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ORIGINAL ARTICLE

Disruptive behavior in childhood and socioeconomic position in adulthood: a prospective study over 27 years

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Abstract
Objectives We examined whether childhood disruptive behavior (aggressiveness, hyperactivity and social adjustment), predicts adulthood socioeconomic position (SEP), i.e., educational level, occupational status and income and social mobility.
Methods Social mobility was defined by comparing the participants' adulthood socioeconomic position with that of their parents ("intergenerational social mobility"). The subjects were derived from a population-based cohort study ($N = 3{,}600$) and our sample consisted of 782 participants (403 women) aged 3–9 years at baseline and were followed until they were aged 30–36.
Results High childhood aggression associated with low educational level and occupational status suggesting an early beginning negative tracking of aggressive behavior. High hyperactivity and poor social adjustment predicted adulthood low occupational status proposing a more slow effect on adulthood SEP. No associations between disruptive behavior and income-related mobility were found, but high hyperactivity associated with educational downward drift, whereas high aggression and low social adjustment related with occupational downward drift.
Conclusions Results suggest that childhood disruptive behavior may have long-lasting negative effects. In order to reduce the adverse effects of disruptive behavior, early intervention of problematic behavior becomes salient.

Keywords Disruptive behavior · Education · Health selection · Income · Intergenerational social mobility · Occupation · Prospective study · Socioeconomic position (SEP)

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Introduction

Childhood disruptive behavior is characterized by impulsivity, inattention, over-activity, and tendency to antisocial acts. These traits have been shown to appear early in life and have significant continuity over the life course (Hinshaw 1992b). The co-occurrence of specific traits of disruptive behavior is high and they are relatively refractory to typical interventions (Hinshaw 1992b). The diagnostic and statistical manual of mental disorders (DSM-IV-TR) (American Psychiatric Association 2007) divides disruptive behavior into social and cognitive components that are conceptually distinctive although some overlap exists (Hinshaw 1992a, b). The social component of disruptive behavior comprises aggressiveness, opposition and antisociality, while the cognitive component incorporates hyperactivity, inattention, and impulsivity (Vitaro et al. 2005).

The far-reaching influence of childhood disruptive behavior with poor educational career and social outcomes has been demonstrated in several longitudinal studies. Childhood disruptive behavior associates with lower reading ability (Berger et al. 1975; Heiervang et al. 2001), poor school performance (Alatupa et al. 2011; Hinshaw 1992a, b; Tremblay and Masselink 1992), underachievement, i.e., achievement that is below one's actual capacities (Alexander et al. 1997; Asendorpf et al. 2008), higher school drop-out rates (Alexander et al. 1997; Asendorpf et al. 2008; Bradshaw et al. 2010; Vitaro et al. 2005), and with lower college attendance rates (Hinshaw 1992b).

Childhood disruptive behavior also relates with poor health and social outcomes later in life. Disruptive children are more likely to start smoking (Otten et al. 2009) and consume alcohol as teenagers (King et al. 2004) and as adults (Englund et al. 2008). In adulthood, they also tend to develop psychiatric disorders such as anxiety and antisocial personality disorders (Sourander et al. 2007), and they are at higher risk to commit criminal offences (Sourander et al. 2006).

Childhood disruptive behavior may be one of the early-life factors that select individuals into educational and occupational careers, as suggested by the "selection hypothesis" (or drift hypothesis) (Blane et al. 1993). Individuals with pre-existing illness or difficult behavioral style are more likely to drift down the social scale, whereas those with better health or social capital tend to move upwards. Indeed, disruptive behavior has been shown to predict educational outcomes such as poor school performance (Alatupa et al. 2011; Tremblay and Masselink 1992) and dropping out of school (Alexander et al. 1997; Asendorpf et al. 2008; Vitaro et al. 2005). Early personality further associates with unemployment (Hintsanen et al. 2009) and with poor health behaviors (Pulkki et al. 2003) in adulthood.

There is a scarcity of nationally representative longitudinal studies that would have examined the impact of childhood disruptive behavior on various socioeconomic position (SEP) outcomes, i.e., education, occupation and income, and intergenerational social mobility, simultaneously. Most of the studies have examined the impact of selected components of adulthood SEP, such as educational level or educational attainment (Vitaro et al. 2005), occupational status or attainment (Caspi et al. 1998; Dubow et al. 2006; Newman et al. 1997), or both education and occupation (Asendorpf et al. 2008; Caspi et al. 1987; Dubow et al. 2006; Kokko and Pulkkinen 2000) as the outcome variables.

To address some of the problems of previous studies, such as restricted samples (Asendorpf et al. 2008; Caspi et al. 1987, 1998; Dubow et al. 2006; Kokko and Pulkkinen 2000), limited indicators of adulthood SEP (Asendorpf et al. 2008; Caspi et al. 1987, 1998; Dubow et al. 2006; Kokko and Pulkkinen 2000; Newman et al. 1997; Vitaro et al. 2005), or short-term follow-up (Asendorpf et al. 2008; Caspi et al. 1998; Newman et al. 1997), we examined the prospective association of childhood disruptive behavior with adulthood educational level, occupational status and income measured 27 years later in a nationally representative population-based sample of Finnish children. Childhood disruptive behavior was measured in age cohorts from 3- to 9-year-olds, and the same individuals were examined for educational level, occupational status, and income in adulthood when they had reached the age 30 to 36 years.

Disruptive behavior may have different impact on different indicators of socioeconomic position (SEP) which traditionally comprises educational level, occupational status and income. Education is usually achieved first and it strongly predicts later employment and income (Lynch and Kaplan 2000; Smith et al. 1998). Because education may "pave the way" to future career, we will hypothesize that education serves as a mediating link between childhood behaviors and adulthood occupational and income-related outcomes.

Because socioeconomic position tends to be transmitted across generations (Blane 2006), we examined whether childhood disruptive behavior predicts future socioeconomic position when the childhood socioeconomic circumstances were taken into account. Additionally, we examined whether childhood disruptive behavior is associated with upward or downward drift in the social ladder by comparing the participants' adulthood socioeconomic position with that of their parents (called "intergenerational social mobility"). Individuals who have achieved a higher socioeconomic position than their caregivers are usually called "upwardly mobile", while those who have drifted down in the socioeconomic hierarchy are called "downwardly mobile". Those following the SEP of family of origin may be called "socioeconomically stable". Several studies with prospective designs has shown that childhood internalizing and externalizing problems as well as explosive temper tantrums associate with less upward social mobility and an increased likelihood of downward social mobility (Stansfeld et al. 2011; Caspi et al. 1987). In order to examine whether those from the low end of the SEP categories differ in their childhood disruptiveness, we used the categorization low versus high educational level, occupational status and income level. The purpose of this categorization was also to point out the developmental path of such socioeconomic risk factors that have previously been related to health.

Methods

Participants

Participants were from a prospective, ongoing population-based cardiovascular risk in Young Finns study (referred to as the Young Finns study) originally focusing on the developmental risk factors of coronary heart disease. At the baseline in 1980, a stratified random sample of 3,596 children and adolescents from age cohorts of 3, 6, 9, 12, 15, and 18 years were selected. In each area urban and rural girls and boys were randomly selected on the basis of their personal social security number from the Social Insurance Institutions' population register, which covers the whole population of Finland (Raitakari et al. 2003). The study plan was approved by local ethical committees of all participating universities. All subjects gave written consent and the study was conducted in accordance with the Helsinki declaration.

We focused on children from the three youngest age cohorts, i.e., children who were 3, 6, and 9 years old at the baseline in 1980 (eligible $N = 1{,}806$). There was 1,024 drop-outs due to incomplete data in all of the measures. The final study group consisted of 782 participants (403 women, 379 men).

Attrition analyses showed that compared to the excluded the included participants were more often women than men (44.4 vs. 42.2 %), had lower levels of aggression (means 1.06 vs. 1.07), lower hyperactivity (means 2.08 vs. 2.17), and higher social adjustment (means 2.50 vs. 2.35) in childhood. The participants included in the study had achieved a higher educational level (77.5 vs. 66.2 %, $\chi^2 = 15.512$, $df = 1$, $p < 0.001$), higher occupational status (48.2 vs. 36.5 %, $\chi^2 = 23.334$, $df = 1$, $p < 0.001$) and higher income (85.6 vs. 60.9 %, $\chi^2 = 80.841$, $p < 0.001$) than participants who were excluded. The included participants came from a higher SEP of origin than the excluded participants (means of parental education (46.4 vs. 40.7 %, $\chi^2 = 18.642$, $df = 1$, $p < 0.00$), occupational status (46.3 vs. 40.7 %, $\chi^2 = 5.526$, $df = 1$, $p = 0.019$), and income (47.5 vs. 36.0 %, $\chi^2 = 17.687$, $df = 1$, $p < 0.001$).

All childhood measures were reported by the participants' parent in 1980. Educational level, occupational status and income in adulthood were reported by participants in 2007 when the respective cohorts were 30, 33, and 36 years of age.

Measures

The dimensions of disruptive behavior were aggression, hyperactivity and social adjustment. These were assessed by a questionnaire derived from the health examination survey (Wells 1980). This non-standardized questionnaire was originally designed to screen children with potential behavioral problems, and can be completed by non-professionals (by persons without background in psychology). The scales have been tested for construct validity (Katainen and Räikkönen 1999; Räikkönen et al. 2000) and predictive validity (Pesonen et al. 2003; Pulkki-Råback et al. 2005) in relation to similar constructs. Table 1 presents the items of aggression, hyperactivity and social adjustment.

Pearson correlation analyses were computed to test whether the dimensions of disruptive behavior associate with each other. All of the associations were statistically significant (Pearson correlation coefficients for aggression and hyperactivity, $r = -0.107$; aggression and social adjustment, $r = -0.176$, and hyperactivity and social adjustment, $r = -0.189$, p values in all of the associations <0.001).

Table 1 Items of childhood disruptive behavior of aggression, hyperactivity and social adjustment

Disruptive behavior	Range of scale/ item value
Aggression, 6 items (range 1–5[a])	
The child often hits, pushes, or provokes other children	1–5
Other children's parents often complain about the child's behavior	1–5
The child often fights	1–5
The child often swears	1–5
Other children often tell tales about him/her	1–5
The child often comes home to tell he/she has hurt himself/herself	1–5
Hyperactivity: please, choose the most accurate statement of the following:	
My child is	
Always controlled	1
Overactive or restless only occasionally, for instance when tired	2
Continuously more active than the average child or youth	3
Always extremely active and energetic, even restless	4
Social adjustment: Please, choose the most accurate statement:	
My child	
Is always very cooperative and responsive to others	1
Has sometimes problems with peers, but is mostly cooperative	2
Shows continuous problems with peers	3

The Young Finns study, 1980–2007

[a] 1 = The statement does not fit the child, 5 = The statement totally fits the child

Adulthood educational level, occupational status and income were self-reported by the participants at the 27-year follow-up examination. Because we were specifically interested in whether disruptive behavior predicts poor socioeconomic outcomes or downward drift, we dichotomized the variables as follows: low versus high educational level (comprehensive education only vs. secondary or higher education), low versus high occupational status (manual occupation vs. non-manual), and low versus high income (lowest tertile vs. two highest tertiles).

Parental educational level, occupational status, and family income were self-reported by both parents in 1980. Family SEP was defined using information from the parent with higher education, higher occupational status or higher income. SEP categories were formed similarly to those of the participants.

Table 2 Characteristics of the study population

	n	*M* (SD)	%
Childhood variables in 1980			
Participants' age			
3	243		31.1
6	257		32.9
9	282		36.1
Disruptive behavior in childhood			
Aggression (range 1–5)	782	1.06 (0.11)	
Hyperactivity (range 1–4)	782	2.08 (0.59)	
Social adjustment (range 1–3)	782	2.50 (0.69)	
Parental educational level			
Low (comprehensive education only)	147		18.8
High (secondary and academic)	635		81.2
Parental occupational status			
Low (manual)	305		39.0
High (lower and higher non-manual)	477		61.0
Parental income			
Low (low)	160		20.5
High (medium and high)	622		79.5
Adulthood variables in 2007			
Participants' educational level			
Low (comprehensive education only)	235		30.1
High (secondary and academic)	547		69.9
Participants' occupational status			
Low (manual)	245		31.3
High (lower and higher non-manual)	537		68.7
Participants' income			
Low (lowest tertile)	237		30.3
High (two highest tertiles)	545		69.7

Variables are means (M) and standard deviations (SD) for continuous variables and percentages for categorical variables ($N = 782$)

The Young Finns study, 1980–2007

Intergenerational social mobility was based on comparing participants adulthood SEP with that of the SEP of origin (i.e., parental SEP). For educational, occupational and income-related mobility's, four categories were formed: stable high (high parental and high adulthood SEP), downwardly mobile (high parental and low adulthood SEP), upwardly mobile (low parental and high adulthood SEP), and stable low (low parental and adulthood SEP).

Statistical methods

T tests for independent-samples were conducted in order to see whether participants from low and high SEP families differ in disruptive behavior. We used logistic regression analyses to examine associations between standardized values of disruptive behavior and adulthood low socioeconomic position. The analyses were conducted separately for the different components of disruptive behavior (aggression, hyperactivity and social adjustment) and separately for each of the adulthood SEP variables (low educational level, low occupational status and low income) as binary outcome variables. We constructed three models for each component of disruptive behavior: Model 1 was adjusted for age and gender, Model 2 was additionally adjusted for SEP of origin, and Model 3 was additionally adjusted for the other components of disruptive behavior (for instance, adjusting for hyperactivity and social adjustment in the analyses where aggression is the predictor variable). If a significant association between disruptive behavior and occupational status or income was observed, adulthood education was included as a covariate to examine for potential mediation-effect (model already including age, gender and SEP of origin). The results from the latter analyses are reported in text.

We used the univariate general linear model procedure to examine mean levels of childhood disruptive behavior in different social mobility groups (stable high, downwardly mobile, upwardly mobile, stable low). For the comparisons of the differences in disruptive behavior between the social mobility groups, post hoc Bonferroni analyses were computed.

We tested for gender differences in the associations between childhood disruptiveness traits and adulthood educational level, occupational status and income. The general linear models showed non-significant gender interactions (all p values >0.228) except for one significant gender interaction between aggression and adulthood income ($p = 0.007$). We tested whether the bivariate association between childhood aggression and adulthood income would differ between the gender groups. As the associations pointed to a similar direction and were of similar magnitude for women and men, all of the

subsequent analyses were conducted with the gender groups combined. All analyses were adjusted for age and gender and performed using SPSS software (version 15.0).

Results

Table 2 presents the characteristics of the study variables. There were no gender differences in the childhood variables. In adulthood, larger proportion of women had high educational level (73.4 vs. 66.2 %, $\chi^2 = 4.874$, $p = 0.028$), occupational status (73.0 vs. 64.1 %, $\chi^2 = 7.089$, $p = 0.008$) and income (76.2 vs. 62.8 %, $\chi^2 = 16.559$, $p < 0.001$) than men. The larger proportion of women having high adulthood income level (that combines those with average and high income), is due to the fact that more women than men had an average income level ($N = 264$ vs. 223), although more men than women had high income level ($N = 125$ vs. 43). We tested associations between parental SEP categories and childhood disruptive behavior. Table 3 shows that participants from families with lower occupational status had lower social adjustment ($p = 0.002$) and higher levels of aggression ($p = 0.0.048$). Lower income was associated with higher levels of aggression in childhood ($p = 0.035$).

Table 4 shows the relations of childhood disruptive behavior characteristics with adulthood socioeconomic outcomes. The odds of belonging to the group with low educational level in adulthood were 1.29 times higher per each one unit increase in childhood aggression (Model 1). The association was robust against adjustment for childhood SEP (Model 2) and the other elements of disruptive behavior (Model 3). Hyperactivity and social adjustment did not show robust associations with adulthood educational level.

The odds for belonging to the group with low occupational status (manual occupation) were approximately 1.2 times higher per each one unit increase in aggression and hyperactivity (Model 1). Higher social adjustment, in contrast, was associated with smaller risk for belonging to the group with low occupational status (OR = 0.76, CI = 0.66–0.91, $p > 0.001$). In the fully adjusted models the only remaining significant association was between lower social adjustment and lower socioeconomic position (OR = 0.85, CI = 0.72–0.99, $p = 0.048$).

As there were significant results in the analysis above, a further model was computed for the occupational status. In order to examine for the possible mediating effect participants' educational level in adulthood was added into the analysis (other variables: age, gender, parental occupational status). An association was found for social adjustment (OR = 0.774, CI = 0.64–0.94, $p = 0.010$). There were no significant associations between any of the childhood disruptiveness and adulthood income level ($p \geq 0.249$, for all associations).

Linear regression analyses were conducted to test whether the associations between childhood disruptive behavior and adulthood income level remain the same when income variable was categorized as high, intermediate and low. The conducted models were similarly to those in the logistic regressions (Model 1 was adjusted for age and gender, Model 2 was additionally adjusted for SEP of origin, and Model 3 was additionally adjusted for the other components of disruptive behavior (for instance, adjusting for hyperactivity and social adjustment in the analyses where aggression is the predictor variable). There were no significant associations between any of the disruptive behavior dimensions and income (results for the fully adjusted models were as follows; aggression $\beta = -0.056$, $p = 0.118$, $sr^2 = 0.003$; hyperactivity $\beta = -0.022$, $p = 0.536$, $sr^2 = 0.0004$, and for social adjustment $\beta = 0.013$, $p = 0.710$, $sr^2 = 0.0002$).

Table 3 Table of means (*M*) and standard deviations (SD) of childhood disruptive behavior according to parental SEP

Parental SEP categories	Disruptive behavior								
	Aggression			Hyperactivity			Social adjustment		
	n	*M* (SD)	*p*	*n*	*M* (SD)	*p*	*n*	*M* (SD)	*p*
Parental educational level									
Low (lowest tertile)	147	1.06 (0.10)	0.548	147		0.420	147		0.644
High (two highest tertiles)	635	1.06 (0.11)		635			635		
Parental occupational status									
Low (lowest tertile)	305	1.07 (0.11)	0.048	305		0.867	305		0.002
High (two highest tertiles)	477	1.05 (0.11)		477			477		
Parental income									
Low (lowest tertile)	160	1.07 (0.13)	0.035	160		0.193	160		0.371
High (two highest tertiles)	622	1.05 (0.10)		622			622		

The Young Finns study, 1980–2007

Table 4 Childhood disruptive behavior (mean age 6.1 years) predicting low educational level, low occupational status, and low income in adulthood (mean age 33.1 years)

	Low educational level			Low occupational status			Low income		
	OR	(95 % CI)	*p*	OR	(95 % CI)	*p*	OR	(95 % CI)	*p*
Aggression[a]									
Model 1[b]	1.29	(1.11–1.49)	0.001	1.25	(1.08–1.45)	0.003	1.09	(0.94–1.27)	0.249
Model 2[c]	1.24	(1.07–1.44)	0.005	1.21	(1.04–1.41)	0.015	1.05	(0.91–1.23)	0.502
Model 3[d]	1.21	(1.04–1.45)	0.013	1.16	(0.99–1.35)	0.062	1.05	(0.90–1.22)	0.576
Hyperactivity[a]									
Model 1[b]	1.12	(0.96–1.30)	0.138	1.18	(1.02–1.38)	0.026	1.06	(0.91–1.24)	0.429
Model 2[c]	1.14	(0.97–1.33)	0.108	1.21	(1.03–1.41)	0.017	1.05	(0.90–1.23)	0.544
Model 3[e]	1.10	(0.94–1.29)	0.245	1.15	(0.98–1.36)	0.081	1.04	(0.89–1.22)	0.633
Social adjustment[a]									
Model 1[b]	0.86	(0.73–0.99)	0.030	0.76	(0.66–0.91)	<0.001	0.94	(0.80–1.09)	0.390
Model 2[c]	0.89	(0.76–1.04)	0.135	0.80	(0.69–0.94)	0.006	0.96	(0.82–1.13)	0.630
Model 3[f]	0.94	(0.80–1.10)	0.428	0.85	(0.72–0.99)	0.048	0.98	(0.83–1.15)	0.780

The Young Finns study ($N = 782$), 1980–2007

[a] OR depicts the change in risk per one standard deviation in disruptive behavior

[b] Model 1—adjusted for age and gender

[c] Model 2—adjusted for age, gender, and parental SEP (educational level, occupational status or income)

[d] Model 3—adjusted for age, gender, parental SEP and the traits of hyperactivity and social adjustment

[e] Adjusted for age, gender, parental SEP and the traits of aggression and social adjustment

[f] Adjusted for age, gender, parental SEP and the traits of aggression and hyperactivity

Means of childhood disruptiveness in different intergenerational educational and occupational social mobility groups are shown in Figs. 1 and 2, respectively. The figures present the fully adjusted models (controlled for age, gender, parental SEP, and disruptive behavior; Fig. 2 additionally adjusted for years of education in adulthood). Figure 1 demonstrates that participants with stable low and downwardly mobile educational level had the highest levels in aggression. The mean levels were significantly different between stable high and the downwardly mobile group (means 1.07 vs. 1.09, $p = 0.004$). No other significant differences were found.

Figure 2 shows that participants with stable low occupational status had higher levels of aggression than those from stable high ($p = 0.003$) mobile group. Participants with stable low occupational status had higher aggression than upwardly mobile participants ($p = 0.043$). In social adjustment, participants from stable high mobility group had higher levels than those with stable high status ($p < 0.001$). No significant differences were found for hyperactivity.

Discussion

The current study examined association of childhood disruptive behavior, including aggression, hyperactivity, and social adjustment with adulthood socioeconomic position and intergenerational social mobility. This study was carried out in a representative population-based sample. Childhood disruptive behavior was assessed at pre-school or school age and adulthood SEP was measured when the participants were aged 30 to 36. The major strengths of the present study were: a nationally representative sample, a prospective study design with a lengthy follow-up period (27 years), and various indicators of socioeconomic position of two generations that enabled examination of intergenerational social mobility.

We showed that aggressiveness in childhood is the risk factor that should be monitored for in preventing drift to low SEP in adulthood. Aggression was associated with an increased likelihood of low adulthood educational level after controlling for age, gender, parental SEP, and other characteristics of disruptive behavior. Childhood aggressive tendencies have previously been associated with school maladjustment (at age of 14) (Kokko and Pulkkinen 2000) and with educational attainment (poor reading achievement and lack of school certificate at age of 15) (Caspi et al. 1998), that may provide a mechanism linking disruptive behavior with later educational outcomes. Our finding is in agreement with previous research associating high childhood aggression with poor educational outcomes in adulthood (e.g., Asendorpf et al. 2008; Breslau et al.

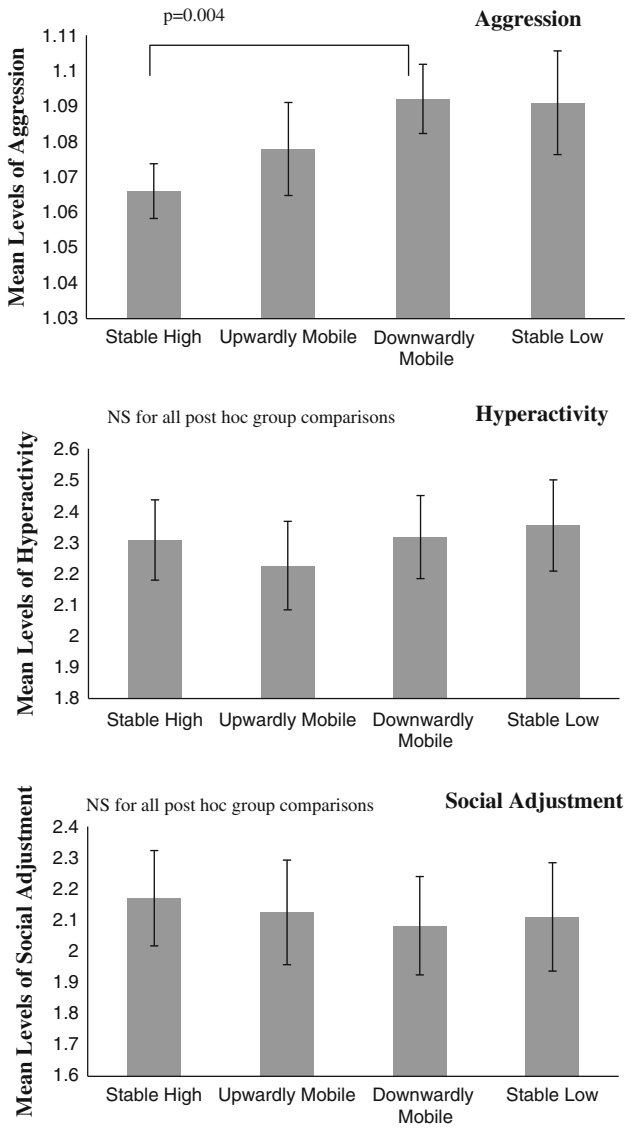

Fig. 1 Means and standard errors of childhood disruptive behavior (aggression, hyperactivity and social adjustment) according to the groups of intergenerational educational mobility. Adjusted for age, gender, and the other components of disruptive behavior. The Young Finns study, 1980–2007

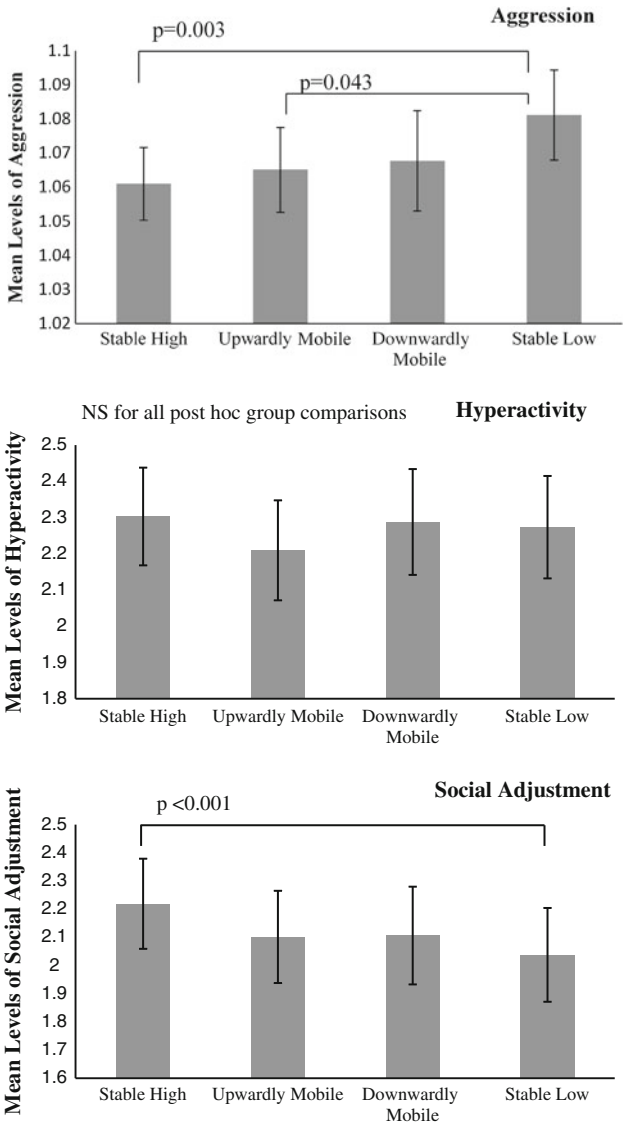

Fig. 2 Means and standard errors of childhood disruptive behavior (aggression, hyperactivity and social adjustment) according to the groups of intergenerational occupational mobility. Adjusted for age, gender, years of education in adulthood and the other components of disruptive behavior. The Young Finns study, 1980–2007

2009; Caspi et al. 1987; Dubow et al. 2006; Stansfeld et al. 2008).

Each of the components of disruptiveness, i.e., high aggression and hyperactivity, and low social adjustment associated with low adulthood occupational status, but social adjustment remained the only independent predictor when parental SEP, participants own educational level in adulthood and childhood aggression and hyperactivity were controlled for. This finding suggests that low childhood social adjustment has an independent association with future occupational status.

That hyperactivity and social adjustment were not associated with educational level, but showed associations with occupational status, may result from their slow cumulative effect. The negative impact of aggression, in turn, becomes relevant already during the years of education and its' influence continues throughout the occupational career.

That disruptive behavior was not related with adulthood income may result from the stronger influence of disruptive behavior on academic achievement at an earlier age. It has been shown, that hyperactivity is more relevant on educational attainment in elementary grades whereas aggression becomes more relevant by adolescence (Hinshaw 1992b). Additionally, our result may be at least partly be explained by the fact that income is more sensitive

when it comes to short-term life changes, such as ill-health in adulthood (Lynch and Kaplan 2000), but is not affected through childhood or adolescence behavioral styles.

With regards to intergenerational social mobility, childhood disruptive behavior was associated with educational and occupational mobility whereas no association was found for income-related mobility. Childhood hyperactivity associated with intergenerational educational mobility while aggression and social adjustment related with occupational downward drift over 27-years. The present result accords with an earlier finding where childhood externalizing behavior at the age of seven highly predicted manual SEP at the age of 42 over and above low parental SEP (Stansfeld et al. 2011). Altogether, the present study showed that different aspects of childhood disruptive behavior may predict different types of SEP outcomes in adulthood, and that disruptive behavior most clearly associates with occupational status.

Although educational, occupational and income levels are highly correlated in adulthood, they may have different etiological backgrounds. We showed that disruptive behavior was differently associated to them, probably due to their phased development in a human life. Educational attainment is usually achieved first, presenting the transition from childhood and adolescence into adulthood and exposure to working life. Occupation and income are the consequences of achieved educational level, and final occupational and income levels are often attained several years after reaching final education. Thus, aggression might be the first marker predicting later socioeconomic position that might have its foundation in low educational attainment. Our results provide evidence for the health selection hypothesis, i.e., that childhood disruptive behavior increased the risk of being in low SEP in adulthood.

We demonstrated that participants with high hyperactivity were more likely to remain in low educational level whereas those with high aggression and low social adjustment tended to stay in low occupational status throughout the life course. This suggests that participants with high aggression and hyperactivity originally from low SEP were not able to move up the social ladder. When interpreting the results of intergenerational social mobility, we need to take into account the possibility of ceiling effect. Ceiling effect refers to the fact that those from stable high and stable low SEP cannot move the social scale upwards or downwards, respectively. Additionally, there is a social gradient within each SEP categories, i.e., among both the poor and the rich (Marmot 2003). Examining the childhood behavior differences as potential risk factors within the SEP groups might have widened the variability of the present results.

One limitation relates to the high and somewhat systematic attrition rate. High attrition rates are, however, a general problem within longitudinal studies. The drop-outs are more likely to be men, from lower SEP and with lower health status. In the present study, participants lost to follow-up were also more likely to be men than women, had higher levels of childhood aggression and hyperactivity and lower levels of social adjustment, and their socioeconomic position tended to be lower both in childhood and in adulthood. Thus, the present sample was selected so that the most disadvantaged persons had been lost during the follow-up, possibly restricting the range of our sample.

Another possible concern associates with how disruptive behavior was operationalized. In 1980, appropriate instruments to measure disruptive behavior were limited. The measurement adopted in our study was originally developed to screen children with potential behavioral problems. It is probable that the whole domain of disruptive behavior was not covered, as in two of the measured dimensions, i.e., hyperactivity and social adjustment we had only one item per scale. In regard to hyperactivity, the item gave us information of motor restlessness, but information related with attention problems is missing. In social adjustment, the item tells us about cooperativeness but less about sociability of a child. Moreover, internalizing symptoms were not assessed and they would require further attention.

We further have to take into account the possibility, that the assessment of children's behavior may be biased by maternal stress or affective disorder. It has been suggested, for example, that maternal depression may have an effect on their perceptions of child's maladjustment and temperamental difficulty (Pesonen et al. 2004). Thus, children assessed as highly aggressive, highly hyperactive or low in social adjustment, may have been perceived by the mothers as more negatively as the children actually were.

In order to reduce disruptive behavior it is important to teach children skills that improve their abilities to control their disruptive behavior. A recent meta-analysis showed that school-based programs in general have positive effects in order to reduce fighting, bullying, name-calling, intimidation, acting out and undisciplined behaviors (Wilson and Lipsey 2007). The most effective and most used methods are universal programs involving all students within a class. These programs are mainly using cognitive approaches, concentrating on changing thinking patterns, developing social skills or self-control and anger management. Positive results have also been gained with social skills training with the focus on learning constructive behavior for interpersonal interactions (training communication skills and conflict management).

Potential risk factors of childhood disruptive behavior can be identified in the mothers before, during and shortly after pregnancy. Mothers that show antisocial behavior, smoke during pregnancy, are young by the birth of their first child, have depressive symptoms or show hostile

attitudes concerning their child, are more likely to have children with disruptive behavior. Counselling individuals, groups or families during and shortly after pregnancy might reduce the long-lasting consequences of disruptive behavior (Petitclerc and Tremblay 2009).

Our evidence suggests that later socioeconomic position is partially rooted in early behavior and its influence remains throughout the life course irrespective of the SEP of origin. Childhood problem behaviors may thus be used as early markers of potential future educational and occupational problems. From the public health viewpoint early intervention becomes salient as it might reduce the serious lifelong consequences of disruptive behavior.

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