

Veterans' Offspring's Personality Traits and the Intergenerational Transmission of Posttraumatic Stress Symptoms

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Abstract Following war and war captivity, many combat veterans and former prisoners of war (ex-POWs) may suffer from posttraumatic psychopathologies, and these may be transmitted to their offspring. Though there are considerable individual differences between offspring in this respect, the mechanisms underlying such differences remain unclear. The current longitudinal study examined the role that veterans' offspring's Big Five personality traits may play within this intergenerational transmission. One hundred and twenty-three dyads consisting of veterans (79 ex-POWs and 44 combat veterans) and their adult offspring were examined. Fathers' posttraumatic stress symptoms (PTSS) and global psychiatric distress (GD) were assessed 30 and 35 years after the war, and offspring's PTSS, GD, and Big Five personality traits were assessed 40 years after the war. Findings indicate that veterans' psychopathologies were associated with those of their offspring. Furthermore, analyses revealed significant positive associations between offspring's psychopathologies and their Neuroticism, and negative associations with their Agreeableness and Conscientiousness. Finally, a mediation effect was found wherein the fathers' PTSS and GD were related to their offspring's Neuroticism levels, and the offspring's Neuroticism was related to their PTSS and GD levels. These findings suggest that offspring's personality traits may indeed play a role in the transmission of posttraumatic psychopathologies from veterans to their offspring, and may

explain individual differences in this respect. Specifically, high levels of Neuroticism may place offspring at risk for secondary traumatization. Possible explanations and limitations are discussed, and future research directions are suggested.

Keywords Veterans · Offspring · Personality · Intergenerational transmission · Posttraumatic stress

Introduction

War and war captivity are both extremely stressful experiences, each harboring a potentially detrimental aftermath (e.g., Herman 1992). Of particular interest in this respect are symptoms of posttraumatic stress disorder (PTSD): intrusive thoughts and images of the trauma, avoidance of trauma reminders, negative alterations in mood and cognition, and hyperarousal, all of which amass to considerable distress and dysfunction (American Psychiatric Association [APA] 2013). Typically, captivity is associated with worse psychopathology than war (e.g., Solomon et al. 2012). The torment and strife entailed in the aftermath of both experiences, however, are not limited to the primary survivors, but may rather permeate and impede the psychological well-being of veterans' offspring—a phenomenon known as the intergenerational transmission of trauma (Dekel and Goldblatt 2008; Galovski and Lyons 2004).

Intergenerational transmissions from parents to offspring are discussed in various domains in the literature, particularly concerning psychological, biological, and behavioral factors (e.g., Boehnke 2015; Bowers and Yehuda 2016; Brook et al. 2015; Kitamura et al. 2009). Within this context, the intergenerational transmission of posttraumatic

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stress symptoms (PTSS) and related psychopathology (e.g., depression, anxiety, etc.) to the offspring of trauma survivors has attracted considerable empirical research (Lambert et al. 2014). Such transmissions have been demonstrated among offspring of war veterans (e.g., Dekel and Goldblatt 2008), and recently also among the progeny of repatriated prisoners of war (ex-POWs; e.g., Zerach et al. 2016). Notably, however, though not all offspring will evince such psychopathologies, the mechanisms underlying such individual differences are only partially understood.

When considering the mechanisms underlying the transmission of posttraumatic psychopathologies, the primary distinction is between what may be considered as direct transmission and what is considered to be an indirect transmission. In the case of direct transmissions the child is supposedly directly impacted by the parent's symptomatology, while in indirect transmissions the child is impacted by environmental factors that the parent's symptoms foster (e.g., family environment). To date, studies that have attempted to unravel the mechanisms of the intergenerational transmissions of trauma have mostly underscored the role that the fathers' characteristics play in determining their offspring's PTSS. Particularly, the fathers' PTSS have been the most commonly considered factors when speaking of direct mechanisms of transmission, and their parenting and the family environment it facilitates have been dominant in considerations of indirect mechanisms of transmission (e.g., Dekel and Goldblatt 2008; Leen-Feldner et al. 2013; Zerach and Aloni 2015). However, the literature concerning secondary traumatization (i.e., PTSS among individuals that are proximate to the primary victims; e.g., Ludick and Figley 2016) underscores the role that characteristics of secondary victims play in their psychopathologies (e.g., their empathic concern). Studies with ex-POWs' wives and offspring, for instance, indicate that the secondary victims' incapacity to maintain a balanced differentiation between their own emotional states and those of the ex-POWs may play a role in their vulnerability to secondary traumatization (Solomon et al. 2009; Zerach 2015). Thus, striving to understand individual differences in the transmission process at hand, offspring's attributes must also be taken into consideration. Since a person's personality strongly relates to his or her coping processes in the wake of stressful events (e.g., Bolger and Zuckerman 1995; Connor-Smith and Flachsbart 2007), it stands to reason the offspring's personality may play a role in the intergenerational transmission of trauma.

Notwithstanding, for the most part, offspring's personality traits seem to have gone under the radar in extant investigations. Offspring's personality traits have not been considered in meta-analytic efforts devoted to the phenomenon of intergenerational transmissions of trauma (Lambert et al. 2014), nor have they been considered in

systematic reviews discussing secondary trauma among veterans' offspring (Dekel and Goldblatt 2008; Leen-Feldner et al. 2013). Thus, while the association between personality traits and PTSD has been demonstrated in primary trauma victims (e.g., Jakšić et al. 2012; Thomas et al. 2014), and particularly among combat veterans (Caska and Renshaw 2013); no study to date has examined the role that offspring's personality traits might play within the intergenerational transmission of posttraumatic psychopathologies from fathers to offspring. The current study begins to fill this gap.

Personality traits are typically conceptualized as domains of individual differences demonstrated by consistent patterns of thoughts, feelings, and actions throughout developmental periods and contexts (McCrae and Costa 2003). Though far from being consensual, one of the most popular structural personality models, confirmed across virtually all cultures and fairly stable over time, is the five factor model (FFM; McCrae and Costa 2003) also known as The Big Five (the two terms are used interchangeably throughout this paper). The FFM includes the following dimensions: Openness to experience (e.g., being imaginative, original, and curious vs. being down to earth, conventional, and uncurious), Conscientiousness (e.g., being hard working, well-organized, and punctual vs. being lazy, disorganized, and late), Extroversion (e.g., being affectionate, talkative, and active vs. being reserved, quiet, and passive), Agreeableness (e.g., being trusting, generous, and lenient vs. being suspicious, stingy, and critical), and Neuroticism (e.g., being worried, emotional, and self-pitying vs. being calm, unemotional, and self-satisfied).

Though studies in the field are primarily correlational, the association between personality and the psychological aftermath of trauma has been approached under two lenses: personality traits as a predisposition or risk/protective factors for psychopathology on the one hand; and exposure to trauma being conducive to the formation of personality traits on the other. Among the FFM personality traits, PTSD development and severity have been associated mostly with high rates of Neuroticism (e.g., Cox et al. 2004; Fauerbach et al. 2000). High Neuroticism has been considered to be a predisposition or risk factor of elevated PTSS (e.g., Aidman and Kollaras-Mitsinikos 2006; Everly and Lating 2004; Paris 2000). Purportedly, people who are more neurotic are more preoccupied and concerned with possible threats and past grievances (McCrae and Costa 2003), and their coping strategies are less adaptive than those who are less neurotic (e.g., Connor-Smith and Flachsbart 2007). These individuals' inclination to focus on elements in their environment that are negative and threatening makes them more vulnerable than others in that the negative interpretation and appraisal of a traumatic event are pivotal in the manifestation of PTSD (Ehlers and Clark 2000) and are part and

parcel of PTSD symptomatology (e.g., victims' involuntary preoccupation with the traumatic event and its implications, negative alterations in moods and cognitions; American Psychiatric Association 2013).

Considering indirect paths, high levels of Neuroticism are also often associated with inclinations to refrain from utilizing social support or otherwise perceive given support as less supportive (e.g., Borja et al. 2009; Leskelä et al. 2009). Since lack of (perceived) social support has repeatedly been found to be a risk factor for PTSD (e.g., Brewin et al. 2000), high Neuroticism may be associated with worse PTSS via this route. Furthermore, studies indicate that personality traits may be implicated in increases in exposure to traumatic experiences (Bolger and Zuckerman 1995; Jang et al. 2003). Specifically, it has been found that individuals high in Neuroticism may find themselves exposed to more traumatic experiences (e.g., Boals et al. 2015; Parslow et al. 2006), thus placing them at higher risk for developing posttraumatic psychopathology.

Though Neuroticism is undeniably the trait that is most commonly linked to PTSD, and indeed a major factor in a wide range of additional psychiatric disorders (Kotov et al. 2010), it is certainly not the only trait associated with PTSD. Studies with varying populations found that PTSD symptomatology was also associated also with low Agreeableness (Chung et al. 2007; Talbert et al. 1993), as well as with low Openness, Conscientiousness, and Extroversion (e.g., Caska and Renshaw 2013; Fauerbach et al. 2000). Higher levels of Extroversion, Openness, and Conscientiousness have been associated with greater utilization of social support, higher rates of positive affect, higher sense of self-efficacy, and greater utilization of problem-focused coping styles (e.g., DeLongis and Holtzman 2005; Leskelä et al. 2009; Penley and Tomaka 2002), which have all been associated with better outcomes when coping with stress (e.g., Lazarus and Folkman 1984), and therefore may serve as potential buffers against PTSD. The predisposition of personality traits has also been suggested from a biological perspective, wherein it was found that high Neuroticism as well as low Openness and Agreeableness are associated with low cortisol reactivity and low cardiovascular stress reactivity (e.g., Bibbey et al. 2013), which have been associated with less adaptive reactions to stress. Notably, a few prospective studies that included both pre-trauma and post-trauma assessments found that none of the FFM personality traits was a significant buffer of PTSD (Knezevic et al. 2005; Yuan et al. 2011). Notably, it has been found that individuals that are high in Neuroticism are not necessarily more reactive to traumatic events (i.e., do not demonstrate significant differences in symptomatic increments), but may nevertheless evince more detrimental responses because their symptom rates pre- as well as post-trauma are significantly higher than those who score lower in Neuroticism (Engelhard et al. 2009).

Though individual differences in personality traits have been considered also as an outcome of the exposure to trauma, empirical investigations yield inconsistent findings. Moreover, here too Neuroticism has proved to be the dominant trait in play. For instance, Löckenhoff et al. (2009) found that within a 2 year interval, participants who reported a recent and extremely adverse life event showed increases in facets of Neuroticism and decreases in facets of Agreeableness. Similarly, Sutin et al. (2010) longitudinal investigation found that subjects' construal of stressful experiences was associated with changes in their personality traits. Specifically, viewing the event as negative was associated with increases in Neuroticism, while construing the event as a learning experience was associated with increases in Extroversion and Conscientiousness. Boals et al. (2015) conducted a prospective study wherein over 1100 participants completed three measures of Neuroticism twice, separated by approximately 3 months. Participants indicated the most traumatic or adverse event they experienced during the intervening time. The researchers found that participants who experienced traumatic events during that time reported significant increases in Neuroticism. Other longitudinal studies, however, reveal a more complex picture. A 12 year longitudinal study, for instance, indicated that the death of a spouse may affect Neuroticism, indicating increase in the short-term followed by rapid decreases later in life (Mroczek and Spiro 2003). In another longitudinal study no changes were found in Neuroticism when trauma occurred in adulthood, but elevations in Neuroticism were evident when the trauma occurred earlier in life (Ogle et al. 2014).

Alterations in personality following exposure to trauma may be explained in several manners. Exposure to trauma may ultimately entail the shattering of positive world views and the adoption of less favorable views of self and world in their stead (Janoff-Bulman 1992). A traumatic experience may also result in more catastrophizing appraisals of potential threat (Ehlers and Clark 2000). Such negative views and appraisals may be readily interpreted as characteristics of Neuroticism (McCrae and Costa 2003). Additionally, associations have been found between the psychopathological aftermath of trauma and more frequent displays of hostility and psychological abuse and fewer expressions of acceptance and humor in veterans and their partners (e.g., Miller et al. 2013). Additionally, PTSD has been associated with greater anger (e.g., Olatunji et al. 2010). When such characteristics become entrenched they are considered to be indicators of lower Agreeableness (McCrae and Costa 2003). Considering the intergenerational transmission of trauma, it may therefore be postulated that offspring's secondary exposure to their fathers' trauma and its aftermath may be related to changes in their personality, particularly higher rates of Neuroticism.

As noted above, the consideration of personality traits both as potential outcomes and potential predispositions of trauma's aftermath suggests a mediation effect. Bramsen et al. (2002), for instance, found that among Dutch survivors of World War II, wartime stress led to higher Neuroticism, which in turn led to worse self-rated PTSD. Moreover, Bramsen et al. found that the relationship between wartime stress and Neuroticism was strongly mediated by the development of a negative world view. Translating these observations to the intergenerational transmission of trauma suggests that offspring's exposure to their fathers' trauma and to its aftermath may place them at risk of posttraumatic psychopathology by predisposing them to the development of a more neurotic personality. It therefore transpires that, individual differences in the transmission of trauma's aftermath from father to offspring may be explained by the latter's personality traits.

Targeting war veterans and their adult offspring, the current study had three main goals. The first goal was to assess whether veterans' psychopathologies were associated with the psychopathologies of their offspring, thus suggesting an intergenerational transmission of trauma. The second goal was to investigate whether offspring's personality traits may explain individual differences in the association between fathers' and offspring's psychopathologies. The third goal was to investigate whether the offspring's personality traits may mediate the process whereby the intergenerational transmission of trauma occurs. Following Galovski and Lyons (2004), we investigated two kinds of distress manifestations, so as to provide a more comprehensive clinical picture. First, we addressed PTSS associated with the veterans' traumas both among the veterans and their offspring (i.e., experience specific psychopathology), and on the other hand we addressed global distress (GD), wishing to account for "a wide range of manifestations of distress, not merely those that mimic PTSD" (p. 478). Concomitantly, we formulated three hypotheses. (1) The offspring of veterans with higher PTSS and GD will evince higher PTSS and GD, respectively, compared to offspring of veterans with lower PTSS and GD. (2) The offspring's Neuroticism will be positively correlated with their PTSS and GD, and the remaining personality traits (i.e., Extroversion, Openness to experience, Conscientiousness, and Agreeableness) will be negatively correlated with their PTSS and GD. Furthermore, personality traits will contribute to the explained variance in offspring PTSS and GD. (3) A mediation effect will be found, wherein veterans' PTSS and GD will explain variances in their offspring's personality, primarily their Neuroticism; which in turn will explain variances in the offspring's PTSS and GD.

Method

Participants

The current study included 123 Israeli father and adult offspring dyads wherein the father was a veteran of the Israeli Defense Forces (IDF), and served in the infantry during the 1973 Yom Kippur War. Among 79 dyads the fathers were ex-POWs, while among the remaining 44 dyads the fathers fought on the same fronts as the ex-POWs but were not held captive. The non-captive veterans (NCVs) were initially selected as a control group for assessing the aftermath of captivity while controlling for that of combat (Solomon et al. 2012). Hence, participant selection for the NCV group was done on the basis of their similarity to the ex-POWs in the relevant military and personal variables such as age, combat exposure, and rank.

Data were collected from fathers at three time points: 1991, 2003, and 2008, of which only the two later assessments, 2003 (T1) and 2008 (T2), were utilized in the current study. Two time points were chosen in order to examine the relation of two measurements to the personality traits, and only these points were chosen so as to retain relative proximity to the time of data retrieval from the offspring, which took place during 2013–2014 (henceforth the offspring's assessment point will be referred to as T3). The initial sample size in 1991 included 121 veterans, while in 2003, 91 veterans remained. In 2008, 27 participants were added, resulting in an overall sample size of 118 dyads. For all offspring's fathers were present throughout their rearing.

Ninety-two ex-POWs' adult offspring and 68 NCVs' adult offspring were contacted. Among ex-POWs' offspring 79 (87% response rate) participated and 12 refused to participate, and among the NCVs' offspring, 14 refused to participate, resulting in 44 participants (80.6% response rate). Socio-demographic characteristics are presented in Table 1 (for more details see Zerach et al. 2016).

Procedure

Veterans were located via the IDF computerized database (for more details see Solomon et al. 2012). Offspring were located through the contact information of their fathers. Potential participants were sent a letter in which the present study was introduced and participants were informed that research assistants (graduate psychology students) would contact them in the following days. After receiving an explanation of the aim of the present study, the offspring who agreed to participate were offered the option of filling out research questionnaires either at their homes or a location of their choice. We first appealed to the oldest child, and if he or she could not or would not participate, we turned to the next oldest child who agreed to participate. If more than

Table 1 Offspring's socio-demographic characteristics

Veterans'/fathers' variables		Ex-POWs (<i>n</i> = 79)	NCVs (<i>n</i> = 44)
Age		<i>M</i> = 57.86 (SD = 6.25)	<i>M</i> = 56.58 (SD = 4.16)
Education		<i>M</i> = 14.04 (SD = 4.40)	<i>M</i> = 14.43 (SD = 3.16)
Participation in previous wars		<i>M</i> = 0.30 (SD = 0.72)	<i>M</i> = 0.62 (SD = 1.02)
Combat exposure		<i>M</i> = 1.41 (SD = 0.56)	<i>M</i> = 1.68 (SD = 0.71)
Negative life events since war		<i>M</i> = 7.10 (SD = 5.02)	<i>M</i> = 6.74 (SD = 5.12)
Country of origin	Israel	50 (68.5%)	33 (84.6%)
	America	16 (21.9%)	3 (7.7%)
	Europe	7(9.6%)	3 (7.7%)
Religiosity	Secular	49 (65.3%)	23 (59%)
	Traditional	20 (26.7%)	11 (28.2%)
	Religious	6 (8%)	5 (12.8%)
Offspring's variables		Ex-POWs offspring (<i>n</i> = 79)	NCVs' offspring (<i>n</i> = 44)
Age		<i>M</i> = 35.12 (SD = 6.49)	<i>M</i> = 34.84 (SD = 5.44)
Education (years)		<i>M</i> = 14.89 (SD = 2.81)	<i>M</i> = 16.42 (SD = 2.51)
Negative life events		<i>M</i> = 2.15 (SD = 1.52)	<i>M</i> = 2.02 (SD = 1.62)
Gender	Female	43 (55.1%)	20 (45.5%)
	Male	35 (44.9%)	24 (54.5%)
Birth order	Firstborn	42 (53.8%)	28 (63.6%)
	Second born	19 (24.4%)	13 (29.5%)
	Third born	9 (11.5%)	1 (2.3%)
	Fourth born	6 (7.7%)	2 (4.5%)
	Fifth born	2 (2.6%)	0 (0%)
Marital status	Single	27 (34.6%)	14 (31.8%)
	Married	42 (53.8%)	29 (65.9%)
	Divorced	8 (10.3%)	1 (2.3%)
	Other	1 (1.3 %)	0 (0%)
Military service	Complete	62 (79.5%)	36 (81.8%)
	Partial	4 (5.1%)	4 (9.1%)
	National	2 (2.5%)	3 (6.8%)
	Other	10 (12.8%)	1 (2.3%)
Religiosity	Secular	54 (70.1%)	25 (59.5%)
	Traditional	13 (16.9%)	13 (31%)
	Religious	8 (10.4%)	3 (7.1%)
	Orthodox	1 (1.3%)	0 (0%)
	Other	1 (1.3%)	1 (2.4%)
Country of origin	Israel	72 (93.5%)	41 (93.2%)
	America	1 (1.3%)	1 (2.3%)
	Europe	4 (5.2%)	2 (4.5%)
Income	Well below average	4 (5.2%)	6 (13.6%)
	Below average	14 (18.7%)	8 (18.2%)
	Average	23 (30.7%)	67 (13.6%)
	Above average	23 (30.7%)	12 (27.3%)
	Well above average	11 (14.7%)	12 (27.3%)

one child agreed to participate, they all filled out the questionnaires and then we randomly chose only one child from each family to include in the analysis. Before filling out the questionnaires each participant signed a form of informed consent. Approval for this study was given by both Tel-Aviv University and Ariel University Ethics Committees.

Measures

Socio-demographic measurements

Fathers and offspring were assessed regarding the demographic characteristics of age, level of education, number of

negative life events, country of origin, and religiosity. In addition, offspring were asked about their birth order, marital status, military service, and income level. Fathers were also asked about their part in previous wars and their combat exposure.

PTSS

Fathers' and offspring's PTSS were assessed by using the PTSD Inventory (PTSD-I; Solomon and Horesh 2007; Solomon et al. 1993), a self-report scale corresponding to PTSD symptom criteria listed in revised fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association 2000). The questionnaire consists of a 4-point scale ranging from 1 (never) to 4 (almost always) to rate the frequency with which they experienced the described symptom. Fathers were asked to indicate symptoms experienced in the previous month in relation to their experience of combat or captivity, whereas offspring were asked to relate to the frequency in which they experienced the described symptom in the previous month, in relation to their fathers' experience of combat or captivity. (e.g., "I have recurrent pictures or thoughts about my fathers' captivity"). PTSS severity was assessed by the number of positively endorsed symptoms. These were calculated by counting the items in which the respondents answered "3" or "4". The scale was found to have good psychometric properties, including high convergent validity compared with clinical interviews based on the SCID (Solomon et al. 1993). Further support for the validity of the administration of the PTSD-I to the offspring's distress is evident in studies showing high convergent validity between PTSS (and its subscales) and depression, with same pattern of results found for both outcomes measures (Zerach et al. 2016). The PTSD-I reliability values for total scores were high for both fathers (Cronbach's $\alpha = 0.92$) and offspring (Cronbach's $\alpha = 0.86$).

Global distress

Fathers' and offspring's GD levels were assessed using the 53-item Brief Symptom Inventory (Derogatis and Melisaratos 1983). This self-report inventory assesses 10 symptom categories (e.g., somatization, depression, anxiety) and a general severity index assessing the mean of psychiatric symptomatology. For each item respondents were required to report the degree to which they were troubled by such symptoms/problems in the past month, using a 5-point Likert scale, ranging from 0 (not at all) to 4 (extremely). Chronbach's α for the total score of fathers and offspring were 0.95 and 0.90, respectively.

FFM personality traits

Offspring's personality traits were assessed using the Big Five Inventory (John et al. 1991), designed to measure each of the FFM personality traits. The questionnaire consists of 44 short-phrase items rated on a 5-point Likert scale from 1 (disagree strongly) to 5 (agree strongly). Its validity is well-established (John and Srivastava 1999). The alpha reliabilities in our sample were 0.78 (Extroversion), 0.72 (Agreeableness), 0.85 (Conscientiousness), 0.84 (Neuroticism), and 0.80 (Openness).

Data Analyses

In order to examine the correlations between study variables a zero-order Pearson correlation analysis was conducted. In order to assess whether offspring's personality traits mediated the link between fathers' and offspring's PTSS and GD, we employed two Structural Equation Modeling (SEM) analyses, one for intergenerational transmission of PTSS and one for intergenerational transmission GD. To estimate the models we used AMOS 23 (Arbuckle 2015). A model has an excellent fit to the observed data if the Comparative Fit Index (CFI) and the Tucker–Lewis Index (TLI) are >0.95 and the root mean square error of approximation (RMSEA) are lower than 0.05. A model is considered to have an adequate fit to the observed data if the CFI and TLI are >0.90 and the RMSEA are lower than 0.10. In order to estimate the significance of the indirect effect we employed a bootstrapped confidence interval (CI) for the *ab* indirect effect using procedures described by Preacher and Hayes (2008). In this analysis 5000 bootstrapped samples were drawn to estimate indirect effects of each of the mediators. Bias corrected and accelerated 95% CIs were computed to determine statistical significance of the *ab* paths of each mediator. A CI that does not include zero within its range provides evidence of a significant indirect effect or a significant mediation.

The valid data for offspring's PTSS was $n = 123$ (0 missing, 0%), negative life events were $n = 120$ (3 missing, 2.4%), and GD was $n = 117$ (6 missing, 4.9%). The valid data for fathers' PTSS at T1 were $n = 91$ (32 missing, 26%), PTSS at T2 was $n = 118$ (5 missing, 5.3%), and GD was $n = 112$ (11 missing, 8.9%). To decide whether the data were missing at random (MAR), we conducted analyses of differences between these groups in all of the variables, in and between partners, using Little's Missing Completely at Random (MCAR) test (Collins et al. 2001; Little and Rubin 1987). The analysis revealed a non-significant MCAR test, $\chi^2(131) = 105.8$, $p = 0.9$. Nevertheless, according to supplementary *T*-tests, there were indications that the data absence was indeed related to the observed data. Hence, we

cautiously assumed that the data were MAR. Missing data were handled with maximum likelihood, which is recommended as an optimal method for computing missing data to avoid biased data (e.g., Schafer and Graham 2002). The final sample comprised of 123 father–offspring dyads.

Results

Intercorrelations between the study variables are presented in Table 2. As hypothesized, offspring PTSS and GD were significantly and positively correlated with those of their fathers. Furthermore, offspring’s psychopathologies were significantly and negatively correlated with their Agreeableness and Conscientiousness, and positively correlated with their Neuroticism, but not with their Extroversion and Openness. Fathers’ PTSS in both measurements as well as their GD at T2 were significantly and positively correlated with offspring’s Neuroticism but not with the remaining personality traits.

Capitalizing on two assessment points with the veterans, the research questions above were explicated into two main analytical inquiries: (1) do the father’s PTSS and GD at T1 indirectly explain offspring’s PTSS and GD via a one-step mediation process (i.e., via offspring’s personality traits)? (2) Do the father’s PTSS and GD at T1 indirectly explain adult offspring’s PTSS and GD via a two-step mediation process (i.e., via fathers’ PTSS and GD at T2 and offspring’s personality traits)? In order to determine which of these potential mediations is at work we conducted two SEM analyses, the first for transmission of PTSS and the second for transmission of GD from fathers to offspring via the offspring’s personality traits.

Since the literature indicates that birth order may be associated with PTSD (e.g., Green and Griffiths 2014) and

with personality (e.g., Jefferson et al. 1998), we conducted a zero-order Pearson correlation analysis to determine whether there is a need to control for it during the mediation analyses. Results indicated that birth order was not correlated with any of the personality traits (Conscientiousness– $r = -0.12$, $p = 0.19$; Neuroticism– $r = 0.03$, $p = 0.76$; Openness– $r = 0.11$, $p = 0.22$; Extroversion– $r = 0.09$, $p = 0.32$), except for Agreeableness, which was negatively correlated ($r = -0.21$, $p = 0.02$); nor was it correlated with offspring’s PTSS ($r = 0.06$, $p = 0.17$) and GD ($r = 0.09$, $p = 0.15$). We therefore did not control for birth order in the analyses.

The SEM analyses revealed that the multistep mediation model of the transmission of PTSS had an adequate fit to the observed data, $\chi^2(6) = 22.6$, $p = 0.001$, CFI = 0.93, TLI = 0.92, RMSEA = 0.09. Considering the CFI and TLI, the model of the transmission of GD had an adequate fit, however the RMSEA was slightly high, $\chi^2(6) = 25.03$, $p = 0.001$, CFI = 0.92, TLI = 0.9, RMSEA = 0.15.

The significant paths found are shown in Figs. 1 and 2. As evident in Fig. 1, three traits significantly contributed to the explanation of the offspring’s PTSS: Neuroticism, Conscientiousness, and Agreeableness. Fathers’ PTSS at T2 explained only Neuroticism. As evident in Fig. 2, offspring’s Extroversion was positively and marginally significant in explaining their GD, while lower Conscientiousness and higher Neuroticism predicted higher offspring GD. Higher veteran GD at T2 added to the explanation of increments in offspring Neuroticism and lower Openness.

Both models revealed significant indirect paths via Neuroticism (see Table 3). In the model assessing the possible transmission of PTSS, we found one significant indirect path from fathers’ PTSS at T1 to offspring’s PTSS via fathers’ PTSS at T2 and offspring’s Neuroticism. The direct effects from both fathers’ PTSS at T1 and T2 to offspring’s PTSS

Table 2 Correlations matrix between the study factors

	1	2	3	4	5	6	7	8	9	10	11
1. Veteran PTSS T1	–										
2. Veteran PTSS T2	0.82***	–									
3. Veteran GD T1	0.82***	0.78***	–								
4. Veteran GD T2	0.74***	0.9**	0.8***	–							
5. Offspring Extroversion	0.12	0.04	0.13	0.09	–						
6. Offspring Agreeableness	–0.12	–0.13	–0.08	–0.09	0.09	–					
7. Offspring Conscientiousness	0.08	0.08	0.06	–0.00	0.15	0.04	–				
8. Offspring Neuroticism	0.17^	0.25***	0.1	0.26***	–0.13	–0.24***	–0.24**	–			
9. Offspring Openness	0.03	–0.06	0.03	–0.1	0.25**	–0.18*	–0.02	0.01	–		
10. Offspring PTSS	0.33***	0.35**	0.38***	0.42***	–0.09	–0.29**	–0.26	0.42***	0.1	–	
11. Offspring GD	0.18*	0.18*	0.22**	0.24**	0.05	–0.22*	–0.31***	0.58***	0.11	0.57***	–

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p = 0.062$

Fig. 1 Offspring’s personality traits as mediators between fathers’ and offspring’s PTSS. Notes. The direct effects leading from fathers’ PTSS at T1 ($b = 0.14, p = 0.31$) and PTSS T2 ($b = 0.19, p = 0.16$) to the offspring’s PTSS are not drawn in the figure and were nonsignificant. $***p < 0.001$

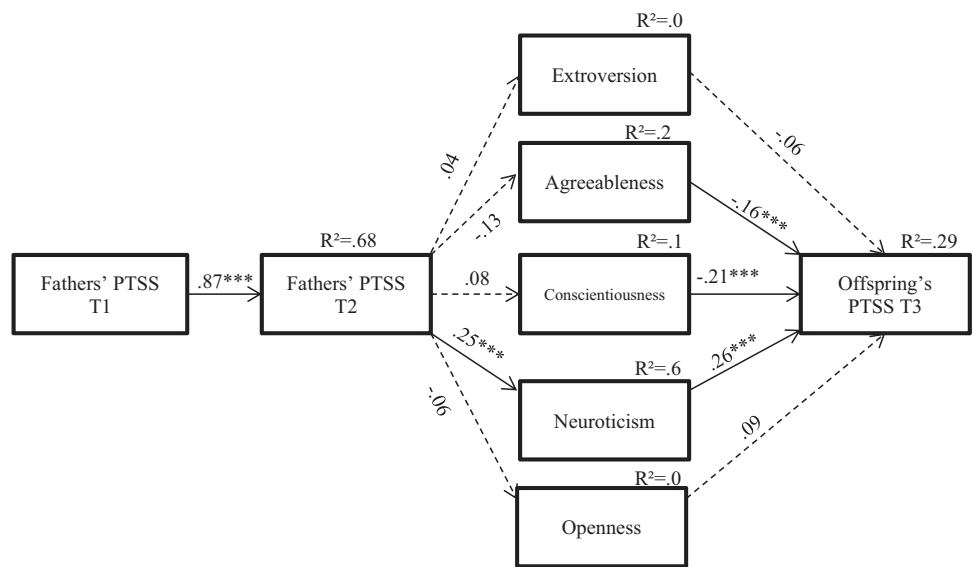
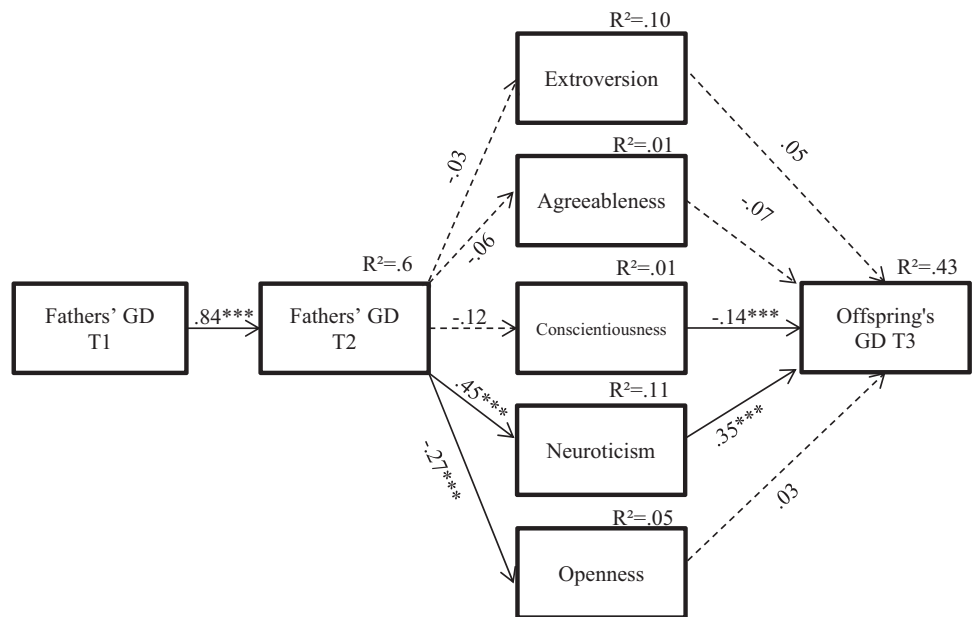


Fig. 2 Offspring’s personality traits as mediators between fathers’ and offspring’s GD. Notes. The direct effects are not drawn in the figure. The direct effect leading from fathers’ GD at T1 to offspring’s GD did not reach significance level ($b = 0.14, p = 0.06$), and from fathers’ GD at T2 to offspring’s GD was nonsignificant ($b = -0.05, p = 0.49$). $***p < 0.001$



were not significant when the offspring’s personality was accounted for. In the model assessing transmission of GD, we found two significant indirect paths from fathers’ GD at T1 to offspring’s GD, via offspring’s Neuroticism (one-step mediation) and via fathers’ GD at T2 and offspring Neuroticism (two-step mediation). The direct effects from fathers’ GD at both time points to offspring’s GD were not significant when personality was accounted for. These findings indicate that Neuroticism was the only trait that mediated the relation between the fathers’ psychopathologies and those of their offspring.

Discussion

In the current study we investigated whether the PTSS and GD of veterans of war and war captivity are implicated also in their offspring’s PTSS and GD, thus suggesting an intergenerational transmission of trauma in this population. Additionally, we investigated whether offspring’s Big Five personality traits may contribute to our understanding of personal differences in this process. As hypothesized (H1), veterans’ PTSS and GD were positively correlated with their offspring’s, suggesting an intergenerational transmission of

Table 3 Indirect effects of Big Five traits between fathers' and offspring's PTSS/GD

Indirect paths leading from fathers' PTSS/GD at T1 to offspring's PTSS/GD T3	PTSS		GD	
	<i>B</i> (SE)	Parameter estimate (95% CI)	<i>B</i> (SE)	Parameter estimate (95% CI)
Neuroticism				
1 steps: via offspring's Neuroticism	−0.26 (0.22)	−0.7995, 0.1139	0.17 (0.07)**	0.0680, 0.3060
2 steps: via fathers' PTSS/GD T2 and Neuroticism	0.11 (0.05)*	0.0400, 0.1980	0.38 (0.02)**	0.2080, 0.5530
Extroversion				
2 steps: via fathers' PTSS/GD T1 and Extroversion	−0.16 (0.14)	−0.5975, 0.0191	0.00 (0.01)	−0.0209, 0.0411
2 steps: via fathers' PTSS/GD T2 and Extroversion	0.01 (0.02)	−0.0068, 0.1180	0.00 (0.00)	−0.0115, 0.0137
Agreeableness				
2 steps: via fathers' PTSS/GD T1 and Agreeableness	0.05 (0.16)	−0.2389, 0.4519	−0.00 (0.02)	−0.0539, 0.0351
2 steps: via fathers' PTSS/GD T2 and Agreeableness	0.01 (0.04)	−0.0703, 0.1122	0.00 (0.01)	−0.0156, 0.0405
Conscientiousness				
2 steps: via fathers' PTSS/GD T1 and Conscientiousness	−0.13 (0.2)	−0.6015, 0.2431	−0.04 (0.03)	−0.1123, 0.0056
2 steps: via fathers' PTSS/GD T2 and Conscientiousness	−0.03 (0.04)	−0.1564, 0.0388	0.01 (0.02)	−0.0145, 0.0633
Openness				
2 steps: via fathers' PTSS/GD T1 and Openness	0.08 (0.11)	−0.0539, 0.4322	0.02 (0.02)	−0.0047, 0.0859
2 steps: via fathers' PTSS/GD T2 and Openness	−0.03 (0.04)	−0.1726, 0.0061	−0.02 (0.02)	−0.0725, 0.0049

Note: Unstandardized parameter estimates from multiple mediation models; estimates for each measure adjust for all other measures in the model

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

psychopathology. Additionally, supporting our hypothesis (H2), we found that Neuroticism was the personality trait that was most strongly and positively correlated with offspring' PTSS and GD, while Conscientiousness and Agreeableness were negatively correlated with offspring PTSS and GD. Interestingly, Openness and Extroversion were not correlated with offspring's measures of PTSS or GD. Finally, the evidence supported our hypothesis (H3), indicating that the father's PTSS and GD contributed to the explained variance in offspring's levels of Neuroticism, which in turn contributed to the explanation of the offspring's PTSS and GD respectively. These findings suggest that among traumatized veterans' offspring, those who develop a more neurotic personality are at greater risk for secondary traumatization, as are those who are less agreeable or less conscientious.

The finding that veterans' posttraumatic outcomes are related to those of their offspring join the substantive literature indicating such intergenerational transmissions of trauma (e.g., Dekel and Goldblatt 2008; Lambert et al. 2014; Leen-Feldner et al. 2013). Furthermore, our findings that personality traits may play a role in explaining individual differences in offspring's secondary traumatization, particularly Neuroticism's central role, are consistent with the literature concerning personality traits and traumatization among primary victims (e.g., Caska and Renshaw 2013; Ebstrup et al. 2011; Jakšić et al. 2012; Jensen-

Campbell and Graziano 2001). Nevertheless, the finding that these observations may be applicable to secondary PTSS and GD, as well as the finding that offspring's personality traits may mediate the association between parental and offspring traumatizations are novel. Moreover, these findings are important because they are a necessary preliminary step in the effort to shed light on the underlying factors implicating individual differences in resilience and vulnerability among traumatized veterans' offspring.

Several explanations may be offered in the interpretation of the findings. The finding that veterans' PTSS and GD may be conducive to the fashioning of their offspring's personality traits, primarily their Neuroticism, is consistent with the notion that exposure to trauma may change world views for the worse (e.g., Janoff-Bulman 1992), and the literature indicating that negative construal of the event may increase levels of Neuroticism after traumatic events (Sutin et al. 2010). Since secondary exposure to trauma may be implicated in similar outcomes as primary exposure (e.g., APA 2013; Ludick and Figley 2016), offspring's exposure to the content of their fathers' traumatic pasts may simultaneously expose them to the same deleterious effects that the trauma had exposed their fathers, including personality formation and psychopathology. Offspring that construe their fathers' traumatic pasts in a more negative fashion may therefore develop a more neurotic personality and concurrently evince more severe secondary traumatic stress symptoms.

Additionally, the current findings may be related to the observation that parents' manner of parenting is implicated in offspring personality (e.g., Otani et al. 2009; Patock-Peckham and Morgan-Lopez 2009; Reti et al. 2002). Several studies suggest that trauma victims' parenting may be implicated by their trauma and its aftermath (e.g., Cohen et al. 2011; Rowlang-Klein 2004; Rosenheck and Fontana 1998; Samper et al. 2004), and if so it might affect their offspring's personalities. Indeed, a home environment that is rife with anxiety, overprotectiveness, avoidance, potential rage outburst and violence, as well as parents' emotional numbing (e.g., Galovski and Lyons 2004) is likely to have such detrimental implications. Concomitantly, it has been found that the intergenerational transmission of PTSS from father to offspring may be mediated by offspring's perceptions of their parents' parenting styles (Zerach and Aloni 2015). Therefore, it may be that more severely traumatized veterans evince less adaptive parenting styles, which in turn may result in more Neuroticism among their offspring, which in turn predisposes the latter to posttraumatic psychopathologies.

Furthermore, we cannot negate the possibility that offspring's personality traits affect their fathers' parenting. Leen-Feldner et al. (2013) suggest that "sophisticated models of the impact of elevated parental PTSS on offspring will have to address potential 'child-driven effects,' which refer to parenting behaviors that are elicited by offspring characteristics..." (p. 1127). In this respect, the offspring's personality may affect the manner in which parenting is exercised (e.g., Prinzie et al. 2010), and hence, it stands to reason, may also affect the manner in which trauma's aftermath is transmitted from parent to child. Though it has been demonstrated that parenting styles are at play in the transmission of PTSS from ex-POWs to their offspring (Zerach and Aloni 2015), to the best of our knowledge no study has yet accounted for offspring's personality traits within this interaction.

It is also possible that personality traits may influence offspring's reactions to their fathers' posttraumatic aftermaths by implicating coping resources and strategies (Connor-Smith and Flachsbart 2007). Higher levels of Conscientiousness, and Agreeableness have been associated with higher actual and perceived social support (e.g., Kitamura et al. 2002; Leskelä et al. 2009), while high Neuroticism has been associated with the failure to utilize such support (e.g., Borja et al. 2009). Given the repeated finding that lack of social support is a risk factor for PTSD (Brewin et al. 2000), the presence or absence of apt support that personality traits may promote may account for offspring's distress and psychopathological reactions. Moreover, higher levels of Conscientiousness, and Agreeableness and lower Neuroticism have been associated with higher rates of positive affect, higher sense of self-

efficacy, and greater utilization of problem-focused coping styles (e.g., DeLongis and Holtzman 2005; Leskelä et al. 2009; Penley and Tomaka 2002). These have all been associated with better coping outcomes when faced with stress (e.g., Lazarus and Folkman 1984), thus suggesting the aforementioned personality traits may play a role in offspring's resilience and vulnerability to secondary traumatization.

The findings in the current study may also relate to the finding that personality traits (Jang et al. 2003), and particularly high Neuroticism may be associated with more exposure to traumatic experiences (Boals et al. 2015; Parslow et al. 2006). It may be that higher rates of Neuroticism among children who are raised in a home wherein the father suffers from PTSS and GD contributes to their posttraumatic outcomes in that they lead a life wherein exposure to trauma is relatively more prevalent compared to offspring that are not high in Neuroticism. Future studies would do well to investigate this possibility by accounting for the relation between offspring's personality traits and life events across their lifespan.

Finally, biological factors may be at play, though these are beyond the scope of the current investigation. Research suggests that personality traits are genetically inheritable (e.g., Jang et al. 1996). Additionally, recent findings indicate that exposure to traumatic stress may include epigenetic implications (e.g., Kellermann 2013; Nestler 2012; Yehuda and Bierer 2009), and intergenerational transmissions of stress vulnerabilities may include neuroendocrine, epigenetic, and neuroanatomical processes associated with both maternal and paternal genes (see Bowers and Yehuda 2016 for a review). High Neuroticism as well as low Openness have been associated with low cortisol reactivity and low cardiovascular stress reactivity (e.g., Bibbey et al. 2013), which have been associated with greater vulnerability to stress. Linking these observations suggests that intergenerational transmission of personality and biology may work in tandem to predispose offspring to secondary traumatization. This explanatory route may be relevant primarily but not solely for offspring that were conceived after the trauma, which in the current study comprised 77.8% of the offspring sample. Such mechanisms may be investigated in the future.

Undeniably, any interpretation that indicates causality must be approached with caution. The lack of additional longitudinal information (e.g., pre- and post-trauma measures of symptomatology and personality traits) and the correlational nature of the current study do not allow for such inferences. Therefore, it must be stressed that while the current findings strongly suggest causality they nevertheless cannot determine it.

Limitations and Future Directions

The findings in the current study must be understood in the context of several limitations. First, the current study examined a relatively small sample. Furthermore, while employing a longitudinal research design, the assessment of offspring's personality traits and posttraumatic outcomes remains cross-sectional. Additionally, the relation between personality traits and PTSD is invariably dependent on the manner in which personality is assessed (e.g., Thomas et al. 2014). It is plausible that the utilization of assessment measures other than those utilized in the current study will reveal different connections. Finally, there are similarities between expressions of Neuroticism (e.g., anxiety, fear, moodiness, worry, frustration; McCrae and Costa 2003) and PTSS (e.g., negative alterations in mood, hypervigilance, avoidance; American Psychiatric Association 2013). Difficulties discerning these phenomena make the two potentially confounded. In order to adequately address these limitations, considerably more longitudinal studies are needed wherein pre- and post-trauma traits, distress, and behaviors are assessed. Furthermore, additional intervening factors must be considered in future investigations of intergenerational transmissions of trauma wherein offspring's personality traits are accounted for. Among these are offspring's life events, their perception of the qualities of parenting and home environment during their childhood, and biological predispositions.

Notwithstanding the limitations above, the current study makes an important contribution to the extant literature. Specifically, the findings above suggest that offspring's personality traits may not only serve to explain individual differences in offspring's psychological outcomes and adaptations to their fathers' posttraumatic aftermaths, but may also in themselves be susceptible to change in light of their fathers' trauma. Pursuing both potentialities in future research may contribute to our understanding of individual differences in offspring's propensity for secondary traumatization.

Author Contributions J.Y.S. was responsible for the preparation of the manuscript and the integration of all components of the study. Y.L. was responsible for the statistical analyses and the drafting of the "Method" and "Results" sections. G.Z. was responsible for the collection of offspring's data, the initial conceptualization of the study, and suggestions concerning the manuscript throughout its drafting. Z.S. was the leading researcher and lab manager, supervised the entire study, and made significant recommendations for the drafting of the manuscript.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no competing interests.

Ethical Approval All procedures performed in this study were in accordance with the ethical standards of both Tel-Aviv University and Ariel University Ethics Committees.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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