# Posttraumatic stress disorder symptoms and suicidal ideation/behavior: The moderating effects of positive mental health and social support among Iranian and German students

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## Abstract

Suicidal ideation and behavior are common in those suffering from Posttraumatic Stress Disorder (PTSD). The present study investigated factors buffering the association between PTSD symptoms and suicidal ideation/behavior. A total of 571 Iranian students and 421 German students took part in the investigation. Social support and positive mental health (PMH) were considered as resilience factors moderating the association between PTSD symptoms and suicide ideation/behavior within both samples. PMH moderated the impact of PTSD symptoms on suicidal ideation/behavior in Iranian and German students. Social support moderated the impact of PTSD symptoms on suicidal ideation/behavior in Iranian students only. Positive mental health and perceived social support seem to confer resilience and should be taken into account, when assessing individuals for suicide risk.

**Keywords** Suicidal ideation · Resilience · Social support · Positive mental health · PTSD

## Introduction

Suicidal ideation and behavior are prevalent in those with Posttraumatic Stress Disorders (PTSD; Gradus et al., 2010; Panagioti et al., 2012, 2015), as well as in those who have experienced trauma (Angelakis et al., 2019; Krug et al., 1999) and/or suffer from subclinical PTSD symptoms (Marshall et al., 2001; Panagioti et al., 2014). In a European study, 32.9% of respondents with PTSD reported lifetime suicidal ideation and 10.7% reported lifetime suicide attempts (Bernal et al., 2007). Similarly, the WHO Mental Health Surveys found a prevalence rate of lifetime suicide attempts in the presence of PTSD of 10.4% (Nock et al., 2012). Associations between post-traumatic stress disorder and suicide attempts are found irrespective of the type of trauma experienced: for example, a higher prevalence of suicidal behavior has been found in PTSD patients after wartime deployment, physical/sexual abuse, intimate partner violence, natural disasters, and combined trauma experiences (Panagioti et al., 2009). Taken together, PTSD symptoms are a key risk factor for suicidal ideation and behavior.

While significant efforts have been made to elucidate risk factors contributing to suicide ideation and suicidal behavior, far less attention has been paid to understanding protective/resilience factors that reduce the risk of suicidal ideation and behavior (Franklin et al., 2017). In their work on the Bi-Dimensional Framework, Johnson and colleagues (2011; Johnson, 2016) propose that to be viewed as conferring resilience, a variable has to display three main characteristics: (1) It should encompass a separate dimension to risk and moderate the association between risk and outcome. Therefore, to ascertain resilience it is necessary to assess both, a risk factor and suicidal ideation/behavior. (2) It should exist on a bipolar continuum, with its opposite intensifying the association between risk and outcome. (3) It should be a psychological construct, such as a skill, an attitude or a personal resource (including social support) which buffer individuals against the development of negative consequences – such as suicide ideation and behavior – when challenged with a risk factor.

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In the context of PTSD, high levels of social support have not only been shown to be associated with lower PTSD severity (Zalta et al., 2021) and better psychological treatment outcomes (Price et al., 2013, 2018), but also with a lower risk of suicidal ideation/behavior: In a sample of participants suffering from PTSD symptoms, Panagioti et al. (2014) found that perceived social support moderated the impact of the number and severity of PTSD symptoms on suicide-related outcomes. Those who reported high levels of social support were less likely to suffer from suicidal ideation/behavior – even when suffering from heightened levels of PTSD symptoms. In a similar vein, social support buffered the effect of PTSD on suicidal ideation/behavior in Chinese parents who lost their only child (Wang et al., 2019) and Chinese earthquake survivors (Guo et al., 2018). Social support should therefore be seen as a cross-cultural resilience factor in the sense of Johnson et al. (2011).

Another factor that might contribute to resilience against suicidal ideation/behavior in those who suffer from PTSD symptoms is positive mental health (PMH). PMH, that is, high levels of subjective and psychological well-being (Keyes, 2005) has been shown to moderate the association between various risk factors (e.g., depression, perceived burdensomeness) and suicidal ideation (Brailovskaia et al., 2018; Siegmann et al., 2019), as well as the association between suicide ideation and suicide attempts (Brailovskaia et al., 2019). Corresponding effects have been demonstrated in cross-sectional studies (e.g., Siegmann et al., 2018) and in longitudinal studies (e.g., Brailovskaia et al., 2020). Furthermore, a study of German inpatients and outpatients showed that PMH and suicidal thoughts are not mutually exclusive, but exist simultaneously (Teismann et al., 2018). PMH and suicidal thoughts/behavior are thus not opposite poles of a single dimension, but form two independent factors of mental health/mental illness (cf., Keyes, 2005). Overall, the relevance of PMH as a resilience factor has been demonstrated in a growing number of studies. However, at present, it is unclear in as much the association between PTSD symptoms and suicide ideation/behavior is moderated by PMH.

Furthermore, most studies on the association between PTSD and suicide ideation/behavior (Krysinska & Lester, 2010; Panagioti et al., 2012), as well as on resilience factors against suicide-related outcomes (Johnson et al., 2011) have been conducted in Western societies. It is therefore unclear to what extent findings can be generalized to Asian societies. In this sense, a first cross-cultural comparative study showed that the association between depression and suicide ideation/behavior was moderated by social support in a Chinese student sample - but not in a German student sample (Siegmann et al., 2018). Accordingly, when studying mechanisms underlying suicide risk, the cultural context always should be taken into account (Colucci & Lester, 2013), which on the one hand is trivial to say, but on the other hand is still rarely addressed.

On this background, the first aim of this study was to examine whether social support and PMH buffer the effect of PTSD symptoms on suicidal ideation/behavior. The second aim was to investigate whether these moderation effects occur in samples of university students from Germany as well as from Iran. The suicide rate and lifetime prevalence of suicide attempts are very comparable in both countries (Hassanian-Moghaddam & Zamani, 2017; Mohammadi et al., 2005; Nock et al., 2012) and at the same time there are significant cultural differences in terms of, for example, religion, individualistic versus collectivistic orientation as well as familism (Amiri, 2021).

## Methods

### Participants and Procedure

The German sample consisted of 421 university students (84.1% women; age in years: $M(SD) = 23.87(5.50$, range: 18–53); marital status: single: 41.1%, with partner: 54.2%, married: 4.8%) studying at the Ruhr-Universität in Bochum (83.8% undergraduates, 16.2% were graduate students). The Iranian sample comprised of 571 university students (73.2% women; age in years: $M(SD) = 24.46(6.65$, range: 18–76); marital status: single: 80.2%, married: 19.8%; cf., Naghavi et al., 2020) studying at the University of Isfahan (63% undergraduates, 37% were graduate students).

In both countries, participants of the online survey were recruited via participation invitations displayed at social media (i.e., groups on Facebook, Twitter, Instagram, WhatsApp, and Telegram). The only requirement for participation was to be a university student. The participation was voluntary. The responsible Ethics Committee approved the implementation of the present study. All participants were properly instructed and provided their informed consent to participate online. There were no missing data, and no data sets were excluded in the German sample. In the Iranian sample, two data sets were excluded due to missing values.

### Measures

**Positive Mental Health Scale (PMH-Scale; original German version: Lukat et al., 2016; Iranian version: Naghavi et al., 2021)** The PMH-Scale assesses subjective and psychological aspects of well-being across nine items (e.g., "I enjoy my life", "I feel that I am actually well equipped to deal with life and its difficulties") that are rated on a 4-point Likert-type scale (0 = *do not agree*, 1 = *tend to disagree*, 2 = *tend to agree*, 3 = *agree*). Higher scores indicate higher levels

of PMH. Internal consistency was $\alpha = 0.91$ in the current Iranian sample and $\alpha = 0.93$ in the current German sample.

***Multidimensional Scale of Perceived Social Support* (MSPSS; original version: Zimet et al., 1988; Iranian version: Rostami et al., 2010)** Perceived social support was assessed with the MSPSS. This measure consists of twelve items (e.g., "There is a special person who is around when I am in need") that are rated on a 7-point Likert-type scale (0 = *very strongly*, 6 = *very strongly agree*). The higher the sum score, the higher the perceived social support. In the present study, the MSPSS was translated in the German language by the customary translation-backtranslation-modification procedure (Berry, 1989). Internal consistency was $\alpha = 0.92$ in the current Iranian sample and $\alpha = 0.93$ in the current German sample.

***PTSD Checklist* (PCL-5; German version: Krüger-Gottschalk et al., 2017; Iranian version: Sadeghi et al., 2016)** The PCL-5 assesses symptoms of PTSD (i.e., intrusion, avoidance, cognitive and mood alteration, arousal, and reactivity alteration) with 20 items (e.g., "In the past month, how much were you been bothered by: Repeated, disturbing, and unwanted memories of the stressful experience?") that are rated on a 5-point Likert-type scale (0 = *not at all*, 4 = *extremely*). The higher the sum score, the higher the sypmtoms of PTSD. Internal consistency was $\alpha = 0.94$ in the current Iranian sample and $\alpha = 0.95$ in the current German sample.

***Suicide Behaviors Questionnaire-Revised* (SBQ-R; German version: Glaesmer et al., 2018; Iranian version: Amini-Tehrani et al., 2020)** Item 1 of the SBQ-R measures lifetime suicide ideation, suicide plans and attempts. The item (i.e., "Have you ever thought about or attempted to kill yourself?") is rated on a 6-point Likert-type scale (1 = *never*, 6 = *I have attempted to kill myself, and really hoped to die*). Item 1 of the SBQ-R has been recommended for epidemiological

studies and has frequently been used in clinical and non-clinical samples (Osman et al., 2001).

## Statistical Analyses

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS 26) and the macro Process version 3.5 (www.processmacro.org/index.html; Hayes 2021). After descriptive analyses, the relationship between the main investigated variables was assessed by the calculation of zero-order bivariate correlation analyses. Next, two moderation analyses (Process: model 1) were computed. Both analyses included symptoms of PTSD as predictor and suicide-related outcomes as outcome, controlling for age and gender as covariates because of the mostly female and relatively young composition of the sample. In the first analysis, PMH served as moderator and perceived social support was included as a further covariate. In the second analysis, perceived social support served as moderator and PMH was included as a further covariate. The moderation effect was assessed by the bootstrapping procedure (10.000 samples) that provides percentile bootstrap confidence intervals (CI 95%). The same calculations were computed in both country-specific samples. A priori conducted power analyses (G*Power program, version 3.1) revealed that the sample sizes were sufficient for valid results (power > 0.80, $\alpha = 0.05$, effect size $f^2 = 0.15$).

## Results

Table 1 presents the descriptive statistics of the investigated variables and their correlations. Any form of suicide-related outcomes (SBQ-R Item 1 > 1) was indicated by 45.6% of the German sample and by 43.6% of the Iranian sample. In both country-specific samples, symptoms of PTSD were significantly negatively correlated with PMH and perceived social

**Table 1** Descriptive statistics and correlations of the investigated variables in Germany and Iran

| | M (SD) | Min–Max | (2) | (3) | (4) |
|---|---|---|---|---|---|
| Germany, N = 421 | | | | | |
| (1) Symptoms of PTSD | 16.91 (15.88) | 0–80 | − 0.465** | − 0.410** | 0.406** |
| (2) PMH | 17.92 (5.98) | 0–27 | | 0.438** | − 0.358** |
| (3) Social Support | 59.63 (11.89) | 10–72 | | | − 0.257** |
| (4) Suicidality | 1.76 (1.12) | 1–6 | | | |
| Iran, N = 571 | | | | | |
| (1) Symptoms of PTSD | 28.84 (17.35) | 0–80 | − 0.490** | − 0.279** | 0.372** |
| (2) PMH | 15.40 (6.19) | 0–27 | | 0.466** | − 0.360** |
| (3) Social Support | 44.82 (16.70) | 0–72 | | | − 0.270** |
| (4) Suicidality | 1.72 (1.09) | 1–6 | | | |

PTSD = Post-Traumatic Stress Disorder; PMH = Positive Mental health; *M* = Mean, *SD* = Standard Deviation, *Min* = Minimum, *Max* = Maximum. **$p < 001$
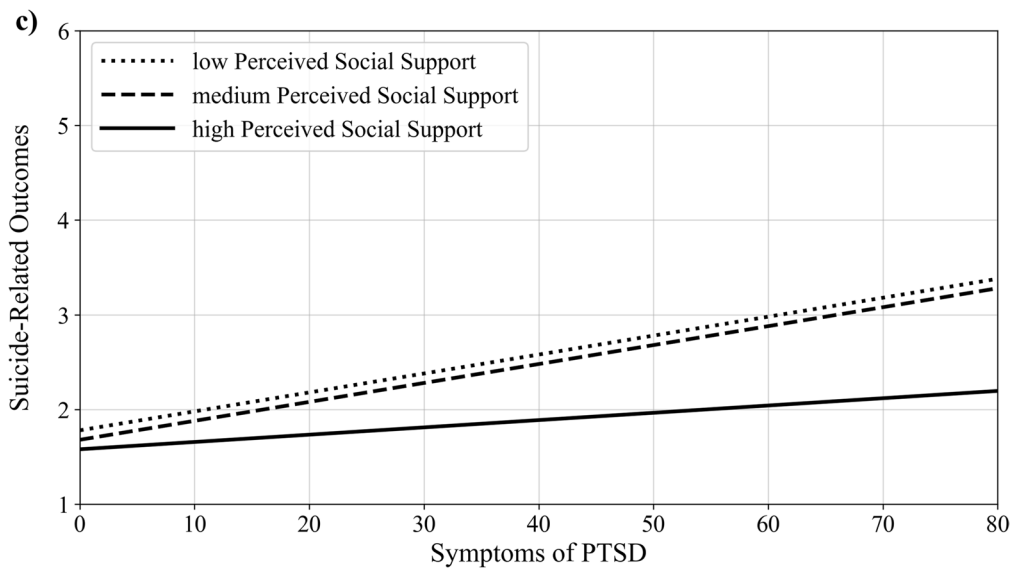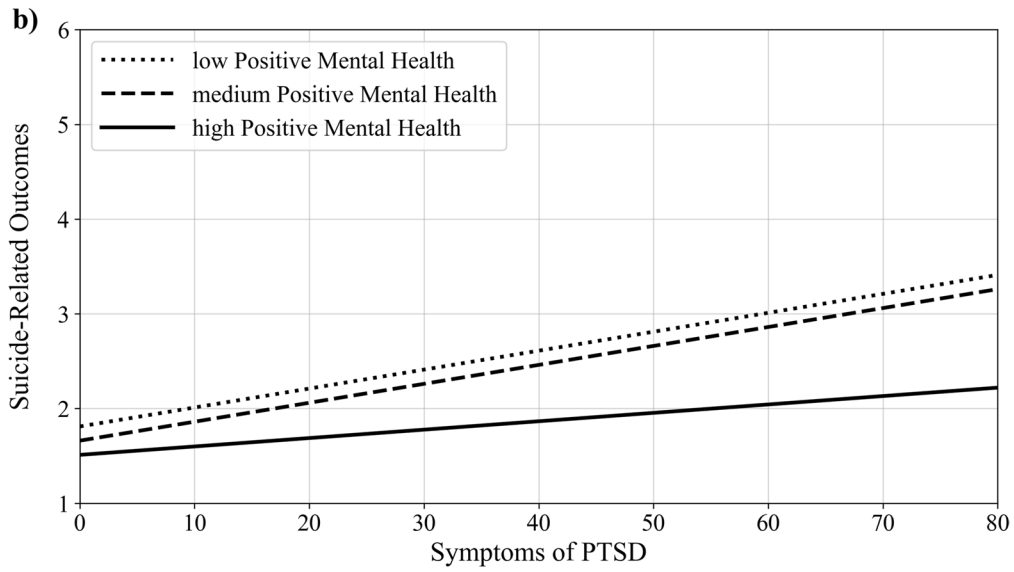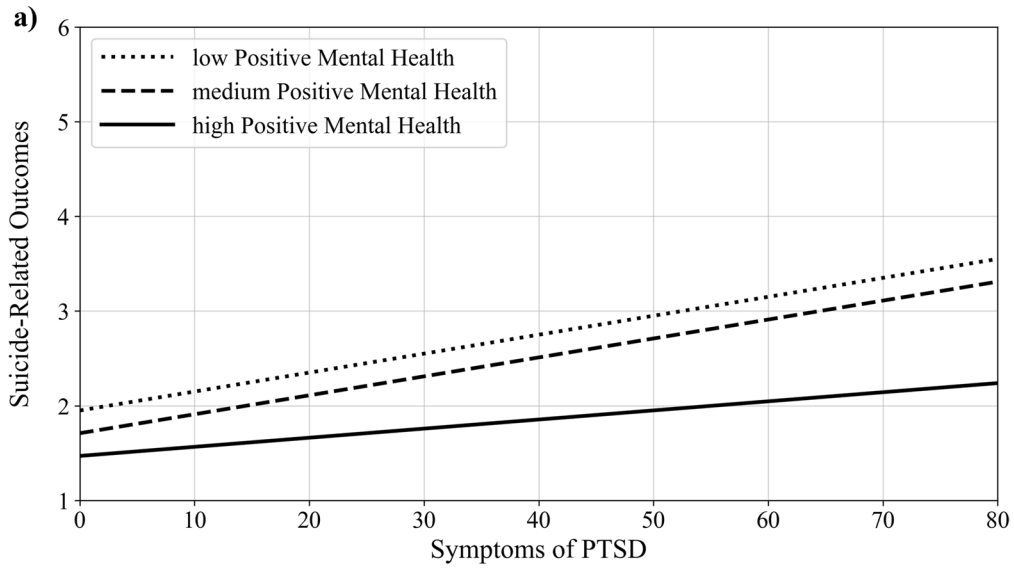
**a)**



**b)**



**c)**

◄**Fig. 1** Moderation effect on the association between symptoms of PTSD (predictor) and suicide-related outcomes (outcome) of (**a**) positive mental health (moderator) in the German sample; (**b**) positive mental health (moderator) in the Iranian sample; (**c**) perceived social support (moderator) in the Iranian sample. *Notes*. PTSD = Post-Traumatic Stress Disorder; German sample: $N$ = 421, Iranian sample: $N$ = 571

support. Its correlation with suicide-related outcomes was significantly positive. PMH and perceived social support were significantly positively correlated. Both were significantly negatively correlated with suicide-related outcomes.

**Moderation Effects in the German Sample** In the German sample, the first moderation model that included PMH as moderator turned out to be statistically significant, $R^2$ = 0.221, $F(6,414)$ = 19.514, $p < .001$. The significant interaction between symptoms of PTSD and PMH, b=-0.001, SE = 0.001, 95% CI [-0.002, −0.001], t=-2.406, $p$ = .017, revealed that the association between symptoms of PTSD and suicide-related outcomes was moderated by PMH. As shown by the simple slopes tests, the positive link between symptoms of PTSD and suicide-related outcomes was significant for low (one *SD* below mean=-5.984: b = 0.024, SE = 0.004, 95% CI [0.016, 0.032], t = 6.059, $p < .001$) and medium level of PMH (mean = 0: b = 0.017, SE = 0.004, 95% CI [0.009, 0.024], t = 4.317, $p < .001$). The link was stronger for low than for medium level of PMH. However, the relationship between symptoms of PTSD and suicide-related outcomes was not significant for high level of PMH (one *SD* above mean = 5.984: b = 0.010, SE = 0.006, 95% CI [-0.002, 0.021], t = 1.700, $p$ = .090). Thus, the lower the PMH level, the closer the relationship between symptoms of PTSD and suicide-related outcomes.

The second moderation model that included perceived social support as moderator was statistically significant, $R^2$ = 0.212, $F(6,414)$ = 18.532, $p < .001$. However, the interaction between symptoms of PTSD and perceived social support was not significant, b=-0.003, SE = 0.002, 95% CI [-0.001, 0.001], t=-1.064, $p$ = .288. Thus, the relationship between symptoms of PTSD and suicide-related outcomes was not moderated by perceived social support in the German sample.

**Moderation Effects in the Iranian Sample** In the Iranian sample, the first moderation model that included PMH as moderator turned out to be statistically significant, $R^2$ = 0.221, $F(6,564)$ = 26.694, $p < .001$. The interaction between symptoms of PTSD and PMH was significant, b=-0.001, SE = 0.001, 95% CI [-0.002, −0.001], t=-3.215, $p$ = .001, revealing that PMH moderated the association between symptoms of PTSD and suicide-related outcomes. The positive link between symptoms of PTSD and suicide-related outcomes was significant for low (one *SD*

below mean=-6.187: b = 0.022, SE = 0.003, 95% CI [0.016, 0.029], t = 6.822, $p < .001$), medium (mean = 0: b = 0.016, SE = 0.003, 95% CI [0.010, 0.020], t = 5.804, $p < .001$), and high level of PMH (one *SD* above mean = 6.187: b = 0.009, SE = 0.004, 95% CI [0.002, 0.016], t = 2.508, $p$ = .012). Notably, the link was stronger for low than for medium and high level of PMH. Thus, the lower the PMH level, the closer the relationship between symptoms of PTSD and suicide-related outcomes.

The second moderation model that included perceived social support as moderator was also statistically significant, $R^2$ = 0.224, $F(6,564)$ = 27.084, $p < .001$. The significant interaction between symptoms of PTSD and perceived social support, b=-0.001, SE = 0.001, 95% CI [-0.001, −0.001], t=-3.492, $p$ = .001, revealed that the link between symptoms of PTSD and suicide-related outcomes was moderated by perceived social support in the Iranian sample. The positive association between symptoms of PTSD and suicide-related outcomes was significant for low (one *SD* below mean=-16.703: b = 0.023, SE = 0.003, 95% CI [0.017, 0.030], t = 6.972, $p < .001$), medium (mean = 0: b = 0.015, SE = 0.003, 95% CI [0.010, 0.021], t = 5.749, $p < .001$), and high level of perceived social support (one *SD* above mean = 16.703: b = 0.008, SE = 0.004, 95% CI [0.001, 0.015], t = 2.118, $p$ = .035). However, the relationship was stronger for low than for medium and high level of perceived social support. Thus, the lower the level of perceived social support, the closer the association between symptoms of PTSD and suicide-related outcomes. Figure 1 visualizes the moderation effect of PMH in the German sample (see Fig. 1a) and of PMH (see Fig. 1b) and perceived social support in the Iranian sample (see Fig. 1c).

## Discussion

The aim of the current study was to investigate whether positive mental health and/or social support buffer the association between PTSD symptoms and suicide ideation/behavior in Iranian and German students. There were two main findings: (1) PMH moderated the impact of PTSD symptoms on suicide ideation/behavior in German and Iranian students. (2) Social support moderated the impact of PTSD symptoms on suicide ideation/behavior in Iranian students, but not in German students.

In line with various previous studies (e.g., Brailovskaia et al., 2018, 2019, 2020; Siegmann et al., 2018, 2019), PMH buffered the association between a risk factor – in this case PTSD symptoms – and suicide ideation/behavior. German and Iranian students who reported high levels of PMH, did not show increased levels of suicide ideation/behavior even when experiencing a heightened level of PTSD symptoms.

Therefore, it can be assumed that PMH confers resilience against suicide ideation/behavior (Johnson et al., 2011). Furthermore, the importance of PMH does not seem to be limited to a Western society, but to exist also in Asian societies. As such, the current findings complement findings from previous research showing that PMH buffers the effect of depression on suicide ideation/behavior in Chinese students (Siegmann et al., 2018) and is of salutogenetic relevance in students from Pakistan (Bibi et al., 2020). PMH as measured with the PMH-Scale (Lukat et al., 2016) covers aspects of self-acceptance, environmental mastery and satisfaction with life (Teismann & Brailovskaia, 2020). In the context of suicide risk assessments, as well as in the treatment of suicidal individuals, it might be advisable to explore and promote these aspects (Willutzki & Teismann, 2013) - both in Western and Eastern treatment settings. In this regard, it is important for treatment providers to keep in mind that features of PMH may be present concurrently with suicide ideation/behavior (Teismann et al., 2018).

Perceived social support emerged as a significant moderator of the PTSD-suicide ideation/behavior association in Iranian students. Those students who reported high levels of social support were a little less likely to experience suicide ideation/behavior even at higher levels of PTSD symptoms. The importance of social support as a resilience factor for suicidal ideation/behavior has repeatedly been shown in studies using a wide variety of methodological approaches (Johnson et al., 2011). In a recent test of the Bi-dimensional framework, perceived social support was found to moderate the impact of the PTSD symptoms on suicidal outcomes in Asian and European samples (Guo et al., 2018; Panagioti et al., 2014; Wang et al., 2019). Social support has also been emphasized in current theoretical models on suicidal behavior (Joiner, 2005; Klonsky & May, 2015). One might speculate that social support augments a person`s perceived ability to cope with traumatic events and reduces negative appraisals of the trauma (Zalta et al., 2021). On this background, it is astounding that social support only moderated the association between PTSD symptoms and suicidal ideation/behavior in Iranian students, but not in German students. Yet, the same pattern was found in a recent cross-cultural comparison of Chinese and German students (Siegmann et al., 2018): Social support moderated the association between depression and suicidal outcomes in Chinese students, but not in German students. It seems as if social support might be a particularly important means of buffering against adversities in rather collectivistic Asian cultures. However, as the importance of social support – with regard to PTSD symptoms (Zalta et al., 2021) and suicide-related outcomes (Johnson et al., 2011) – is well established in studies from Europe and America, the results of the present study should be considered with caution and as preliminary. It is possible that methodological factors of the survey may play a role

(cf., Siegmann et al., 2018). As such it might be advisable to conduct more fine-grained studies in the future, in which the subjectivity of social support (perceived vs. received) as well as the context of social support (general vs. in response to disclosure of distress) is taken into account. Considering clinical implications, no one should conclude from the present findings that it is irrelevant to focus on social support in suicide risk assessments and treatment of suicidal patients.

There are several limitations to the present study. First, given the cross-sectional nature of the data, conclusions about causality inevitably involve a degree of speculation. Second, the data was collected exclusively through self-report. This method has certain advantages for cross-cultural survey research (e.g., the measures are inexpensive and easy to administer). However, self-report measures may fail to capture suicide ideation/behavior, PTSD, or resilience factors in their full complexity. Therefore, in future studies clinician-rated measures should be used. Third, a generalization of the results to age or social groups other than university students is not possible, as the study focused only on this highly educated group. Fourth, as a non-clinical sample was studied, levels of PTSD were rather low. As such, it is unclear to what amount the results would generalize to clinical samples. Fifth, suicide ideation/behavior was only assessed with the respective item of the SBQ-R instead of a more broad method to assess suicide ideation. Yet, there is robust evidence for the predictive validity of single items assessing suicidality (Green et al., 2015; Simon et al., 2013). Nevertheless, it seems advisable to use more comprehensive measures to assess suicide ideation/behavior in future studies.

To conclude, the present study demonstrated that positive mental health and perceived social support buffered the impact of PTSD symptoms on suicidal ideation/behavior. Accounting for these factors may improve the identification of individuals at risk of suicidal outcome and may be an important area to target in prevention and treatment efforts – both in Western and Eastern countries. In terms of theoretical implications, the results of the current study highlight the necessity to focus on the interplay between risk and resilience in suicide research.

## Declarations

**Conflict of Interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Ethic Approval** All procedures performed in this study were in accordance with the ethical standards of the institutional research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Consent to Participate** Informed consent was obtained from all individual participants included in the study.

**Consent for Publication** All authors listed have approved the publication of the manuscript.

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