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Homogeneity of Severe Posttraumatic Stress Disorder Symptom Profiles in Children and Adolescents Across Gender, Age, and Traumatic Experiences Related to 9/11

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Patients with a posttraumatic stress disorder (PTSD) diagnosis according to the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., *DSM-IV*; American Psychiatric Association, 1994) will very likely not share all of the same symptoms, a consequence of the polythetic approach used in the *DSM*. We examined heterogeneity in the latent structure of PTSD symptoms using data from a previously published sample of 8,236 youth a subset of which had been exposed to the September 11, 2001 attacks ($N = 6{,}670$; Hoven et al., 2005). Latent class analysis was applied (a) to PTSD symptoms alone, (b) to symptoms in combination with impairment indicators, and (c) to PTSD symptoms when stratified by age and gender, as well as by empirically defined classes of exposure. We identified 4 symptom classes: no disturbance (49.4%), intermediate disturbance (2 classes; 21.5% and 18.6%, respectively), and severe disturbance (10.5%). These classes varied not only in the severity of symptoms, but also in the configuration of symptoms. We observed a high probability of endorsing both PTSD symptoms and indicators of impairment only in the severe disturbance class. A similar 4-class structure was found when the data were stratified by age, gender, and exposure classes. There were no significant differences as a function of age, gender, or exposure in the presence of severe PTSD. Heterogeneity was observed at intermediate levels of PTSD symptom severity. The specific PTSD symptoms that defined the severe PTSD profile could constitute the pathogenic aspects of a largely invariant and clinically meaningful PTSD syndrome.

In contrast to the literature on adults (Neria, DiGrande, & Adams, 2011), few studies have examined posttraumatic stress disorder (PTSD) in youth exposed to the World Trade Center (WTC) attack (Neria et al., 2011) on September 11, 2001 (9/11). In the only representative sample of New York City (NYC) public school students in grades 4–12 (whose data were used for this study), Hoven et al. (2005) reported that probable PTSD had a prevalence of 10.6% 6 months after 9/11, was more prevalent in girls (13.3%) than boys (7.4%), and was more prevalent in younger students (20.1%, 9.1%, and 5.9%, in grades 4–5, 6–8, and 9–12, respectively). Furthermore, the likelihood of probable anxiety/depressive disorders was related to the child's direct exposure, exposure to the media, and even more strongly to the exposure of a family member. The latter was defined as a family member being killed, being injured, or having witnessed and escaped unharmed.

Patients with a *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., *DSM-IV*; American Psychiatric Association [APA], 1994) PTSD diagnosis typically will not share all of the same symptoms, a consequence of the polythetic approach used in the *DSM* (Breslau, Reboussin, Anthony, & Storr, 2005). Therefore, various researchers have empirically examined the heterogeneity of presenting symptoms of *DSM-IV* PTSD using latent class analysis (LCA), with the goal of identifying latent classes of individuals characterized by similar symptom profiles. Breslau and colleagues (2005) were the first to apply LCA to the examination of PTSD in adults (ages 18–45 years) and showed heterogeneity in the manifestation of PTSD severity, with the identification of two discrete classes characterized as pervasive, intermediate, and a no PTSD class. The presence of discrete classes (between two and four) varying in severity of PTSD has been confirmed by subsequent studies in adult

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veterans (Maguen et al., 2013; Naifeh, Richardson, Del Ben, & Elhai, 2010; Steenkamp et al., 2012), and nonveterans (Elhai, Naifeh, Forbes, Ractliffe, & Tamburrino, 2011; Rosellini, Coffey, Tracy, & Galea, 2014). A 3-class structure of PTSD symptoms was replicated in the only LCA study in youth of which we are aware, which included only 12- to 17-year old participants (Ayer, Danielson, et al., 2011). Heterogeneity at severe levels of PTSD symptoms was not observed in any of the LCA studies mentioned above because all of the studies identified only one class characterized by severe PTSD. Thus, by definition at severe levels homogeneity was the outcome in each study. Conversely, symptom heterogeneity was observed at intermediate levels of severity.

In the child/adolescent sample whose data were analyzed for this study (Hoven et al., 2005), differences associated with gender, age, and traumatic experiences and the prevalence of PTSD 6 months after 9/11 raised the question of whether the latent structure of PTSD symptoms is invariant across gender, age, and traumatic experiences. Studies had suggested that the genetic influences on symptoms of anxiety and depression in males and females are very similar for children, but become less similar in those aged 13–20 (Kendler, Gardner, & Lichtenstein, 2008). In youth, differences in the latent structure of PTSD symptoms related to gender, age, and/or exposure have been mostly examined through factor analytic studies. Studies testing factorial invariance across gender have produced inconsistent results, with differences in factor structure by gender observed in some studies (Armour et al., 2011; Bennett, Kerig, Chaplo, McGee, & Baucom, 2014; Saul, Grant, & Carter, 2008) but not in others (Ayer, Cisler, et al., 2011; Contractor et al., 2013). The few studies that have examined the effect of age on structure shared the finding of age-related differences in the factor structure (Contractor et al., 2013; Saul et al., 2008). Only one factor analytic study has examined differences as a function of exposure to violent versus nonviolent traumatic events and found no differences (Saul et al., 2008).

We found only one LCA study in adults (Chung & Breslau, 2008) that examined differences in the manifestation of PTSD across different demographic and exposure groups (assaultive violence vs. other qualifying traumatic events). It found evidence of differential symptom reporting as a function of trauma type within the same exposure group, but no evidence of variability associated with gender. Quantitative and qualitative differences in PTSD symptom profiles related to gender and traumatic experiences in children and adolescents have not yet been explored to our knowledge. None of the cited LCA studies of PTSD examined differences in the latent structure of PTSD related to age. Thus, to date, differences across groups defined by gender, age, and type of trauma remain understudied as variables potentially important in understanding symptom heterogeneity in the clinical manifestation of PTSD in youth.

This study extended the analysis of the latent structure of PTSD symptoms to a representative sample of NYC public school students in grades 4–12, assessed with the Diagnostic Interview Schedule for Children (DISC) Predictive Scales (DPS; Lucas et al., 2001). The DPS (see the Method section) was used to maximize the number of disorders assessed within the administration time (one class period) allotted for the study by the NYC Department of Education. Youth in this sample differed in terms of number of traumas and type of traumatic events experienced. To capture and adequately describe the complexity, heterogeneity, and clustering of exposure to 9/11 and to identify meaningful homogenous classes characterized by similar patterns of naturally co-occurring traumatic events, we used a person-centered approach, as used in other studies (e.g., Houston, Shevlin, Adamson, & Murphy, 2011; Shevlin & Elklit, 2008), and applied LCA to exposure variables (see the Method section).

The DPS retained only those DISC items that were most strongly associated with a DISC PTSD diagnosis, and to ensure good sensitivity and specificity. Therefore, we hypothesized that the structure of PTSD symptoms assessed with this screening tool would mirror the latent structure of PTSD symptoms measured with full diagnostic instruments used in previous studies, and would still yield three latent classes (low, intermediate, and severe disturbance), that varied qualitatively (symptom configuration) and quantitatively (level of severity). Given that there are no studies using large representative samples of children and adolescents that address the latent structure of PTSD symptoms measured with the DPS or other screening tools, this examination offers an important research contribution. Furthermore, we hypothesized that the configuration of severe PTSD would be robust against variation in gender, age, and empirically derived profiles of exposure to 9/11; configurational differences were instead expected at intermediate levels of severity.

Method

Participants and Procedure

The Hoven et al. (2005) sample consisted of 8,236 NYC public school students, aged 8–21 years in grades 4–12. The sampling strategy has been described in detail elsewhere (Hoven et al., 2005). For this study, 6,670 subjects who had been exposed to at least one direct, indirect, or media exposure (see the Measures subsection below) to the WTC attack were selected for analysis (53.3% females; 44.6% in grades 4–8).

Active parental consent was required for participation of 4th and 5th graders, and parental notification was required for 6th through 12th graders. This study was conducted in compliance with the New York State Psychiatric Institute Institutional Review Board, the NYC Department of Education, and the New York State Office of Mental Health Committee for WTC-Related Research.

Measures

Participants were assessed 6 months after 9/11 with a self-report questionnaire (Hoven et al., 2005).

Specific questions measured (a) direct exposure (personally witnessed the attack, hurt in the attack, in or near the cloud

of dust and smoke, evacuated to safety), (b) family exposure (having a family member or a friend killed or injured in the attack, or being in the area of the attack but escaping unharmed), and (c) media exposure (a lot of time spent watching coverage of the attack on television, on the radio, newspaper, or magazines, or on websites).

The DPS (Lucas et al., 2001) was used to screen for PTSD and seven other disorders, including conduct disorder (CD), separation anxiety disorder (SAD), and major depressive disorder (MDD). The DPS is a self-report youth screening measure derived from the National Institute of Mental Health's Diagnostic Interview Schedule for Children, Version IV (DISC-IV; (Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) and includes those DISC-IV items that were determined to be most predictive of *DSM-IV* DISC diagnoses (Lucas et al., 2001). Dichotomous questions, worded to refer to the WTC attack as the anchoring traumatic event, were used to evaluate the severity of eight PTSD symptoms during the month before the survey: (a) recurrent recollections; (b) nightmares; (c) avoidance of thoughts, feelings, or conversations; (d) avoidance of activities or places; (e) avoidance of people; (f) foreshortened future; (g) difficulty sleeping; and (h) difficulty concentrating. All DPS symptoms assessed are included in the *DSM-V* (APA, 2013). Subjects endorsing ≥ five PTSD symptoms were considered to have met diagnostic criteria for current DSM-IV PTSD; the DPS scale and the DISC-IV have similar discriminatory power (sensitivity, 85.0%; specificity, 98.4%; Hoven et al., 2005; Lucas et al., 2001). In addition to eight psychiatric disorders, exposure to 9/11, demographic variables, and impairment (see below), other relevant variables—not included in the present study—were measured as part of the original epidemiological survey conducted by Hoven and colleagues (2005). Therefore, a screening tool was used to assess PTSD and other psychiatric disorders to maximize the information that could be gathered during the one class period assigned for the study by the NYC Department of Education. Psychometrics of the DPS are described in Lucas et al. (2001) and Hoven et al. (2005). The questionnaire used in the Hoven et al. study (2005) is available on request.

Using a scale of 0 = *not at all* to 3 = *a lot of the time*, participants reported the frequency of seven psychosocial impairment indicators in the previous month due to the way they had been feeling or acting after 9/11: (a) parents felt worried or concerned, parents have gotten annoyed or upset; (b) not able to do things or go places with family; (c) felt bad or upset; (d) not able to do things or go places with peers; (e) teachers have gotten annoyed or upset; and (f) problems with schoolwork/grades. In the current analyses, unlike Hoven et al. (2005), we considered as present items scored as 3. Endorsement of ≥ two impairment indicators scored as 3 was categorized as impairment.

Data Analysis

LCA, performed using the poLCA function in the R package poLCA (Linzer & Lewis, 2011), probabilistically assigns each observation into a latent class, identifying and characterizing classes containing individuals with similar symptom profiles. LCA models from two to six classes were fit. In general, the Bayesian information criterion (BIC) was used to select the best-fitting model, using the decision rule of the lowest BIC value. Nevertheless, an important element of model comparison relates to the tradeoff between parsimony and goodness-of-fit (Vandekerckhove, Matzke, & Wagenmakers, 2015); thus, in two instances, when further increasing the number of classes produced only a marginally lower BIC value at the expense of a complication in the model, a solution with less classes was accepted as the best model, based on principles of interpretability and parsimony (Vandekerckhove et al., 2015). First, LCA was applied to the eight PTSD items in the whole sample of 6,670 trauma-exposed individuals. Second, to investigate the relationship between PTSD symptom profiles and functional impairment, LCA was simultaneously applied to the eight PTSD items and the seven impairment indicators; in each class derived from this analysis we calculated the prevalence of MDD, SAD, and CD. Third, LCA models were evaluated separately in four demographic groups: males ($n = 1{,}393$) and females in grades 4–8 ($n = 1{,}773$), and males ($n = 1{,}702$) and females in grades 9–12 ($n = 1{,}802$). Fourth, LCA was applied to 13 exposure variables (described above) to empirically identify profiles of trauma-exposure as in previous studies (e.g., Houston et al., 2011; Shevlin & Elklit, 2008); LCA models of PTSD were then fitted within each trauma-exposure class.

We evaluated quantitative differences among classes (i.e., differences in the level of severity of symptom profiles) by calculating the sum of the conditional probability of each symptom within a class. To investigate qualitative differences among classes and across groups defined by age and gender and by exposure (i.e., configurational differences in the relative prevalence of symptoms), we calculated, for each symptom, the relative risk (RR) of endorsing the symptom in one class compared to another class (e.g., severe vs. intermediate disturbance), and, within each disturbance class (e.g., severe disturbance), in one group compared to another group (e.g., younger girls vs. younger boys). To focus on larger differences between classes, we considered only RR ≥ 2, a cutoff based on common rule of thumb in the field of epidemiology (McNutt, Wu, Xue, & Hafner, 2003). Hoven et al. (2005) had imputed missing data from other available data such as items on scales, write-ins, demographics, or school variables. They had used multiple imputations in the case of sex, maternal education, family composition, and probable psychiatric disorders. As a consequence, the dataset we analyzed had no missing values.

Results

BIC values for 2-, 3-, 4-, and 5-class models of the latent structure of PTSD symptoms were, respectively, 60, 248, 59,775, 59, 509, and 59,521; therefore, the 4-class model was selected as

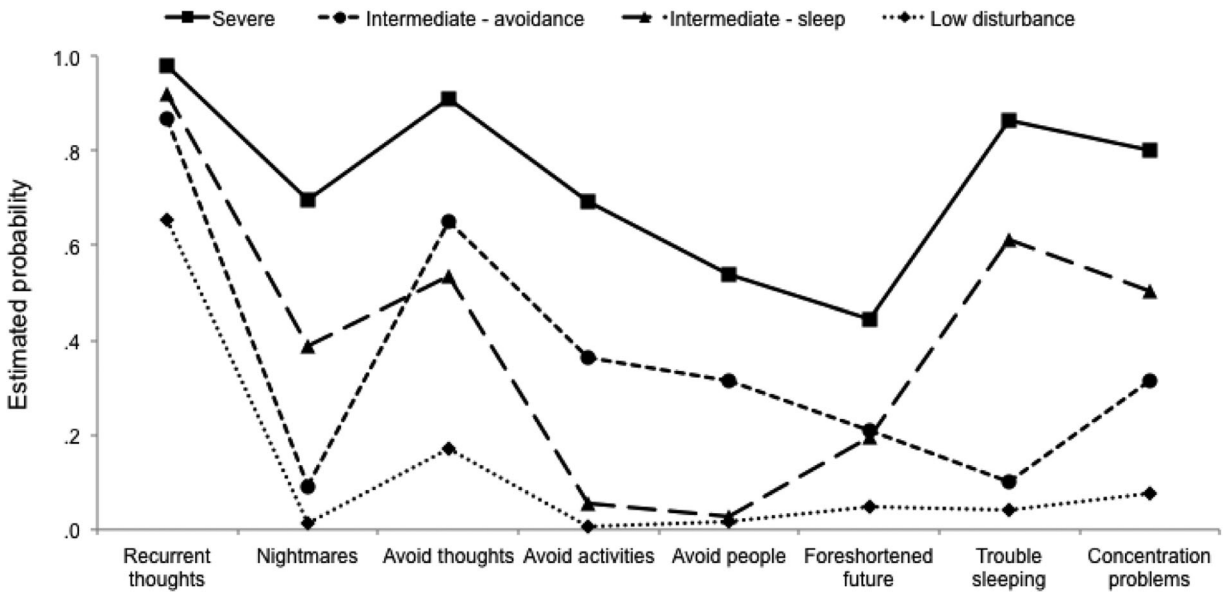

Figure 1. $N = 6{,}670$. The figure shows the 4-class model and estimated probability of posttraumatic stress disorder symptoms.

the best fitting (Figure 1). The classes defined different profiles of symptom severity characterized by a progressive increase of symptoms and prevalence of PTSD and impairment from Class 1 to 4. Class 1 (50% of subjects) was characterized by little disturbance, showing a low probability of symptom endorsement, with the exception of recurrent thoughts. The prevalence of PTSD and impairment was 0% and 17.2%, respectively. Members of Class 2 and 3 (23% and 17% of subjects, respectively) exhibited intermediate disturbance, with an average of 3.2 and 2.9 symptoms, respectively. Profile differences between the two intermediate disturbance classes consisted of a higher probability (RR ≥ 2) of endorsing sleep-related symptoms—nightmares: RR = 4.22, 95% confidence interval (CI) [3.48, 5.12]; and trouble sleeping: RR = 6.00, 95% CI [5.03, 7.16]; all $p < .001$, in Class 2 (sleep problems class), and a higher probability of reporting avoidance of activities, places: RR = 6.63, 95% CI [5.20, 8.46], $p < .001$; and people: RR = 11.41, 95% CI [8.10, 16.07], $p < .001$, in Class 3 (avoidance class). Class 2, compared to Class 3, had a slightly higher prevalence of PTSD, 14.0% versus 8.6%, RR = 1.62, 95% CI [1.28, 2.04], $p < .001$; and impairment, 32.6% versus 28.2%, RR = 1.15, 95% CI [1.02, 1.31], $p = .023$. Class 4 (10% of subjects) was qualified by severe disturbance (over 5.9 symptoms, on average); the prevalence of PTSD and impairment was 99.6% and 46.6%, respectively. The severe disturbance class had higher RR (all $p < .001$) of reporting avoidance of activities, places: RR = 12.67, 95% CI [10.00, 16.05]; and people: RR = 19.65, 95% CI [14.00, 27.57], compared to the sleep problems class, nightmares: RR = 7.53, 95% CI [6.25, 9.09], trouble sleeping: RR = 2.12, 95% CI [1.84, 2.43]; and concentration problems: RR = 2.55, 95% CI [2.33, 2.80], compared to the avoidance class, and foreshortened future, compared to both the intermediate severity avoidance class: RR = 2.12, 95% CI [1.84, 2.43]; and sleep problems class: RR = 2.27, 95% CI [1.97, 2.61].

A 5-class model best fitted the data (Figure 2). The largest drop in BIC value was observed increasing the number of classes from two (=77,756) to five (=76,467). Increasing the number of classes up to six further reduced the BIC value (=76,427), but at the expense of parsimony. The low disturbance class, the two classes of intermediate disturbance, and the severe disturbance class previously shown could still be identified. Among these classes, only the severe disturbance class had high levels of PTSD (6.04 symptoms, on average; prevalence = 98.0%) and impairment (2.12 impairment indicators, on average; prevalence = 66.4%). In the intermediate avoidance class, intermediate sleep problems class, and no disturbance class, the prevalence of PTSD was 10.6%, 28.6%, and 0.0%, respectively. The prevalence of impairment was 21.6%, 15.1%, and 6.7% respectively. The inclusion of impairment variables generated a fifth class with low PTSD severity (2.19 symptoms, on average; prevalence = 0.7%) and high level of impairment (2.57 impairment indicators, on average; prevalence = 97.7%). Compared to the severe PTSD disturbance class, the high degree of impairment and low PTSD disturbance in the fifth class might in part be explained by the high prevalence of CD: 32.4% versus 19.6%, RR = 1.67, 95% CI [1.36, 2.04], $p < .001$. In contrast to the fifth class, the severe PTSD disturbance class had higher rates of MDD–31.8% versus 25.0%, RR = 1.27, 95% CI [1.06, 1.52], $p = .0081$ and SAD–55.6% versus 18.5%, RR = 3.00, 95% CI [2.52, 3.57], $p < .001$.

In each demographic group, a 4-class model had the lowest BIC value, and was selected as the best fitting (Figure 3). BIC values for 2-, 3-, 4-, and 5-class models were, respectively,

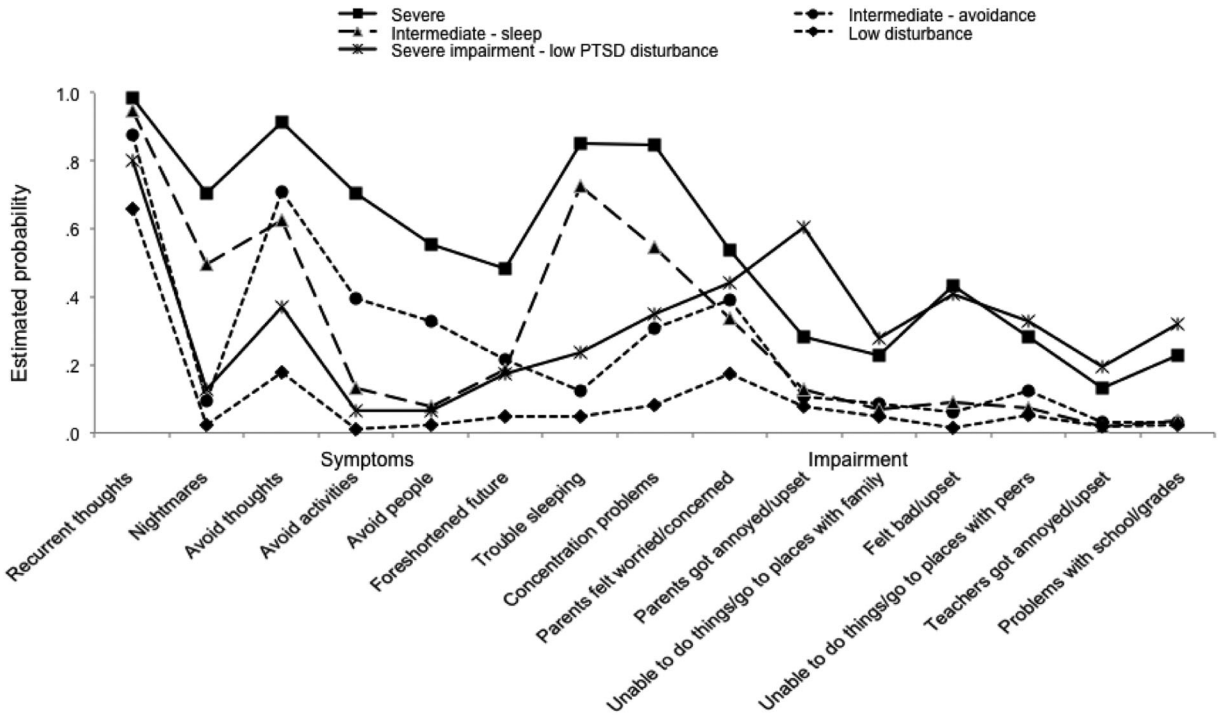

Figure 2. $N = 6{,}670$. The figure shows the 5-class model and estimated probability of posttraumatic stress disorder symptoms and impairment indicators.

18,216, 18,088, 18,056, and 18,098 in younger girls, 14,207, 14,139, 14,124, and 14,156 in younger boys, 14,567, 14,541, 14,482, and 14,516 in older girls, and 12,126, 12,102, 12,097, and 12,133 in older boys. Despite differences in the prevalence of PTSD across groups in the entire sample (younger girls = 21%, younger boys = 14%, older girls = 10%, older boys = 5%), PTSD symptom profiles within each disturbance class were in general similar across demographic groups. At severe PTSD levels, RR $\geq$ 2 was observed only when comparing the probability of endorsing avoidance of activities between older girls and older boys, RR = 2.07, 95% CI [1.66, 2.58], $p <$ .001. Within the intermediate disturbance class characterized by sleep-related symptoms, every group had a higher probability of reporting nightmares compared to older boys—older girls yielded RR = 3.44, 95% CI [2.54, 4.66]; younger boys yielded RR = 3.40, 95% CI [2.51, 4.62]; younger girls yielded RR = 2.80, 95% CI [2.07, 3.80]; all $p <$ .001. In each demographic subgroup, the prevalence of PTSD and impairment, respectively, were always above 90% and 43% in the severe disturbance class, below 21% and 37% in the intermediate disturbance classes, and 0% and below 19% in the low disturbance class.

When LCA was applied to items assessing direct, indirect and media exposure to 9/11, the steepest drop in BIC value was observed when the number of classes was increased from 2 (88,151) to 4 (86,069); increasing the number of classes to 5 produced only a marginally lower BIC value (85,872) at the expense of a complication in the model. Thus, based on principles of parsimony and interpretability, a 4-class solution was chosen as the best-fitting model (Figure 4). Class 1 ($n = 1{,}655$, females = 47%, and younger age range = 15%) grouped individuals with high probability of having experienced direct exposure events (direct exposure class). Class 2 ($n = 2{,}963$, females = 52%, and younger age range = 55%) was characterized by high probabilities of exposure through the media (media exposure class). Class 3 ($n = 696$, females = 59%, and younger age range = 48%) was representative of individuals with intermediate probabilities of having experienced direct exposure events, and a high probability of reporting indirect exposure, and exposure through the media (indirect/media exposure class). To better examine exposure-related differences in the latent structure of PTSD symptoms, these three classes were the focus of analysis because a fourth class ($n = 1{,}419$, females = 59%, and younger age range = 56.3%) was characterized by low or intermediate probabilities of reporting exposure events. The prevalence of PTSD was higher in the indirect/media exposure class (29%) compared to the media and direct exposure classes (13% and 9%, respectively).

In the media exposure class, the largest drop in BIC value was observed increasing the number of classes from two (33,545) to four (33,170); increasing the number of classes to five produced only a marginal increase in BIC value (33,157), and further increasing the number of classes deteriorated the model's fit. BIC values for 3-, 4-, and 5-class models were, respectively, 17,929, 17,927, and 17,950 in the direct exposure group,

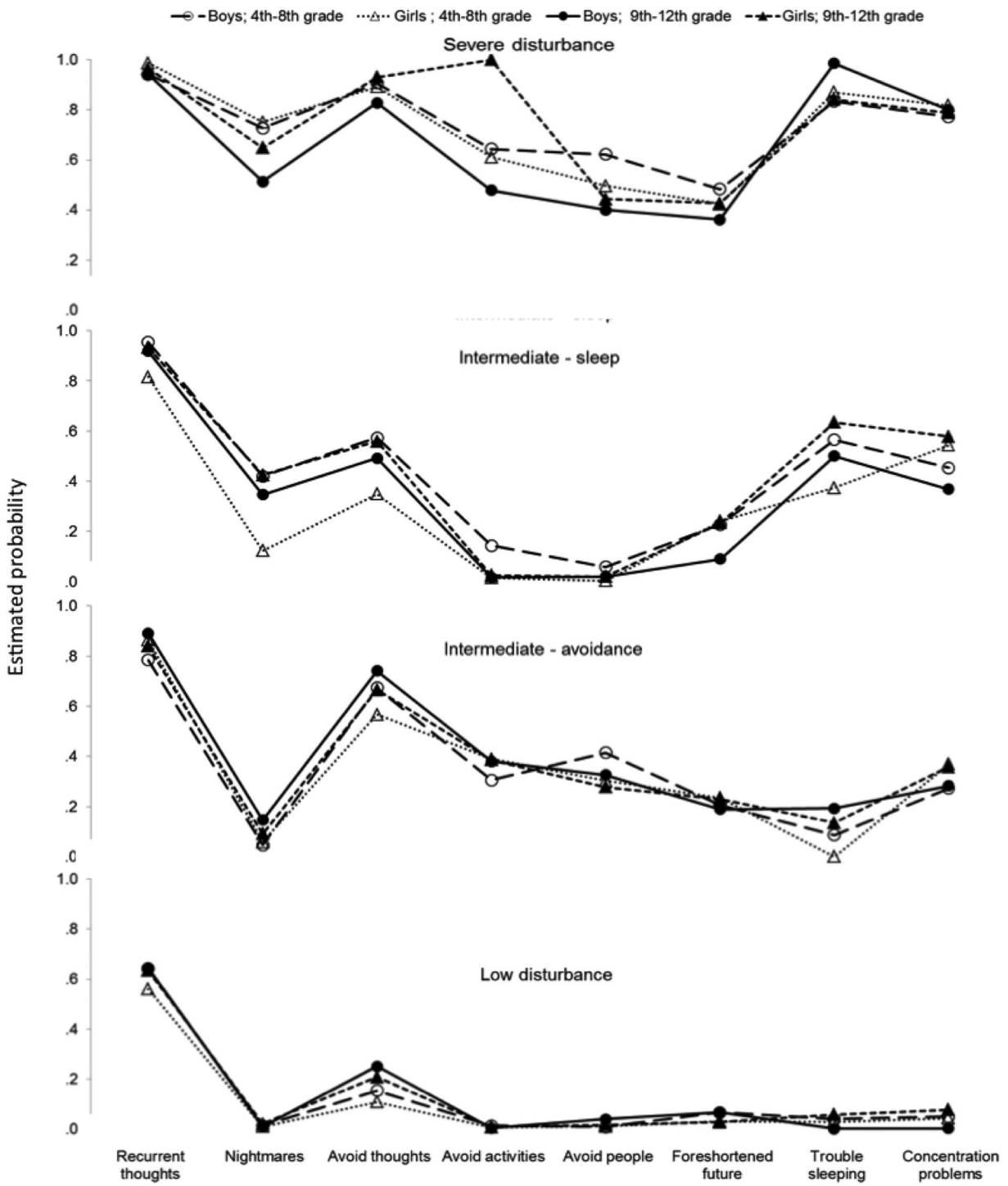

Figure 3. $n = 1{,}393$ (males, grades 4–8); $n = 1{,}773$ (females, grades 4–8); $n = 1{,}702$ (males, grades 9–12); $n = 1{,}802$ (females, grades 9–12). The figure shows the 4-class model and estimated probability of posttraumatic stress disorder symptoms in the sample stratified by age and gender.

and 9,344, 9,333, and 9,397 in the indirect/media exposure group.

Thus, a 4-class model was selected as the best-fitting model in each exposure class. Within each exposure class, PTSD profiles were overall consistent with those identified in the whole sample (Figure 5). Profile differences across severe disturbance classes were in general negligible. Among intermediate disturbance classes characterized by avoidance symptoms, the probability of endorsing nightmares was much higher in the indirect/media exposure class compared to the media class,

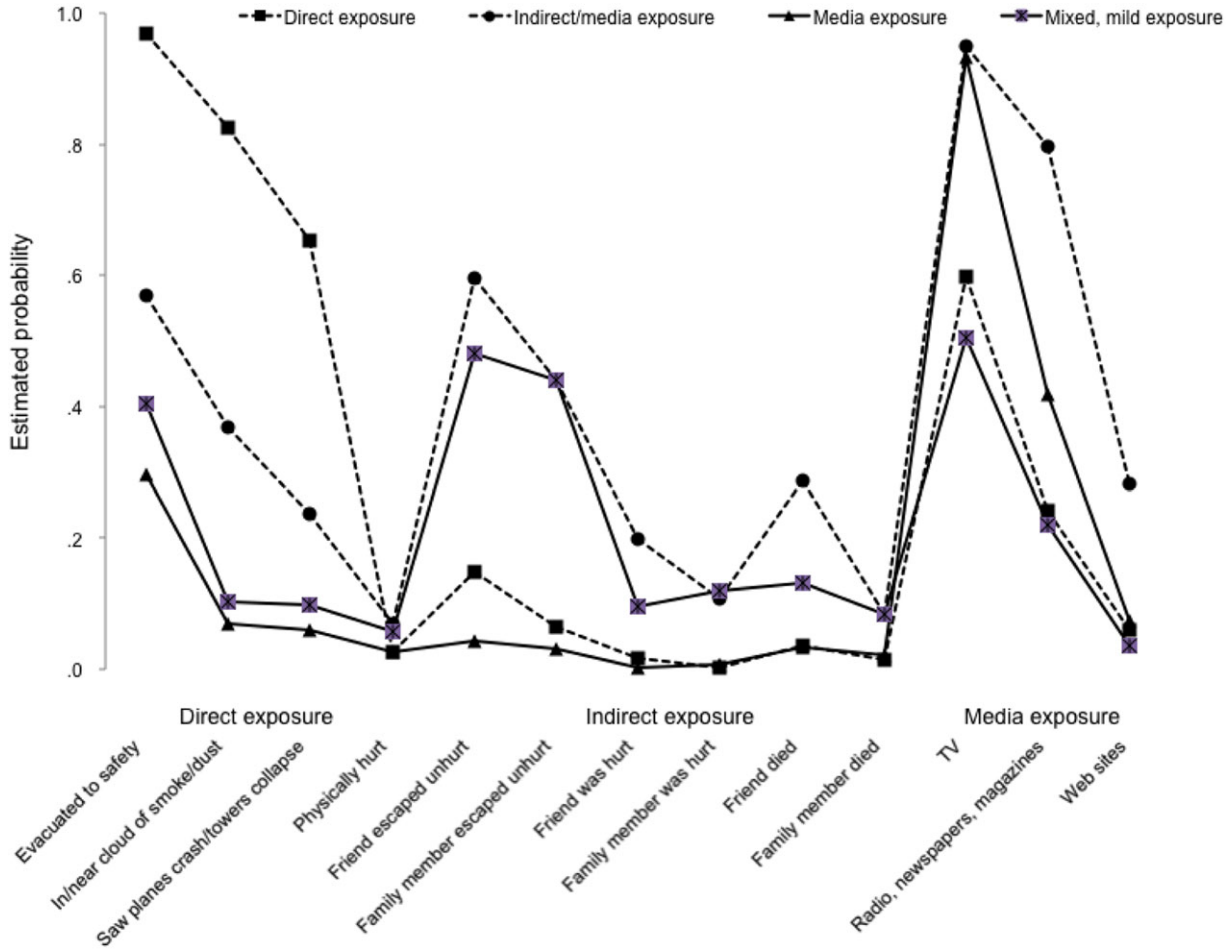

Figure 4. $N = 6{,}670$. The figure shows the 4-class model and estimated probability of exposure events.

RR = 5.09, 95% CI [3.43, 7.57], $p < .001$; and the direct exposure class, RR = 14.29, 95% CI [4.53, 45.05], $p < .001$. No differences were observed between the media and direct exposure classes. Finally, among intermediate classes defined by sleep-related problems, the probability of endorsing nightmares and trouble sleeping was higher in the indirect/media exposure class compared to the media exposure class and to the direct exposure class, whereas the probability of endorsing avoidance of thoughts was higher in indirect/media exposure class compared to the direct exposure class on the probability of endorsing avoidance of thoughts, RR ranged between 2.07 and 3.18, all $p < .001$. In each exposure class, the prevalence of PTSD and impairment, respectively, was always above 88% and 44% in the severe disturbance class, below 41% and 39% in the intermediate disturbance classes, and 0% and below 25% in the low disturbance class.

Discussion

In the present study, the symptom structure of PTSD was examined applying LCA to the data of 6,670 youth differentially exposed to the WTC attack. In the sample, in accord with previous studies of adolescents and adults (Ayer, Danielson, et al., 2011; Breslau et al., 2005; Chung & Breslau, 2008; Elhai et al., 2011; Maguen et al., 2013; Naifeh et al., 2010; Nugent, Koenen, & Bradley, 2012; Rosellini et al., 2014; Steenkamp et al., 2012), our findings were of heterogeneity in the manifestation of PTSD severity. We found four classes produced better fit instead of three as hypothesized: a low disturbance class, two intermediate disturbance classes, and a severe disturbance class. A previous study in adolescents identified three classes (Ayer, Danielson, et al., 2011). In this study, the larger sample size and age range (8–21 years vs. 12–17 years), together with differences in model selection (in addition to the BIC, Danielson, et al., [2011] we also used the Lo-Mendell-Rubin adjusted likelihood test) and the number of PTSD symptoms assessed (8 vs. 17) may have contributed to the identification of two sets of symptoms (sleep-related symptoms and avoidance symptoms) that define two different intermediate disturbance profiles. Classes also varied qualitatively in terms of symptoms configuration. The symptom of recurrent thoughts represented the only exception, as it was uniformly highly prevalent in each class and group.

When LCA was applied to PTSD symptoms and impairment indicators, we identified four classes that were very similar

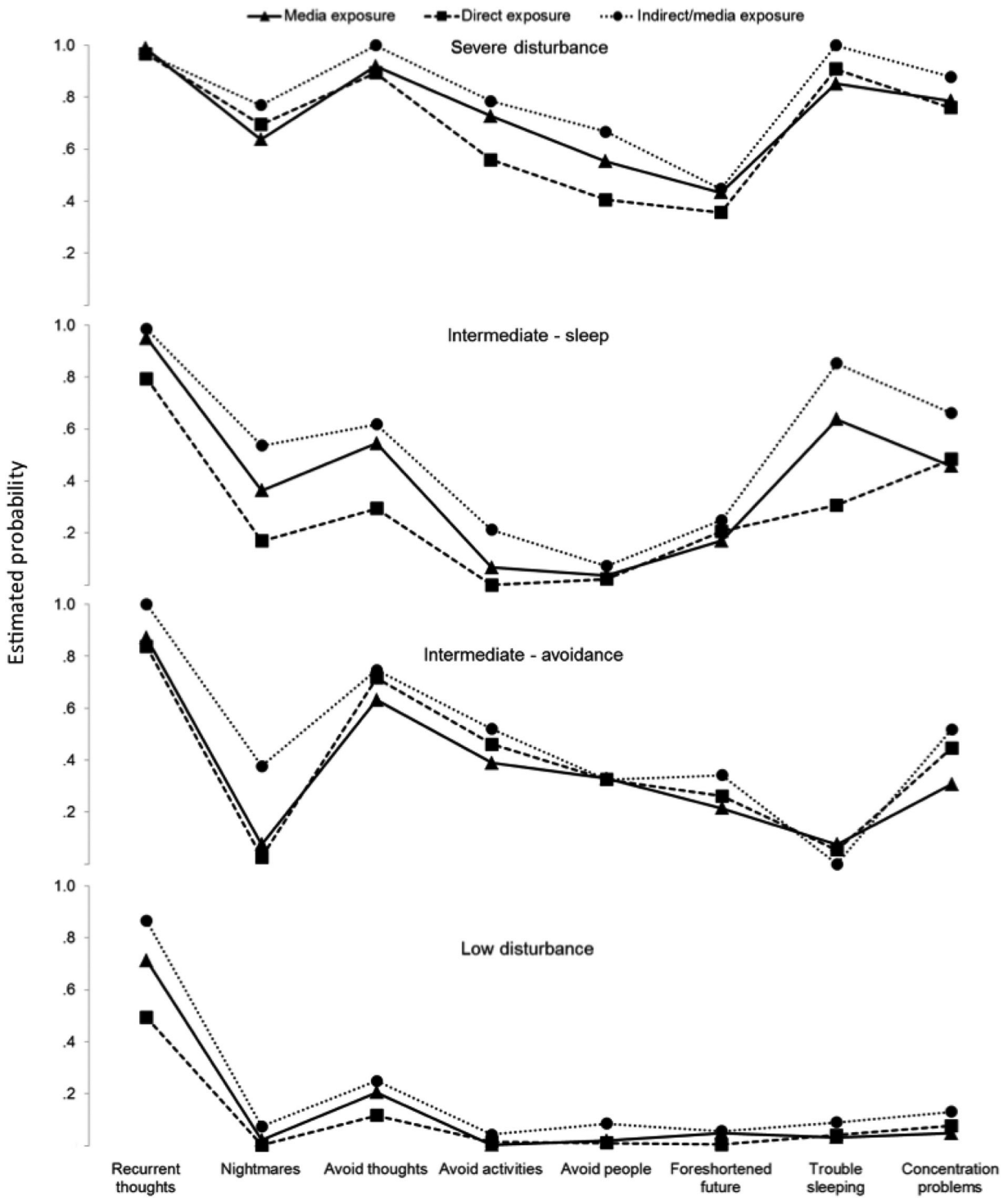

Figure 5. $n = 1{,}655$ for the direct exposure class; $n = 2{,}963$ for the media exposure class; $n = 696$ for the indirect/media exposure class. The figure shows the 4-class model and estimated probability of posttraumatic stress disorder symptoms in the sample stratified by exposure profiles.

to the ones identified in the previous analysis; among these classes, only the severe PTSD disturbance class also had a high probability of endorsing impairment indicators. A fifth class grouped subjects with low levels of PTSD and high levels of impairment, probably explained by the high prevalence of externalizing psychopathology. Thus, among classes characterized by intermediate or severe PTSD disturbance, only the severe disturbance class was also characterized by high probability of

reporting functional impairment. These results suggest that in this sample, the only symptom combination to generate a clinically meaningful syndrome is that of recurrent, involuntary, and intrusive thoughts of the traumatic event, the two sets of symptoms that define intermediate disturbance profiles (sleep-related symptoms and avoidance symptoms), and concentration problems. A 4-class structure similar to the one identified in the whole sample was also found when the sample was stratified by age and gender, and by empirically derived exposure profiles. These findings suggest that demographic (gender), developmental (age), and exposure variables that are epidemiologically associated with differences in PTSD risk (Hoven et al., 2005) did not seem to produce variation in the latent structure of PTSD symptoms 6 months after exposure.

Even though, as expected, there was evidence of heterogeneity in the severity of PTSD symptoms shown in the low-to-severe disturbance classes, there was no evidence of heterogeneity in severe PTSD. We detected only one PTSD severe disturbance class in the whole sample, when PTSD symptoms were analyzed in combination with impairment indicators, and in the sample stratified by age and gender and by exposure profiles. Furthermore, differences in severe PTSD symptom profiles related to age and gender, and to exposure to the WTC attack were in general negligible, except for a higher probability of endorsing avoidance of activities in older girls compared to older boys. Thus, the manifestation of severe PTSD was fairly homogeneous across groups defined by different age and gender, and WTC-related exposures. As pointed out by Keller, Neale, and Kendler (2007), a central question in psychiatry has been whether variation in causal factors is related to variation in clinical presentation. Although aspects of a syndrome may be central or core (pathogenic), other aspects may be pathoplastic, differing as a function of personal or precipitating factors (Keller et al., 2007). Our results indicate that PTSD symptoms which—in combination—define a severe PTSD profile might constitute the pathogenic aspects of a clinically meaningful PTSD syndrome, that would be largely invariant across individuals and robust against variation in demographic and exposure factors. The fact that the probability of endorsing certain symptoms, such as avoidance of people and sense of foreshortened future, was lower compared to the probability of endorsing any other symptoms raises the question of whether these symptoms should be considered core aspects of severe PTSD in children and adolescents.

Heterogeneity in the presentation of PTSD was observed at the intermediate levels of severity, with two classes of intermediate disturbance identified in every analysis. The probability of endorsing nightmares showed the highest degree of variation due to differences in gender, age, and exposure. Thus, unlike severe PTSD, the probability of reporting certain symptoms in the presence of only moderate PTSD disturbance might be affected by demographic and environmental variables, suggesting that—in the absence of a clinically meaningful syndrome—the presentation of PTSD might be more dependent on individual differences in gender, age, and exposure to traumatic events.

Several limitations should be noted. First, *DSM-IV* PTSD Criterion A was not assessed; thus, 9/11-related events can only be considered as potentially traumatic events. Second, the DPS does not cover the full range of *DSM-IV* PTSD symptoms. Therefore, comparison with previous studies on the latent PTSD structure can only be tentative. This limitation might have decreased the power to identify heterogeneity at severe levels of PTSD, and might have implications for generalizability of the results. DPS items were selected, however, as they were shown to be the most predictive of *DSM-IV* PTSD DISC diagnosis, and the substantial reduction in scale length was not associated with significant changes in discriminatory power (Lucas et al., 2001). Third, exposure to traumatic events before 9/11 (being badly hurt, seeing anyone killed/seriously injured, death/severe injury of a close friend or death/severe injury of a family member) and socioeconomic status were not examined in this study because none of these variables was associated with PTSD (unpublished data). Fourth, the different LCA models presented in this article were obtained in a single sample and are therefore not independent. Finally, the assessment of PTSD 6 months after exposure, and the uniqueness of the WTC attack may limit the generalizability of the findings.

In sum, our results support the evidence that heterogeneity is found only in the degree of PTSD severity (varying from low-to-severe disturbance), in the manifestation of intermediate disturbance (two intermediate disturbance classes), and—based on age, gender, and exposure—in the manifestation of intermediate disturbance. The identified severe PTSD syndrome seems instead homogeneous in the whole sample, and across groups that differ in regard to age, gender, and exposure to 9/11.

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