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Comparison between emerging adults and adults in terms of contamination fear, post-COVID-19 PTSD and psychiatric comorbidity

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Abstract

The present study compared Chinese emerging adults and adults regarding the association between contamination fear, posttraumatic stress disorder post-COVID-19 and psychiatric comorbidity after controlling for demographic and trauma exposure variables. 1089 Chinese civilians (M = 382; F = 707) with a mean age of 26 years (M = 26.36, SD = 8.58) were recruited from different provinces in China via an online survey posted on mainstream Chinese social networking platforms. They completed a demographic page with questions on trauma exposure, the Vancouver Obsessional Compulsive Inventory, the Posttraumatic Stress Disorder Checklist for DSM-5 and the General Health Questionnaire-28. Results showed that 12.7%, 68.7% and 18.6% met criteria for full, partial and no PTSD, respectively. Emerging adults reported significantly lower levels of symptoms of re-experiencing, avoidance, somatic problems, anxiety and fear of contamination than adults. In both emerging adults and adults, contamination fear was correlated with PTSD and psychiatric comorbidity. High educational attainment was significantly correlated with psychiatric comorbidity in emerging adults, but with PTSD in adults. Length of quarantine was correlated with psychiatric comorbidity only in adults. In conclusion, both emerging adults and adults developed varying levels of contamination fear, posttraumatic stress and general psychological symptoms following the outbreak of COVID-19. Emerging adults were more resilient than adults in coping with distress.

Keywords Contamination fear · PTSD · COVID-19 · Emerging adults

Introduction

Coronavirus disease (COVID-19), caused by a highly contagious coronavirus (Severe Acute Respiratory Syndrome Coronavirus 2, SARS-CoV-2), was first identified in Wuhan, China, in December 2019 and declared a pandemic in March 2020. This illness may increase the risk of posttraumatic stress disorder (i.e. post-COVID-19 PTSD) (Boyraz & Legros, 2020; Coleman, 2020), with prevalence rates ranging from 1 to 98% among hospital patients (Bo et al., 2020; Guo et al., 2020) and 3.8–12.6% among healthcare workers (Chew et al., 2020; Kang et al., 2020; Lai et al., 2020; Yin et al., 2020).

In Spain, 36.6% of the population was reported to have post-COVID-19 PTSD shortly after the outbreak, with avoidance behaviours being the most common symptom (Rodriguez-Rey et al., 2020; Taylor et al., 2020). In addition to avoidance behaviours, fear, anger and hopelessness were also common. Interestingly, their fear was more about fear of the negative impact COVID-19 had on their household

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income, access to health care and food supply, rather than threats to life (Trnka & Lorencova, 2020).

When community adults living in Wuhan and surrounding cities in China were studied, a prevalence rate of 7% for post-COVID-19 PTSD was found (Liu et al., 2020). A slightly lower rate (4.6%) was found among people living outside Wuhan, although it was higher (18.4%) among people with a suspected or confirmed COVID-19 diagnosis or those who had close contact with an infected person (Sun et al., 2020). COVID-19 affects not only adults but also young people, 14.4% of whom from China reported PTSD symptoms, while almost 40.4% reported psychiatric comorbidity (Liang et al., 2020). These traumatic effects can last over a long period of time, partly due to unresolved traumatic stress in schools and families (Zhou, 2020).

In addition to PTSD symptoms, people may experience mild (19.4%) and moderate to severe (18.6%) global psychological distress after the outbreak (Moccia et al., 2020). People in China have been found to experience mild (about 5–10%), moderate (1–6%) and severe anxiety (13%), and mild (10–14%), moderate (2–18%) and severe (1–9%) depression (Ahmed et al., 2020; Wang et al., 2020a, b), while approximately 2%, 10% and 29% experienced increased alcohol dependence, harmful drinking and hazardous drinking, respectively; 32.1% were also thought to have low psychological well-being (Ahmed et al., 2020). Other psychological symptoms included obsessive compulsion, interpersonal sensitivity, phobic anxiety and psychoticism in more than 70% of the Chinese civilian population in different parts of China (Tian et al., 2020).

The above prevalence rates of PTSD and comorbid psychiatric symptoms suggest that there are individual differences in the manifestation of the psychological impact of COVID-19. Understanding these clinical manifestations is important. It will help us understand the underlying nature of the disorders and build aetiological models that will then guide treatment (Contractor et al., 2018; Litz et al., 2018; Pietrzak et al., 2014). These are the reasons for conducting the current study, which aimed to investigate aetiological factors for post-COVID-19 PTSD.

Several research gaps are noteworthy from the previous literature. First, while awareness has been raised that fear of contamination associated with COVID-19 can affect people's mental health (French & Lyne, 2020; Pozza et al., 2020), systematic research on this topic is limited. One study claimed that worries about germs, obsessive-compulsive contamination behaviour and checking rituals are associated with COVID stress syndrome, which is characterised by fear of the dangerousness of COVID-19 and of foreigners coming to their countries and spreading the virus (xenophobia), compulsive checking behaviour and worries about the socioeconomic costs of the virus (Taylor et al., 2020). However, this study did not focus on the relationship between contamination fear, post-COVID-19 PTSD and psychiatric comorbidity. More research is clearly needed to investigate this, which is the first knowledge gap for the current study.

Second, in examining this relationship, it is essential to consider the 'victim variables' that have been shown to influence trauma responses and distress outcomes (Friedman et al., 2007; Vogt et al., 2007). In the context of COVID-19, these variables include gender, with female gender being a consistent predictor of stress (Boyraz & Legros, 2020; Liu et al., 2020; Rodriguez-Rey et al., 2020; Sun et al., 2020; Yin et al., 2020), low educational attainment (Liang et al., 2020) and social inequality such as poverty (Boyraz & Legros, 2020). Certain COVID-19 trauma exposure characteristics are also thought to be associated with increased PTSD and psychiatric comorbidity (Boyraz & Legros, 2020; Yin et al., 2020). These characteristics can be identified based on individuals' place of residence (whether or not they live in the Wuhan epicentre) (Liu et al., 2020; Sun et al., 2020), personal infection with the virus (Jiang et al., 2020), personal contact with an infected family member (Kisely et al., 2020; Wytrychiewicz et al., 2020), the experience of quarantine (Blackman, 2020; Dutheil et al., 2020), loss of a person to the virus (Blackman, 2020; Boyraz & Legros, 2020; Dutheil et al., 2020; Kokou-Kpolou et al., 2020), personal occupation (e.g. healthcare worker) (Boyraz & Legros, 2020; Lai et al., 2020) and occupation of others (family members as COVID-19 healthcare workers) (Jiang et al., 2020).

Third, it remains unclear to what extent the interrelationship between victim variables, contamination fear, post-COVID-19 PTSD and psychiatric comorbidity might vary depending on the current developmental stage of the victims. The present study aimed to clarify this by comparing emerging adults (Arnett, 2000) who were approximately between 18 and 25 years old with adults (26+). Why is it important to conduct such a study? A recent claim is that COVID-19 can impact emerging adults and adults in different ways, whether through changes in the way they are educated, the prospect of a job in the future for emerging adults, or through unemployment, financial difficulties, increased vulnerability to the virus for adults, both middle-aged and older (Martin, 2020). In other words, emerging adults and adults should differ in the way they respond to the impact of the pandemic.

Furthermore, trauma research seems to show that emerging adults are particularly vulnerable to trauma exposure (Borsari et al., 2008; Daigle et al., 2008; Fisher et al., 2006; Rennison & Addington, 2018). It is estimated that approximately 80–90% of them will experience high rates of PTSD symptoms and psychiatric comorbidity such as substance abuse at some point in their lives (Arnett, 2000,

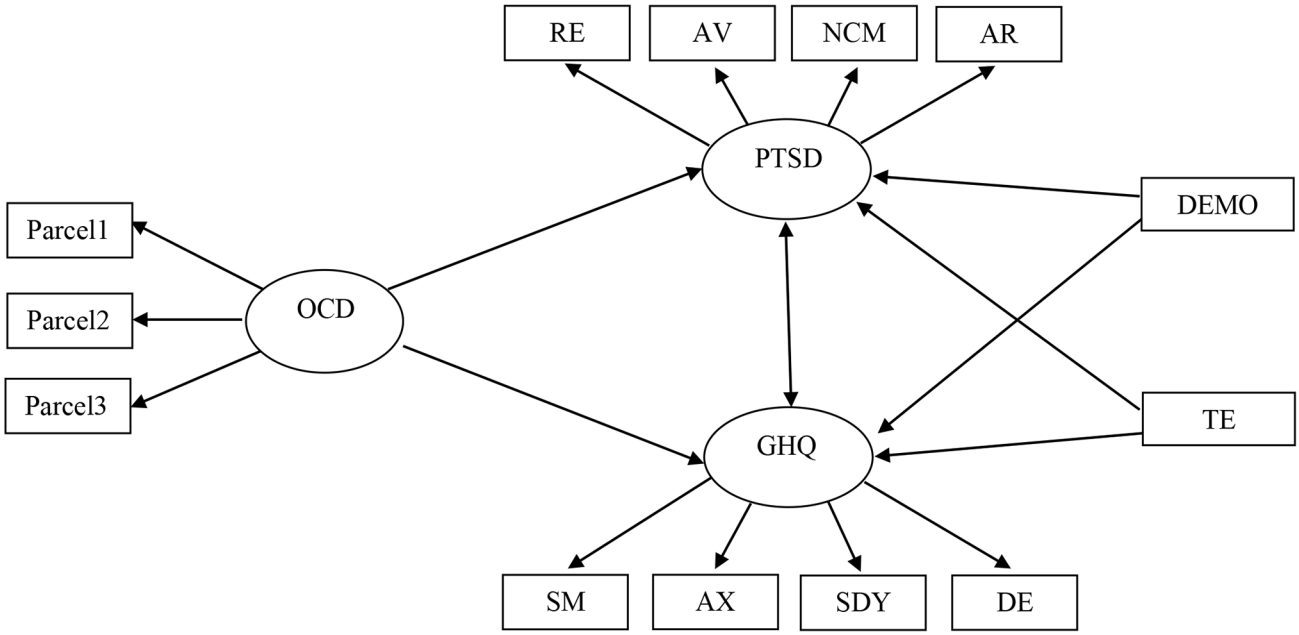

Fig. 1 Hypothesized structural equation model associating fear contamination, PTSD and psychiatric co-morbidity with demographic variables and trauma exposure adjusted
Note: RE: re-experiencing symptoms; AV: avoidance; NCM: negative cognition and mood; AR: hyperarousal; SM: somatization; AX: anxiety; SDY: social dysfunction; DE: depression; DEMO: demographic variables; TE: trauma exposure.

2005; Borsari et al., 2008; Gilhooly et al., 2018). In addition, emerging adults are in a stressful developmental period where they do not feel like adolescents or adults and are still searching for their own identity (Arnett, 2006). According to a large-scale international study (Gibson-Cline, 2000), this identity crisis has caused them great anxiety and stress. In other words, although they struggled with the identity crisis in adolescence, their struggle with questions about values in life, role and involvement in society, views on work, politics, religion and intimacy continued into adulthood (Erikson, 1968).

The aim of the current study

The purpose of the current study was to examine whether the relationships between contamination fear, COVID-19 PTSD, and psychiatric comorbidity differ between emerging adults and adults after controlling for victim variables (see the hypothesised model depicted in Fig.1). Given the literature highlighting the differential impact of COVID-19 on people in the community, as well as the vulnerability of emerging adults, one would hypothesize that (1) emerging adults would report higher levels of contamination fear, PTSD and psychiatric comorbidity than adults and (2) the composition of the hypothesised model would vary between emerging adults and adults. The extent to which the model differs is difficult to assess due to the lack of literature comparing these two groups in the context of COVID-19.

Method

Procedure

After ethical approval from the affiliated university, 1216 Chinese citizens were recruited via an online survey in April 2020. The link to the survey was posted on the main Chinese social networking platforms (wenjuanxing, wechat). The inclusion criteria were: (1) 18 years old or older, living in China, and (2) of Chinese descent. Following the literature (Liu et al., 2020), the exclusion criteria were: (1) completing the questionnaires in 2min or less or 30min or more; (2) a traceable pattern in responses (e.g., all items were scored 1 or 2); and (3) Chinese living abroad. Of the 1216 participants, 127 responses were removed based on these criteria; 1089 valid responses were then included in the study. All questionnaires went through the back-translation procedure. The original English versions were translated into Chinese, which was back-translated into English by another translator who had a good command of both Chinese and English. The two translators discussed any discrepancies in the questionnaire items with the first author of the research team, if necessary, until a consensus was reached.

The power calculation assumes analysis using a structural equation model. Based on the number of observed (n = 11) and latent variables (n = 3) and a medium effect size (f2 = 0.10), the calculation resulted in a minimum sample size of 1000 with a power of 0.95 and an alpha of 0.05.

Participants

The 1089 participants (M = 382; F = 707) were on average 26 years old (M = 26.36, SD = 8.58). They were mainly from Guangdong (49%), followed by Hubei (9%) and Henan (6%), the provinces considered to have the worst outbreaks (https://www.sohu.com/a/372505431_260616). Their family income ranged from RMB 5,000 to more than RMB 20,000 per month; slightly more than half (55%) were university students, the rest were doctors, managers and labourers; 67% had a bachelor's degree and 22% had a postgraduate degree. A large majority were single (68%).

Measures

Demographic information was collected on age, gender (1 = male, 2 = female), marital status (1 = single, 2 = married, 3 = divorced, 4 = widowed), educational attainment (1 = up to secondary school, 2 = up to college level, 3 = undergraduate degree, 4 = postgraduate degree), occupation (1 = managerial position, 2 = non-managerial position, 3 = self-employed, 4 = student, 5 = unemployed) and income level (1 = less than 5000, 2 = 5000–10,000, 3 = 10,000–20,000, 4 = more than 20,000 RMB per month).

Information on COVID-19 trauma exposure characteristics was collected with the following questions: Where do you live? (1 = Hubei, 2 = Guangdong, 3 = Zhejiang, 4 = Henan, 5 = Hunan, 6 = Anhui, 7 = other). Are you or any of your family members a frontline doctor or nurse? (1 = yes, 2 = no), have any of your immediate family members become infected? (1 = yes, 2 = no), has one of your immediate family members died as a result of COVID-19? (1 = yes, 2 = no), did you have a cold, cough or fever during the epidemic? (1 = yes, 2 = no), were you COVID-19 diagnosed or suspected of having COVID-19? (1 = yes, 2 = no), how long ago did you learn about the outbreak? (1 = first, 2 = middle, 3 = last 10 days in December, 4 = first, 5 = middle, 6 = last 10 days in January), how long ago did you start quarantine? (1 = last 10 days in January, 2 = first, 3 = middle, 4 = last 10 days in February, 5 = first, 6 = middle, 7 = last 10 days in March), how long did your quarantine last? (1 = 14 days, 2 = one month, 3 = one and a half months, 4 = two months, 5 = two and a half months, 6 = 3 months, 7 = 3 months or longer), and are you still in quarantine? (1 = at home, 2 = in isolation, 3 = not in quarantine).

The Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson et al., 2004) is designed to assess a range of obsessions, compulsions, avoidance behaviours and personality traits related to obsessive-compulsive disorder using a five-point rating scale (0 = not at all to 4 = very much). For the current study, the contamination subscale (12 items) was used to measure contamination-related obsessive-compulsive symptoms, i.e., fear of contamination and washing compulsions after the onset of COVID-19. This subscale showed excellent internal consistency ($0.79 \leq \alpha \leq 0.92$), test-retest reliability (coefficients 0.53 or higher), convergent and discriminant validity (0.59 or higher for correlations with other contamination measures) not only in patients with obsessive-compulsive disorder but also in the general population (Gönner et al., 2010; Olatunji et al., 2007). The Cronbach's α for the total score was 0.92 in the present study.

The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5; Weathers et al., 2013) was used to measure PTSD with COVID-19 as the index trauma. This scale is composed of four subscales: Re-experiencing symptoms, avoidance symptoms, negative mood and cognition and alterations in arousal and reactivity, which are scored using the following criteria: 0 = not at all to 4 = extremely. High total scores mean a higher severity. Meeting the diagnostic criteria for the four symptom groups leads to a probable full-PTSD diagnosis; fulfilment of the criteria for one, two or three of the symptom groups leads to a partial-PTSD diagnosis; meeting no criteria for any of the symptom groups means no-PTSD. This classification has been adopted from the literature, e.g. (Chung & Wall, 2013). The PCL-5 has been shown to be psychometrically excellent: Cronbach's α = 0.94; test-retest reliability = 0.82; convergent validity between 0.74 and 0.85 and discriminant validity between 0.31 and 0.60 (Blevins et al., 2015). Based on the current sample, the Cronbach's α of the total score was 0.93.

The General Health Questionnaire-28 (GHQ-28; Goldberg & Hillier, 1979) comprises four subscales: somatisation, anxiety, social dysfunction and severe depression on a rating scale of 1 = not at all to 4 = much more than usual. Higher scores indicate greater overall psychological distress. The GHQ-28 is well validated and used cross-culturally, with Cronbach's α ranging from 0.78 to 0.95 (Ardakani et al., 2016; Monteiro, 2011; Wang et al., 2020a, b). In the current sample, the Cronbach's α of the total score was 0.94. Although this scale was developed some time ago, it is recommended as a validated and standardised questionnaire to measure global dysfunction associated with PTSD (Raphael et al., 1989).

Data analysis

Descriptive statistics were used to describe the basic demographic information. Independent T-tests were used to compare differences between emerging adults and adults in contamination fear, PTSD and psychiatric comorbidity. Bivariate correlation analysis, including point bi-serial correlation (r_{bp}), was conducted to examine whether dummy-coded demographic variables were correlated with outcome variables. Variables with significant correlations were controlled for in structural equation modelling. For PTSD and psychiatric comorbidity, subscales were used as indicators. For obsessional compulsive behaviour, random item parcels (three parcels of four items each) were used (Kline, 2015). The advantage of item parcelling over using all items as indicators was the increase in model fit, parsimony and reliability (Little et al., 2002). In structural equation modelling with maximum likelihood estimation, measurement invariance was tested by comparing chi-square and model fit differences between models with and without factor loading constraints. Non-significant results would suggest that the constructs have similar meaning for both emerging adults and adults (Cheng et al., 2013). Models would be considered to fit the data if the comparative fit index (CFI) and Tucker-Lewis index (TLI) were 0.90 or greater, the root mean square error of approximation (RMSEA) and standard root mean-square residual (SRMR) were within 0.06–0.08, and the ratio of $\chi 2$ by degree of freedom less than 3 (MacCallum et al., 1996). All analyses were conducted using SPSS25 and Mplus7.0. Normality of the data, assumptions regarding linearity and homoscedasticity were checked. PTSD and GHQ-28 totals were subjected to log transformation. No outliers were detected. Regression imputation was used to estimate missing responses. This is an acceptable method for data with a total number of missing responses of less than 2% (Schafer & Graham, 2002), as was the case for the present study.

Results

Descriptive information

A minority of participants worked or had family members who worked as frontline doctors or nurses (4.5%), had immediate family members infected with the virus (0.4%) or showed symptoms of cough, cold or fever during the epidemic (8.7%). One participant was diagnosed with or suspected of having COVID-19. In another, a family member had died as a result of the virus. Most of them (78.9%) learned about the epidemic after the first ten days in January 2020 and started quarantine at home (83.4%). The duration of quarantine ranged from 14 days to more than 3 months. At the time of the study, 70% were no longer in quarantine.

Using the diagnostic criteria of PCL-5, 12.7% of them met the criteria for full-PTSD, 68.7% partial-PTSD and the rest (18.6%) no-PTSD. The rate of full-PTSD was higher than among adults in the Chinese community (Liu et al., 2020), but lower than among those suspected of having COVID-19 or described in the literature as having contact with an infected person (Sun et al., 2020). The present study extended the existing literature by going beyond the typical dichotomous approach (PTSD vs. no PTSD) to consider partial PTSD, criteria for which were met by almost 70% of the current sample.

Following the age range for the two developmental stages from the literature (Arnett, 2000), participants were divided into emerging adult (18–25 years) (N = 633, 58%) and adult (26+) (N = 456, 42%) groups. The vast majority (90%) of emerging adults were single university students, had no children of their own and therefore were not concerned about how COVID-19 affected financial obligations for their families. Diagnostic status (PTSD, partial-PTSD, no-PTSD) was not correlated with stage of development. However, there were significant differences between the developmental groups in terms of how long ago they learned about the COVID-19 outbreak, whether they lived in the provinces with the worst outbreaks, when they started quarantine and for how long, and whether they were still in quarantine at the time of the study. Emerging adults had significantly lower scores for intrusion, avoidance, somatic problems, anxiety and contamination fear than adults (see Table1).

Structural equation modelling results

Bivariate correlations were conducted prior to analysis of SEM to determine which demographic and trauma exposure variables were correlated with outcomes. Because most participants were not frontline physicians or nurses, were not diagnosed or suspected of having COVID-19 and did not have family members who had been infected with or died from the virus, these trauma exposure variables were not included in the bivariate correlations. Results showed that education (dummy: below postgraduate level vs. postgraduate level, r_{bp}=0.12 for PTSD; r_{bp}=0.11 for psychiatric comorbidity) and length of quarantine (dummy: two months or less vs. more than two months, r_{bp}=0.06 for PTSD; r_{bp}=0.07 for psychiatric comorbidity) were the only demographic and trauma exposure variables associated with distress outcomes. They were therefore adjusted for analysis.

The measurement model comprising the whole sample was first examined and found to have a good model fit ($\chi 2 = 247.298$, df = 39, TLI = 0.959, CFI = 0.971,

Table 1 Comparing emerging adults & adults in trauma exposure, PTSD, psychiatric co-morbidity and contamination fear

	Emerging adults		Adults		
	N	%	N	%	χ^2
Full-PTSD	83	8	55	5	3.15
Partial-PTSD	422	39	326	30	-----
No-PTSD	128	12	75	7	-----
Knew about the virus before January	163	15	66	6	20.30***
Living in provinces with the worst outbreaks	37	3	64	6	21.12***
Started quarantine at the end of January	550	51	358	33	13.43***
Quarantine length less than a month	120	11	158	15	49.82***
Quarantine length one to two months	199	18	159	15	-----
Quarantine length more than two months	314	29	139	12	-----
Currently in quarantine	246	23	81	8	56.16***
	M	SD	M	SD	T
Re-experiencing	4.02	3.50	4.52	3.33	-2.35*
Avoidance	2.83	1.95	3.20	1.95	-3.04**
Negative mood & cognition	4.15	4.68	4.54	4.34	-1.39
Arousal	3.42	4.29	3.50	3.97	-0.24
Somatic problem	11.45	3.45	12.24	3.30	-3.82***
Anxiety	11.41	4.10	12.33	4.22	-3.58**
Social dysfunction	15.13	3.17	14.80	3.09	1.72
Depression	10.35	3.85	10.27	3.60	0.37
Contamination fear	24.16	9.96	26.49	10.75	-3.68***

Note: The non-significant trauma exposure items were not listed

*** $p<0.001$; ** $p<0.01$ * $p<0.05$

SRMR = 0.046, RMSEA = 0.070). All factors loaded significantly on the corresponding indicators ($0.55 \leq \beta s \leq 0.96$). Measurement equivalence was then examined with developmental stage (emerging adult vs. adult) as a grouping variable. The overall model fit statistic for the unconstrained model was $\chi2 = 294.132$, df = 78, TLI = 0.958, CFI = 0.970, SRMR = 0.046, RMSEA = 0.071; the model fit statistic for the constrained model was $\chi2 = 312.534$, df = 86, TLI = 0.960, CFI = 0.969, SRMR = 0.051, RMSEA = 0.070. The difference of $\chi2$ was significant ($\triangle\chi2 = 27.402$, $\triangle$df = 8, $p<0.05$), indicating that the model without constraints fit better. However, because chi-square can be easily affected by sample size, researchers are increasingly using model fit differences to test for measurement equivalence (Cheung & Rensvold, 2002; Meade et al., 2008), so a difference of less than 0.01 indicates non-significance, as was the case in this study ($\triangle$TLI = 0.002, $\triangle$CFI = 0.001). Thus, the constructs were equivalently measured across the two groups.

Structural analyses were then conducted separately for emerging adults and adults. With respect to emerging adults, the fit of the SEM model was acceptable ($\chi2 = 315.447$, df = 59, TLI = 0.920, CFI = 0.939, SRMR = 0.056, RMSEA = 0.083). The path coefficients showed that contamination fear was significantly correlated with PTSD and psychiatric comorbidity (see Fig. 2). As with the adult group, the fit of the model SEM was acceptable ($\chi2 = 216.775$, df = 59, TLI = 0.934, CFI = 0.949, SRMR = 0.049, RMSEA = 0.071). The path coefficients from contamination fear to PTSD and psychiatric comorbidity were also significant (see Fig. 3). Examination of the background variables revealed that a high level of education was significantly correlated with psychiatric comorbidity in emerging adults, but with PTSD in adults. Duration of quarantine was associated with psychiatric comorbidity only in adults.

Discussion

The present study examined whether emerging adults and adults would differ in levels of contamination fear, COVID-19 PTSD, and psychiatric comorbidity after controlling for background and COVID-19 trauma exposure variables. In contrast to hypothesis one, emerging adults reported significantly lower levels of contamination fear, PTSD and psychiatric comorbid symptoms than adults. Hypothesis two was supported in that while contamination fear was related to PTSD and psychiatric comorbidity in both groups, high educational attainment was significantly associated with psychiatric comorbidity in emerging adults but with PTSD in adults. Duration of quarantine was only associated with psychiatric comorbidity in adults.

Posttraumatic stress disorder is a disorder that occurs along a continuum of normal to abnormal stress responses. Partial PTSD is applied to people with clinically significant PTSD reactions who usually lacked one or two symptoms and thus did not meet the diagnostic threshold for full PTSD. This threshold is set to exclude PTSD cases with less than average symptoms (Brewin, 2003). Nevertheless, partial-PTSD is associated with increased social, functional and physical impairment as well as psychiatric comorbidity. In other words, people with this partial diagnosis still require psychological intervention (Brewin, 2003; Cukor et al., 2010; Pietrzak et al., 2011; Varela et al., 2013; Zlotnick et al., 2002). Its importance should not be overlooked (Blank, 1993.; I. V. Carlier & B. P. Gersons, 1995; I. V. E. Carlier & B. P. R. Gersons, 1995; Cukor et al., 2010; Joseph et al., 1997.). However, in the current study, diagnostic status appeared to be independent of developmental stage (emerging adult or adult). There is no reason to believe that certain types of adults are more or less likely to receive a particular PTSD diagnosis.

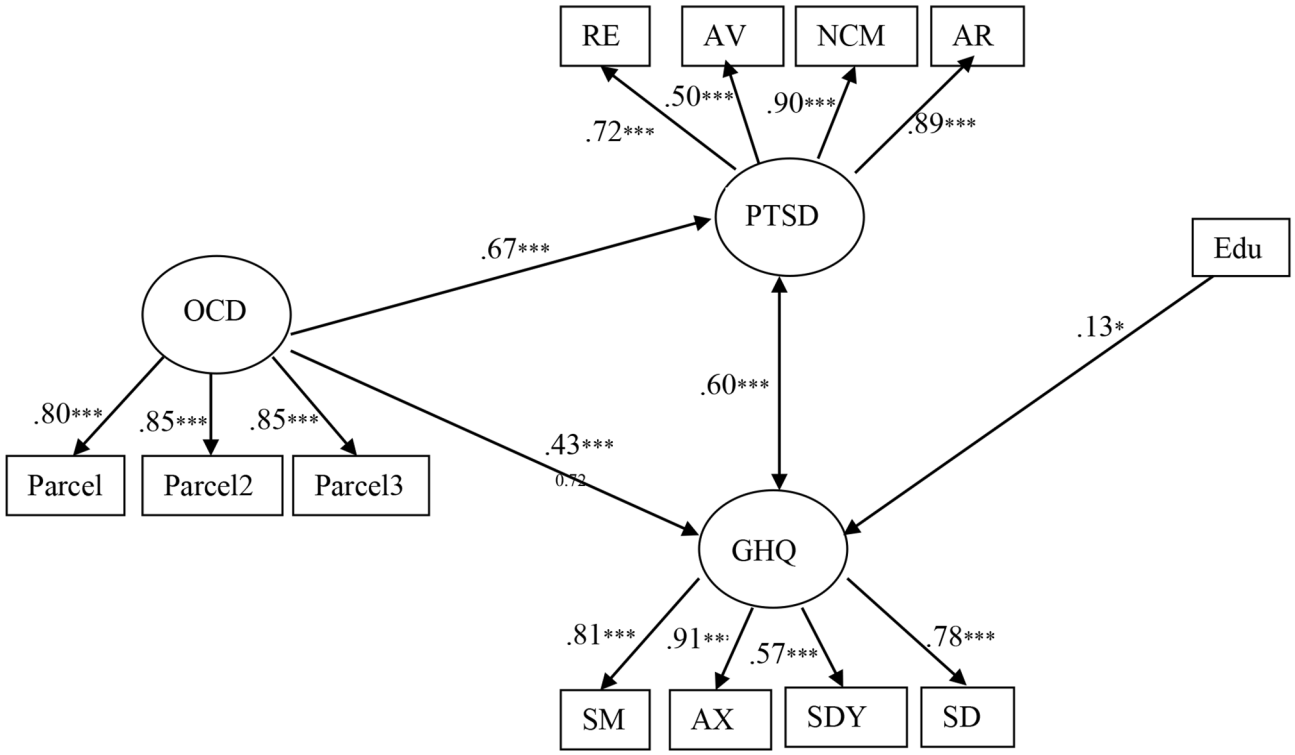

Fig. 2 Standardized coefficients of the final structural equation model for emerging adults
Note: RE: re-experiencing symptoms; AV: avoidance; NCM: negative cognition and mood; AR: hyperarousal; SM: somatization; AX: anxiety; SDY: social dysfunction; DE: depression; Edu: education level; Length: length of quarantine.
***$p<0.001$; *$p<0.05$.

Notwithstanding this, significant differences between the two developmental groups emerged when looking at the individual symptoms. Contrary to our hypothesis, emerging adults appeared to be more resilient compared to adults and reported significantly fewer re-experiencing symptoms, avoidance behaviours, somatic problems, anxiety and contamination fear. It is possible that emerging adults experienced some level of distress but felt free from role obligations and constraints. They may also have countered their distress with a sense of optimism, i.e. that there should be a vaccine before they enter the workforce after graduation. These responses may have boosted their self-esteem, which enabled them to cushion the distress. In addition, their maturity in social cognition may have enabled them to develop understanding of themselves and others, which is a fundamental ingredient for resilient character (Arnett, 2016).

The present findings have also supported the argument that adversity during this transitional period can paradoxically bring about positive changes in young adults. Some of them are able to use adaptive resources such as planful competence (e.g. realistic goal setting, self-confidence), future motivation, autonomy, adult support and coping skills to manage the current adversity (Masten, 2014). Adaptive coping strategies, resilience and social support have been shown to mitigate the effects of COVID-19 on PTSD and depression in Chinese university students (Tang et al., 2020; Ye et al., 2020).

Although emerging adults reported lower levels of re-experiencing symptoms, avoidance behaviours, somatic problems, anxiety and contamination fear than adults, both groups showed the association between contamination fear, PTSD and psychiatric comorbidity. In other words, this association appeared to be relevant for people living with the effects of COVID-19 regardless of their developmental stage. It was postulated that people with obsessive-compulsive symptoms perform symbolic actions that serve to regulate affect. For example, repetitive washing can temporarily remove distressing internal feelings of contamination (Carpenter & Chung, 2011; Fairbrother et al., 2005; Fonagy, 1999). However, these actions are particularly pronounced during times of stress and high arousal (Emmelkamp, 1990), characterised by PTSD and psychiatric comorbid symptoms in the current study. Further analyses showed that fear of contamination was significantly correlated with all PTSD and psychiatric comorbid subscales, with r-values ranging from 0.28 to 0.57 ($p < 0.001$).

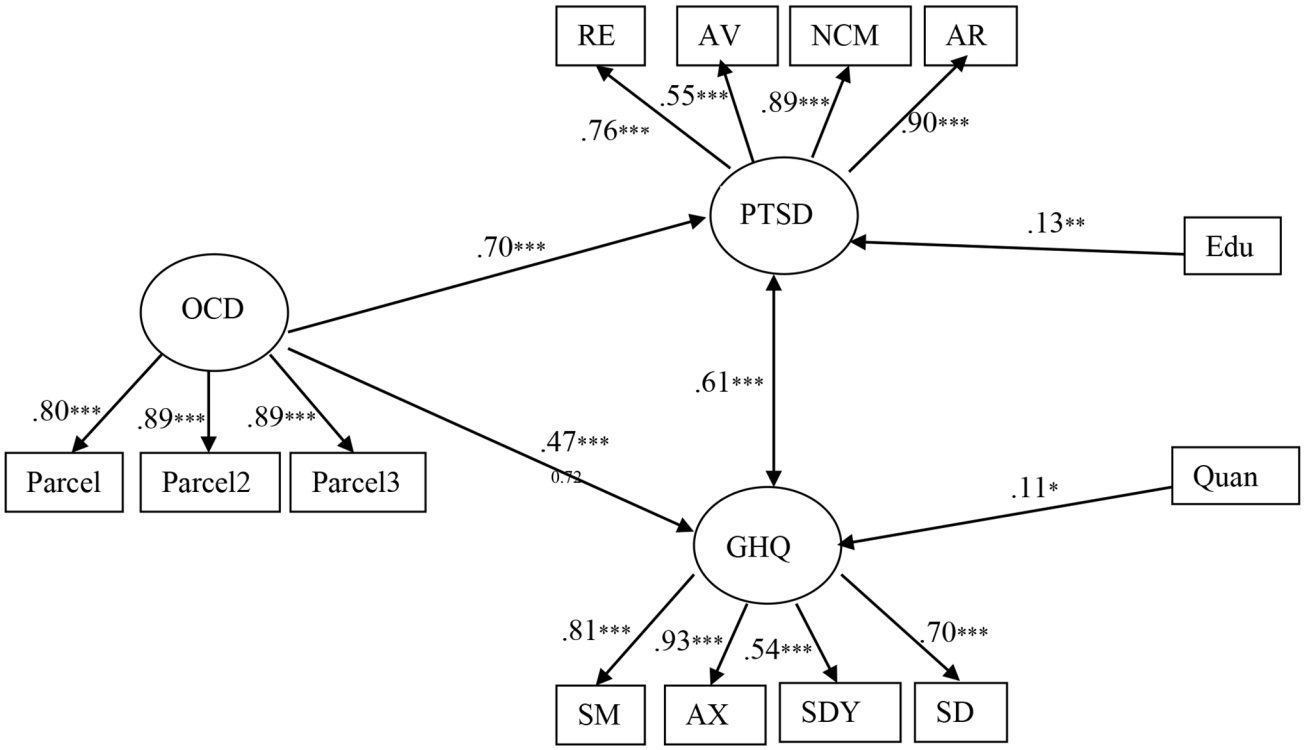

Fig. 3 Standardized coefficients of the final structural equation model for adults
Note: RE: re-experiencing symptoms; AV: avoidance; NCM: negative cognition and mood; AR: hyperarousal; SM: somatization; AX: anxiety; SDY: social dysfunction; DE: depression; Edu: education level; Quan: length of quarantine.
***p<0.001; *p<0.05.

However, the impact of background variables on distress appeared to vary by developmental stage. Before discussing this result, we should point out that the correlation coefficients between these variables (education and quarantine) and distress scores, as shown in Fig.3, were small but still significant. The large sample size probably contributed to this result. Nevertheless, the fact that these weak correlations were significant suggests that they had an impact on distress outcomes despite their limited practical significance.

Emerging adults with high levels of education reported high levels of psychiatric comorbidity, while adults with high levels of education reported high levels of PTSD. These findings are at odds with existing research suggesting that low educational attainment is a risk factor for COVID-19 associated with distress (Liang et al., 2020), for SARS-related PTSD (Fang et al., 2004; Wu et al., 2005), for PTSD in victims of various types (Brewin et al., 2000), and for comorbidity of major depression and PTSD (Kostaras et al., 2017). They have also refuted the claim that a high level of education is a protective factor (Andu et al., 2018). A possible explanation for these unexpected findings could be that educated people in the current sample were likely to cope with the effects of COVID-19 through a 'monitoring' coping style. This is the style in which they paid attention to and searched for information related to the disease. As a result, they may have been particularly alert and sensitive to the potentially harmful and threatening cues associated with the pandemic. This, in turn, resulted in psychological distress that was even greater than that of patients suffering from a life-threatening illness (Miller, 1995).

Interestingly, the types of distress differed between educated emerging adults and adults. In other words, even if people share the diathesis for some psychological distress, their experience and expression may vary due to individual differences (Barlow, 2002; Keane et al., 2007). This may reflect the cognitive specificity hypothesis (Beck & Perkins, 2001), whereby certain individual factors (e.g., developmental status) may trigger specific cognitive emotion regulation strategies (e.g., monitoring style) to regulate certain emotional outcomes (i.e., either PTSD symptoms or general psychological distress). Similarly, a meta-analysis has argued that specific emotion regulation strategies are related to specific psychological symptoms (Aldao et al., 2010). This hypothesis of cognitive specificity has been demonstrated in trauma victims of different types (Chung & Hunt, 2014; Chung et al., 2008; Chung & Reed, 2016; Slanbekova et al., 2019). Differentiating the individual factors that contribute to specific symptoms of emotional disorders may

pave the way for a better understanding of the aetiology and course of these disorders, which in turn has implications for treatment (Bruch et al., 1993).

Regarding trauma exposure variables, the lack of influence of trauma exposure characteristics on distress outcomes is partly due to the fact that several of these variables were excluded from the analysis, as participants' responses were similar. Length of quarantine was the variable that correlated with increased psychiatric comorbidity only in adults. This finding supports literature suggesting that quarantine can have negative effects on people's overall distress (Banducci & Weiss, 2020; Boyraz & Legros, 2020; Kisely et al., 2020; Taylor et al., 2020). However, it contradicted the literature that quarantine was significantly and positively associated with emotional distress, likely depression and other symptoms in Chinese university students (emerging adults) (Xin et al., 2020).

Quarantine may have had a particular impact on adults due to the increased likelihood of unemployment, financial worries (Tull et al., 2020), feelings of uncertainty and despair (Mucci et al., 2020), the effects of which may be channelled through quarantine-related psychological distress rather than PTSD symptoms. Indeed, the literature links quarantine to general psychological distress, characterised not by PTSD symptoms but by health anxiety (Tull et al., 2020), frustration, boredom (Brooks et al., 2020), loneliness, feelings of lack of social support (Tull et al., 2020), confusion and anger (Brooks et al., 2020; Wytrychiewicz et al., 2020). However, it remains to be seen to what extent these general characteristics of psychological distress might be relevant to the current sample.

Several limitations of the current study must be acknowledged. First, no stratified random sampling technique was used in the recruitment of the samples. This means that the precision of the sample was not determined and that there would likely be sampling error in the estimation. However, stratified sampling is labour intensive and requires a lot of resources. Moreover, it would have been difficult, if not impossible, to exhaustively divide the population into different subgroups. The degree of difficulty would have been increased by the nature of their PTSD symptoms, i.e. some people would have deliberately avoided participating in the study. Secondly, no information was collected on whether they had a psychiatric disorder, cognitive impairment or special educational needs, as it would have been difficult to access their medical records or structured clinical interviews, or information on any special educational needs. Distress scores may have been inflated by the co-occurrence of these psychiatric disorders (McHugh & Weiss, 2019). For example, people with special needs tend to have more mental health problems due to their learning disability than those without (Salazar et al., 2015). Thirdly, the subjective experience of quarantine could have been measured more thoroughly, in particular the feelings associated with quarantine (e.g. uncertainty, fear, frustration, boredom, loneliness and anger) have now been described in the literature, e.g. (Brooks et al., 2020; Mucci et al., 2020; Tull et al., 2020; Wytrychiewicz et al., 2020). In addition, quarantine could lead to families spending more time together. This in turn could increase the likelihood of domestic violence, which is associated with PTSD symptoms (Blackman, 2020; Dutheil et al., 2020).

To conclude, following the onset of COVID-19, both emerging adults and adults could develop contamination fear, posttraumatic stress disorder and other general psychological symptoms, although emerging adults were more resilient in managing these symptoms. While educational level may influence distress in both types of adults, quarantine experience appeared to have notable effects in adults. Important implications emerge from the current findings. First, since both types of adults differ in the expression of distress symptoms, different psychological mechanisms are likely involved in these differences. Future studies should aim to explore these mechanisms. Second, the findings from this study will have important implications for the specific types of psychological interventions that can be developed for these adults. There is no reason to believe that some generic psychological interventions can be applied to both groups of individuals. Third, future studies should also examine the effectiveness of these interventions, which will probably require some randomised controlled trials. Last but not least, although the current study adopted a quantitative approach to research design, future studies could complement the existing findings by exploring the subjective meanings of participants experiencing COVID-19 PTSD. Online photovoice, an emerging innovative qualitative research method, can be used for this purpose (Tanhan & Strack, 2020).

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Data Availability The datasets generated during the current study are available from the corresponding author upon reasonable request.

Declarations

Conflicts of interest None.

Ethical approval The study has got ethical approval from the ethical committee of the affiliated university of the corresponding author.

Consent to participate: The participation is on voluntary basis. Completing the questionnaire indicates consent to participate.

References

Ahmed, M. Z., Ahmed, O., Aibao, Z., Hanbin, S., Siyu, L., & Ahmad, A. (2020). Epidemic of COVID-19 in China and associated Psychological Problems. *Asian Journal of Psychiatry*, *51*, 102092. https://doi.org/10.1016/j.ajp.2020.102092

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004

Andu, E., Wagenaar, B. H., Kemp, C. G., Nevin, P. E., Simoni, J. M., Andrasik, M., & Rao, D. (2018). Risk and protective factors of posttraumatic stress disorder among African American women living with HIV. *AIDS Care*, *30*(11), 1393–1399.

Ardakani, A., Seghatoleslam, T., Habil, H., Jameei, F., Rashid, R., Zahirodin, A., & Arani, A. M. (2016). Construct validity of symptom checklist-90-revised (SCL-90-R) and general health questionnaire-28 (GHQ-28) in patients with drug addiction and diabetes, and normal population. *Iranian journal of public health*, *45*(4), 451.

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469–480.

Arnett, J. J. (2005). The Developmental Context of Substance Use in Emerging Adulthood.*Journal of Drug Issues,35*(2), 235–254.

Arnett, J. J. (2006). Emerging adulthood in Europe: a response to Bynner. *Journal of Youth Studies*, *9*, 111–123.

Arnett, J. J. (2016). *The Oxford handbook of emerging adulthood* (xv, 631 pp.). New York, NY, US: Oxford University Press; US.

Banducci, A. N., & Weiss, N. H. (2020). Caring for patients with posttraumatic stress and substance use disorders during the COVID-19 pandemic.*Psychological Trauma: Theory, Research, Practice, and Policy.*pp. No Pagination Specified.

Barlow, D. H. (2002). *Anxiety and its disorders: The nature and treatment of anxiety and panic*. New York: Guildford Press.

Beck, R., & Perkins, T. S. (2001). Cognitive content-specificity for anxiety and depression: A meta-analysis. *Cognitive Therapy and Research*, *25*, 651–663.

Blackman, J. S. (2020). A psychoanalytic view of reactions to the coronavirus pandemic in china.*The American Journal of Psychoanalysis*. pp. No Pagination Specified.

Blank, A. (1993). The longitudinal course of posttraumatic stress disorder. In J. R. T. Davidson, & F. EB (Eds.), *Posttraumatic stress disorder: DSM-IV and beyond* (pp. 3–22). Washington, DC: American Psychiatric Press.

Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and Initial Psychometric Evaluation. *Journal of Traumatic Stress*, *28*(6), 489–498. https://doi.org/10.1002/jts.22059

Bo, H. X., Li, W., Yang, Y., Wang, Y., Zhang, Q., Cheung, T., & Xiang, Y. T. (2020). Posttraumatic stress symptoms and attitude toward crisis mental health services among clinically stable patients with COVID-19 in China. *Psychological Medicine*, 1–2. https://doi.org/10.1017/S0033291720000999

Borsari, B., Read, J. P., & Campbell, J. F. (2008). *Posttraumatic stress disorder and substance use disorders in college students. Journal of College Student Psychotherapy, 22*(3), 61–85.

Boyraz, G., & Legros, D. N. (2020). Coronavirus disease (covid-19) and traumatic stress: Probable risk factors and correlates of posttraumatic stress disorder. *Journal of Loss and Trauma*. pp. No Pagination Specified.

Brewin, C. R. (2003). *Posttraumatic stress disorder: Malady or myth?* New Haven: Yale University Press.

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, *68*(5), 748–766.

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence.*The Lancet*, *395*(10227), 912–920.

Bruch, M. A., Mattia, J. I., Heimberg, R. G., & Holt, C. S. (1993). Cognitive specificity in social anxiety and depression: Supporting evidence and qualifications due to affective confounding.*Cognitive Therapy and Research*, *17*(1), 1–21.

Carlier, I. V. E., & Gersons, B. P. R. (1995). Partial posttraumatic stress disorder (PTSD): The issue of psychological scars and the occurrence of PTSD symptoms. *Journal of Nervous and Mental Disease*, *183*, 107–109.

Carpenter, L., & Chung, M. C. (2011). Childhood trauma in obsessive compulsive disorder: The roles of alexithymia and attachment. *Psychology and Psychotherapy: Theory Research and Practice*, *84*, 367–388.

Cheng, H. L., Kwan, K. L. K., & Sevig, T. (2013). Racial and ethnic minority college students' stigma associated with seeking psychological help: Examining psychocultural correlates. *Journal of counseling psychology*, *60*(1), 98.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural equation modeling*, *9*(2), 233–255.

Chew, N. W. S., Lee, G. K. H., Tan, B. Y. Q., Jing, M., Goh, Y., Ngiam, N. J. H., & Sharma, V. K. (2020). A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behavior and Immunity*, *88*, 559–565. https://doi.org/10.1016/j.bbi.2020.04.049

Chung, M., & Hunt, L. (2014). Posttraumatic stress symptoms and well-being following relationship dissolution: past trauma, alexithymia, suppression. *Psychiatric Quarterly*, *85*, 155–176.

Chung, M. C., Berger, Z., & Rudd, H. (2008). Coping with posttraumatic stress disorder and comorbidity after myocardial infarction. *Comprehensive Psychiatry*, *49*, 55–64.

Chung, M. C., & Reed, J. (2016). Posttraumatic Stress Disorder Following Stillbirth: Trauma Characteristics, Locus of Control, Posttraumatic Cognitions. *Psychiatric Quarterly*. https://doi.org/10.1007/s11126-016-9446-y

Chung, M. C., & Wall, N. (2013). Alexithymia and posttraumatic stress disorder following asthma attack. *Psychiatric Quarterly*, *84*, 287–302. https://doi.org/10.1007/s11126-012-9244-0

Coleman, S. R. M. (2020). A commentary on potential associations between narcissism and trauma-related outcomes during the coronavirus pandemic.*Psychological Trauma: Theory, Research, Practice, and Policy*. pp. No Pagination Specified.

Cukor, J., Wyka, K., Jayasinghe, N., & Difede, J. (2010). The nature and course of subthreshold PTSD. *Journal of Anxiety Disorders*, *24*(8), 918–923.

Daigle, L. E., Fisher, B. S., & Cullen, F. T. (2008). The violent and sexual victimization of college women: Is repeat victimization a problem?*Journal of Interpersonal Violence*, *23*(9),1296–1313.

Dutheil, F., Mondillon, L., & Navel, V. (2020). Ptsd as the second tsunami of the sars-cov-2 pandemic.*Psychological Medicine.* pp. No Pagination Specified.

Emmelkamp, P. M. G. (1990). Anxiety and fear.In A. S. Bellack, M. Hersen, A. E. Kazdin (Eds.), *International handbook of behavior modification and therapy*, (2nd ed., pp.283–305, xxiii, 885 pp.). New York, NY, US: Plenum Press; US.

Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: Norton.

Fairbrother, N., Newth, S. J., & Rachman, S. (2005). Mental pollution: Feelings of dirtiness without physical contact.*Behaviour Research and Therapy*, *43*(1), 121–130.

Fang, Y., Zhe, D., & Shuran, L. (2004). Survey on Mental Status of Subjects Recovered from SARS [Chinese].*Chinese Mental Health Journal*, *18*(10), 675–677.

Fisher, B. S., Daigle, L. E., Cullen, F. T., & Turner, M. G. (2006). Reporting Sexual Victimization to the Police and Others: Results From a National-Level Study of College Women. In Bartol, C. R., & Bartol, A. M. (Eds.), *Current perspectives in forensic psychology and criminal justice* (pp. 149–159, xi, 283 pp.). Thousand Oaks, CA, US: Sage Publications, Inc; US.

Fonagy, P. (1999). The transgenerational transmission of holocaust trauma: Lessons learned from the analysis of an adolescent with obsessive-compulsive disorder.*Attachment & Human Development.1*(1), 92–114.

French, I., & Lyne, J. (2020). Acute exacerbation of ocd symptoms precipitated by media reports of covid-19.*Irish Journal of Psychological Medicine*. pp. No Pagination Specified.

Friedman, M., Keane, T., & Resick, P. (Eds.). (2007). *Handbook of PTSD: Science and Practice*. New York: Guilford.

Gibson-Cline, J. (Ed.). (2000). *Youth and coping in twelve nations*. London: Routledge.

Gilhooly, T., Bergman, A. J., Stieber, J., & Brown, E. J. (2018). Posttraumatic stress disorder symptoms, family environment, and substance abuse symptoms in emerging adults.*Journal of Child & Adolescent Substance Abuse, 27*(3), 196–209.

Goldberg, D. P., & Hillier, V. F. (1979). A scaled version of the General Health Questionnaire. *Psychological medicine*, *9*(1), 139–145.

Gönner, S., Ecker, W., Leonhart, R., & Limbacher, K. (2010). Multidimensional assessment of OCD: integration and revision of the vancouver obsessional-compulsive inventory and the symmetry ordering and arranging questionnaire. *Journal of Clinical Psychology*, *66*(7), 739–757.

Guo, Q., Zheng, Y., Shi, J., Wang, J., Li, G., Li, C., & Yang, Z. (2020). Immediate psychological distress in quarantined patients with COVID-19 and its association with peripheral inflammation: A mixed-method study. *Brain Behavior and Immunity*, *88*, 17–27. https://doi.org/10.1016/j.bbi.2020.05.038

Jiang, F., Deng, L., Zhang, L., Cai, Y., Cheung, C. W., & Xia, Z. (2020). Review of the Clinical Characteristics of Coronavirus Disease 2019 (COVID-19). *Journal of General Internal Medicine*, *35*(5), 1545–1549. https://doi.org/10.1007/s11606-020-05762-w

Joseph, S., Williams, R., & W, Y. (1997). *Understanding posttraumatic stress: A psychosocial perspective on PTSD and treatment*. Chichester: John Wiley & Sons.

Kang, L., Ma, S., Chen, M., Yang, J., Wang, Y., Li, R., & Liu, Z. (2020). Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. *Brain Behavior and Immunity*, *87*, 11–17. https://doi.org/10.1016/j.bbi.2020.03.028

Keane, T. M., Brief, D. J., Pratt, E. M., & Miller, M. W. (2007). Assessment of PTSD and its comorbidities in adults. In M. J. Friedman., T. M. Keane., & P. A. Resick (Eds.), *Handbook of PTSD* (pp. 279–305). New York: The Guilford Press.

Kisely, S., Warren, N., McMahon, L., Dalais, C., Henry, I., & Siskind, D. (2020). Occurrence, prevention, and management of the psychological effects of emerging virus outbreaks on healthcare workers: Rapid review and meta-analysis.*BMJ: British Medical Journal,369*. ArtID m1642.

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford publications.

Kokou-Kpolou, C. K., Fernandez-Alcantara, M., & Cenat, J. M. (2020). Prolonged grief related to COVID-19 deaths: Do we have to fear a steep rise in traumatic and disenfranchised griefs? *Psychological Trauma: Theory, Research, Practice, and Policy*, pp. No Pagination Specified.

Kostaras, P., Bergiannaki, J. D., Psarros, C., Ploumbidis, D., & Papageorgiou, C. (2017). *Posttraumatic stress disorder in outpatients with depression: Still a missed diagnosis. Journal of Trauma & Dissociation, 18*(2), 233–247.

Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., & Hu, S. (2020). Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Network Open*, *3*(3), e203976–e203976. https://doi.org/10.1001/jamanetworkopen.2020.3976

Liang, L., Ren, H., Cao, R., Hu, Y., Qin, Z., Li, C., & Mei, S. (2020). The effect of covid-19 on youth mental health.*Psychiatric Quarterly*, pp. No Pagination Specified.

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural equation modeling*, *9*(2), 151–173.

Liu, N., Zhang, F., Wei, C., Jia, Y., Shang, Z., Sun, L., & Liu, W. (2020). Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: Gender differences matter. *Psychiatry Research*, *287*, 112921. https://doi.org/10.1016/j.psychres.2020.112921

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, *1*(2), 130. https://doi.org/10.1037//1082-989x.1.2.130

Martin, P. (2020). The effect of a virus on adult development.*Journal of Adult Development*, *27*(2), 81–82.

Masten, A. S. (2014). *Ordinary magic: Resilience in development*. New York, NY: Guilford Press; US.

McHugh, R. K., & Weiss, R. D. (2019). Alcohol use disorder and depressive disorders.

Meade, A. W., Johnson, E. C., & Braddy, P. W. (2008). Power and sensitivity of alternative fit indices in tests of measurement invariance. *Journal of applied psychology*, *93*(3), 568.

Miller, T. W. (1995). Stress adaptation in children: Theoretical models.*Journal of Contemporary Psychotherapy: On the Cutting Edge of Modern Developments in Psychotherapy*, *25*(1), 5–14.

Moccia, L., Janiri, D., Pepe, M., Dattoli, L., Molinaro, M., De Martin, V., & Di Nicola, M. (2020). Affective temperament, attachment style, and the psychological impact of the COVID-19 outbreak: an early report on the Italian general population. *Brain Behavior and Immunity*, *87*, 75–79. https://doi.org/10.1016/j.bbi.2020.04.048

Monteiro, A. P. T. D. A. V. (2011). Assessment of the factor structure and reliability of the Portuguese version of the General Health Questionnaire-28 among adults. *Journal of Mental Health*, *20*(1), 15–20.

Mucci, F., Mucci, N., & Diolaiuti, F. (2020). Lockdown and isolation: Psychological aspects of COVID-19 pandemic in the general population.*Clinical Neuropsychiatry: Journal of Treatment Evaluation,17*(2), 63–64.

Olatunji, B. O., Lohr, J. M., Sawchuk, C. N., & Tolin, D. F. (2007). Multimodal assessment of disgust in contamination-related obsessive-compulsive disorder. *Behaviour Research and Therapy*, *45*(2), 263–276.

Pietrzak, R. H., Goldstein, R. B., Southwick, S. M., & Grant, B. F. (2011). Prevalence and axis I comorbidity of full and partial posttraumatic stress disorder in the United States: Results from wave 2 of the national epidemiologic survey on alcohol and related conditions. *Journal of Anxiety Disorders*, *25*, 456–465.

Pozza, A., Mucci, F., & Marazziti, D. (2020). Risk for pathological contamination fears at coronavirus time: Proposal of early intervention and prevention strategies.*Clinical Neuropsychiatry: Journal of Treatment Evaluation*, *17*(2), 100–102.

Rennison, C. M., & Addington, L. A. (2018). Comparing violent victimization experiences of male and female college-attending emerging adults.*Violence Against Women*, *24*(8), 952–972.

Rodriguez-Rey, R., Garrido-Hernansaiz, H., & Collado, S. (2020). Psychological impact of COVID-19 in Spain: Early data report.*Psychological Trauma: Theory, Research, Practice, and Policy.*pp. No Pagination Specified.

Salazar, F., Baird, G., Chandler, S., Tseng, E., O'Sullivan, T., Howlin, P., & Simonoff, E. (2015). Co-occurring psychiatric disorders in preschool and elementary school-aged children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *45*(8), 2283–2294.

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, *7*, 147–177.

Slanbekova, G. K., Chung, M. C., Ayupova, G. T., Kabakova, M. P., Kalymbetova, E. K., & Korotkova-Ryckewaert, N. V. (2019). The Relationship between Posttraumatic Stress Disorder, Interpersonal Sensitivity and Specific Distress Symptoms: the Role of Cognitive Emotion Regulation. *Psychiatris Quarterly*. https://doi.org/10.1007/s11126-019-09665-w

Sun, L., Sun, Z., Wu, L., Zhu, Z., Zhang, F., Shang, Z., & Liu, W. (2020). Prevalence and Risk Factors of Acute Posttraumatic Stress Symptoms during the COVID-19 Outbreak in Wuhan, China. *medRxiv*, 2020.2003.2006.20032425. https://doi.org/10.1101/2020.03.06.20032425

Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., & Xu, J. (2020). Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students.*Journal of Affective Disorders*, *274* ,1–7.

Tanhan, A., & Strack, R. W. (2020). Online photovoice to explore and advocate for Muslim biopsychosocial spiritual wellbeing and issues: Ecological systems theory and ally development. *Current Psychology*, *39*(6), 2010–2025. https://doi.org/10.1007/s12144-020-00692-6

Taylor, S., Landry, C. A., Paluszek, M. M., Fergus, T. A., McKay, D., & Asmundson, G. J. G. (2020). Covid stress syndrome: Concept, structure, and correlates.*Depression and Anxiety*. pp. No Pagination Specified.

Thordarson, D. S., Radomsky, A. S., Rachman, S., Shafran, R., Sawchuk, C. N., & Hakstian, A. R. (2004). Vancouver Obsessional-Compulsive Inventory (VOCI). *Behaviour Research and Therapy*, *42*, 1289–1314.

Tian, F., Li, H., Tian, S., Yang, J., Shao, J., & Tian, C. (2020). Psychological symptoms of ordinary Chinese citizens based on SCL-90 during the level I emergency response to COVID-19. *Psychiatry Research*, *288*, 112992. https://doi.org/10.1016/j.psychres.2020.112992

Trnka, R., & Lorencova, R. (2020). Fear, anger, and media-induced trauma during the outbreak of COVID-19 in the Czech Republic.*Psychological Trauma: Theory, Research, Practice, and Policy.*pp. No Pagination Specified.

Tull, M. T., Edmonds, K. A., Scamaldo, K. M., Richmond, J. R., Rose, J. P., & Gratz, K. L. (2020). Psychological Outcomes Associated with Stay-at-Home Orders and the Perceived Impact of COVID-19 on Daily Life. *Psychiatry Research*, *289*, 113098. https://doi.org/10.1016/j.psychres.2020.113098

Varela, V. S., Ng, A., Mauch, P., & Recklitis, C. J. (2013). Posttraumatic stress disorder (PTSD) in survivors of Hodgkin's lymphoma: Prevalence of PTSD and partial PTSD compared with sibling controls. *Psycho-Oncology*, *22*(2), 434–440.

Vogt, D., King, D., & King, L. (2007). Risk pathways in PTSD: Making sense of the literature. In M. Friedman, T. Kean, & P. Resick (Eds.), *Handbook of PTSD: Science and Practice* (pp. 99–116). New York: Guildford.

Wang, N., Chung, M. C., & Wang, Y. (2020a). The relationship between posttraumatic stress disorder, trauma centrality, posttraumatic growth and psychiatric co-morbidity among Chinese adolescents. *Asian Journal of Psychiatry*, *49*, 101940.

Wang, Y., Di, Y., Ye, J., & Wei, W. (2020b). Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China. Psychology Health & Medicine, 1–10. doi:10.1080/13548506.2020b.1746817.

Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P. (2013). The PTSD Checklist for DSM-5 (PCL-5). *Available from*: https://doi.org/www.ptsd.va

Wu, K. K., Chan, S. K., & Ma, T. M. (2005). Posttraumatic Stress, Anxiety, and Depression in Survivors of Severe Acute Respiratory Syndrome (SARS).*Journal of Traumatic Stress*, *18*(1),39–42.

Wytrychiewicz, K., Pankowski, D., Jasinski, M., & Fal, A. M. (2020). Commentary on COVID-19 situation in Poland: Practical and empirical evaluation of current state.*Psychological Trauma: Theory, Research, Practice, and Policy.*pp. No Pagination Specified.

Xin, M., Luo, S., She, R., Yu, Y., Li, L., Wang, S., & Lau, J. T. (2020). Negative cognitive and psychological correlates of mandatory quarantine during the initial COVID-19 outbreak in China. *American Psychologist,75*(5), 607–617.

Ye, Z., Yang, X., Zeng, C., Wang, Y., Shen, Z., Li, X., & Lin, D. (2020). Resilience, social support, and coping as mediators between covid-19-related stressful experiences and acute stress disorder among college students in china.*Applied Psychology: Health and Well-Being*.pp. No Pagination Specified.

Yin, Q., Sun, Z., Liu, T., Ni, X., Deng, X., Jia, Y., & Liu, W. (2020). Posttraumatic stress symptoms of health care workers during the corona virus disease 2019.*Clinical Psychology & Psychotherapy.*pp. No Pagination Specified.

Zhou, X. (2020). Managing psychological distress in children and adolescents following the COVID-19 epidemic: A cooperative approach.*Psychological Trauma: Theory, Research, Practice, and Policy.*pp. No Pagination Specified.

Zlotnick, C., Franklin, C., & Zimmerman, M. (2002). Does "subthreshold" posttraumatic stress disorder have any clinical relevance? *Comprehensive Psychiatry*, *43*(6), 413–419.