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## The association between preschool behavioural problems and internalizing difficulties at age 10-12 years

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## **Introduction**

Internalizing disorders like depression and anxiety disorders are prevalent in children as well as in adults [8], and the public health impact of the disorders is significant [2]. Treatment strategies have so far proved less efficient than desirable and the possibility of early intervention needs further exploration [37]. However, the value of early intervention depends upon the identification of early symptoms or risk factors and the link between early and later symptoms.

The identification of early childhood indications of an increased risk of later childhood and adult psychopathology may provide a better understanding of the developmental pathway toward psychopathology [5;28]. This is essential for accurate prediction, timely intervention, and perhaps even prevention of later problems [17].

In very young children, diagnostic syndromes are not yet entirely agreed upon [16;16]. Some suggest that major depressive disorder occurs as a distinct and stable depressive disorder in children as young as 2-3 years of age but that DSM diagnostic criteria for major depressive disorder (MDD) should be modified for very young children [30-32]. Others argue that, although there may be small distinctions between the two, anxiety and depressive disorders correlate to an extent that they may be treated as one internalising disorder in preadolescents [25].

Early occurrence of anxious and depressive symptoms may be associated with later anxious and depressive symptomatology [25;39;43]. This suggests stability of internalizing symptoms due to either persisting inherent disorder, persisting adverse environmental factors, or a combination of the two.

Childhood and adolescent internalizing disorders often co-occur with externalizing disorders [4;39;49]. Externalizing comorbid behaviour is associated with greater social and

academic impairment, a more chronic course of depressive symptomatology [3], and a poor response to treatment of depression [14].

A recent review points out that current data on comorbidity in preschool children is limited to co-occurrence between broad categories of emotional and behavioural disorders [16]. The known pattern of comorbidity between depression, anxiety disorders and oppositional defiant disorder further raises the question to what extent preschool internalizing disorders are equivalent to depressive disorders in later childhood or adulthood, and furthermore how comorbid symptoms are associated with the risk of internalizing symptoms in later life [16].

Previous studies have found a significant association between preschool internalizing behaviour and internalizing difficulties in school-aged children [27;34;43;44] or young adults [12;25]. One recent study found a similar association between preschool and school-age internalizing difficulties in girls only [42]. Most of the studies were relatively small [27;34;43;44]; only three measured comorbidity [34;42;43], and one study adjusted for parental psychopathology [34]. It is therefore not clear whether these results reflect persistency of internalizing difficulties over time, comorbid externalizing behaviour, or a chance finding in small studies. One recent study demonstrated stability over 24 months during early childhood of a diagnosis of MDD in preschool children taking into account comorbid disorders [33]. Follow up well into school age is desirable however. Further studies of the association between early and later internalizing difficulties are therefore needed.

Early externalizing difficulties may be an independent risk factor for future internalizing disorders [12;34;42]. This would suggest either a common precursor for the two dimensions, a transformation of one dimension into another, or increased environmental stress due to externalizing difficulties, resulting in increased risk of internalizing disorders. To our knowledge, it is not established whether hyperactive-distractible difficulties or hostile-aggressive/disruptive difficulties or both play a role in this pathway. More detailed knowledge is important for more specific definition of at-risk children. Also, the transformation of one behavioural dimension into another is an interesting aspect to consider in understanding the complex pathways toward psychopathology across developmental stages, and this issue also needs to be further explored in future studies [16].

Our aim was to study longitudinally the association between preschool internalizing and externalizing difficulties and the risk of internalizing difficulties at 10-12 years of age, taking into account the potential effects of comorbidity and a variety of potential confounding

factors. We expected to find that preschool internalizing difficulties were followed by internalizing difficulties at 10-12 years of age.

## **Method**

### **Participants, design and procedures**

The children included in this follow-up study were born between May 1, 1991 and April 30, 1992 in Aarhus, Denmark. When the children were 7 to 10 months of age, their parents were invited to participate in a study of their children's health (Fig. 1). All parents of children in this age group living in the municipality of Aarhus (N = 3,383) were contacted [46]. The response rate in this particular study was 79% (n = 2,664). The majority of these children were also part of a well-defined prenatal cohort, the Aarhus Birth Cohort (ABC) (n = 2,432; 72%) [41;47]. The ABC is based on unselected pregnant women who planned to give birth at the only obstetrics department in the municipality. They were recruited during early pregnancy and included the vast majority of the deliveries in the municipality of Aarhus. The additional participants in the children's health study (n = 951; 28%) had either moved to the municipality of Aarhus after birth of the child or were non-responders from the ABC, they were not included in the study sample.

When the children were between 3 and 4 years old, the responders of the children's health study (n = 2,664) received a parent-administered questionnaire concerning child behaviour, health, and development and psychosocial factors in the family. Child behaviour was measured with the Preschool Behaviour Questionnaire (PBQ) [6]. The response rate was 65% (n = 1,742). These children constituted the basis of the present study.

When the children were 10–12 years of age, the participating families received a parent-administered questionnaire, Strength and Difficulties Questionnaire (SDQ) [3;3], concerning child behavioural difficulties. The response rate was 79% (n = 1,379). For the purpose of this study, only children with complete data on PBQ and SDQ (n = 1,336) were included (Fig. 1). The final sample consisted of 681 boys and 655 girls. All responders were Danish-speaking, but further information on ethnicity was not obtained.

### **Figure 1 inserted here**

#### **Preschool assessment**

Sixteen items of the PBQ were used to measure child behaviour at age 3.5 years (Table 1). The PBQ was developed in 1974 by Behar and Stringfield [6;7] as a modification of the Children's Behavior Questionnaire by Rutter [45]. It was originally designed for use by teachers to screen for preschool psychiatric difficulties but has also been used for maternal

ratings of internalizing child behaviour [11]. In this study the PBQ was parent-administered. The PBQ and the Child Behaviour Check List (CBCL) have shown a medium to high correlation between maternal ratings of items related to child behaviour of interest in this study [10].

### **Table 1 inserted here**

In the present study each item was rated 0 (does not apply), 1 (sometimes applies) or 2 (frequently applies). Only the answer “frequently applies” was considered a positive response. Children who scored within the highest 10<sup>th</sup> percentile on each subscale were included in three *not* mutually exclusive behavioural groups, anxious-fearful (n = 146; 11%), hyperactive-distractible (n = 98; 7%), and hostile-aggressive (n = 170; 13%). In order to evaluate the influence of comorbidity, we defined three additional *mutually exclusive* subgroups of the three preschool behavioural groups: anxious-fearful symptoms without comorbidity (n = 104; 8%), hyperactive-distractible symptoms without comorbidity (n = 52; 4%), and hostile-aggressive symptoms without comorbidity (n = 110; 8%).

To expand the scale measuring preschool internalizing difficulties, we defined an additional scale, an anxious-fearful-depressive scale (n = 129; 10%), using two additional questions from the PBQ concerning anxious/depressive symptoms in the children (Table 1).

### **School-age assessment**

When the children were 10 to 12 years old, parents completed the Danish version of the Strength and Difficulties Questionnaire (SDQ) [40] developed by Goodman [19].

SDQ is a 25-item instrument for screening of emotional and behavioural problems in children and adolescents. The instrument consists of five subscales. Because the present study addresses internalizing difficulties, only the subscales regarding emotional difficulties is of interest in the present study.

Each item was rated 0 (does not apply), 1 (sometimes applies) or 2 (frequently applies). Based on the recommended cut-off score on the SDQ emotional scale, children were categorized as being non-emotional (score 0–3; n = 1,133; 85 %), borderline emotional (score 4; n = 89; 7%) or emotional (score 5–10; n = 114; 8%).

Previous studies show a high reliability and validity of the SDQ as a screening instrument [20;21]. Parental SDQ predicts ICD-10 and DSM-IV diagnoses reliably [19].

### **Potential confounding factors**

Information about potential confounding factors (gender of the child, maternal education, parental cohabitation and employment, and serious parental illness) was obtained simultaneously with the preschool data collection. Information about history of parental

psychiatric admission (in- or outpatient treatment) was obtained from the Danish Psychiatric Case Register when the preschool data was collected [36].

## **Table 2 inserted here**

### **Attrition analyses**

Mothers of children who were included in the Aarhus Birth Cohort but were non-responders at the follow-up at 8 months (The Child Health Study) or 3.5 years (The Preschool Study) have previously been reported to be younger and with shorter educations compared with responders [29]. Compared with responders the non-responders in the school-age study (n = 364) were more likely to have mothers with lower levels of education and parents who did not live together. No preschool differences were found regarding parental employment, gender of the child, serious parental illness, and parental psychiatric hospitalization.

### **Data analyses**

The univariate and adjusted associations between preschool categories of behaviour and school-aged emotional difficulties were evaluated in a multinomial logistic regression model and expressed as odds ratios (OR) with 95% confidence intervals (95% CI) (Table 3). Similar analyses were performed with the *mutually exclusive* preschool categories (without comorbidity). Previously reported risk factors for internalizing disorders (see Table 2) were considered potential confounders in the analyses and were a priori included in the multivariate logistic regression model as a number of dummy variables equal to the number of categories minus one [13]. Missing information within a variable was assigned a separate category within each variable.

We also analyzed the association between internalizing difficulties in preschool and school-age after excluding children of parents with a history of psychiatric hospitalizations and without serious parental illness (Table 3).

The results were considered statistically significant at a two-sided *P* value of less than 0.05.

Data were analyzed by using the statistical package of STATA intercooled [1].

## **Results**

### **Preschool single items and school age emotional difficulties**

The distribution between the PBQ behavioural items and the SDQ emotional categories is presented in Table 1.

In the anxious-fearful scale, items related to being shy, nervous and fearful or afraid were significantly associated with school-age borderline or emotional difficulties (*P* value <0.05).

The two items related to preschool depressive/anxious behaviour were also significantly associated with school-age emotional difficulties.

All of the single items related to hostile-aggressive and hyperactive-distractible behaviour, except impulsivity, were also significantly associated with school-age borderline or emotional difficulties.

### **Confounding factors**

The distribution of potential confounding factors in the preschool and school-age behavioural groups is shown in Table 2. No apparent associations were found between preschool anxious-fearful behaviour and potential confounding factors. Preschool hyperactive-distractible behaviour was more often reported when the mother was less educated (basic school only), when the parents were not cohabiting, and when they were unemployed. Boys more often had preschool hostile-aggressive behaviour.

School-age emotional difficulties were more common with less maternal education, parental unemployment, serious parental illness, and when the parents were not living together. School-age borderline emotional difficulties were also more common when the parents were not cohabiting.

Children with missing information on parental employment, co-habitant status, and serious illness were similar to children with complete data with respect to gender of the child, maternal educational level, and presence of a parental psychiatric diagnosis.

### **Univariate and adjusted analyses**

Preschool children with anxious-fearful and hostile-aggressive behavioural problems had approximately twice the risk of emotional difficulties or borderline emotional difficulties at age 10–12 compared with well-adjusted preschool children at age 3.5 years, even after adjustment for confounding (Table 3).

In the univariate analyses, hyperactive-distractible children also had twice the risk of later emotional difficulties, but after adjustment the results from the multivariate analyses became statistically insignificant (OR 1.5; 95% CI 0.8-2.3) (Table 3).

The results were unchanged in sub-analyses of the *mutually exclusive* preschool groups: anxious-fearful without comorbidity (borderline emotional: OR 2.1; 95% CI 1.0-4.2;  $P < 0.05$ ) (emotional: OR 2.1; 95% CI 1.1-4.0), hyperactive-distractible without comorbidity (borderline emotional: OR 1.4; 95% CI 0.5-4.2) (emotional: OR 1.5; CI 0.6-3.8), and hostile-aggressive without comorbidity (borderline emotional: OR 2.3; 95% CI 1.1-4.5) (emotional: OR 2.4; 95% CI 1.3-4.7).

When analyses were performed restricted to children with no parental history of psychiatric hospitalizations and no serious parental illness, the associations remained essentially unchanged (Table 3).

**Table 3 inserted here**

## **Discussion**

In this study we found an association between both preschool anxious-fearful and hostile-aggressive behaviour and later emotional difficulties at age 10–12 years. Comorbid difficulties within each behavioural group did not explain these findings.

The apparent association between preschool externalizing hyperactive-distractible behaviour and later emotional difficulties in the univariate analyses was not statistically significant when controlled for socio-demographic factors and family characteristics.

Our findings of an association between preschool internalizing behaviour and later emotional difficulties support our study hypothesis as well as findings from other studies [12;27;34;43;44] and indicate some degree of internalizing symptom stability. This may be due to either persistent inherent disorder, difficulty of the child, or continuous stressful life circumstances or a combination of the two. In contrast with previous studies, we were able to evaluate whether comorbidity was the explanation for the associations. We also carried out more extensive adjustments for socio-demographic factors and family characteristics than most other studies have done.

We were able to categorize preschool externalizing behaviour into hostile-aggressive and hyperactive-distractible behaviour, and we found that only hostile-aggressive behaviour was significantly associated with school-age internalizing difficulties.

Our single-item analyses also indicate that particularly hostile-aggressive items related to peer-interaction difficulties (fights, bullies, etc.) are associated with school-age emotional difficulties. This has also been indicated by previous cross-sectional and small studies on bullying behaviour and internalizing difficulties in both childhood [18;48] and adolescence [9].

We believe that we have been able to present more detailed data about internalizing symptom stability, different comorbidity patterns, including lack of comorbidity, than most previous studies in this field. Our study suggests that preschool internalizing disorders can be equivalent to internalizing disorders in later childhood. Hostile-aggressive behaviour may lead to internalizing disorder due to increased environmental stress, a common precursor for the two dimensions or a longitudinal transformation of one behavioural dimension into



another in later childhood. This is an additional finding of what we expected. Our findings support the view that at least some degree of hyperactive and distractible behaviour is normal in 2-3 year old children and should not be considered a risk factor for future internalizing problems.

Our results indicate the possibility of preventing later depressive and anxious psychopathology and that intervention against internalizing as well as externalizing symptoms in early childhood may be of importance. However, because most symptomatic preschool children seem to grow out of their symptoms, there is a need to investigate further, which children need early intervention. Additionally, in the present study most school-age children with internalizing symptoms did not display symptoms in the preschool study. Therefore, the effort to detect and intervene against emotional symptoms should probably be maintained throughout childhood.

### **Strengths and limitations**

Our study has several advantages over many of the previous studies in this field. The results are based on a large study population and include detailed information about comorbidity and potential confounding factors, which are needed to address questions about nosology, comorbidity and epidemiology in preschool psychiatric disorders [16]. It is a longitudinal community-based study with exposure measures collected prospectively, thereby eliminating risk of differential recall. The association under study may differ between populations, and the present study is the first known Scandinavian study of its kind and one of the first studies in the Nordic countries [42]. Health care services in the Nordic countries differ from services in many other countries by being essentially free of charge for all inhabitants. This may influence the natural course of psychiatric disorders because access to intervention is less restricted and symptom stability may therefore be less evident. Studies conducted in different countries and settings are therefore important.

Some limitations must be taken into account when interpreting the results. We attempted to adjust for the potential influence of parental psychopathology on internalizing difficulties. This was done by information from the nationwide Danish Psychiatric Registry in which all psychiatric diagnoses and severity are reported. This adjustment may be incomplete because parental psychiatric in- or outpatients are crude measures of parental psychopathology as risk factors for behavioural disorders. One previous study did, however, account for this factor in a similar manner [35].

Families invited to participate in the follow-up study when the child was 3.5 years old were responders from an earlier study when the children were 7-10 months old. Similarly,

only responders of the 3.5-year follow-up were invited to participate in the follow-up when the children were 10-12 years old. This recruitment procedure may potentially cause selection bias, but only if non-responding families had children with no symptoms at age 3.5 years and many symptoms at age of 10-12 years or vice versa. Such strong associations in the non-responders seem somewhat unlikely. However, the non-responders were more likely to be families with low maternal education and single mothers. If the children of non-responders have a higher frequency of behavioural difficulties compared with responders, and in addition have fewer resources to intervene, non-responders may have an even stronger association between early and later symptoms than our results indicate. Nevertheless, the frequency of behavioural problems reported by the mother in the preschool study (22%) was similar to that reported previously [15;26].

Our study group consisted almost entirely of Caucasians and results may not apply to children of other ethnic groups.

Information on child behaviour was based on parental reports. In general, multi-informant-reports are considered most reliable in assessment of childhood difficulties [24] and self-reports have highly contributed to our knowledge of internal states in children as young as 5 or 6 years [23]. The possibility exists, that parental report reflects the parent's mental state or the parent-child relationship in addition to the symptoms inherent in the child. In this case the continuity measured may be the continuity of the parent's mental state or the parent-child relationship. However, the ability to express emotions on a self-report basis requires a certain level of thought-processing that preschool children do not possess, and in general parents are considered valid informers of child internalizing problems at that age unless the parent him- or herself suffers from MDD [38].

We were able to compare child behaviour using two different instruments because the construction of the questions related to internalizing behaviour in PBQ and SDQ is very similar. However, instruments applicable for both age groups (e.g. the CBCL) may give more comparable results than the use of two different instruments, had they been available. We used the PBQ and SDQ because there was no other validated Danish short behaviour questionnaires at the time when the study and follow-up was initiated. It would have been valuable to have had more detailed information on preschool as well as school-age internalising behaviour. Such information might help further narrow down the group of children at risk of future problems. However, such instruments were not available, nor was it considered feasible to increase the length of questionnaire in this sample, which had already taken part in several research projects. More detailed instruments are becoming more

available thanks to the increasing focus on very early presentation of depressive disorders [30]. The study was purely associational thus implications regarding causal pathways cannot be drawn based on the findings.

### **Clinical and research implications**

There is an increasing public interest in the possibility that early intervention or preventive efforts could reduce the severity or even prevent mental disorders later in life [22]. Our findings suggest an association between preschool internalizing behaviour, hostile-aggressive behaviour, and internalizing difficulties in later life. Thus, very early intervention may be possible, although there is a need to further narrow down the group at risk. More attention should be drawn both to preschool internalizing as well as hostile-aggressive behaviour, but our finding of an association between preschool hostile-aggressive behaviour and internalizing difficulties in later life is new and needs to be studied further.

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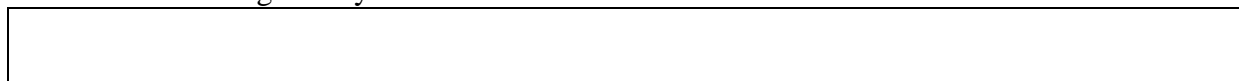
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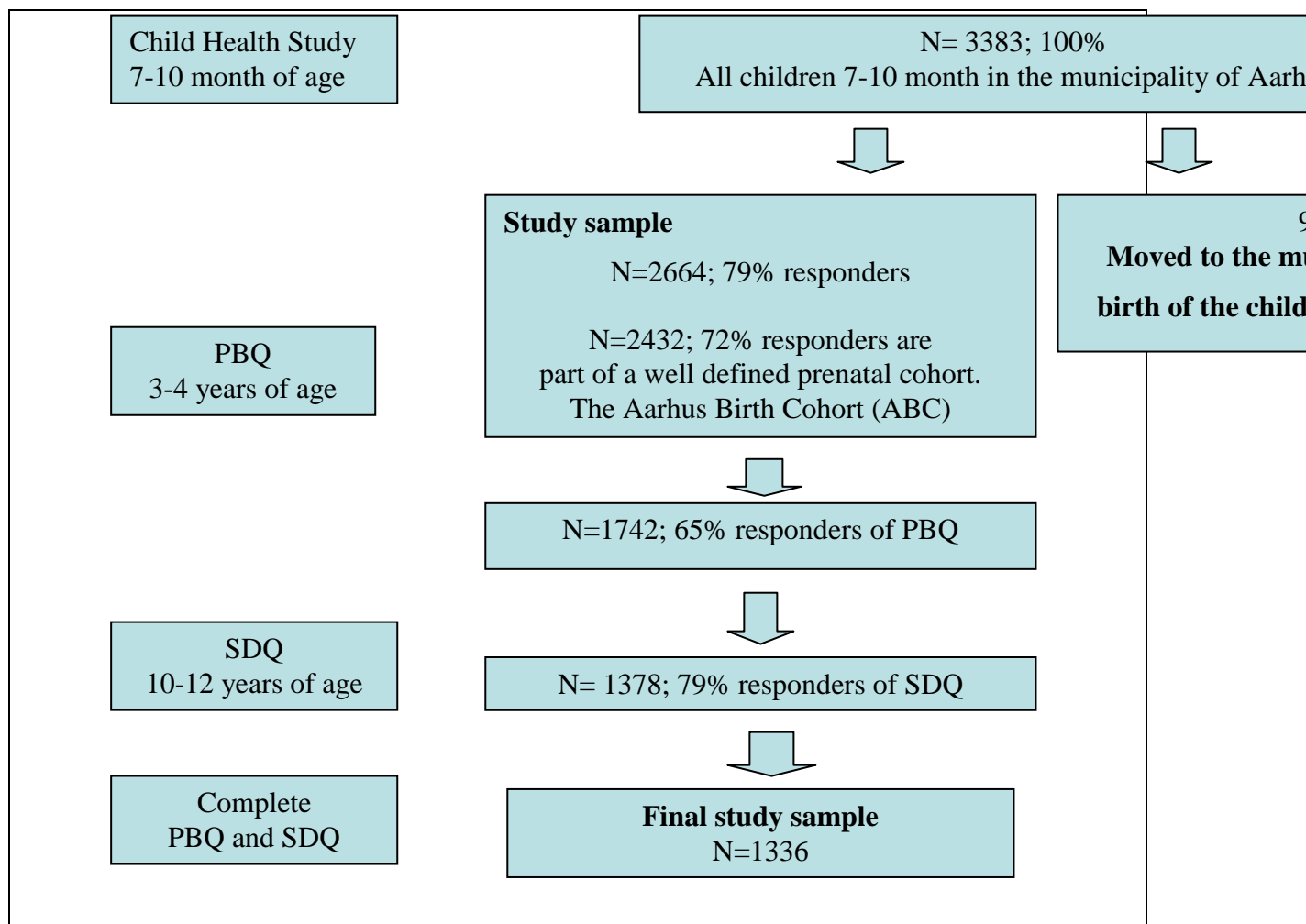
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Fig. 1. Flowchart of the follow-up study from the Child Health study, Preschool Study and to the final School Age Study.





PBQ: Preschool Behavior Questionnaire  
SDQ: Strength and Difficulties Questionnaire

T) single items and the Strength and Difficulties Questionnaire (SDQ) categorised into borderline emotional (n=89) and emotional difficulties (n=114).

<u>PBQ</u>	<u>SDQ</u>	
	Borderline	Emotional
	N	n (%)
		n (%)



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**Anxious-fearful scale**

Shy and nervous			
No	1,325	88 (6.6)	110 ( 8.3)
Yes	11	1 (9.1)	4 (36.4)
Fearful/afraid of new things/ situations			
No	1,297	83 (6.4)	108 (8.3)
Yes	39	6 (15.4)	6 (15.4)
Cries easily			
No	1,251	81 (6.5)	105 (8.4)
Yes	85	8 (9.4)	9 (10.6)
Gives up easily			
No	1,294	85 (6.6)	108 (8.3)
Yes	42	4 (9.5)	6 (14.3)

**Hostile-aggressive scale**

Fights with other children/hits them			
No	1,326	88 (6.6)	108 (8.3)
Yes	10	1 (10.0)	6 (22.2)
Pinches and fights others when upset			
No	1,309	86 (6.6)	111 (8.4)
Yes	27	3 (11.1)	3 (27.3)
Kicks or hits out at other children			
No	1,325	89 (6.7)	98 (7.9)
Yes	11	0	16 (17.6)
Destroys own or others` belongings			

No	1,321	88 (6.7)	111 (8.4)
Yes	15	1 (6.7)	3 (20.0)
<b>Bullies other children</b>			
No	1,316	85 (6.5)	110 (8.4)
Yes	20	4 (20.0)	4 (20.0)
<b>Does not share toys</b>			
No	1,294	85 (6.6)	108 (8.3)
Yes	42	4 (9.5)	6 (14.3)

### **Hyperactive-distractible scale**

Restless/runs about, does not keep still

No	1,277	80 (6.3)	98 (7.9)
Yes	42	9 (21.4)	16 (17.6)

More active than others, in full swing

No	1,245	82 (6.4)	106 (8.2)
Yes	91	7 (7.7)	8 (17.8)

Poor concentration/attention span

No	1,291	85 (6.6)	111 (8.8)
Yes	45	4 (8.9)	3 (3.8)

Impulsive, acts before thinking

No	1,257	81 (6.4)	111 (8.4)
Yes	79	8 (10.1)	3 (30)

### **Depressive variables**

Seems to be sad and unhappy	1,331	88 (6.6)	112 (8.4)
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No	4	1 (25.0)	2 (50.0)
Yes			
Tends to worry			
No	1,319	88 (6.7)	106 (8.3)
Yes	15	1 (6.7)	8 (53.3)

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**TABLE 2**

The distribution of the cohort characteristics by the preschool PBQ behavioural groups and by the school age SDQ groups.

	N	<b><u>PBQ</u></b>		
		Anxious-fearful n = 146 n (%)	Hostile-aggressive n = 170 n (%)	Hyperactive-distractible n = 98 n (%)
<b>Maternal education</b>				
> 10 years	964	97 (10.1)	116 (12.0)	52 (5.4)
Basic school only	372	49 (13.2)	54 (14.5)	46 (12.4)
<b>Parental cohabitation<sup>1</sup></b>				
Yes	1,155	124 (10.7)	140 (12.1)	75 (6.5)
No	161	18 (11.1)	24 (14.9)	21 (13.0)
<b>Parent unemployment<sup>2</sup></b>				
No	1,061	106 (10.0)	134 (12.6)	68 (6.4)
Yes	219	29 (10.1)	29 (13.2)	28 (12.8)
<b>Serious parental illness<sup>3</sup></b>				
No	1,225	124 (10.1)	154 (12.6)	90 (7.3)
Yes	51	9 (17.6)	7 (13.7)	4 (7.8)
<b>Parent psychopathology</b>				
No	1,301	121 (9.3)	167 (12.8)	96 (7.3)
Yes	35	4 (11.4)	3 (8.6)	2 (5.7)
<b>Gender</b>				
Girl	655	73 (11.1)	107 (15.7)	58 (8.5)

Boy 681 73 (10.7)

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*Note:* Missings: cohabitants<sup>1</sup>: 20; unemployment<sup>2</sup>: 56; serious parental illness<sup>3</sup>:60.

### **TABLE 3**

Univariate and adjusted associations between preschool PBQ behaviour and school-aged SDQ borderline emotional (n =105) and emotional difficulties (n =136) presented as odds ratio (OR) with 95% confidence intervals (CI). Multinomial logistic regression models. N= 1,336.

**Preschool Behaviour Questionnaire (PBQ)**

<b>School-aged Strength and Difficulties Questionnaire (SDQ)</b>	N	<u>Anxious-fearful</u> (n =146)		<u>Hostile-aggressive</u> (n =170)		<u>Hyperactive-distractible</u> (n = 98)	
		OR (95%CI)	n	OR (95%CI)	n	OR (95%CI)	n

Univariate associations

No emotional difficulties	1,130	1 ref.	13	1	76	1
Borderline emotional difficulties	896	2.1 (1.2-3.7)	17	1.8 (1.0-3.2)*	8	1.4 (0.6-2.9)
Emotional difficulties	1146	2.3 (1.4-3.8)	23	2.0 (1.2-3.3)	14	1.9 (1.1-3.6)

Adjusted associations\*\*

No emotional difficulties	1,130	1	13	1	76	1
Borderline emotional difficulties	896	2.2 (1.2-3.9)	17	2.8 (1.5-5.1)	8	1.3 (0.6-2.9)
Emotional difficulties	1146	2.1 (1.3-3.6)	23	2.6 (1.5-4.5)	14	1.5 (0.8-2.8)

Restricted associations\*\*\*

No emotional difficulties	1,068	1	123	1	73	1
Borderline emotional difficulties	845	2.1 (1.2-3.8)	17	2.0 (1.1-3.6)	7	1.2 (0.5-2.7)
Emotional difficulties	1,068	2.0 (1.1-3.6)	23	1.7 (1.0-2.8)	14	1.4 (0.7-2.7)

*Note:* Missings: cohabitants<sup>1</sup>: 20; unemployment<sup>2</sup>: 56; serious parental illness<sup>3</sup>:60. \* P< 0.05

\*\*Adjusted for gender of the child, maternal education, parental cohabitants, parental employment status, serious parental illness and parental psychiatric hospitalizations.

\*\*\*Same adjustment as above, restricted to children of parents without a history of psychiatric hospitalizations (n =35) and children of parents with serious illness (n = 48); N =1,253.