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Child Psychological Adjustment to War and Displacement: A Discriminant Analysis of Resilience and Trauma in Syrian Refugee Children

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Abstract
The ongoing war in Syria has led to the displacement of 12 million people since 2011, with minors representing 40% of all refugees. Syrian children living in refugee camps are at risk of developing a wide range of mental health problems, given their previous and ongoing exposure to episodes of violence, disruption of family ties, and discontinuous access to education. In this study, we drew on the salutogenic paradigm to investigate whether, and to what extent, high/low levels of resilience were associated with other indicators of mental health and post-traumatic response in Syrian children living in refugee camps. The sample was composed of 311 Syrian children living in Jordanian refugee camps as a consequence of the war in Syria. We administered quantitative self-report measures to assess participants' exposure to trauma, individual levels of resilience, and mental health, performing discriminant analysis to examine the association between resilience and trauma/mental health. Syrian children living in Jordanian refugee camps reported intense exposure to traumatic events. The linear discriminant equation supported adoption of the function [Wilk's Lambda ($\Lambda = 0.827$)]: lower levels of resilience were associated with trauma symptoms (re-experiencing, avoidance, and hyperarousal) and emotional problems, while higher levels of resilience were associated with pro-social behaviours. The findings of the present study suggest that resilience acts as a protective factor buffering children from the consequences of trauma and challenging life conditions. We discuss the implications for interventions designed to promote the wellbeing and mental health of children living in refugee camps.

Keywords Relational resilience · War refugees · Prosocial behaviours · Children

Highlights
- Syrian children living in refugee camps are at risk of developing psychological sequelae.
- Children with different levels of resilience may display differential patterns of trauma symptoms, emotional problems, and prosocial behaviours.
- We performed discriminant analysis to verify whether trauma symptoms, emotional adjustment, and prosocial competence distinguished highly resilient children from peers with low resilience.
- Prosocial behaviours were found to predict membership of the highly resilient cohort, while trauma and emotional distress predicted membership of the low resilience group.
- Clinical intervention designed to boost social resilience may help to reduce symptoms in children.

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Syrian child victims of armed conflicts and displacement are at risk of psychological burden as a result of exposure to multiple and cumulative traumatic experiences (Nehring et al., 2019; Yayan et al., 2020). Posttraumatic Stress Syndromes (PSS) along with emotional and behavioural impairments are the most frequently reported consequences for children's psychological functioning in the aftermath of military violence and displacement (Buchmüller et al., 2018; Karam et al., 2019). Most research conducted with

child refugees and their caregivers has focused on psychological dysfunction and poor mental health following cumulative traumatic experiences (Hodes & Vostanis, 2019; Khan et al., 2019; Nasıroğlu et al., 2018; Norredam et al., 2018; Giordano et al., 2019a, 2019b, 2019c). Threatening events can induce higher and even incapacitating levels of arousal, anxiety, and posttraumatic stress in refugee children. Calamities such as getting separated from family members or losing their home and community ties can trigger a sense of sadness, grief, and depression (Bean et al., 2007). Accordingly, an 11% rate of PTSD has been recorded among child and adolescent refugees in resettlement countries, alongside a 5% rate of depression (Fazel et al., 2005). Psychiatric disorders such as psychosis are a further documented risk for refugee children and adolescents, (Fearon et al., 2006; Kirkbride et al., 2006; Hollander et al., 2016; Priebe et al., 2016).

Accordingly, Syrian child refugees commonly experience grief over losing their homes, family members, significant relationships, and support structures (Hassan et al., 2015). A study conducted with 1000 Syrian refugee children and adolescents showed that 45.6% had developed PTSD symptoms, which in turn displayed a high rate of comorbidity with emotion dysregulation (Khamis, 2019). In another study carried out with 1115 Syrian children displaced in Turkey, anxiety and depression were found to be significantly associated with PTSD (Yayan et al., 2020). In a sample of 8000 displaced Syrian children, 15.1% reported ongoing fears, while 26% mentioned having suicidal thoughts (James et al., 2014).

Parental factors have also been shown to play a role in shaping the effects of trauma exposure on Syrian refugee children. For example, parental psychological functioning was associated with a global measure of mental distress, emotional issues, and conduct problems in a group of 263 Syrian child refugees who had been resettled in Turkey (Eruyar et al., 2018). In another study with 384 child refugees from Syria living in Turkish refugee camps, attachment patterns were found to predict PTSD, while conduct problems were predicted by a lack of emotional warmth, rejection and over-protection on the part of parents, as well as by insecure attachment relationships (Eruyar et al., 2020).

On the other hand, the child victims of war and extreme violence have also been observed to display resilience and coping strategies. Indeed, children can display considerable resources and ability to adjust in the face of war-related hardship (Motti-Stefanidi, 2018; Yaylaci, 2018). Different definitions of resilience have been adopted, helping to build up a multifaceted picture of how the child resists the burdens of war and military violence (Keles et al., 2018).

Cicchetti and Rogosch define resilience as "a dynamic process that encompasses the attainment of positive adaptation within the context of exposure to significant adversity that typically exerts major assaults on biological and psychological development" (Cicchetti & Rogosch, 2012; p.1), an approach that is more focused on individual ability to adapt than on contextual factors fostering or hindering adjustment to adversity. Investigation of individual resources has frequently focused on stable and dispositional trajectories of resilience, leading scholars to argue that resiliency may be essentially a developmental trait (Bonanno, 2004). Authors have variously conceptualized resilience in children as: an extraordinary set of competences allowing individuals to resist hardships via personal resources such as coping strategies (Kocijan-Hercigonja et al., 1998); a constellation of personality traits (for a critique of this perspective, see Masten, 2014); a form of emotion regulation (Southwick et al., 2014), and even genetic factors (Kim-Cohen et al., 2004).

In contrast, Masten (2015) proposed that resilience is a process through which a dynamic system expresses its capacity to adapt to disturbances that threaten its function, viability, or development. Similarly, Windle (2011) described resilience as the process of adapting to and managing significant sources of stress or trauma, analysing multiple micro and macro factors whose dynamic interaction may help individuals to adjust to adversity. From these more ecological perspectives, protective individual, relational and environmental resources or assets can all contribute to fostering resilience. Finally, embracing a socioecological perspective, Ungar (2008) defined resilience as the capacity of individuals to make culture-sensitive use of psychological, social, cultural, and physical resources so as to go on functioning in the wake of exposure to hardship. Each of these systems plays a specific role in enhancing resilience in children (Cesana et al., 2018; Giordano & Ferrari, 2018; Masten, 2011; Tol et al., 2013; Giordano et al., 2015). Furthermore, examining the interplay between resources and risk factors is a key line of inquiry within resilience research and can shed light on the mechanisms underpinning both vulnerability and adaptation (Luthar, 2006; Masten, 2014; Masten & Curtis, 2000).

Recent advances within the diverse field of inquiry into children's adjustment to war (Liu et al., 2017) have led to shift in focus from individual to environmental and socioecological factors (Giordano et al., 2019a, 2019b, 2019c; Ungar, 2011). Accordingly, authors have begun to document the key role of environment, social relations, and culture-specific dimensions of resiliency in promoting functioning among war-affected children (Catani, 2018; Diab et al., 2018). Increasingly, scholars have emphasized the relational characteristics of resilience, in terms of the collective support required to cope with hardship (Turner et al., 2012; Walsh, 1998). In this study, we draw on the concept of relational resilience, understood as a process of

"adaptive accommodation and transformation to loss, dislocation, and radically changed circumstances" (Turner et al., 2012; p. 7) via the mobilization of social competences and behaviours (Bang & Collet, 2020).

Qualitative studies conducted with Syrian refugees have indicated that resilience can take the form of communal coping strategies such as seeking social support, remaining in touch with family members in Syria, practicing the Muslim faith, and adaptive fatalism. Such features of resilience are more characteristic of collectivist societies than of Western individualist cultures (Atari-Khan et al., 2021). Free access to education facilities and primary health care were found to foster the expression of prosocial competencies and resiliency among Syrian child refugees in Turkey (Ekmekci, 2017). In addition, most refugee children from northern Syria were able to maintain family ties despite having been displaced, thus improving their chances of benefiting from both protective parenting and relational factors (Kirisçi, 2014). Finally, Çelebi and colleagues (2017) found that a sense of efficacy and meaningfulness based on their ethnic identity and a sense of belonging were effective in buffering Syrian children against the mental and physical impact of perceived discrimination. In sum, collectivist societies place more emphasis on the relational environment than on individuals, pursuing healing through relationships and social networks, as well as enacting personal well-being via prosocial behaviors that can promote survival and coping skills in the aftermath of traumatic experiences (Atari-Khan et al., 2021; Bemak & Chung, 2017; Veronese & Barola, 2018).

The salutogenic model introduced by Antonowsky in the domain of the health sciences shares multiple characteristics with ecological theories of resilience (Antonovsky, 1996). Both perspectives are systems-oriented and focus on complex, multilevel social and relational factors, in recognition of the fact that individualistic approaches may fail to adequately capture human adaptation to hardship and trauma (Mittelmark, 2021). Eriksson and Lindström (2006 2010) observed that later theoretical formulations of both approaches emphasizes processes and the role of systemic and relational factors above personal attributes. Indeed, both the resilience and salutogenesis paradigms invoke the contribution of individual, group and community resources to coping with adversity. Thus, the aim of this exploratory study, which was also informed by a salutogenic perspective (Höltge et al., 2018) focused on 'ease', rather than 'disease', was to define differential protective and risk trajectories with respect to traumatic experience in highly resilient children versus children with low resilience (Bethancourt & Khan, 2018).

We adopted a discriminant analysis approach as that most suited to identifying factors with the power to differentiate between groups. Specifically, we conducted a discriminant analysis to determine the extent of trauma symptoms, psychological adjustment, and prosocial competence in a group of highly resilient children versus children classified as low resilient.

Based on existing research, we hypothesized that highly resilient children would display greater relational skills in terms of prosocial behaviors as measured by the Strengths and Difficulties Questionnaire (H1), while children with low resilience would be at greater risk of developing trauma symptoms, and would display greater emotional distress and more limited prosocial skills (H2) (Derluyn & Broekaert, 2007). Our secondary research aim was to document the pivotal role of the social and relational bases of resilience, understood as a human capability that emerges from nurturing social contexts (Peltonen et al., 2014).

Methods

Sample and Procedure

The sample was composed of 311 Syrian children, from age 7 to 14 ($M = 10.49$, $SD = 2.16$). The sample was evenly balanced between genders: boys ($n = 155$, 49.8%) and girls ($n = 156$, 50.2%). The recruitment process was carried out in tented refugee settlements and local villages by social workers at Child and Family Protective Places (CFPs) in the Community Development Centres of Ajloun, Jerash, and Balqa. The CFPs - run by JOHUD (the Jordanian Hashemite Fund for Human Development) in partnership with INTERSOS NGO and financed by UNICEF and OCHA - offered psycho-social programs aimed at enhancing child protection and fostering relational resilience among children and their families (Giordano et al., 2021). Interested parents provided written consent for their children to participate, and children provided verbal assent. Families were fully briefed about the aims of the study.

Inclusion criteria were as follows: (1) being aged between 7 and 14 years at the time of the study, (2) being Syrian and living in a refugee camp and (3) having been exposed to traumatic events in the three months prior to the study (4) attending one of the CFPs in Ajloun, Jerash, or Balqa for no longer than two months. This last criterion was designed to minimize the potential for bias due to participation in psycho-social interventions focused on relational resilience. Out of 380 children who met the eligibility criteria, 311 participated in the study, yielding a response rate of 82%.

All research data was collected anonymously, and all analyses were performed on aggregate scores. Participation in the study was voluntary, and no financial, monetary, or other incentives were provided. Completion of the research protocol required approximately 20 min. The data was

collected over a two-month period in July and August 2014. Trained local educators and social workers were asked to administer the questionnaires and assess the children directly at the camp where they were based. The data collection settings were designed to offer a relational space (Hydén, 2014) where participants could feel free to express their representations and opinions (Veronese et al., 2016; Veronese & Pepe, 2021). Participants were aware that they were free to withdraw from the study at any time. All phases of the research were conducted following American Psychological Association (APA) ethical guidelines (APA, 2010) and the code of conduct outlined in the Declaration of Helsinky (1967). The research was approved by the IRB of the University of Milano-Bicocca. None of the authors have financial or other kinds of conflict of interest to declare in relation to the research aims and outcomes.

Measures

Child and Youth Resilience Measure (CYRM-28; Ungar & Liebenberg, 2009). The CYRM-28 is a self-report questionnaire designed to assess dimensions of resilience in children and adolescents. The measurement model comprises three correlated factors: personal skills (e.g., "I'm able to solve problems without harming myself or other"), social resources (e.g., "my caregiver(s) stand(s) by me during difficult times"), and contextual factors (e.g., "I feel I belong at my school"). The 28 items are rated on a Likert scale ranging from 1 ("Not at all") to 5 ("A lot"). A cumulate global score ranging from 28 to 140 may be used, with high scores on the cumulate index indicating greater potential for resilience. Given that there were no validated standard Arabic versions of the instrument available in the existing literature, the items were translated and culturally adapted following the back-translation method (Brislin, 1981) by a group of Lebanese research psychologists employed by the NGO, Himaya, who had conducted a similar study with Syrian refugees in the Lebanon (Maragel & Manachi, 2018). In the present study, the reliability coefficient (Cronbach's alpha; Cronbach, 1951) for the global score was $\alpha = 0.832$.

Childhood War Trauma Questionnaire (CWTQ; Macksoud & Aber, 1996). The CWTQ is a semi-structured interview evaluating the types of traumatic experience to which a child has been exposed and with what frequency. The instrument comprises two sub-sections: the first records demographic information (e.g., age, gender, and place of residence) while the second concerns the child's direct and indirect experience of, and exposure to, war. A binary rating ("yes", "no") is assigned to the different types of trauma, which are grouped into the following categories: Separation, Victim of Violent Acts, Involvement in Hostilities, Displacement, Bereavement, Exposure to Shelling or Combat, Witness Violent Acts, Physical Injuries, Emigration, and Extreme Depravation. The CWTQ also yields a unidimensional score ranging from 0 to 12, with a high score indicating severe exposure to traumatic experience.

Strengths and Difficulties Questionnaire (SDQ; Goodman & Goodman, 2009). The SDQ is a quantitative behavioral screening measure for children and adolescents aged between 3 and 16 years. It is used in research, in the evaluation of treatment outcomes, and as part of clinical assessments of children's mental well-being (Goodman et al., 2000). The measurement model comprises five dimensions: emotional symptoms (5 items), conduct problems (5 items), hyperactivity/inattention (5 items), peer relationship problems (5 items), prosocial behavior (5 items). The questionnaire items are rated on a Likert ordinal response scale ranging from "not true" (0) to "certainly true" (2). We administered the Arabic version of the questionnaire (Almaqrami & Shuwail, 2004; Thabet et al., 2000). The Cronbach reliability scores obtained in the present study were emotional symptoms ($\alpha = 0.544$), conduct problems ($\alpha = 0.479$), hyperactivity/inattention ($\alpha = 0.432$), peer relationship problems ($\alpha = 0.403$), and prosocial behavior ($\alpha = 0.587$). This poor reliability performance as measured by Cronbach's alpha may have been due to violation of basic assumptions (specifically, tau-equivalence and uncorrelated errors; Birnbaum et al., 1968). In such cases, true reliability can be underestimated (Raykov, 1997) and the greatest lower bound (GLB) measure should be preferred as a reliability index (Trizano-Hermosilla & Alvarado, 2016). GLB values for the SDQ measures were as follows: emotional symptoms ($\alpha = 0.738$), conduct problems ($\alpha = 0.725$), hyperactivity/inattention ($\alpha = 0.718$), peer relationship problems ($\alpha = 0.689$), and prosocial behavior ($\alpha = 0.788$). In any case, the Arabic version of the questionnaire adopted in this study has been validated by other authors (Emam et al., 2016). Other studies conducted on the factor structure of the SDQ suggest that the original model may be viewed as reliable and appropriate for use in empirical research (see for example McAloney-Kocaman & McPherson, 2017; Palmieri & Smith, 2007). Accordingly, we deployed the subscales of the SDQ as empirical measures of children's psychological adjustment.

Post-Traumatic Stress Reaction Checklist for Children (PTSRC; Macksoud et al., 1990). The PTSRC is a self-report tool for assessing PTSD symptoms in children. Three types of symptom are evaluated: re-experiencing the trauma (e.g., "Do you sometimes feel as if the trauma is happening all over again?"), hyper-arousal (e.g., "Is it more difficult for you to concentrate or pay attention to things than before?") and avoidance strategies (e.g., "Do you try not to think about what happened?"). The Arabic version of the instrument has been validated and consists of 14 items, each representing a specific PTSD symptom listed in the DSM

IV-TR (American Psychiatric Association, 2000). Items are rated dichotomously (0 = absence of the symptom; 1 = presence of the symptom). Reliability scores in the present study were re-experiencing trauma (α = 0.789), hyperarousal (α = 0.742), and avoidance strategies (α = 0.703).

Data Analysis Strategy

In order to identify patterns of association between children's resilience scores, trauma symptoms, and mental health, a discriminant analysis approach was applied (see Lachenbruch & Goldstein, 1979; Veronese & Pepe, 2017). Discriminant analysis (DA) is a powerful multivariate data analysis technique that involves estimating a quantitative linear function with a view to classifying observations into empirically grounded, mutually exclusive groups (Landau & Everitt, 2003). When applied to the data for a set of variables, the linear equation provides a basis for separating the data points, assigning them either to a given category or to an alternative category. A crucial feature of DA is the use of this linear combination of variables to generate a new "hypothetical" group membership function, which is empirically founded rather than based on predefined classification strategies (Veronese & Pepe, 2020). Cross-validation of the equation's performance by assigning observations to the hypothetical groups lends added value to this kind of analysis.

Given that the main aim of the present study was to assess the efficacy of a linear combination of trauma exposure, trauma symptoms, and children's mental health in differentiating between high and low levels of resilience, the data were analyzed following a stepwise approach. First, two groups (high-resilience versus low-resilience) were created using the cumulate CYRM-28 score and the interquartile distance as classification criteria. This meant that the children were divided into two mutually exclusive cohorts. In light of this binary classification, expected membership was computed using Fisher's linear discriminant function (Posse, 1992). This procedure allows a multivariate observation, x, to be turned into a univariate observation, y, such that the y values derived from each of the populations to be classified are separated to the greatest possible extent (Ye et al., 2005). In this study, the performance of the linear function in discriminating between the two groups was evaluated based on four different outputs. First, Wilk's Lambda (λ) was calculated to identify the proportion of total variance that was not accounted for by the differences between cohorts. We opted for a discriminant analysis approach because we wished to answer the research question: 'in relation to what variables are these groups most different?'. We decided to investigate two groups (high vs. low resilience) in order to gather information about the highest and lowest scoring subjects. We

$$Q = \frac{[N-(n*k)]^2}{N(k-1)}$$

Fig. 1 The formula for estimating Press's Q statistic. N = total sample size, n = number of correctly classified observations, k = number of groups

agree that in general the practice of dichotomizing continuous variables leads to a loss of information (see MacCallum et al., 2002). Second, canonical discriminant function coefficients were used to assess the strength and direction of the association between the binary target variable and the data sets for the other study variables (McLachan, 2004). Third, we implemented a resubstitution estimate procedure (Solow, 1990) to verify the accuracy of the linear function in classifying "blind" observations. Finally, we calculated Press's Q statistic (i.e., a chi-square statistic with one degree of freedom) to assess whether the discriminant function was statistically better than a chance model at classifying cases (Hahs-Vaughn, 2016; see Fig. 1).

To control for possible sources of co-variation, the variables age and gender were included in the discriminant linear function. The rationale for this methodological decision was dual: (1) inclusion of potential covariates made our analysis of the study variables more specific and informative (Pearl, 2001; Pepe & Addimando, 2014; Veronese et al., 2017a, 2017b) and (2) it also allowed us to test for the Yule-Simpson effect (i.e., a statistical association that holds for the entire sample but is trivial or reversed in the individually assessed cohorts, Ramanana-Rahary et al., 2009).

The outcomes are reported in the next section. All the analyses were performed using SPSS 21.0.

Results

General Descriptive and Zero-order Correlations

Mean values, standard deviations, and other descriptive statistics are summarized in Table 1.

Participants' levels of exposure to different types of potentially traumatic event are summarized in Table 2.

Approximately half of the sample (46.3%) had been exposed to two or more traumatic events. Ten percent of the participating children reported having experienced over seven different traumatic episodes. The sample had experienced a mean of 3.5 events associated with military violence, war, and displacement. Zero order correlations are reported in Table 3.

Analysis of the zero-order correlations among variables suggests that, in general, resilience was associated with more prosocial behavior ($r = 0.207$) and fewer emotional problems ($r = -0.154$). Also, exposure to trauma was found to be mainly correlated with emotional problems and

Table 1 Summary of main descriptive statistics

	Min	Max	*M*	*SD*	Skewedness	S.E.
1. Re-experiencing	0	6	2.91	2.07	−0.170	0.138
2. Hyper-arousal	0	3	1.32	1.18	0.201	0.138
3. Avoidance	0	5	2.09	1.72	0.197	0.138
4. Resilience total score	28	140	110.70	16.73	−0.809	0.138
5. Prosocial behavior	0	10	7.98	1.88	−0.936	0.138
6. Hyperactivity/ Inattention	0	10	5.48	2.13	−0.200	0.138
7. Emotional symptoms	0	10	4.63	2.35	0.033	0.138
8. Conduct problems	0	10	3.91	2.19	0.426	0.138
9. Peer relationship problem	0	10	5.02	2.13	0.097	0.138
10. Exposure to trauma	0	12	3.55	2.79	0.953	0.138

M Mean, *SD* Standard Deviation, *S.E.* Standard Error

Table 2 Children's exposure to traumatic events (CWTQ)

	YES (%)
CWTQ—Displacement	99.4
CWTQ—Bereavement	77.2
CWTQ—Witnessing of Interpersonal Violence	31.2
CWTQ —Involvement in Hostilities	6.7
CWTQ—Family Torture	58.5
CWTQ—Exposure to Shelling	64.1

Sample size = 311

trauma symptoms. The number of traumatic events to which children had been exposed was correlated with age, with older children obtaining higher scores than younger children. There were no other significant correlations with participants' demographic characteristics. In addition, statistically significant correlations were found between emotional problems and the re-experiencing ($r = 0.265$), hyper-arousal ($r = 0.149$) and avoidance ($r = 0.205$) sub-domains of trauma. Hyperactivity/inattention on the other hand was significantly correlated with the other dimensions of mental health (i.e., emotion problems, conduct problems, and peer relationship issues).

Results of Discriminant Analysis

The 11 selected quantitative indicators (SDQ, PTSRC, CWTQ and demographics) were included concurrently in the discriminant function analysis for classifying observations. The linear equation output supported adoption of the function: specifically, both Wilk's Lambda ($\Lambda = 0.827$) and chi-square values ($\chi2(11) = 29.37$, $p = 0.002$) were robustly statistically significant. The linear discriminating function accounted for approximately 40 percent of variance, and canonical correlation was 0.416. A more detailed picture emerged from analysis of the individual variables' relative contribution to the equation (see Table 4).

In calculating the standardized discriminant coefficients, we took the group with low resilience scores as the baseline group. Negative coefficients indicate that scores were significantly lower in the reference group, while positive values denote higher scores among this cohort. The discriminant analysis suggested that the derived function comprises the following components: prosocial behaviors, emotional problems, and trauma symptoms (specifically, re-experiencing, avoidance, and hyper-arousal). The coefficients for the other variables did not attain statistical significance, meaning that scores were similar across the two groups. With regard to the main differences between the two cohorts, the high resilience group (HRG) obtained higher scores for prosocial behaviors than did the low resilience group (LRG), while the LRG displayed higher levels of emotional problems, re-experiencing, and avoidance. Finally, the variable gender (0.237) contributed significantly, in that it was more frequently associated with belonging to the cohort of high resilient children. With regard to classification power, the predictive accuracy of the model was 66.7% for the HRG sub-sample; sensitivity and specificity for the cross-validation sample were 74.4 and 55.6%, respectively. Hence, out of 149 children, 110 were classified correctly. These values were reflected in the statistically significant Press's Q score: 30.95 ($p < 0.001$) and endorsed acceptance of the linear function. Table 5 presents the main descriptive statistics for the study variables by cohort of children (i.e., LRG vs HRG).

Discussion

In this quantitative cross-sectional study, we set out to explore domains of trauma, resilience and psychological adjustment in Syrian children aged 7–14 years who were living in refugee camps in Jordan after being displaced as a result of war. Our results suggested that prosocial behaviors, emotional problems, and symptoms of trauma were the

Table 3 Zero-order correlations between children's trauma symptoms, resilience, mental health, and exposure to trauma

	1	2	3	4	5	6	7	8	9	10	11	12
1. Re-experiences	1											
2. Hyper-arousal	0.683**	1										
3. Avoidance	0.717**	0.729**	1									
4. Resilience total score	−0.10	−0.05	−0.09	1								
5. Prosocial behavior	−0.01	0.02	−0.01	0.207**	1							
6. Hyperactivity/ Inattention	0.01	−0.03	0.00	0.04	0.03	1						
7. Emotional symptoms	0.265**	0.149**	0.207**	−0.154**	0.06	0.369**	1					
8. Conduct problems	0.120*	0.06	0.124*	−0.05	−0.01	0.458**	0.518**	1				
9. Peer relationship problem	0.03	−0.03	−0.01	0.03	0.259**	0.310**	0.293**	0.376**	1			
10. Exposure to trauma	0.352**	0.320**	0.343**	0.091	0.011	0.003	0.140*	0.044	0.074	1		
11. Age	−0.02	0.01	0.02	0.06	0.08	0.09	0.07	0.03	0.02	0.211**	1	
12. Gender	0.01	−0.03	0.01	0.137*	0.05	−0.01	0.02	−0.09	−0.134*	0.04	0.009	1

*$p < 0.01$, **$p < 0.001$; the reported coefficients are Pearson correlations

Table 4 Standardized linear function coefficient for discriminant analysis

	LRG ($n = 72$)	HRG ($n = 90$)
Prosocial behaviors		0.583
Emotional problems	−0.531	
Re-experiencing	−0.409	
Avoidance	−0.391	
Hyper-arousal	−0.278	
Age		0.237
Exposure to trauma	−0.213	
Behavioral problems	n.s.	
Gender	n.s.	
Peer relational problems	n.s.	
Hyper-activity/inattention	n.s.	

n.s. non- statistically significant, *LRG* Low Resilience group, *HRG* High Resilience group

Table 5 Summary of the main descriptive statistics for the two cohorts of children

	LRG		HRG		
	M	SD	M	SD	d
1. Re-experiencing	3.33	2.14	2.53	2.14	−0.37
2. Hyper-arousal	1.43	1.21	1.12	1.22	−0.26
3. Avoidance	2.28	1.79	1.67	1.64	−0.36
4. Resilience total score	38.11	4.76	57.08	1.84	5.26
5. Prosocial behavior	7.49	2.01	8.43	1.57	0.52
6. Hyperactivity/ Inattention	5.56	1.92	5.43	2.13	−0.06
7. Emotional symptoms	5.04	2.17	3.88	2.56	−0.49
8. Conduct problems	3.99	1.95	3.66	2.15	−0.16
9. Peer relationship problem	5.15	1.81	5.43	2.25	0.14
10. Exposure to trauma	3.78	2.98	3.24	2.53	−0.20

M Mean, *SD* Standard Deviation, *LRG* Low Resilience Group, *HRG* High Resilience Group

main contributors to a linear discriminant function with the power to classify children as displaying high or low resilience.

We found that a leading characteristic of the high resilience group was the capacity to establish good social relationships in contexts typically characterized by the disruption of social networks, poor community ties, and an increased sense of social isolation (Juan et al., 2018; Giordano et al., 2019; Veronese et al., 2017b; Veronese et al., 2018). Research showed that during the process of relocation the emotional needs of individuals increase markedly, while their support social network is severely disrupted (Sluzki, 1992). Feelings of isolation may lead children feeling lost, not knowing whom to trust, or where to find help or reliable information. Therefore, having

supportive relationships appears as a key priority for the wellbeing of migrant children. Syrian children who successfully maintained good social competence and functioning were associated with membership of the high resilience cohort.

In contrast, higher levels of trauma and emotional distress, together with low prosocial competence, were associated with membership of the low resilience group (Newnham et al., 2018). These results are in line with previous studies conducted with children with a history of interpersonal trauma, which found that children with low resilience were more likely to have negative outcomes, such as higher levels of trauma symptoms and other emotional problems, than were peers with high resilience (Haskett et al., 2006). The negative correlation between resilience and trauma-related symptoms may thus be explained by the fact that resilience comes into play shortly after exposure to trauma has occurred, before symptoms arise, thus buffering subjects against the development of mental health conditions (van der Walt et al., 2014). Other studies that have investigated the latent construct of trait resilience found that positive affect is an associated trait that draws on resilience to shield individuals from emotional challenges (Chang et al., 1997; Gross & John, 2003).

Therefore, trauma symptoms and emotional distress are present in displaced children with low resilience, likely exposing them to a greater risk of developing psychological syndromes (Gormez et al., 2018). Other studies conducted on Syrian children have observed that trauma-related symptoms can augment children's sense of social isolation and loneliness, while negative emotions can heighten their sense of ongoing threat and uncertainty (Khamis, 2019).

The negative association between prosocial competence and resilience is in line with previous studies that identified a relationship between low resilience and a low propensity to engage in prosocial behaviors (Sanders et al., 2019). We might argue that a deficit in prosocial competence following the loss of secure bonds, and the exposure to interpersonal violence related to war and displacement could augment children's sense of being isolated and unsupported, their perceptions of personal suffering, and their risk of incurring poor mental health (trauma symptoms and emotional dysregulation) (Kletter & Carrion, 2018). Accordingly, all our hypotheses were supported by the empirical data, suggesting that the group of children that reported a high level of resilience was better equipped to cope effectively with the aftermath of war. Importantly, greater resilience was associated with more frequent deployment of prosocial behaviors and resources as assessed by the SDQ (prosocial behaviors) scale (Giordano et al., 2019). We thus propose that prosocial competence may have contributed to protecting our participants from war-related burden. Future research could usefully investigate the causal factors

facilitating children's development of pro-social behaviors, thus helping to define a complex conceptual model of relational human functioning and its power to protect children from war trauma. Furthermore, with regard to refugee children specifically, war and post-war conditions give rise to continual traumatic events, for which children must compensate by refining their adjustment strategies if they are to reduce the risk of psychological breakdown. Hence, we require a more in-depth understanding of the relations between exposure to trauma, ongoing and cumulative traumatic experience, and the prosocial competences that shape resilience and survival skills (Veronese & Barola, 2018). We might plausibly hypothesize a curvilinear relationship between exposure to trauma and the prosocial behaviours that protect children from trauma symptoms. When the pressure of traumatic events is such that it risks undermining relational functioning in child victims of war, it is crucial to know what other domains of functioning and wellbeing might buffer them from the effects of ongoing trauma, protect their social functioning, and prevent disruption of their resilience competences (Veronese et al., 2017b; Veronese & Cavazzoni, 2020; Veronese et al., 2018). Future research may shed light on these complex and interlocking relationships by providing a better understanding of the internal and external processes that can enhance children's agency in face of hardship (Betancourt & Khan, 2008; Giordano et al., 2012; Giordano et al., 2015) and their relational resiliency (Vindevogel, 2017) during war and forced displacement.

In sum, our work challenges exclusively individualist definitions of resilience (Barber, 2013; Vindevogel, 2017), leaving room for a more culture-sensitive concept of relational resilience, especially in relation to members of collectivist societies such as Syrian child refugees (Dionigi, 2016; Panter-Brick et al., 2018). Instead of having an internal locus of control, as can be the case for members of individualistic societies that value personal ability, children in collectivist cultures may experience trauma and resilience in terms of relational competences and ties more than in terms of self (Buse et al., 2013). Future research might provide a more critical and in-depth analysis of relational resilience, questioning current Western understandings and addressing the limitations of a person-centred definition of resilience, particularly in relation to contexts characterized by ngoing trauma and stratified hardships (Giacaman, 2020). Indeed, prosocial behaviors reflect the capacity of resilient refugee children from Syria to enact survival skills thanks to social networking, family ties, and connectedness with other community members. Now, one of the arguments for resilience as a community process is that it shifts responsibility for adapting to hardship away from children and places it on the shoulders of their communities, which have the potential to harm them but should provide them

with support. This is particularly relevant to collectivistic societies in which family and community relations are the main pillars of society (Alameddine et al., 2019; Giordano et al., 2021). Clearly, this is problematic in the context of designing programs to help refugee children who have been displaced to foreign countries. Nevertheless, interventions aimed at reconstructing social capital and networks for children affected by war are urgently required (Veronese et al., 2010; Veronese & Cavazzoni, 2020).

In the future, ethnographic and qualitative research designs will help to shed light on non-Western characteristics of relational and community resilience in collectivistic Muslim societies. Indeed, relationships—in terms of giving and receiving support within peer groups and families, kindness, and solidarity—may significantly contribute to shaping resilience in children coping with uncertain and unstable life contexts (Walsh, 1998). Helping others, helping one another, overcoming their self-interest, and taking responsibility for other people may boost resilient behaviours and foster children's personal well-being (Jordan, 1992; Goodman, 2004).

Conclusion

For decades, the impact of war and forced displacement on child victims has been studied in depth, yielding a vast amount of data on these children's mental health and psychological suffering. As a result, dozens of symptoms-oriented and psychiatrically-informed interventions for reducing children's vulnerability in the wake of traumatic events have been developed and empirically validated (Betancourt et al., 2013; Newnham et al., 2018). In parallel, non-clinical psychosocial interventions aimed at reinforcing children's resilience and resistance have also been designed and implemented (El-Khani & Calam, 2019; Veronese & Barola, 2018; Wessells, 2018; Giordano & Ungar, 2021). Less has been done in terms of clinical and therapeutic intervention aimed at enhancing children's relational competences and pro-social behaviors as protective factors buffering them against trauma and emotional exhaustion. In our view, clinical intervention designed to strengthen these skills would make a key contribution to reducing symptoms in children (Sim et al., 2019; Giordano et al., 2019; Giordano et al., 2019; Giordano & Ferrari, 2018). Indeed, trauma symptoms and emotional dysregulation among children may be strongly associated with relational issues arising from displacement and precarious living conditions in host countries (Khamis, 2019). Thus, relational therapies could potentially have even greater impact in conditions like those faced by the Syrian child refugees in our sample. Indeed, social isolation, disruption of community ties, and the loss of social capital and relational networks can all

augment self-perceived vulnerability, allowing traumatic memories to be reactivated and symptoms produced (Fazel & Betancourt, 2018). Accordingly, we may conclude that prevalently clinically-informed and symptoms-oriented interventions cannot sufficiently address the underlying conditions that maintain and—most probably—will continue to increase, children's vulnerability. Salutogenic and multilevel psycho-social approaches should be aimed at transforming relational contexts, not just individuals (Höltge et al., 2018; van der Merwe et al., 2019), and at producing health within the community. Ultimately, when it comes to the mental health and psychological wellbeing of war-affected and displaced children, promoting their pro-social competences within their broader social context represents a key step towards building a future resilient, healthy, and functioning society.

Limitations

As in all empirical research, this study presents limitations that should be acknowledged. First, the sample size was relatively small, while the specific characteristics of the participants suggest that caution is required in generalizing the results to other cultures and settings. In relation to this, the sample might also be viewed as meeting the criteria for a cohort, in that all the participating children were receiving psychosocial support at the time of data collection. As a result, they may have been more resilient than children living in other refugee camps or experiencing other challenging situations. Consequently, our findings may be viewed as transferable (Polit & Beck, 2010) rather than generalizable. Second, the research design was cross-sectional, meaning that longitudinal research is required to assess potential causal relationships between resilience, mental health, and trauma, while our findings here should be read in terms of probabilistic rather than casual associations.

Another limitation is our reliance on a continuous variable (resilience) to define high versus low resilience groups, which meant that we could not capture the effects of intermediate degrees of resilience in the population under study as well as weakening the statistical power of our analysis. Nevertheless, we chose to conduct discriminant analysis because we wished to verify which of our variables significantly predicted, and to what extent (weight), to membership of resilient and non-resilient cohorts, with a view to defining a meaningful profile for each of these groups (Cai et al., 2016). On the contrary, treating resilience as a continuous variable would have prevented us from building up a detailed profile of these cohorts (Press & Wilson, 1978). In addition, discriminant analysis allowed us to evaluate the associations between the variables of interest

and each of the groups, making the interpretation of our results more meaningful. It has been shown that when sample sizes are equal, and homogeneity of variance/covariance holds, discriminant analysis is more accurate than using alternative regression techniques (Alayande & Adekunle, 2015).

Another limitation of the present study was that the items on the traumatic checklist were presented as binary dichotomic "yes/no" variables. Although this made for a more agile and easy to administer instrument suited to the disrupted and unstable research setting, it prevented us from accessing information about the frequency and severity of child exposure to potentially traumatic events.

Finally, all the variables under study were measured using quantitative self-report questionnaires. This may have given rise to common-method variance in our data (i.e., a spurious shared variance that is attributable to the method rather than to the construct). Future research should thus follow a mixed-method approach combining qualitative and quantitative data to provide a more comprehensive picture of resilience, mental health, and trauma in children escaping from was zones.

Compliance with ethical standards

Conflict of interest The authors declare no competing interests.

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