

# Family factors and children's disruptive behaviour: an investigation of links between demographic characteristics, negative life events and symptoms of ODD and ADHD

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Received: 10 September 2008 / Accepted: 14 April 2009 / Published online: 2 May 2009  
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## Abstract

**Background** Oppositional defiant disorder behaviours (ODD) and attention deficit/hyperactivity disorder symptoms (ADHD) are common disruptive childhood problems and co-occur to a large extent. In this study, prime questions were the specificity of relations between demographic factors and negative life events, respectively, and ADHD and ODD symptoms, and the role of negative life events in the relations between demographic factors and ODD and ADHD symptoms.

**Methods** Concurrent relations between maternal education, family structure, ethnicity/immigrant background and symptoms of ADHD and ODD were investigated in a Swedish population sample of 1,200 10-year-old children (52% boys). Parents completed questionnaires containing information about demographic characteristics and negative life events and rated the child's ADHD and ODD symptoms using DSM-IV criteria.

**Results** Low maternal education, single/step-parenthood and non-European descent were associated with higher numbers of ODD and ADHD symptoms. Regression analyses identified ethnicity as specifically associated with ODD symptoms and single/step-parenthood as specific to ADHD symptoms, while there was no specificity with regard to negative life events. Experiences of multiple negative life events were more common in families in non-optimal circumstances. Negative life events had mainly additive effects on the level of ODD and ADHD symptoms above effects of the demographic stressors and especially conflicts between adults around the child were related to high symptom levels. The few gender effects pointed to

boys as being more vulnerable than girls to non-optimal family factors expressed in relations to ODD and ADHD symptoms.

**Conclusion** Even in an affluent and egalitarian society, children's life circumstances are related to their mental health. Further, there seems to be some specificity in the demographic risk factors associated with ODD and with ADHD symptoms, while negative life events act as general stressors.

**Keywords** Maternal education · Ethnicity · Family structure · Life events · ODD symptoms · ADHD symptoms

## Introduction

In this study, we investigated the specificity in the relations between demographic factors and negative life events on one hand and symptoms of attention deficit/hyperactivity disorder symptoms (ADHD) and oppositional defiant disorder behaviours (ODD) on the other. Further, we studied the role of negative life events in the relations between the demographic variables and ODD and ADHD symptoms. We also studied the effect of gender on all relations.

Two forms of disruptive behaviour, ADHD (developmentally inappropriate levels of hyperactive, impulsive and inattentive behaviour) and ODD (difficulties with authority and frequent displays of anger), are among the most common childhood problems [2]. Higher levels of ADHD symptoms among boys than among girls is a robust finding [2, 5] while teachers, but not parents, often report higher levels of ODD symptoms among boys [43]. Furthermore, there is considerable co-occurrence of these problems. ADHD and ODD symptoms overlap among 30–90% in community-based and clinical samples [3, 7, 16, 18, 21].

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As regards aetiology, neuropsychological impairments are a common background to ADHD, and ODD symptoms are associated with social adversity, family conflicts and poor parenting [4, 5]. However, a multi-factorial background to ADHD symptoms, including family factors, is increasingly being stressed [46], but it has also been argued that, due to the biological roots of ADHD, family stressors should be more important in the development of ODD symptoms than in the development of ADHD symptoms [25]. Exploring possible specificity in the relations of family factors to ADHD and ODD symptoms should clarify similarities and dissimilarities in their respective background and thus help in the differentiation of these two disruptive problems.

Decades of research attest to the impact of family factors on children's development. In the present study, we have focused on two classes of family factors, demographic characteristics and negative life events. Demographic characteristics describe families along structural variables that define the social contexts in which children's lives are set and operate on a macro-level as influences on children's development. Parental education as an indicator of the family's SES, family structure and ethnicity (i.e., belonging to a minority or a majority group) are among the most important structural variables.

Parental education may play a role as an indicator of human capital. Investment in education usually yields returns in terms of earnings, but education is also a reflection of a parent's cognitive abilities and personal strivings that may benefit a child, for instance in helping him/her to develop language, academic and social skills. In fact, maternal education is the most widely used indicator of a child's SES [58]. Regarding family structure, the presence of two biological parents positively affects the material resources, time and quality that parents can provide for their children. Living in step-parent families affords material benefits over single parent families but may entail emotional strains that have adverse effects on children [59]. Thus, low maternal education or living in a single parent/step-parent family may put the child at disadvantage with regard to his/her successful adaptation. Finally, children in immigrant families who have endured the stress of migration in addition to being part of an ethnic minority are at heightened risk for various mental health problems [48].

Negative life events are potentially stressful events and circumstances that may happen to families and operate within the contexts defined by the structural factors described above. Departing from the family stress model, which links economic hardship to child adaptation via parental mental health problems and family relations [12], we have replaced economic deprivation with low maternal education, immigrant background and living with single/step-parents as risk factors that may set the stage for further strain. Experiencing negative events such as financial

problems, family conflicts, illness and psychological problems in the family [6, 26] could be such strain. Indeed, there have been associations between a high number of negative life events and low SES, and in one study, one-fourth of the families in a large sample of immigrant children had experienced at least one negative life event [36, 53]. It is also possible that socially disadvantaged children are particularly vulnerable to adverse events and prone to react with problem behaviours in the face of extra stressors. However, studies of how demographic variables interact with life events are lacking. Further, such disparate life events as family conflicts and economic strain are often collapsed in studies. To reach a more nuanced understanding of the role of life events for disruptive behaviour, it seems essential to investigate different kinds of life events in relation to ADHD and ODD symptoms.

### Family factors and ODD and ADHD symptoms

#### Demographic factors and ODD and ADHD symptoms

While a large number of studies have reported on family factors and broadband externalizing problems, research on specific diagnoses in relation to demographic factors and negative life events is less abundant. There are a fair number of reports of associations between low parental education/SES and high levels of ADHD symptoms [3, 8, 11, 13, 14, 27, 29, 30, 37, 44, 47], but only few reports about associations of SES to ODD symptoms [3, 49]. However, the connection between low SES and ADHD symptoms may be spurious, as low SES/low maternal education has not been associated with "pure" ADHD, i.e., ADHD with control for co-morbid problems [3, 24]. As regards family structure, children living in single parent and step-families have been found to have higher levels of ADHD symptoms [14, 25, 27, 33, 37, 51] and ODD symptoms [3, 22, 25] compared to children living with two biological parents. Very few studies have investigated associations between immigration and ADHD or ODD symptoms, but in two European studies, ADHD was unrelated to whether parents were foreign-born or not [29, 30].

There is little evidence of specificity in the relations between different demographic variables and ADHD or ODD symptoms [50]. However, few studies have been conducted of SES and family structure that control for both these variables and for co-occurrence of the two symptom types, and none, to our knowledge, have added ethnicity to these predictors.

#### Negative life events and ODD and ADHD symptoms

In the majority of studies, life events have been studied in terms of quantity. Several studies have found associations

between multiple negative life events and high levels of ADHD [13, 14, 24, 25, 31], and ODD symptoms [9, 25, 31, 35], but little is known about the specificity in the relations of negative life events to these two kind of symptoms. Also, the question of whether some events seem particularly harmful has largely been neglected. A few studies, although not specifically focussing ADHD or ODD symptoms, have reported life events reflecting poor family relations to be more closely related to child malfunctioning than are economic problems [23, 57]. Further, parental psychopathology, separation and family conflicts have been related to children's ADHD or ODD symptoms [13, 16, 32, 45]. In line with these findings and the family stress model [12], we expected that recent life events in terms of relational and psychological/personal problems in the family would be especially strongly related to the two kinds of disruptive symptoms.

#### Gender effects on the relations between family factors and ODD and ADHD symptoms

Generally, there is little empirical support for moderator effects of various individual and contextual characteristics on the relations between unfavourable circumstances and psychopathology [28]. However, gender seems to play a role. It has been put forward that boys' higher aggression levels and socialization pressures towards self assertion could make them more prone than girls to react to stressors with externalizing behaviours. These proposals have received empirical support in several studies, see [38, 40] for reviews. Again, there has been less research on specific problems. Low SES/parental education have been associated with ADHD symptoms particularly for boys [15, 51], but a broad measure of social disadvantage showed similar relations to ODD for boys and girls [49]. In the latter study, also atypical family structure (e.g., single and step-parent families) was similarly related to ODD for boys and girls. There have been no investigations, to our knowledge, of gender effects in relations of ethnicity/immigrant background to ADHD and ODD problems. This scarcity applies also to negative life events, although one study found that family adversity was similarly associated with ADHD symptoms for boys and girls [8]. Thus, whether family factors are similarly related to ODD and ADHD symptoms for boys and girls is an relatively open question.

#### Summary

There is considerable knowledge about family factors and ADHD symptoms, but less so about family factors and ODD symptoms, and many issues need further exploration. First, the specificity in relations between demographic

factors and negative life events and these two problems is not well known. Second, the role of negative life events in conjunction with demographic variables has largely been neglected. Finally, reports about gender effects in the relations between family factors and ADHD and ODD symptoms are scarce.

#### Aims

In the present study, a prime aim was to investigate the specificity in the relations between the demographic variables maternal education, family structure, ethnicity/immigrant background, and various kinds of negative life events on one hand, and ODD and ADHD symptoms on the other. As we studied several family factors in relation to the two outcomes, a stressor-outcome specific strategy (i.e., several stressors in relation to several outcomes) was adopted [40]. Further, we investigated the extent to which negative life events, both in terms of the burden of events and in terms of kind of events, added to symptoms, given the demographic circumstances and whether life events interacted with demographic circumstances with regard to symptom levels. We expected that ADHD symptoms would have less strong relations to the demographic variables than would ODD symptoms, that social disadvantage sets the stage for negative life events, and that life events concerning personal and relational family problems in particular would add to disruptive symptoms. We also studied gender effects in the above relations, but in view of the scarce and somewhat contradictory findings, we did not formulate specific hypotheses.

## Methods

### Procedure and participants

A population-based register, which included all residents in two regions in mid Sweden, was used for recruiting a random sample of 2,000 children 10 years of age. Age 10 was chosen because this is an age when the child's disruptive behaviours have usually stabilized, the transition into school has been well made, but the child has not yet reached puberty. A questionnaire pertaining to the child's psychosocial functioning including questions about ADHD and ODD symptoms and questions about demographic variables and negative life events was mailed to parents in the spring of the child's 10th year. The response rate was 60.4% after two reminders. The questionnaires were completed by mothers (78%), by fathers (12%) and by the parents jointly (10%).

The participants were 1,206 10-year-old children (52% boys),  $M = 10$  years 2 months ( $SD = 3$  months).

Forty-four percent had one sibling, 48% had two or more siblings and 7% were only children. Maternal age was  $M = 40$  years ( $SD = 5$ ) and paternal age was  $M = 42$  years ( $SD = 6$ ). Maternal education was fairly high and most children lived with both biological parents and were of Swedish descent, see Table 1. Eighty-one percent of the children in single/step-parent families had lived with this family composition for at least 2 years. In about 9% of the families, both parents were born outside Sweden, most of them outside Europe, while 12% had one Swedish and one foreign-born parent. Thirty-eight percent of the parents born in a European country came from Western Europe, and the rest came from Eastern Europe, former Yugoslavia and Turkey. Among those born outside Europe, 72% came from the Middle East (Palestine, Iran, Iraq, Lebanon and Syria) while the remaining parents came from different countries in Asia, Africa, Indonesia and South America. Ten percent of the children with one Swedish-born and one foreign-born parent, and 31% of the children with both parents born outside Sweden were themselves foreign-born; however, all but 16 of these children had immigrated before 5 years of age. A few children missed data on each measure with the exception of ethnicity. 6.9% of the parents had not provided information about their country of birth. Further, a higher number of parents of children with a Scandinavian family name than parents of children with a non-Scandinavian family name had responded,  $\chi^2(1997,1) = 5.78$ ,  $p < 0.05$ . The sample was similar to the Swedish population with regard to maternal age, family structure and number of siblings, but children with both parents born outside Sweden were underrepresented (9.3 vs. 15%), as were mothers with <9 years of schooling, 5.5 versus 9% [55–57].

## Measures

### ADHD symptoms and ODD symptoms

ADHD symptoms were measured using the ADHD Rating Scale IV, an 18-item measure reflecting DSM-IV-criteria [2], which is well validated and extensively used within ADHD research [19]. Nine items measure inattention and nine items measure hyperactivity/impulsivity. Each item was rated on a scale ranging from 1 (“never or rarely”) to 4 (“very often”). Cronbach’s alpha was  $\alpha = 0.94$  for the whole scale. A symptom is considered as present if the child receives a score of  $\geq 3$ . Symptoms of ODD were studied using the 8 DSM-IV symptom criteria [10] in the same format as described for ADHD symptoms, Cronbach’s  $\alpha = 0.88$ , and as before, a score  $\geq 3$  indicated that the symptom was present. Scale scores were computed as the sum of symptoms.

### Maternal education

Mothers were asked to report the highest educational level attained, which was categorized in three categories: the 9-year compulsory school, secondary school (10–12 years of schooling) or a college or university degree.

### Family structure

Parents were asked about which adults the child was living with: the two biological parents, alternating between mother and father, only mother or only father or parent and

**Table 1** Overview of variables for boys ( $n = 584$ –630) and girls ( $n = 539$ –576)

Variable	Boys $M(SD)$ range	Girls $M(SD)$ range	(Df) $t$ or $\chi^2$
ODD symptoms	0.51(1.30) 0–8	0.65(1.40) 0–9	$t(1198) -1.78$
ADHD symptoms	2.31(3.71) 0–18	1.40(2.80) 0–18	$t(1163) -4.85^{**}$
Number of negative life events	1.29(1.47)	1.24(1.57)	$t(1198) 0.57$
<i>Maternal education</i>	(%)	(%)	$\chi^2 1.31$
≤9 years of schooling	4.8	6.2	
11–12 years of schooling	55.7	53.6	
College degree	39.5	40.2	
<i>Family structure</i>	(%)	(%)	$\chi^2 0.02$
Two biological parents	85.8	85.7	
Single parent	8.0	8.2	
Parent and step-parent	6.2	6.1	
<i>Ethnicity</i>	(%)	(%)	$\chi^2 0.91$
Parents born in Sweden	78.3	78.5	
One parent born in Sweden, one parent foreign-born	12.7	11.8	
Parents born in Europe	2.4	3.3	
Parents born outside Europe	6.5	6.4	

Bold values denote significant results

\*\*  $p < 0.01$

step-parent. Eleven percent of the children lived approximately half the time with their biological mother and father, which is a not uncommon arrangement for separated parents in Sweden, and has been so for the last 20 years. As children that lived full time with both parents and children that alternated did differ in neither ODD nor ADHD symptoms,  $t_s < 1.25$ , the latter were considered to live with both parents.

#### *Immigrant background/ethnicity*

During the last decades, people have immigrated to Sweden from many countries, but excepting immigrants, the Swedish population is homogenous with regard to ethnicity and religion. Thus, a non-Swedish ethnic origin in children is more or less synonymous with having one or both parents born outside Sweden, but the immigrant population is ethnically highly heterogeneous. For the sake of brevity, we will refer to immigrant/ethnic background as ethnicity in the following. Based on questions about each parent's country of birth, the children were classified as being of Swedish origin, i.e., both parents were born in Sweden, as being of European origin, i.e., both parents were born in a European country outside Sweden, as being of non-European origin, i.e., both parents were born outside Europe, and as being of mixed origin, i.e., one parent was born in Sweden and one parent was foreign-born. This group was not categorized as to European–non-European descent of the foreign-born parent. It should be pointed out that many, probably the majority of immigrants from non-European countries to Sweden are war or political refugees.

#### *Negative life events*

In an adaptation of an instrument by Masten and co-workers [41], parents informed in a yes/no format about the occurrence of 13 negative or ambiguous life events that were beyond the child's control. The negative events were medical problems of the child, medical or psychological problems of close relatives, death of close relatives, separation between parents, conflicts between adult family members, parents' work related or financial problems and a new adult having moved in. It was stressed in the instructions to parents that the events should have taken place/been initiated some times during the last 2 years, but still some events could represent long-term or chronic conditions, e.g., financial problems or family conflicts and some are discrete events, e.g., parental separations. The number of yes-answers measured the child's burden of life events. We also wanted to study the impact of specific categories of life events. As the literature suggests that family conflicts and family members' own problems are connected with children's functioning [13, 16, 32, 45, 60],

we summed two items addressing conflicts between adult family members/relatives, termed "family conflicts" and two items referring to medical or psychological problems in family members termed "family members' personal problems". To capture events of a social nature, we summed three items on financial problems, parents' job loss and parents' work related problems, termed "social problems". The items about parent's separation and a new adult moving in with the family, discrete events that are potential risk factors [23] were used as single-item indicators. The items referring to deaths of parents or siblings were not used because this had happened to very few (13) children.

#### *Statistical analyses*

The main research issues were investigated using hierarchical regression analyses. The two outcome variables ODD and ADHD symptoms suffered from slight skewness, 2.87 and 2.31, but considerable kurtosis, 8.61 and 5.38, respectively. Both variables were square root-transformed rendering the distributions to be within the acceptable range [34]. The transformed outcome variables were used in the regressions. In analyses exploring the specificity in the relations between demographic variables and negative life events on the one hand, and ODD symptoms or ADHD symptoms on the other hand, gender and ADHD or ODD symptoms were entered in a first step, in a second step, the other three demographic variables or a life event variable, respectively, were entered, and in a final step, interaction terms of gender and each demographic/life event variable was entered. In the regressions investigating additive and interactive effects of negative life events and demographic variables we allowed for shared variance of ADHD and ODD symptoms, to obtain ecological validity when dealing with these often co-occurring symptoms. Here, the issue was effects of life events above, or in interaction with, effects of demographic variables. First, to explore whether any specific life events were associated with ODD and ADHD symptoms, we pitted the five kinds of life events against each other in a second step controlling for the demographic variables. Second, to explore additive and interactive effects, separate analyses were performed with each life event variable (the summed life event and the different kinds of life event; six regressions). In these analyses, the first step included demographic variables, a second step included the life event variable, in a third step interactions between each of the four demographic variables and the life event variable was entered, and in a final step, the three-way interactions of gender  $\times$  each demographic variable  $\times$  the life event variable was added, three interaction terms per analysis. As recommended, variables were centred before entering and significant interaction

**Table 2** ODD and ADHD symptoms in relation to maternal education, family structure and ethnicity

	ODD symptoms <i>M(SD)</i>	ADHD symptoms <i>M(SD)</i>
Maternal education		
≤9 years of schooling	1.23(1.89)	3.52(4.83)
10–12 years of schooling	0.55(1.33)	1.83(3.25)
College degree	0.55(1.29)	1.71(3.13)
Df, <i>F</i>	2,1187, <b>7.89**</b>	2,1192, <b>8.76**</b>
Significant group differences	1 > 2, 3	1 > 2, 3
Family structure		
Two biological parents	0.53(1.29)	1.64(3.04)
Single parent	0.83(1.51)	3.19(4.24)
Parent and step-parent	0.85(1.62)	2.78(4.08)
Df, <i>F</i>	2,1189, <b>4.05*</b>	2,1195, <b>13.56**</b>
Significant group differences		1 < 2, 3
Ethnicity		
Swedish-born parents	0.47(1.21)	1.63(2.99)
Swedish- and foreign-born parent	0.66(1.36)	2.32(3.67)
Parents born in Europe	1.03(2.18)	2.03(2.90)
Parents born outside Europe	1.73(2.07)	4.13(5.20)
Df, <i>F</i>	3,1102, <b>20.69**</b>	3,1107, <b>13.99**</b>
Significant group differences	1, 2 < 4	1, 2, 3 < 4

Bold values denote significant results

\*  $p < 0.05$ ; \*\*  $p < 0.01$

effects were interpreted according to Aiken and West [1]. Significant interactions are presented in figures, using a dichotomization of each category of life events as having occurred or not.

## Results

### Preliminary analyses

As seen in Table 1, boys had a significantly higher number of ADHD symptoms than girls. There was a moderate relationship between ODD and ADHD symptoms,  $r = 0.58$ ,  $p < 0.01$ .

Children of mothers with ≤9 years of education had more ODD and ADHD symptoms than had children of mothers with more years of education, see Table 2. Thus, the sample was dichotomised into mothers with ≤9 years of schooling (termed “Low education”) and mothers with a longer education (termed “Not-low education”). Effect sizes for these group differences in symptoms were small,  $d = 0.47$  and  $0.48$ . There were also effects of family structure. Lower symptom levels were found in families with two biological parents than in other family types, at small effect sizes,  $d = 0.23$  and  $0.41$ . This dichotomy was used in further analyses. Finally, children whose parents were born outside Europe had a higher number of especially ODD symptoms,  $d = 0.81$  but also of ADHD symptoms,  $d = 0.57$ , than children of parents with other origins, and a

dichotomous variable with children of non-European descent vs. the other three groups collapsed was used. Thus, as one could expect from the literature, children of low-educated mothers, in single/step-parent households or of non-European descent had elevated symptom levels.

There were modest relations between the number of negative life events and ODD and ADHD symptoms,  $r = 0.20$  and  $0.18$ ,  $p < 0.01$ . Low maternal education, a non-European descent and single/step-parenthood were associated with a particularly high load of negative life events,  $p < 0.05$ . Low maternal education and a non-European descent were associated with high incidences of family conflicts, social problems and parental separations,  $p < 0.05$ . Single/step-parenthood was associated with high incidences of family conflicts, family members’ personal problems and social problems,  $p < 0.05$ .

Specificity of relations between demographic factors, negative life events and ODD and ADHD symptoms

First, we investigated whether maternal education, family structure or ethnicity were uniquely related to ODD or ADHD symptoms and whether gender moderated the relationship between these variables and symptom levels. As seen in Table 3, ethnicity contributed significantly to ODD symptoms and family structure contributed significantly to ADHD symptoms. There were two interaction effects of gender and other demographic variables on ODD symptoms. Low maternal education was associated with

**Table 3** Maternal education, family structure, and ethnicity as predictors of ODD and ADHD symptoms controlling for gender and ODD and ADHD symptoms, respectively, and interaction effects of each predictor with gender

Predictors	ODD symptoms		ADHD symptoms	
	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$
Step 2: demographic variables	<b>0.02**</b>		<b>0.01**</b>	
Maternal education		0.02		0.03
Family structure		-0.00		<b>0.10**</b>
Ethnicity		<b>0.15**</b>		0.03
Step 3: interaction terms	<b>0.01**</b>		0.00	
Maternal education $\times$ gender		<b>0.06*</b>		-0.03
Family structure $\times$ gender		<b>-0.07**</b>		0.02
Ethnicity $\times$ gender		0.03		0.04

Bold values denote significant results

\*  $p < 0.05$ ; \*\*  $p < 0.01$

high numbers of ODD symptoms particularly for boys,  $\beta = 0.11$ ,  $p < 0.05$ , compared to girls,  $\beta = 0.00$ ; however, living in a step/single parent family was associated with high levels of ODD symptoms more for girls,  $\beta = 0.07$ ,  $p < 0.01$  than for boys,  $\beta = -0.03$ , see Figs. 1 and 2.<sup>1</sup>

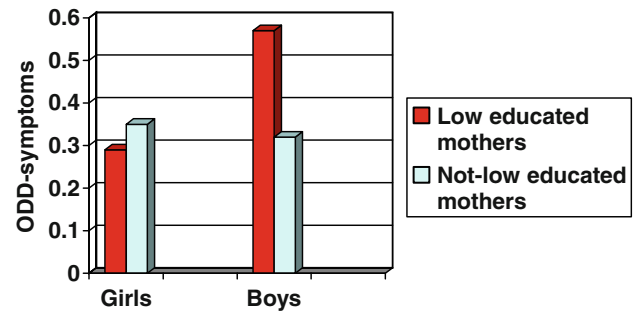
A higher number of negative life events was associated with higher levels of both ODD and ADHD symptoms, controlling for gender and each other,  $\beta = 0.07$  and  $\beta = 0.11$ ,  $p < 0.01$ . In separate regressions with each of the five different kinds of life events as predictor, family conflicts, family members' personal problems, social problems and parental separation contributed significantly to both ODD and ADHD symptoms,  $\beta_s > 0.05$ ,  $p < 0.05$ . A new adult having moved in did not contribute significantly to ODD or ADHD symptoms,  $\beta_s < 0.04$ , ns. None of the interaction terms of gender with each life event variable was significant,  $\beta_s < 0.04$ .

#### Demographic factors, negative life events and ODD and ADHD symptoms

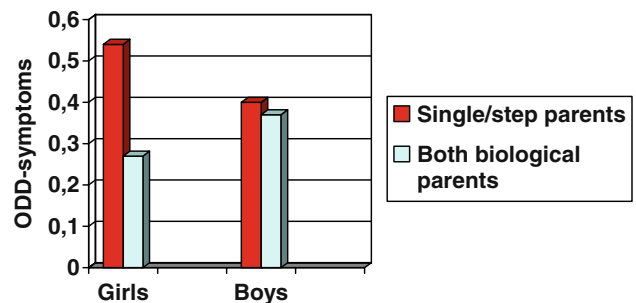
To investigate our second question with regard to life events, namely whether life events added to or interacted with demographic factors with regard to the level of disruptive symptoms, a series of regression analyses were performed, see "Methods". First, ODD and ADHD symptoms were regressed on the summed life event variable controlling for the demographic variables. The burden of life events added significantly in both analyses,  $\beta = 0.13$  and  $\beta = 0.15$ ,  $p < 0.01$ . None of the two-way or three-way interactions was significant,  $p > 0.05$ .

The issue whether any specific life events were associated with ODD and ADHD symptoms was investigated by

<sup>1</sup> Please notice that all figures present transformed symptom variables.



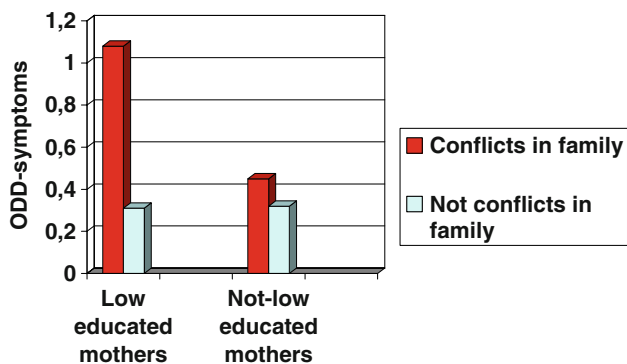
**Fig. 1** Interaction of gender and maternal education with regard to the level of ODD symptoms



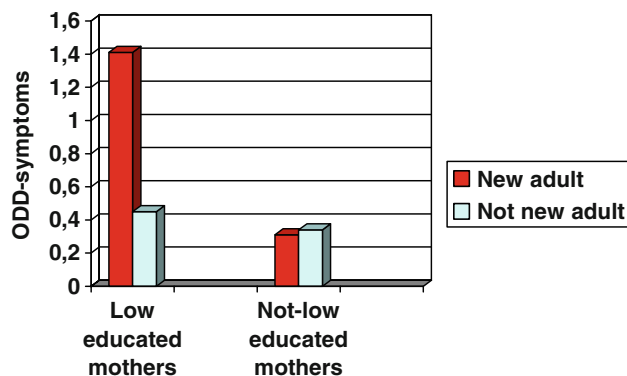
**Fig. 2** Interaction of gender and family structure with regard to the level of ODD symptoms

pitting the five kinds of life events against each other, controlling for the demographic variables. Family conflicts gave a significant contribution to both ODD and ADHD symptoms,  $\beta = 0.08$ ,  $p < 0.05$  and  $\beta = 0.09$ ,  $p < 0.01$ , family members personal problems contributed to ODD symptoms,  $\beta = 0.07$ ,  $p < 0.05$  and social problems were associated with ADHD symptoms,  $\beta = 0.07$ ,  $p < 0.05$ .

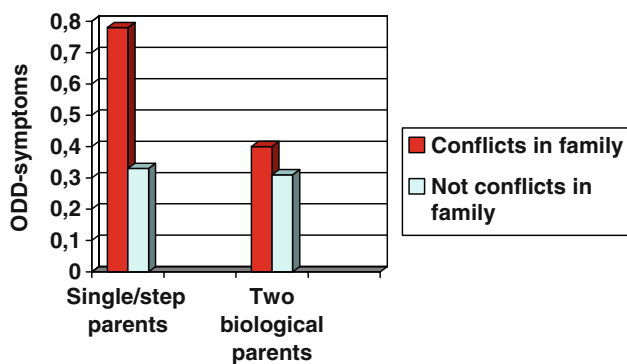
Finally, interactive effects were studied in separate analyses on each kind of life event. There were four two-way interaction effects and one three-way interaction effect on ODD symptoms, and one three-way interaction effect on ADHD symptoms. Family conflicts interacted with maternal education and with family structure,  $\beta = 0.07$  in both cases,  $p < 0.05$ . For children with low-educated mothers and for children living in single/step-parent families, family conflicts were associated with higher symptom levels, which was not the case for children with not-low-educated mothers and for children living with both biological parents, see Figs. 3 and 4. The moving in of a new adult interacted with maternal education and with ethnicity,  $\beta = 0.21$  and  $-0.09$ ,  $p < 0.01$ . For children with low-educated, but not for children with not-low-educated mothers, the moving in of a new adult was associated with higher symptoms levels, see Fig. 5. However, for children of non-European descent, the moving in of a new adult was associated with lower symptom levels, while there was no such effect for children of European descent, see Fig. 6.



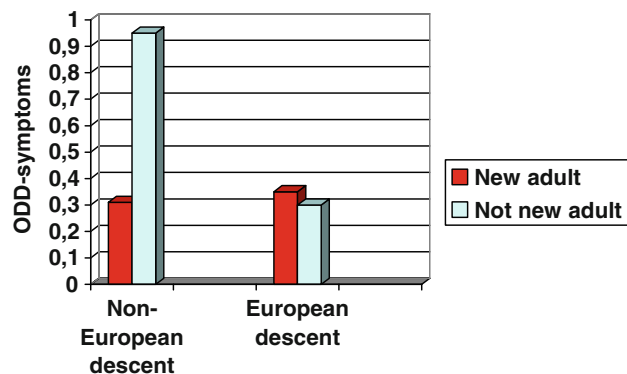
**Fig. 3** Interaction of maternal education and conflicts in the family with regard to the level of ODD symptoms



**Fig. 5** Interaction of maternal education and a new adult having moved in on the level of ODD symptoms



**Fig. 4** Interaction of family structure and conflicts in the family with regard to the level of ODD symptoms

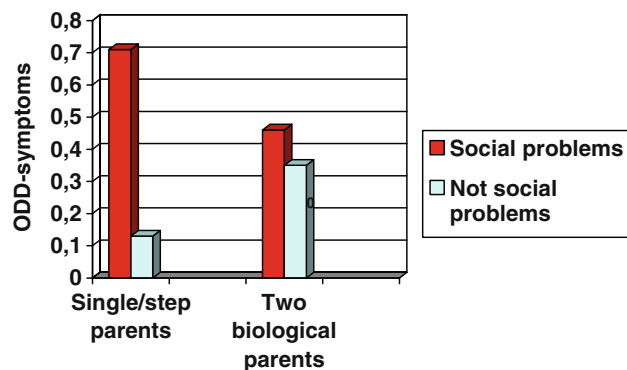


**Fig. 6** Interaction of ethnicity and a new adult having moved in with regard to the level of ODD symptoms

The interaction effects of gender × family structure × social problems on ODD and on ADHD symptoms,  $\beta = 0.08, p < 0.05$ , and  $\beta = 0.11, p < 0.01$ , indicated that only for boys, was the combination of living in single/step-parent families and social problems associated with high symptoms levels, see Figs. 7 and 8.

**Discussion**

In this study, low maternal education, single/step-parent-hood and non-European descent were associated with high levels of ODD and ADHD symptoms. The regressions demonstrated that ethnicity was specifically associated with high levels of ODD symptoms and single/step-parent-hood was associated with high levels of ADHD symptoms. In line with expectations, experiences of negative life events were more common in families in less advantageous circumstances. Further, negative life events, especially family conflicts, had additive effects on the level of ODD and ADHD symptoms above effects of the demographic factors, but there were few moderating effects of demographic factors and negative life events. The few gender



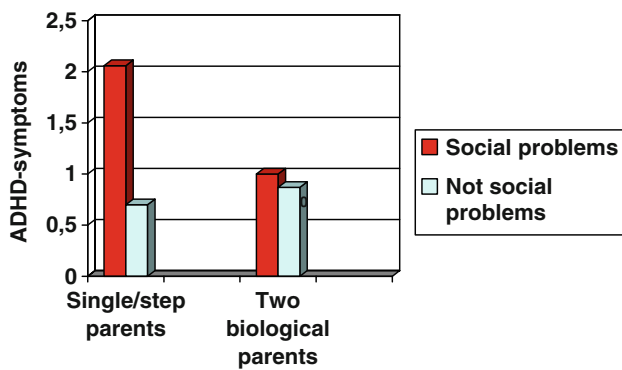
**Fig. 7** Interaction of family structure and social problems for boys with regard to ODD symptoms

effects pointed to boys as being more vulnerable to family stress than girls.

Demographic factors, negative life events and ODD and ADHD symptoms

In line with the literature, maternal education, family structure and ethnicity all had relations with disruptive





**Fig. 8** Interaction of family structure and social problems for boys with regard to ADHD symptoms

behaviour. It was the about 5.5% who had mothers with an education of 9 years or less, the 15% living in single/step-parent families, and the 6.5% whose parents had immigrated to Sweden from countries outside Europe who had the highest symptom levels of both kinds. These effects were at most moderate, but it is noteworthy that demographic factors were related to children's adaptation also in an affluent society that embraces egalitarian ideals and welfare for all.

Stressor-outcome specificity was demonstrated in two of three cases, as non-European descent was a specific predictor of ODD symptoms and living with single/step-parents was a specific predictor of ADHD symptoms in the regressions. Possibly, it was our control for both co-occurrence of symptoms and the other demographic variables that identified the specificity of demographic correlates, which somewhat contradicts prior research [50]. That non-European descent was not a specific correlate to ADHD symptoms is in agreement with the absence of relations between immigration and ADHD found in the two prior studies that have looked into this question [29, 30]. Thus, in the absence of ODD symptoms, immigrant background may not entail high levels of impulsive and inattentive behaviour. Low maternal education seems to be a non-specific correlate to disruptive problems, but of less unique importance than the other two demographic variables, as seen in the regressions. There were no indications of specificity regarding negative life events. A high number of such events as well as four of the five kinds of events were associated with both kinds of symptoms, controlling for each other, i.e., acted as general stressors with regard to these disruptive problems.

How can we understand the finding that non-European descent was associated with norm-breaking and oppositional behaviour? As mentioned earlier, many immigrants to Sweden are political refugees, often having suffered warfare and various forms of persecution. This is especially true of immigrants from the Middle East, who constituted

72% of the group with non-European descent. The remainder came from various countries in Asia, Africa, Indonesia and South America. It is a limitation of this study that we could not perform more fine grained analyses of nationality, but such sub-grouping requires a very large sample if it is population based. Our results point to the need for studies that recruit participants representing various immigrant groups.

Whether the risk for ODD symptoms lies in the strains connected with belonging to a minority immigrant group or in the mainly refugee background, we can not know. Both these circumstances may feed anger, frustration and estrangement in the families, which could take an outlet in oppositional and norm-breaking behaviour in the children. In a study of adult recent refugees from the Middle East in Sweden, resettlement stress (e.g., social/economic strain, alienation, discrimination and violence) were found to be the most important factors behind poor mental health, but also pre-settlement trauma contributed [39]. In the present study, both pre- and post-migration experiences could play a role even if mainly affecting parents. Transmission of parents' traumatic experiences to children has been demonstrated [17]. Our results underscore the importance of identifying factors that may explain how children come to develop problem behaviour in response to migration.

Contrary to our expectations, ADHD symptoms, which are highly biologically determined [5] were not less related to demographic factors than was ODD symptoms, but our results support findings that SES may not be associated with ADHD per se [3, 24]. Controlling for co-morbidity and other demographic factors maternal education was not significant. Living in a step/single parent family came out as the strongest predictor. Which elements in these families that relates to ADHD symptoms can only be speculated on. Perhaps, children in single/step-parent families have numerous interactions with people such as the other biological parent and step siblings, providing a stimulus rich environment that may provoke hyperactive and inattentive behaviour. Hypothetically, our results may also express some gene-environment interaction. Parents who themselves have ADHD problems tend to have partner problems [20], which may lead to more than one marriage. Prospective studied with repeated measurements of predictors and outcomes are, however, needed to disentangle the direction of effects.

#### *Additive and interactive effects of negative life events and demographic factors on symptom levels*

A second question regarding life events was the role of such events in the relations between socio-demographic

circumstances and disruptive behaviours. Departing from the family stress model, we hypothesized that non-optimal life circumstances could put families at heightened risk for negative life events. That was what we found, i.e., single/step-parenthood, non-European descent and low maternal education were connected with a higher number of negative events. In contrast to the family stress model, which linked economic hardship to child adaptation via parental mental health problems and family relations, we did not test for mediational effects of life events in our cross-sectional design but we investigated additive and moderating effects. As other studies of life events and children's adaptation have found [14, 24, 42, 57] the effects on ODD and ADHD symptoms were mainly additive, i.e., the presence of these events on top of unfavourable circumstances was associated with higher symptom levels. Conflicted relations appeared most important, as this category gave a significant contribution controlling for other kinds of events to both ODD and ADHD symptoms, and family members' personal problems contributed to ODD symptoms. Thus, as was suggested in the introduction, it seems to be the well-being and interpersonal harmony of those around a child that most relate to his or her functioning. However, also social problems contributed to ADHD symptom levels. The processes behind this relationship can only be guessed at, but possibly, such events may give rise to disquiet and changes of family routines to which children may react with attention problems and impulsivity.

Our question whether non-optimal circumstances would interact with negative events was answered in the negative, as only 4 of 40 moderation analyses were significant. However, somewhat unexpectedly, for children of non-European descent, the moving in of a new adult was associated with lower levels of ODD symptoms, indicating a buffering effect. In sum, our results indicate that an elevated risk of experiencing negative life events may be one mechanism by which demographic variables affect children's disruptive behaviour, and mainly, these effects seem to be additive.

#### *Gender effects*

Our final question addressed gender effects on the relations between family factors and the two disruptive problems. Demographic risk factors related similarly to ADHD symptoms for boys and girls, but in line with the literature on broad band externalizing problems [52, 59], the relations between low maternal education and ODD symptoms applied particularly to boys. In contrast, living in step/single parent families was associated with high levels of ODD symptoms particularly for girls. There were some gender effects regarding the combination of family structure and life events, indicating that for boys, but not for

girls, living in single/step-parent families that were struck with social problems was associated with high levels of disruptive symptoms. On the whole, considering the large number of analyses, there were few gender effects, but boys seemed to be somewhat more sensitive than girls to non-optimal life circumstances.

#### **Conclusions**

First, some limitations of the present study should be mentioned, the most important being that only parents provided ratings. We do not know to what extent the behaviour problems penetrated out-of-home contexts. This is a problem mainly with regard to ADHD, for which the manifestation of symptoms in multiple contexts is important [2]. For ODD symptoms, parental information is seen as sufficient. The rigorous cut-off for symptoms (see "Methods") should ascertain that the problems these children had were not trivial. Further, method variance may have inflated the relations between some of the life events and disruptive symptoms. Parents experiencing family conflicts and medical and psychological problems could be inclined to see their children's behaviour as particularly problematic. Third, the relatively low response rate (60.4%) make for caution in drawing conclusions about population symptom levels—possibly, parents with highly symptomatic children may not have responded. Also, children with immigrant background and with low-educated mothers were somewhat under represented in the study, perhaps because these parents did not respond, but this should, if anything, have deflated the associations we found between maternal education and ethnicity and the two kinds of disruptive behaviour. Fourth, the cross-sectional design precluded proper mediational analyses, which could have shed light on pathways in the associations. Fifth, there are numerous important family factors we did not include, such as parental psychopathology and domestic violence.

This being said, a conclusion of the study is that, even in an affluent and egalitarian society like Sweden, children's life circumstances are related to their mental health. Disruptive behaviours are not equally distributed in the child population. Second, there seems to be some specificity in the demographic risk factors associated with ODD and with ADHD symptoms, while negative life events, particularly family conflicts, act as general stressors. As this study is based on a fairly large, age homogenous representative sample, these results could be generalized to the population of Swedish 9–10 year olds. However, demonstrating relations between demographic and behavioural phenomena is not sufficient. To advance knowledge and to guide intervention efforts, an important task for developmental

research is to try to identify the social and psychological processes that account for the relations between demographic factors and children's behaviour problems. Our findings indicate that a higher exposure to negative life events may be a part of this puzzle.

**Acknowledgments** This research was supported by a grant from the Swedish Council for Working Life and Social Research.

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