Guilt as a Mediator Between Depressive Symptoms and Subjective Age: A 17-Year Longitudinal Study of Israeli Ex-Prisoners of War

Sharon Avidor, Yafit Levin, and Zahava Solomon

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Sharon Avidor
Ruppin Academic Center

Yafit Levin and Zahava Solomon
Tel Aviv University

This longitudinal study assesses the trajectories of depressive symptoms and subjective age and the mediating role of guilt in the association between them. Two groups of aging Israeli combat veterans (M age = 57), 128 ex-prisoners of war (ex-POWs), and 106 comparable combat veterans (controls), were assessed at 3 times: 18 (Time 1 [T1]), 30 (Time 2 [T2]), and 35 (Time 3 [T3]) years after the war. They filled out self-report questionnaires on depression, guilt, and subjective age. Results revealed that significantly more ex-POWs had chronic or delayed clinical levels of depressive symptoms than did controls and that chronic and delayed depressive symptoms were associated with a higher subjective age at T3. Furthermore, the path between depressive symptoms at T1 for predicting subjective age at T3 was fully explained by levels of guilt-distress at T2. Although the mediation effect was found in both study groups, it was significantly stronger among ex-POWs than among controls. These findings suggest that not only is depression a long-term sequela of traumatic stress, it is also a risk factor for psychological aging among war veterans. Furthermore, guilt-distress appears to play an important role in advancing subjective age, especially among ex-POWs.

Individuals who have been exposed to trauma and are entering later stages of life form a uniquely important group to explore. According to the stress-process model (Pearlin, 1989) the effects of early life adversities can accumulate throughout the life span, depleting the survivors of much-needed coping resources, and rendering them physically and mentally vulnerable as they age (e.g., Pearlin, Schieman, Fazio, & Meersman, 2005). Throughout the life span, this pattern of losses is associated with psychological symptoms such as posttraumatic stress disorder (PTSD) and depression (Johnson, Palmieri, Jackson, & Hobfoll, 2007), which in turn can bring about further resource loss. One possible outcome of these processes is the acceleration of subjective perceptions of aging (Schafer, 2009), which are often measured by *subjective age*, or how old one feels (Diehl et al., 2014). The current study examines whether trauma survivors who experience depressive symptoms over the years will report a heightened subjective age in later life and whether this association can be further understood by examining trauma-related guilt.

Combat veterans are often subjected to severely stressful experiences on the battlefield, which can carry a significant psycho-

logical impact (i.e., Hoge, Auchterlonie, & Miliken, 2006). War captivity is one of the most potent pathogenic war-related traumas as it entails extreme torment and repeated physical and mental abuse, usually after having suffered traumas on the battlefield (e.g., Hunt et al., 2008). The trauma of captivity also involves a prolonged interpersonal coercive bond with the captors (Herman, 1992). These extreme stressors carry a risk for developing a broad range of posttraumatic outcomes, such as depression, guilt, and accelerated aging (e.g., Avidor, Benyamini, & Solomon, 2014; Engdahl, Page, & Miller, 1991; Park, Kaiser, Spiro, King, & King, 2012; Solomon & Ohry, 2010; Ursano et al., 1996). Taken together, these separate studies indicate that following exposure to traumatic stress, the aging process might involve depression, guilt, and subjective age. In the following section, we examine each of these concomitants of traumatic stress in the context of age.

Although PTSD is a common outcome of exposure to trauma, posttraumatic symptoms do not encompass all of the psychological symptoms that can arise following traumatic events. Depressive symptoms are one such common outcome of trauma, which is not encompassed by PTSD criteria. The development of depression has been strongly linked with past experiences of major stress (e.g., Verhoeven et al., 2014). It involves affective symptoms such as sadness, loss of pleasure and motivation (i.e., *anhedonia*), as well as fatigue, and difficulty in making decisions (American Psychiatric Association, 2013). Depression is prevalent in the older adult years (Byers, Yaffe, Covinsky, Friedman, & Bruce, 2010), particularly among those who have experienced earlier traumas (e.g., Trappler, Cohen, & Tulloo, 2007). Furthermore, the development of depression following past experiences of major

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Sharon Avidor, School of Social and Community Sciences, Ruppin Academic Center; Yafit Levin and Zahava Solomon, I-Core Research Center for Mass Trauma, School of Social Work, Tel Aviv University.

Correspondence concerning this article should be addressed to Sharon Avidor, School of Social and Community Sciences, Ruppin Academic Center, Emek Hefer 402500, Israel. E-mail: sharonav@ruppin.ac.il

stress has been linked with the acceleration of aging, whether through biological, psychological, or functional markers (e.g., Price, Kao, Burgers, Carpenter, & Tyrka, 2013; Wolkowitz, Epel, Reus, & Mellon, 2010). Thus, depression is a marker of vulnerability in later life and is implicated in the effects of trauma on subjective age.

In the context of war-trauma, depression can be seen as a response to the losses that war entails. Studies on casualties of combat stress-reaction (CSR) revealed that loss and the grief over fallen friends on the battlefield leaves many combat soldiers with dwindled energy or desire to return to previous baselines of functioning (Solomon, 1993). Affected deeply by war-related losses, many veterans feel disengaged from their families and from their work (Adler, Zamorski, & Britt, 2011; Hendin & Pollinger Haas, 1984). Thus, the depressive symptoms exhibited by combat veterans can be regarded as a response to the losses incurred during combat. Viewing the depressive symptoms of veterans as originating from the losses inherent in war is in line with the conservation of resource (COR) theory (Hobfoll, 1998), which, as mentioned in the preceding section predicts that traumatic events often set off spirals of further losses by depleting individuals of psychosocial and other resources (Hobfoll et al., 2008).

In the wake of trauma, depressive symptoms tend to fluctuate over the course of life (Boschloo et al., 2014). For some, they may appear at a younger age (early onset), and later on remit, recur, or remain stable through the years. Others may experience depression for the first time in old age (delayed or late-onset). Others still may never reveal significant clinical levels of depressive symptoms (resilient). It is unclear, however, how these trajectories of depression following earlier trauma are associated with later difficulties in coping with the challenges of aging. Studies on depression in later life have not systematically assessed the point of onset of depression and its fluctuations over the course of life (Fiske, Wetherell, & Gatz, 2009) or how these distinctions can predict manifestations of accelerations to one's subjective age. In the present study, we examine whether the severity of depression in response to trauma and its trajectories (whether resilient to depression, or revealing recovered, delayed, or chronic patterns of symptoms) can predict subjective age in later life.

This examination is particularly relevant in the context of the Israeli population. The military has a dominant presence in Israel, and the culture of the Israeli army is embedded within a society undergoing continuous violent conflict. This is a unique cultural and political setting, where, unlike other nations, conscription in the army is universal, and serving in the army is considered, to some extent, a normative experience. Therefore, the present sample, which is based on Israeli veterans of the 1973 Yom-Kippur War, has by now been exposed to an accumulation of further adverse events following the war. Israeli soldiers returning from war might continue to serve, in some cases, after having been exposed to previous wars and even to the trauma of captivity. Thus, although the present sample has been exposed to the stresses of war, these veterans likely also experienced a great deal of stress produced by events following the war. This could be implicated in the responses to trauma such as long-term trajectories of depressive symptoms over one's adult life span, and one's subjective age.

Posttraumatic Guilt

Guilt is a common psychological response to trauma (Kim, Thibodeau, & Jorgensen, 2011), which involves negative emotions and cognitions of self-blame (Kubany & Watson, 2003). Guilt is often documented among combat veterans (e.g., Nazarov et al., 2015) and has also been shown to be involved in the trauma of captivity (Solomon, Avidor, & Givon Mantin, 2015). Captivity entails a confinement within a prolonged interpersonal bond of coercion with the captors and repeated exposure to physical and emotional torture. These experiences often carry long-lasting effects on the captive's personality and relationships (Herman, 1992) and may give rise to feelings of guilt for certain behaviors or transgressions that were committed within such a profound and torturous bond (Solomon et al., 2015). These sources for guilt might include the mere fact of having fallen captive, disclosing military information during interrogations, being unable to fight back, or revealing emotions that are construed as weakness.

At the peritraumatic stage, guilt can be considered as an attempt to reconcile disturbing and conflicting aspects of an experience, or as an attempt to regain one's sense of control (Browne, Trim, Myers, & Norman, 2015). When outlasting the traumatic event for too long, however, it may hold maladaptive consequences in the struggle to adapt to life following trauma (Kim et al., 2011). The negative self-assessment and self-blame involved in posttraumatic guilt is seen as a profoundly disturbing experience that gives rise to persistent emotional distress. As such, trauma-related guilt has been associated with worse posttraumatic outcomes (Held, Owens, Schumm, Chard, & Hansel, 2011), worse response to treatment (Owens, Chard, & Cox, 2008), lower functioning (Foa & Meadows, 1997), and suicide risk (Bryan, Ray-Sannerud, Morrow, & Etienne, 2013). Guilt is considered to hold its own unique contribution to posttraumatic outcomes (Owens, Steger, Whitesell, & Herrera, 2009). It has been shown, for instance, that among treated veterans, guilt is significantly linked to increased suicidal ideation, beyond the effects of depression and PTSD symptoms (Bryan et al., 2013).

For elderly traumatized people, guilt has the potential to intensify long-lasting outcomes of depression. Guilt has been likened to a load that weighs down on one's shoulders (Kouchaki, Gino, & Jami, 2014). Persistent guilt can chafe psychological resources (Dost & Yagmurlu, 2008), possibly impeding one's ability to cope in later life. Thus, the mental burden of guilt (i.e., Friedman et al., 2007) could conceivably leave one more susceptible to feeling old. Guilt that lingers as a persistent experience for the trauma survivor can undermine one's ability to maintain a positive emotional state. Furthermore, as one engages in the process of life review and self-reflection in later life (McAdams, 2001), carrying unresolved persistent guilt regarding traumatic events can hinder one's ability to achieve narrative integration.

Subjective Age

One of the concomitant effects of depression among traumatized people is a higher subjective age (Benson, 2014). Age identity is an important component of aging processes, as subjective age is a better predictor of mortality and health than is chronological age (Uotinen, Suutama, & Ruoppila, 2003). Most older adults report feeling younger than their chronological age (Bergland, Nico-

laisen, & Thorsen, 2014), a perception that is likely protective in this life stage (Kleinspehn-Ammerlahn, Kotter-Gruhn, & Smith, 2008) as this gap is involved in maintaining a high quality of life in later adulthood (Bowling, See-Tai, Ebrahim, Gabriel, & Solanki, 2005). Furthermore, a young subjective age relative to one's chronological age is inversely related with symptoms of depression (Keyes & Westerhof, 2012). Thus, subjective age is considered to hold significant consequences for health, well-being, and mortality (Westerhof et al., 2014).

The present study aims to establish predictors of an older subjective age in the context of the effects of traumatic experiences in later life. An advanced subjective age can be a concomitant effect of fewer adaptive coping resources, as it has been linked with a stress-related erosion of resources and mental health (Benson, 2014; Foster, Hagan, & Brooks-Gunn, 2008). Extending this view, an older subjective age might be associated with impediments to adaptation to the challenges met by trauma survivors as they age. It is plausible that for those with previous traumatic experiences, more age-related declines and losses could heighten their subjective age, unlike their cohorts who normally feel younger than their actual age. Considering previous studies on U.S. veterans and health outcomes, for example, military trauma ensuing in PTSD has been associated with increased earlier mortality as well as increased risk for several chronic diseases associated with aging (such as development of diabetes, heart disease, and hypertension; Schnurr et al., 2000). The finding that veterans diagnosed with PTSD also report an older subjective age (Solomon, Helvitz, & Zerach, 2009) suggests that when individuals who have been traumatized in the past report of their subjective age they likely take into account the hardship that they encounter as a response to the losses involved in coping with negative life events, such as their chronic health struggles.

The present study therefore seeks to examine the implication of posttraumatic depression and guilt in subjective age among two groups of aging war-veterans: ex-prisoners of war (ex-POWs) who experienced war combat and were subsequently held captive and a group of matched combat veterans who fought in the same war but did not fall captive.

The Present Study

Most of the studies examining depressive symptoms, guilt, or subjective age following traumatic experiences were based on retrospective reports or were cross-sectional in nature. The first novelty of this study is the use of a prospective approach for examining trajectories of depressive symptoms (i.e., the course of symptoms measured on several occasions over many years). Furthermore, it is important to examine the exact patterns by which depressive symptoms evolve over time in predicting subjective age. Thus, the association between differential longitudinal patterns of depressive symptoms and outcomes of subjective age are examined. Lastly, it is important to understand the trauma-related variables that are unique to war, and even more so to captivity experiences, that can explain the long-term links between depressive symptoms and subjective age. One avenue through which these links might be maintained is that of posttraumatic guilt, which often ensues from interpersonal trauma (e.g., Beck et al., 2015), with negative effects for one's prognosis (Held, Owens, & Anderson, 2015). Therefore, this study examines the role of post-

traumatic guilt in maintaining the long-term association between depressive symptoms and subjective age among those who experienced the extreme trauma of captivity in early life.

The present research followed ex-POWs and comparable war veterans (controls) who were not held captive, 18 years after their participation in war, and on two more occasions (30 and 35 years after the war) as they were entering the early stages of old age. On the basis of the present review, it is hypothesized that ex-POWs will reveal higher levels of depression, guilt, and subjective age; ex-POWs will reveal a higher likelihood of chronic or delayed trajectories of depressive symptoms, compared with controls; among ex-POWs and controls alike, chronic or delayed trajectories of depressive symptoms will be associated with subsequent advanced subjective age. Lastly, because of the extreme nature of the interpersonal trauma of captivity, which can involve a distinctive association with guilt, we also hypothesized that there would be a mediation effect of guilt on the association between depression and subjective age among ex-POWs but not among control veterans.

Method

Participants and procedure. This study is part of a longitudinal study on Israeli veterans of the 1973 Yom Kippur War (see Solomon, Horesh, Ein-Dor, & Ohry, 2012 for more details). A cohort of Israeli male veterans of that war was followed over 17 years, at three time points: 1991 (Time 1 [T1]), 2003 (Time 2 [T2]), and 2008 (Time 3 [T3]). Following approval of the Israel Defense Forces (IDF) and the Tel Aviv University review boards, lists of potential participants were drawn from the IDF computerized databank. Participants were contacted by phone, the purpose of the study was explained, and they were asked to take part in the study. The questionnaire packet was administered at a central hospital or in their homes. Informed consent was obtained from all participants, and they were debriefed at the end of each interview.

The participants comprised two groups of combat veterans: ex-POWs who had served in the Israeli Army land forces and were captured during the war either on the Syrian front or on the Egyptian front and comparable combat veterans who had fought in the same units as the ex-POWs but were not captured. Both groups were exposed to battlefield stressors of active fighting and encounters with death, but only the ex-POWs were subjected to the torture, humiliations, and deprivation of captivity. The two groups were matched on military and sociodemographic variables, with no differences in combat exposure.

At T1, 164 ex-POWs took part in the assessment, 144 participated in the data collection at T2, and 171 ex-POWs participated in T3. In addition, 185 control veterans were initially interviewed. Of them, 143 participated at T2, and 118 at T3. At the last measurement (T3), the mean age in both groups was 57 ($SD = 5$), and the mean years of education was 14 ($SD = 4$). Most participants in both groups rated their income as "above the mean," with 30% of the participants rating their income as "much higher than the mean." Most participants defined themselves as secular (62.2%), were married (91%), and were currently working (57.2%).

The analyses only included participants who took part in all three waves of measurement ($N = 234$; ex-POWs, $n = 128$; controls, $n = 106$). Analyses of the pattern of missing data (Little

& Rubin, 1983) revealed that the data were not missing at random, $\chi^2(25) = 48.24$, $p = .003$. Supplementary analyses revealed that compared with those who participated in all three waves of data collection, veterans with missing data at T3 endorsed significantly fewer depression symptoms and less guilt compared with those who participated in all three waves of data collection. Other differences were not significant. Data on the study variables were nevertheless assumed to be missing at random (MAR) as the mechanism of missing data was not known. Handling missing data under erroneous assumptions of MAR should result in minor impacts in the absence of significant proof of nonrandomness (Collins, Schafer, & Kam, 2001). Missing data were computed using the multiple imputation method, which was the optimal method for longitudinal data as missing responses can be recovered from earlier or later waves (i.e., Schafer & Graham, 2002).

Measures.

Depressive symptoms. Depressive symptoms were assessed at each wave using the 6-item Depression subscale of the Symptom Checklist-90 (Derogatis, 1977). Respondents were asked to indicate how frequently they experienced each symptom over the last 2 weeks on a 5-point scale, ranging from 1 (*not at all*) to 5 (*extremely*). In every wave, the score was the mean frequency of experiencing depressive symptoms (Cronbach's α: T1 = .83; T2 and T3 = .90), with a higher score reflecting more depressive symptoms. The presence of clinical symptom levels was also defined, using a cutoff score of .73, on the basis of norms for psychiatric outpatients (Derogatis, 1977), which has been effectively used in previous studies (e.g., Dekel, Solomon, Horesh, & Ein-Dor, 2014).

Guilt. Guilt was assessed at T2 using the Trauma-Related Guilt Inventory (TRGI; Kubany et al., 1996). The 32-item questionnaire is made up of three scales: (1) Guilt−Distress; (2) Global Guilt; and (3) Guilt Cognitions, which refer to the guilt experienced as a result of the trauma of captivity (for the ex-POWs) or of the Yom Kippur war (for the control group). Respondents were asked to rate each item on a 5-point scale ranging from 1 (*not true at all*) to 5 (*very true*). The mean score was used as the score for each subscale, with a higher score reflecting more guilt (Cronbach's α: Distress = .91; Global Guilt = .91; Cognitions = .81). Guilt was assessed only at T2; therefore, this was the only measurement available to us.

Subjective age. Subjective age was measured at T3 based on Barak and Schiffman's (1981) subjective age measure, revised into a five-item scale. Respondents were asked to rate different facets of subjective perceptions of their age (felt age, age appearance, vitality, etc.) on a 3-point scale, where 1 = *younger than*, 2 = *same age as*, and 3 = *older than one's age*. The mean score was used to reflect subjective age (Cronbach's α = .83), with higher scores indicating a more advanced subjective age. Although separate items are categorical, we referred to the combined scale as a continuous score (Avidor et al., 2014). Subjective age was only assessed at the last wave of measurement, therefore the T3 measure was the only one available to us.

Life events. The measurement of postwar life events was added to the present model as a covariate because of previous reports of accumulated distressing life events among trauma survivors (Shmotkin, Blumstein, & Modan, 2003). The number of stressful life events experienced between the war and the time of the initial measurement was measured at T1. The measure is an adaptation of a scale used in previous studies of Israeli combat veterans (Solomon, Mikulincer, & Waysman, 1991) and includes specific events such as death of a loved one, prolonged illness in the family, or a severe accident. Participants were asked to indicate for each of nine stressful life events whether they had experienced it since the war (*yes/no*). The sum of the events that were experienced was used for the analyses.

Data analysis. For the examination of differences in the study measures between the study groups, ex-POWs and controls were compared on the mean scores of depressive symptoms, subjective age, and guilt. In addition, the correlation patterns of the central study variables in the total sample were explored. Next, borrowing from previous findings on the dynamic nature of depression among veterans (Dekel et al., 2014), trajectories of depression scores were constructed. The trajectories were based on the presence of suggested clinical levels of depression across all three times of measurement. Differences between the study groups in their distribution in the trajectories were examined using chi-square analyses. Controlling for life events, chronological age, and study group, the trajectories were then compared using analysis of variance in order to assess how different trajectories of depression were associated with subjective age. Lastly, the mediation effect of T2 guilt, on the association between T1 depressive symptoms and T3 subjective age, moderated by group (ex-POWs vs. controls) were examined using the moderated mediation model of Preacher and Hayes (2004). Variables that could possibly impact subjective age in the present model (chronological age, T2 and T3 depressive symptoms, and life events) were controlled for in the analyses predicting this variable.

Results

For the first hypothesis (i.e., that ex-POWs will report higher depressive symptoms, more guilt, and an older subjective age than controls), we examined differences between the two groups on each of these variables. Differences in reported number of life events were also assessed. *T* tests revealed significant differences between the groups on all the study variables, except for life events (see Table 1 for the means and standard deviations in each group). As hypothesized, ex-POWs endorsed an older subjective age and higher levels of depressive symptoms and guilt.

We next examined the correlations between the study variables (presented in Table 2). As shown, depressive symptoms at every wave were positively correlated with each other. Subjective age was positively correlated with depressive symptoms at each measurement wave. Significant correlations were also found between negative life events and T1 and T2 depression and between the global and distress measures of guilt with depressive symptoms and subjective age at each wave. There were no correlations between guilt cognitions and subjective age. Of all the subscales of guilt, Distress was the most strongly correlated with the study variables. Furthermore, because of high correlations between guilt−distress and depressive symptoms, the Variance Inflation Factor (VIF) was examined to rule out multicollinearity. VIF scores were lower than 10 (scores ranged between 1.9 to 4.4), indicating that

Table 1. *Means and Standard Deviations for Central Study Variables Among Study Groups*

	Ex-POWs (n = 128)		Control group (n = 106)		
Group	M	SD	M	SD	t(232)
Subjective age	1.77	.48	1.54	.45	2.94**
Depressive symptoms T1	.49	.57	.29	.42	2.99**
Depressive symptoms T2	1.46	.97	.45	.51	9.70***
Depressive symptoms T3	1.37	.97	.54	.77	5.80***
Global guilt	.60	.92	.13	.37	4.78***
Guilt distress	2.24	1.12	.80	.82	10.67***
Guilt cognitions	.84	.59	.65	.52	2.53*
Negative life events	1.9	1.35	1.95	1.32	.26

Note. Table presents results of *t*-test comparisons. Ex-POWs = ex-prisoners of war, T1 = Time 1, assessment in 1991, T2 = Time 2, assessment in 2001, T3 = Time 3, assessment in 2008.
* $p < .05$. ** $p < .01$. *** $p < .001$.

there was no high degree of multicollinearity that would bias results based on the model.

The trajectories of depression were next examined to assess for rates of depression across all three times of measurement. Four depression trajectories were identified: (1) chronic depression (i.e., veterans who displayed indications of clinical levels of depressive symptoms in all waves of measurement); (2) delayed depression (i.e., veterans who did not display indications of clinical levels of depressive symptoms at T1, but did so in at least one of the later measurements); (3) recovered (veterans who initially displayed indications of clinical levels of depressive symptoms but later did not); and (4) resilient (veterans who did not meet indications of clinical levels of depression at any point in time). Other potential trajectories exist (e.g., a trajectory of relapse for those with indications of depression at T1, who at T2 were without clinical levels of depression and who again revealed indicated clinical levels of the disorder at T3). However, there were no participants in the present study who fit such other possible categories. Table 3 presents the trajectories among the ex-POW and the control groups. A chi-square test revealed significant differences in the distribution of trajectories between the study groups, $\chi^2(3) =$

49.77, $p < .001$, with control veterans revealing higher rates of resilient trajectories (53%) and ex-POWs revealing higher rates of delayed and chronic trajectories (44% and 27%, respectively), compared with the other trajectories.

Next, differences between trajectories of depression in subjective age were examined, using analysis of covariance with subjective age as the dependent variable and depression trajectories as the factor. We added study group (ex-POWs vs. controls) as another independent variable to adjust for effects of captivity and to explore possible additive effects of captivity to depression (interaction effects). Negative life events reported in T1 and chronological age were entered as covariates and did not reveal significant main effects, $F(1, 224) = .00$, $p = .99$, $\eta^2 = .00$, for life events, and $F(1, 224) = .75$, $p = .39$, $\eta^2 = .00$, for age. Univariate statistics indicated significant differences between depression trajectories in subjective age, $F(3, 224) = 8.04$, $p < .001$, $\eta^2 = .10$. However, no differences were found neither between study groups, $F(1, 224) = 3.33$, $p = .07$, $\eta^2 = .02$, or for the interaction between study group and depression trajectories, $F(3, 224) = 1.50$, $p = .22$, $\eta^2 = .02$. Post hoc tests using Bonferroni correction showed that in the total sample veterans with chronic ($M = 1.80$, $SD = .56$; $p = .002$) and delayed depression trajectories ($M = 1.73$, $SD = .50$; $p < .001$) reported significantly higher subjective age compared with those with resilient trajectories ($M = 1.54$, $SD = .40$). In addition, those with delayed depression trajectories also reported significantly higher subjective age compared with recovered trajectories ($M = 1.64$, $SD = .46$; $p = .008$). Thus, results support the second hypothesis (i.e., that depression symptoms at T1 [baseline], and indications of chronic or delayed clinical symptoms of depression across time are significantly associated with an older subjective age at T3).

Guilt as a mediator between depressive symptoms and subjective age. We first tested for simple mediation effects of guilt on the association between T1 depressive symptoms and T3 subjective age. Applying Preacher and Hayes' (2004) bias-corrected bootstrap mediation model, we tested for multiple mediations with covariates, controlling for effects of chronological age, life events, and T3 depressive symptoms. We used 2,000 bootstrap resamples with a 95% confidence interval (CI). T2 depressive symptoms were inserted

Table 2. *Intercorrelations Among Main Study Measures*

Measurement	1	2	3	4	5	6	7	8	9
1. Depressive symptoms, T1	—	.55***	.41***	.25**	.19*	.43**	.19**	.33***	−.09
2. Depressive symptoms, T2		—	.70***	.39***	.44***	.73***	.30***	.15*	−.11
3. Depressive symptoms, T3			—	.39***	.31***	.54***	.29***	.11	−.08
4. Subjective age, T3				—	.28***	.44***	.10	.11	.01
Guilt subscales, T2									
5. Global					—	.42***	.53***	.03	−.03
6. Distress						—	.20**	.03	−.01
7. Cognition							—	.06	−.13
8. Negative life events								—	−.05
9. Age									—

Note. Table presents Pearson's coefficients. T1 = Time 1, assessment in 1991, T2 = Time 2, assessment in 2001, T3 = Time 3, assessment in 2008.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3. *Distribution of Depression Trajectories by Study Group and Means and Standard Deviations in Subjective Age by Depression Trajectories*

Group	Ex-POWs				Controls			
Trajectory	Resilient	Recovered	Delayed	Chronic	Resilient	Recovered	Delayed	Chronic
N (%)	21 (16.4)	18 (14.1)	56 (43.7)	34 (26.5)	56 (52.8)	13 (12.3)	21 (19.8)	16 (15.1)
Subjective age M (SD)	1.54 (.35)	1.76 (.40)	1.77 (.50)	1.92 (.50)	1.50 (.39)	1.48 (.48)	1.61 (.40)	1.61 (.55)

Note. Depression refers to indications of clinical levels of depressive symptoms. N (%) present the amount of values in each trajectory among ex-POWs ($n = 128$) and controls ($n = 106$). Ex-POWs = ex-prisoners of war.

as an additional mediator. Thus, the size and significance of the indirect effect was estimated beyond the effects of depressive symptoms at the same wave of measurement (T2) and of the covariates. Because the TRGI includes three main subscales of guilt, the model was tested separately with global guilt as a mediator and again with guilt−distress as a mediator. Guilt cognitions revealed no correlation with the dependent variable and were therefore not retained in any subsequent analyses. The model with global guilt as a mediator was not significant, indicating that there was no indirect effect of depressive symptoms on subjective age through global guilt (indirect effect = .00, bootstrap SE = .02; bootstrap CI [−.0191, .0717]). Only the model with guilt−distress as a mediator met criteria for mediation and was further analyzed (see Figure 1).

T2 guilt−distress significantly mediated the association between T1 depressive symptoms and T3 subjective age (paths a1*b1 indirect effect = .09, bootstrap SE = .01; bootstrap CI (95%) .0763, 1024). T2 depressive symptoms did not significantly mediate this path (paths a2*b2 indirect effect = .00, Boot SE = .01; bootsrap CI [−.0099−.0192]). The direct effect of T1 depressive symptoms on T3 subjective age, adjusting for the influence of the mediators and the covariates, was not significant (path c': B = −.00, SE = .02, p = .94). The coefficient for the total effect (path c: direct + indirect) was significant (B = .09, bootstrap SE = .01; bootstrap CI [.0801−.1101]). All of the direct effect of T1 depressive symptoms on subjective age was accounted for by the indirect

effects. Of both indirect effects, almost all of the effect was explained by the indirect path hypothesized from T1 depressive symptoms via guilt−distress to subjective age (95.9%). Thus, guilt−distress fully mediated the association between T1 depressive symptoms and T3 subjective age.

Moderated mediation. We expected to find the mediation effect of guilt-distress on subjective age only among ex-POWs, but not among controls. Because of the formulation of guilt as a distinct posttraumatic symptom among ex-POWs, it was hypothesized that the path from T2 guilt-distress to subjective age would be moderated by the study group (ex-POWs vs. control veterans). To examine whether the effect of the mediator (guilt−distress) on the dependent variable (subjective age) varies at the two levels of the moderator (study group), we used a corrected-bootstrap conditional mediation analysis (Preacher, Rucker, & Hayes, 2007) relying again on 2,000 bootstrap resamples with a 95% CI. Because T2 depressive symptoms did not mediate the effect of T1 depressive symptoms, guilt−distress was retained as the only mediator in the model, whereas T2 depressive symptoms were instead entered as a covariate along with T3 depressive symptoms.

Figure 2 presents the individual path estimates for the predictor and the mediator, moderated by study group. Coefficient estimates revealed again that there was a nonsignificant direct effect of T1 depressive symptoms on T3 subjective age (B = .01, SE = .01, t = 1.10, p = .27). As for the covariates, T2 depressive symptoms yielded no significant effect for predicting subjective age. T3 depressive symptoms, however, did significantly predict subjective age. More importantly, study group did not significantly predict subjective age (B = −.02, SE = .01, p = .06), although it did moderate the effect of the mediator, as revealed in a significant interaction effect between study group and T2 guilt−distress for predicting T3 subjective age (B = .04, SE = .01, t = 4.77, p < .001).

Conditional indirect effects showed that there was a significantly higher indirect effect of T1 depressive symptoms on T3 subjective age among ex-POWs (B = .01, bootstrap SE = .00; bootstrap CI [.0023−.0132]) compared with controls (B = .00, bootstrap SE = .00; bootstrap CI [.0014−.0079]). Thus, guilt-distress significantly mediated the effect of T1 depressive symptoms on subjective age in both study groups. This was not fully in accord with the hypothesized moderation effect that stipulated no mediation effect among control veterans. However, the indirect effect of guilt was nonetheless moderated by study group, with a stronger mediation effect of guilt−distress among ex-POWs than for controls.
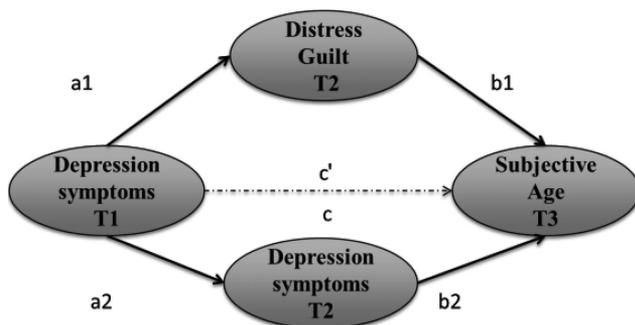

Figure 1. Basic multiple mediation model. a_i paths represent the indirect paths from the independent variable (independent variable [IV]: depressive symptoms at Time 1 [T1]) to the mediating variable, guilt-distress and depressive symptoms at Time2 [T2]; b_i paths represent indirect paths from the mediating variables to the dependent variable (dependent variable [DV]: subjective age); c' represents the direct path from the IV to DV; c represents the total direct and indirect effects. The model is adjusted for life events, Time 3 [T3] depressive symptoms and chronological age.

Ex-POWs

Distress Guilt T2

Depression Symptoms T1

Subjective Age T3

$B = .01$ Boot $SE = .00$; Boot CI (95%) .0023-.0132

Non-POW Veterans

Distress Guilt T2

Depression Symptoms T1

Subjective Age T3

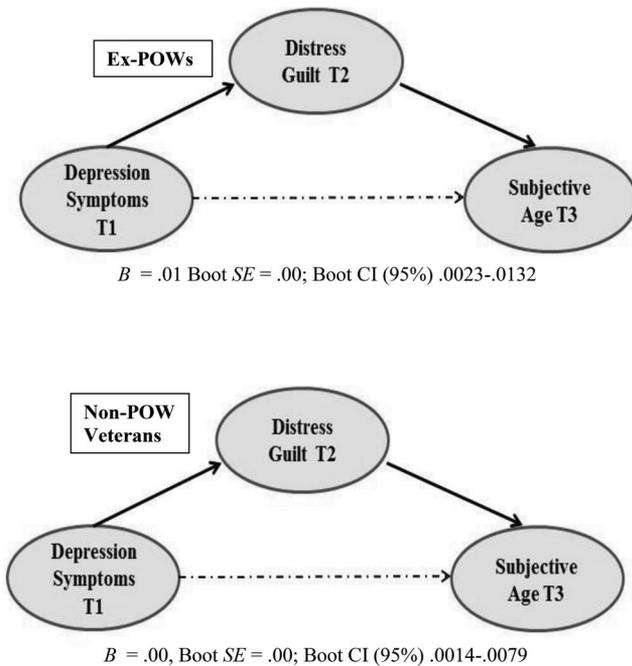$B = .00$, Boot $SE = .00$; Boot CI (95%) .0014-.0079

Figure 2. The mediation of guilt-distress of the association between depressive symptoms at Time 1 [T1], and subjective age at Time 3 [T3], moderated by captivity (ex-prisoners of war [POWs] vs. non-POW veterans). The total indirect effect is given for each group to illustrate differences in the mediation model based on the groups. Depressive symptoms at T2 and T3 were added as covariates.

Discussion

Over a span of 17 years, ex-POWs revealed worse outcomes for depressive symptoms, more posttraumatic guilt, and an older subjective age when compared with controls. An examination of the temporal trajectories of the depressive symptoms also revealed that ex-POWs displayed more chronic and more delayed trajectories of suggested clinical levels of depressive symptoms as compared with control veterans. Put differently, captivity is associated with more depressive symptoms that endure for more years. Furthermore, among the total sample of veterans, delayed or chronic trajectories of depressive symptoms contributed to an older subjective age at T3. Mediation analyses revealed that most of the contribution of depressive symptoms at T1 to subjective age at T3 was indirect and was fully explained by the distress component of posttraumatic guilt at T2. It is important to note that supporting the notion that guilt distinctively typifies the aftermath of captivity, the mediation effect of guilt-distress was significantly stronger for ex-POWs than for control veterans.

The expectations that ex-POWs would reveal higher levels of depressive symptoms at each of the three times of measurement, as well as a higher predominance of long-term trajectories of chronic and delayed depressive symptoms, were supported. These results extend those of previous studies on the associations between exposure to life stress and depressive symptoms in later life (e.g., Shmotkin & Litwin, 2009) and higher levels of depression symptoms among ex-POWs (Park et al., 2012). The measurement of trajectories of depression over time in this population, which, to

our knowledge, has not been previously tested, contributes to these previous findings by shedding light on the temporal patterns of onset and duration of depressive symptoms among ex-POWs and controls. Our findings show that a higher proportion of ex-POWs suffer chronically from symptoms of depression, even if, for some, those symptoms flared up many years after the war (as in the delayed trajectories). Although control veterans also reported depressive symptoms through the years, more of them revealed trajectories of resilience or recovery from depressive symptoms.

What accounts for the vulnerability to depressive symptoms and their persistence among ex-POWs? The first possible explanation lies in the view that depression, at its base, develops from accumulated losses that one experiences throughout life. Stressful events that have an aspect of loss to them have been identified in the past as provoking grief, hopelessness, and other indicators characteristic of depression (e.g., Brown & Harris, 1978; Hammen, 2006). The POW experience can abrade one's basic perceptions of self-esteem, of autonomy, and of control and mastery over one's own body. These losses can leave an indelible mark on one's very personality and mental integrity (Ebert & Dyck, 2004; Herman, 1992). Thus, captivity leads to critical losses to one's psyche, and these contribute to subsequent symptoms of depression, which often do not abate over time. From the perspective of COR theory (Hobfoll et al., 2008), it can be said that in response to the severe trauma of captivity, ex-POWs experience loss of personal, interpersonal, and physical resources. These losses can further carry an impact on development over the long-term, increasing the risk of suffering from psychological distress due to these losses.

Another explanation regards the interpersonal trauma of captivity. When the losses that follow a trauma are fundamentally personal, as in the severe man-made trauma of captivity, their effect is all the more resounding. Ex-POWs sustain mental and physical losses that extend inwardly, due to the prolonged torture and abuse inflicted on them with the intent of breaking them down. Thus, a POW might feel that he or she has lost any semblance of humanity, that they no longer know themselves (a loss of their previous "self" or character), or that they have lost any sense of self-worth as a result of the sadistic, humiliating bond with their captors. Indeed, interpersonal trauma has been established as a risk factor for depression (Hammen, 2005), and it is quite conceivably this aspect of the trauma of captivity that underlies the enduring occurrence of depressive symptoms throughout the decades following repatriation.

Our results revealed elevated rates of trajectories of chronic and delayed onset of depressive symptoms among ex-POWs. The chronic trajectories revealed here extend earlier studies on U.S. POWs that measured depressive symptoms at one time point and indicated chronic levels of depression many years following captivity (Engdahl et al., 1991). Indeed, past exposure to trauma is a central risk factor for chronic depression (Tanskanen et al., 2004), and a higher number of adverse events predict a higher likelihood for chronicity of depression (dose-response; Chapman et al., 2004). Thus, the severity and extent of the traumatic exposure among ex-POWs can result in a long-lasting struggle with depressive symptoms. Regarding the higher likelihood for delayed trajectories of depression among ex-POWs, these are consistent with previous studies that examined trajectories of PTSD among traumatized populations (i.e., Solomon & Mikulincer, 2006). A longitudinal study based on Holocaust survivors has also shown a

similar instance of subgroups of participants who revealed trajectories of delayed onset of symptoms of PTSD over a time frame of 10 years (Yehuda et al., 2009). This is the first study to date that establishes a similar pattern based on trajectories of depressive symptoms following the trauma of war captivity.

The trajectories of delayed onset of depressive symptoms among ex-POWs can be accounted for by the complexities of the aging process, given that by the third wave of measurement in 2008 most of the participants were older adults. The struggles encountered in the process of growing older might be confounded with the effects of past traumas that are unexpectedly brought to the forefront during later adulthood. The difficulties experienced during normal aging (e.g., physical limitations, loss of autonomy, loss of loved ones, salience of death) can often echo similar losses experienced in one's past (Brandler, 2000). Ex-POWs have coped with several traumas and losses during captivity, and these might have reawakened because of pervasive losses incurred in later life, consequently increasing their physical and psychological vulnerability. In a recent study, for instance, the present sample of ex-POWs had higher rates of health-related conditions and reported progressive worsening in their self-rated health compared with controls (Solomon et al., 2014). Such a reawakening of a traumatic past could interfere with adaptation to the process of growing older and hold negative consequences for mental health (Shmotkin, Shrira, & Palgi, 2011). Thus, even trauma survivors who were previously resilient might feel inundated and express pathological reactions given the reoccurrence of declines and enfeeblement that can arise in later life.

Regarding the interplay of depression and subjective age in the total sample of veterans, findings supported the hypothesis that depressive symptoms were related to a higher subsequent subjective age. To our knowledge, this is the first study to assess temporal trajectories of depression following trauma in the context of subjective age. Higher levels of subjective age have been documented before among Israeli traumatized veterans (Solomon et al., 2009), consistent with ex-POWs from the present dataset (Avidor et al., 2014). The accumulation of stressful life experiences among ex-POWs can set in motion a cascade of subsequent adversity, in many cases before or around midlife, which might lead them to feel like they have "aged before their time." This process might be quite similar to the subjective weathering processes found among individuals who have experienced losses earlier in life (e.g., Schafer, 2009). The present study widens our understanding of these processes by making use of prospective data regarding the contribution of depressive symptoms at baseline and of patterns of temporal trajectories of depression to subjective age following trauma. Furthermore, these findings validate earlier accounts of traumatized American Vietnam veterans suffering from depression (Hendin & Pollinger Haas, 1984), who had appeared to have "lost vitality" (p. 66) after many years of coping with such outcomes.

One cannot negate the possibility that depression and subjective age are two facets of the same experience. Depressive symptoms that persist throughout adulthood, as a sequela of earlier traumas, can lead to a loss of joy in life and to decreases in energy levels that resemble the loss of "zest" or vigor that characterizes an eradicated age identity. It could be the case that a sense of "declining years" beyond the normative experience of aging actually contributes to later depressive symptoms and that those, in

turn, play a part in further advancing subjective age. It is also plausible that accelerated psychological age and depressive symptoms might be related to a third common factor and therefore coexist as outcomes of earlier adversity. One such possible feature of trauma is that of future time orientation. Studies have shown that exposure to trauma can constrict the perception of future time that remains, even among adolescents (Lavi & Solomon, 2005). Furthermore, a foreshortened future is one of the criteria of PTSD (American Psychiatric Association, 2013). The sense that one is approaching the end of life and a preoccupation with death are also typical of accelerated subjective age and of depression. Thus, although establishing causality is beyond the scope of the present work, this study contributes to previous work by revealing that depressive symptoms and their trajectories play a role in increasing subjective age in late adulthood.

The present study sought to further expand current knowledge by delineating the specific pathways through which depression contributes to subjective age. Our hypothesis that following trauma initial levels of depressive symptoms would predict subsequent subjective age mostly through guilt was supported. Moreover, the mediation effect of guilt was stronger among ex-POWs. That is, following the complex trauma of captivity, posttraumatic guilt−distress leads to stronger effects of depressive symptoms on subjective age over time. These results are important in shedding light on the ways in which traumatic events influence age-related perceptions over the course of life. Excessive guilt might evoke negative outcomes for functioning and for perceptions of oneself (Kugler & Jones, 1992). This is especially pertinent in the case of ex-POWs, who have suffered through prolonged interpersonal traumatic experiences at the hands of their captors, with guilt being a central component in the aftermath of such traumas. According to early psychoanalytic conceptions, victims of violent personal bonds often internalize the guilt of the perpetrator (Ferenczi, 1933/1988), taking on themselves the remorse and regret for the wrongdoing. In the case of repatriated POWs, there also exists the complicated relationship with one's country and military, which, upon homecoming might condemn the ex-POW for having fallen captive, pointing the blame for their own trauma onto themselves, giving rise to even more guilt.

When such guilt persists, it can skew the way one sees the world and oneself and can interfere with one's ability to process past events and come to terms with them. Addressing its distinctive posttraumatic sequelae, complex interpersonal trauma has been implicated not only with depression or PTSD, but also with symptoms of self-blame (Cloitre et al., 2011). Excessive guilt can therefore interfere with what has been described as an ongoing struggle among ex-POWs to maintain balance and restore self-regulation following release from captivity (Solomon & Ohry, 2010). Thus, the ongoing burden and distress of guilt seems to be one of the posttraumatic mechanisms that disrupt equilibrium, wearing down one's inner resources and propelling premature aging processes.

Trauma-related guilt is multifaceted, and includes distress, global, and cognitive elements (Kubany & Watson, 2003). In the present study, however, guilt distress was the only component that mediated the effects of depression on subjective age. These findings are consistent with a previous study among a cohort of U.S. war veterans that found that guilt-distress was the strongest pre-

dictor of depressive symptoms (Bryan et al., 2013). In that study, the authors pointed to a need for better differentiation between distress that is induced by guilt and distress that stems from other forms of posttraumatic psychopathology. The present study therefore attempted to account for the net effect of guilt-distress by also accounting for measures of depressive symptoms at all three points in time. Thus, the association of guilt with the distress of depression was adjusted for in the model, and the present findings regarding guilt were significant beyond the measures of depression.

The present findings should also be placed into the wider context of the concomitants of depression for older veterans who suffer from depression over many years. The older adult who suffers from depression exists within a social environment, and the individual's depression plays a significant role and can influence the entire family system (Knight, 1996). One risk factor is that depressed individuals perceive themselves as a burden to others, which was predictive of suicidal ideation among a clinical sample of depressed U.S. veterans (Peak et al., 2016). These can have a considerable impact not only on the individual who might contemplate self-harm, but also on the family and social network of that individual, who might feel exasperated with their own well-being and personal resources dwindled because of years of attending to a loved one who suffers from depression.

The present study is based on a unique, longitudinal sample of ex-POWs and well-matched controls, and makes an important contribution regarding long-term outcomes of posttraumatic depression. Results should, however, be interpreted with some caution. The study relied on self-report measures of depression and guilt, possibly causing a response bias. Although the items in the guilt questionnaire were specifically tethered to the events of the war (for the control veterans) and to captivity (for the ex-POWs), it was not possible to account for the whole range of changes that might have influenced levels of guilt in the 30 years between the war and the second measurement of the study in which guilt was assessed. Furthermore, the design of the statistical model was limited by the fact that guilt was only measured at T2 and subjective age was only measured at T3 in the study. Future studies that rely on several measurements of these variables are needed to shed more light on how guilt and subjective age change in accordance with each other, and how these interconnections unfold over time. Another limitation of the study is its attrition rate and the reliance on data that pertain only to those who participated in the three waves of measurement. Attrition is an inevitable aspect of prospective studies, and the rates in the present study were similar to those of other longitudinal studies on traumatized populations (e.g., Niles, Newman, & Fisher, 2000), yet the extent to which these results can be generalized is somewhat limited.

The present study, despite its limitations, makes a contribution to the understanding of the concomitants of long-term depressive symptoms following war and captivity. Depression has been acknowledged in previous studies as an emotional response among war veterans, alongside PTSD (e.g., Ikin et al., 2016). The findings here suggest that looking into depressive symptoms can shed light on long-lasting symptoms that relate to trauma. To the best of our knowledge, this is the first study to assess trajectories of depressive symptoms in a cohort of aging veterans, suggesting that, quite similarly to the course of PTSD, depressive symptoms can wax and wane. The severity of the depressive symptoms relates to the

severity of the trauma. Furthermore, this is the first study to examine the interconnections between depressive symptoms, guilt, and subjective age, revealing that guilt is intertwined with posttraumatic depression, in a way that is linked with subjective age in later life. Our results suggest that careful professional attention be given to aging war-veterans, and especially ex-POWs, as they are at high risk not only for PTSD, but also for depressive symptoms that can be stirred up even decades following their war experiences. All the war-veterans in the present study have access to the auspices of therapeutic services offered by the Israeli defense ministry, which some of them occasionally turn to for support. Although this study didn't assess the contribution of psychotherapy to their mental health, our results hold clinical implications that should be further explored and assimilated in the knowledge relating to treatment of veterans. Increased awareness and therapeutic attention should also be given to the fact that trauma-related guilt is an important mechanism that possibly exacerbates the long-term effects of depressive symptoms on psychological aspects of aging.

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