =* 141 |  | *n =* 161 |  |  |
| Beck Depression Inventory (BDI) | |  | 24.96 (10.85) |  | 15.57 (8.76) |  | *t* = 8.2\*\*\*  (*d =* .96) |
|  | |  |  |  |  |  |  |
| State Trait Anger Expression Inventory (STAXI) | |  |  |  |  |  |  |
| State Anger (SA) | |  | 15.44 (6.21) |  | 13.05 (4.41) |  | *t* = 3.83\*\*\*  (*d =* .45) |
|  | |  |  |  |  |  |  |
| Interpersonal Needs Questionnaire (INQ) | |  | *n =* 140 |  | *n =* 162 |  |  |
| Perceived Burdensomeness | |  | 19.08 (10.16) |  | 10.07 (5.99) |  | *t* = 9.2\*\*\*  (*d =* 1.1) |
|  | |  |  |  | *n =* 161 |  |  |
| Thwarted Belongingness | |  | 41.24 (11.6) |  | 29.95 (11.62) |  | *t* = 8.41\*\*\*  (*d =* .97) |
|  | |  |  |  |  |  |  |
| Note: | Smaller sample size on ethnic group, partnership, completed level of education, SPIN, BDI and INQ due to missing data on questionnaires  *n* = sample size, *M* = mean, *SD* = standard deviation, *χ2* = chi-square, *t* = t-Test, φ = Cramer’s V, *d* = Cohen’s *d*  \* *p* ≤ .05, \*\*\* *p* ≤ .001, two-tailed. | | | | | | |

**3.1. Demographics and clinical variables**

Among the included 305 SAD individuals, 142 (46.6%) had a sum score ≥ 1 in the BSS, displaying signs of SI. Out of these individuals, 42 (13.8%) further reported active SI, with scores ≥ 1 in Item 4 of the BSS. There were no significant differences between individuals with SI and individuals without SI in regard to age, sex and ethnic group (Table 1). However, there were more individuals with a partnership (*χ2*(1) = 5.45, *p* = .02, φ = .14) and a higher level of education (*χ2*(2) = 20.83, *p* < .001, φ = .26) in the latter group. Significant differences were also present concerning the SPIN score (*t*(300) = 4.62, *p* < .001, *d* = .53), the BDI score (*t*(268.844) = 8.2, *p* = <.001, *d* = .96), the ACE score (*t*(303) = 3.39, *p* = < .001, *d* = .39), the STAXI-SA score (*t*(250.072) = 3.83, *p* = <.001, *d* = .45) and the INQ score for PB (*t*(218.038) = 9.2, *p* = < .001, *d* = 1.1) and TB (*t*(299) = 8.14, *p* = < .001, *d* = .97) which all show higher scores in the sample with SI, confirming hypothesis (i).

**3.2. Covariates of suicidal ideation**

All significant continuous variables in univariate analysis were entered into the backward stepwise binary logistic regression where the presence of SI served as the dependent variable (Table 2). Linearity assumptions were met and no multicollinearity between covariates was present as the VIF was < 10. After removing variables, which did not contribute to the model significantly, four variables remained in the final model (perceived burdensomeness, thwarted belongingness, adverse childhood experiences and state anger). No significant difference was detected between observed and expected values as shown by the Hosmer-Lemeshow-Test (*χ2*(8) = 4.05, *p* = .85), indicating a good model fit. The combination of covariates remaining in the final model classified 73.6% of individuals correctly. Each covariate increased the risk of SI significantly, specifically the odds of having SI are increased by 11% for each unit gained in the INQ-subscale “perceived burdensomeness”. Likewise, the odds are increased for each unit gained in the INQ-subscale “thwarted belongingness” and the STAXI-subscale “state anger” by 5% and 7%, respectively. Additional adverse childhood experiences as defined by the ACE increased the odds of SI by 18%. Hypothesis (ii) and (iii) were, therefore, only confirmed partially, as the interaction of PB and TB, depression and SAD symptoms were not significant.

The model in multinomial logistic regression showed a good model fit (Pearson’s *χ2*(584) = 594.48, *p =* .37; Deviance *χ2*(584) = 451.05, *p* = 1.0). The same set of covariates explained a significant amount of variance in both passive and active SI compared to no SI apart from SA, which only reached significance in active SI. Like the binary logistic model, for significant covariates, each unit gained in the respective questionnaire resulted in an increased odd for passive and/or active SI (Table 3).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 2**  Backward stepwise binary logistic regression (*n* = 292) | | | | | | | | | |
|  | | **Suicidal Ideationa** | | | | | | | |
| **Covariates** | | ***B*** | ***SE B*** | **Wald** | ***p*** | ***OR (d)*** | **95% *CI*** | | ***R*2** |
| ***LL*** | ***UL*** |
| INQ – PB | | .100 | .021 | 23.47 | <.001 | 1.11 (.02) | 1.06 | 1.15 |  |
| INQ – TB | | .044 | .013 | 11.14 | <.01 | 1.05 (.01) | 1.02 | 1.07 |
| ACEQ | | .166 | .069 | 5.78 | .02 | 1.18 (.04) | 1.03 | 1.35 |
| STAXI - SA | | .064 | .029 | 4.95 | .03 | 1.07 (.02) | 1.01 | 1.13 |
| constant | | -4.408 | .635 |  |  |  |  | |
|  | |  |  |  |  |  |  | | .39 |
| Note: | *n* = sample size, *B* = regression coefficient, *SE b* = standard error regression coefficient, *p* = p-value, *OR* = odds ratio, *d* = Cohen’s *d*, *CI* = confidence interval, *LL* = lower limit, *UL* = upper limit, INQ = Interpersonal Needs Questionnaire, PB = perceived burdensomeness, TB = thwarted belongingness, ACEQ = Adverse Childhood Experiences Questionnaire, STAXI = State Trait Anger Expression Inventory, SA = state anger, R2 = Nagelkerke’s R2  a sum score of > 1 in BSS | | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3**  Multinomial logistic regression (*n* = 298) | | | | | | | | | |
| **Covariates** | | ***B*** | ***SE B*** | **Wald** | ***p*** | ***OR (d)*** | **95% *CI*** | | ***R*2** |
| ***LL*** | ***UL*** |
| *No SIa vs. passive SIb* | | | | | | | | | |
| INQ – PB | | .097 | .021 | 20.55 | <.001 | 1.10 (.02) | 1.06 | 1.15 |  |
| INQ – TB | | .042 | .014 | 9.50 | <.01 | 1.04 (.01) | 1.02 | 1.07 |
| ACEQ | | .160 | .072 | 5.01 | .03 | 1.17 (.04) | 1.02 | 1.35 |
| STAXI - SA | | .035 | .031 | 1.23 | .27 | 1.04 (.01) | 0.97 | 1.10 |
| constant | | -4.126 | .666 |  |  |  |  |  |
| *No SIa vs. active SIc* | | | | | | | | |  |
| INQ – PB | | .125 | .027 | 21.96 | <.001 | 1.13 (.03) | 1.08 | 1.19 |  |
| INQ – TB | | .053 | .021 | 6.62 | .01 | 1.06 (.01) | 1.01 | 1.10 |
| ACEQ | | .212 | .103 | 4.19 | .04 | 1.24 (.05) | 1.01 | 1.51 |
| STAXI - SA | | .140 | .036 | 14.56 | <.001 | 1.15 (.03) | 1.07 | 1.24 |
| constant | | -7.922 | 1.046 |  |  |  |  |  |
|  | |  |  |  |  |  |  |  | .40 |
| Note: | Reference category is no suicidal ideation.  *n* = sample size, *B* = regression coefficient, *SE b* = standard error regression coefficient, *p* = p-value, *OR* = odds ratio, *d* = Cohen’s *d*, CI= confidence interval, *LL* = lower limit, *UL* = upper limit, SI = suicidal ideation, INQ = Interpersonal Needs Questionnaire, PB = perceived burdensomeness, TB = thwarted belongingness, ACEQ = Adverse Childhood Experiences Questionnaire, STAXI = State Trait Anger Expression Inventory, SA = state anger, R2 = Nagelkerke’s R2  a sum score of = 0 in BSS  b sum score of ≥ 1 in BSS and score of 0 in BSS Item 4  c score of ≥ 1 in BSS item 4 | | | | | | | | |

**3.3. ROC analysis**

ROC-curves for each significant covariate of SI were computed as shown in Figure 1. AUC was either considered poor (.50 - <.70), acceptable (.70 - <.80), excellent (.80 - <.90) or outstanding (≥ .90) (Hosmer et al., 2013). As shown in Table 4, PB and TB displayed acceptable to excellent discrimination whereas only poor to acceptable discrimination were showcased by ACE and SA. Along the ROC-curves, we utilized the Youden index to determine the best cut-off value where sensitivity and specificity were maximized. The highest Youden Index, and therefore the best balance between sensitivity and specificity, was shown for PB followed by TB. Except for TB, higher cut-off values for PB, ACE and SA were determined for active SI compared to passive or overall SI.

|  |  |
| --- | --- |
| **(a)**  **(b)**    **(c)** | |
| **Figure 1:** ROC-curves for significant covariates in: (a) binary logistic regression and multinomial logistic regression for (b) passive suicidal ideation and (c) active suicidal ideation. |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 4**  Receiver Operating Characteristics Analysis | | | | |
|  | | **SIa** | **Passive SIb** | **Active SIc** |
|
|  | |  |  |  |
| *Perceived burdensomeness* | |  |  |  |
| Cut-off score (range 6-42) | | 9 | 9 | 20 |
| Youden Index | | .44 | .42 | .54 |
| Sensitivity | | .77 | .75 | .62 |
| Specificity | | .68 | .68 | .92 |
| Area under curve (Cohen’s d) | | .78 (1.08) | .76 (1.00) | .82 (1.28) |
|  | |  |  |  |
| *Thwarted Belongingness* | |  |  |  |
| Cut-off score (range 9-63) | | 39 | 40 | 39 |
| Youden Index | | .44 | .39 | .54 |
| Sensitivity | | .62 | .56 | .74 |
| Specificity | | .82 | .84 | .80 |
| Area under curve (Cohen’s d) | | .76 (.98) | .73 (.87) | .80 (1.21) |
|  | |  |  |  |
| *Adverse Childhood Experiences* | |  |  |  |
| Cut-off score (range 1-10) | | 2 | 4 | 5 |
| Youden Index | | .19 | .17 | .27 |
| Sensitivity | | .73 | .43 | .39 |
| Specificity | | .46 | .74 | .88 |
| Area under curve (Cohen’s d) | | .62 (.43) | .60 (.36) | .67 (.62) |
|  | |  |  |  |
| *State Anger* | |  |  |  |
| Cut-off score (range 10-40) | | 11 |  | 19 |
| Youden Index | | .18 |  | .39 |
| Sensitivity | | .65 |  | .46 |
| Specificity | | .53 |  | .92 |
| Area under curve (Cohen’s d) | | .62 (.45) |  | .74 (.89) |
|  | |  |  |  |
| Note: | SI = suicidal ideation  a sum score of = 0 in BSS  b sum score of ≥ 1 in BSS and score of 0 in BSS Item 4  c score of ≥ 1 in BSS item 4 | | | |

**4. Discussion**

This paper identified risk factors of suicidal ideation by analyzing the influence of “perceived burdensomeness” and “thwarted belongingness”, two constructs of the Interpersonal Theory of Suicide (Joiner, 2005; Van Orden et al., 2010), and their interaction together with depression, social anxiety symptoms, current anger and adverse childhood experiences in a large sample of individuals diagnosed with SAD.

Binary logistic regression showed that PB and TB significantly explain an amount of variance in SI accounting for other clinical variables which is consistent with previous results regarding SI in individuals diagnosed with SAD, at least for PB (Duffy et al., 2020). Our findings further support the prominent role of PB and TB in SI in a bigger sample of individuals diagnosed with SAD and these results can be further extended to acute SI as there were methodological differences in the assessment of SI. Duffy et al. (2020) utilized the Suicidality Subscale of the Depressive Symptom Index (DSI-SS; Metalsky & Joiner, Jr., 1997) which consists of four items that refer to the past two weeks whereas the BSS covers acute feelings at the same day. As TB was not a significant predictor in their study, its relevance and influence seem to be contained to acute feelings of SI, though the results with DSI-SS need to be further researched in a larger and more heterogenous sample of SAD individuals.

Results of multivariate analysis also indicate a slightly bigger influence of PB on SI than TB, which fits with the results of a meta-analysis where PB displayed a stronger relationship to SI than TB (Chu et al., 2017). Van Orden et al. (2010) attributes the dimensions of “liability” and “self-hate” to PB. The attributes connected to PB are seemingly more relevant to SI in SAD individuals. Feelings of self-doubt, low self-esteem and the belief to be a burden or liability to close others influence the presence of SI in people with SAD. Compared to TB, which is associated with the dimensions of “loneliness” and “absence of reciprocal care”, to evaluate oneself as a burden to others and self-hatred both include a certain negative connotation and appraisal which is not necessarily true with the feeling of loneliness and social isolation that is captured by TB. Overall, regarding SAD individuals, the absence of personal connections or caring relationships to others do not influence the presence of passive SI as much as the own perception of worthlessness and liability to others.

The dimensions of TB display certain overlaps with the clinical symptoms of SAD, in fact, previous research showed that SAD symptoms were significant predictors of TB and not PB (Davidson et al., 2011; Silva et al., 2015) which suggest that the lack of social interaction and bonding caused by SAD symptoms can potentially lead to TB. Since our inclusion of SAD symptom severity through SPIN showed no significant influence, the avoidance and fear of social situations themselves does not seemingly affect SI, more the lack of deeper and closer relationships to others that might be caused by it.

Additionally, our findings suggest that the interaction of PB and TB does not explain a significant amount of variance in SI above and beyond the main effects of PB and TB. The Interpersonal Theory of Suicide posits that the interaction of PB and TB together with hopelessness contribute to active SI whereas PB and TB alone only influence the presence of passive SI (Joiner, 2005; Van Orden et al., 2010). Mixed results have been achieved regarding the connection between the interaction of PB and TB with SI (Hill et al., 2015; Monteith et al., 2013; Van Orden et al., 2008) but meta-analysis showed that the interaction is indeed significantly associated with SI (Chu et al., 2017). In our sample of SAD individuals, the proposed contributing effect of the interaction between PB and TB failed to reach statistical significance. However, our study did not assess „hopelessness“. The missing inclusion of this construct might explain the lacking influence of the interaction between PB and TB as the state of “hopelessness” about the presence of both PB and TB is a key factor for active SI (Joiner, 2005; Van Orden et al., 2010).

The differentiation between passive and active SI was assessed through multinomial logistic regression which shows similar results to the binary model with the slightly stronger contribution of PB compared to TB in both passive and active SI. Interestingly, the current feeling of anger did not reach significance for passive SI but for active SI, indicating a more prominent role of anger among SAD individuals in suicidal thoughts that revolve around killing oneself. Except for TB, the calculated cut-off values of each significant covariate for active SI are higher than those for SI in general and passive SI.

Depression did not explain a significant amount of variance in SI over other covariates which is in line with the findings of Duffy et al., (2020) who utilized a different questionnaire for the assessment of depressive symptoms in the form of BDI II (Beck et al., 1996), covering the last two weeks. Based on these results, depression does not seem to play an integrating role in SI among SAD individuals neither short- nor long-term above and beyond other predictors.

Although PB, TB, SA and ACE were significant covariates of SI, ROC-curves showcased that the former two classified more SAD individuals correctly than the latter two, indicating a more reliable role of PB and TB as independent covariates than SA and ACE. The differences in classification rates might be due to the nature of SA since it represents the current feeling of anger which can vary for each person and is therefore susceptible to fluctuations. Concerning ACE, we did not specify what kind of ACE was predominantly associated passive or active SI in SAD individuals as we used the sum score as a covariate. The differentiation between certain ACE might increase the reliability of classification.

**4.1. Implications**

This study has clinical implications for the treatment of individuals diagnosed with SAD. The extent of PB and TB, two dimensions postulated in the Interpersonal Theory of Suicide, raises the likelihood of acute SI in SAD individuals. Therefore, they should be considered not only in diagnosis but in treatment and therapeutical interventions, also. The assessment of PB and TB in INQ only consists of fifteen items which ensures a quick diagnosis of the current extent of PB and TB in SAD individuals and could be used as a screening tool. Since both PB and TB are independently related to SI, higher values in either domain could hint on the presence of SI, specifically for PB, very high values in this domain could indicate active SI. The use of the INQ is relatively flexible and can be utilized right at the beginning to directly account for SI or during therapeutic intervention if the presence of SI is still unclear. However, more research regarding effective clinical use of the INQ is needed and due to the self-reporting nature, there is always a risk of bias or social desirability which could lead to an inaccurate measurement.

Consideration of current anger symptoms and adverse childhood experiences should be important as well since both are independently related to acute SI. Their approach can be similarly applied like PB and TB with both STAXI and ACEQ serving as a screening tool with detailed information gained through personal conversation. Like PB, higher numbers of ACE and higher current anger are related to active SI. As both ACEQ and STAXI-SA showcased relatively low discrimination compared to PB and TB, it is advised to utilize the INQ domains first and to incorporate ACE and anger if high values were attained in the INQ, though all three questionnaires can be used at the same time as well since they are relatively brief. The calculated cut-off values through the Youden index can be used for orientation when treating SAD individuals.

The assessment of SI by means of questionnaires support those, that are not comfortable speaking about it even in a safe environment e.g. therapeutic settings. Although it is advised to address SI openly with the affected individual as it may be a relief for them to get asked about this sensitive topic (American Psychiatric Association, 2003), the opposite can also be true with individuals shutting down such questions or showing reluctance to speak about it. By assessing the presence of SI through questionnaires, the clinician can evaluate the results and, if necessary, prepare for appropriate intervention measures.

**4.2. Strengths and limitations**

The big sample of SAD individuals ensures great power and is one of the strengths in this paper. External validity is especially given since our heterogenous sample consists of SCID-I diagnosed SAD individuals with and without clinical treatment that were recruited through various methods as well as generally older and more male individuals compared to Buckner et al. (2017) or Duffy et al. (2020). Nevertheless, the aforementioned results should be treated with caution. The cross-sectional design does not allow causal interpretation of the results and the assessment methods were mainly self-reporting questionnaires which are susceptible to various biases e.g. social desirability or recall bias.

Very low or barely perceptible effect sizes were achieved for each included covariate in binary and multinomial logistic regression, which should be considered to avoid over-emphasis and to put the logistic regression results into perspective. In this context, changes of 1 point in the respective questionnaire may significantly increase the odds of SI, but the actual increase itself has only limited clinical relevance. As outlined before, the proposed cut-off values for significant covariates might be of more use as the effect sizes indicate a clinically relevant classification among SAD individuals regarding SI.

In conclusion, our findings further emphasize the prominent role of PB and TB concerning acute SI, providing evidence for the Interpersonal Theory of Suicide for individuals with SAD. Together with acute anger symptoms and adverse childhood experiences, they should be clarified in advance to avoid potential difficulties during clinical interventions.

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