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Suicidal behaviour in the social environment: Does exposure moderate the relationship between an individual's own suicidal ideation and behaviour?

Lea Roland[1] | Inken Höller[1] | Thomas Forkmann[1] | Heide Glaesmer[2] |
Laura Paashaus[1] | Antje Schönfelder[2] | Tobias Teismann[3] | Georg Juckel[4] |
Dajana Rath[1]

[1]Department of Clinical Psychology, University of Duisburg-Essen, Essen, Germany

[2]Department of Medical Psychology and Medical Sociology, University of Leipzig, Leipzig, Germany

[3]Mental Health Research and Treatment Center, Department of Psychology, Ruhr-Universität Bochum, Bochum, Germany

[4]Department of Psychiatry, LWL-University Hospital, Ruhr-Universität Bochum, Bochum, Germany

Correspondence
Dajana Rath, Department of Clinical Psychology, University of Duisburg-Essen, Universitätsstraße 2, 45141 Essen, Germany.
Email: dajana.rath@uni-due.de

Abstract

Introduction: Suicidal behaviour still cannot be sufficiently predicted. Exposure to suicidal behaviour in the personal social environment is assumed to moderate the individual's transition from suicidal ideation to suicidal behaviour within the integrated motivational–volitional model of suicidal behaviour (IMV model). This study aimed to investigate this moderating effect in a German high-risk sample.

Methods: We interviewed 308 psychiatric inpatients (53% female) aged 18 to 81 years ($M = 36.9$, $SD = 14.30$) admitted after attempted suicide (53%) or due to an acute suicidal crisis (47%) regarding exposure events in their social environment. Four types of exposure events were analysed using moderation analyses: familial suicides/suicide attempts and non-familial suicides/suicide attempts. Additionally, the numbers of reported exposure events were compared between patients with and without a recent suicide attempt as well as between patients with lifetime suicide attempts and lifetime suicidal ideation.

Results: Neither moderating effects of exposure events on the relationship between lifetime suicidal ideation and recent suicidal behaviour nor group differences between suicidal ideators and suicide attempters regarding the exposure events were found.

Conclusions: Exposure events might have differential and possibly protective effects on suicidal behaviour—depending on type and quality (intensity, personal relevance and recency) of event—and on the outcome (suicide vs. suicide attempt).

KEYWORDS
exposure, ideation-to-action, integrated motivational–volitional model, suicidal behaviour, suicidal ideation

1 | INTRODUCTION

With 800,000 suicide deaths registered in 2019, suicide remains a global concern for public health and local communities (World Health Organization [WHO], 2019). Per death, the lives of approximately 135 individuals in addition to the decedent's are affected (Cerel et al., 2019). Identifying concrete risk factors in the development of suicidal behaviour is required for designing primary preventive measures, the precise assessment of suicide risk, secondary preventive care of those affected and further development of tailored psychotherapy.

Survivors of suicide attempts will often engage in suicidal behaviour again, with suicide attempts predicting future attempts (Joiner et al., 2005), one of which might eventually be lethal. Yoshimasu et al. (2008) found the risk of dying by suicide to be 16 times higher in decedents with a history of self-harm or previous attempts compared to controls without such a history. Apart from past behaviour, suicidal ideation and mental disorders provide some explanatory value for predicting suicidal behaviour (Nock et al., 2009, 2010).

In working towards a better understanding of suicidal behaviour, one major lead appears to be that the prevalence of suicidal ideation exceeds the prevalence of suicidal plans and behaviour (Nock et al., 2008). Therefore, it seems to be important to distinguish between suicidal ideation and behaviour. In line with this, ideation-to-action theories differentiate between the two and emphasize that they represent distinct phenomena and stages of suicidality (Klonsky et al., 2016). The integrated motivational–volitional model of suicidal behaviour (IMV model; O'Connor, 2011; O'Connor & Kirtley, 2018) is one of those ideation-to-action models offering a comprehensive explanatory approach. It postulates three phases of suicidality and three groups of moderators determining transitions from the development of suicidal ideation to behaviour. While the authors of the model argue for the simultaneous interaction of many factors (O'Connor & Kirtley, 2018), the factor of exposure still needs individual testing in empirical studies so that its relevance and rightful place within the model can be assessed.

It is the third and last phase of the model (volitional phase), in which the exposure to suicidal behaviour in the individual's environment (as a volitional moderator) is assumed to moderate the transition from suicidal ideation to suicidal behaviour.

The impact of suicidal behaviour on the suicidal behaviour of other individuals in spatial–temporal proximity has received ample attention in sociological and psychological suicide research (Durkheim, 1951; Niederkrotenthaler et al., 2012; Phillips, 1974; Phillips & Carstensen, 1986; Robinson et al., 2016, Tarde, 1903). In the past, the clustering of suicides (Durkheim, 1951; Tarde, 1903), the Werther (Phillips, 1974; Phillips & Carstensen, 1986) and Papageno effects (Niederkrotenthaler et al., 2012), have been examined. Personal relationships between suicidal individuals have only recently been examined more specifically (Robinson et al., 2016). Recent studies have focused on how experiencing suicidal behaviour in the personal social environment (e.g., within the family) might affect an individual's own suicidal behaviour. In a meta-analysis, Andriessen

> **Key Practitioner Message**
> - Exposure events can be important for the development of suicidal behaviour and should therefore be addressed in therapy.
> - The significance of an event must be determined individually. It can be a risk-increasing factor.

et al. (2017) estimated that 22% of the population experience such exposure events in their lifetime, with higher rates of exposure events outside of the family. Four main types of exposure events can be identified using two categories: first, relationship towards the other person (related or non-related) and, second, type of their suicidal behaviour (suicide or suicide attempt; cf. Harris & Bettiol, 2017). Accordingly, exposure events can be differentiated into familial suicides, familial suicide attempts, non-familial suicides and non-familial suicide attempts.

In this regard, exposure events have been found to increase the risk of one's own suicidal behaviour with different effects depending on the type of exposure event and outcome. While exposure to suicide seems to increase the risk of any suicidal behaviour, exposure to suicide attempts specifically increases the risk of suicide attempts (Hill et al., 2020). Meta-analyses reported that both exposure to familial (Pitman et al., 2014) and non-familial suicides (Maple et al., 2017) are associated with increased risk for one's own suicide. The latter study also examined the risk for one's own suicide attempt(s), besides the risk for suicide as an outcome, and found both risks to be elevated. Even though the referenced meta-analysis infers that exposure events are a risk factor for suicides and suicide attempts, some studies have only found this effect for specific types of exposure events (e.g., Crepeau-Hobson & Leech, 2014; Thompson & Light, 2011; Wong et al., 2005) or have found protective effects instead (Mercy et al., 2001).

Methodological limitations in the field of exposure research may account for the heterogeneity of results. Major problems concern: First, different types of exposure events seem to have differential effects on suicidal behaviour, and studies have analysed them either pooled (e.g., 'all exposure events' or 'all (non-)familial events'; e.g., Dhingra et al., 2015; Nanayakkara et al., 2013) or separately (e.g., Lee et al., 2018). One recent reliability and dimensionality study even showed no correlation between the four types and no common factor to which they were attributable (Harris & Bettiol, 2017). Sometimes, researchers only ask whether there has been exposure to suicidal events or not (e.g., Dhingra et al., 2015; Wetherall et al., 2018), but the count of events might be important to consider dose–response effects.

Second, most research has been conducted on samples of adolescents and young adults (Hill et al., 2020), since suicide is the second leading cause of death among 15- to 29-year-olds (WHO, 2018) and adolescents are regarded as particularly vulnerable and susceptible to social influence (Abrutyn & Mueller, 2014). However, conclusions drawn from these young risk samples cannot be transferred to all age groups.

Third, the outcomes of exposure events (i.e., suicide or suicide attempt) vary between studies. Especially older studies have used a combination of suicidal ideation and behaviour as the main outcome of interest (e.g., Brent et al., 1990).

Furthermore, in psychological autopsy and birth register studies with the outcome 'suicide', it is crucial to remember that relationships or acquaintances do not necessarily implicate knowing about the other person's suicidal behaviour. For example, Brent et al. (1990) found that 36% of their samples were unaware of the familial history of suicidal behaviour.

The effects of exposure events on one's own suicidal behaviour have especially been understudied in the context of ideation-to-action frameworks. Studies examining the role of exposure events within the theoretical framework of the IMV model have not yet tested moderating effects (Branley-Bell et al., 2019; De Beurs et al., 2019; Dhingra et al., 2015, 2016; Wetherall et al., 2018). Only group comparisons revealed that lifetime attempters (at least one suicide attempt) reported a higher number of exposure events than lifetime suicidal ideators (no suicide attempt) (Branley-Bell et al., 2019; Dhingra et al., 2015; Wetherall et al., 2018). While most findings point towards an association between exposure events and suicidal behaviour, it remains unclear whether exposure events moderate the *transition* from suicidal ideation to behaviour.

This study aimed to contribute to a better understanding of the role of exposure events within the IMV model. We examined whether the number of exposure events in the past moderates the relationship between lifetime suicidal ideation and recent suicidal behaviour (within the last 2 weeks prior to assessment) in a German sample of psychiatric inpatients, who had recently been admitted to a psychiatric hospital after an acute suicidal crisis or suicide attempt.

We hypothesized that (1a) the more exposure events, the stronger the relationship between lifetime suicidal ideation and recent suicidal behaviour. We assumed that (1b) the more exposure events, the stronger the relationship between lifetime suicidal ideation and the lethality of recent suicidal behaviour. We chose 'lethality' as a second outcome since it might be a better proxy variable to suicide than suicide attempt yes/no. Some suicide attempts are interrupted and aborted or have a very small potential to be lethal (knowingly or unknowingly). We differentiated between four types of exposure events: familial suicides and suicide attempts, and non-familial suicides and suicide attempts (cf. Harris & Bettiol, 2017). Additionally, we hypothesized that (2a) recent attempters report more exposure events than recent suicidal ideators and that (2b) lifetime attempters report more exposure events than lifetime suicidal ideators.

2 | MATERIALS AND METHODS

This study was part of the multicentre study PRESS (prediction of the longitudinal development of suicidal thoughts and behaviours) (for further information, see Forkmann, Glaesmer, Paashaus, Rath, Schönfelder, Juckel, et al., 2020; Forkmann, Glaesmer, Paashaus, Rath, Schönfelder, Stengler, et al., 2020).

2.1 | Participants

This study analysed data from a prospective multicentre study, longitudinally investigating predictors of suicidal ideation and behaviour over the course of 12 months. Further results from this study can be found elsewhere (Forkmann et al., 2020, b; furthermore: Brailovskaia et al., 2019; Höller et al., 2020, 2021; Lucht et al., 2020; Paashaus et al., 2019, 2020, 2021; Rath, Teismann, Hoeller, et al., 2021; Rath, Teismann, Schmitz, et al., 2021; Schönfelder et al., 2020, 2021; Teismann et al., 2021; Wannemueller et al., 2020). In the current examination, only data from the first assessment (T_0) were analysed. The total sample comprised $n = 308$ participants aged 18 to 81 years ($M = 36.8$, $SD = 14.30$), 54% ($n = 165$) were female and 0.3% ($n = 1$) declared that they were neither of male nor female gender. Participants had been admitted to a psychiatric ward due to recent suicide attempt ($n = 163$, 53%) or due to a suicidal intent with intrusive suicidal ideation ($n = 145$, 47%). The most common diagnoses according to the International Classification of Diseases (ICD-10; WHO, 1992) were affective disorders (F3, $n = 235$, 76%), neurotic, stress or somatoform disorders (F4, $n = 110$, 36%), and personality or behavioural disorders (F6, $n = 76$, 25%). Due to missing data, 301 participants were included for further analyses.

2.2 | Procedure

The recruitment of participants took place in 13 different German hospitals. All psychiatric inpatients meeting the inclusion criteria were contacted ($n = 531$). The participation rate was 58%. Participants were interviewed after their admission to the psychiatric ward. They were excluded from participation if their age was below 18 years or they had insufficient knowledge of the German language, acute psychotic symptoms, cognitive impairments or dementia. Prior to assessments, all participants were informed about the purpose of the study, the voluntary nature of their participation, data storage and security. All gave written informed consent. The study was approved in all three study centres by the responsible ethics committees (RWTH Aachen University, Ruhr-Universität Bochum and University of Leipzig) and was in accordance with the Declaration of Helsinki (WHO, 2001). Data collection for T_0 took place between September 2016 and February 2018.

2.3 | Measures

2.3.1 | Self-injurious thoughts and behaviours interview—German version (SITBI-G, Fischer et al., 2014; SITBI, Nock et al., 2007)

The SITBI-G is a structured interview assessing the presence, frequency and characteristics of a wide range of self-injurious thoughts and behaviours. Item 4 ('During how many separate times in your life have you had thoughts of killing yourself? Please give your best

estimate.') and Item 10 ('On average, how intense were these thoughts?') were used to assess suicidal ideation. The latter had to be answered on a Likert scale ranging from 0 ('very low') to 4 ('highest possible intensity'). To combine the information of Items 4 and 10, an aggregate score was calculated by multiplying the number of phases by average intensity. This score was used to index suicidal ideation. Item 36 ('Have you ever made an actual attempt to kill yourself in which you had at least some intent to die', 'yes' or 'no') was used to differentiate between participants with at least one and no lifetime suicide attempt. Participants were assigned to the group of lifetime attempters if their answer was 'yes'. Those who answered 'no' were assigned to the group of lifetime suicidal ideators. All study participants reported at least one episode of suicidal ideation. Good inter-rater and retest reliability and good convergent validity have been shown for the SITBI-G (Fischer et al., 2014).

2.3.2 | Genograms of suicidal behaviour in the social environment (Teismann et al., 2016)

A genogram in paper-and-pencil form, structured like an ancestral chart, was completed with all participants (see Figure 1 for an example or the supporting information for the complete genogram). They were asked whether there had ever been suicides or suicide attempts within their personal social environment. The sum of suicide attempts and the date of the most recent attempt was specified for (non-)blood relatives, friends and acquaintances. The individual counts of events regarding four types of exposure were used: familial suicides and suicide attempts, and non-familial suicides and suicide attempts.

2.3.3 | Recent suicide attempt

The reason for admission was used to code recent suicidal behaviour as '0' (no suicide attempt shortly before admission) or '1' (suicide attempt shortly before admission). Participants with a recent suicide attempt were assigned to the group of recent attempters. Those without a recent attempt were assigned to the group of recent suicidal ideators.

2.3.4 | Suicide Attempt Self-Injury Interview (SASII; Linehan et al., 2006)

The SASII is a structured interview assessing past intentional self-injurious and/or suicidal behaviour. The interviewers assessed the lethality of participants' recent suicide attempt retrospectively (Item 62). The item was answered on a Likert scale ranging from 0 ('very
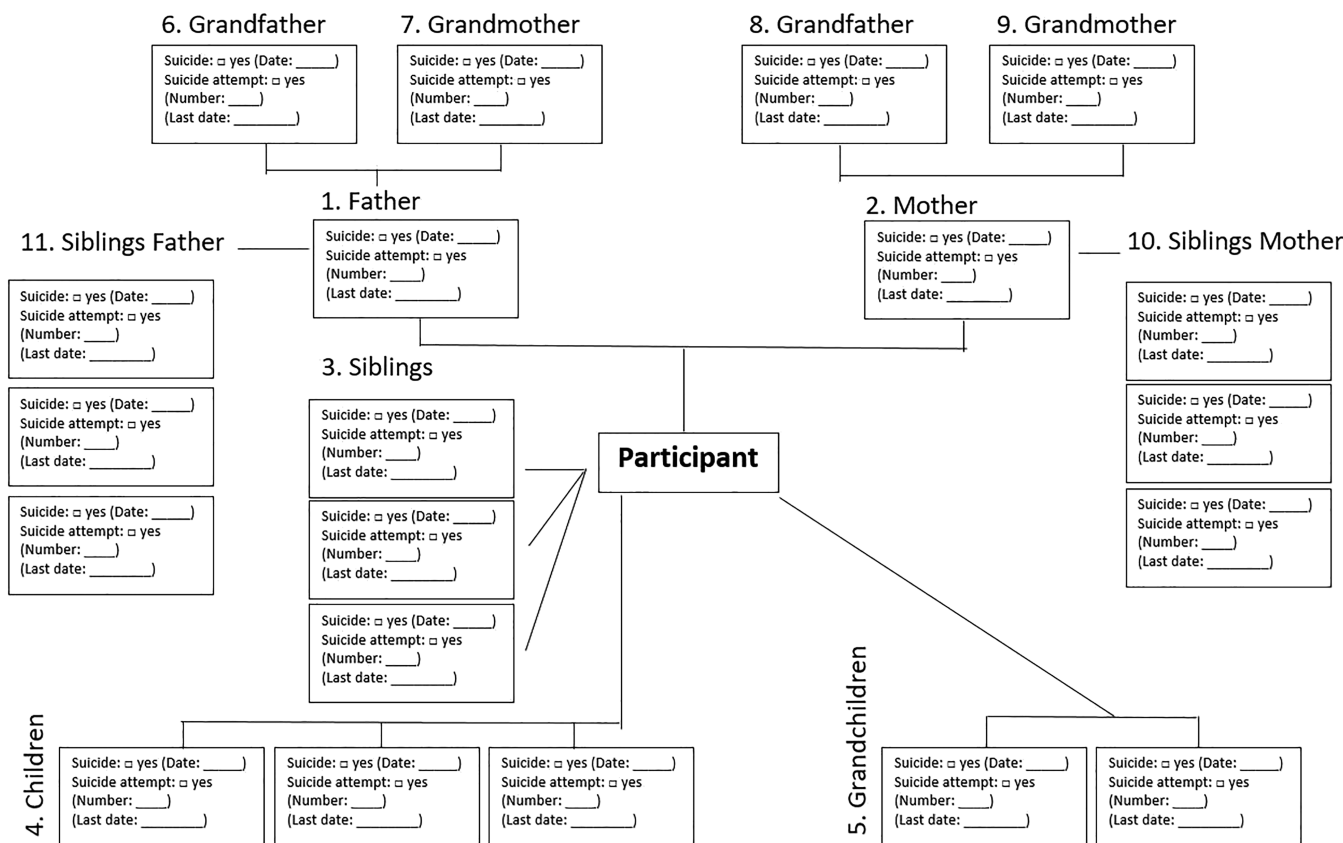

FIGURE 1 The first part of the genogram collecting suicides and suicide attempts of family members

low') to 6 ('extremely high'). Very good interrater reliability and adequate validity have been shown for the SASII (Linehan et al., 2006).

2.4 | Statistical analyses

Statistical analyses were conducted using the SPSS 26 and the PROCESS macro Version 3.1 (Hayes, 2017). First, means, standard deviations and Pearson's correlation coefficients were calculated for all variables to obtain information about the characteristics of the sample and the associations between variables.

Simple moderation analyses were performed to test the hypotheses that the number of exposure events moderates the relationship between lifetime suicidal ideation and the probability of recent suicide attempt (1a) as well as the lethality of recent attempt (1b). For testing Hypothesis 1, Model 1 of the PROCESS macro for moderation analyses with one moderator was employed. The outcome 'recent suicide attempt' (1a) was analysed with logistic regression models based on maximum likelihood estimation (MLE). The outcome 'lethality of recent attempt' (1b) was analysed with linear regression models based on ordinary least squares (OLS) modelling, applicable for analysing count variables (Hayes, 2013). The two outcomes (recent suicide attempt yes vs. no, and lethality of recent suicide attempt) were each used in four separate moderation models with the moderator variables: number of exposure events regarding familial suicides and suicide attempts, and non-familial suicides and suicide attempts. Overall, eight moderation analyses were conducted.

For every single moderator, model fit was computed in terms of R^2, a pseudo-determination coefficient according to McFadden (1973). Moderating effects were indicated by significant interaction terms ($X \times W$ as a predictor of Y; X: number of phases with and intensity of suicidal ideation, W: four types of exposure events and Y: occurrence or lethality of suicidal behaviour). Bootstrapping procedure with 10,000 samples was applied and used to estimate heteroscedasticity-consistent standard errors and confidence intervals. One-tailed testing with 95% confidence intervals was used due to the directed hypotheses. All variables except the dichotomous variable 'recent attempt' were z-standardized to facilitate the interpretation of parameters. Participants who scored at least 1.5 standard deviations over the mean on the variable 'number of phases of suicidal ideation' were deemed to be outliers and were excluded from all analyses ($n = 36$, 12%). This group included participants who indicated chronic suicidal ideation or more than 100 lifetime phases of ideation. Their inclusion would have greatly increased variance and, thus, possibly distorted results. For analyses with the outcome 'lethality of recent attempt', only participants with a completed recent suicide attempt (neither interrupted nor aborted) were included so that a definitive death wish could be assumed ($n = 171$, 57%). Further moderation analyses only including most recent exposure could not be conducted due to a too small subsample ($n = 21$; during the last 12 months).

In order to test group differences in the number of exposure events, two single-factor MANOVAs using the four exposure variables (number of exposure events regarding familial suicides and suicide attempts, and non-familial suicides and suicide attempts) as dependent variables were calculated. The first MANOVA compared recent attempters vs. recent suicidal ideators (Hypothesis 2a). The second one compared lifetime attempters vs. lifetime suicidal ideators (Hypothesis 2b).

3 | RESULTS

3.1 | Descriptive statistics and correlations

Means and standard deviations are presented in Table 1. One hundred and thirty-four participants (44%) were aware of no suicidal behaviour in their social environment during their lifetime. Thirty-seven (12%) reported at least one suicide and 65 (21%) at least one attempted suicide of a family member related by blood, while 78 (25%) had been exposed to the suicide of a non-blood relative, friend or acquaintance and 58 (19%) to a suicide attempt in this environment. One hundred and ninety participants (71%) had attempted suicide at least once in their lifetime. In 120 (39% of the total sample) out of 163 (53%) cases who had recently attempted suicide, the attempt had not been interrupted or aborted.

Lifetime suicidal ideation (number of phases × intensity) was positively correlated with the number of exposure events regarding familial suicides and non-familial suicide attempts (see Table 2). Significant correlations were of small size (ranging from 0.13 to 0.21). Lifetime suicidal ideation was neither correlated with the probability of recent attempt nor with the lethality of recent attempt.

3.2 | Power analyses

We conducted power and sensitivity analyses using G*Power 3.1 (Faul et al., 2009) prior to conducting the moderation analyses. When assuming $\alpha = 0.05$, $\beta = 0.80$ and a moderate $f^2 = 0.15$, a minimal sample size of $n = 77$ would have been required. A sensitivity analysis for the actual sample size of $n = 141$ showed that we were able to detect effects $f^2 > 0.065$.

3.3 | Moderation analyses

Regarding the number of exposure events moderating the relationship between lifetime suicidal ideation and the probability of recent suicide attempt (Hypothesis 1a), only the moderation model with the moderator 'number of familial suicide attempts' reached statistical significance (see Table 3). Low values of the pseudo-R^2 showed a poor model fit. None of the interaction terms were significant.

Regarding the number of exposure events moderating the relationship between lifetime suicidal ideation and the lethality of recent suicide attempt (Hypothesis 1b), none of the moderation models reached statistical significance (see Table 4).

	Exposed participants[a]			All participants		
	N	M	SD	N	M	SD
Lifetime SI						
Mean intensity (0–4)	140	2.44	0.83	261	2.51	0.81
Number of phases	140	11.64	13.29	264	10.72	12.76
Aggregate score	140	29.13	37.84	263	26.82	35.01
Lifetime exposure events						
All	133	2.85	2.99	253	1.50	2.59
FS	140	0.31	0.59	264	0.16	0.46
FSA	137	1.07	2.28	259	0.57	1.74
NFS	140	0.71	0.92	264	0.38	0.76
NFSA	136	0.79	1.59	258	0.42	1.22
Lethality of recent SA (0–6)	81	3.49	1.21	143	3.46	1.22
Number of lifetime SA	140	1.73	2.11	264	1.83	3.02

TABLE 1 Means and standard deviations for all study variables

Note: Aggregate score = mean intensity multiplied by the number of phases of suicidal ideation.
Abbreviations: FS, number of reported familial suicides; FSA, number of reported familial suicide attempts; NFS, number of reported non-familial suicides; NFSA, number of reported non-familial suicide attempts; SA, suicide attempt(s); SI, suicidal ideation.
[a]The exposed group includes all participants who reported at least one exposure event of any of the four types.

	SI	FS	FSA	NFS	NFSA	Recent SA	Lethality SA
SI							
FS	0.13*						
FSA	0.10	0.06					
NFS	−0.04	0.08	0.13*				
NFSA	0.21*	0.05	0.16*	0.09			
Recent SA	−0.12	−0.01	−0.04	−0.01	−0.10		
Lethality SA	−0.03	0.02	−0.03	−0.01	0.05	0.01	

TABLE 2 Correlation matrix with Pearson's product–moment correlations of all study variables

Abbreviations: FS, number of reported familial suicides; FSA, number of reported familial suicide attempts; lethality SA, lethality of recent suicide attempt; NFS, number of reported non-familial suicides; NFSA, number of reported non-familial suicide attempts; SA, suicide attempt; SI, aggregate score of numbers of phases and intensity of lifetime suicidal ideation.
*$p < 0.05$.

	Overall model				Interaction terms			95% CI	
	n	χ^2	p	R^2	b	SE	p	LLCI	ULCI
FS	258	4.952	0.175	0.014	−0.135	0.205	0.315	−0.586	0.136
FSA	258	10.876	0.012*	0.030	−0.847	0.614	0.053	−2.554	−0.197
NFS	258	7.588	0.055	0.021	−0.391	0.292	0.077	−1.186	−0.044
NFSA	252	4.874	0.181	0.014	−0.019	0.366	0.858	−0.953	0.219

TABLE 3 Overall moderation models with the outcome, recent attempt and moderating effects of exposure variables indicated by the interaction terms

Abbreviations: b, standardized regression coefficient; CI, confidence interval; FS, number of reported familial suicides; FSA, number of reported familial suicide attempts; LLCI, lower-limit confidence interval; NFS, number of reported non-familial suicides; NFSA, number of reported non-familial suicide attempts; R^2, pseudo-determination coefficient according to McFadden (1973); SE, standard error; ULCI, upper-limit confidence interval.
*$p < 0.05$.

TABLE 4 Overall moderation models with the outcome, lethality of recent attempt and moderating effects of exposure variables indicated by the interaction terms

	Overall model				Interaction terms			95% CI	
	n	F[a]	p	R²	b	SE[a]	p	LLCI[a]	ULCI[a]
FS	141	1.409	0.243	0.013	0.032	0.041	0.359	−0.042	0.117
FSA	141	0.406	0.749	0.005	0.003	0.116	0.999	−0.079	0.351
NFS	141	0.437	0.727	0.006	0.023	0.090	0.821	−0.147	0.199
NFSA	138	0.904	0.441	0.019	−0.025	0.065	0.681	−0.154	0.094

Abbreviations: b, standardized regression coefficient; CI, confidence interval; FS, number of reported familial suicides; FSA, number of reported familial suicide attempts; LLCI, lower-limit confidence interval; NFS, number of reported non-familial suicides; NFSA, number of reported non-familial suicide attempts; R^2, determination coefficient; SE, standard error; ULCI, upper-limit confidence interval.
[a]Heteroscedasticity-consistent estimates after Cribari-Neto.

3.4 | Group differences

Regarding Hypothesis 2a, we found no differences in the number of exposure events between participants with and without a recent attempt, $F(4, 157) = 0.724$, $p = 0.577$, $\eta^2 = 0.018$ (see Table 5). Regarding Hypothesis 2b, we also found no significant differences between participants with and without lifetime suicide attempts (only suicidal ideation), $F(4, 280) = 0.617$, $p = 0.651$, $\eta^2 = 0.009$.

4 | DISCUSSION

This study investigated whether the number of familial or non-familial suicides or suicide attempts moderates the relationship between lifetime suicidal ideation and recent suicidal behaviour in a German inpatient sample. We hypothesized that (1a) the more exposure events, the stronger the relationship between lifetime suicidal ideation and recent suicidal behaviour, and that (1b) the more exposure events, the stronger the relationship between lifetime suicidal ideation and the lethality of recent suicidal behaviour. We also examined whether the groups of suicide attempters and suicidal ideators (both recent and lifetime) differed regarding the number of exposure events of each type. In this regard, we hypothesized that (2a) the recent attempters report more exposure events than recent suicidal ideators and that (2b) the lifetime attempters report more exposure events than lifetime suicidal ideators.

Regarding Hypothesis 1a, no effects could be found. However, the interaction effect of the moderator 'number of familial suicide attempts' with the outcome 'recent attempt' almost reached statistical significance. Nevertheless, this effect was negative: For exposed participants, more suicidal ideation predicted a lesser likelihood of recent attempt. Regarding Hypothesis 1b, no effects could be found. We also found no evidence to support the hypotheses that participants who had recently attempted suicide (2a) or at least once in their lifetime (2b) differed in the number of exposure events from those who had no recent or lifetime attempt.

According to our knowledge, this is the first study examining the role of exposure as a volitional moderator (cf. O'Connor & Kirtley, 2018). Previous research had only conducted group comparisons showing that lifetime suicide attempters reported more exposure events than suicidal ideators (Branley-Bell et al., 2019; Dhingra et al., 2015; Wetherall et al., 2018). Others had employed structural equation modelling (Dhingra et al., 2016) and reported exposure events to be predictive of an individual's own suicidal behaviour or network analysis (De Beurs et al., 2019) and reported exposure events to explain little variance in current suicidal ideation. However, the moderating effect of exposure events on the relationship between suicidal ideation and behaviour had not been tested before.

In contrast to meta-analyses showing the risk for suicidal behaviour to be elevated in individuals reporting lifetime exposure events compared to individuals without exposure (Hill et al., 2020; Maple et al., 2017; Pitman et al., 2014), this prominent finding was not reflected in our results. One reason could be the low rates of exposure events in both the overall sample and the exposed subgroup. Rates were lower than in previous studies (e.g., Branley-Bell et al., 2019; Wetherall et al., 2018). This could have complicated finding any moderating effects or group differences between suicide attempters and ideators. In our study, only the number of familial suicide attempts was higher (almost reaching significance in moderating the relationship between lifetime suicidal ideation and recent suicidal behaviour).

Nevertheless, the marginally significant effect for exposure to familial suicide attempts was negative. A possible explanation for the direction of the effect could be that exposure events regarding familial suicide attempts implicate a close relationship with the other person, leading to the individual experiencing the negative antecedents and consequences of the other's suicide attempt. Thus, suicidal behaviour might not be perceived as an effective coping mechanism, and the initiation of one's own suicidal behaviour is inhibited (Chiles et al., 1985; Pitman et al., 2017). Mercy et al. (2001) postulated that protective effects of exposure events could be explained not by close relationships, but by emotional distance, meaning that it might be that our participants had no intimate relationship with the family members whose attempts they had been exposed to.

	Recent attempters		Recent ideators		Lifetime attempters		Lifetime ideators	
	M	SD	M	SD	M	SD	M	SD
FS	0.13	0.39	0.21	0.50	0.11	0.46	0.16	0.44
FSA	0.83	3.27	1.06	2.76	0.39	0.92	0.86	2.89
NFS	0.34	0.65	0.40	0.64	0.32	0.88	0.36	0.65
NFSA	0.41	1.39	0.78	1.81	0.48	1.39	0.48	1.51

TABLE 5 Means and standard deviations of the number of exposure events reported by recent and lifetime attempters and ideators

Abbreviations: FS, number of reported familial suicides; FSA, number of reported familial suicide attempts; NFS, number of reported non-familial suicides; NFSA, number of reported non-familial suicide attempts.

Another reason for missing moderating effects might refer to further aspects of the quality of exposure events, namely, the recency and intensity or personal appraisal—the latter of which could partly depend on the nature of the relationship. It has been noted that the risk for suicidal behaviour might be elevated only within the first year after exposure (Feigelman & Gorman, 2008) or especially within this time period (Abrutyn & Mueller, 2014; Chan et al., 2018). While the intensity of the exposure event has not been measured in the present study, we could not consider the recency of events, because recent exposure events had been rare and some participants could not recall the dates of events. The latter aspect might not be a shortcoming of our study but a rather general problem of people remembering exposure dates of years or decades ago. Excluding these participants from the analyses was not possible, since the remaining sample would not have been sufficiently powered. On the other hand, among the few studies which have examined the recency of exposure events, there are also indications of long-term effects of exposure events that occurred more than 1 year ago (De Leo & Heller, 2008; Mueller et al., 2015). Furthermore, the lack of effects in our results could also be due to not controlling for further potentially confounding variables (e.g., depressive symptoms: Wong et al., 2005; poor parent–child relationship and low family cohesion: Ho et al., 2000; and age of first exposure: Burke et al., 2010). Considering Ho et al.'s (2000) findings about parent–child relationship and family cohesion, the relationship between the person attempting suicide or dying by suicide and the person being exposed to this behaviour might be relevant. While we concluded familial exposure to be of higher relevance than non-familial exposure to suicidal behaviour, there might be stronger relationships between friends than between family members for some people. Consequently, the quality of the relationship, besides the recency and intensity of the exposure, should be examined more specifically in future research.

Furthermore, using an unweighted count of events for analysing exposure to suicide (compared to suicide attempts) could be problematic, since suicides can have at least as dramatic interpersonal consequences as attempts but are much less common. The integration of dimensions of the quality of exposure events, such as intensity and personal relevance, has been lacking in exposure research so far. The use of unweighted count variables could partly explain why we did not find any effects of exposure events, especially regarding suicides.

Finally, we used a sample containing participants of all age groups. Most of the research reporting exposure to be a risk factor for suicidal behaviour has been conducted on adolescents.

The null results found in the present study suggest that effects might differ depending on age. The development of identity formation, for example, strategies to cope with psychological distress, puts adolescents in a position of increased vulnerability and susceptibility (Abrutyn & Mueller, 2014). It seems that the occurrence of exposure events during this vulnerable phase increases the risk of an individual's suicidal behaviour specifically during adolescence (e.g., Hill et al., 2020), but not so much later in life.

4.1 | Limitations

Interpreting the results of this study, some strengths and weaknesses must be kept in mind. Although we could not find any significant effects of exposure events on the relationship between suicidal ideation and suicidal behaviour, we did consider and improve some of the weaknesses of previous research. We used a large clinical high-risk sample including participants of different age groups, who were asked about different types of exposure events. We analysed these types separately and considered the moderating role of exposure events as suggested by the IMV model. Although the data used in this study were assessed simultaneously, it can be assumed that lifetime suicidal ideation and exposure events preceded the recent suicidal attempt, the reason for the hospitalization at the time of the examination. Thus, the investigation of the assumed causal relationships appears to be justified.

However, there are some limitations that need to be acknowledged. First, suicidal ideation was measured through retrospective self-reports, which are prone to memory bias. The increased salience of suicidal ideation due to the patients' recent admission to the psychiatry could have resulted in an erroneously high estimate of lifetime suicidal ideation. Alternatively, the recent suicidal crisis could have had a cathartic effect on those with a recent attempt (cf. Sarfati et al., 2003) and, therefore, produced an erroneously low estimate of lifetime suicidal ideation. Lethality of recent suicide attempt was also assessed retrospectively in our study and included only the subjective categorization by interviewers, which, in turn, had to rely on participants' subjective description of their suicide attempt. Furthermore,

assessing the frequency of lifetime suicidal ideation in phases holds potential difficulties because there is no definition of what is actually meant by 'phase'. It is questionable whether a phase can be continuous or whether each interruption, for example, by sleep, marks a new phase.

Second, the assessment of exposure events through genograms depends on the ability of participants to report such events. Information about estranged family members and former generations is likely to be incomplete. In some genograms, question marks indicated uncertainty of the number of suicide attempts. It is possible that the number of events was either underestimated or overestimated. Future research should meet this challenge, for example, by recruiting the family members of patients for the completion of genograms. Additionally, interviewers did not assess the quality of exposure events. Therefore, only the frequency of events was examined in our analyses. The quality of exposure events can differ in many aspects, for example, regarding the intensity (e.g., depending on whether the suicidal behaviour was witnessed first-hand, cf. Ventrice et al., 2010), personal relevance (e.g., depending on the quality of the relationship with the other person) or recency of the event. It remains unclear whether exposure events can have differential effects on one's own suicidal behaviour depending on quality.

Lastly, the usefulness of the outcomes 'probability of recent attempt' and 'lethality of recent attempt', only assessing suicidal behaviour at one point in participants' lifetime, may be limited. The majority of our participants had conducted at least one suicide attempt in their lifetime. However, only about half of the sample had attempted suicide recently. In every suicidal crisis, many factors affect a person's volition simultaneously. This could explain why lifetime suicidal ideation was not correlated with recent suicidal behaviour. O'Connor and Kirtley (2018) argue for the joint consideration of these factors in risk trajectories because of the potentially limited explanatory value of singular risk factors. In a psychological autopsy study on a sample of deceased people, Phillips et al. (2002) found that 96% of those who met the criteria for six or more risk factors for suicide had died by suicide. However, not one person who had been exposed to a maximum of two risk factors had died by suicide. Since exposure has been found a risk factor for suicidal behaviour in many studies, it is recommended to investigate this characteristic in the context of risk assessment and therapy of patients. Separate determinants of the transition from ideator to attempter which have been considered so far do not have sufficient explanatory value to enable an aetiological understanding, which is why the consideration of interactions and comprehensive cause–effect relationships seems to be a promising approach for future research (Phillips et al., 2002). Recent developments in using machine learning approaches to predict suicidal ideation and suicide attempts (e.g., Huang et al., 2020; Ribeiro et al., 2019) highlight the shift away from a focus on single risk factors to a focus on models using multiple predictors. Yet research in this area is inconclusive (van Mens et al., 2020) and the prediction of suicidal behaviour will continue to be only approximate (Belsher et al., 2019).

4.2 | Conclusions

Exposure events in the social environment have been highlighted as a risk factor for an individual's own suicidal behaviour. Recent research suggests that it is important to differentiate between different types of exposure and to examine their relation to suicidal ideation and suicidal behaviour. Our study was the first to examine moderating effects of exposure events on the relationship between suicidal ideation and suicidal behaviour. The participants constituted a mixed-age clinical sample. Overall, our findings suggest that the number of exposure events neither moderates the relationship between lifetime suicidal ideation and recent suicide attempt nor between lifetime suicidal ideation and the lethality of a recent suicide attempt. Additionally, neither recent suicidal ideators and attempters nor lifetime suicidal ideators and attempters differed in the number of exposure events. Future studies should concentrate on examining the moderating effect of different types of exposure events on the relationship between suicidal ideation and suicidal behaviour within the IMV model of suicidal behaviour longitudinally in a large exposed sample, while considering the intensity, personal appraisal and recency of exposure events.

CONFLICT OF INTERESTS

There is no conflict of interest for any author of the submitted manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Inken Höller https://orcid.org/0000-0001-6572-1421
Laura Paashaus https://orcid.org/0000-0002-9713-9783

Antje Schönfelder https://orcid.org/0000-0002-2009-0512

Dajana Rath https://orcid.org/0000-0003-3976-3016

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