



Suicidal ideation in patients with diabetes and childhood abuse – The mediating role of personality functioning: Results of a German representative population-based study

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ABSTRACT

Aims: Suicidal ideation (SID) in patients with diabetes mellitus is increasingly acknowledged. Still, the underlying mechanisms are unclear. We examined SID prevalences in patients with diabetes, its association with different types of abuse, and a mediating effect of personality functioning.

Methods: In a representative population sample ($N = 2,515$), diabetes, SID, abuse (ICAST-R), personality functioning (OPD-SQS), and depression/anxiety (PHQ-4) were assessed by self-report. Statistical analyses comprised χ^2 -Tests, logistic regression and mediation analyses.

Results: The prevalence of SID (21.8 %) was three fold higher in patients with diabetes compared to the general population. Abuse further increased the likelihood to report SID in diabetes patients (sexual: 48.1 % vs. 18.2 %; $\chi^2_{(1)} = 12.233$, $p < .001$; emotional: 35.7 % vs. 15.7 %; $\chi^2_{(1)} = 10.892$, $p < .001$). A dose–response relationship between the number of abuse experiences and SID was observed (one abuse experience: OR = 1.138, 95 %-CI [0.433, 2.990], $p = .793$, >2 abuse experiences: OR = 2.693, 95 %-CI [1.278, 5.675], $p = .009$). Impaired personality functioning had an indirect effect on the association between emotional abuse and SID ($b = 0.25$, 95 %-CI [0.037, 0.551]).

Conclusions: Diabetes patients experience increased SID prevalences, especially those with emotional or sexual abuse. In individuals with a history of emotional abuse, impaired personality functioning partly explained SID and should therefore be considered and addressed in this patient group.

1. Introduction

With suicidal ideation and suicidal behavior being a known phenomenon in individuals experiencing multimorbidity, research on its associated factors has been an object of increasing interest [1,2]. Accordingly, research on suicidal crises in patients with diabetes has substantially expanded [3]. Evidence pointed out that suicidal ideation –

contemplations and wishes regarding death and suicide – as well as suicide attempts or completed suicide are prevalent in this patient group. Meta-analytic evidence of cross-sectional studies shows a prevalence of suicidal ideation among patients with diabetes of 16.2 % and a significantly higher risk for suicide attempts with an odds ratio of 1.45 (95 % CI: 1.07–1.96) [4]. Research focusing on risk factors for these increased suicidal crises has pointed to the role of e.g., diabetes

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duration, HbA_{1c} levels and depressive symptoms [5,6].

Another line of research promotes adverse childhood experiences (ACEs) as a risk factor for impairments in mental and physical health as well as suicidal ideation and behavior in different populations [7]. ACEs comprise experiences of abuse, neglect, or other household adversities [8]. In the context of managing a chronic condition such as diabetes, ACEs also implicate a lack of self-care, as evidenced by poor health behaviors and medical adherence [9]. This in turn is in itself a risk factor for the development, maintenance, and exacerbation of both physical and mental illness [10,11]. Still, little is known about the role of ACEs regarding suicidal ideation in patients with diabetes as well as its underlying mechanisms.

Persons with a history of childhood abuse might have suffered from experiences of sexual, physical or emotional abuse, often resulting in disruptions of a child's physical or psychological health and development [8]. This, especially if experienced repeatedly, often results in impaired personality functioning [12,13]. Personality functioning is a dimensional conception of a person's ability in e.g., emotion regulation, cognition/perception, communication or building interpersonal relationships [14]. Both the DSM-5 as well as the ICD-11 incorporated this more dimensional assessment of personality functioning for the diagnosis of personality disorders [15,16]. Evidence indicates that personality functioning enhances our understanding of the link between ACEs and adult psychopathology and physical health such as depression and anxiety, posttraumatic stress disorder and diabetes [17–20]. Further, a representative population-based study in the German population found a mediating effect of personality functioning in the association between childhood abuse and neglect and self-harm [21], pointing to its relevance for understanding the underlying pathways between ACEs and suicidal ideation or self-harm. Extending respective models to individuals with chronic illness could inform prevention and intervention efforts as they could highlight potentially modifiable, proximal risk factors implicated in suicidal crises. Notably, experts have stated that the links between chronic illness and suicidality are likely indirect and shaped by psychological factors that have so far been insufficiently addressed by empirical research [22].

To enhance our understanding of suicidal ideation in patients with diabetes the aims of this study were to examine 1) the prevalence of suicidal ideation in patients with diabetes and childhood abuse compared to no childhood abuse, 2) the association between different types of abuse and suicidal ideation, and 3) the underlying mechanisms between childhood abuse and suicidal ideation by considering personality functioning as a mediator.

2. Subjects, materials and methods

2.1. Sample

Data of $N = 2,515$ participants were collected in a representative survey of the German population conducted by the independent research institute USUMA GmbH Berlin. Between July and October 2021, households within 258 predefined regions were selected by a random route procedure, and in households with multiple persons, the person to be interviewed was randomly selected using the Kish-Selection-Grid [23]. Inclusion criteria were sufficient German language skills, an age > 16 and informed consent before taking part in the study. The study was conducted in accordance with the Declaration of Helsinki and fulfilled the ethical guidelines of the International Code of Marketing and Social Research Practice of the International Chamber of Commerce and the European Society of Opinion and Marketing Research. Ethical approval was obtained by the Ethics Committee of the Medical Faculty of the University of Leipzig (no. 298/21-ek).

2.2. ICAST-R

The self-report questionnaire ISPAN Child Abuse Screening Tools-

Retrospective (ICAST-R) was used to assess childhood abuse retrospectively. It consists of 36 items, covering the areas of sexual, physical and emotional child abuse with response options of either yes or no. The ICAST-R has been used in numerous studies internationally and showed moderate to good reliability, with Cronbach's $\alpha = 0.82$ for sexual abuse, 0.61 for physical abuse and 0.63 for emotional abuse [24]. In the present study, Cronbach's α was acceptable with $\alpha = 0.79$ for sexual abuse, $\alpha = 0.74$ for physical abuse and $\alpha = 0.72$ for emotional abuse.

2.3. OPD-SQS

The Operationalized psychodynamic diagnosis structure questionnaire-short form (OPD-SQS) is a self-report questionnaire to screen for impairments in personality functioning. It comprises the three subscales 1) self-perception, 2) interpersonal contact, and 3) relationship model, with four items each. Response options range from 0 = 'does not apply at all' to 4 = 'fully applies', resulting in a sum score ranging from 0 to 48, with higher scores indicating more severe deficits in personality functioning. The OPD-SQS showed good internal consistency ($\alpha = 0.88$) [25]. In the present study, Cronbach's alpha was good for both the total scale and the subscales (total: $\alpha = 0.91$, self-perception: $\alpha = 0.86$, interpersonal contact: $\alpha = 0.84$ and relationship model: $\alpha = 0.83$).

2.4. PHQ-4

To assess symptoms of depression and anxiety, the Patient Health Questionnaire (PHQ-4) consisting of four items was used [26]. It comprises two items of the Generalized Anxiety Disorder Scale-2 (GAD-2) to assess anxiety symptoms and two items of the PHQ-2 to assess depression symptoms. Response options range from 0 = 'not at all' to 3 = 'nearly every day', resulting in a sum score between 0 and 12, with scores ≥ 6 indicating a probable presence of a depressive or anxiety disorder and scores ≥ 9 indicating a highly probable presence of a depressive or anxiety disorder. The PHQ-4 showed good reliability with a McDonald's omega of $\omega = 0.85$ [27]. In the present sample, the internal consistency was good with a McDonald's omega of $\omega = 0.86$.

2.5. Diabetes

Diabetes was assessed through self-report. All participants who answered the question of a diabetes diagnosis with 'yes' were included as patients with diabetes.

2.6. Suicidal ideation

Using a single item of the 9-item version of the Patient Health Questionnaire (PHQ-9) [28], participants were asked how often over the last two weeks they felt bothered by thoughts that they would be better off dead or hurting themselves in some way. Response options ranged from 0 = 'not at all' to 3 = 'nearly every day'. In line with previous research, participants answering with at least 1 = 'several days' were classified as reporting suicidal ideation [29]. This item has previously shown predictive validity.

2.7. Statistical analyses

Population-representative prevalences of suicidal ideation in patients with diabetes were calculated with a weight variable, adjusting for age, sex, and region. Subgroup analyses employing Chi²-Tests examined differences in the frequency of suicidal ideation in patients with diabetes and childhood abuse and without childhood abuse. The effect size was examined with ϕ as appropriate for a 2×2 contingency table. A value of 0.1 is considered a small effect, 0.3 a medium effect and 0.5 a large effect.

A logistic regression analyses was employed to investigate a possible dose-response relationship between the number of abuse experiences

and the likelihood of suicidal ideation. A categorical variable was computed classifying 0 abuse experiences, 1 abuse experience and more than 2 abuse experiences. The explained variance is indicated with Nagelkerke's R^2 with $R^2 > 0.2$ considered a small effect, >0.4 a medium effect and >0.5 a large effect. Odds ratios (ORs) indicate the probability of the occurrence or non-occurrence of suicidal ideation. Sex and age were entered as covariates.

Separate mediation analyses for sexual, emotional and physical abuse were performed to investigate a possible mediating effect of personality functioning in the association between childhood abuse and suicidal ideation in individuals with diabetes. Using the PROCESS macro version 4.1 by Hayes [30] for IBM SPSS Statistics, the respective dichotomous abuse variable was entered as the independent variable, the OPD-SQS sum score as the mediator, the dichotomous variable for suicidal ideation as the dependent variable and to control for symptoms of depression and anxiety, the PHQ-4 sum score was included as a covariate. The mediation effect is evaluated by employing bootstrapped 95 % confidence intervals (CI) for the indirect effect of childhood abuse on suicidal ideation through personality functioning. A relevant mediation effect is indicated when the CI for the indirect effect exclude zero. All statistical analyses were conducted in SPSS version 28.

3. Results

The total sample comprised $N = 2,496$ participants. Fig. 1 displays details on the inclusion and exclusion criteria. Male and female participants were distributed almost equally (48.3 % and 51.7 %) and $n = 213$ individuals reported having diabetes (8.5 %). Table 1 shows detailed sociodemographic characteristics of the total sample as well as patients with and without diabetes.

The adjusted population-representative prevalence of suicidal ideation at least on 'several days' was 8.2 % ($n = 208$) in the total sample and 21.8 % ($n = 48$) in patients with diabetes. Subgroup analyses revealed that patients with diabetes and any type of childhood abuse were significantly more likely to report suicidal ideation than patients with diabetes but no childhood abuse ($n = 28$, 30.0 % vs. $n = 20$, 15.7 %; $\chi^2_{(1)} = 6.470$, $p = .011$, $\phi = 0.171$). More specifically, this association emerged for patients with diabetes and sexual abuse ($n = 13$, 48.1 % vs. $n = 35$, 18.2 %; $\chi^2_{(1)} = 12.233$, $p < .001$, $\phi = 0.235$) or emotional abuse ($n = 24$, 35.7 % vs. $n = 24$, 15.7 %; $\chi^2_{(1)} = 10.892$, $p < .001$, $\phi = 0.222$), but not for patients with diabetes and physical abuse ($n = 19$, 29.2 % vs. $n = 29$, 18.5 %; $\chi^2_{(1)} = 3.133$, $p = .077$, $\phi = 0.119$). For details, see also Table 2.

The logistic regression model to examine the effect of multiple abuse experiences on suicidal ideation in diabetes patients was adjusted for age and sex and explained a small but statistically significant amount of variance ($\chi^2_{(4)} = 11.570$, $p = .021$, $R^2 = 0.082$). A dose-response relationship between the number of abuse experiences and suicidal ideation was observed, as with more than two abuse experiences the odds of suicidal ideation significantly increased compared to no abuse (one abuse experience: OR = 1.138, 95 % CI [0.433, 2.990], $p = .793$, more than two abuse experiences: OR = 2.693, 95 % CI [1.278, 5.675], $p = .009$). While age was not a significant predictor for suicidal ideation ($p = .796$), gender differences were observed. Women were significantly more likely to report suicidal ideation than men (OR = 2.000, 95 % CI [1.012, 3.955], $p = .046$).

The model that tested whether the association between emotional abuse and suicidal ideation was mediated through personality functioning was statistically significant ($p < .001$) and explained 49.6 % of the variance in suicidal ideation. A significant indirect effect (mediating effect) of personality functioning emerged ($b = 0.25$, 95 % CI [0.037, 0.551]). The mediation models for the association between physical abuse or sexual abuse and suicidal ideation, mediated through personality functioning, were statistically significant ($p < .001$) and explained 49.1 % and 51.3 % of the variance in suicidal ideation. In these models, no significant indirect effect of personality functioning between physical

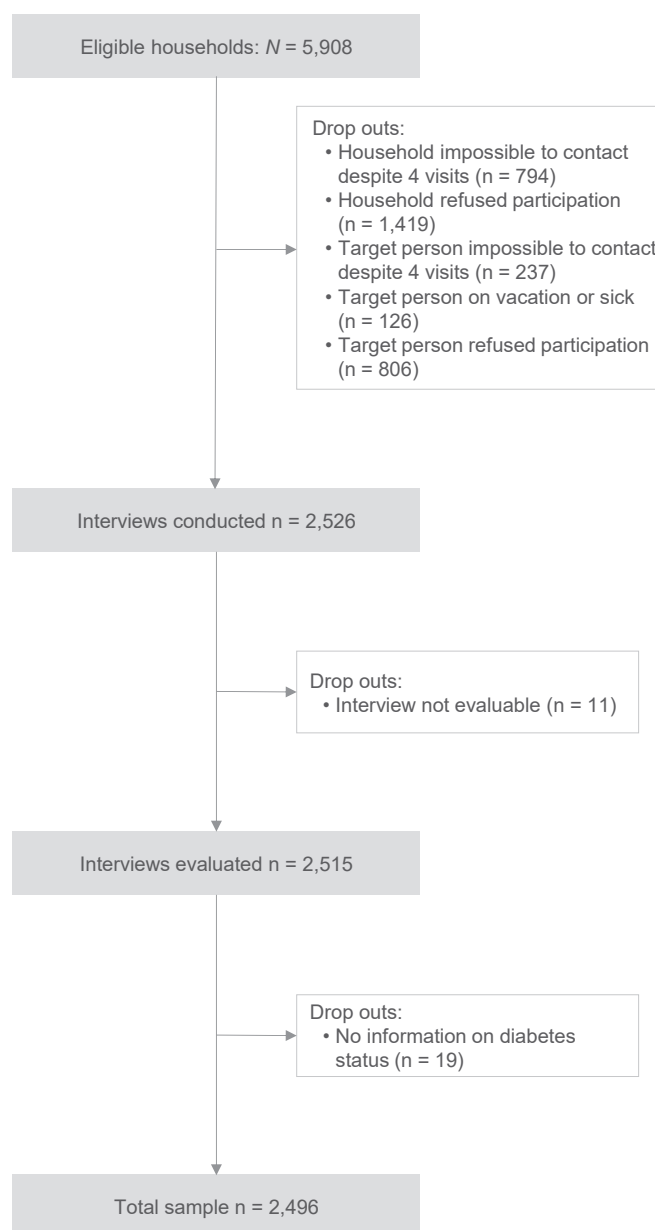


Fig. 1. Overview of eligible households, conducted interviews and evaluated interviews.

abuse ($b = 0.15$, 95 % CI [-0.029, 0.377]) and sexual abuse ($b = 0.10$, 95 % CI [-0.175, 0.378]) and suicidal ideation emerged. For details, see also Fig. 2.

4. Discussion

The key finding of this study is the impact of different abuse types on suicidal ideation in patients with diabetes as well as the mediating effect of impaired personality functioning in the association between emotional abuse and suicidal ideation.

Our study shows that with 21.8 % the prevalence of suicidal ideation in patients with diabetes is three times higher compared to 8.2 % in the general population. These findings are in line with previous studies, presenting a prevalence of suicidal ideation of 16 % in patients with diabetes and 8 % in the general German population respectively [4,31]. Hence, we add to the evidence showing that patients with diabetes are a high-risk group that experiences increased psychological burden in terms of suicidal ideation. Different aspects regarding the increased

Table 1
Demographic characteristics of the total sample and patients with and without diabetes.

	total sample* (N = 2,496)		patients with diabetes [†] (n = 213)		patients without diabetes (n = 2,283)		χ^2 -Test/t-test
	M	(SD)	M	(SD)	M	(SD)	
age	50.1	(18.0)	67.5	(12.9)	48.5	(17.6)	$t_{(291,180)} = 19.768, p < .001$ Cohen's d = 1.098, 95 % CI [0.954, 1.241]
	n	(%)	n	(%)	n	(%)	
sex							
male	1,204	(48.3)	112	(52.8)	1,092	(47.8)	$\chi^2_{(1)} = 1.941, p = .164$
female	1,291	(51.7)	100	(47.2)	1,191	(52.2)	Cramer's V = 0.028, 95 % CI [0.001, 0.066]
partnership status [‡]							
single	790	(31.7)	22	(10.3)	768	(33.7)	$\chi^2_{(2)} = 76.827, p < .001$
married	1,039	(41.7)	87	(40.8)	952	(41.8)	Cramer's V = 0.176, 95 % CI [0.140, 0.213]
divorced/widowed	663	(26.6)	104	(48.8)	559	(24.5)	
educational years [§]							
<10	767	(30.8)	121	(56.8)	646	(28.3)	$\chi^2_{(2)} = 74.849, p < .001$
10–13	1,474	(59.1)	82	(38.5)	1,392	(61.1)	Cramer's V = 0.173, 95 % CI [0.133, 0.213]
>13	252	(10.1)	10	(4.7)	242	(10.6)	
monthly income							
<1,250 €	310	(12.6)	59	(28.1)	251	(11.2)	$\chi^2_{(2)} = 72.457, p < .001$
1,250–2,500 €	1,009	(41.2)	102	(48.6)	907	(40.5)	Cramer's V = 0.172, 95 % CI [0.133, 0.219]
>2,500 €	1,133	(46.2)	49	(23.3)	1,084	(48.3)	

notes. *Missings: n = 19 people did not provide any information about their diabetes status and were excluded from all analyses. [†]Diabetes (yes/no) was assessed via self-report (n = 221). [‡]Married comprises married people living together and married people living apart. Single comprises people who are neither married, nor divorced. [§]< 10 years of education comprise people without any school-leaving qualification, students, or people with between 8 and 10 years of school. More than 13 years of education comprises people with a university qualification. ^{||}equalized monthly household income.

Table 2
Association between different types of childhood abuse* and suicidal ideation[†] in patients with and without diabetes[‡].

		patients with diabetes (n = 221)			patients without diabetes (n = 2,275)		
		suicidal ideation		χ^2 -Test	suicidal ideation		χ^2 -Test
		yes	no		yes	no	
childhood abuse – any type	yes	28 (30.0)	66 (70.0)	$\chi^2_{(1)} = 6.470,$ $p = .011, \phi = 0.171$	109 (15.2)	607 (84.8)	$\chi^2_{(1)} = 108.468,$ $p < .001, \phi = 0.218$
	no	20 (15.7)	107 (84.3)		50 (3.2)	1,509 (96.8)	
sexual abuse	yes	13 (48.1)	14 (51.9)	$\chi^2_{(1)} = 12.233,$ $p < .001, \phi = 0.235$	53 (27.7)	138 (72.3)	$\chi^2_{(1)} = 138.182,$ $p < .001, \phi = 0.246$
	no	35 (18.2)	159 (81.8)		106 (5.1)	1,978 (94.9)	
physical abuse	yes	19 (29.2)	47 (70.8)	$\chi^2_{(1)} = 3.133,$ $p = .077, \phi = 0.119$	78 (17.5)	367 (82.5)	$\chi^2_{(1)} = 93.076,$ $p < .001, \phi = 0.202$
	no	29 (18.5)	126 (81.5)		81 (4.5)	1,749 (95.5)	
emotional abuse	yes	24 (35.7)	43 (64.3)	$\chi^2_{(1)} = 10.892,$ $p < .001, \phi = 0.222$	87 (17.6)	408 (82.4)	$\chi^2_{(1)} = 110.596,$ $p < .001, \phi = 0.220$
	no	24 (15.7)	129 (84.3)		72 (4.0)	1,708 (96.0)	

notes. *Different types of childhood abuse were assessed with the self-report questionnaire ISPAN Child Abuse Screening Tools-Retrospective (ICAST-R). [†]Suicidal ideation was assessed via a single item from the 9-item version of the Patient Health Questionnaire (PHQ-9). [‡]Diabetes (yes/no) was assessed via self-report.

prevalence in patients with diabetes have been discussed. For example, due to the often required medication with insulin, patients with diabetes have a readily available means to overdose. Having access to lethal means is one of the strongest risk factors for suicide attempts and deaths [32]. Indeed, dying by suicide by insulin overdose is well documented in the literature [33]. Further, sexual and emotional abuse in childhood were also important risk factors in previous investigations, for instance, in psychiatric patients [34,35]. In population-based representative studies, emotional abuse showed the strongest association with self-harm – which can have a suicidal intent [21]. Given the diverse detrimental effects of childhood abuse, it is not surprising that our results also revealed that patients with diabetes and any kind of childhood abuse had almost twice the prevalence of suicidal ideation compared to patients with diabetes but without childhood abuse (30.0 % vs. 15.7 %). More precisely, we found an association between emotional as well as sexual abuse in patients with diabetes. Corresponding to previous findings [21,34], experiences of physical abuse, however, did not have

an impact on suicidal ideation in patients with diabetes. As studies pointed to the protective effect of social support [29], considering the current psychosocial situation beyond adverse childhood experiences could further help understand differences in suicidal ideation in the present. We further demonstrated that more frequent experiences of childhood abuse were linked to higher odds of suicidal ideation, indicating a dose–response relationship and that the odds of reporting suicidal ideation were higher for women than for men. These gender differences add to previous evidence [29] and correspond to findings from a large population-based study investigating the clinical picture and gender differences of people reporting suicidal ideation. The authors report that in women suicidal ideation was associated with e.g. experiences of somatic complaints, while in men it was more associated with manifest somatic diseases such as myocardial infarction [36]. This emphasizes the differential impact of health-related factors associated with suicidal ideation in men and women and helps to develop an individual perspective on people at risk. However, research has demonstrated that

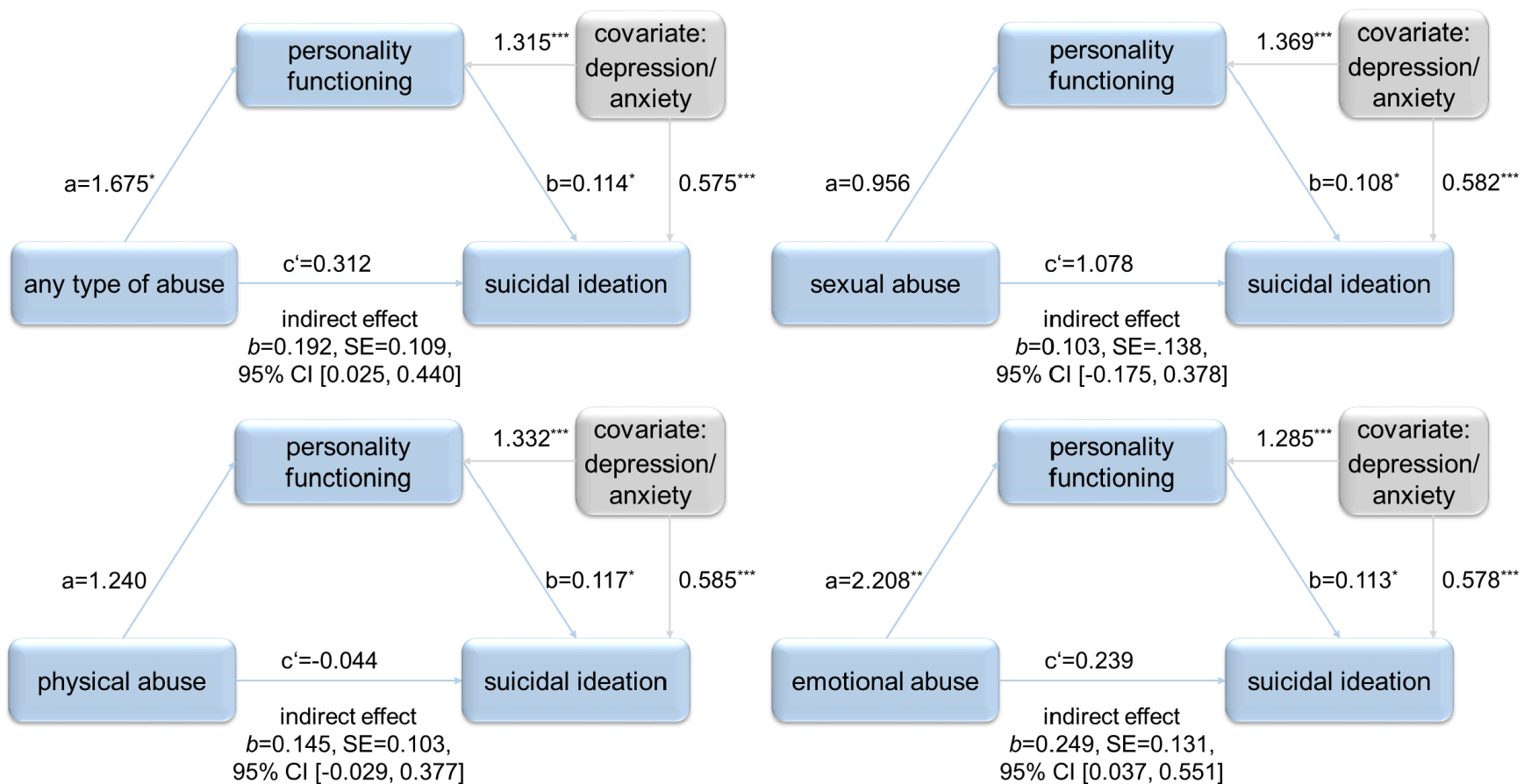


Fig. 2. Path diagrams for each mediation analysis conducted, showing the total effect (c') of the abuse type on suicidal ideation and the indirect (mediating) effect of the abuse type on suicidal ideation through personality functioning in patients with diabetes. p-values: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

risk factors for suicidal thoughts and behaviors are distinct [37]. From a prevention perspective, it is important to study both and to intervene in the suicidal process at the earliest possible time. Still, little is known about the underlying mechanisms that lead to the increased development of suicidal ideation in patients with diabetes.

To better understand our initially assumed association between emotional as well as sexual abuse and suicidal ideation, our analyses included personality functioning as a mediator. Emotional abuse and personality functioning explained nearly 50 % of the variance in suicidal ideation. Our results indicated a substantial mediating effect of personality functioning in the association between emotional abuse and suicidal ideation in patients with diabetes. This corresponds to recent research showing that difficulties in emotion regulation – which are a crucial part of personality functioning – are associated with higher levels of suicidal ideation in both clinical and population samples [38]. Still, the present study indicates a more specific association of experiences of abuse and suicidal ideation later in life that goes beyond general mental distress (which the mediation model controlled for). Hence, our results question if the chronic illness itself, the associated quality of life deficits or the potential availability of lethal means are the sole reason for the overall increased risk for suicide in this population. We rather suggest equally considering the increased history of emotional abuse [20,39] and the resulting impairments in personality functioning [17]. Following this line of thinking, dealing with a chronic and non-communicable disease like diabetes alongside a history of emotional abuse and corresponding impairments in personality functioning might make suicide prevention even more challenging. However, it also helps us to better understand the contributing factors and devise targeted support offers. The resulting psychological burden stemming from a history of childhood abuse and impaired personality functioning alongside known factors such as the continuous challenges of diabetes self-management and coping with a chronic disease might contribute to the elevated prevalence of suicidal ideation. Moreover, diabetes must also be conceptualized as a potential consequence of child maltreatment whose effects are likely shaped by difficulties in emotion regulation and health risk behavior alike [9,10].

While both of these potential pathways to suicide risk require further research, our findings emphasize the importance to consider a biopsychosocial model of health and illness. On the one hand, it has to be seen to what degree and in which way diabetes specific characteristics like diabetes symptoms, psychopathologies and diabetes-related treatments contribute to suicidal ideation. On the other hand, our findings highlight the role of social and psychological factors by interconnecting emotional abuse as well as impaired personality functioning with suicidal ideation in patients with diabetes. While both themselves pose to be risk factors, knowing about the importance of personality functioning as a modifiable factor in this association might offer a new treatment angle for patients with diabetes, e.g. through psychotherapeutic interventions.

5. Strengths and Limitations

To our knowledge, there are no studies reporting prevalences of suicidal ideation in patients with diabetes specifically for the German population. We addressed this research gap by presenting representative numbers based on a large population sample. Regarding childhood abuse, we broaden the evidence by investigating a dose–response relationship as well as the association between different abuse types and suicidal ideation, giving differential insights into the detrimental and far-reaching effects of childhood abuse. By employing the transdiagnostic concept of personality functioning as a dimensional measure for psychological capacities, we expand recent research on its importance for numerous mental and physical health issues. Another factor that is associated with both diabetes and suicidal ideation are depressive symptoms. To account for their confounding influence we controlled for symptoms of depression and anxiety in our analyses.

Still, some limitations of this study have to be considered when interpreting the results. The cross-sectional design of the present study does not allow any conclusions regarding cause and effect between childhood abuse, personality functioning and suicidal ideation. In addition, diabetes was assessed via self-report which limits the validity of the diabetes prevalence to some degree, even though there is evidence supporting the utility of self-reported diabetes for clinical studies [40]. Further, the study design did not allow for a separate collection of data on type 1 and type 2 diabetes, which might yield different results regarding suicidal ideation due to the different pathomechanisms. However, only three people with diabetes were under the age of 30, pointing to a probably low proportion of type 1 diabetes in our study sample. As for the influence of other factors on suicidal ideation, such as socioeconomic status, it is important to note that 28 % of patients with diabetes reported a monthly income of less than 1,250 €, which is close to the existential minimum for a married couple living in one household in Germany. Future studies should investigate the association between childhood abuse and neglect and suicidal ideation for type 1 and type 2 diabetes separately and consider further confounding factors, such as socioeconomic status, migration background, levels of social support, insulin treatment, diabetes duration, or comorbid diabetes-related secondary diseases.

6. Conclusion

Patients with diabetes are a high-risk group with nearly 3-fold heightened prevalences of suicidal ideation compared to the general population. Emotional and sexual abuse were associated with a substantially increased risk of suicidal ideation, highlighting the detrimental and far-reaching effects of childhood abuse. In patients with diabetes and a history of emotional abuse, impaired personality functioning partly explained the increased prevalences of suicidal ideation and should therefore be considered and addressed when dealing with this patient group. Hence, knowledge about a history of emotional abuse and resulting impaired personality functioning in patients with diabetes and suicidal ideation provides relevant information on both the development of adequate prevention as well as psychotherapeutic treatment measures.

CRedit authorship contribution statement

Sandra Zara: Conceptualization, Methodology, Writing – original draft. **Johannes Kruse:** Conceptualization, Data curation, Supervision, Writing – review & editing. **Elmar Brähler:** Data curation, Writing – review & editing. **Cedric Sachser:** Data curation, Writing – review & editing. **Jörg M. Fegert:** Data curation, Writing – review & editing. **Karl-Heinz Ladwig:** Writing – review & editing. **Mareike Ernst:** Writing – review & editing. **Hanna Kampling:** Conceptualization, Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- [1] Kavalidou K, Smith DJ, Der G, O'Connor RC. The role of physical and mental multimorbidity in suicidal thoughts and behaviours in a Scottish population cohort study. *BMC Psychiatry* 2019;19(1):38. <https://doi.org/10.1186/s12888-019-2032-8>.

- [2] Smith L, Shin JI, Lee S, Oh JW, López Sánchez GF, Kostev K, et al. The association of physical multimorbidity with suicidal ideation and suicide attempts in England: a mediation analysis of influential factors. *Int J Soc Psychiatry* 2023;69(3):523–31. <https://doi.org/10.1177/00207640221137993>.
- [3] Wang B, An X, Shi X, Zhang JA. Management of Endocrine Disease: suicide risk in patients with diabetes: a systematic review and meta-analysis. *Eur J Endocrinol* 2017;177(4):R169–81. <https://doi.org/10.1530/EJE-16-0952>.
- [4] Elamoshy R, Bird Y, Thorpe L, Moraros J. Risk of depression and suicidality among diabetic patients: a systematic review and meta-analysis. *J Clin Med* 2018;7(11):445. <https://doi.org/10.3390/jcm7110445>.
- [5] Lee HY, Hahm MI, Lee SG. Risk of suicidal ideation in diabetes varies by diabetes regimen, diabetes duration, and HbA1c level. *J Psychosom Res* 2014;76(4):275–9. <https://doi.org/10.1016/j.jpsychores.2014.02.003>.
- [6] Kim YC, Um YH, Kim SM, Kim TW, Seo HJ, Hong SC, Jeong JH. Suicide Risk in Patients With Diabetes Varies by the Duration of Diabetes: The Korea National Health and Nutrition Examination Survey (2019). *Psychiatry Investig*. 2022;19(4):326–32. 10.30773/pi.2021.0396.
- [7] Angelakis I, Gillespie EL, Panagioti M. Childhood maltreatment and adult suicidality: a comprehensive systematic review with meta-analysis. *Psychol Med* 2019;49(07):1057–78. <https://doi.org/10.1017/S0033291718003823>.
- [8] Kalmakis KA, Chandler GE. Adverse childhood experiences: towards a clear conceptual meaning. *J Adv Nurs* 2014;70(7):1489–501. <https://doi.org/10.1111/jan.12329>.
- [9] Ittoop T, Jeffrey K, Cheng CI, Reddy S. The relationship between adverse childhood experiences and diabetes in central Michigan adults. *Endocr Pract* 2020;26(12):1425–34. <https://doi.org/10.4158/EP-2020-0239>.
- [10] Hughes K, Bellis MA, Hardcastle KA, Sethi D, Butchart A, Mikton C, et al. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *Lancet Public Health* 2017;2(8):e356–66. [https://doi.org/10.1016/S2468-2667\(17\)30118-4](https://doi.org/10.1016/S2468-2667(17)30118-4).
- [11] Kalmakis KA, Chandler GE. Health consequences of adverse childhood experiences: a systematic review. *J Am Assoc Nurse Pract* 2015;27(8):457–65. <https://doi.org/10.1002/2327-6924.12215>.
- [12] Beebe B, Jaffe J, Markese S, Buck K, Chen H, Cohen P, et al. The origins of 12-month attachment: a microanalysis of 4-month mother–infant interaction. *Attach Hum Dev* 2010;12(1–2):3–141. <https://doi.org/10.1080/14616730903338985>.
- [13] Dagnino P, Ugarte MJ, Morales F, González S, Saralegui D, Ehrental JC. Risk factors for adult depression: adverse childhood experiences and personality functioning. *Front Psychol* 2020;11:594698. <https://doi.org/10.3389/fpsyg.2020.594698>.
- [14] Ehrental JC, Benecke C. Tailored treatment planning for individuals with personality disorders: the OPD approach. In: Kramer U, editor. *Case Formulation for Personality Disorders: Tailoring Psychotherapy to the Individual Client*. Cambridge, MA: Elsevier; 2019. p. 291–314.
- [15] Morey LC, Hopwood CJ. Expert preferences for categorical, dimensional, and mixed/hybrid approaches to personality disorder diagnosis. *J Pers Disord* 2019;1–8. <https://doi.org/10.1521/pedi.2019.33.398>.
- [16] Mulder RT. ICD-11 personality disorders: utility and implications of the new model. *Front Psychiatry* 2021;12:655548. <https://doi.org/10.3389/fpsyg.2021.655548>.
- [17] Freier A, Kruse J, Schmalbach B, Zara S, Werner S, Brähler E, et al. The mediation effect of personality functioning between different types of child maltreatment and the development of depression/anxiety symptoms – a German representative study. *J Affect Disord* 2022;299:408–15. <https://doi.org/10.1016/j.jad.2021.12.020>.
- [18] Kampling H, Kruse J, Lampe A, Nolte T, Hettich N, Brähler E, et al. Epistemic trust and personality functioning mediate the association between adverse childhood experiences and posttraumatic stress disorder and complex posttraumatic stress disorder in adulthood. *Front Psychiatry* 2022;13:919191. <https://doi.org/10.3389/fpsyg.2022.919191>.
- [19] Krakau L, Tibubos AN, Beutel ME, Ehrental JC, Gieler U, Brähler E. Personality functioning as a mediator of adult mental health following child maltreatment. *J Affect Disord* 2021;291:126–34. <https://doi.org/10.1016/j.jad.2021.05.006>.
- [20] Zara S, Brähler E, Sachser C, Fegert JM, Häuser W, Krakau L, et al. Associations of different types of child maltreatment and diabetes in adulthood – the mediating effect of personality functioning: findings from a population-based representative German sample. *Ann Epidemiol* 2023;78:47–53. <https://doi.org/10.1016/j.annepidem.2022.12.004>.
- [21] Ernst M, Brähler E, Kampling H, Kruse J, Fegert JM, Plener PL, et al. Is the end in the beginning? child maltreatment increases the risk of non-suicidal self-injury and suicide attempts through impaired personality functioning. *Child Abuse Negl* 2022;133:105870. <https://doi.org/10.1016/j.chiabu.2022.105870>.
- [22] Rogers ML, Joiner TE, Shahar G. Suicidality in chronic illness: an overview of cognitive-affective and interpersonal factors. *J Clin Psychol Med Settings* 2021;28(1):137–48. <https://doi.org/10.1007/s10880-020-09749-x>.
- [23] Kish L. A procedure for objective respondent selection within the household. *J Am Stat Assoc* 1949;44(247):380–7.
- [24] Dunne MP, Zolotor AJ, Runyan DK, Andrevva-Miller I, Choo WY, Dunne SK, et al. ISPCAN child abuse screening tools retrospective version (ICAST-R): Delphi study and field testing in seven countries. *Child Abuse Negl* 2009;33(11):815–25. <https://doi.org/10.1016/j.chiabu.2009.09.005>.
- [25] Ehrental J, Dinger U, Schauenburg H, Horsch L, Dahlbender RW, Gierk B. Entwicklung einer Zwölf-Item-Version des OPD-Strukturfragebogens (OPD-SFK)/Development of a 12-item version of the OPD-Structure Questionnaire (OPD-SQS). *Z Psychosom Med Psychother*. 2015;61(3):262–74. 10.13109/zptm.2015.61.3.262.
- [26] Löwe B, Wahl I, Rose M, Spitzer C, Glaesmer H, Wingenfeld K, et al. A 4-item measure of depression and anxiety: validation and standardization of the patient health Questionnaire-4 (PHQ-4) in the general population. *J Affect Disord* 2010;122(1–2):86–95. <https://doi.org/10.1016/j.jad.2009.06.019>.
- [27] Wicke FS, Krakau L, Löwe B, Beutel ME, Brähler E. Update of the standardization of the patient health Questionnaire-4 (PHQ-4) in the general population. *J Affect Disord* 2022;312:310–4. <https://doi.org/10.1016/j.jad.2022.06.054>.
- [28] Kocalevent RD, Hinz A, Brähler E. Standardization of the depression screener patient health questionnaire (PHQ-9) in the general population. *Gen Hosp Psychiatry* 2013;35(5):551–5. <https://doi.org/10.1016/j.genhosppsy.2013.04.006>.
- [29] Otten D, Ernst M, Tibubos AN, Brähler E, Fleischer T, Schomerus G, et al. Does social support prevent suicidal ideation in women and men? gender-sensitive analyses of an important protective factor within prospective community cohorts. *J Affect Disord* 2022;306:157–66. <https://doi.org/10.1016/j.jad.2022.03.031>.
- [30] Hayes A. *Introduction to mediation, moderation, and conditional process analysis: a regression-based approach*. Guilford publications 2017.
- [31] Forkmann T, Brähler E, Gauggel S, Glaesmer H. Prevalence of suicidal ideation and related risk factors in the german general population. *J Nerv Ment Dis* 2012;200(5):401–5. <https://doi.org/10.1097/NMD.0b013e31825322cf>.
- [32] Hawton K. Restricting access to methods of suicide: rationale and evaluation of this approach to suicide prevention. *Crisis* 2007;28(S1):4–9. <https://doi.org/10.1027/0227-5910.28.S1.4>.
- [33] Pitman A, Tham SG, Hunt IM, Webb RT, Appleby L, Kapur N. Access to means of lethal overdose among psychiatric patients with co-morbid physical health problems: analysis of national suicide case series data from the United Kingdom. *J Affect Disord* 2019;257:173–9. <https://doi.org/10.1016/j.jad.2019.06.027>.
- [34] Berardelli I, Sarubbi S, Rogante E, Erbutto D, Giuliani C, Lamis DA, et al. Association between childhood maltreatment and suicidal ideation: a path analysis study. *J Clin Med* 2022;11(8):2179. <https://doi.org/10.3390/jcm11082179>.
- [35] Schönfelder A, Hallensleben N, Spangenberg L, Forkmann T, Rath D, Glaesmer H. The role of childhood abuse for suicidality in the context of the interpersonal theory of suicide: an investigation in german psychiatric inpatients with depression. *J Affect Disord* 2019;245:788–97. <https://doi.org/10.1016/j.jad.2018.11.063>.
- [36] Ladwig KH, Klupsch D, Meisinger C, Baumert J, Erazo N, Schneider A, et al. Gender differences in risk assessment of death wishes and suicidal ideation in the community: results from the KORA Augsburg F3 study with 3079 men and women, 35 to 84 years of age. *J Nerv Ment Dis* 2010;198(1):52–8. <https://doi.org/10.1097/NMD.0b013e3181c81f92>.
- [37] May AM, Klonsky ED. What distinguishes suicide attempters from suicide ideators? a meta-analysis of potential factors. *Clin Psychol: Sci Pract* 2016;23(1):5–20. <https://doi.org/10.1037/h0101735>.
- [38] Colmenero-Navarrete L, García-Sancho E, Salguero JM. Relationship between emotion regulation and suicide ideation and attempt in adults and adolescents: a systematic review. *Arch Suicide Res* 2022;26(4):1702–35. <https://doi.org/10.1080/13811118.2021.1999872>.
- [39] Atasoy S, Johar H, Fleischer T, Beutel ME, Binder H, Brähler E, et al. Depression mediates the association between childhood emotional abuse and the onset of type 2 diabetes: findings from German multi-cohort prospective studies. *Front Psychiatry* 2022;13:825678. <https://doi.org/10.3389/fpsyg.2022.825678>.
- [40] Jackson JM, DeFor TA, Crain AL, Kerby T, Strayer L, Lewis CE, et al. Self-reported diabetes is a valid outcome in pragmatic clinical trials and observational studies. *J Clin Epidemiol* 2013;66(3):349–50. <https://doi.org/10.1016/j.jclinepi.2012.01.013>.