Psychological Trauma: Theory, Research, Practice, and Policy

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Lower Subjective Life Expectancy in Later Life Is a Risk Factor for Posttraumatic Stress Symptoms Among Trauma Survivors

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Objective: These studies examined whether exposure to traumatic events at different stages of life would predict posttraumatic stress symptoms (PTSS) in old age. Furthermore, the regulating role of perceptions that relate to one's future time horizons (subjective life expectancy, SLE) and age (subjective age) were also examined. ***Method and Results:*** It was hypothesized that exposure to trauma would predict more PTSS, and that this association would be moderated by SLE and subjective age, so that for those with higher SLE and a younger subjective age, exposure to trauma will have a weaker association with PTSS. Study 1 ($N = 294$) revealed that among Israeli war veterans (mean age 57), those who experienced the trauma of war captivity in the Yom Kippur War reported higher PTSS than comparable veterans, and that the relationship between captivity and PTSS was weaker for those with a higher SLE. Study 2 ($N = 339$), which was based on older adults who were currently exposed to ongoing rocket fire in the south of Israel (mean age 65), revealed the same pattern of findings: Exposure to rocket fire predicted more PTSS, but this relationship was weaker among those with a higher SLE. Subjective age did not reveal a moderation effect. ***Conclusions:*** These findings suggest that different traumatic experiences, whether belonging to one's past or whether currently ongoing, predict PTSS in later life. Moreover, it appears that subjective time horizons until death, but not subjective age since birth, can buffer against the negative effect of the trauma.

Keywords: subjective age, subjective life expectancy, posttraumatic stress symptoms

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The aging process involves naturally occurring losses and transformations (such as the loss of loved ones, physical declines, and cognitive alterations). Such typical losses associated with aging might be exacerbated by traumatic experiences that an individual may have experienced in the distant or recent past. In this vein, it has been proposed that the aging process interacts with the resonance of past traumas in ways that can influence mental health and adjustment in old age (Avidor, Benyamini, & Solomon, 2014). However, when examining ways of coping with past adversity in old age, findings reveal that the long-term effects of trauma do not conform to a single, predictable pattern (Shmotkin, Shrira, & Palgi, 2011). Studies indicate, instead, divergent outcomes for trauma survivors in later life. Some studies among Holocaust survivors, for instance, indicate resilient coping and adaptation in old age (i.e., Sagi-Schwartz, Bakermans-Kranenburg, Linn, & van IJzedndoorn, 2013), while others reveal adverse posttraumatic outcomes in later life (i.e., Trappler, Cohen, & Tulloo, 2007).

Regarding war-related trauma, previous studies have shown that although exposure is one of the more robust predictors of posttraumatic stress disorder (PTSD), exposure in and of itself is not a sufficient predictor, as not every trauma survivor goes on to develop these responses (e.g., Shalev & Freedman, 2005). This has led to research into different moderators and concomitants of PTSD, in the attempt to shed light on the question of who will reveal psychopathological outcomes following trauma, and who will not. One avenue of such research involves the concept of time perceptions, including those relating to one's perceived age since birth (Foster, Hagan, & Brooks-Gunn, 2008) and those of future time horizons until death (Lang & Carstensen, 2002). Studying these two divergent time perceptions is germane to the understanding of the aftermath of trauma over the adult life span. Evidence has begun to accumulate regarding the implications of stress for the acceleration of subjective aging processes, as conceptualized in the subjective weathering model (Foster, Hagan, & Brooks-Gunn, 2008). As for perceptions of time left to live, recent research has emphasized its involvement in psychological outcomes of exposure to trauma among older adults (Palgi, 2016). This can be explained by a heightened death anxiety following traumatic exposure, which according to terror management theory can disrupt the normal buffering mechanisms that shield one against the fear

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of impending death (Chatard et al., 2012). Methodologically, looking into these two subjective time perspectives is quite efficient, as they can be measured by brief single-item questions. Thus, these perceptions are conceptualized in the present study as important concomitants of posttraumatic responses.

Several other topical issues remain unanswered when considering previous research on psychological outcomes for trauma survivors in later life. As many studies rely on single samples, or several samples that are similar (i.e., similar ages, or cohort, similar types of traumatic exposure), it is difficult to tease out the outcomes that pertain to the traumatic events, from possible cohort effects. Furthermore, the question remains whether the recency of the trauma for those who are exposed to trauma in older age creates a different clinical picture in comparison to those who carry memories from a more distant traumatic past. That is, traumatic experiences that occur at different points in one's life cycle (i.e., in childhood, young adulthood, or later adulthood) might predict posttraumatic outcomes differentially in later life. Findings regarding the issue of the timing of the trauma and its psychological sequelae are not unequivocal, however (Palgi, Shrira, & Shmotkin, 2015), and we therefore conducted two studies, relying on study groups that differ with regards to the timing of the trauma that they have experienced. This study assesses psychological outcomes of exposure to two different forms of war-related traumatic experiences among two groups of older adults in Israel: a group of combat veterans who fought in the 1973 Yom Kippur War, some of whom were held as prisoners of war (POWs), and a group of civilians living in the south of Israel, who have been exposed in recent years to ongoing rocket fire.

The present study seeks to examine such previously reported inconsistencies in coping with trauma in later life, by assessing posttraumatic stress symptoms (PTSS) among the two groups described above. Furthermore, we examine psychological constructs that might elucidate the processes by which certain people reveal more vulnerability to trauma and its outcomes in later life, while others show more resilience in dealing with traumatic events and their aftermath in old age (Shmotkin et al., 2011). In this context, two moderating variables are proposed that relate to perceptions of time: subjective life expectancy and subjective age. Subjective life expectancy (SLE) is the personal perception of time left to live (Kaufman & Elder, 2002). Subjective age refers to how old one feels (Montepare, 2009). Such self-perceptions that relate to time and age can be valuable when attempting to understand adjustment in later life (i.e., Kotter-Grühn, Grühn, & Smith, 2010; Westerhof & Barrett, 2005). These psychological perceptions become even more important to traumatized individuals in the second half of life, as they can impact one's coping with the significant changes of aging, which are compounded upon posttraumatic sequelae.

Recent evidence suggests that expectations for longevity, such as SLE, can predict physical and mental health, and even actual longevity (e.g., Kotter-Grühn et al., 2010). Furthermore, a high SLE, or perceived distance to death, a proxy of SLE, have been linked with psychological variables such as optimism (Griffin, Loh, & Hesketh, 2013) and lower psychological distress (Shrira, Bodner, & Palgi, 2014). It is also plausible that SLE is associated with exposure to trauma, since traumatic events can carry a lasting influence on one's time perspective. Among children and adolescents, for example, exposure to trauma was associated with a sense of a foreshortened future and a generally thwarted future orientation (Lavi & Solomon, 2005).

An older subjective age involves the sense that one has aged before one's chronological time. Higher subjective age can also be considered as a posttraumatic sequela expressed through such advanced self-perceptions of one's age. In middle age and onward, reports typically tend to skew more toward a younger subjective age. This tendency toward a relatively younger age identity is a predictor of more positive health and well-being outcomes in this life-stage (i.e., Westerhof & Barrett, 2005). Conversely, feeling older than one's chronological age is associated with worse physical and mental health (Kotter-Grühn, Neupert, & Stephan, 2015). People's sense of their age identity is closely linked to personal histories of adversity, stress, and traumatic experiences (i.e., Z. Solomon, Helvitz, & Zerach, 2009). Thus, stressful events are usually a precursor to an older subjective age (Schafer, 2009), contrasting with the typical reports among older adults of a relatively younger subjective age.

One of the normal aspects of the aging process is decline or loss (such as widowhood, physical illness, cognitive changes). Experiencing a younger subjective age relative to one's chronological age, and sensing that one's mortality is somewhat remote, rather than an actual and pressing notion, might serve to ward off some of the distress of aging. In the absence of a relatively young subjective age and high SLE, there might be a sharp awareness of illness, declines, and one's mortality in the second half of life. These might be difficult to tolerate, and may make it difficult to attain a fundamental sense of security. For people with recent or past exposure to trauma, this might come at a cost of being more prone to distress and psychopathology, as it could result in fewer emotional resources available to organize overwhelming feelings stemming both from trauma and from the changes that are common in older adulthood. This difficulty to tolerate distressing psychological states could involve a higher risk for disrupted homeostasis, which is associated with PTSS (Z. Solomon & Ohry, 2010). Based on the literature reviewed here, we propose that due to their positive associations with well-being and health, as well as their importance for adjustment to adversity in later life, subjective age and SLE can buffer against the effects of trauma in later life. Although this idea has not been tested in the past, it could explain some of the differences revealed in past studies among survivors of different traumatic experiences. We therefore test for this buffering effect in two study groups: ex-POWs of the Israeli 1973 Yom Kippur War—who were subjected to ongoing torture, humiliation, loss of their personal autonomy, and solitary incarceration while held captive as soldiers—and older individuals living around the south of Israel, who are presently exposed to continuous rocket fire. The participants in the two samples experienced the traumas in question at different points in their lives, and the span of time between the traumatic exposure and the measurement of trauma-related responses in the two studies also differs. These issues of diverging age and temporal distance from the event cannot be controlled for. However, testing for the buffering effects of subjective age and SLE in two different samples can help to gain insight into the processes that promote coping with different types of trauma

throughout the adult life span. Thus, based on previous research, the present study hypothesized that those exposed to trauma will reveal more PTSS. Furthermore, we also examine the previously untested proposition that a higher SLE [expecting to live longer] and a younger subjective age (feeling younger) will moderate the association between trauma and PTSS, so that those who have experienced previous or recent traumas will reveal significantly less PTSS if their SLE is high, and their subjective age is low.

Study 1

Method

Study 1 relied on a component of a longitudinal study spanning several decades, on the consequences of war and captivity among Israeli ex-POWs of the 1973 Yom Kippur War.

Participants. One hundred and seventy-seven ex-POWs, who had served in the Israeli Army land forces during the 1973 Yom Kippur War and were captured either on the Syrian front or on the Egyptian front, were interviewed in 2008 (the current study used data from the 2008 wave of interviews, as it was the only wave to include measures of SLE and subjective age). The POWs in both Syria and Egypt were similarly subjected to intense isolation and physical and psychological torture during captivity. Additionally, 117 combat veterans of the same war who did not fall captive (controls) participated in the study. This group was matched with the ex-POWs on personal and military variables, including age, education, marital status, and ethnic background, as well as military rank, assignment, and military unit, and their scores on performance prediction tests consisting of personality and intelligence measures that were administered before being drafted to the military. Participants were contacted by phone, and after explaining the purpose of the study, they were invited to participate. Participants filled in questionnaires at their homes or in other locations of their choice. Before administering the questionnaires, all participants signed an informed consent form. The study was approved by the Israeli Defense Forces and by the Tel Aviv University institutional review board.

Comparisons of the study groups revealed that they did not differ in age, education, religiosity, or income. The average age in both groups was 57 years (57.09, $SD = 5.58$, among the ex-POWs, and 56.62, $SD = 4.65$, among the controls), and average years of formal education was 14 (13.82, $SD = 4.43$, among the ex-POWs, and 14.21, $SD = 2.97$, among the controls). Most participants in both groups rated their income as "above average," with 30.0% of the participants rating their income as "much higher than the average." Most participants in both groups defined themselves as secular (62.2%), were married (91.0%), and were currently working (57.2%).

Measures. Covariates included background measures of age, years of education, income (rated on a 5-point scale, from *much below average* to *much above average*), and marital status (coded as *not married* or *married*). In addition, self-rated health (SRH) was assessed by a single item: "How would you define your physical health status in general?" Responses were given on a 5-point scale (1 = *excellent* to 5 = *bad*). The answers were coded so that higher scores represented better health. SRH is a widely used tool in health studies, with an independent contribution to prospective health outcomes, including mortality (Idler & Benyamini, 1997). These covariates were chosen because they had been previously shown to be related to PTSS, subjective age, or SLE (e.g., Gelkopf, Berger, Bleich, & Silver, 2012; Griffin et al., 2013; Shrira et al., 2014).

The PTSD Inventory (Z. Solomon et al., 1993) was used for the assessment of combat-related posttraumatic symptoms (PTSS). The questionnaire consisted of 17 statements, corresponding to *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; American Psychiatric Association, 2010) criteria for PTSD. Respondents were asked to rate each statement according to the frequency in which they experienced the described content during the last month, on a 4-point scale ranging from 1 (*never*) to 4 (*very often*). The items referred to symptoms that were associated with the Yom Kippur War (for controls) or captivity (for the ex-POWs). The total score for the scale was continuous, computed based on the summed frequency of the symptoms. Higher scores indicated higher levels of PTSS. Cronbach's alpha for the scale was 0.96.

Subjective age was measured by a five-item scale. Respondents were asked to rate subjective perceptions of their age as previously described by Barak and Schiffman (1981; felt age, age appearance, vitality, etc.). Answers were given on a 3-point scale ranging from *younger than one's age*, to *same age as one's age*, to *older than one's age*. Although separate items are categorical, the mean score was used to reflect subjective age (Cronbach's alpha = .83), with higher scores indicating a more advanced subjective age. This measure departs from the more prevalent, single-item measure for subjective age commonly used (i.e., Westerhof & Barrett, 2005). However, given that it incorporates different facets of subjective age, it has been successfully used in past research (i.e., Avidor et al., 2014). It was therefore retained in the current study as a viable measure for subjective age.

Subjective life expectancy was assessed using a single-item scale drawn from the Future Orientation Scale (Saigh, 1995), which was modified in the present study to reflect future motivations and expectations described in the literature as typical in midlife and onward (Lang & Carstensen, 2002). Respondents were asked to rate on a 5-point scale (*not at all* to *very much*) whether they agreed with the following item: "I believe I will live until after the age of 80." The present study did not use a traditional measure for SLE (i.e., Griffin et al., 2013). However, this measure was deemed as a proxy for SLE because it assesses expectations regarding one's longevity, and due to its resemblance to other measures used in previous studies on SLE (i.e., Zick, Smith, Mayer, & Taylor, 2014).

Data analysis. Hierarchical regression analyses were performed in order to test the first hypothesis that captivity would be associated with more PTSS. PTSS were regressed on captivity (controls vs. ex-POWS) and the covariates (age, education, income level, marital status, and SRH). Subjective age and SLE were also entered (in separate regressions for each) in this step. In order to examine the second hypothesis regarding a moderation effect of subjective age and SLE on the associations between captivity and PTSS, the two-way interaction terms between subjective age and captivity, and between SLE and captivity, were added in Step 2 (in separate regressions for each). The interaction was probed using the Hayes' (2013) PROCESS computational macro.

Results

We tested the univariate associations between SLE and the other study measures, within the ex-POW group, and among controls. As can be seen in Table 1, among ex-POWs, a higher SLE score was significantly correlated with an older age ($r = .20$, $p = .012$), a higher income level ($r = .27$, $p = .001$), and better SRH ($r = .46$, $p < .001$). There were no correlations with education or marital status. SLE also correlated negatively with PTSS ($r = -.47$, $p < .001$). Among the controls, correlations were weaker. SLE again correlated positively with SRH ($r = .38$, $p < .001$), and negatively with PTSS ($r = -.30$, $p = .004$). There were no significant correlations between SLE and the sociodemographic variables for the control group, including age. In line with previous research on the present database (Avidor et al., 2014), subjective age was independent from chronological age and did not correlate with it in either study group. It correlated positively with PTSS among controls ($r = .25$, $p = .008$) and slightly more strongly among ex-POWs ($r = .35$, $p < .001$). There was a similar negative correlation with SRH in both groups ($r = -.46$, $p < .001$). Subjective age correlated with education and with income ($r = -.21$, $p = .007$; $r = -.31$, $p < .001$, respectively) among the ex-POWs. As with SLE, subjective age did not correlate with background variables among controls. Among controls, subjective age and SLE were moderately correlated ($r = -.27$, $p = .013$), and more strongly so among ex-POWS ($r = -.50$, $p < .001$).

Examining our first hypothesis, in Step 1 of the linear regression analyses with subjective age as predictor, it did not significantly predict PTSS ($\beta = .04$, $p = .37$). Furthermore, there was no interaction effect of subjective age with captivity for predicting PTSS ($\beta = .11$, $p = .15$). In the model with SLE as predictor and moderator, it was revealed that, as predicted, SLE was negatively associated with PTSS. Controlling for sociodemographic variables and the separate predictors of Step 1, the two-way interaction in Step 2 was significant, with an additional 1% in the explained variance of PTSS. We probed the interaction by computing its conditional effect at 1 *SD* below and 1 *SD* above the mean of the moderator, SLE. The interaction is visually depicted in the online supplemental Figure S1. The association between captivity and PTSS is stronger for those with lower levels of SLE, at 1 *SD* below the mean ($B = 7.22$, $SE = .80$, $p < .001$) and weaker for those with higher levels of SLE, at 1 *SD* above the mean ($B = 4.80$, $SE = .71$, $p < .001$). While the hypothesis regarding subjective age was not established, these results support the hypothesis that SLE moderates the relationship between captivity and PTSS, after controlling for age and sociodemographic variables.

Study 2

Method

Participants and procedure. The participants for Study 2 were drawn from a study conducted among individuals living in the south of Israel. Thus, the second form of traumatic exposure that we examine involves that of the current and continuous exposure to rocket fire, among a civilian population living in the south of Israel, who have already entered into old age. For a little over 10 years, the population living in the region within fire-range from near the southern Israel border has been exposed to rocket attacks that have resulted in deaths, in physical injuries, and in destruction of homes and property. Studies have shown that this ongoing exposure to missile fire predicts distress, especially in the form of PTSD (e.g., Gelkopf et al., 2012). In one study, older age was associated with higher levels of PTSD among residents of this region (Dekel & Nuttman-Shwartz, 2009). Thus, this form of

Table 1
Descriptive Statistics and Intercorrelations for the Study Variables in Study 1, Among Ex-POWs (First Row) and Controls (Second Row)

Variable	*M* or %	*SD*	1	2	3	4	5	6	7	8
1. PTSS	9.56	5.15	—							
	2.19	3.40								
2. Subjective age[a]	1.78	.51	.35***	—						
	1.51	.39	.25**							
3. SLE[b]	2.78	1.41	−.47***	−.49***	—					
	3.41	1.21	−.30**	−.27*						
4. Age	57.10	5.38	−.19*	.00	.20*	—				
	56.62	4.65	−.01	−.07	.17					
5. Education	13.81	4.43	−.19*	−.21***	.11	.01	—			
	14.21	2.97	−.36***	−.07	.14	−.16				
6. Income	3.49	1.21	−.43***	−.31***	.27**	.06	.48***	—		
	3.81	1.23	−.29**	−.14	−.04	−.15	.49***			
7. Marital status[c]	7.5%	—	−.08	−.07	.02	−.14	.08	.13	—	
	5.2%		.00	.07	.00	−.14	.08	.15		
8. SRH[d]	2.52	1.05	−.55***	−.46***	.46***	.06	.07	.34***	.14	—
	3.51	1.02	−.40***	−.49***	.38***	−.11	.27**	.23*	−.06	

Note. Ex-POWs: $n = 177$; controls: $n = 117$. Ex-POWs = ex-prisoners of war; PTSS = posttraumatic stress symptoms; SLE = subjective life expectancy; SRH = self-rated health.
[a] Higher scores indicate that the participant feels older than his actual age. [b] Higher scores indicate that the participant expects to live longer. [c] 1 = currently unmarried; 2 = currently married, or living with a partner. [d] Higher scores indicate higher self-rated health.
* $p < .05$. ** $p < .01$. *** $p < .001$.

ongoing stressful exposure in old age can be said to impact aging processes in a more proximal manner (Palgi, Shrira, & Shmotkin, 2015).

Participants were drawn by a polling company through an in-region random digit dialing methodology. Participants were all Jewish, lived in the south region of Israel that surrounds the Gaza Strip, and were aged 50 years or older. In order to achieve a randomized sampling the company used the national telephone directory, which provides regional and community-specific phone number information. The interviews were conducted between January and February 2014, about 14 months after a military operation in which more than 800 rockets were fired at the area. During those 14 months, 63 rockets were targeted at the area; among them, 24 rockets were fired during the time of the interviews (http://www.terrorism-info.org.il/he/article/20624). In order to achieve better representation of the population and due to biases known in telephone surveys, the sample was stratified by age group (50–64, 65–90), gender, and place of living. Two thirds of the sample lived in the city of Sderot, Israel, and one third lived in rural communities, a percentage that was compatible with previous representative studies in the area (see Bleich, Gelkopf, Melamed, & Solomon, 2008; Gelkopf et al., 2012). The sample consisted of 339 participants who completed the entire survey, between age 50 and age 90, with an average age of 65.44 (SD = 9.77). About half of the participants were female (56%), most participants were married (69.9%), and the average number of years of formal education was 13.57 (SD = 3.24). Demographic characteristics of the sample are presented in Table 2. The telephone interviews were carried out by experienced interviewers in either Hebrew or Russian, lasting 15–25 min. Informed consent was obtained at the beginning of the interview. Recruitment and administration were approved by the ethics committee of the University of Haifa.

Measures. Covariates included the following demographic variables: age, gender, marital status (1 = married or living with a partner, 2 = single, divorced, or widowed), years of education, place of living (1 = Sderot, 2 = rural communities), and SRH. The study did not include a measure of income. Instead, we relied on place of living as a proxy for general socioeconomic status, based on previously documented social and economic disparities between people living in Sderot and those from the more affluent neighboring communities (e.g., Gelkopf et al., 2012; Yiftachel, 2000).

Posttraumatic stress symptoms (PTSS) were assessed with the PTSD Checklist (PCL; Weathers et al., 1996). This is not in keeping with the version used in Study 1, as Study 2 was conducted 6 years later, in 2014. Thus, the measure for PTSS in the current study was adapted from the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; American Psychiatric Association, 2013), which was the most recent edition. This questionnaire is a 20-item measure of PTSS. For each symptom, participants are asked to choose their response on a 5-point scale from 1 (*not at all bothered*) to 5 (*extremely bothered*). Participants were asked to rate each symptom while thinking of the most stressful event related to rocket fire that they had reported. If they found it difficult to select a specific event, they were asked to provide a general report about their life under rocket fire. Due to the chronic nature of the stressor, the questions referred specifically to symptoms experienced during the previous month. A continuous measure of PTSS was computed based on the mean scores across all items. Higher scores indicated higher levels of PTSS. Cronbach's alpha for the scale was 0.93.

Exposure to rocket fire was assessed by asking participants to endorse any of eight possible exposures: (a) I heard or saw a rocket fall; (b) a rocket fell close to me; (c) my house was hit; (d) I was physically injured; (e) someone I know was physically injured; (f) a family member or a close relative was physically injured; (g) one of my acquaintances was killed; and (h) a family member or a close relative was killed, as detailed by Gelkopf et al. (2012). A summary score was used.

Subjective age was measured by asking participants to specify, in years, how old they felt most of the time. In accordance with previous studies (e.g., Westerhof & Barrett, 2005), participants' responses were subtracted from their chronological age.

Perceived distance to death (DtD) was assessed by asking participants to indicate until what age they expected to live, as done by Heintz, Krol, and Levin (2013), and then subtracting that number from their chronological age. Higher scores indicated that participants expected to live longer. In spite of differences in measurement, DtD is conceived as a measure parallel to the notion of SLE used in Study 1, as both questions tap into self-held

Table 2
Descriptive Statistics and Intercorrelations for the Study Variables in Study 2

Variable	M or %	SD	1	2	3	4	5	6	7	8	9	10	11
1. PTSS	39.85	19.28	—										
2. Exposure to rockets	3.85	1.32	.37***	—									
3. Subjective age[a]	13.56	13.06	−.22***	−.02	—								
5. Perceived DtD[b]	21.82	14.44	−.11	.03	.23***	—							
6. Age	65.44	9.77	−.13*	−.20***	.05	−.49***	—						
7. Gender[c]	56.0%	—	.08	−.09	−.06	−.11	−.02	—					
8. Education	13.57	3.24	−.33***	−.08	.07	.09	−.07	.07	—				
9. Marital status[d]	69.9%	—	.05	.12*	.00	.17*	−.17**	−.24***	.05	—			
10. Place of living[e]	66.1%	—	−.35***	.37***	.09	.06	.03	−.07	.18**	−.12*	—	—	
11. Subjective health	3.20	1.09	−.40***	−.10	.33***	.29***	−.22***	−.04	−.25***	−.13*	.31***	−.10	—

Note. Total N = 339. PTSS = posttraumatic stress symptoms; DtD = distance to death.
[a] Higher scores indicate that the participant feels younger than his/her actual age. [b] Higher scores indicate that the participant expects to live longer. [c] 1 = man, 2 = woman. [d] 1 = currently married, or living with a partner; 2 = currently unmarried. [e] 1 = city of Sderot, Israel; 2 = rural communities.
* $p < .05$. ** $p < .01$. *** $p < .001$.

perspectives of future time left until death (Adams & Nettle, 2009).

Data analysis. Linear models similar to the analysis performed in Study 1 were used to examine the first hypothesis regarding the association between exposure to rocket fire and PTSS. Covariates (age, gender, education, marital status, place of living, and SRH) were entered in the first step of the multiple hierarchical regression. Exposures to rocket fire, subjective age, or perceived DtD were entered in the second step. The second hypothesis was examined with another multiple hierarchical regression in which the first two steps were identical to the ones used in the first model. In the third steps the interaction between exposure to rocket fire and subjective age (or perceived DtD in a separate regression) were entered. Significant interactions in the second hypothesis were investigated with the PROCESS computational macro (Hayes, 2013).

Results

Participants with higher exposure to rocket fire were related to younger age ($r = -.20$, $p < .001$), but not related to subjective age ($r = -.02$, $p = .716$), nor to shorter DtD ($r = -.03$, $p = .717$). Subjective age and perceived DtD were only moderately correlated ($r = .23$, $p < .005$), suggesting that these variables represent separate constructs (see also Shrira et al., 2014). Following our first hypothesis, exposure to rockets was positively correlated with PTSS ($r = .37$, $p < .001$). Age and subjective age were negatively correlated with PTSS ($r = -.13$, $p < .05$; $r = -.22$, $p < .001$, respectively); however, perceived DtD was not significantly correlated with PTSS ($r = -.11$, $p = .129$; for more details, see Table 2). Conducting a linear regression in which covariates were entered in Step 1 showed that individuals who reported higher exposure to rocket fire, $\beta = .38$, $t(279) = 4.87$, $p < .001$, but not older subjective age, $\beta = .22$, $t(279) = 1.35$, $p = .18$, reported greater PTSS. Similarly, a linear regression analysis showed that individuals who reported higher exposure to rocket fire, $\beta = .22$, $t(200) = 3.29$, $p < .001$, but not shorter perceived DtD, $\beta = -.04$, $t(200) = .56$, $p = .578$, reported greater PTSS.

The second hypothesis was tested with one further step, using the same first two steps as in the initial hierarchical regression. The linear interaction between exposure to rocket fire and subjective age was entered in Step 3. Results show only a marginally significant interaction, $B = -.11$, $t(280) = 1.93$, $p = .06$, accounting for an additional 1% of the variance in PTSS. After controlling for the effect of covariates in Step 1, and examining the main effects in Step 2, a significant interaction between exposure to rocket fire and perceived DtD was found in Step 3, accounting for an additional 4% of the variance in PTSS, $B = -.17$, $t(204) = 3.25$, $p < .005$.

A computational procedure (Hayes, 2013) that estimated linear effects when perceived DtD values were ± 1 *SD* from the mean was also conducted. For individuals who scored 1 *SD* below the mean of perceived DtD (i.e., reporting closer distance to death), each additional type of exposure to rocket fire was associated with a significant increase of 5.71 points in PTSS, $B = 5.71$, $t(204) = 5.23$, $p < .001$. For individuals who scored 1 *SD* above the mean of subjective age (i.e., reporting further distance to death), each additional type of exposure to rocket fire was associated with an increase of only .65 points in PTSS, $B = .73$, $t(204) = .59$, $p = .553$.

The two-way interaction between exposure to rocket fire and perceived DtD in predicting PTSS is presented in the online supplemental Figure S2. As can be seen in this figure, the relationship between exposure to rocket fire and PTSS was stronger among individuals who felt closer to their death.

Finally, conducting the same regression analyses for exposure to rocket fire, but with age as the moderator while controlling for either subjective age, $B = -.09$, $t(280) = 1.14$, $p = .257$, or for perceived DtD, $B = -.035$, $t(204) = .41$, $p = .679$, yielded no significant interaction between exposure to rocket fire and age.

Discussion

In the two studies reported in this work, exposure to traumatic events—whether a prolonged trauma that occurred in the past or presently ongoing trauma—was related to higher levels of PTSS among older adults. Furthermore, personal perceptions of longevity (SLE and DtD) moderated that relationship, while subjective age did not moderate these associations. In Study 1, people with subjective perceptions of having longer years to live revealed a weaker relationship between exposure to war trauma and PTSS. In Study 2, people with a longer DtD also revealed a weaker relationship between exposure to rocket fire and PTSS.

The finding that previous exposure to trauma predicts subsequent levels of PTSS among older adults replicated previous findings about the effects of traumatic experiences in later life (i.e., Trappler et al., 2007). Thus, although there exist divergent findings regarding resilience and vulnerability to trauma in later life (Shmotkin et al., 2011), the current studies indicate a psychological vulnerability, as exposure to different forms of traumatic events was associated with heightened PTSS for older adults in our samples. These associations were similarly present, whether among a group of veterans who were exposed to the trauma of war captivity 35 years prior to the study, or among a group of civilians who are aging while being currently subjected to ongoing terror in the south of Israel. These studies therefore suggest that aging with past trauma, as well as aging while facing ongoing trauma, are both involved in negative mental health outcomes in the form of PTSS.

Our findings suggest that traumatic events that differ in their timing, in their extent, and in their very nature, exert effects through similar associations with variables of future time perspective. Although the traumas in both studies were essentially different, the findings relating to the mechanisms that predict levels of PTSS were similar. This suggests that evaluations of future time left until death are associated with the regulation of PTSS. Thus, future time perceptions might be involved in buffering against and possibly coping with posttraumatic outcomes. Furthermore, this appears to play a role in posttraumatic sequelae both among people who were exposed to prolonged and extreme traumas in young adulthood, during war captivity, as well as among people who are exposed to the ongoing traumatic experience of rocket fire, in later life.

The moderation effects between perceptions of longevity in the two studies (estimated maximum age and DtD) with traumatic exposure, suggest that personal future time horizons are important concomitants of posttraumatic stress. In contrast, personal percep-

tions of time since birth (subjective age) did not serve as moderators in the present studies. This is in line with previous work, which has emphasized that the two constructs represent separate, relatively independent notions (Shrira et al., 2014). Subjective age captures attitudes relating to the aging process, while SLE represents one's conceptions regarding the end of life. In the present context, it appears that representations which are more directly bound to the notion of the end of life might also be more involved in the psychological response to trauma. This is in keeping with prominent theories on regulating the distress of being aware of one's mortality, most notably Terror Management Theory (TMT; S. Solomon, Greenberg, & Pyszczynski, 1991). TMT proposes that individuals can easily become aware of their own mortality and need to cope with the sense of terror regarding its inevitability (mostly by way of fostering a sense of value and meaning through social and psychological mechanisms). PTSS might disrupt one's ability to buffer against death anxiety (e.g., Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). It can be argued that under traumatic circumstances, one's impending death is made very salient. The trauma of war, which was examined in Study 1, involves many near-death experiences on the battlefield, as well as witnessing the actual death of one's fellow soldiers. Furthermore, war captivity invokes much terror as POWs live in the constant fear of death. When held captive, the POW has no awareness of whether one will even survive captivity and be freed alive. Civilians living in political conflict areas, as examined in Study 2, who experience ongoing rocket fire, are also exposed to life threatening situations (such as bombing in or around their place of living, and the fear for their lives and that of their loved ones). In the framework of TMT theory, for older adults with recent or past traumatic experiences, any psychological mechanism that can evoke reminders of approaching death, such as feeling that one has few years to live and that death is imminent, can further impede coping with the trauma.

In contrast, the personal experience of age did not regulate the relationship between trauma and PTSS in either study. Subjective age been shown in past research to be a relevant outcome of traumatic experiences (i.e., Schafer, 2009; Z. Solomon et al., 2009). Recent research does show that it moderates the association between traumatic events and PTSS among young adults (Hoffman, Shrira, & Grossman, 2015). In the present research model, findings do not indicate that it is involved to the same extent in moderating the effect of traumatic exposure on subsequent PTSS among older adults. This might be associated with the reasoning noted above, that personal perceptions of future time left to live outweigh the importance of subjective perceptions of age in later life for modulating outcomes of trauma. It should also be noted, however, that while the moderation effects for subjective age were not found to be statistically significant, this does not dismiss the possibility that such a moderation effect does actually exist, yet it was not detected statistically in the present studies. This is especially true in Study 2, where the interaction effect involving subjective age was marginally significant.

Another important message stemming from the present work is that recent and ongoing trauma, as well as earlier traumatic experiences, exert their effects through similar psychological mechanisms. In both studies, the traumatic exposure had similar connections with subsequent PTSS for older people in spite of examining differing traumatic circumstances. Furthermore, the mechanisms that were involved in these connections (SLE) were also similar, in spite of the many differences between the two samples. The ability to compare the two samples and these findings is somewhat restricted, as the two studies are based on samples that differ in their background and in many other dimensions. But the significance of the shared findings in both samples still stands: that the links between traumatic exposure and PTSS are to some extent regulated by perceptions of longevity. In each study, the samples have been subjected to completely different trajectories of adverse experiences: That of war trauma of Yom Kippur war was distant and, in the case of captivity, prolonged and extreme, whereas the trauma of exposure to rocket fire as civilians is also prolonged, but recent and even presently ongoing in old age. These differences would lead one to assume that they would hold divergent outcomes in later life, and involve personal time perceptions in distinctive ways. However, the present results suggest that at the heart of coping with traumatic experiences in later life there lie similar processes of perceptions of time left to live, regardless of vast differences in the traumas, their timing, and their span.

The studies reported here have several limitations. Both of the designs are cross-sectional which limits any conclusions regarding causality or temporal precedence between SLE with PTSS. It is also possible that other variables were at play in the present findings, although they were not accounted for. Optimism, for example, is correlated with PTSS, and it might have influenced reports regarding SLE, an association which has been previously revealed (Griffin et al., 2013). Future studies are required in order to assess for longitudinal connections between time perceptions and PTSS, as well as other relevant variables which were not included in the present studies. Moreover, while the two studies measured similar concepts (PTSS and SLE), each of the studies relied on slightly different scales. Thus, although the variables were equivalent, they were not identical. Recent studies have revealed the effects of previous as well as current exposure to trauma, and the relevant psychological mechanisms that might inoculate, or sensitize, older adults to PTSS (Palgi, Gelkopf, & Berger, 2015; Shrira et al., 2014). Studies comparing samples using homogenous designs can further shed light on the extent of these associations.

In conclusion, the findings from the two studies reported here point to the importance of SLE in coping with trauma in the second half of life. For those with past experience of the trauma of war and captivity, and for those who are presently exposed to the ongoing trauma of rocket fire, having constricted personal time horizons was associated with more PTSS. Subjective age did not play a role in the associations between trauma and PTSS in either study. This suggests that, although subjective age has been established in the past as a concomitant of trauma, it seems that death-related regulative processes (such as the perceptions of future time left to live that were measured in the present studies) are more prominent in regulating the connections between traumatic exposure and PTSS. These findings hold clinical implications, as they point to the involvement of perceptions of time left to live in regulating one's PTSS levels. It may well be that for clinicians working with older trauma survivors, such time perceptions are a valuable point of focus for coping with trauma.

References

Adams, J., & Nettle, D. (2009). Time perspective, personality and smoking, body mass, and physical activity: An empirical study. *British Journal of Health Psychology, 14,* 83–105. http://dx.doi.org/10.1348/135910708X299664

American Psychiatric Association. (2010). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Avidor, S., Benyamini, Y., & Solomon, Z. (2014). Subjective age and health in later life: The role of posttraumatic symptoms. *Journals of Gerontology: Series B. Psychological Sciences and Social, 71,* 415–424.

Barak, B., & Schiffman, L. G. (1981). Cognitive age: A nonchronological age variable. In E. C. Hirschman & M. B. Holbrook (Eds.), *Advances in consumer research* (Vol. 8, pp. 602–606). Ann Arbor, MI: Association for Consumer Research.

Bleich, A., Gelkopf, M., Melamed, Y., & Solomon, Z. (2008). Mental health and resiliency following 44 months of terrorism: A survey of an Israeli national representative sample. In B. Trappler (Ed.), *Modern terrorism and psychological trauma* (pp. 113–135). New York, NY: Gordian Knot Books/Richard Altschuler & Associates.

Chatard, A., Pyszczynski, T., Arndt, J., Selimbegović, L., Konan, P. N., & Van der Linden, M. (2012). Extent of trauma exposure and PTSD symptom severity as predictors of anxiety-buffer functioning. *Psychological Trauma: Theory, Research, Practice, and Policy, 4,* 47–55. http://dx.doi.org/10.1037/a0021085

Dekel, R., & Nuttman-Shwartz, O. (2009). Posttraumatic stress and growth: The contribution of cognitive appraisal and sense of belonging to the country. *Health & Social Work, 34,* 87–96. http://dx.doi.org/10.1093/hsw/34.2.87

Foster, H., Hagan, J., & Brooks-Gunn, J. (2008). Growing up fast: Stress exposure and subjective "weathering" in emerging adulthood. *Journal of Health and Social Behavior, 49,* 162–177. http://dx.doi.org/10.1177/002214650804900204

Gelkopf, M., Berger, R., Bleich, A., & Silver, R. C. (2012). Protective factors and predictors of vulnerability to chronic stress: A comparative study of 4 communities after 7 years of continuous rocket fire. *Social Science & Medicine, 74,* 757–766. http://dx.doi.org/10.1016/j.socscimed.2011.10.022

Griffin, B., Loh, V., & Hesketh, B. (2013). A mental model of factors associated with subjective life expectancy. *Social Science & Medicine, 82,* 79–86. http://dx.doi.org/10.1016/j.socscimed.2013.01.026

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis*. New York, NY: Guilford Press.

Heintz, E., Krol, M., & Levin, L. A. (2013). The impact of patients' subjective life expectancy on time tradeoff valuations. *Medical Decision Making, 33,* 261–270. http://dx.doi.org/10.1177/0272989X12465673

Hoffman, Y., Shrira, A., & Grossman, E. S. (2015). Subjective age moderates the immediate effects of trauma exposure among young adults exposed to rocket attacks. *Psychiatry Research, 229,* 623–624. http://dx.doi.org/10.1016/j.psychres.2015.07.080

Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior, 38,* 21–37. http://dx.doi.org/10.2307/2955359

Kaufman, G., & Elder, G. H., Jr. (2002). Revisiting age identity. *Journal of Aging Studies, 16,* 169–176. http://dx.doi.org/10.1016/S0890-4065(02)00042-7

Kotter-Grühn, D., Grühn, D., & Smith, J. (2010). Predicting one's own death: The relationship between subjective and objective nearness to death in very old age. *European Journal of Ageing, 7,* 293–300. http://dx.doi.org/10.1007/s10433-010-0165-1

Kotter-Grühn, D., Neupert, S. D., & Stephan, Y. (2015). Feeling old today? Daily health, stressors, and affect explain day-to-day variability in subjective age. *Psychology & Health, 30,* 1470–1485. http://dx.doi.org/10.1080/08870446.2015.1061130

Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging, 17,* 125–139. http://dx.doi.org/10.1037/0882-7974.17.1.125

Lavi, T., & Solomon, Z. (2005). Palestinian youth of the Intifada: PTSD and future orientation. *Journal of the American Academy of Child & Adolescent Psychiatry, 44,* 1176–1183. http://dx.doi.org/10.1097/01.chi.0000177325.47629.4c

Montepare, J. M. (2009). Subjective age: Toward a guiding lifespan framework. *International Journal of Behavioral Development, 33,* 42–46. http://dx.doi.org/10.1177/0165025408095551

Nuttman-Shwartz, O., & Dekel, R. (2009). Ways of coping and sense of belonging in the face of a continuous threat. *Journal of Traumatic Stress, 22,* 667–670.

Palgi, Y. (2016). Subjective age and perceived distance-to-death moderate the association between posttraumatic stress symptoms and posttraumatic growth among older adults. *Aging & Mental Health, 20,* 948–954. http://dx.doi.org/10.1080/13607863.2015.1047320

Palgi, Y., Gelkopf, M., & Berger, R. (2015). The inoculating role of previous exposure to potentially traumatic life events on coping with prolonged exposure to rocket attacks: A lifespan perspective. *Psychiatry Research, 227,* 296–301. http://dx.doi.org/10.1016/j.psychres.2015.03.020

Palgi, Y., Shrira, A., & Shmotkin, D. (2015). Aging with trauma across the lifetime and experiencing trauma in old age: Vulnerability and resilience intertwined. In K. E. Cherry (Ed.), *Traumatic stress and long-term recovery: Coping with disasters and other negative life events* (pp. 293–308). New York, NY: Springer. http://dx.doi.org/10.1007/978-3-319-18866-9_16

Pyszczynski, T., Greenberg, J., Solomon, S., Arndt, J., & Schimel, J. (2004). Why do people need self-esteem? A theoretical and empirical review. *Psychological Bulletin, 130,* 435–468. http://dx.doi.org/10.1037/0033-2909.130.3.435

Sagi-Schwartz, A., Bakermans-Kranenburg, M. J., Linn, S., & van IJzendoorn, M. H. (2013). Against all odds: Genocidal trauma is associated with longer life-expectancy of the survivors. *PLoS ONE, 8,* e69179. http://dx.doi.org/10.1371/journal.pone.0069179

Saigh, P. A. (1995). *The children's future orientation scale*. Princeton, NJ: Trauma Resources.

Schafer, M. H. (2009). Parental death and subjective age: Indelible imprints from early in the life course? *Sociological Inquiry, 79,* 75–97. http://dx.doi.org/10.1111/j.1475-682X.2008.00270.x

Shalev, A. Y., & Freedman, S. (2005). PTSD following terrorist attacks: A prospective evaluation. *American Journal of Psychiatry, 162,* 1188–1191. http://dx.doi.org/10.1176/appi.ajp.162.6.1188

Shmotkin, D., Shrira, A., & Palgi, Y. (2011). Does trauma linger into old-old age? Using the Holocaust experience as a paradigm. In L. W. Poon & J. Cohen-Mansfield (Eds.), *Understanding well-being in the oldest old* (pp. 81–95). New York, NY: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511920974.007

Shrira, A., Bodner, E., & Palgi, Y. (2014). The interactive effect of subjective age and subjective distance-to-death on psychological distress of older adults. *Aging & Mental Health, 18,* 1066–1070. http://dx.doi.org/10.1080/13607863.2014.915925

Solomon, S., Greenberg, J., & Pyszczynski, T. (1991). A terror management theory of social behavior: The psychological functions of self-esteem and cultural worldviews. *Advances in Experimental Social Psychology, 24,* 93–159. http://dx.doi.org/10.1016/S0065-2601(08)60328-7

Solomon, Z., Benbenishty, R., Neria, Y., Abramowitz, M., Ginzburg, K., & Ohry, A. (1993). Assessment of PTSD: Validation of the revised PTSD Inventory. *Israel Journal of Psychiatry and Related Sciences, 30,* 110–115.

Solomon, Z., Helvitz, H., & Zerach, G. (2009). Subjective age, PTSD and physical health among war veterans. *Aging and Mental Health, 13,* 405–413. http://dx.doi.org/10.1080/13607860802459856

Solomon, Z., & Ohry, A. (2010). The toll of war captivity: Vulnerability, resilience, and premature aging. *Trauma Rehabilitation After War and Conflict,* 361–387. http://dx.doi.org/10.1007/978-1-4419-5722-1_15

Trappler, B., Cohen, C. I., & Tulloo, R. (2007). Impact of early lifetime trauma in later life: Depression among Holocaust survivors 60 years after the liberation of Auschwitz. *American Journal of Geriatric Psychiatry, 15,* 79–83. http://dx.doi.org/10.1097/01.JGP.0000229768.21406.a7

Weathers, F., & Ford, J. (1996). Psychometric properties of the PTSD checklist (PCL-C, PCL-S, PCL-M, PCL-PR). In H. Stamm (Ed.), *Measurement of stress, trauma, and adaptation* (pp. 205–252). Lutherville, MD: Sidran Press.

Westerhof, G. J., & Barrett, A. E. (2005). Age identity and subjective well-being: A comparison of the United States and Germany. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 60,* 129–136. http://dx.doi.org/10.1093/geronb/60.3.S129

Yiftachel, O. (2000). "Ethnocracy" and its discontents: Minorities, protests, and the Israeli Polity. *Critical Inquiry, 26,* 725–756. http://dx.doi.org/10.1086/448989

Zick, C. D., Smith, K. R., Mayer, R. N., & Taylor, L. B. (2014). Family, frailty, and fatal futures? Own-health and family-health predictors of subjective life expectancy. *Research on Aging, 36,* 244–266. http://dx.doi.org/10.1177/0164027513482948

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