Emotional numbing: A key construct in the assessment of mental health during COVID-19 pandemic

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Abstract

Emotional numbing is a debilitating response to traumatic stress, but no scale has yet to be validated for use among Chinese populations. The aim of the study is to revise and validate a brief measurement of emotional numbing and test the clinical significance of emotional numbing among Chinese adults. A total of 3,230 participants enrolled in this study during a city-wide lockdown caused by the COVID-19 pandemic in Shanghai, China. The general subscale of the Emotional Reactivity and Numbing Scale (ERNS) was used to assess emotional numbing. Cronbach's αs were calculated to examine each item's contribution to the measurement reliability. A unidimensional graded response model was estimated to evaluate the item-level performance and validity from an item-response theory (IRT) perspective. Informed by the reliability test and the IRT analysis, a four-item ENRS-C scale was found to be a reliable and valid measurement. Regression models were used to examine pandemic-related stressors and mental health correlates of emotional numbing. Emotional numbing was associated with intimate partner violence, bereavement, stressful life events and mental health outcomes including self-reported depression symptoms, anxiety symptoms, psychological well-being, and sleeping problems. This study highlights emotional numbing as a mental health condition associated with major life stressors and has significant clinical and functional implications. Additional studies are needed to investigate how emotional numbing in China is shaped by sociocultural contexts that discourage the expression of socially disruptive emotions.

Introduction

Posttraumatic symptomatology covers a spectrum of mental health conditions including avoidance of trauma reminders, emotional distress, prolonged grief, and traumatic memory symptoms (American Psychiatric Association, 2022). Considering the high clinical heterogeneity for posttraumatic symptomatology, a closer investigation of different posttraumatic sequela is urgent. Emotional numbing, referring to absence or marked reduction of internal emotional experience, is one of the most common sequela following traumatic stress (Litz & Gray, 2002). The term was first introduced as "restricted ranged of affect" as a symptom criterion for PTSD in the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) and was further refined in the DSM-5 (Friedman et al., 2011). The endorsement of emotional numbing falls between 55.9% and 65% among PTSD patients (Carmassi et al., 2014; Franklin & Zimmerman, 2001). Emotional numbing was also included as a symptom of prolonged grief disorder (PGD) in the DSM-5-TR and the ICD-11 (Szuhany et al., 2021). In addition to trauma and stressor-

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related disorders, emotional numbing was also found associated with depression (Christensen et al., 2022), anxiety (Jaycox et al., 1998), psychosis (Hardy et al., 2021), personality disorders (Dixon-Gordon et al., 2016), and suicidal ideation (Guerra & Calhoun, 2011). Therefore, using a transdiagnostic perspective to study emotional numbing is needed in order to understand the mechanism and functional roles of emotional dysregulation among people exposed to stressful events.

Emotional numbing is also associated with worsening psychosocial outcomes following adversity. First, it is associated with chronic posttraumatic psychopathology (Foa et al., 1995). An early study shows emotional numbing was twice as prevalent among chronic PTSD patients (62.3%) than those with acute PTSD (Breslau & Davis, 1992). A longitudinal study of 270 "9/11 attack" first responders found numbing was the only PTSD symptom cluster that significantly predicted later PTSD diagnosis both one and two years later (Malta et al., 2009). Another long-term follow up to the 9/11 survivors shows that less severe emotional numbing symptoms 2.5 years after the disaster were significantly associated with subsequent PTSS recovery in the following 10 years (Adams et al., 2019). One study among terror attack survivors found numbing significantly predicted subsequent levels of other posttraumatic stress symptoms (Solberg et al., 2016). Findings from these prospective studies suggest that emotional numbing might play a causal role in shaping posttraumatic symptom course. Second, emotional numbing was associated with significant impairments in functioning, especially psychosocial functioning (Birkley et al., 2016; Schuman et al., 2019). Studies among veterans found emotional numbing was specifically associated with worse relationship quality (Cook et al., 2004), impaired cognitive functioning, and lower quality of life (Pietrzak et al., 2015). More recent studies among disaster survivors replicated these findings and reported a higher correlation with functional impairment and distress for numbing compared with other posttraumatic stress symptoms (North et al., 2019). Impairments associated with high emotional numbing could even lead to loss of social resources to help build up resilience towards trauma exposure (Johnson et al., 2007), which further indicated that numbing may be more than a corollary of mental distress, but also a potential cause.

Moreover, emotional numbing was associated with poorer intervention outcomes: endorsement of the symptom and lower emotional reactivity to traumatic materials were associated with lower efficacy of exposure-based psychotherapy (Byrne et al., 2017b; Wangelin & Tuerk, 2015). Moreover, greater emotional numbing severity was associated with less improvement after antidepressant treatment (Byrne et al., 2017a). Overall, identifying individuals with elevated emotional numbing during or shortly after trauma exposure and understanding why people develop this phenotype has critical public health significance for the prevention of posttraumatic psychopathologies and functional impairments after public emergencies.

Chinese culture values emotional suppression. Strong displays of emotion are viewed as signs of immaturity in Chinese culture (Chen & Swartzman, 2001). However, emotional numbing is a distinct emotional regulation process from emotional suppression. Emotional numbing is the lack of internal emotional experiences (Keane et al., 1989), while emotional suppression is defined as inhibition of the expression of currently experienced emotions (Gross & Levenson, 1993). Although the traditional collectivistic culture encourages emotional suppression to maintain social harmony and interdependence (Matsumoto, 1990), emotional numbing is culturally dystonic and considered pathological in China. Emotional numbing is usually considered to be a sign of apathy and indifference in China, which constitutes potential threats to social harmony. Study among Chinese population also found that numbing towards positive or negative emotions was associated with lower quality of life in Chinese trauma-exposed population (Li et al., 2020). Therefore, the study of emotional numbing as a pathological condition has important cultural relevance in a Chinese context.

Despite the key role of emotional numbing in psychopathological reactions to traumatic stress and as a barrier to mental health treatment, data that link the prevalence and psychosocial correlates of emotional numbing remain elusive, especially in non-Western contexts. Current assessments of emotional numbing mainly come from two perspectives. The first is from a biological perspective, assessing the physiological arousal to emotional stimulus with different valence (Eskelund et al., 2018; Felmingham et al., 2014). Lower physiological reactivity to emotional stimuli indicated higher emotional numbing. This assessment lacks a phenomenological investigation of participants' subjective emotional experiences and might thus have limited external validity (Orsillo et al., 2007). An alternative approach is from a clinical perspective, via interview or self-report measures of PTSD symptoms, which is more commonly used in observational studies. However, this approach ignores the transdiagnostic nature of emotional numbing as discussed above, and emotional numbing is usually clustered and assessed together with other close but distinct emotional states (e.g., detachment and anhedonia; Liu et al., 2014). Therefore, a psychometrically valid and reliable assessment for emotional numbing is needed.

Orsillo and colleagues developed and validated an assessment of emotional numbing—the Emotional Reactivity and Numbing Scale (ERNS; Orsillo et al., 2007). The ERNS is a 62-item self-report questionnaire asking about individuals' emotional response to an emotion eliciting event or experience (e.g., *In situations when other people have strong emotional responses, I don't feel anything at all*). Participants are instructed to choose from five options describing different tendency to experience these feelings (from *Not at all typical of me* to *Entirely typical of me*). The ERNS contains five subscales measuring general numbing (8 items), numbing to positive

emotions (26 items), sadness (11 items), anger (11 items), and fear (6 items), respectively. The reliability and validity of the scale was supported among psychiatric outpatients and American teenagers (Dell et al., 2020; Kerig et al., 2016). The ERNS provides a comprehensive assessment of numbing experience towards different fundamental emotions people would have in their daily life. However, the questionnaire is too long to administer in large-scale surveys. Further effort is needed to shorten the ERNS and create a brief version of the scale as a screening instrument for emotional numbing problems. The general numbing subscale of ERNS was designed as a brief scale to assess general experiences of numbing and does not point to any specific emotions. In addition, the ERNS is only available in English now. To our knowledge, no previous psychometric validation study has been done to test the reliability and validity of the scale in other-language versions.

The public mental health burden caused by the ongoing COVID-19 pandemic has been well-documented (Gruber et al., 2021). Public health measures implemented globally to control the virus spread including mass quarantine and lockdowns increased the burden (Fancourt et al., 2021). These disease-containment measures might be traumatic (Bridgland et al., 2021) as previous public health emergencies show that intensity of exposure to such measures could predict the severity of posttraumatic symptomatology (Hawryluck et al., 2004; O'Donnell & Greene, 2021). There were also increased reports of other traumatic experiences in places (e.g., domestic violence) where strict pandemic control policies are implemented (Hall & Tucker, 2020). Shanghai, one of the biggest cities of China, went through a two-month lockdown from March 31 to June 1, 2022. The lockdown was strictly implemented to eliminate the COVID-19 virus, leaving over 26 million residents in their dwellings with limited accessibility to food supplies and other services, which constituted potential trauma experiences.

The aim of the study is to revise and validate a Chinese version of the ERNS-general subscale as a self-report measurement of emotional numbing problems among the general Chinese population using item-response theory (IRT). The study participants were derived from a city-wide epidemiological study of the Shanghai lockdown. We also evaluated the associations between the revised scale and measurement of different lockdown-related stressors or common mental health outcomes. We hypothesized that emotional numbing would be specifically more associated with traumatic stressors and mental disorders that represent dysphoric moods such as depression and anxiety.

Methods

Participants and procedure

The 2022 Shanghai Lockdown Study started on April 29, one month following the initiation of the lockdown, and ended on June 1, when the city reopened. Participants of the survey were recruited online via the *Wenjuanxin* platform (Ranxing Information Technology Co., LTD. Changsha, China). Purposive sampling was conducted to reach a geographically representative sample of 200 adult participants from each of the 16 administrative districts in the city. Potential participants who were residents of Shanghai during the lockdown were identified using their network IP addresses. Informed consent was obtained from each participant, and an incentive was provided to those who completed the questionnaires. The study was approved by the New York University Shanghai Institutional Review Board on April 21, 2022.

Measurement

Emotional numbing. The eight items from the general subscale of the ERNS (Orsillo et al., 2007) were initially assessed for each participant. Participants were instructed to base their responses on experiences occurring during the last two weeks. The Cronbach's α for the original general subscale was 0.81. The items and instructions of the ERNS were translated to Simplified Chinese through a forward and back translation and reconciliation process. Items with acceptable psychometric characteristics informed by the reliability and validity tests were kept in a revision of the scale (ERNS-C). A total score of the ERNS-C was calculated as an estimation of the emotional numbing severity, with higher scores indicating greater emotional numbing.

Lockdown-related trauma exposure. Several questions were asked about traumatic experiences and stressors during the lockdown, including history of COVID-19 infection, history of quarantine during the lockdown (including self-quarantine at home and centralized quarantine in hotels or shelter hospitals), losing jobs and income because of the lockdown, witnessing other people become seriously ill or die during the lockdown, and bereavement in the past 12 months. In addition, for those with a partner, intimate partner violence (IPV) during the lockdown was assessed using the Extended-Hurt, Insulted, Threaten, Scream (E-HITS) scale (Iverson et al., 2015). The E-HITS contains five items and has been validated as a screening tool for IPV across different populations, including Chinese populations (Li & Dong, 2022). The original E-HITS scale has good reliability (Cronbach's $\alpha = .90$). As previously recommended, the total score for E-HITS was further dichotomized using a cutoff of ≥ 7 (Iverson et al., 2015). The E-HITS has good internal reliability in the subsample with any partners (Cronbach's $\alpha = .83$).

Mental health outcomes. Depression and anxiety symptoms were assessed with the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001) and the Generalized

Anxiety Disorder Scale (GAD-7; Spitzer et al., 2006), both of which have been well validated and widely used in China (Gong et al., 2021; Yeung et al., 2008). Each scale assessed symptom severity occurring over the past two weeks on a 4-point Likert scale. The original revisions demonstrated high internal consistency (Cronbach's $\alpha = .86–.89$ for PHQ-9;.92 for GAD-7). Both scales had good reliability in our sample (Cronbach's $\alpha = .89$ for PHQ-9;.92 for GAD-7). Psychological well-being was assessed by the WHO-5 Wellbeing Index (WHO-5; WHO, 1998). The WHO-5 is a five-item self-report scale assessing subjective well-being in the last two weeks. Each item is rated on a six-point scale. A higher score on the WHO-5 indicates a higher level of psychological well-being. The internal consistency of the original WHO-5 was excellent (Cronbach's $\alpha = .83-.92$). The WHO-5 has been validated in China (Fung et al., 2022), and has excellent reliability in the current sample (Cronbach's $\alpha = .94$). Sleeping problems were assessed by two items from the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989) asking about sleep quality and actual sleep time in the past month. Both items are 4-point Likert scaled. Higher scores indicate poor sleep quality and shorter sleep duration.

Demographic information. Demographic data, including gender, age, education level, marital status, household income, migration status, and history of psychiatric diagnosis were assessed using self-report questions.

Statistical analysis

All the data analyses were conducted using R (version 4.2.1). A revision of the ERNS was conducted by evaluating each item's contribution to the reliability and validity of the scale. For reliability evaluation, Cronbach's α was calculated to examine the internal consistency of the measure. Items were examined with respect to their contribution to internal consistency by calculating the Cronbach's α after each item was removed. To evaluate scale validity, IRT analysis was conducted for the psychometric evaluation of items at varying levels of emotional numbing. For the parameter estimation of item difficulty and discrimination, a unidimensional graded response model (GRM) was estimated (Samejima, 2016). In the GRM model, the difficulty parameters refer to the levels of underlying ability (i.e., emotional numbing) when participants have equal probability to choose between neighboring options. Therefore, for each 5-point Likert scale item, four difficulty parameters were estimated. The discrimination parameter indicates the item's ability to distinguish between individuals who have different levels of the latent construct (emotional numbing). In addition, the item information function (IIF) for each item was estimated and plotted. The IIF provides information about an item's contribution to the latent score and at which range of underlying ability an item

provides the most distinguishing information (Hambleton & Jones, 1993; Reeve, 2014). IIF can be used for scale revision by choosing items that discriminate well at the desired level of the latent construct (Raykov & Marcoulides, 2018). The R package *ltm* was used to estimate the GRM models, and the model fit was tested using *mirt*.

A recalculated score of the revised scale (ERNS-C) was used for subsequent estimation of correlations between emotional numbing, trauma exposures, and mental health outcomes. To test the convergent validity of the scale, a series of multivariate regression models was estimated. Associations with trauma exposure were tested by setting the exposures as predictors and the ERNS-C score as the dependent variable. For mental health outcomes, multivariate regression models were estimated with the ERNS-C score as the independent variable. All the regression models controlled the demographic covariates, and the significant level was set at $p < .05$. Bonferroni correction was conducted on the p values to correct for multiple comparisons.

Results

Descriptive statistics

The final analytic sample contained 3,230 participants. The mean age for the sample was 33.4 years (SD = 10.9, range 18–88). Half of the participants were males (N = 1657, 51.3%). Most participants completed college or higher (N = 2045, 63.3%), were married (N = 2032, 62.9%), had a household income between 8,000–15,000 Chinese Yuan (1,100–2,060 USD) per month (N = 996, 30.8%), and were migrants from other areas of China (N = 2268, 68.9%). There were 146 (4.5%) participants who reported previous psychiatric diagnosis by a mental health professional. Regarding lockdown-related exposure, 454 (14.1%) participants reported experiencing medical quarantine and 139 (4.3%) had a history of COVID-19 infection during the lockdown. There were 22.4% (N = 722) participants who reported a job loss and 77.4% (N = 2501) reported loss of household income due to the lockdown. There were 392 (12.1%) participants who saw a person became seriously ill or die during lockdown, and 673 (20.8%) experienced death of a family member in the past 12 months. Of the 2,038 participants who had any partner, 547 (26.8%) reported IPV during lockdown, higher than the one-year prevalence of 18.7% reported in Shanghai before the pandemic (Tu & Lou, 2017). The mean score for PHQ-9, GAD-7, and WHO-5 was 7.2 (SD = 5.6, range 0–27), 5.9 (SD = 5.0, range 0–21), and 12.1 (SD = 7.0, range 0–25), respectively. There were 37.2% participants who reported poor sleep quality and 7.2% had less than 5 h actual sleep per night. Participants' responses on the ERNS general subscale are shown in Table 1.

Table 1. Descriptive statistics of the ENRS-general subscale.

Item	Not at All Typical of Me	A Little Typical of Me	Somewhat Typical of Me	Very Typical of Me	Entirely Typical of Me	Cronbach's α if Item Deleted
1. I am able to feel a wide range of emotions (e.g., happiness, sadness, anger, and fear).*	561 (17.4%)	624 (19.3%)	670 (20.7%)	754 (23.3%)	621 (19.2%)	0.76
2. I feel cut off from my emotions.	1662 (51.5%)	713 (22.1%)	531 (16.4%)	209 (6.5%)	115 (3.6%)	0.60
3. In situations when other people have strong emotional responses, I don't feel anything at all.	1675 (51.9%)	780 (24.1%)	470 (14.6%)	204 (6.3%)	101 (3.1%)	0.59
4. There are certain emotions that I cannot feel.	1360 (42.1%)	1002 (31.0%)	535 (16.6%)	207 (6.4%)	126 (3.9%)	0.59
5. I think of myself as a very emotional person.*	343 (10.6%)	593 (18.4%)	805 (24.9%)	839 (26.0%)	650 (20.1%)	0.72
6. I have a hard time feeling close to people, even my friends or family.	1265 (39.2%)	777 (24.1%)	662 (20.5%)	317 (9.8%)	209 (6.5%)	0.62
7. I feel like I am emotionally numb.	1753 (54.3%)	701 (21.7%)	467 (14.5%)	200 (6.2%)	109 (3.4%)	0.57
8. There are some negative emotions that I rarely feel even when there is reason to feel them.	1322 (40.9%)	1028 (31.8%)	529 (16.4%)	222 (6.9%)	129 (4.0%)	0.62

Note. N = 3,230. *The item is reversed scored.

Internal consistency

With all eight items of the original ERNS general subscale, the internal consistency was questionable in our sample (Cronbach's $\alpha = .67$). Deletion of item #1 or item #5 increased the internal consistency to an acceptable level (Cronbach's $\alpha > .7$; see Table 1). When both items 1 and 5 were removed, the internal consistency became excellent (Cronbach's $\alpha = .85$).

Item-response theory

The GRM model with all eight items included demonstrated poor fit to our data ($\chi^2 = 1095.509$, df = 20, $p < .001$; CFI = 0.92; TLI = 0.88; RMSEA = 0.13 [95% CI: 0.12–0.13]). The discrimination estimation for item #1 and item #5 was low (−0.482 and −0.125, respectively), suggesting poor performance of these items. Therefore, these two items were excluded in a modified GRM model. The modified GRM model with remaining six items shows better but still unacceptable data fit ($\chi^2 = 334.424$, df = 9, $p < .001$; CFI = 0.95; TLI = 0.97; RMSEA = 0.11 [95% CI: 0.09–0.12]), suggesting further revision of the scale was needed.

The item difficulty and discrimination are summarized in Table 2. Item #7 (*I feel like I am emotionally numb*) had the highest discrimination among all items likely due to high face validity. Items #6 and #8 had relatively lower discrimination than other items. With regard to difficulty, Item #6 had lower overall difficulty than other items, suggesting individuals tend to rate higher on this item even though numbing is not high. The IIF for each item is plotted in figure 1. Items #6 and #8 provide slightly more information when the latent emotional numbing level is lower than 1 SD from the average. When numbing is above average (more than 0 on the x axis), other items provide significantly more information than these two items. As the scale is designed to identify individuals with more emotional numbing problems, the item performance at higher levels of latent construct should be more heavily weighted. Thus, Items #6 and #8 were further excluded according to a tutorial of instrument construction and development using information functions by Raykov and Marcoulides (2018), resulting in four remaining items in the revised scale.

The final ERNS-C scale contains four items from the ERNS general subscale: *I feel cut off from my emotions*; *In situations when other people have strong emotional responses, I don't feel anything at all*; *There are certain emotions that I cannot feel*, and *I feel like I am emotionally numb*. The internal consistency of ERNS-C is good (Cronbach's $\alpha = .83$). The mean score for ERNS-C in the sample was 7.6 (SD = 3.6, range 4–20). There were 28.7% (927) participants who reported endorsement (defined by rating 3 or higher on a 1–5 five-point scale)

Table 2. Discrimination and difficulty parameters for the emotional numbing items.

Item	IRT Discrimination	IRT Diff. 1	IRT Diff. 2	IRT Diff. 3	IRT Diff. 4
I feel cut off from my emotions.	2.129	0.051	0.807	1.660	2.402
In situations when other people have strong emotional responses, I don't feel anything at all.	2.383	0.052	0.856	1.626	2.382
There are certain emotions that I cannot feel.	2.239	−0.254	0.757	1.603	2.296
I have a hard time feeling close to people, even my friends or family.	1.584	−0.395	0.503	1.462	2.298
I feel like I am emotionally numb.	2.609	0.125	0.840	1.569	2.242
There are some negative emotions that I rarely feel even when there is reason to feel them.	1.723	−0.315	0.855	1.767	2.575

Note: **Diff.** = Difficulty.

of two emotional numbing items or more. Younger people, males, and those with psychiatric diagnosis history rated higher on the ERNS-C scale (all $ps < .01$).

Association with lockdown exposure and mental health

The regression results for lockdown exposure are summarized in Table 3. Direct exposure to the virus or experiencing quarantine did not significantly predict ERNS-C scores. Those exposed to economic stressors during lockdown (loss of job/income) had higher ERNS-C scores with small effect sizes (*Cohen's d*s = .23–.25). Witnessing other people seriously ill or die and recent bereavement of family members both significantly associated with the ERNS-C score (*Cohen's d*s = .25–.27). Moreover, those who reported exposure to IPV during lockdown had significantly higher ERNS-C scores with a medium effect size (*Cohen's d* = .69).

Higher ERNS-C scores were correlated with higher PHQ-9 ($r = .55$, $p < 0.001$), GAD-7 scores ($r = .54$, $p < 0.001$), poorer self-report sleep quality ($r = .26$, $p < 0.001$), shorter sleep duration ($r = .18$, $p < 0.001$), and lower WHO-5 score ($r = -.31$, $p < 0.001$). The associations between emotional numbing and these mental health outcomes remained after controlling for covariates in the regression models (see Table 4). An exploratory logistic regression showed that ERNS-C score was specifically associated with self-reported unwillingness to seek mental health support during the lockdown when covariates, depression, and anxiety symptoms were controlled (OR = 1.03, 95%CI: 1.01–1.05, p = 0.011).

Discussion

The current study refines and validates a brief four-item self-report instrument to assess emotional numbing among Chinese adults. Emotional numbing was a common experience among adult Chinese residents who went through a two-month citywide lockdown in Shanghai, China: 28.7% participants reported endorsement of at least two ERNS-C items. The revised scale shows good external validity. Economic stress, witnessing death, and intimate partner violence during the lockdown were significantly associated with emotional numbing. Higher numbing was associated with worse mental health outcomes including higher depression and anxiety symptoms, sleep disturbance, and lower mental well-being.

Previous studies of emotional numbing focused on PTSD patients or people who experience traumatic events that meet Criteria A of the DSM-5 PTSD diagnosis (i.e., severe threat to life), using a measurement of PTSD symptoms (Li et al., 2020). By using a specific assessment for emotional numbing, our study revealed that emotional numbing is reported by over one in four people experiencing a citywide lockdown. Consistent with previous studies (Allwood et al., 2011; Gharacheh et al., 2020), our data show that exposure to domestic violence is strongly associated with emotional numbing. In additional to typical psychological traumas (IPV, bereavement), we also found stressful life events such as economic stressors also increased emotional numbing. Among those who reported endorsement of at least two ERNS-C items in our sample, 75.7% did not experience serious trauma like IPV or bereavement, suggesting that severe trauma exposure might not be the necessary condition of numbing experience.

The key difference between the current ERNS-C scale and previous PTSD-based assessment of emotional numbing is that an index trauma event is not needed in the current assessment. In PTSD-based assessments such as the Clinician-Administered PTSD Scale (CAPS), if the participant did not report any traumatic event that met the DSM Criteria A, the following questions about symptoms are not asked. Given that our data suggest that emotional numbing could be experienced by people even when Criteria A is not met, PTSD-dependent assessments

Item Information Curves
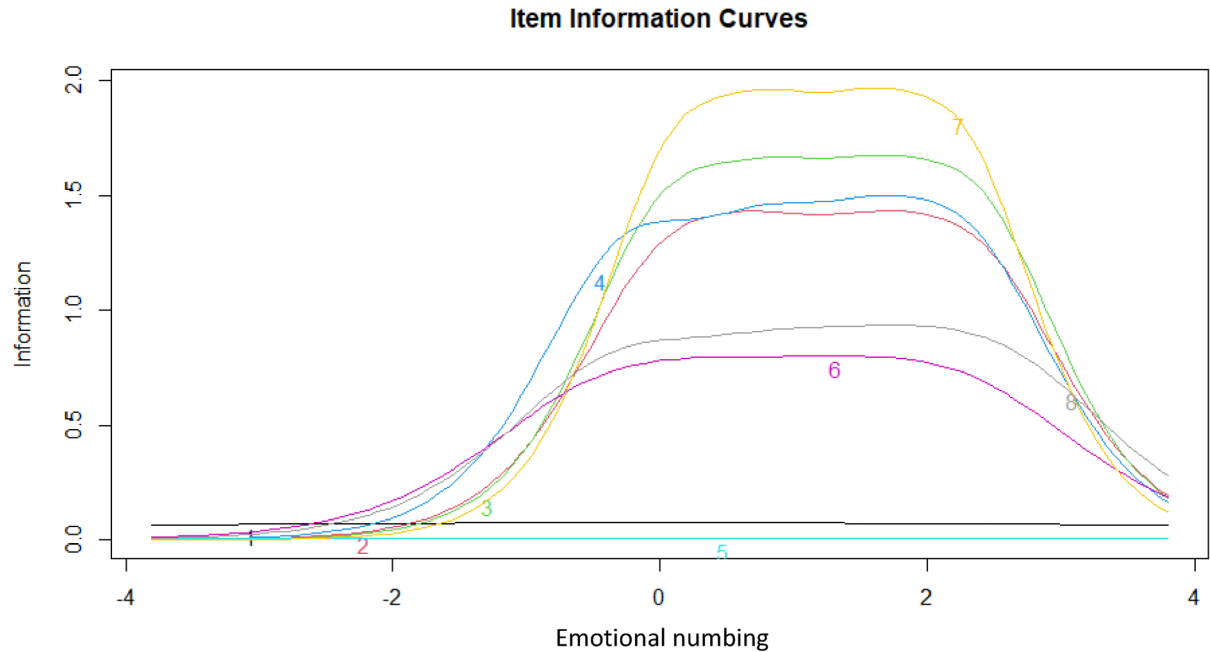
Figure 1. The item information function from the IRT analysis.
Note: 2: I feel cut off from my emotions; 3: In situations when other people have strong emotional responses, I don't feel anything at all; 4: There are certain emotions that I cannot feel; 6: I have a hard time feeling close to people, even my friends or family; 7: I feel like I am emotionally numb; 8: There are some negative emotions that I rarely feel even when there is reason to feel them.

would lead to an underestimation of the burden caused by emotional numbing in the population and fail to identify all individuals affected by this critical mental health condition.

Two reverse-scored items from the original scale were removed for psychometric and face validity considerations. The IRT analysis showed that discriminations for both items were below zero (-0.482 and -0.125), which implies that these two items barely provide additional information to differentiate people with different numbing levels. This finding was consistent with a previous IRT study finding that reverse-scored items are usually uninformative when scored in the opposite direction as the majority of the other items in the scale (Eichenbaum et al., 2019). Although reverse-scored items can be applied to reduce socially desirable responding, it was suggested that the psychometric cost might outweigh these advantages (Eichenbaum et al., 2021). The face validity of the items is also questionable from a phenomenological perspective. The current scale is designed to assess emotional numbing as a status rather than a personality trait. While the item *I think of myself as a very emotional person* is a typical item asking about one's personality, the other item, *I am able to feel a wide range of emotions*, appears to be a question asking for experience of a wide range of emotions recently, rather than the capability to feel different emotions, when understood in Chinese language.

By revealing associations with common mental disorders, our study provides evidence that emotional numbing is relevant to a wide spectrum of psychopathologies related to stress, and thus should be reconceptualized and reinvestigated as a clinical phenotype independent of PTSD using dimensional, transdiagnostic frameworks, such as the Research Domain Criteria (RDoC) from NIMH (Insel et al., 2010). Numbing to negative emotions and positive emotions map on the negative valence and positive valence system dimensions proposed by the RDoC, respectively. For example, investigating the reward responsiveness construct under the positive valence dimension would allow further understanding of the biological underpinning of numbing to positive emotions (e.g., unable to feel happiness) by integrating experimental assessments from the laboratory with self-report assessment from questionnaires. An alternative framework is the Hierarchical Taxonomy of Psychopathology (HiTOP) framework, which is also dimensional and mainly on data of self- and other-reported symptoms, traits, signs, and syndromes (Kotov et al., 2017). The framework provides a novel taxonomy of psychopathology against the traditional diagnostic systems. According to the framework, emotional numbing could be assessed and understood as one component of the distress subfactor, which further belongs to a broader internalizing spectrum, rather than a symptom component of the PTSD diagnosis. The current ERNS-C scale could serve as a useful instrument to fit these new approaches to psychopathology.

Although with a limited effect size, emotional numbing was found a potential mental health barrier (versus depression or anxiety) to seeking mental health support from

Table 3. Associations between lockdown-related trauma exposure and emotional numbing.

Exposure	B	SE	β	t	Bonferroni corrected p	Cohen's d
Being infected with COVID-19 during lockdown	−0.351	0.304	−0.020	−1.16	1	0.01
Having medical quarantine history	0.188	0.177	0.018	1.058	1	0.10
Losing job due to lockdown	0.798	0.156	0.093	5.122	< 0.001	0.25
Losing income due to lockdown	0.687	0.150	0.081	4.570	< 0.001	0.23
Seeing a person become seriously ill or die during lockdown	0.873	0.187	0.080	4.659	< 0.001	0.27
Losing family member in the past 12 months	0.842	0.151	0.096	5.589	< 0.001	0.25
Experiencing intimate partner violence during lockdown*	2.104	0.159	0.280	13.253	< 0.001	0.69

Note: N = 3,230. Age, gender, education level, marital status, household income, migration status, and history of psychiatric diagnosis were controlled as covariates. *The analysis was conducted in a subsample of 2,134 participants.

Table 4. Associations between emotional numbing and mental health outcomes.

Outcome	B	SE	β	t	Bonferroni corrected p
Depression symptoms	0.815	0.023	0.522	35.258	< 0.001
Anxiety symptoms	0.724	0.021	0.517	34.554	< 0.001
Well-being	−0.596	0.034	−0.303	−17.644	< 0.001
Sleep quality	0.059	0.004	0.251	14.428	< 0.001
Sleep time	0.050	0.005	0.194	11.188	< 0.001

Note: N = 3,230. Analyses were adjusted by age, gender, education level, marital status, household income, migration status, and history of psychiatric diagnosis.

others. The result suggests that individuals with emotional numbing might have limited capability and willingness to engage in psychological treatment (Grubaugh et al., 2019). Higher emotional numbing would lead to narrowed emotional experience including negative affect, thus leading to a lower perception of need for support. Also, emotional numbing is likely associated with impairments in interpersonal functioning (Birkley et al., 2016), which further limit individuals' capability to seek and gain support from their social networks. Therefore, strategic plans need to be made when delivering mental health services to people with high emotional numbing.

Studying emotional numbing in China could yield clinically, epidemiologically, and theoretically important insights into how social and cultural factors shape this psychological state. Emotional numbing likely interacts with different cultural patterns of psychosomatic experience, including social scripts that determine which emotions are perceived as threatening, and the ability of differently positioned actors to express emotions.

Additional research is needed on whether patterns of numbing and positive versus negative emotions vary cross-culturally. Research using the ERNS-C could suggest links between cultural patterns of emotional suppression and experiences of emotional numbing, or it could reveal correlations between numbing and particular stressors that affect certain segments of the Chinese population. By validating a Chinese language version of the general subscale of the

ERNS, this study takes an important step towards future investigations of emotional numbing in different sociocultural contexts.

There are several limitations of this study. First, we did not use another independent assessment of emotional numbing to examine the external validity of the revised ERNS-C scale. Currently, there have been no other validated measurements of emotional numbing for the Chinese general population. Although there is a validated Chinese version of the Oxford Depression Questionnaire, which also assesses emotional blunting, it was designed for patients who are receiving antidepressant treatment (Chen et al., 2022). Second, the cross-sectional nature of the dataset precludes causal inference of the observed associations, especially between the mental disorder symptoms and emotional numbing. Third, this study focused on a very specific population undergoing a severe traumatic event. The generability of the scales to other Chinese populations such as children and adolescents in other traumatic contexts such as abuse, disasters or accidents needs further validation. Fourth, to get a brief measurement of emotional numbing, only the general subscale of the ERNS was revised. Previous studies have suggested numbing to different emotions might result from different trauma types and could have a different impact on function (Berfield et al., 2021; Kerig et al., 2016; Li et al., 2020). However, the multidimensionality of emotional numbing is not addressed by the ERNS-C scale and additional work is needed to

validate and expand the assessment of numbing among Chinese people.

This study presents novel findings regarding the characteristics of emotional numbing in a general population who experienced a citywide lockdown during COVID-19. It suggests that emotional numbing could be a commonly reported mental health condition among people with trauma exposure. The associations between emotional numbing and a wide range of mental health outcomes were tested in this study for the first time. The findings imply that emotional numbing is a psychiatric phenotype with important clinical and functional implications. Our study suggests more attention to this phenotype not only in psychotraumatology studies, but also in studies of stress-related psychopathology, public mental health services, and policies aiming to reduce the negative psychological effects of major crises such as disasters or public health emergencies. In future studies, emotional numbing can be systematically studied following the Research Domain Criteria (RDoC) framework by mapping it onto the positive/negative valence and arousal systems. Also, more work is needed to understand how cultural contexts moderate the role of emotional numbing in the onset and development of psychopathologies.

Highlights

- A brief measurement for emotional numbing was validated among Chinese population.
- Emotional numbing is commonly reported among people with trauma exposure associated with the COVID-19 pandemic.
- Emotional numbing could be a transdiagnostic phenotype with important clinical and functional implications.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

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Supplemental material

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy reasons.

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