Development of anxiety disorders in a traumatized pediatric population: A preliminary longitudinal evaluation

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Abstract

Objective: The current study was conducted to determine if post-traumatic stress disorder (PTSD) symptomatology predicted later development of non-PTSD anxiety disorders in children and adolescents victimized by interpersonal trauma.

Methods: Thirty-four children with a history of interpersonal trauma and no initial diagnosis of anxiety disorder participated in the study. Children were assessed at time one (T1) and then 12–18 months later at time two (T2). At T1, the Clinician Administered PTSD Scale for Children and Adolescents (CAPS-CA) and the Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL) were used to evaluate children’s PTSD symptoms and comorbid non-PTSD anxiety disorder diagnosis. At T2, the CAPS-CA and the K-SADS-PL were repeated.

Results: The diagnosis of PTSD and PTSD symptoms in children exposed to interpersonal trauma at T1, particularly the symptoms associated with avoidance and constricted emotional expression (criteria C) as well as physiological hyperarousal (criteria D), predicted the development of other anxiety disorders at T2.

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Conclusion: Traumatized children with initial PTSD symptomatology may be at risk of later development of other anxiety disorders.

Keywords: Trauma, Anxiety, Adolescents, Comorbidity, PTSD

Introduction

A lifetime diagnosis of an anxiety disorder places one at considerable risk of the development of additional anxiety disorders (Breslau, Schultz, & Peterson, 1995). Breslau et al. reported that 80% of the subjects with lifetime diagnoses of panic disorder also met criteria for other anxiety disorders. In this study, high rates of anxiety disorder comorbidity were also present in obsessive-compulsive disorder (OCD), generalized anxiety disorder and simple phobia.

Individuals with post-traumatic stress disorder (PTSD) have been found to have higher comorbidity when compared to other anxiety disorders, such as OCD or phobias (Zayfert, Becker, Unger, & Shearer, 2002). A diagnosis of PTSD increases the probability of having more anxiety symptoms (Golier, Yehuda, Schneider, & Siever, 2001) or other psychiatric disorders (Deykin & Buka, 1997; Giacconia et al., 1995). Levels of comorbidity are high; it is estimated that approximately 57% of adults with a current diagnosis of PTSD meet diagnostic criteria for another Axis I disorder (Hubbard, Realmuto, Northwood, & Marsten, 1995) and 80% of children with PTSD present with other psychiatric disorders (Carrion, Weems, Ray, & Reiss, 2002). Anxiety disorders are the most common of these comorbid disorders (Bolton, O’Ryan, Udwin, Boyle, & Yule, 2000; Lipschitz, Winegar, Hartnick, Foote, & Southwick, 1999).

In Giacconia et al.’s (1995) study of 384 adolescents, those meeting diagnostic criteria for PTSD were seven times more likely than nontraumatized adolescents to present with other psychiatric disorders. They were also four times more likely than traumatized adolescents without PTSD to present with other psychiatric disorders. Similarly, in a study of adolescents who survived a boat sinking tragedy, 61.8% of those with PTSD met diagnostic criteria for one or more other psychiatric disorders (Bolton et al., 2000). In a study of adolescents on an acute inpatient unit, 83.3% of the PTSD group had comorbid anxiety disorders, compared to 56.2% in adolescents without PTSD (Lipschitz et al., 1999).

Recent studies have suggested that even subthreshold PTSD symptoms are linked to comorbidity. For example, PTSD symptom severity is positively correlated to symptoms of social phobia and agoraphobia in male combat veterans (Crowson, Frueh, Beidel, & Turner, 1998). In a study of juvenile delinquents, Generalized Anxiety Disorder (GAD) rates were higher in both the PTSD group (23%) and the subthreshold PTSD group (12.3%) when compared to a non-PTSD group (3.4%) (Ruchkin, Schwab-Stone, Koposov, Vermeiren, & Steiner, 2002). Another recent study of traumatized children reported that subthreshold PTSD had similar percentages of anxiety comorbidity (56%) as the group that fulfilled all PTSD criteria (50%) (Carrion et al., 2002). These findings suggest that despite an absence of a PTSD diagnosis, the presence of PTSD symptoms may be enough to place children at risk of the development of additional anxiety disorders.

Researchers have explored these issues by examining the association between anxiety and the three PTSD symptom clusters of re-experiencing (Cluster B), avoidance and numbing (Cluster C) and hyperarousal (Cluster D) symptoms. For example, McMillen, North, and Smith (2000), in their cross-sectional study of adult survivors of the Northridge earthquake, found that comorbidity with anxiety disorders
was associated with avoidance/numbing symptoms (Cluster C) as well as full PTSD diagnosis. Individual cluster scores have also been linked to anxiety in children. For instance, Lonigan, Shannon, Taylor, Finch, and Sallee (1994) found that Trait anxiety was associated with all three PTSD clusters, most strongly with hyperarousal (Cluster D), in children who survived hurricane Hugo.

Thus, PTSD diagnosis, subthreshold PTSD, and PTSD cluster scores have all been linked to anxiety disorders other than PTSD. However, two questions remain: first, what is the temporal relation between post-traumatic symptoms and anxiety comorbidity and second, what PTSD symptoms, if any, are more predictive of anxiety comorbidity?

Undergoing a traumatic experience is a risk factor for developing PTSD, but may also be associated with the development of other psychiatric conditions, especially anxiety disorders (Fierman et al., 1993; Leskin & Sheikh, 2002; Ruchkin et al., 2002). For example, Stein et al. (1996) reported that patients with anxiety disorders are nearly three times as likely (23% vs. 8.1%) to have a history of childhood physical abuse.

The association between PTSD symptoms and state or trait anxiety has also been investigated in adults. In a study of survivors of a cruise ship disaster, symptoms of intrusion (Cluster B) 3–7 months after the trauma were associated with both state and trait anxiety 12–14 months after the trauma (Joseph, Yule, & Williams, 1995). Symptoms of avoidance and numbing (Cluster C) were also associated with later trait anxiety (Joseph et al., 1995). Hence, it seems important to study PTSD at a subsyndromic level since different symptoms may follow different association patterns with anxiety.

The present study was designed to examine the two questions posed above: first, does PTSD symptomatology predict the development of other non-PTSD anxiety diagnoses in a sample of traumatized children and adolescents and second, what specific PTSD symptoms are more associated with developing other anxiety disorders. Given the high comorbidity of anxiety disorders and PTSD, we hypothesized that PTSD symptoms would be associated with a future diagnosis of anxiety. In addition, based on research presented above (Joseph et al., 1995; Lonigan et al., 1994), we also hypothesized that PTSD clusters (Clusters B, C or D), would individually be associated with a non-PTSD anxiety diagnosis 12–18 months after the initial evaluation. The risk that PTSD symptoms place on an individual for a subsequent anxiety disorder was also explored.

Methods

Participants

Fifty-nine children between the ages of 6 and 14 with a history of at least one traumatic event were recruited from local social service departments and mental health clinics. Fifty percent of these children were receiving treatment interventions (n = 17). All had been the victim of at least one episode of interpersonal trauma as defined by DSM-IV criterion A (American Psychiatric Association, 1994) and had a severity score of 12 or above on the PTSD Reaction Index (Nader, Pynoos, Fairbanks, & Frederick, 1990). The most recent trauma was at least 6 months prior to study participation, and each child was currently in a safe and stable home environment. Separation and loss was included as a trauma if it was experienced with distress or horror (DSM-IV, criteria A2). For many children separation or loss from a caregiver raises significant safety issues, and can even be more detrimental than the fear of death—a concept they will usually understand as universal and irreversible in the late school-age years. Hence, we
find a developmental justification for the inclusion of separation and loss as a traumatic event. Two children experienced separation and loss as their only traumatic event. Types of separation and loss included removal from a parent’s home and foster placement, death of a caregiver, parental imprisonment, and divorce/separation of parents. Most children (55%) experienced multiple traumatic events. Traumatic events included separation and loss (55%), witnessing violence (40%), physical abuse (37%), sexual abuse (20%), physical neglect (12%), and emotional abuse (7%). Twenty-five children presented with an initial non-PTSD anxiety disorder diagnosis in addition to PTSD symptoms. These 25 children and adolescents were excluded to control for the confound effect that a pre-existing anxiety disorder would have in testing the hypotheses. Thus, 34 children met the full inclusion criteria for this study. At the initial assessment, none of these youth met diagnostic criteria for any of the following anxiety disorders: panic disorder (with or without agoraphobia), obsessive-compulsive disorder, generalized anxiety disorder, social anxiety disorder, specific phobias, and separation anxiety disorder.

The final follow-up sample consisted of 18 (53%) boys and 16 (47%) girls. The mean age of the group was 10.3 years \(SD = 2\) years. The ethnic composition was Euro-American (40%), African-American (50%), Hispanic (6.7%), and Asian (3.3%).

**Measures**

*The Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA).* The CAPS-CA is a structured clinical interview used to determine trauma exposure (Criteria A from DSM-IV) and PTSD diagnosis. It also facilitates assessment of the frequency and severity of the 17 PTSD symptoms outlined in DSM-IV (American Psychiatric Association, 1994). The frequency and intensity of each of the symptoms are rated via behaviorally anchored ratings (0–4). This measure has internal consistency for the intensity ratings and concurrent validity with the Child PTSD Checklist, a self-report measure of PTSD (Nader et al., 1996). The interview was conducted by a board certified psychiatrist (VC), who was trained on the administration of this instrument. An intraclass coefficient of .97 was established on a subsample of the interviews with one of the creators of the instrument (Dr. Elana Newman) who rated videotaped recordings of 10 interviews. The CAPS-CA gives a total PTSD score and also provides scores for the DSM-IV defined Cluster B (re-experiencing), Cluster C (avoidance/numbing), and Cluster D (hyperarousal).

*The Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL).* The K-SADS is a semistructured clinical interview designed to identify current and lifetime DSM-IV disorders (Kaufman et al., 1997). This instrument was used to identify other non-PTSD anxiety diagnoses. The interview was conducted by a board certified psychiatrist (VC), who was trained on the administration of this instrument.

**Procedure**

Written consent for participation was obtained from parents and legal guardians, or by the participating county courts for those children in foster placement. Additionally, participation was contingent on the children’s written assent. Sixty families were invited to participate. Only one child and family refuse participation due to time unavailability. Investigators presented all subjects and their caretakers a copy of the Stanford University IRB-approved informed consent form. A procedure was in place to report any suspected ongoing maltreatment; however, no such cases were identified. Children were evaluated at their
clinics (referral sites) whenever there was an appropriate room supporting confidentiality, when this was not possible, children would come to our outpatient clinic for assessment.

Subjects were assessed for PTSD symptoms and for non-PTSD DSM-IV (American Psychiatric Association, 1994) anxiety disorder diagnoses (panic disorder, obsessive-compulsive disorder, generalized anxiety disorder, specific phobia, separation anxiety disorder and agoraphobia) during a structured clinical interview. This same battery was repeated approximately 12–18 months later (\(M = 14\) months, \(SD = 2\) months) for longitudinal follow-up (T2). This time frame was chosen to allow for enough time for the development of other conditions if these were to be manifest. No children were lost to follow-up. At this follow-up, children meeting criteria for one or more non-PTSD anxiety diagnoses were categorized dichotomously as anxiety disorder positive (ANX+; \(n = 10\)) or anxiety disorder negative (ANX−; \(n = 24\)). Types of anxiety disorders included separation anxiety disorder (\(n = 1\)), specific phobia (\(n = 4\)), social phobia (\(n = 4\)), and generalized anxiety disorder (\(n = 1\)).

<table>
<thead>
<tr>
<th>Anxiety+ ((n = 10))</th>
<th>Anxiety− ((n = 24))</th>
<th>(p)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(M_{\text{CAPS total T1}})</td>
<td>52.70</td>
<td>31.96</td>
</tr>
<tr>
<td>(SD)</td>
<td>23.3</td>
<td>17.4</td>
</tr>
<tr>
<td>(M_{\text{Cluster B T1}})</td>
<td>12.90</td>
<td>9.25</td>
</tr>
<tr>
<td>(SD)</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>(M_{\text{Cluster C T1}})</td>
<td>23.00</td>
<td>13.83</td>
</tr>
<tr>
<td>(SD)</td>
<td>10.7</td>
<td>9.7</td>
</tr>
<tr>
<td>(M_{\text{Cluster D T1}})</td>
<td>16.80</td>
<td>8.88</td>
</tr>
<tr>
<td>(SD)</td>
<td>7.7</td>
<td>6.6</td>
</tr>
<tr>
<td>(M_{\text{CAPS Total T2}})</td>
<td>34.00</td>
<td>22.25</td>
</tr>
<tr>
<td>(SD)</td>
<td>18.9</td>
<td>16.2</td>
</tr>
<tr>
<td>(M_{\text{Cluster B T2}})</td>
<td>10.10</td>
<td>5.21</td>
</tr>
<tr>
<td>(SD)</td>
<td>7.7</td>
<td>5.9</td>
</tr>
<tr>
<td>(M_{\text{Cluster C T2}})</td>
<td>14.50</td>
<td>10.79</td>
</tr>
<tr>
<td>(SD)</td>
<td>7.4</td>
<td>7.3</td>
</tr>
<tr>
<td>(M_{\text{Cluster D T2}})</td>
<td>9.40</td>
<td>6.29</td>
</tr>
<tr>
<td>(SD)</td>
<td>9.2</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Note: Anxiety+: met criteria for anxiety disorder at Time 2; Anxiety−: did not meet criteria for anxiety disorder at Time 2.

T1: Time one; T2: Time two; CAPS total: total PTSD symptoms on Clinician Administered PTSD Scale for Children and Adolescents. Cluster B include symptoms of re-experiencing, Cluster C include symptoms of avoidance and emotional numbing and Cluster D symptoms of hyperarousal.
Results

Statistical analyses were performed with the Statistical Package for Social Sciences (SPSS 11.0) for windows. In order to address potential confounds with development of anxiety disorders (Jalenques & Coudert, 1990; Rhine & Spaner, 1983), we examined age, ethnicity and gender. Independent samples t test found no association between T2 anxiety diagnosis and age ($t = .24, df = 28, p = .8$). Chi-square analyses showed no association between ethnicity and T2 anxiety diagnosis ($\chi^2 = 7.90, df = 3, p = .06$) or between gender and T2 anxiety diagnosis ($\chi^2 = .01, df = 1, p = .96$).

To test the hypothesis that T2 anxiety disorders would be associated with T1 PTSD symptoms, independent sample t tests were conducted. Results are summarized in Table 1 and indicated that T1 CAPS-CA total score was significantly different between groups, with the ANX+ group exhibiting higher scores than the ANX− group. T1 Cluster C scores were significantly higher in the ANX+ group compared to the ANX− group as were Cluster D T1. T1 Cluster B scores were not significantly different between the ANX+ group and the ANX− group. T2 PTSD symptoms did not significantly differentiate the groups (see Table 1).

Next, logistic regression analyses were conducted to explore the risk that PTSD and PTSD symptoms place on an individual for a subsequent anxiety disorder. The distribution of new non-PTSD anxiety disorder diagnoses at T2 as a function of PTSD diagnosis and PTSD symptom clusters at T1 is presented in Table 2. We tested the statistical significance of the association with the $\chi^2$ statistic and examined the predictive association with odds ratios and 95% confidence intervals for the odds ratios. The odds ratios indicate the relative risk of having a T2 anxiety disorder given that the individual met criteria for PTSD (or for one the Clusters). Results of the analyses are summarized in Table 3. These analyses demonstrated

<table>
<thead>
<tr>
<th>PTSD diagnosis</th>
<th>Anxiety+ (n = 10) (%)</th>
<th>Anxiety− (n = 24) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (n = 9)</td>
<td>88</td>
<td>12</td>
</tr>
<tr>
<td>No (n = 25)</td>
<td>22</td>
<td>78</td>
</tr>
<tr>
<td>Met for Cluster B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 26)</td>
<td>75</td>
<td>25</td>
</tr>
<tr>
<td>No (n = 8)</td>
<td>69</td>
<td>31</td>
</tr>
<tr>
<td>Met for Cluster C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 17)</td>
<td>88</td>
<td>12</td>
</tr>
<tr>
<td>No (n = 17)</td>
<td>53</td>
<td>47</td>
</tr>
<tr>
<td>Met for Cluster D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n = 18)</td>
<td>87</td>
<td>13</td>
</tr>
<tr>
<td>No (n = 16)</td>
<td>56</td>
<td>44</td>
</tr>
</tbody>
</table>

Note. Anxiety+: met criteria for anxiety disorder at Time 2; Anxiety−: did not meet criteria for anxiety disorder at Time 2; PTSD diagnosis: met DSM-IV criteria for PTSD on the Clinician Administered PTSD Scale for Children and Adolescents at Time 1; Cluster B: met the DSM-IV criteria for symptoms of re-experiencing at Time 1; Cluster C: met the DSM-IV criteria for symptoms of avoidance and emotional numbing at Time 1, and Cluster D: met the DSM-IV criteria for symptoms of hyperarousal at Time 1.
Table 3
Summary of logistic regression analyses Time 1 PTSD diagnosis and PTSD symptom clusters predicting Time 2 anxiety diagnoses

<table>
<thead>
<tr>
<th>Odds ratio</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>PTSD diagnosis</td>
<td>25.7**</td>
</tr>
<tr>
<td>Met for Cluster B</td>
<td>1.3</td>
</tr>
<tr>
<td>Met for Cluster C</td>
<td>6.7*</td>
</tr>
<tr>
<td>Met for Cluster D</td>
<td>5.6*</td>
</tr>
</tbody>
</table>

Note. PTSD diagnosis: met DSM-IV criteria for PTSD on the Clinician Administered PTSD Scale for Children and Adolescents at Time 1; Cluster B: met the DSM-IV criteria for symptoms of re-experiencing at Time 1; Cluster C: met the DSM-IV criteria for symptoms of avoidance and emotional numbing at Time 1; and Cluster D: met the DSM-IV criteria for symptoms of hyperarousal at Time 1.

* Model $\chi^2$ significant $p < .05$.
** Model $\chi^2$ significant $p < .01$.

that T1 PTSD diagnosis predicted the presence of T2 anxiety disorders diagnosis. The odds ratio indicates a strong increased risk. Similar to the results of the $t$ tests, meeting criteria for Cluster B at Time 1 did not predict anxiety diagnosis at T2. However, meeting criteria for Clusters C and D were significantly associated with having an anxiety disorder diagnosis at T2.

Discussion

Overall, PTSD symptomatology was significantly related to later development of a non-PTSD anxiety disorder and appeared to represent a high risk for later anxiety disorder diagnosis (e.g., youth meeting full T1 PTSD criteria were 25 times more likely to have a non-PTSD anxiety disorder at Time 2, see Table 3). In addition to total PTSD score, two out of the three PTSD clusters, avoidance/numbing and hyperarousal, prospectively predicted diagnosis. At T2, there was no significant association between having a non-PTSD diagnosis and current total, avoidance/numbing, or hyperarousal symptom levels.

These results provide evidence in support of a temporal relationship wherein PTSD symptoms are predictive of the development of an anxiety disorder diagnosis 12–18 months later. In addition, symptoms of avoidance and numbing (Cluster C) and hyperarousal (Cluster D) seem to be especially associated with the development of other anxiety disorders. In contrast, initial re-experiencing symptoms (Cluster B) were not predictive of the development of an anxiety disorder. Time 2 re-experiencing symptoms, however, were significantly higher in those children meeting diagnostic criteria for one or more anxiety disorders. Examination of the pattern suggests that those children who eventually develop an anxiety disorder are, initially, similar to those who do not with respect to re-experiencing; however, it is the failure to exhibit a decrease in re-experiencing symptoms over time that differentiates them at T2. This lack of symptom reduction does not allow for prospective prediction of diagnosis; however, it is informative, providing converging evidence of differential effects of the PTSD symptom clusters over time.

There are several hypothesized mechanisms underlying the current results. First, PTSD symptomatology and general anxiety symptoms required to meet diagnostic criteria for an anxiety disorder may be functionally the same construct. The association may be the ongoing expression of the same traits over time. However, the lack of a link between T2 avoidance/numbing and hyperarousal symptoms and
anxiety-disorder comorbidity is not consistent with this hypothesis. The relationship emerges only in a time-lag context, suggesting that T1 avoidance/numbing and hyperarousal symptoms and T2 anxiety symptoms are not the same symptoms persisting over time.

Alternatively, the identified T2 non-PTSD anxiety disorders may represent a manifestation of a pre-morbid general anxiety vulnerability activated or potentiated by a traumatic event. This pre-morbid vulnerability may be genetic in nature, representing a heritable anxiety predisposition or trait, or a learned response subsequent to higher anxiety symptoms expressed by family members. In addition, it could represent an increased level of anxiety sensitivity, a construct that has been found to be elevated in individuals with PTSD (Lang, Kennedy, & Stein, 2002).

It is also possible that the experience of trauma is, in and of itself, a specific risk factor for later anxiety difficulties. PTSD symptomatology represents a psychological, cognitive, and physiological struggle to integrate and manage a terrible experience. Traumatized children expend considerable energy avoiding any memory or situation related to their trauma and/or numbing or constricting their emotions; they are struggling to cope with high levels of distress. Over time, effort, behavior, and energy directed at coping with a trauma may lead to an overall resource depletion. The ability to cope with additional stressors diminishes or is compromised, and children fare less well as time progresses. Trauma could also directly change how children and adolescents perceive both their environments and their responses to them. Children with higher levels of physiological and psychological arousal associated with trauma exposure may simply be more aware of and attuned to their own baseline experience of anxiety. In addition, placement at T2 may influence the development of normative anxiety signs that may overlap with anxiety disorder symptoms. For example, recently separated children may endorse symptoms that overlap with separation anxiety disorder. Although we only had one child with this diagnosis at T2, this point underscores the importance of understanding the child’s environment at the time of the evaluation.

Regardless of the mechanism, our results have significant clinical implications, as specific PTSD symptoms may differentially predict the relative risk of future comorbidity. Not only should treatment and prevention efforts focus on the reduction of PTSD symptomatology, but also higher scores on these specific clusters (avoidance/numbing and hyperarousal) may help clinicians to detect the subset of traumatized children who are more likely to suffer from later comorbidity.

The more precise nature of the predictive role of PTSD symptoms in the current study would be clarified with examination of additional time points, including a follow-up. One study limitation is that while all children and adolescents termed ANX− had no lifetime or current anxiety diagnosis, it is unclear if they had at some point in the past had manifested anxiety symptoms in the absence of a diagnosis. We attempted to address this issue by excluding all participants who exhibited subthreshold diagnostic criteria at time one, but this does not preclude the presence of either pretrauma or time one subclinical anxiety symptoms. Other limitations include the sample size and the relatively wide age range. Our results will need to be replicated on larger samples so that age can be examined. In addition, although we limited trauma experience to interpersonal trauma, future studies may concentrate on the specific nature, extent and frequency of trauma. Future studies may also study the relationship of psychological family history to this relationship.

In sum, specific PTSD symptoms, even in the absence of a PTSD diagnosis, represent a risk factor for other psychological difficulties. Practitioners, especially those who do some form of assessment-based treatment, can use high scores or clinical evidence of avoidance/numbing and hyperarousal as predictors of other anxiety disorders. The presence of these symptoms may inform allocation of resources and prevention efforts. These results are an important step towards understanding the complex and wide-
ranging effects of traumatic experiences on developing children. Our results underscore the need to identify and treat children with PTSD symptoms, not only to improve present clinical condition but also to prevent development of other symptoms and future functioning.

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References


**Résumé**

French-language abstract not available at time of publication.

**Resumen**

Spanish-language abstract not available at time of publication.