

Effects of a Brief Self-Compassion Online Intervention on Complex Posttraumatic Stress Symptoms Among Chinese University Students With Trauma History: A Pilot Randomized Controlled Trial

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Abstract

Purpose: The present study aimed to investigate the efficacy of a brief 10-day online self-compassion intervention, lasting around 25 min per day, in reducing complex posttraumatic stress disorder (CPTSD) symptoms among university students with trauma history. **Method:** We adopted a 2 (intervention group vs. control group) × 3 (pre-test vs. post-test vs. one-month follow-up) randomized controlled trial (RCT) design. **Results:** Seventy-seven participants completed the study; repeated measures analysis of variance revealed a reduction in total CPTSD scores post-intervention. There was medium effect size of the intervention on disturbances in self-organization symptoms. Network analysis of CPTSD symptom changes and intervention conditions showed that changes in avoidance of external trauma cues, worthlessness, emotion dysregulation, feelings of isolation, and nightmare symptoms were directly associated with the intervention condition. **Conclusions:** The pilot RCT suggests the feasibility and potential effectiveness of the online self-compassion intervention for CPTSD symptoms among university students.

Keywords

CPTSD symptoms, self-compassion, online brief intervention

A variety of mental health problems can be precipitated by traumatic events, with posttraumatic stress disorder (PTSD) being one of the most common (Bryant, 2019). According to the International Classification of Diseases - 11th Revision (ICD-11), typical PTSD symptoms include flashbacks, avoidance, and hypervigilance (World Health Organization, 2022). Following trauma exposure, some individuals may develop complex PTSD (CPTSD) symptoms, which include not only the typical PTSD symptoms but also disturbance in self-organization (DSO). DSO symptoms manifest as dysregulated affect, negative self-concept, and disturbances in relationships, reflecting the pervasive impact of trauma on an individual's emotional regulation, self-concept, and interpersonal functioning (Karatzias et al., 2017).

CPTSD symptoms most often occur following complex traumas (chronic, repeated, and compounded traumatic events that are difficult to escape or avoid; e.g., childhood abuse). However, they may also occur following single-incident or non-interpersonal traumatic events (Cloitre et al., 2013; Murphy et al., 2016). The subjective experience of trauma varies between individuals (Boals, 2018). What one person may perceive as common stress events, another may

experience as a serious threat (Robinson & Larson, 2010), undermining an individual's sense of security and self-worth. With the accumulation of empirical evidence, the World Health Organization officially included CPTSD in ICD-11 as a separate diagnostic entity from PTSD given its distinguishing characteristics. While some individuals may meet the diagnostic criteria for CPTSD, a subset of the trauma-exposed population may not fulfill these criteria but may still experience CPTSD symptoms that affect their

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quality of life and warrant attention. Therefore, it is vital to address the diverse needs of individuals who have experienced trauma and present with CPTSD symptoms even if they do not meet the clinical diagnostic criteria.

Identifying potentially modifiable factors is crucial in preventing or ameliorating the negative effects of trauma. In recent years, self-compassion has attracted the attention of researchers and practitioners as one of the protective factors for CPTSD symptoms. Self-compassion consists of three essential elements: kindness to oneself instead of judgment, mindfulness of one's present moment instead of over-identification, and the recognition that one's sufferings belong to a shared human experience instead of having feelings of isolation (Bluth & Neff, 2018). Despite the promise of self-compassion for reducing symptoms of CPTSD, the majority of prior research has investigated the association between self-compassion and PTSD. According to the theoretical framework of the emotion regulation system proposed by Gilbert (2009), self-compassion enables individuals to activate the inherent mammalian caring system, which functions to provide comfort and reduce feelings of threat. Activating this system could, in turn, help balance an overly active threat system, which may reduce the symptoms associated with PTSD.

In addition to its effectiveness in reducing typical PTSD symptoms, self-compassion may also mitigate DSO symptoms, indicating its potential as a viable treatment for CPTSD. The Memory and Identity theory of ICD-11 CPTSD emphasizes that trauma exposure in the context of individual vulnerability gives rise to intrusive memories and negative identities (Hyland et al., 2023). A higher level of self-compassion may result in less avoidance of painful emotions and a reduction in feelings of overwhelming shame and self-judgment (Braehler & Neff, 2020). Therefore, self-compassion may enhance a positive self-identity and mitigate negative self-perceptions resulting from trauma. Given that CPTSD involves deep-seated negative self-concept, cultivating self-compassion may help build a healthier self-identity by fostering a more positive and accepting self-view (Miyagawa, 2023). Self-compassion potentially operates as an efficacious regulatory mechanism for emotions (Inwood & Ferrari, 2018), which could influence the development and progression of CPTSD symptoms. Although there is limited research on self-compassion and CPTSD, Karatzias et al. (2019) discovered that self-compassion negatively predicted the DSO symptoms in CPTSD by performing a descriptive study in a clinical sample. Indeed, the relationship between self-compassion and CPTSD, as well as the benefits of a self-compassion-based intervention on CPTSD symptoms, is still an area that requires further examination.

There is substantial evidence that self-compassion-based interventions effectively treat many psychological problems (Ferrari et al., 2019). Currently, compassion-focused therapy (CFT), developed by Gilbert and Procter (2006) and the mindful self-compassion (MSC) program developed

by Germer and Neff (2019) are two widely recognized self-compassion intervention programs. CFT is a well-established form of individual psychotherapy, with many clinical studies demonstrating its effectiveness for psychological disorders, such as reducing posttraumatic stress symptoms (Lawrence & Lee, 2013), improving self-esteem (Thomason & Moghaddam, 2021), and treating eating disorders (Turk & Waller, 2020). MSC is also a widely accepted self-compassion training program. MSC consists of eight 2.5 h weekly group sessions. The sessions are led by two MSC teacher-trained individuals. Each week's session focuses on a different topic related to developing self-compassion, including basic mindfulness skills, cultivating a compassionate inner voice, and dealing with difficult emotions (Germer & Neff, 2019).

Many people worldwide fall into low or lower-middle income brackets and get only a small share of mental health resources (Kola et al., 2021). Therefore, cost-effective and accessible interventions are urgently needed for those with trauma experiences. A recent study has confirmed the effectiveness of short-term interventions for the treatment of PTSD (Sloan et al., 2023). Consequently, while both CFT and MSC are effective, they are relatively time-consuming and expensive, requiring a large amount of therapist or coach involvement. As such, many people are unable to access the self-compassion treatment they need. Convenient and affordable self-compassion interventions are needed to make mental health improvement accessible to a wider range of people in distress.

Brief online interventions have several advantages, including the ability to alleviate geographical distance, which enables a wider audience to access the intervention and reduces costs associated with venue and transportation. Furthermore, there is increasing evidence demonstrating the feasibility and effectiveness of brief online self-compassion interventions. For example, Mitchell et al. (2018) conducted a study that showed how a brief self-compassion intervention helped 262 mothers of newborns improve their levels of self-compassion and reduce distressing feelings during breastfeeding, as well as posttraumatic stress symptoms like intrusion and hypervigilance (Mitchell et al., 2018). Additionally, brief online self-compassion interventions have been found to increase levels of self-compassion in Chinese university students (Chen, 2020) and employees of Chinese companies (Li et al., 2021). Many individuals requiring psychological services lack access to appropriate resources due to various factors; consequently, low-threshold intervention programs can contribute to enhancing the mental health of a larger population in need (Kazdin, 2018).

The effectiveness of interventions needs to be evaluated to better verify or improve the program. Traditionally, the examination of intervention effects primarily focused on total scores. However, this approach does not facilitate a comprehensive understanding of how interventions influence the improvement of specific symptoms. Moreover, a substantial

body of clinical research has demonstrated the existence of interrelationships between symptoms, which can influence the overall progression of a disease. Nonetheless, it is challenging to ascertain the effects of interventions on these symptoms and the interrelationships among them using traditional analysis of variance (ANOVA).

The increasing popularity of network analysis offers a new perspective on intervention evaluation. Unlike traditional approaches, network analysis assesses the effectiveness of interventions at the symptom-level rather than the aggregated-score level. This symptom-level approach is particularly crucial because interventions differ in their improvement of symptoms (Mullarkey et al., 2020). Improvement in symptoms of high centrality may benefit participants more than the improvement in symptoms with low centrality. Mullarkey et al. (2020) used the difference in symptom scores measured before and after the intervention as network nodes to construct a difference score network model to investigate which symptoms the intervention directly contributed to improving. This approach facilitates a more in-depth exploration of the intervention's impact on various symptoms. Therefore, network analysis of intervention outcomes can provide valuable insights into the effectiveness of the intervention and help identify areas that require further improvement, thereby optimizing future interventions.

In summary, although self-compassion has been established as an essential component of improving mental health, there remains limited research on its effectiveness in reducing CPTSD symptoms. Traditional self-compassion interventions place relatively high demands on time and professional expertise. However, it is unclear whether brief self-compassion interventions can effectively reduce CPTSD symptoms. Furthermore, while previous research focused predominantly on total score changes to evaluate intervention projects, network analysis provides a more comprehensive approach to evaluate intervention projects by understanding symptom-level improvements. Thus, the aim of the current study is two-fold: (1) to explore whether a 10-day brief, online self-compassion intervention could reduce CPTSD symptoms in Chinese university students with trauma exposure and (2) to evaluate the effect of the intervention using network analysis to explore the symptom-level improvement and patterns, in addition to the total score analysis. These findings can offer important knowledge that can be applied to develop better mental health promotion programs for university students with trauma experience.

Methods

Study Design

This study used a 2 (intervention group vs. control group) \times 3 (pre-test vs. post-test vs. one-month follow-up test) RCT design. The intervention group received the intervention between the pre-test and the post-test, and the control group

did not receive the intervention. Participants randomized to the waitlist control group were also individuals with CPTSD symptoms, similar to the intervention group. They were provided with mental health education materials on self-compassion after the follow-up assessment (e.g., psychoeducation on self-compassion and meditation audios) out of concern for the participants' wellness.

Participants

Participants were recruited through commonly used Chinese social networking platforms, such as WeChat and QQ. Participants were recruited based on the following criteria: (1) current university students aged 18 years or older; (2) proficient in using Chinese for communication; (3) internet accessibility during the intervention; (4) experienced at least one traumatic event to date, as assessed by a trauma experience checklist adapted for Chinese university students by Tian et al. (2020); (5) met the cutoff of at least one of the six CPTSD symptom clusters on the International Trauma Questionnaire (Cloitre et al., 2018; avoidance, hypervigilance, flashbacks, affect dysregulation, negative self-concept, and disturbances in relationships) given that we focused on the trauma population with subclinical CPTSD symptoms. Exclusion criteria for participants were as follows: (1) under active treatment for psychiatric illness, as this could confound study results; (2) currently experiencing ongoing interpersonal violence, which may exacerbate CPTSD symptoms and impede full engagement in the study intervention as safety concerns were paramount; (3) current alcohol or substance abuse, which can hinder study participation and potentially obscure or worsen CPTSD symptoms; and (4) current self-injurious behavior or ideation as current self-injurious tendencies may require intensive support beyond what the research study can offer, and their mental state may be too unstable for meaningful participation. If serious psychological problems (e.g., suicidal ideation and behavior) were identified through the recruitment questionnaire, university students were referred to call professional mental health service hotlines or to seek medical attention. During the intervention study, participants could contact the researcher if they had any doubts or discomfort, and those experiencing severe discomfort would be referred to the appropriate professional agency or hospital. No participants reported discomfort to researchers during the study.

We used G*power 3.1 for our statistical power analysis. An effect size of $f=0.25$ was set, based on a previous meta-analysis on self-compassion intervention for PTSD, which suggested a medium effect size (Luo et al., 2021). We set a significance level of 0.05 and a statistical power of 0.8. A minimum sample size of 66 was required to ensure the validity of the statistical analysis sample when using a multivariate repeated measures ANOVA. Previous studies have reported an online intervention attrition rate of approximately 30% (Krieger et al., 2016). Therefore, a minimum of 94 participants would need to be recruited. A total of 411 university

students completed the recruitment questionnaire, which also served as the pre-test. Of those, 96 participants met the recruitment criteria and were randomly assigned to either the intervention group ($n=48$) or the control group ($n=48$). During the intervention period, eleven participants in the intervention group and eight participants in the control group dropped out. Using a per-protocol analysis, we assessed the effectiveness of the intervention by comparing pre- and post-test scores. This approach mitigates non-compliance bias and provides insight into the treatment effect under optimal adherence conditions. A total of 37 participants in the intervention group and 40 in the control group completed both the pre-test and post-test, which were included in the final analyses. At the one-month follow-up assessment, 32 participants in the intervention group and 37 participants in the control group were retained (see Figure 1). The Missing Completely at Random (MCAR) test (Little & Rubin, 1989) found that the pattern of missing data was not materially different from a random pattern (normed Chi-squared (χ^2/df)=1.26, $p=.108$). Therefore, we used the Expectation-Maximization (EM) imputation algorithm for the imputation of missing values at the follow-up measurement.

Procedure

All participants were required to complete an informed consent form prior to the start of the intervention. The

intervention materials were delivered and data collection was completed via the Questionnaire Star Platform (<https://www.wjx.cn>). Participants received a standardized reminder to complete the intervention. In this 10-day intervention, participants were given daily session links at the same time each day, and the links remained available throughout the intervention period.

Prior to the start of the intervention, participants in both groups added a research-specific WeChat account for receiving information about the project from the research assistant. At the pre-test, participants in both the intervention and control groups reported demographic information, trauma experience, levels of self-compassion, and CPTSD symptoms. After completing the pre-test, a 10-day self-compassion intervention was administered to the intervention group, while no intervention was administered to the control group. During the 10-day intervention period, the intervention group received a reminder at 7 p.m. each day to complete the day's exercises. A second reminder was given at 10:30 p.m. to participants who had not completed the day's exercise. If participants in the intervention group completed eight of the ten days, they were considered to have completed the intervention. All participants completed the same measures at the post-test. The follow-up assessment was performed one month after the post-test. Participants who completed the whole intervention and follow-up test received a reimbursement of 50 RMB

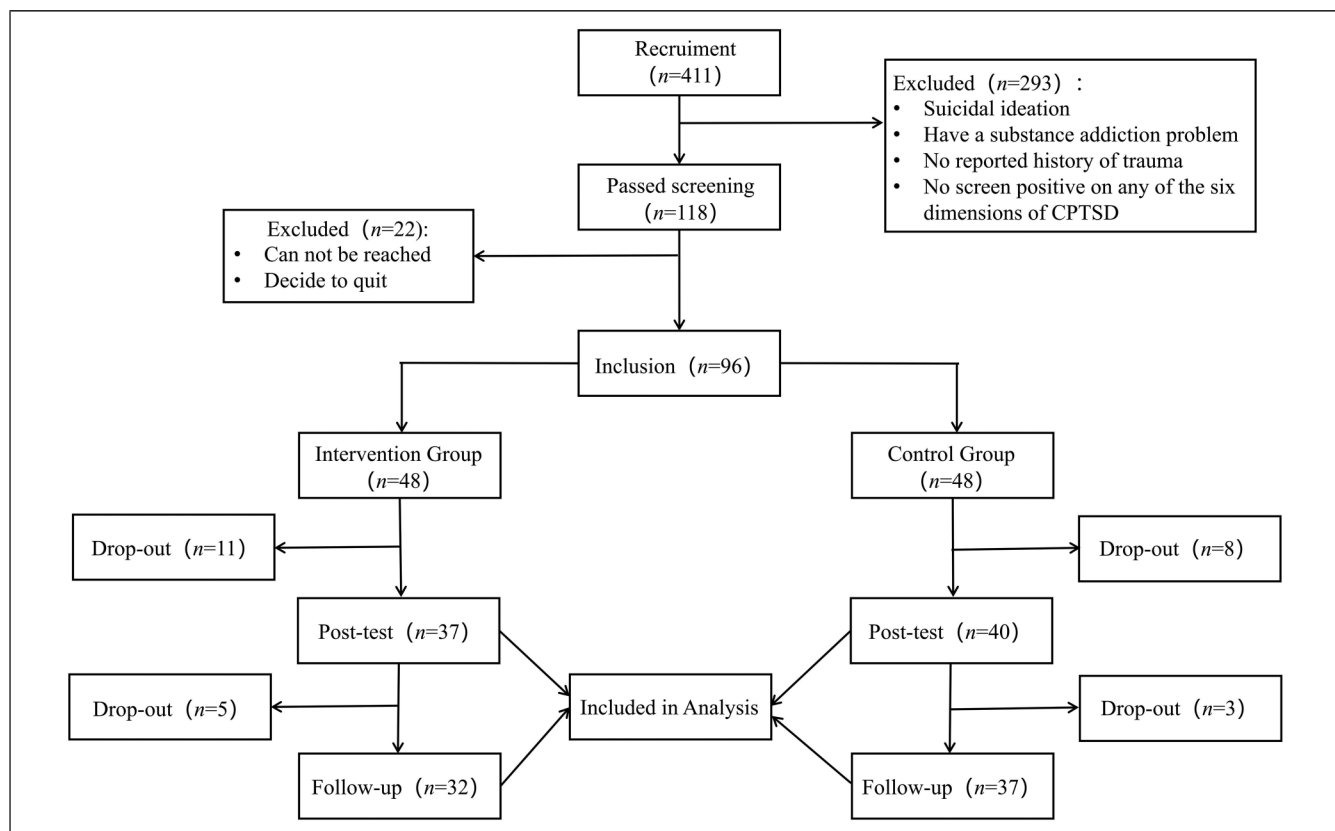


Figure 1. Flow chart of the study participants.

(equivalent to around 7.5 USD). This study was approved by the Ethics Committee of Shenzhen University. This intervention experiment was registered on the Chinese Clinical Trials Registry under the World Health Organization International Clinical Trials Registry platform (registration number: ChiCTR2200057474).

Content of the Intervention

The intervention drew on an established eight-week MSC intervention (Germer & Neff, 2019), on CFT (Gilbert & Procter, 2006), and on a four-week self-compassion online intervention adapted for the Chinese population by Chen (2020). In addition, we increased the focus on negative self-concepts based on previous network analysis of CPTSD symptoms (Huang, Chi, et al., 2023; Knefel et al., 2019) by including sections on the impact of trauma on negative self-concept and the importance of self-appreciation. The meditation voice blueprint used for this intervention is a publicly available resource (Neff, 2022). The original meditation was translated by a certified translator and recorded by a native speaker of Mandarin.

The intervention lasted for a period of ten days. The daily structure comprised three components: (1) a 5- to 10-min session on the acquisition of relevant knowledge through psychoeducation, (2) an around 10-min self-compassion meditation practice, and (3) a 5- to 15-min self-compassion writing exercise. The total duration of each daily session was approximately 20–35 min. On Day 1, participants were introduced to the program, CPTSD, and the components of self-compassion, followed by an audio exercise on instant self-compassion and maintaining a self-compassion diary. Day 2 focused on how trauma affects the body and the practice of compassionate breathing. Day 3 encouraged discovering the inner voice of caring to help regulate the body's responses. On Day 4, participants learned to treat suffering with love and extend compassion to themselves. Day 5 emphasized self-appreciation through self-compassion. Day 6 introduced the fierce perspective of self-compassion, focusing on action and boundaries. Day 7 explored self-compassion in interpersonal relationships, while Day 8 addressed the needs behind emotions. On Day 9, participants learned to cope with self-judgment using self-kindness. Finally, Day 10 summarized key takeaways and encouraged ongoing self-compassion practice. Each day included an audio exercise and diary entry to reinforce learning and reflection. Interventions are structured in a way that requires participants to complete preceding components before proceeding to subsequent ones.

Measurements

Trauma Experience. We used the adapted Chinese version of the DSM-5 Life Events Checklist (LEC-5) to assess trauma experiences (Tian et al., 2020; Weathers et al., 2013). In the study by Tian et al. (2020), the original version of LEC-5 assessed 17

traumatic events, some of which were reported to have minimal response among young people in modern China (e.g., severe humanitarian crisis, war or exposure to war zones). Based on the study, we excluded six events that are unlikely to be reported by Chinese university students and added 14 events that are commonly reported in Chinese culture (e.g., emotional/physical abuse by a teacher) according to Tian et al. (2020). Participants rated each event on a six-point Likert scale ranging from 1 to 6 based on the level of their impact (0 = never happened to me, 1 = no impact to 6 = extreme impact). Individuals who selected the “never happened to me” option are assumed not to have had such traumatic experiences, while other options are assumed to have had traumatic experiences. Higher total scores indicate more severe trauma impact.

CPTSD Symptoms. We used the International Trauma Questionnaire (Cloitre et al., 2018) that includes both PTSD and DSO symptoms dimensions to assess CPTSD symptoms. The Chinese adaptation of this instrument has demonstrated strong psychometric validity (Ho et al., 2019). Six items assessed PTSD symptoms, including re-experiencing (manifested as nightmares and flashbacks), avoidance (characterized by evading both internal and external traumatic cues), and threat (evidenced by hypervigilance and an exaggerated startle response). An additional six items evaluated DSO symptoms, such as affect dysregulation (represented by emotion dysregulation and emotional numbness), negative self-concept (indicated by feelings of failure and worthlessness), and difficulties in relationships (expressed as feelings of isolation and difficulty with intimacy). Participants rated each symptom using a five-point Likert scale from 0 (not at all) to 4 (extremely). The scores were added together, and a higher total score indicated a greater severity of symptoms. The Cronbach's alpha coefficients for this scale were 0.85, 0.90, and 0.88 at the pre-test, post-test, and follow-up.

Self-Compassion. We employed the Self-compassion Scale-Short Form (SCS-SF) to assess levels of self-compassion (Raes et al., 2011). The SCS-SF, validated in a Chinese college student population, exhibits robust validity (Huang, Qu, et al., 2023). The scale comprises 12 items that span six dimensions, and participants rate each item on a five-point Likert scale, ranging from 0 (almost never) to 4 (almost always). After reversing uncompassionate aspects of self-compassion, the mean of the six dimensions' scores was calculated to produce an overall self-compassion score. The Cronbach's alpha coefficients for this scale were 0.82, 0.89, and 0.87 at the pre-test, post-test, and follow-up.

Project Satisfaction and Usability Questionnaire. This is a self-administered program evaluation questionnaire containing six items. Participants in the intervention group were asked to rate how well each item fit their actual situation. The questionnaire assessed positive emotional experiences during the intervention, sense of meaning and growth during the intervention, intervention effectiveness, intervention satisfaction,

and likelihood of continued use in the future. The scale was scored on a 5-point Likert scale, ranging from 1 (not at all agree) to 5 (strongly agree). The Cronbach's alpha coefficient for this scale in this study was 0.92.

Statistical Analyses

Baseline Differences and Attrition Analyses. Independent samples *t*-tests or chi-squared tests were used to compare differences between the intervention and control groups at pre-test on demographic variables, trauma experience, and clinical symptoms. Next, we examined differences between the intervention and control groups of attrited and retained participants on demographic variables, as attrition can potentially affect the validity of study results. All analyses were performed via SPSS (version 23) and R (version 4.2.3).

Intervention Effect Test. Total score analyses. We used Cohen's *d* as a method to measure effect size (Fritz et al., 2012). Effect sizes are conventionally interpreted in terms of small (0.2), medium (0.5), and large (0.8). To assess intervention outcomes, mixed-effects repeated measures ANOVAs were performed with time (pre-test, post-test, and follow-up) as the within-subject factor and group (intervention and control) as the between-subject factor. The study examined the effects of the intervention on self-compassion and CPTSD symptoms. The effects of the intervention on each CPTSD symptom component were then further examined.

Symptom level analyses. Network analysis was used to explore the effects of the intervention on each symptom of CPTSD. We included the node "group (intervention versus control group)" in the network of differences in CPTSD symptoms based on prior research (Mullarkey et al., 2020). Group was included as a dichotomous variable, with the control group coded as zero and the intervention group coded as one. The CPTSD symptom difference score for each symptom was calculated as the post-test score minus the pre-test score. Because the network included both dichotomous and continuous variables, a mixed graphical model (MGM) was used. We used three-fold cross-validation (CV) to estimate the network structure. We retained all estimated connections without thresholding (threshold = "none") and utilized the "AND" rule for regularization, ensuring that only the most robust connections were included. The graphical least absolute shrinkage and selection operator (LASSO) was employed as a penalty factor to remove some of the weakly connected edges from the network graph. In this network, symptom nodes that were directly associated with the intervention condition indicated that they were directly influenced by the intervention, even after controlling for the effects of other symptoms. On the other hand, symptoms that did not have a direct association with the intervention condition but were associated with it through other symptom nodes suggested that these symptoms may have been more indirectly influenced by the intervention.

Results

Tests of Baseline Differences and Attrition Analysis

A total of 96 participants eligible for the study were randomly assigned to the intervention and control groups, with 48 in each group. We used simple randomization for this study, employing a computer-generated random number sequence. Participants in the intervention group were deemed to have completed the intervention if they completed 80% or more of the intervention exercises (i.e. if they completed more than eight out of the ten exercises, counting one per day) and completed both the pre-test and post-test. In total, 37 intervention-group and 40 control-group participants completed the intervention and the pre- and post-tests. There were no statistical differences at pre-test between the intervention and control groups in terms of demographic characteristics or primary study variables (Table 1).

Additionally, there were no significant differences between the total retained ($n = 77$) and attrited participants

Table 1. Baseline Difference Test Between Intervention and Control Groups at Pre-Test.

Variables	Intervention Group ($n = 37$) n (%) / M (SD)	Control Group ($n = 40$) n (%) / M (SD)	Statistical Significance (p)
Sex			0.806
Male	10 (27.0%)	12 (30.0%)	
Female	27 (73.0%)	28 (70.0%)	
Age			0.239
M (SD)	21.97 (1.62)	21.52 (1.68)	
Range	19–27	19–27	
Grade			0.351
Freshman	1	0	
Sophomore	0	2	
Junior	9	14	
Senior	9	10	
Graduate	11	6	
School			
Other	7	8	
Has sibling(s)			0.636
No	12 (32.4%)	16 (40.0%)	
Yes	25 (67.6%)	24 (60.0%)	
Family structure			0.731
Intact	32 (86.5%)	36 (90.0%)	
Other	5 (13.5%)	4 (10.0%)	
Residence			0.821
Urban	18 (48.6%)	21 (52.5%)	
Rural	19 (51.4%)	19 (47.5%)	
Self-compassion	3.18 (0.44)	3.06 (0.61)	0.393
CPTSD symptoms	13.54 (7.38)	14.03 (6.29)	0.757

Note. Use χ^2 test for categorical variables and *t*-test for continuous variables. CPTSD = complex posttraumatic stress disorder.

Table 2. Participants' Previous Trauma Experiences at Pre-Test Measurement.

	Intervention Group (n = 37)	Control Group (n = 40)	Statistical significance
Number of traumatic incidents			
M (SD)	9.70 (6.85)	7.65 (6.14)	$t = 1.38, p = .173$
Total range	1–25	1–25	
Type of traumatic event	n (%)	n (%)	
1. Emotional abuse by a parent or significant other (e.g., scolding, shaming, insulting, and speaking disparagingly)	27 (73.0)	26 (65.0)	$\chi^2 (1) = 0.57, p = .473$
2. Emotional neglect by parents or other significant others (e.g., often feeling lonely, unapproachable, and no one likes you or thinks you are important)	31 (83.8)	28 (70.0)	$\chi^2 (1) = 2.04, p = .185$
3. Physical neglect of a parent or significant other (not having enough food to eat, needing to wear dirty clothes, and not taking you to the doctor when you are sick)	22 (59.5)	16 (40.0)	$\chi^2 (1) = 2.91, p = .112$
4. Has lost a biological father or mother, through divorce, abandonment or other reasons	9 (24.3)	6 (15.0)	$\chi^2 (1) = 1.07, p = .391$
5. Adults who lived together during their formative years had a history of depression or other mental health disorders, or had attempted suicide	12 (32.4)	10 (25.0)	$\chi^2 (1) = 0.52, p = .614$
6. Has lived with an adult who had a problem with alcohol or drugs as a child	5 (13.5)	5 (12.5)	$\chi^2 (1) = 0.02, p = 1.000$
7. A member of the family has been in prison	6 (16.2)	10 (25.0)	$\chi^2 (1) = 0.90, p = .407$
8. Experiencing bullying, such as hitting you, threatening you, giving you a hard time or insulting you	18 (48.6)	16 (40.0)	$\chi^2 (1) = 0.58, p = .496$
9. Long-term living in communities where violence is dangerous or occurs	8 (21.6)	6 (15.0)	$\chi^2 (1) = 0.57, p = .559$
10. Natural disasters (e.g., floods, typhoons, and earthquakes)	18 (48.6)	15 (37.5)	$\chi^2 (1) = 0.98, p = .363$
11. Fire or explosion	7 (18.9)	5 (12.5)	$\chi^2 (1) = 0.60, p = .536$
12. Traffic accidents (e.g., car accidents, boat accidents, train wrecks, and plane crashes)	12 (32.4)	10 (25.0)	$\chi^2 (1) = 0.52, p = .614$
13. Serious accidents at work or during leisure	12 (32.4)	7 (17.5)	$\chi^2 (1) = 2.31, p = .186$
14. Exposure to toxic substances (e.g., hazardous chemicals and radiation)	7 (18.9)	4 (10.0)	$\chi^2 (1) = 1.25, p = .336$
15. Physical assault (e.g., being hit, assaulted, slapped, kicked and smashed)	16 (43.2)	12 (30.0)	$\chi^2 (1) = 1.46, p = .246$
16. Sexual assault (rape, attempted rape, rape, or any type of sexual act committed by force, and threat of violence)	8 (21.6)	5 (12.5)	$\chi^2 (1) = 1.14, p = .367$
17. Other unwanted or uncomfortable experiences of sexual behavior	13 (35.1)	9 (22.5)	$\chi^2 (1) = 1.50, p = .313$
18. Life-threatening illness or injury	11 (29.7)	8 (20.0)	$\chi^2 (1) = 0.98, p = .429$
19. Sudden violent death (e.g., homicide and suicide)	7 (18.9)	4 (10.0)	$\chi^2 (1) = 1.25, p = .336$
20. Sudden and unexpected death, either personally experienced or witnessed	8 (21.6)	4 (10.0)	$\chi^2 (1) = 1.97, p = .213$
21. Families have been under very poor conditions for a long time	18 (48.6)	22 (55.0)	$\chi^2 (1) = 0.31, p = .651$
22. Failing the National College Entrance Examination in China	25 (67.6)	21 (52.5)	$\chi^2 (1) = 1.81, p = .245$
23. Emotional abuse by teacher(s)	17 (45.9)	13 (32.5)	$\chi^2 (1) = 1.46, p = .251$
24. Physical abuse or corporal punishment by teacher(s)	12 (32.4)	11 (27.5)	$\chi^2 (1) = 0.22, p = .804$
25. Any other very stressful event or experience	30 (81.1)	33 (82.5)	$\chi^2 (1) = 0.03, p = 1.000$

Note. Use χ^2 test for categorical variables and t -test for continuous variables.

($n = 19$) on demographic variables (age: $t = 1.23, p = .223$; gender: $\chi^2 = 2.87, p = .104$) or the primary study variables at the pre-test (self-compassion: $t = 0.06, p = .956$; CPTSD symptoms: $t = 0.46, p = .650$).

Comparative Analysis of Trauma Experience in the Intervention and Control Groups

Table 2 shows participants' previous trauma experience at the pre-test measurement. No significant differences were found between the intervention group and control group in terms of the mean number of traumatic events experienced.

In addition, there were no significant differences in exposure to any specific type of traumatic event.

The Effects of Intervention

Pre-test, post-test, and follow-up values of the main study variables for the intervention and control groups are shown in Table 3. Additionally, Cohen's d effect sizes are provided. The intervention group showed small to medium improvements compared to the controls in self-compassion and overall CPTSD symptoms.

To examine the effects of the intervention on subjects' total levels of CPTSD symptoms, PTSD dimensions, DSO dimensions,

and self-compassion, we conducted repeated-measures ANOVAs on the above variables. In each ANOVA, the within-group variable was intervention phase (with three levels: pre-test, post-test, and follow-up) and the between-subject variable was treatment condition (with two levels: intervention group and control group). Due to the significant outcome of Mauchly's test of sphericity in self-compassion and CPTSD symptoms, we applied the Greenhouse–Geisser correction. The results indicate a significant interaction effect between time and group for self-compassion ($F(1.63, 109.14) = 5.01, p = .012, \eta_p^2 = 0.07$), CPTSD symptoms ($F(1.65, 123.83) = 3.29, p = .049, \eta_p^2 = 0.04$), and DSO symptoms ($F(2, 150) = 4.05, p = .022, \eta_p^2 = 0.05$). However, the interaction effect for PTSD symptoms was not significant ($F(2, 150) = 0.65, p = .526, \eta_p^2 = 0.01$). Detailed results of pairwise comparisons are included in Figure 2. The intervention was effective for the intervention group, increasing participants' self-compassion and reducing their total CPTSD symptoms, PTSD symptoms, and DSO symptoms at the post-test compared to the pre-test. The two groups showed between-group differences in self-compassion ($p = .002$), CPTSD symptoms ($p = .009$), PTSD symptoms ($p = .029$), and DSO symptoms ($p = .018$) at the post-test. However, in the follow-up measurement, the statistical difference in PTSD symptoms ($p = .136$) between the two groups was not significant, while the differences in self-compassion ($p = .058$), total CPTSD scores ($p = .050$), and DSO symptoms ($p = .085$) showed marginal significance.

Network of the CPTSD Symptoms Change Scores and Intervention Conditions

The pre- and post-test difference scores for each CPTSD symptom dimension were used as nodes, and the intervention condition (0 = control group; 1 = intervention group) was added to construct the CPTSD dimension change scores network. Greater change scores reflect greater decreases in symptoms. The results are shown in Figure 3. The intervention condition was directly associated with the improvement of *avoidance of external trauma cues* (Edge weight [EW] = 0.116), *worthlessness* (EW = 0.236), *emotion dysregulation* (EW = 0.251), and *feelings of isolation* (EW = 0.119), after controlling for the effects of other symptoms. However, after controlling for other factors, the intervention condition was negatively associated with *nightmares* (EW = -0.238). Improvements in other symptoms may have been largely indirectly associated with the intervention condition.

Project Satisfaction and Availability

At the end of the intervention, the majority of participants in the intervention group reported positive emotional experiences in the moment (81.1%; on a scale of 1–4, including participants who selected 3 “somewhat like me” and 4 “fully like me”, same below), a sense of meaning (83.8%), and growth (71.3%). In addition, 75.7% of the participants felt that the

Table 3. Descriptive Statistics and Effect Sizes of Study Variables at Three-Time Points.

	Intervention Group ($n = 37$)			Control Group ($n = 40$)			Effect Size		
	PRT M (SD)	POT M (SD)	FU M (SD)	PRT M (SD)	POT M (SD)	FU M (SD)	PRT to POT d	PRT to FU d	POT to FU d
Self-compassion	3.18 (0.44)	3.43 (0.54)	3.33 (0.55)	3.08 (0.60)	3.00 (0.56)	3.07 (0.55)	-0.69	-0.32	0.58
CPTSD symptoms	13.54 (7.38)	8.03 (6.64)	9.89 (7.60)	14.03 (6.29)	12.38 (7.53)	13.27 (7.30)	0.51	0.38	-0.19
PTSD symptoms	5.65 (3.68)	3.35 (3.25)	3.88 (4.16)	6.38 (4.21)	5.13 (3.69)	5.24 (3.77)	0.25	0.14	-0.12
DSO symptoms	7.89 (4.93)	4.68 (4.29)	6.01 (4.55)	7.65 (3.92)	7.25 (4.99)	8.03 (5.49)	0.58	0.46	-0.14
Nightmare	0.95 (0.74)	0.65 (0.68)	0.65 (0.94)	1.38 (1.01)	1.00 (0.88)	1.02 (1.28)	-0.09	-0.05	0.02
Flashback	0.95 (0.78)	0.57 (0.69)	0.64 (0.89)	0.93 (0.89)	0.73 (0.78)	0.86 (0.84)	0.34	0.36	0.04
Internal avoidance	1.30 (0.91)	0.70 (0.74)	0.77 (0.95)	1.28 (0.96)	1.08 (0.92)	1.18 (0.98)	0.34	0.36	0.04
External avoidance	1.16 (0.96)	0.62 (0.64)	0.92 (1.16)	1.05 (0.88)	1.05 (0.90)	0.97 (0.93)	0.48	0.12	-0.38
Hypervigilance	0.59 (0.60)	0.38 (0.64)	0.36 (0.71)	0.70 (0.88)	0.60 (0.74)	0.37 (0.74)	0.14	-0.13	-0.30
Startle response	0.70 (0.85)	0.43 (0.73)	0.53 (0.71)	1.05 (1.01)	0.68 (0.73)	0.83 (0.92)	-0.11	-0.05	0.08
Emotion Dysregulation	2.00 (0.67)	1.19 (0.88)	1.38 (0.86)	2.05 (0.82)	1.83 (0.87)	1.85 (0.95)	0.57	0.39	-0.19
Numbness	1.08 (1.16)	0.76 (0.98)	0.79 (0.90)	1.20 (0.88)	1.13 (1.04)	0.98 (0.95)	0.21	0.07	-0.23
Sense of failure	1.05 (0.91)	0.65 (0.79)	0.90 (0.95)	1.05 (1.04)	1.13 (1.14)	1.06 (1.11)	0.47	0.18	-0.33
Worthlessness	0.89 (0.97)	0.46 (0.73)	0.73 (1.06)	0.83 (1.01)	0.85 (1.03)	0.94 (1.12)	0.58	0.30	-0.20
Isolation	1.24 (1.07)	0.59 (0.87)	1.00 (1.00)	1.13 (0.76)	1.13 (1.07)	1.33 (1.40)	0.60	0.37	-0.18
Difficulty with intimacies	1.63 (1.19)	1.03 (1.14)	1.22 (1.18)	1.40 (1.15)	1.20 (0.97)	1.84 (1.43)	0.32	0.62	0.39

Note. PRT = pre-test; POT = post-test; FU = follow-up; M = mean; SD = standard deviation; CPTSD = complex posttraumatic stress disorder; PTSD = posttraumatic stress disorder; DSO = disturbance in self-organization; d = Cohen's d .

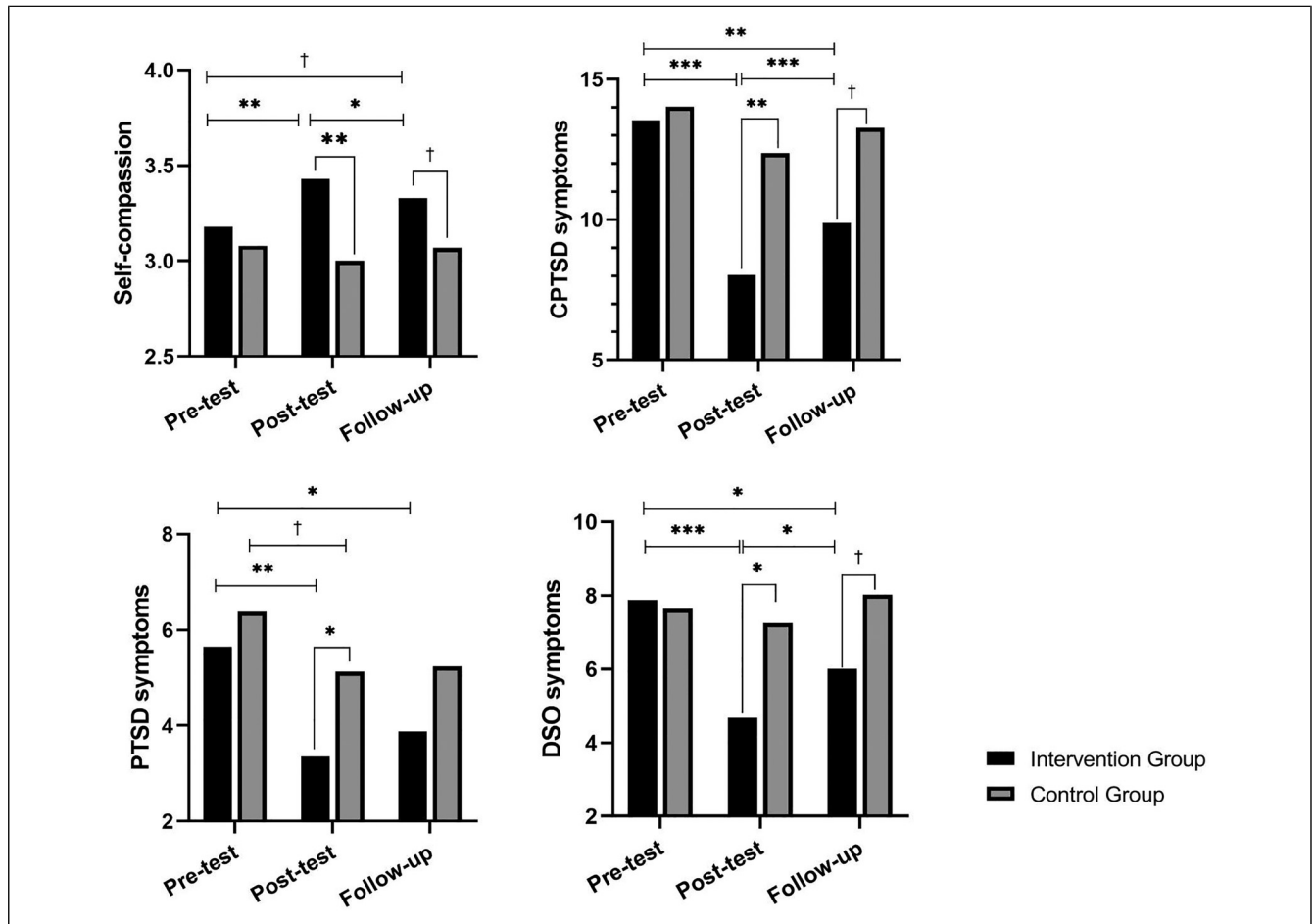


Figure 2. Pairwise comparison results of studied variables.
 Note. † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

intervention was effective for them, 81.1% were satisfied with the intervention, and 83.8% indicated that they would continue to use what they had learned in the intervention in their future lives.

Discussion and Applications to Practice

This study explored the effects of a self-compassion-based network intervention on CPTSD symptoms. Results of a repeated-measures ANOVA revealed that the self-compassion intervention reduced the overall CPTSD symptoms in university students, with DSO symptoms improving more than PTSD symptoms. Network analysis further identified the symptom changes that were directly associated with the intervention condition: improvements in *avoidance of external trauma cues*, *worthlessness*, *emotion dysregulation*, *feelings of isolation*, yet increases in *nightmares*.

The effect size of the current online brief intervention for enhancing self-compassion reached a medium to large effect at the post-test measurement, similar to the previous study by Ferrari et al. (2019). Yet it sustained only a small effect after the one-month follow-up. The results of the

repeated measures ANOVA showed a significant improvement in total CPTSD scores at both the post-test and the one-month follow-up measurement compared to the pre-test measurement. This finding indicated that the self-compassion intervention was effective in reducing CPTSD symptoms. However, while the effect size for improving PTSD reached a medium level at the post-test, it showed only a small effect at the one-month follow-up. This indicates short-term effectiveness, but sustained results may require ongoing reinforcement or support. Boosting participant motivation and providing additional booster sessions may aid in maintaining effects.

Even though the effect size of the intervention was much larger for DSO symptoms than for PTSD symptoms, a significant reduction in both PTSD and DSO total scores was observed at post-test following the self-compassion intervention. This finding partially contrasts with the study by Dumarkaitė et al. (2021), who found that an online mindfulness-based intervention for CPTSD was mostly effective for DSO symptoms at post-test. One possibility for this discrepancy is that self-compassion includes not only mindful awareness of distressing emotions, but also self-kindness and reflection on the common

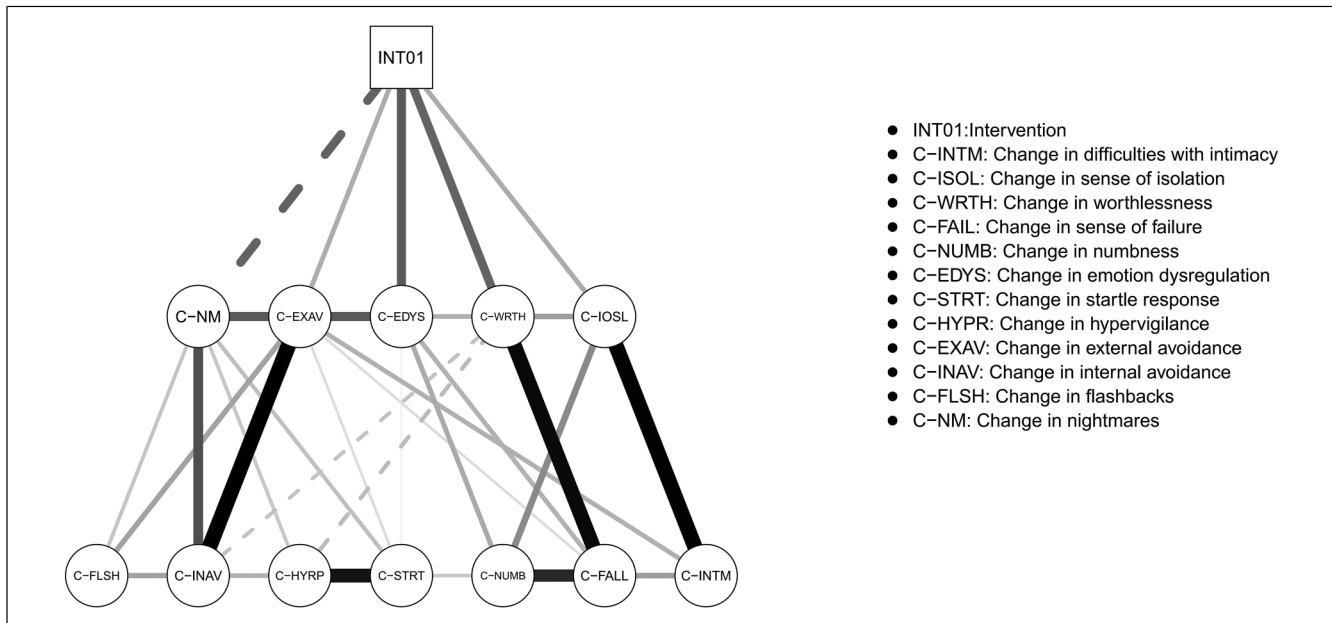


Figure 3. Network of intervention conditions and the changed scores of CPTSD symptoms.

Note. INT01 represents the intervention condition (control group = 0; intervention group = 1). Solid lines represent positive correlations, while dashed lines indicate negative correlations. The thicker the line, the stronger the correlation.

humanity of distress (Neff, 2003). By fostering self-kindness and common humanity, individuals can approach themselves and their experiences with greater kindness and a broader perspective, thereby reducing avoidance and suppression of posttraumatic emotions (Winders et al., 2020). Self-compassion encourages a non-judgmental and reassuring stance that does not shy away from traumatic information, providing a gentle exposure effect that may help mitigate PTSD symptoms (Winders et al., 2020). Moreover, self-compassion promotes adaptive emotion regulation (Inwood & Ferrari, 2018), aiding individuals in alleviating symptoms related to affect dysregulation. The common humanity aspect of self-compassion enhances an individual's interpersonal skills (Bistricky et al., 2017), increasing individuals' sense of social connection and potentially alleviating relationship difficulties associated with CPTSD. As a balanced and healthy approach to self-relating, self-compassion aids in improving negative self-concepts, which could decrease feelings of failure and worthlessness (Zhang et al., 2023). Hence, the more comprehensive self-compassion-based intervention might exhibit greater effectiveness in comparison to mindfulness-based interventions when treating CPTSD symptoms.

The present research found that participants' total CPTSD and DSO scores at the one-month follow-up were significantly lower than the pre-test scores. However, the prolonged effect of this intervention on total PTSD scores was not significant compared to the pre-test. In addition, it is worth noting that there was a significant decrease in self-compassion and a rebound in the total DSO scores at the one-month follow-up compared to the post-test measurement. One possible reason may be the short duration of this intervention. As the findings of a meta-analysis of the intervention of PTSD suggest,

alleviating PTSD symptoms necessitates a more extended intervention period (Luo et al., 2021). Furthermore, individuals may experience temporary changes in their cognitive and behavioral patterns during the intervention. However, as an intervention ends, the factors sustaining these changes might become insufficient or weakened, leading to the fading of the intervention's effectiveness (Hailemariam et al., 2019).

This study conducted a network analysis of changes in CPTSD symptoms and intervention conditions at the pre-test and the post-test. The findings provide insight into the direct and indirect associations of the intervention with CPTSD symptoms and, thus, allow us to explore the pathways through which the intervention works (Blanken et al., 2019; Cervin et al., 2019). We found that the intervention was directly associated with decreases in *avoidance of external trauma cues*, *worthlessness*, *emotion dysregulation*, and *feelings of isolation*. That is, after controlling for other symptoms, participants had more improvement in the aforementioned symptoms, which were directly influenced by the intervention condition relative to the control group. This finding corroborates previous research, which found that self-compassion negatively predicts avoidance of trauma reminders (Krieger et al., 2013). A possible explanation is that the mindfulness component of self-compassion can promote an individual's awareness of the present moment, reducing avoidance behavior (Braehler & Neff, 2020). Besides, the self-compassion intervention can improve participant's *worthlessness* and, thus, reduce *feelings of failure*. This may be because self-compassion emphasizes the importance of extending kindness towards oneself during challenging times and setbacks, which can facilitate self-worth (Dupasquier et al., 2020). The finding aligns with existing

research, which has demonstrated that *worthlessness* holds high centrality in the CPTSD symptoms network and may exert a greater influence on other symptoms (Knefel et al., 2019). In other words, improvements in *worthlessness* are likely to lead to improvements in other symptoms.

Additionally, elevated self-compassion can facilitate self-acceptance and cognitive reappraisal at times of distress (Jin et al., 2020), which may lessen *emotion dysregulation*. Moreover, it is found that the intervention condition is directly associated with changes in *feelings of isolation*. This finding is consistent with a review of the relationship between self-compassion and close relationships (Lathren et al., 2021), with better self-compassion associated with more close relationship benefits. It is possible that self-compassion highlights the shared human experience and fosters a sense of connection among individuals (Aspy & Proeve, 2017); in doing so, it may alleviate feelings of isolation. Self-compassion also emphasizes treating oneself with kindness, assisting individuals in becoming more emotionally supportive of themselves (Neff, 2023). These changes may alleviate *feelings of isolation* and facilitate the improvement of self-worth and emotion regulation. Notably, the LASSO regularized estimates may compress some edge weights with small values to 0. That is, some nodes may have a direct association with the intervention condition of self-compassion but are not reflected in the network because of their small values.

Interestingly, we found that the intervention was directly associated with an increase in *nightmares*, after controlling for the effects of other symptoms. Taking a closer look, the intervention on nightmare symptoms shows minimal effect size. One possible explanation is that engaging in self-compassion allows individuals to acknowledge distressing emotions (Neff, 2023). This acknowledgment may bring previously avoided trauma-related memories back to consciousness. As a result, there could be a temporary increase in the propensity for *nightmares*. Nevertheless, as other symptoms improve (e.g., *avoidance of external and internal trauma cues*), the processing of trauma-related memories is facilitated (Braehler & Neff, 2020), ultimately leading to a reduction in nightmare symptoms.

The intervention attrition analysis showed a pre- to post-test attrition rate of 22.0% in the intervention group and 16.7% in the control group. The attrition rate for this intervention was similar to that of previous web-based intervention studies (approximately 27.0%; Cavanagh et al., 2014). Gender analysis showed that only 27.3% of the participants in the final sample were male. A likely reason for this is that a lower percentage of men sought and were willing to receive mental health services relative to women (Susukida et al., 2015). Furthermore, this discrepancy might also be attributable to the fact that women tend to experience more trauma that is high impact and occurs earlier in life (during a more crucial developmental period), with the prevalence of PTSD being higher in females compared to males (Olf,

2017). These may limit the recruitment and completion of participation by male participants.

Importantly, while the intervention demonstrated considerable group variations at post-test, these differences trended towards marginal significance or non-significance at the one-month follow-up measure. The findings of this research imply that although brief interventions can effectuate an immediate enhancement in self-compassion and an improvement in CPTSD symptoms at a total-score level among university students with trauma experiences, these effects attenuate over time. Therefore, it may be beneficial to incorporate weekly or monthly booster sessions subsequent to the intervention (Gearing et al., 2013) to reinforce the treatment outcomes.

The above findings of this study suggest that self-compassion practices can benefit university students with trauma experiences. It is plausible that the cultivation of self-compassion plays a role in reconciling negative beliefs, such as perceiving failure as a common human experience (Neff, 2023), which could facilitate a healthy evaluation of self-worth. By increasing their self-compassion, individuals may experience a reduction in their fear of failure. Moreover, self-compassion emphasizes the intrinsic value of each individual and challenges the notion that perceived imperfections are flaws (Neff, 2011). This emphasis on self-worth can enhance individuals' perception of themselves. In addition, self-compassion enables individuals to better cope with emotionally challenging situations with better emotion regulation (Scoglio et al., 2018), thereby reducing avoidance behaviors. This process contributes to restoring balance within a dysregulated threat system. Collectively, these findings have implications for the mental health of university students who have experienced trauma, as self-compassion practices can aid in coping with daily challenges and promoting mental well-being.

This study presents several limitations. First, it primarily examined CPTSD symptoms among university students with trauma history instead of individuals who met the diagnostic criteria for clinical CPTSD. We chose to include participants endorsing at least one CPTSD symptom cluster to capture a broader spectrum of CPTSD symptoms. While this approach increases sample size, it may also include individuals with less severe presentations. Consequently, caution must be exercised when generalizing the findings to clinical populations. In future research, it may be beneficial to implement the study within clinical cohorts. Second, it is important to note the differences in diagnostic criteria for PTSD. This study focuses on CPTSD as defined by ICD-11, whereas DSM-5-TR does not recognize CPTSD as a separate diagnosis. Instead, DSM-5-TR includes "negative alterations in cognition and mood" as one of the four PTSD symptom clusters, similar to the "affect dysregulation" dimension of DSO in ICD-11 CPTSD. This overlap suggests that our ICD-11-based findings may also be relevant to the DSM-5-TR PTSD framework. Future research should examine the impact of these diagnostic differences on treatment outcomes and the applicability of self-compassion

interventions across both diagnostic systems. Third, although we used network analysis in an exploratory manner to measure the effects of our intervention, thereby offering a novel lens for program evaluation, it is crucial to exercise caution in our interpretations due to existing data limitations. Further empirical studies are warranted to generate a more substantial body of evidence that either confirms or refutes the observed patterns of effects. Fourth, the current measure relies largely on subjective self-report measures and lacks clinical interviews or objective indicators. This may have led to biased estimates of university students' trauma experiences, CPTSD symptoms, or other psychological symptoms. It is important for future research to include clinician ratings, collect objective indicators, expand the dimensions of measurement, and improve the reliability and validity of assessment methods. Fifth, the participant pool was predominantly composed of university students, and the sample size was insufficient for robust subgroup analysis to determine if the intervention's effectiveness varies with different types of traumatic events. Future research should include a larger and more diverse sample to explore these variables across different trauma-exposed groups and age ranges. Importantly, given the recent advancements in generative artificial intelligence, the intervention platform can be enhanced for future adaptability, offering more personalized and responsive services. Lastly, the one-month follow-up may not capture the program's long-term effects. Future research should include longer-term assessments, like a one-year follow-up, and additional indicators, such as overall well-being, for a more comprehensive evaluation.

Despite the limitations, this study suggests that the online self-compassion-based intervention can help reduce CPTSD symptoms in university students. By using both total score and symptom-level analysis, we can gain a deeper understanding of the effectiveness of the intervention and identify areas for future improvement. Our intervention also demonstrates that when barriers prevent in-person interventions (e.g., due to epidemic outbreaks, location limitations, and workforce constraints), the development of effective online interventions for trauma-affected populations is essential and contributes to the advancement of mental health. Besides, this study's findings provide important insights for social workers in trauma-informed practice. Integrating self-compassion exercises into therapeutic toolkits can enhance the efficacy of treating clients with CPTSD symptoms. Recognizing the positive impact of self-compassion on self-concept, social workers are encouraged to collaborate with clients in reshaping negative self-views. Furthermore, the observed improvements in avoidance behaviors and feelings of isolation indicate that self-compassion practices can aid clients in confronting and processing traumatic memories more effectively. It helps clients feel more connected and less alone in their experiences. Social workers can integrate these practices into their sessions, thereby fostering a more profound and sustained recovery process. Acknowledging

the intervention's short-term benefits and the need for sustained support, it is advisable for social workers to establish ongoing mechanisms. These might include periodic boost-ups or peer support groups to maintain the progress achieved.

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