Preschool Israeli Children Exposed to Rocket Attacks: Assessment, Risk, and Resilience

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Preschool children are among the most vulnerable populations to adversity. This study described the effects of 4 weeks of daily exposure to rocket attacks on children living on Israel’s southern border. Participants enrolled in this study were 122 preschool children (50% boys) between the ages 3 and 6 years from 10 kindergartens. We assessed mothers’ report of children’s symptoms according to the DSM-IV and alternative criteria resembling the DSM-5 criteria for posttraumatic stress disorder (PTSD), general adaptation, traumatic exposure, and stressful life events 3 months after the war. The prevalence of PTSD was lower when the diagnosis was derived from the DSM-IV (4%) than from the DSM-5 criteria (14%). Mothers of children with 4 or more stressful life events reported more functional impairment in social, occupational, and other important areas of functioning compared to children with 0 or 1 stressful life event. Children with more severe exposure showed more severe symptoms and mothers had more concerns about the child’s functioning ($\eta^2_p = .09–.25$). Stressful life events and exposure to traumatic experiences accounted for 32% of the variance in PTSD and 19% of the variance in the adaptation scale. Results were explored in terms of risk and resilience factors.

During Operation Cast Lead in December 2008, hundreds of rockets and mortars were delivered from the Gaza Strip to the populated areas in the south of Israel, where civilians were forced to halt their daily routines and stay close to shielded areas in case of an alarm. For 4 weeks during the operation, schools and kindergartens were closed and sirens announcing the need to take cover were sounded daily.

Close exposure to traumatic events, particularly man-made events such as war or terrorist attacks, is significantly related to stress and anxiety reactions (Kar, 2009). Most children under these circumstances show the appearance of new behaviors that can be traced to the traumatic event (Abel & Friedman, 2009; Laor et al., 1996; Sadeh, Hen-Gal, & Tikotzky, 2008; Wang et al., 2006). Traumatized children may show psychological symptoms such as anger, aggressiveness, hopelessness, difficulties with trust, anticipatory fears, separation anxiety, crying outbursts, and hypervigilance (Ayalon, 1982; Dreman & Cohen, 1982; Fields, 1979; Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2008; Rigamer, 1986). These reactions are also found in young children (Laor et al., 1996; Scheeringa, Zeanah, Drell, & Larrieu, 1995; for a phenomenological description of young children living under continuous exposure to missile attacks, see Pat-Horenczyk et al., 2012; Schiff & Pat-Horenczyk, 2014).

Research has shown that appropriate familial cohesiveness, not overly enmeshed or disengaged, is associated with children’s ability to cope with and process stressful events (Laor et al., 2003). Children who perceive their parents as anxious have been found to display higher levels of stress under missile attacks (Bat-Zion & Levy-Shiff, 1993; Klingman, 2001; Zeidner, Klingman, & Itskowitz, 1993). Also when trauma involves threat to the caregivers, children exhibit higher rates of posttraumatic stress disorder (PTSD; Scheeringa & Zeanah, 1995). Laor et al. (1997) found that the children’s stress symptoms were related to maternal response and that this relationship was stronger among children under the age of 5, who are more dependent on their mother’s ability to process stressful stimuli (Abel & Friedman, 2009; Wolmer, Laor,
PTSD may present in early childhood and often shows less remission with time compared to its appearance among older children (Scheeringa et al., 1995, 2007). Scheeringa et al. (1995) have argued, however, that the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., DSM-IV; American Psychiatric Association [APA], 1994) criteria for PTSD were not sufficiently sensitive to developmental considerations in the manifestation of signs and symptoms in early childhood. Young children have limited cognitive and language skills; prior to the age of 5 years, they may not have developed explicit memory, which entails the ability to recall a past memory and communicate it to others (Gaensbauer & Siegel, 1995). Children’s difficulties conveying their subjective experience to others requires unique sensitivities and methods to understand their feelings and thoughts (Scheeringa et al., 1995).

In fact, research has indicated that there are significant differences in the manifestation of PTSD symptoms between adults and school-aged children, particularly very young ones (Green, 1985; Terr, 1985; Wang et al., 2006). For example, young children show separation anxiety, fear of strangers, monsters, or animals, avoidance, and preoccupation with words or symbols related or unrelated to the traumatic event (Kar, 2009). They also exhibit regressive behavior such as wetting themselves, thumb sucking, and fear of the dark (Terr, 1991).

For this reason, Scheeringa et al. (1995; Scheeringa, Zeanah, Myers, & Putnam, 2003) tested alternative criteria to identify PTSD in preschool children that lowered the threshold for Criterion C (numbing/avoidance) and D (hyperarousal) to the manifestation of only one symptom and modified wording for four symptoms to render them developmentally sensitive. Using the alternative criteria, Scheeringa, Wright, Hunt, and Zeanah (2006) showed that parents were inclined to underestimatetheir children’s symptoms. After exposure to motor vehicle accidents involving children aged 2–6, Meiser-Stedman et al. (2008) found a 4-times higher prevalence rate (6.5% vs. 1.6%) of PTSD using the alternative criteria in the first month, and a 7-times higher prevalence 6 months later (14% vs. 2%), compared to standard *DSM-IV* criteria. The alternative criteria also predicted the appearance of significantly more PTSD symptoms and functional impairment in more domains over the course of 2 years (Scheeringa, Zeanah, Myers, & Putnam, 2005).

Recently, these alternative criteria, more behaviorally anchored and developmentally sensitive to detect PTSD in preschool children, have been incorporated into the *DSM-5* (APA, 2013). Changes to the criteria included the removal of the criterion that the children’s reactions at the time of the traumatic events showed extreme distress (also for adults), a change in wording of reexperiencing symptoms, the requisite of only one symptom in either the avoidance symptoms or in negative alterations in cognitions and mood (instead of three), and the wording modification of two symptoms, and a modification in the increased arousal symptom “irritability or outbursts of anger” to include “extreme temper tantrums.”
The present study described the psychological responses of young children to the rocket attacks. Using the alternative criteria (which closely resemble the DSM-5 criteria), we hypothesized that both greater exposure to the rocket attacks and exposure to more stressful life events in the preceding 2 years would predict more posttraumatic stress symptoms. We also hypothesized that greater maternal concern and being exposed to harsh descriptions of the events by family members (according to the mother’s subjective opinion) would be related to more PTSD symptoms among the children. Based on previous findings (Scheeringa, Zeanah, & Cohen, 2011), we expected that diagnosis of PTSD using the DSM-5-like criteria would result in significantly more cases compared to DSM-IV criteria.

Method

Participants and Procedure

Following approval from the Clalit Health Services Institutional Review Board, parents received a letter from the kindergarten psychologist requesting their consent to participate in the study. Only parents who signed an informed consent and approved their participation were contacted for a 45-minute telephone interview to assess the child’s condition. Trained master’s-degree psychology students conducted the phone interview with the child’s mother. No particular difficulty was encountered during the interviews and cooperation was very satisfactory. Children who met criteria for PTSD according to the DSM-5-like criteria were referred to individual treatment (n = 17).

Participants enrolled in this study were 122 preschool children (50% boys) between the ages 3 and 6 years (range = 40 to 81 months; M = 64.12, SD = 8.48) from 10 kindergartens located in a regional council bordering the Gaza Strip in the south of Israel. All kindergartens were located at a similar distance from the border. Only children whose parents signed an informed consent form and agreed to participate in a telephone interview (66.7%) were assessed. Parents confirmed that all the children had been exposed to life-threatening continuous rocket attacks months before and during Operation Cast Lead. The measurement was conducted 3 months after the war. For the sake of consistency, mothers were asked to respond to the questionnaire.

Measures

The PTSD Semi-Structured Interview for Infants and Young Children (Scheeringa et al.) back-translated Hebrew version of this parent-report scale was used in this study (Cohen & Gadassi, 2009). The scale consists of 31 items derived from the DSM-IV PTSD criteria (intrusive recollection, avoidance/numbing, and hyperarousal) and includes new criteria with special sensitivity to developmental consideration in preschool children (e.g., new fears, new separation anxiety, and new aggressive behavior). The mother was asked to indicate if she observed her child experiencing each symptom during at least 1 month after termination of Operation Cast Lead. The answers were coded as 0 = no, 1 = sometimes or a little, and 2 = yes. We used Scheeringa et al.’s (1995, 2003) alternative criteria as the cutoff for possible PTSD and computed scores for each symptom domain. The authors reported good predictive validity (Scheeringa et al., 2005). In the present study, the internal consistency was Cronbach’s α = .90.

With the Change of Functioning Scale (CFS; Laor et al., 1996), mothers were asked to indicate the extent they felt concerned about their child’s functioning in the past month in eight domains: ability to separate from parents, fears, eating, sleeping difficulties, toilet training, stress/anxiety, personal mood, and overall maturity level. The answers ranged from 1 = not concerned at all to 4 = very concerned, such that total scale scores ranged from 8 (low concern) to 32 (very high concern). The internal consistency for this sample was Cronbach’s α = .84 and previous studies have found a significant association with degree of traumatic exposure (Laor et al., 1996).

We questioned mothers about 11 traumatic experiences to which the child might have been exposed during the rocket attacks (perceived threat, separation from family, loss of kin, left alone, changes in life routine, loss of functional abilities, hospitalization, witnessing violence or destruction, exposure to direct violence, involvement in life-saving or rescue efforts, and exposure to harsh descriptions of the events from kin). In addition, mothers were asked about two additional exposure items: exposure to news reports about danger and exposure to severe emotional responses of kin (fear, panic, anxiety). Scores for these 13 items (0 = no, 1 = yes) were summed and formed an exposure index, which ranged from 0 to 13. Following, we classified children’s level of exposure as mild (0–3), moderate (4–5), high (6–7), and very high (8+). All children were exposed to the rocket attacks; three reported no exposure and were categorized as mild.

Mothers reported on the presence of 14 stressful life events that the child might have experienced in the 2-year period prior to the war (severe illness in the family, hospitalization, car accident, animal attack, violence or abuse, divorce or separation, loss of kin, relocation (home and school), exposure to terrorist attacks, witnessing injured or dead people, physical injuries, and two other events). Previous studies have demonstrated the additive effect of stressful life events in explaining children’s response to traumatic exposure (Wolmer et al., 2003). Therefore, we defined for each child a stressful life event score as the sum of the stressful events reported (0 = no, 1 = yes), which ranged from 0 to 14.

Data Analysis

The McNemar exact test was used to examine the differences in the proportions of children meeting the criteria for the various PTSD clusters and for PTSD diagnosis according to the

Table 1
Proportion of Children Meeting DSM-IV and DSM-5-Like PTSD Criteria

<table>
<thead>
<tr>
<th>Variable</th>
<th>DSM-IV</th>
<th></th>
<th>DSM-5</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Intrusive recollection</td>
<td>72.9</td>
<td>89</td>
<td>72.9</td>
<td>89</td>
</tr>
<tr>
<td>Numbing/avoidance</td>
<td>4.1</td>
<td>5</td>
<td>27.8</td>
<td>34</td>
</tr>
<tr>
<td>Hyperarousal</td>
<td>36.1</td>
<td>44</td>
<td>57.3</td>
<td>70</td>
</tr>
<tr>
<td>New criteria</td>
<td>–</td>
<td>–</td>
<td>50.0</td>
<td>61</td>
</tr>
<tr>
<td>PTSD</td>
<td>4.1</td>
<td>5</td>
<td>13.9</td>
<td>17</td>
</tr>
</tbody>
</table>


**DSM-IV and DSM-5-like criteria.** Multivariate analyses of variance (ANOVA) followed by Scheffe post hoc tests explored effects of stressful life events on PTSD symptom clusters as dependent variables. The same analysis was used with the exposure index as an independent variable. In addition, one-way ANOVA tests with the same independent variables (stressful life events and exposure index) explored the effects on the PTSD total score, composed of the sum of all PTSD items, and the effects on CFS. Multiple regression analyses explored the correlation pattern with PTSD symptoms total score and CFS. Because for some variables 21 (17.2%) cases had missing data, the analyses were conducted with the reduced number of cases. Analyses were performed with IBM SPSS Statistics 20.

**Results**

As expected, the prevalence rate of PTSD was lower when the diagnosis was derived from the DSM-IV (4.1%) than from the DSM-5-like criteria (13.9%). This difference was significant according to McNemar exact test (p = .012). A significant difference between the two sets of diagnostic criteria was also found for numbing/avoidance (McNemar exact test, p = .007) and hyperarousal symptoms (McNemar exact test, p = .026; Table 1).

Multivariate ANOVA tests explored how risk and exposure affected the child’s well-being. Stressful life events did not significantly affect PTSD symptom clusters (all Fs < 1.21, ps > .146). The exposure index, however, had a significant effect on all PTSD symptom clusters: intrusion, F(3, 118) = 13.10, p < .001, η² = .25; numbing/avoidance, F(3, 118) = 3.76, p = .015, η² = .09; hyperarousal, F(3, 118) = 12.45, p < .001, η² = .24; new criteria, F(3,118) = 6.91, p < .001, η² = .15. One-way ANOVA revealed that the effect of the exposure index was significant on the PTSD total score, F(3, 118) = 15.27, p < .001, η² = .28, but the effect of stressful life events on the PTSD total score was not, F(3, 118) = 2.21, p = .091, η² = .05.

According to the one-way ANOVA test, the exposure index had a significant effect on the CFS scores, F(3, 118) = 6.23, p = .001, η² = .14, while stressful life events did not, F(3, 118) = 2.32, p = .079, η² = .06. Table 2 summarizes the effect of the exposure index on all PTSD clusters using the DSM-5-like criteria and on the CFS. Scheffe post hoc test revealed that the higher the index, the more severe were the levels of intrusion, numbing/avoidance, hyperarousal, new criteria, total PTSD score, and CFS.

Following Wang et al. (2006) and Laor et al. (1997), we assessed specifically how exposure to harsh descriptions of the events and to severe emotional responses in the child’s close surroundings affected the magnitude of response. Analysis revealed that children who had been exposed to harsh descriptions of the events in the family, according to mothers’ subjective opinions, displayed significantly higher PTSD score, F(1,120) = 14.97, p < .001, η² = .11, and significantly higher maternal concern for the child’s functioning, F(1,120) = 8.16, p = .008, η² = .06. In addition, children exposed to severe emotional responses in their close surroundings had significantly higher PTSD score, F(1,120) = 6.97, p = .038, η² = .09, and significantly higher maternal concern for the child’s functioning, F(1,120) = 9.56, p = .007, η² = .09.

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Table 2
Analysis of Variance of Posttraumatic Symptoms and Change of Functioning Scale by Level of Exposure

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low (n = 35)</th>
<th></th>
<th>Moderate (n = 35)</th>
<th></th>
<th>High (n = 40)</th>
<th></th>
<th>Very high (n = 12)</th>
<th></th>
<th>F</th>
<th>η²p²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrusion</td>
<td>1.31a</td>
<td>1.41</td>
<td>1.86a</td>
<td>1.93</td>
<td>3.58b</td>
<td>2.75</td>
<td>5.17b</td>
<td>2.92</td>
<td>13.10***</td>
<td>.25</td>
</tr>
<tr>
<td>Avoidance/numbing</td>
<td>0.31a</td>
<td>0.83</td>
<td>0.37a</td>
<td>0.60</td>
<td>0.73ab</td>
<td>1.41</td>
<td>1.67b</td>
<td>2.77</td>
<td>3.76*</td>
<td>.09</td>
</tr>
<tr>
<td>Hyperarousal</td>
<td>0.69a</td>
<td>1.35</td>
<td>1.69ab</td>
<td>2.19</td>
<td>2.85b</td>
<td>2.37</td>
<td>4.67c</td>
<td>3.26</td>
<td>12.45***</td>
<td>.24</td>
</tr>
<tr>
<td>New criteria</td>
<td>0.46a</td>
<td>1.12</td>
<td>0.91ab</td>
<td>1.56</td>
<td>1.88c</td>
<td>1.73</td>
<td>2.17bc</td>
<td>2.17</td>
<td>6.91***</td>
<td>.15</td>
</tr>
<tr>
<td>Total PTSD</td>
<td>2.77a</td>
<td>4.04</td>
<td>4.83a</td>
<td>5.08</td>
<td>9.03b</td>
<td>6.54</td>
<td>13.67c</td>
<td>7.70</td>
<td>15.27***</td>
<td>.28</td>
</tr>
<tr>
<td>CFS</td>
<td>1.24a</td>
<td>0.30</td>
<td>1.35a</td>
<td>0.45</td>
<td>1.53ab</td>
<td>0.62</td>
<td>1.93b</td>
<td>0.69</td>
<td>6.23**</td>
<td>.14</td>
</tr>
</tbody>
</table>

Note. Groups with a different subscript letter are significantly different according to the Scheffe post hoc test. PTSD = posttraumatic stress disorder; CFS = Change of Functioning Scale.

*p < .05. **p < .01. ***p < .001.
Multiple regression analysis with age and gender in the model revealed that stressful life events and exposure to traumatic experiences during Operation Cast Lead accounted for 32% of the variance in PTSD total score, $R^2 = .32, F(2, 98) = 20.10, p < .001$, and 19% of the variance in the CFS, $R^2 = .19, F(2, 98) = 7.93, p < .05$ (Tables 3 and 4).

**Discussion**

The goal of this study was to assess the traumatic reactions of preschoolers living in southern Israel to the 4 weeks of rocket attacks that severely disrupted their daily routine. In line with previous research (Meiser-Stedman et al., 2008), the DSM-5-like criteria identified 3.5 times more PTSD cases than the DSM-IV criteria. This consistency strengthens the need to develop sensitive criteria to detect young children affected by exposure to traumatic events (Scheeringa et al., 2011; van der Kolk & Pynoos, 2009).

Stressful life events and severity of exposure accounted for 30% of the variance of PTSD symptoms and 16% of variation in the child’s adaptive behavior. Exposure seemed to be particularly influential on the child’s experience, accounting for most of the relationship variance of both outcome measures. Moreover, multiple exposures to traumatic experiences during the rocket attacks significantly increased the child’s vulnerability to develop PTSD symptoms. Nevertheless, other factors adding to the explanation of the psychological response need to be identified. For example, parental response, considered in this study as part of the exposure index, has been reported as one potential predictor (Laor et al., 1996, 1997; Laor, Wolmer, & Cohen, 2001). Children’s coping abilities and resilience might also regulate maladaptive responses to traumatic events (Wolmer, Hamiel, & Laor, 2011; Wolmer, Hamiel, Barchas, Slone, & Laor, 2011).

As noted, PTSD often shows less remission with time in early childhood compared to its appearance among older children (Scheeringa et al., 1995, 2007). In this study, children with a PTSD diagnosis had the highest scores on the exposure index.

When examining the child’s particular exposure to descriptions of the severe events through the media or adult’s conversations, we found a significant effect on symptom appearance in most symptom clusters. This was consistent with Wang et al.’s (2006) findings that media exposure was related to externalizing and aggressive posttraumatic symptoms and suggests that exposure to media coverage and adults’ conversations about the traumatic events amplify the child’s traumatic experience. Although Wang et al.’s results were more identified with intrusive and hyperarousal symptoms, we also found a significant effect on numbing/avoidance symptoms. In accordance with Laor et al. (1997), exposure to caregivers’ severe emotional responses was associated with increased symptoms (intrusion, hyperarousal, and new criteria). As suggested by Wolmer et al. (2000), this could be the result of the failure in the caregivers’ buffering function, a central aspect of the child’s protective matrix (Laor et al., 2001). These findings also support the relational trauma framework proposed by Scheeringa and Zeanah (2001). Future research should investigate how the children’s reactions to the traumatic events may influence the parents’ psychological well-being.

Caution, however, is warranted in interpreting these findings because the study design did not experimentally control the caregiving variables. The results could also be interpreted to suggest that more-severe children’s PTSD symptoms impacted caregivers to discuss events more harshly and allow more media exposure, consistent with the interpretations of other studies (Koplewicz et al., 2002; Scheeringa et al., in press). The results could also be interpreted as the result of shared genetic variability. That is, if caregivers possessed genes that served as risk factors for trauma-related harsh descriptions in front of their children, those same genes could have been passed to their progeny and served as risk factors for children’s PTSD symptoms.

Because of time constraints and the distribution of our subjects over a vast region, we conducted the semistructured interviews over the telephone rather than in its original face-to-face manner. Phone interviews may result in some loss of information due to lack of intimacy between interviewer and subject. Evidence suggests, however, that it is a reliable method of

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**Table 3**

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>$SE$</th>
<th>$\beta$</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>−5.43</td>
<td>4.01</td>
<td>−1.35</td>
<td>0.35</td>
</tr>
<tr>
<td>Age</td>
<td>0.05</td>
<td>0.06</td>
<td>0.07</td>
<td>0.81</td>
</tr>
<tr>
<td>Gender</td>
<td>−1.09</td>
<td>1.05</td>
<td>−0.97</td>
<td>−1.04</td>
</tr>
<tr>
<td>SLE</td>
<td>1.01</td>
<td>0.44</td>
<td>0.20</td>
<td>2.30</td>
</tr>
<tr>
<td>EI</td>
<td>1.55</td>
<td>0.25</td>
<td>0.54</td>
<td>6.19</td>
</tr>
</tbody>
</table>

Note. $n = 101, R^2 = .32, F(2, 98) = 11.17, p < .001$. SLE = stressful life events; EI = Exposure Index.

**Table 4**

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>$SE$</th>
<th>$\beta$</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.34</td>
<td>0.34</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>Age</td>
<td>0.01</td>
<td>0.01</td>
<td>0.17</td>
<td>1.75</td>
</tr>
<tr>
<td>Gender</td>
<td>−0.05</td>
<td>0.09</td>
<td>−0.05</td>
<td>−0.54</td>
</tr>
<tr>
<td>SLE</td>
<td>0.06</td>
<td>0.04</td>
<td>0.16</td>
<td>1.66</td>
</tr>
<tr>
<td>EI</td>
<td>0.08</td>
<td>0.02</td>
<td>0.36</td>
<td>3.83</td>
</tr>
</tbody>
</table>

Note. $n = 101, R^2 = .19, F(2, 98) = 5.49, p < .001$. SLE = stressful life events; EI = Exposure Index.
interviewing (Sturges & Hanrahan, 2004) and of assessing patients for PTSD (Aziz & Kenford, 2004).

In addition, we did not test additional domains, such as children’s anxiety and depression and parents’ response, all known to correlate with children’s PTSD symptoms (Kar, 2009; Portnova, 2007).

A significant proportion of kindergarten children appear to have developed PTSD symptoms following exposure to rocket attacks, and the prevalence was 3.5 times higher using the DSM-5-like criteria compared to the DSM-IV criteria. Particular attention should be given to young children with multiple exposures which had a significant contribution to the development of PTSD symptoms. This also included exposure to media coverage and the severe emotional responses of parents and/or secondary caregivers.

References


Resilience to Rocket Attacks in Young Children


