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The etiology of functional somatic symptoms in adolescents

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Document Version

Publisher's PDF, also known as Version of record

Publication date:

2011

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Janssens, K. A. M. (2011). *The etiology of functional somatic symptoms in adolescents: a new perspective on lumping and splitting*. s.n.

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Chapter 5

School absenteeism as a perpetuating factor of functional somatic symptoms in adolescents

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The Journal of Pediatrics (in press)

ABSTRACT

Objective: *To examine whether school absenteeism is a perpetuating factor of FSS, and whether this holds true for bullied adolescents*

Study design: *This study is part of the longitudinal population based study Tracking Adolescents' Individual Lives Survey. Data from assessment wave 2 (N = 2149, 51.0% girls, mean age = 13.65, SD = 0.53) and assessment wave 3 (N = 1816, 53.3% girls, mean age = 16.25, SD = 0.72) were used. Peer victimization was assessed by peer nominations, school absenteeism by both parent and teacher reports, and FSS by the Youth Self-Report.*

Results: *Structural equation modeling revealed that school absenteeism at the second wave, adjusted for FSS at the second wave, predicted FSS at the third wave in the entire cohort ($\beta = 0.12$, 95% confidence interval = 0.02 - 0.22), but not in the subgroup of bullied adolescents ($\beta = -0.13$, 95% confidence interval = -0.62 - 0.26). However, the difference between bullied and unbullied adolescents did not reach significance.*

Conclusion: *This study provides evidence that school absenteeism is a perpetuating factor of FSS in adolescents. A clinical intervention study is necessary to examine whether preventing school absenteeism truly helps to reduce FSS in adolescents.*

INTRODUCTION

Functional somatic symptoms (FSS) are somatic symptoms which cannot be fully explained by a known medical condition. FSS are very common during adolescence: about 25% of the adolescents suffer from chronic or recurrent pain (Perquin et al., 2000), and about 10% are chronically fatigued (ter Wolbeek et al., 2006). Studies have shown that FSS are a burden for the child and the family (Hunfeld et al., 2002). Adolescents experiencing FSS frequently miss school (Campo et al., 1999; Konijnenberg et al., 2005; Roth-Isigkeit et al., 2005; Wiendels et al., 2005), and their symptoms contribute to high health care costs (Sleed et al., 2005). More insight into the etiology of this important health problem might aid the development of effective prevention and intervention strategies.

As mentioned, adolescents who suffer from FSS are frequently missing school (Campo et al., 1999; Konijnenberg et al., 2005; Roth-Isigkeit et al., 2005; Wiendels et al., 2005). It is unknown whether school absenteeism in turn has a disadvantageous effect on the course of FSS. School absenteeism might have such an effect, because if adolescents with FSS stay home from school, they have

less distraction from their FSS and may become more focused on them. Focusing on physical symptoms heightens the intensity of these symptoms (Martin et al., 1991). In this way, school absenteeism might be a perpetuating factor of FSS.

If school absenteeism turns out to be indeed a perpetuating factor of FSS, the question remains whether this holds true for all adolescents. School absenteeism might not be a perpetuating factor of FSS in adolescents who are freed from symptom triggers when staying home from school. A possible symptom trigger is being bullied, since being bullied is a heavy stressor for adolescents (Carney, 2008) and has a negative influence on the development of FSS (Fekkes et al., 2006; Gini and Pozzoli, 2009). By being freed from being bullied, school absenteeism may have an advantageous effect on the course of FSS in bullied adolescents. This advantageous effect may mitigate the presumably disadvantageous effect of becoming more focused on FSS when staying home from school. Therefore, school absenteeism may not have a perpetuating effect on FSS in bullied adolescents.

We thus hypothesized that school absenteeism has a disadvantageous effect on the course of FSS in adolescents, and that this does not hold true for bullied adolescents. We used longitudinal data from a general population of adolescents and their classmates to examine our hypotheses.

METHODS

Sample and procedure

This study is part of the TRacking Adolescents' Individual Lives Survey (TRAILS). TRAILS is a prospective cohort study of Dutch adolescents. The study was approved by the Dutch Central Committee on Research Involving Human Subjects. The study reported here involves data from the second and third assessment wave of TRAILS, which ran from September 2003 to December 2004 and from September 2005 to August 2008, respectively. Data from the first wave were not used, because the assessments of peer victimization and school absenteeism were less extensive during this wave, and because the majority of the cohort switched schools between the first and the second assessment wave.

TRAILS participants were selected from five municipalities in the North of the Netherlands, including both urban and rural areas. All children born between 10-01-1989 and 09-30-1990 (first two municipalities) or 10-01-1990 and 09-30-1991

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(last three municipalities) were eligible for inclusion, provided that their schools were willing to cooperate and that they were able to participate in the study. Over 90% of the schools, accommodating 3,145 children, agreed to participate in the study. A small proportion (6.7%) of these children was excluded because of mental or physical incapability or language problems. Of the remaining 2935 children, 2230 (76.0%, mean age = 11.09 years, $SD = 0.56$, range 10–12, 50.8% girls) were enrolled in the study (i.e., both child and parent agreed to participate). Teacher reports, which were available for 40.7% of the nonresponders, revealed that they did not differ from responders with respect to the prevalence of problem behavior, nor regarding associations between sociodemographic variables and mental health outcomes, but nonresponders were more likely to be boys, to have a low socioeconomic background, and to perform poorly at school (de Winter et al., 2005). Parents' and adolescents' written informed consent was obtained after the procedures had been fully explained.

Of the 2230 baseline participants, 96.4% ($N = 2149$, mean age = 13.65 years, $SD = 0.53$, 51.0% girls) participated in the first follow-up assessment (T2), which was held two to three years after assessment wave 1 (mean number of months 29.44, $SD = 5.37$, range 16.69–48.06). At the third assessment wave (T3), which was held two to four years after T2, the response was 81.4% ($N = 1816$, mean age = 16.25 years, $SD = 0.72$, 53.3% girls). Attrition to follow-up at T2 and T3 was not related to FSS at preceding assessment (results available upon request).

Measures

Functional somatic symptoms

FSS were assessed by the Somatic Complaints Scale of the Youth Self-Report (Achenbach et al., 2003) at T2 and T3, which is known to be a valid and reliable instrument (de Groot et al., 1996; Weinstein et al., 1990). This scale contains nine items referring to somatic complaints without a known medical cause (aches/pains, headache, nausea, eye problems, skin problems, stomach pain, and vomiting) or without obvious reason (overtiredness and dizziness). The adolescents could indicate whether they experienced these complaints on a three point scale, with 0 = never, 1 = sometimes or a little bit, 2 = often or a lot. Factor analysis indicated that two items (eye problems and skin problems) had low factor loadings at both assessment waves in both boys and girls, suggesting that these items did not represent the underlying construct well in our sample. These items were therefore excluded. The remaining seven items, which were combined in a

sum score, showed good internal consistency (Cronbach's α at T2: .77 and at T3: .76).

School absenteeism

School absenteeism was assessed using both the teacher and a parent (usually the mother) as informants. The question used to measure school absenteeism at T2 was: 'How often has this pupil/your child been absent from school during the past six months because of illness?' The responses were grouped into 6 categories: 'never', '1 day', '2-3 days', '4-6 days', '7-9 days', and '10 or more days'. The correlation between parent and teacher report was moderate ($r = .38$). To get the most accurate estimate of school absenteeism, we composed a latent factor of school absenteeism reported by the teacher and the parent.

Peer victimization

Peer victimization was assessed at T2 by peer nominations. A previous study within TRAILS has shown that peer nominations are a valid and reliable way to assess peer victimization (Veenstra et al., 2007). Peer nominations were performed in classes with at least three TRAILS-participants, that is, 172 classes in 34 schools, in first grade (72 classrooms) and second grade (100 classrooms) of secondary education. The classrooms were evenly divided by educational track: low (60 classrooms), middle (53 classrooms), and high (59 classrooms). Of all 3672 adolescents who were approached to participate, 90.2% completed the peer nomination assessment (for details see Dijkstra et al., 2008). So 3312 adolescents (1,675 boys, 1,637 girls) participated, including 1078 regular TRAILS participants. Age, gender, and FSS at T2 in this subsample of 1078 participants did not differ significantly from those of the other TRAILS participants. Participants received a list of all classmates and were asked to indicate who in their classroom they were bullying. The number of nominations they could make was unlimited, but they were not required to nominate anyone. The proportion of classmates by whom adolescents were bullied was computed (for details see Veenstra et al., 2005). Adolescents who were nominated by at least one of their classmates were considered bullied adolescents, resulting in 235 bullied adolescents (21.8 %). Measures based on peer nominations are potentially more reliable and valid than self-reports, because peer nominations reflect the aggregate of all the nominations a person received from others (Newcomb et al., 1993; Salmivalli, 2001).

Statistical analyses

Since not all data was normally distributed, Spearman correlations and bootstrapping procedures were used. Spearman partial correlations were

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calculated for all variables, adjusting for gender, using SPSS Version 18. To test our hypotheses, the data were fitted to the structural equation model presented in Figure 1a, using Mplus Version 6. Our first hypothesis, that school absenteeism perpetuates FSS, was tested using a bias-corrected bootstrapping procedure. Thousand resamples with the same sample size as our study sample ($N = 2230$) were randomly drawn with replacement. So, although each resample will have the same number of elements as the original sample, some adolescents were included in a specific resample several times, whereas others were not included, and so the 1000 samples were likely to randomly depart from the original sample. The effect of school absenteeism at T2 on FSS at T3 was calculated for each resample. Thereafter, the mean and the 95% confidence interval (CI) of these 1000 effect estimates were calculated. The effect was considered significant if the 95% CI did not cross zero.

Our second hypothesis, that school absenteeism is not a perpetuating factor of FSS in bullied adolescents, was tested by repeating the procedure for the subgroup of 235 adolescents who were bullied by at least one of their classmates. We tested whether the association between school absenteeism at T2 and FSS at T3 differed significantly between bullied and unbullied adolescents by performing a subgroup analysis for bullied and for unbullied adolescents in the subpopulation of 1078 adolescents who participated in the classmate reports. Group differences were examined by testing (χ^2 difference test) if the model fit worsened significantly when the relation between school absenteeism at T2 and FSS at T3 was constrained to be the same in the group of bullied and unbullied adolescents. Model fits were considered good when the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) were greater than .95, and the Root Mean Square Error of Approximation (RMSEA) was smaller than .05 (Bentler, 1990). Ideally, the χ^2 should be nonsignificant ($p > .05$) as well, but in sample sizes larger than 200 a nonsignificant χ^2 is generally considered to be too conservative (18). To examine whether our results were biased due to missing data (see Table 1 for the number of valid data), a multiple imputation approach was used (Adèr, 2008; Muthen and Muthen, 2010). Mplus performed all analyses on 10 imputed databases and computed average estimates. The results turned out to be essentially the same for imputed and non-imputed data, suggesting that the missing data did not bias our results. We report the results of non-imputed data, because it is not possible to acquire CIs for imputed data in Mplus. All analyses were adjusted for gender, because FSS, peer victimization and school absenteeism are known to be gender-dependent (Kroenke and Spitzer, 1998; Nilsson et al., 2009; Veenstra et al., 2005).

RESULTS

Descriptive statistics

Descriptive statistics were computed for FSS and school absenteeism (Table 1). FSS decreased during follow-up (Table 1). School absenteeism as reported by the teacher was higher than school absenteeism as reported by the parent (Table 1). The proportion of classmates by whom adolescents were bullied at T2 ranged from 0 to 0.44. School absenteeism as reported by the parent and the teacher at T2 were associated with FSS at T2 and T3 (Table 2). Peer victimization at T2 was related to school absenteeism as reported by the teacher at T2, but not with school absenteeism as reported by the parent at T2 (Table 2). Associations between peer victimization at T2 and FSS at T2 and T3 failed to reach significance ($p > .05$).

Table 1. Descriptive statistics of school absenteeism and FSS

Measure	Valid <i>N</i>	Mean (<i>SD</i>)	Range
FSS T2 ¹	2015	2.7 (2.5)	0-13
FSS T3 ¹	1636	2.4 (2.4)	0-12
School absenteeism (PR) T2 ²	1918	2.3 (1.3)	1-6
School absenteeism (TR) T2 ²	1440	3.0 (1.4)	1-6

FSS = functional somatic symptoms, T2 = assessment wave 2, T3 = assessment wave 3, PR = parent report, TR = teacher report, ¹Sumscore of seven FSS, each rated on a three point scale (0 = never, 1 = sometimes or a little bit, 2 = often or a lot), ²Absence during the past six months because of illness (0 = never, 1 = 1 day, 2 = 2-3 days, 3 = 4-6 days, 4 = 7-9 days, 5 = 10 or more days).

Table 2. Spearman partial correlations between FSS, school absenteeism and peer victimization

	School absenteeism (PR) T2	School absenteeism (TR) T2	FSS T2	FSS T3	Peer victimization T2
School absenteeism (PR) T2	1.00				
School absenteeism (TR) T2	.38*	1.00			
FSS T2	.15*	.13*	1.00		
FSS T3	.12*	.09*	.40*	1.00	
Peer victimization T2	.01	.10*	.06	.05	1.00

*PR = parent report, TR = teacher report, T2 = assessment wave 2, T3 = assessment wave 3, * $p < 0.01$, all correlations are adjusted for gender*

School absenteeism and FSS in the entire cohort

The model of FSS and school absenteeism, shown in Figure 1a, had excellent model fits ($\chi^2 [df=2] = 1.4, p = .47$; CFI = 1; TLI = 1; RMSEA < .01). Path analyses (Figure 1a) showed that FSS at T2 were associated with school absenteeism at T2. Furthermore, school absenteeism at T2 predicted FSS at T3, when adjusted for FSS at T2. This finding suggests that school absenteeism is, to some extent, a perpetuating factor of FSS. Results did not significantly differ for boys and girls ($\Delta\chi^2 = 0.23 [\Delta df = 1], p = .63$).

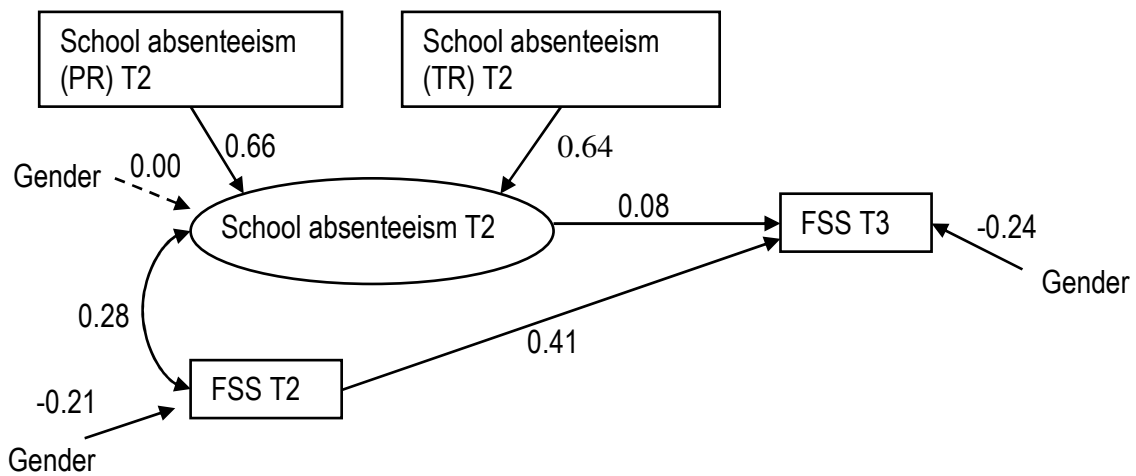


Figure 1a: School absenteeism and FSS in a general population of adolescents

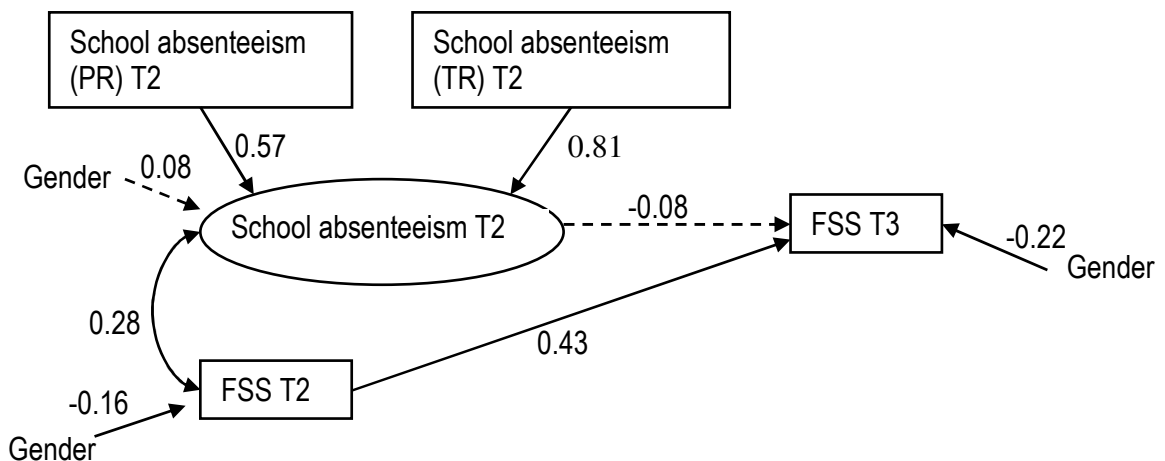


Figure 1b: School absenteeism and FSS in bullied adolescents

Figure 1a, 1b: PR = parent report, TR = teacher report, T2 = assessment wave 2, T3 = assessment wave 3. Bias-corrected bootstrap path coefficients and 95% confidence intervals (of standardized data) are given. Dotted lines indicate non significant paths.

School absenteeism and FSS in bullied adolescents

In bullied adolescents school absenteeism at T2 did not predict FSS at T3 (Figure 1b). This suggests that school absenteeism does not perpetuate FSS in bullied adolescents. This model still had excellent model fits ($\chi^2 [df=2] = 1.9, p = .38$; CFI = 1; TLI = 1), probably due to the significant relations between FSS at T2 and school absenteeism at T2 and FSS at T3, and gender effects. When we modeled the relationship between school absenteeism at T2 and FSS at T3 to be the same in bullied and unbullied adolescents, the model fit did not significantly worsen ($\Delta\chi^2 = 0.62 [\Delta df = 1], p = .43$).

DISCUSSION

This study provides evidence that school absenteeism is a perpetuating factor of FSS in adolescents, since we found that school absenteeism at T2 predicted FSS at T3 after adjusting for FSS at T2. We did not find evidence for such a perpetuating effect in bullied adolescents, although we should be careful when interpreting this result, because the effect of school absenteeism on FSS found in bullied adolescents did not significantly differ from the effect found in the entire cohort. An explanation for the finding that school absenteeism is a perpetuating factor of FSS is that adolescents become more focused on their FSS when staying home from school, and thereby experience more or more severe FSS. This explanation is consistent with a randomized controlled trial which showed that the effect of graduated exercise therapy on FSS is partially explained by a reduction in focusing on FSS (Moss-Morris et al., 2005). The finding that school absenteeism perpetuates FSS in adolescents might explain our previous finding that parental overprotection predicts the development of FSS in adolescents (Janssens et al., 2009) if overprotective parents keep their children home from school more often than nonoverprotective parents. However, the perpetuating effect of parental overprotection on FSS was not mediated by school absenteeism (results available upon request). One could speculate that having overprotective parents is not associated with school absence, since overprotective parents are not only concerned about their children's health, but also about their school performance.

There are several important strengths of this study. One strength of this study is that we used a large population-based cohort, which increases the generalizability of our findings. Further, we assessed peer victimization by peer nominations. Previous studies that examined the relationship between peer victimization and FSS used self-reports. Self-reports might have overestimated the relationship between FSS and peer victimization, because some respondents have a tendency

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to report higher on questionnaires than others. Such overestimation could be indicated by our finding that peer victimization as assessed by classmate reports was not significantly associated with FSS at baseline and follow-up. Furthermore, we used longitudinal data, which enabled us to show that school absenteeism is likely a perpetuating factor of FSS. A final strength is that we gathered information about school absenteeism from both the parent and the teacher. Presumably, this gave a more accurate estimation of adolescents' school absenteeism than single-informant data. That teachers did not report exactly the same as the parent when asked about school absenteeism, was reflected in the finding that school absenteeism as reported by the teacher was correlated with peer victimization, whereas school absenteeism as reported by the parent was not.

Despite these strengths, we have to mention several limitations to this study. First, the model we used is a simplification of the complex reality behind the etiology of FSS. We only address the roles of school absenteeism and peer victimization in our models, whereas the amount of factors involved in the development of FSS is extensive (see Berntsson and Gustafsson, 2000 for a review about this topic). However, we believe that inclusion of more factors that are potentially involved in the development of FSS would have increased the risk of chance findings and diminished the comprehensibility of our results. Second, school absenteeism was measured by both parent and teacher report. These assessments might have suffered from report bias, since parents and teachers had to remember how many days their child or student had been absent during the past six months, which is a quite long period. School records would have provided more accurate information about absences, but were not available in our study. The inaccurate measurement of school absenteeism might be one of the reasons why the associations we found were only small. Third, FSS were measured by the YSR, therefore we are not sure that the FSS were not the result of conventional medical conditions. However, the factor analysis showed that we were measuring one underlying construct. In addition, the YSR explicitly stated that the symptoms had to occur without a medical cause or without an obvious reason. Another shortcoming of the YSR is that no information about impairment due to the FSS is obtained, which makes it difficult to assess the severity and clinical relevance of the symptoms. A final limitation is that we performed the peer nominations in about half of the sample. Therefore the group of bullied adolescents was small, so it is not possible to rule out that the lack of a perpetuating effect of school absenteeism on FSS found in bullied adolescents was due to a lack of power. To diminish this power problem, the analyses were repeated in the group of adolescents who self-reported on one of the questionnaires that they had been bullied at school during the past two

years. Results in this group of 450 bullied adolescents were comparable to the results in the 235 bullied adolescents identified by peer nominations. This increases the robustness of our findings

Since we performed our study in a general population in which the mean levels of FSS and school absenteeism were low, only few adolescents may have suffered from severe FSS. Our study is, therefore, more of theoretical than of clinical importance. Clinical intervention studies are needed to examine whether stimulating adolescents with severe FSS to go back to school leads to a better prognosis of FSS. We have shown that school absenteeism is not likely to perpetuate FSS in bullied adolescents. School absenteeism might also not perpetuate FSS in adolescents who experience other stressors at school associated with FSS, for example low school performance (Campo et al., 1999), fear of failure (Merlijn et al., 2003), or sexual abuse (Paras et al., 2009). Therefore, future research is needed to unravel, whether for adolescents who are dealing with school stressors, an intervention might be better focused on solving the problems experienced at school, prior to focusing on reducing school absenteeism.

Part II

The role of biological factors in the etiology of functional somatic symptoms studied by the splitting approach

