



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Correspondence

Suffering from infectious diseases during the Holocaust relates to amplified psychological reactions during the COVID-19 pandemic



ARTICLE INFO

Keywords

COVID-19
 Holocaust
 PTSD
 Worries
 Loneliness

Older adults are more susceptible to coronavirus disease 2019 (COVID-19) health complications and are likely to remain in stricter self-isolation than other age groups (Shahid et al., 2020). Therefore, COVID-19 related anxiety and the effects of isolation and ensuing loneliness may be especially severe for them (Vahia et al., 2020). Nevertheless, older adults considerably vary in functioning and coping resources and some manifested impressive mental strengths during the initial phases of the pandemic (Shrira et al., 2020). Therefore, a critical goal is to map risk assessment: who is more psychologically vulnerable and who is relatively resilient vis-à-vis the COVID-19 pandemic.

One potentially in-risk group may be that of older adults suffering from long-term effects of traumatic events. Relatedly, the psychological consequences of massive traumatic events such as World War II (WWII) may persist for decades (Rzeszutek et al., 2020). Most relevant in this context are Holocaust survivors, who constitute more than one third of Israelis 75+ years of age (Cohn-Schwartz et al., 2020). Many of them not only cope with posttraumatic stress disorder (PTSD) symptoms and other impairments (Barel et al., 2010), they may also suffer the resurface of Holocaust memories due to COVID-19 threats.

According to memory-based theories of PTSD (Brewin, 2014), present circumstances akin to past traumatic conditions can trigger involuntary retrieval and reliving of intense trauma-related memories and images. Similarly, the current pandemic is reminiscent of various adverse conditions that have existed during the Holocaust, among them the prolonged isolation, the separation from family members due to COVID-19 health policy, but mostly the omnipresent risk of an infectious disease (Cohn-Schwartz et al., 2020).

We, therefore, hypothesized that survivors, especially those who contracted infectious diseases during the Holocaust, would report higher levels of PTSD symptoms, COVID-19 worries, and loneliness relative to comparisons.

1. Method

The sample included 127 older adult Jewish Israelis born before 1945 divided into three groups: 26 survivors who reported having contracted infectious diseases (e.g., tuberculosis, dysentery, etc.) during

the Holocaust, 70 survivors who reported not having contracted such diseases, and 31 Jews of European descent who did not live in Nazi or pro-Nazi dominated countries. Data was collected across Israel between April 23 and June 17, 2020. Eligible participants were located through contact lists provided by organizations related to older adults and survivors, and were interviewed face-to-face, by phone, or were requested to complete web-based questionnaire when possible, all on a voluntary basis. Participants provided verbal informed consent to procedures approved by the ethics committee in Bar-Ilan University.

Participants reported background characteristics and exposure to the Holocaust and to other traumatic events. They noted whether they had chronic medical conditions suspected to increase the risk of death due to COVID-19 complications (i.e., cardiovascular disease, hypertension, diabetes, chronic respiratory disease, and cancer), and noted exposure to six COVID-19 pandemic-related events (Shrira et al., 2020). Respondents further completed the 6-item ICD-11 PTSD questionnaire (Cloitre et al., 2018). Using a 5-point scale (0 = *not at all* to 4 = *extremely*), survivors completed the severity of symptoms during the last few weeks while referring to the Holocaust while comparisons referred to the most traumatic event they have experienced ($\alpha = 0.73$). Respondents also completed five items regarding COVID-19 worries (Bergman et al., 2020), and the three items from the UCLA Loneliness Scale (Hughes et al., 2004), using a 5-point scale in both scales (0 = *not at all* to 4 = *almost always*) ($\alpha = 0.86$ and 0.91 for COVID-19 worries and loneliness, respectively).

Relative to the comparison group, Holocaust survivor groups had a lower percentage of women, a lower percentage of those who completed secondary education, and reported having more medical conditions. The groups did not differ in other background characteristics or exposure to COVID-19 events.

2. Results

Survivors with Holocaust-related diseases reported higher PTSD symptoms and loneliness than comparisons. Survivors without Holocaust-related diseases did not significantly differ from the other groups. Moreover, survivors with Holocaust-related diseases reported

<https://doi.org/10.1016/j.jpsychires.2020.08.024>

Received 12 July 2020; Received in revised form 16 August 2020; Accepted 21 August 2020

Available online 26 August 2020

0022-3956/© 2020 Elsevier Ltd. All rights reserved.

Table 1
Analyses comparing groups on the study variables.

Variable	Survivors with Holocaust-related diseases M (SD)/%	Survivors without Holocaust-related diseases M (SD)/%	Comparisons M (SD)/%	Without covariates			Controlling for gender and chronic medical conditions ⁶		
				F/ χ^2	p	η^2/ϕ	F	p	η^2
Age	82.50 (4.23)	83.22 (3.87)	82.00 (4.35)	1.05	.351	.01	–	–	–
Gender (women)	50.0	52.9	87.1	12.10	.002	.30	–	–	–
Education (completed high-school)	73.1	67.1	93.5	8.00	.018	.25	–	–	–
Marital status (married or with partner)	53.8	51.4	61.3	0.84	.655	.08	–	–	–
Financial status ¹	3.56 (0.76)	3.90 (0.66)	3.74 (0.68)	2.35	.100	.03	–	–	–
Religiousness (secular)	61.5	65.7	67.7	3.76	.439	.17	–	–	–
No. of children	2.76 (1.50)	2.79 (1.12)	2.68 (1.13)	0.10	.906	.00	–	–	–
Place of living (community dwelling)	80.8	78.6	96.7	5.10	.078	.20	–	–	–
Self exposure to COVID-19 ²	0.57 (0.75)	0.56 (0.77)	0.22 (0.56)	2.61	.078	.04	–	–	–
Others' exposure to COVID-19 ³	0.69 (0.78)	0.58 (0.62)	0.35 (0.55)	2.15	.120	.03	–	–	–
Chronic medical conditions ⁴	2.03 (1.34) ^a	1.55 (1.13) ^a	0.96 (0.85) ^b	6.44	.002	.09	–	–	–
PTSD symptoms ⁵	1.96 (1.75) ^a	1.23 (1.48) ^{a,b}	0.53 (0.81) ^b	6.37	.002	.09	4.03	.02	.07
COVID-19 worries	1.57 (1.23) ^a	0.97 (0.81) ^b	0.76 (0.54) ^b	6.61	.002	.09	5.40	.006	.08
Loneliness	1.98 (1.46) ^a	1.41 (1.09) ^{a,b}	0.98 (1.08) ^b	5.08	.008	.07	4.51	.01	.07

Note. n is 26, 70, and 31 for survivors with Holocaust-related diseases, survivors without Holocaust-related diseases, and comparisons, respectively. The sample size had a statistical power of 0.94 for detecting medium effect size (calculated by G*Power 3.1.9.2, [Faul et al., 2009](#)). Means that do not share letters significantly differ from each other in a post-hoc Bonferroni test. Means, SD, and post-hoc Bonferroni test results refer to analyses without covariates. Post-hoc Bonferroni test results remained the same in the analyses with covariates. ¹Rating ranged from 1 (not good at all) to 5 (very good). ²The sum of exposure to the following experiences: currently in isolation, was in isolation, and contracted the coronavirus. ³The sum of exposure to the following experiences: know people close to me, who have been in isolation, know people who have contracted the coronavirus, and know people who died of the coronavirus. ⁴The sum of medical conditions reported from a list: cardiovascular disease, hypertension, diabetes, chronic respiratory disease, and cancer. ⁵Score was computed as sum of symptoms rated as at least moderately severe (≥ 2 on a 5-point scale). ⁶Although education level also significantly differed across the study groups we did not control for it in the analyses of covariance, as we considered this difference to be a direct effect of the Holocaust. Nevertheless, in additional analyses group differences in PTSD symptoms, COVID-19 worries and loneliness remained significant even after adding education to the covariates (details can be received upon request from the authors). Bold numbers refer to significant findings.

higher COVID-19 worries than both survivors without Holocaust-related diseases and comparisons. Controlling for gender and medical conditions, group differences remained significant (for more details see [Table 1](#)).

3. Discussion

In light of the lasting effects of WWII ([Frounfelker et al., 2018](#)), and specifically of the Holocaust ([Barel et al., 2010](#)), the current study examined survivors' psychological reactions during the COVID-19 crisis. Corroborating our hypotheses, we found heightened PTSD symptoms, COVID-19 worries, and loneliness among Holocaust survivors who reported to have contracted infectious diseases during the Holocaust. These findings add to prior evidence on the higher sensitivity of older adult survivors to post-Holocaust adversities, especially such that echoed the primary trauma ([Baider et al., 2008](#); [Kimron and Cohen, 2012](#); [Lamet et al., 2008](#)). It is possible that COVID-19 experiences reactivated traumatic memories especially among survivors who contracted an illness like tuberculosis or dysentery during the Holocaust, thus rendering exacerbated PTSD symptoms, worries, and loneliness. Survivors' greater psychological sensitivity to COVID-19 possibly reflects their increased fear of being sick, losing control and independence, and of course, their fear of death – all of which are linked to similar fears experienced during the war. Such amplified reactions are further supported by long-term neurobiological and epigenetic signatures, including lower cortisol levels and methylation resulting in endocrine dysregulation found among some survivors ([Yehuda and Lehrner, 2018](#)). Interactions with offspring and other family members may further fuel older survivors' reactions, as descendants may too suffer from low stress tolerance due to intergenerational transmission ([Dashorst et al., 2019](#)).

Study limitations include a convenience sample, symptoms based on self-report rather on psychiatric evaluation, and cross-sectional design.

Despite limitations, to the best of our knowledge, this is the first study assessing Holocaust survivors' psychological reactions during the COVID-19 pandemic. Our preliminary findings can inform mental health professionals and policy makers in their efforts to minimize psychological damage among older adults. Tailored interventions aiming to mitigate distress and loneliness should be developed for Holocaust survivors, especially for those whose focal trauma is reactivated in the context of the current pandemic. Future studies should assess whether the current findings generalize to other populations of older adults suffering from the long-term effects of WWII.

Funding/support

None.

Declaration of competing interest

None.

References

- Baider, L., Goldzweig, G., Ever-Hadani, P., Peretz, T., 2008. Breast cancer and psychological distress: mothers' and daughters' traumatic experiences. *Support. Care Canc.* 16, 407–414. <https://doi.org/10.1007/s00520-007-0320-1>.
- Barel, E., Van IJzendoorn, M.H., Sagi-Schwartz, A., Bakermans-Kranenburg, M.J., 2010. Surviving the Holocaust: a meta-analysis of the long-term sequelae of a genocide. *Psychol. Bull.* 136, 677–698. <https://doi.org/10.1037/a0020339>.
- Bergman, Y.S., Cohen-Fridel, S., Shrira, A., Bodner, E., Palgi, Y., 2020. COVID-19 health worries and anxiety symptoms among older adults: the moderating role of ageism. *Int. Psychogeriatr.* <https://doi.org/10.1017/S1041610220001258>.
- Brewin, C.R., 2014. Episodic memory, perceptual memory, and their interaction: foundations for a theory of posttraumatic stress disorder. *Psychol. Bull.* 140, 69–97. <https://doi.org/10.1037/a0033722>.
- Cloitre, M., Shevlin, M., Brewin, C.R., Bisson, J.I., Roberts, N.P., Maercker, A., et al., 2018. The International Trauma Questionnaire: development of a self-report

- measure of ICD-11 PTSD and complex PTSD. *Acta Psychiatr. Scand.* 138, 536–546. <https://doi.org/10.1111/acps.12956>.
- Cohn-Schwartz, E., Sagi, D., O'Rourke, N., Bachner, Y.G., 2020. The coronavirus pandemic and Holocaust survivors in Israel. *Psychol. Trauma*. 12, 502–504. <https://doi.org/10.1037/tra0000771>.
- Dashorst, P., Mooren, T., Kleber, R., de Jong, P., Huntjens, R., 2019. Intergenerational consequences of the Holocaust on offspring mental health: a systematic review of associated factors and mechanisms. *Eur. J. Psychotraumatol.* 10, 1654065 <https://doi.org/10.1080/20008198.2019.1654065>.
- Faul, F., Erdfelder, E., Buchner, A., Lang, A.G., 2009. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>.
- Frounfelker, R., Gilman, S.E., Betancourt, T.S., Aguilar-Gaxiola, S., Alonso, J., Bromet, E. J., et al., 2018. Civilians in World war II and DSM-IV mental disorders: results from the World mental health survey initiative. *Soc. Psychiatr. Psychiatr. Epidemiol.* 53, 207–219. <https://doi.org/10.1007/s00127-017-1452-3>.
- Hughes, M.E., Waite, L.J., Hawkey, L.C., Cacioppo, J.T., 2004. A short scale for measuring loneliness in large surveys: results from two population-based studies. *Res. Aging* 26, 655–672. <https://doi.org/10.1177/0164027504268574>.
- Kimron, L., Cohen, M., 2012. Coping and emotional distress during acute hospitalization in older persons with earlier trauma: the case of Holocaust survivors. *Qual. Life Res.* 21, 783–794. <https://doi.org/10.1007/s11136-011-9984-6>.
- Lamet, A., Szuchman, L., Perkel, L., Walsh, S., 2008. Risk factors, resilience, and psychological distress among holocaust and nonholocaust survivors in the post-9/11 environment. *Educ. Gerontol.* 35, 32–46. <https://doi.org/10.1080/03601270802349403>.
- Rzeszutek, M., Lis-Turlejska, M., Krajewska, A., Zawadzka, A., Lewandowski, M., Szumiał, S., 2020. Long-term psychological consequences of World War II trauma among Polish survivors: a mixed methods study on the role of social acknowledgment. *Front. Psychol.* 11, 210. <https://doi.org/10.3389/fpsyg.2020.00210>.
- Shahid, Z., Kalyanmitra, R., McClafferty, B., Kepko, D., Ramgobin, D., Patel, R., et al., 2020. COVID-19 and older adults: what we know. *J. Am. Geriatr. Soc.* 68, 926–929. <https://doi.org/10.1111/jgs.16472>.
- Shrira, A., Hoffman, Y., Bodner, E., Palgi, Y., 2020. COVID-19 related loneliness and psychiatric symptoms among older adults: the buffering role of subjective age. *Am. J. Geriatr. Psychiatr.* <https://doi.org/10.1016/j.jagp.2020.05.018>.
- Vahia, I.V., Blazer, D.G., Smith, G.S., Karp, J.F., Steffens, D., Forester, B.P., et al., 2020. COVID-19, mental health and aging: a need for new knowledge to bridge science and service. *Am. J. Geriatr. Psychiatr.* 28, 695–697. <https://doi.org/10.1016/j.jagp.2020.03.007>.
- Yehuda, R., Lehrner, A., 2018. Intergenerational transmission of trauma effects: putative role of epigenetic mechanisms. *World Psychiatr.* 17, 243–257. <https://doi.org/10.1002/wps.20568>.

Amit Shrira^{a,*}, Ruth Maytles^{a,b}, Maya Frenkel-Yosef^b

^a *The Interdisciplinary Department of Social Sciences, Bar-Ilan University, Ramat Gan, Israel*

^b *The Nini Czopp Association, Natanya, Israel*

* Corresponding author. The Gerontology Program, Interdisciplinary Department of Social Sciences, Bar-Ilan University, Ramat Gan, 5290002, Israel.

E-mail address: amit.shrira@biu.ac.il (A. Shrira).