Predictors for Persistence of Functional Somatic Symptoms in Adolescents

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Objective To identify risk factors for persistence of functional somatic symptoms (FSS; ie, somatic symptoms that cannot be sufficiently explained by underlying organic pathology).

Study design The first (N = 2230, mean age = 11.1 years [SD 0.6], 50.8% girls), second (N = 2149, mean age = 13.7 years [SD 0.5], 51.0% girls), and third (N = 1816, mean age = 16.3 years [SD 0.7], 52.3% girls) assessment waves of the general population study TRacking Adolescents' Individual Lives Survey were used. FSS were assessed with the Youth Self-Report and the Child Behavior Checklist. Growth mixture models were used to identify different subgroups of adolescents on the basis of the developmental trajectory of their symptoms. Adolescents with persistent symptoms were compared with adolescents with decreasing symptoms with a multivariable logistic regression analysis.

Results In our general population cohort, 4.1% of adolescents suffered from persistent FSS. Risk factors for persistent FSS were being a girl (OR 4.69, 95% CI 2.17-10.12), suffering from depressive symptoms (OR 5.35, 95% CI 1.46-16.62), poor self-rated health (OR 1.56, 95% CI 1.02-2.39), and high parent-reported FSS (OR 4.03, 95% CI 1.20-13.54). Anxiety, parental overprotection, school absenteeism, and diversity of symptoms did not predict persistence of FSS.

Conclusions This study identified risk factors for persistence of FSS in adolescents. Future studies might study effects of coping strategies and iatrogenic factors on symptom persistence. *(J Pediatr 2014;164:900-5)*.

Functional somatic symptoms (FSS) are somatic symptoms that cannot sufficiently be explained by underlying organic pathology.[1] FSS, such as pain and fatigue, are common among adolescents. FSS are known to cause substantial impairment in a subgroup of children and adolescents by resulting in school absenteeism and social problems.[2,3] This impairment is especially true for adolescents suffering from persistent symptoms.[4] To prevent symptoms from becoming persistent, early intervention is important. However, although FSS are persistent in a subgroup of adolescents,[5] FSS often are self-limiting. Thus, it is probably not necessary to (extensively) intervene in all adolescents with FSS. Therefore, insight in whether an adolescent is at risk for persistence of FSS is important.

In previous studies, investigators examined risk factors for persistence of either pain or fatigue in adolescents.[6-9] It is probably more clinically relevant to examine symptom persistence for a full range of FSS because adolescents who have multiple symptoms are especially at risk for long-lasting psychological and social problems.[1] Moreover, symptoms experienced by adolescents might change over time, and their recovery from specific symptoms does not automatically mean that they are symptom-free. Another problem with previous studies is that all, except for one,[6] used cut-off scores to determine whether an adolescent had a good or a poor symptom prognosis. Classifying adolescents by use of developmental trajectories might be a more reliable method, with more realistic subdivisions, because complex trajectories like exponential growth trajectories can be taken into account.

This study differs from previous studies in combining 3 important aspects: (1) it included several types of FSS; (2) it identified risk factors based on developmental trajectories; and (3) it was performed in the general population. We chose to study risk factors for persistence of FSS that can be easily assessed by clinicians or have previously been found to predict poor prognosis of pain or fatigue, or to perpetuate FSS. The risk factors we hypothesized to be risk factors for persistent FSS were being a girl[8,10] and having a high number of different symptoms, poor self-rated health, anxiety,[7,11] depression,[6,7,9,11] school absenteeism,[7,12] parental overprotection,[13] and high parent-reported FSS. Our hypotheses were tested in 2210 adolescents of a prospective population-based cohort study.

Method

The TRacking Adolescents' Individual Lives Survey (TRAILS) is a prospective cohort study of Dutch adolescents, approved by the Dutch Central Committee

BIC	Bayesian Information Criterion
CBCL	Child Behavior Checklist
FSS	Functional somatic symptoms
LMR-LRT	Lo-Mendell-Rubin likelihood ratio test
TRAILS	TRacking Adolescents' Individual Lives Survey
YSR	Youth Self-Report

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This research is part of TRAILS, which has been financially supported by various grants from the Netherlands Organization for Scientific Research, Zorgonderzoek Nederland Medische Wetenschappen, Gebied Maatschappij-en Gedragswetenschappen, the Dutch Ministry of Justice, the European Science Foundation, Biobanking and Biomolecular Research Infrastructure, the participating universities, and Accare Center for Child and Adolescent Psychiatry. The authors declare no conflicts of interest.

 http://dx.doi.org/10.1016/j.jpeds.2013.12.003

on Research Involving Human Subjects. Participating centers of TRAILS include various departments of the University Medical Center and University of Groningen, the Erasmus University Medical Center Rotterdam, the University of Utrecht, the Radboud Medical Center Nijmegen, and the Parnassia Bavo group, all in The Netherlands. The current study used data from the first 3 assessment waves, wave 1 in 2001-2002 (N = 2230, mean age = 11.09 years [SD 0.56], 50.8% girls); wave 2 in 2003-2004 (N = 2149, mean age = 13.65 years [SD 0.53], 51.0% girls), and wave 3 in 2005-2007 (N = 1816, mean age = 16.27 years, [SD = 0.73], 52.3% girls). Informed consent was obtained from both parents and subjects. Detailed information about sample selection and analysis of non-response bias has been reported elsewhere.[14,15]

To assess FSS, adolescents filled out the Somatic Complaints scale of the Youth Self-Report (YSR[16]) at each assessment wave. This scale contains 9 items, which refer to somatic complaints without a known medical cause (aches/pains, headaches, nausea, eye problems, skin problems, stomach pain, and vomiting) or without obvious reason (overtiredness and dizziness). Factor analyses (**Table I**; available at www.jpeds.com) indicated that 2 items (eye problems and skin problems) had low factor loadings, suggesting that these items did not represent the underlying construct well in the TRAILS sample; therefore, these items were excluded. The remaining 7 items showed good internal consistency (Cronbach α at T1: 0.76; at T2: 0.77; at T3: 0.76). Each somatic complaint was rated on a 3-point scale with 0 = never or not at all true, 1 = sometimes or a bit true, and 2 = often or very true. A mean item score was computed by adding the scores of the 7 FSS items and dividing the sum score by 7, which resulted in a scale score that could range from 0 (all items rated as "never or not at all true") to 2 (all items rated as "often or very true").

Potential Risk Factors

Symptom Diversity. The 7 somatic symptoms of the YSR also were used to construct a baseline symptom diversity score, which takes the diversity of symptoms into account without paying attention to the symptom severity. This symptom diversity score could range from 1 to 7 symptoms. A symptom was considered present if it was rated as "sometimes or a bit true" or "often or very true".

Parent-Reported FSS. Parents completed the Child Behavior Checklist (CBCL), which contains the same items and response categories as the YSR. A mean item score was computed for the aforementioned 7 somatic symptoms (Cronbach α at T1: 0.71; at T2: 0.72; at T3: 0.75). Of all parents, 88% (N = 2017) completed the CBCL at T1, 82% (N = 1883) at T2, and 66% (N = 1509) at T3.

Anxiety and Depression. Symptoms of anxiety were measured by the 6 items of the Anxiety scale of the YSR (Cronbach α at T1: 0.63; at T2: 0.63; at T3: 0.65).[16] Depression was measured by the 13 items of the Affective Problems scale of the YSR.[16] One item (overtiredness) was excluded from this scale to prevent overlap with the Somatic Complaints scale. The internal consistency was adequate (Cronbach α at T1: 0.69; at T2: 0.74; at T3: 0.75). Again mean scale scores were used, which could range from 0 to 2.

Parental Overprotection. Parental overprotection at baseline was measured by use of the overprotection subscale of the Egna Minnen Beträffande Uppfostran, Child Version (Swedish for "my memories of upbringing"[17]), which contains 12 items referring to children's perception of parental overprotection, which can be rated on a 5-point scale ranging from 0 = never to 4 = always (Cronbach α = 0.84). Adolescents filled out this questionnaire for both their mothers and fathers. In line with our previous research, in which girls were found to be especially vulnerable for maternal and boys for paternal overprotection, an overall overprotection score was computed that used maternal overprotection scores for girls and paternal scores for boys.[13] Our previous study showed that the effect of overprotection on FSS was equally strong for boys and girls. The low number of participants suffering from persistent FSS did not allow subgroup analyses for boys and girls in the current study. The mean item score was calculated, which could range from 0 to 4.

School Absenteeism. Parents answered the following question about school absenteeism: "How often has your child been absent from school during the past six months because of illness?" Answer categories were: "Never," "Seldom," "Sometimes," "Often," and "Mostly." Because of low cell count, the last 2 categories were combined.

Self-Rated Health. To assess self-rated health, adolescents answered the question "How did you perceive your health during the past year?" with: "Very good (1)," "Good (2)," "Fair (3)," "Moderate (4)," and "Bad (5)."

Statistical Analyses

Growth mixture modeling was used to identify distinct developmental trajectories of FSS. Growth mixture modeling was conducted in Mplus, version 5.2 (Muthen & Muthen, Los Angeles, California).[18] Trajectories were determined by latent growth factors, which model the intercepts and slopes (linear and quadratic) of the individual growth trajectories. First, single-class latent growth models were estimated to determine whether linear or quadratic growth curves fitted the data best. This was based on the smallest Bayesian Information Criterion (BIC),[19] as well as the significance of the quadratic slope growth factor. Second, models (linear or quadratic) with increasing numbers of classes were fitted. The data were rearranged as a function of chronological age instead of clustered by wave of data collection, resulting in 8 (age 10 years until age 17 years) instead of 3 assessment points, which enabled modeling more complex pathways. Trajectories were estimated on the basis of full information maximum likelihood with robust standard errors, which is robust regarding non-normality of the scores, and adjusts