The Profile of Social Functioning in Children with Down Syndrome

Abstract

Background: Practitioners and researchers have asserted for decades that social functioning is a strength in children with Down syndrome (DS). Nevertheless, some studies have concluded that children with DS may be at greater risk of impaired social functioning compared to typically developing controls. This cross-sectional study explores the profile of social functioning (that is, social capabilities and social problems) in 6-year-old children with DS, compares it with that of typically developing children and reveals possible differences in predictors between groups. **Method:** Parental reports and clinical tests were utilized. **Results:** The children with DS had generally weaker social capabilities compared to nonverbal mental age-matched controls, but no significant differences were found for social interactive play, community functioning and prosocial behaviour. No significant differences in predictors for social capabilities between the groups were found.

The children with DS had more social problems than the typically developing controls with a similar chronological age and those with a similar nonverbal mental age, but no significant differences in emotional symptoms were found between the children with DS and either comparison group. Vocabulary was a more important predictor of social problems in the children with DS than in the typically developing control groups. **Conclusion:** Interventions for children with DS should strongly focus on integrating vocabulary skills and social functioning starting at an early age.

Keywords: Social capabilities, social problems, language, vocabulary, typically developing controls, group matching

Introduction

Down syndrome (DS) is the most frequent cause of intellectual disability [1]. It affects learning and development [2,3] as well as language and communication [4,5]. Like children with intellectual disabilities in general, children with DS are therefore at greater risk of impaired social functioning than their typically developing peers. Despite this risk, they are often stereotyped as being highly sociable [e.g. 6,7-9]. However, this stereotype is complicated by research that indicates that children with DS show more social problems than their typically developing peers [e.g. 2]. The importance of identifying how extant research contradicts this stereotype of a sociable personality combined with the fact that few studies have actually explored social functioning in school-age children with DS highlight the need to identify the social functioning profile of children with DS at this specific time in development. Social functioning is crucial for interacting with others as well as for experiencing acceptance and for participation in life situations, such as mainstream education. Enhanced understanding of strengths and weaknesses in the profile of social functioning in children with DS is needed to tailor intervention programmes to obtain optimal individual outcomes. The present article will meet these needs. It aims to investigate social functioning in an age cohort of 6-year-old children with DS compared to typically developing controls and to investigate possible differences in predictors between groups.

Social functioning in children with DS

Social functioning is defined [10] as an individual's interactions "with their environment and the ability to fulfil their role within the environment" (p. 63). It is viewed as a dynamic process of social capabilities and/or social problems, both of which are highly dependent on the social context.

Social capabilities refers to both the skills and behaviour necessary in daily life situations to function adequately in social settings. It is often described as an area of strength in children with DS compared with other clinical groups with the same nonverbal mental ability level [11-14]. Earlier research has reported strengths in children with DS in several aspects of social capabilities, such as social engagement and social orientation [11] and prosocial responses [13]. However, recent research has suggested that compared to typically developing children, children with DS show weaknesses in other aspects of social capabilities [15]: Planning, problem solving [16] and playing (e.g., with objects) [17] have been identified as weak in this population. However, a recent study that controlled for language abilities found that children with DS performed at the same developmental level as mental age-matched typically developing controls on emotion knowledge [18] .

Social problems refer to deficits in either capabilities and/or adequate behaviour in social settings and include both externalizing and internalizing problems. Social problems in children with DS seem to be less pronounced than in other clinical groups with intellectual disabilities, such as William syndrome [19-22]. For example, children with DS have been found to exhibit more socially engaging behaviour [20], less anxiety and fewer emotional problems [22] than other groups with intellectual disabilities. Despite this, they have been shown to have a variety of social problems. Their externalizing problems (i.e., directing problems outward into aggressive or delinquent behaviour) seem to outpace their internalizing problems (e.g., withdrawal, somatic complaints, anxiety) [2]. In particular, problems related to attention [2,23,24], hyperactivity [25] and relationships with peers [2] have been notable in this group of children compared with both typically developing peers and typically developing siblings.

Few of the above-mentioned studies investigated a wide spectrum of social capabilities and social problems, and few of them controlled for the children's cognitive level.

Thus, it is difficult to know whether the reported differences in social capabilities and social problems are related to a lower general mental age or problems with social functioning in general or whether they are specific to a certain area of social functioning. The evidence is scarce considering the different social functioning issues examined in various studies, the age differences between samples (all of the studies reviewed here except van Gameren-Oosterom [2] used age-spread samples) and the use of different matching strategies across the studies that included a comparison group.

Predictors of social functioning

In addition to cognitive abilities, earlier research has suggested that language, socioeconomic status (SES), age and gender are important predictors of social functioning.

Language abilities have been suggested to predict variability in social functioning (especially social problems) in both typically developing children and children with DS [26,27], and they surpass the effects of gender, SES, and performance in different academic and intellectual areas [28]. Children with DS are at risk of language difficulties [4,29] in both the expressive and receptive domains [30,31], although their receptive skills are significantly better than their expressive skills. Vocabulary is seen a relative strength within their language profiles; however, it is still delayed beyond the expectations for their nonverbal mental age [30].

In nearly every area of functioning, SES seems to be an important predictor of functioning, and it has been suggested that this predictive relationship becomes stronger with age [32]. The link between SES and children's social functioning is not as consistent as the link between SES and cognitive attainment [33] but it still applies clearly to typically developing children [e.g. 32,34]. A range of studies have shown that SES and place of living affect children's opportunities in school, such as in terms of available materials (e.g. technical

remedies, concretes, toys) and social and academic resources (e.g. events and experiences, such as trips to libraries or museums, support services, highly educated teachers and special education) [32]. Little evidence exists about the influence of SES on social functioning in primary school age children with DS. However, in a longitudinal study that followed older children/adolescents with DS into adulthood, McCarthy [35] found that SES was not a long-term predictor of social problems.

Typically, age is considered an important predictor of social functioning in both children with DS and typically developing children [14,21,32]. Toddlers with DS appear to show social functioning problems comparable to those of their typically developing peers. However, unlike the typically developing children, whose social problems decrease with age, children with DS are often shown a significant increase in externalizing problems as they grow older [e.g. 21].

In line with evidence from typically developing children [e.g. 34], studies of children with DS also show that gender can explain variations in social functioning and that males have more behavioural problems than females [e.g. 2]. Girls with DS, however, appear to have a higher degree of internalizing problems compared to boys, who show more externalizing problems [e.g. 2]. There are also studies that show no gender differences in behaviour among children with DS [e.g. 20].

In summary, the evidence from earlier research is somewhat inconsistent. Additionally, possibly because of small sample sizes, only one or very few predictors are included in the individual studies. Finally, the question of possible differences in predictors between children with DS and typically developing children remains unanswered. Therefore, there is a need for enhanced knowledge to understand social functioning in children with DS [36,37]. This knowledge is important for designing adapted interventions.

Summary and research questions

Elementary school entry is generally described as a key life cycle transition [38], but limited research has focused on social functioning in school-aged children with DS. Planning for high-quality school entry for children with DS requires broad knowledge and understanding, especially in terms of social functioning, to succeed in mainstream education [39-41]. The present study is unique in including a national age-cohort of 6-year-old children with DS. It builds on baseline measurements from a longitudinal study called "Language and reading development in children with Down syndrome" (see [42]). The aims of the present study are to investigate social functioning in children with DS at school entry compared to typically developing children and to examine the differences in predictors between groups. Here, we present two sub-studies that investigate different aspects of social functioning. The two studies complement each other, and together, they address both social capabilities and social problems. In study 1, the social capabilities of children with DS are compared to those of typically developing children matched for nonverbal mental ability. In study 2, the social problems and capabilities of children with DS are compared to two different groups of typically developing controls: one with similar chronological age and one with similar nonverbal mental abilities.

Study 1

Study 1 is a cross-sectional empirical study that compares the social capabilities of children with DS with those of typically developing children of the same nonverbal mental age.

Methods

Participants

A national age cohort of 43 children with DS (22 boys and 21 girls) and their parents was recruited through the Norwegian National Habilitation Service after the project was approved by the Norwegian research ethical committee. The children's mean chronological age = 75.78 months (*SD* = 3.48 months, range 69.18 to 81.11 months), and their mean nonverbal mental ability raw score (Block Design) = 12.23 (*SD* = 5.40). In line with the inclusion criteria for the study, the children all came from the same age cohort, they had no co-morbid diagnoses of autism, and at least one of their parents spoke Norwegian as their first language. Twelve of the children with DS had permanent hearing disabilities of varying degrees, from requiring hearing aids to having experienced hearing loss at an earlier age. Children in Norway begin school the year they turn six, and mainstream education is the political vision in this country.

A nonverbal mental age-matched control group of 36 typically developing children (18 boys and 18 girls) and their parents were recruited through kindergartens in a typical Norwegian municipality (mean chronological age = 36.37 months, *SD* = 4.17 months, range 29.11 to 41.10 months, mean nonverbal mental ability raw score [Block Design] = 12.47, *SD* = 4.77). In line with the inclusion criteria for the study, the typically developing children all came from the same age cohort, they had no history of special educational needs and no hearing disabilities, and at least one of their parents spoke Norwegian as their first language. Information about hearing disability was missing for two children with DS and one typically developing child.

There were no significant differences in nonverbal mental abilities between the groups, either in a bivariate analysis (b = 0.24, p = .84) or when controlling for gender and parental education level (b = -0.04; p = .97). Additionally, there was no difference in the mean level of parental education between the groups (b = 0.18, t = 0.76, p = .45). Information about

parental education was missing for one mother and three fathers of the typically developing children.

Procedure for collecting data

Data were collected using parental telephone interviews, parental questionnaires and clinical tests of the children.

One parent per child participated in a telephone interview based on the *Pediatric Evaluation of Disability Inventory* (PEDI) [43]. The interview lasted approximately 30-45 minutes, was audiotaped and was scored during the interview.

An electronic questionnaire regarding different background variables, such as hearing, parental education and forms of communication, was sent via email to one parent per child. If no answer was received, up to two reminders were sent.

Data on language abilities were collected via clinical testing of the children. All of the children were assessed individually in a separate room in their kindergarten or school over three separate sessions, usually on consecutive days. All of the children's answers were registered manually, and their expressive answers were audiotaped.

Measures

Social capabilities. The PEDI is a standardized, structured interview instrument. It examines functional capabilities in three domains: self-care, mobility and social function. This study applied the Norwegian version of the PEDI [44]. Data collection was limited to the social function domain only. In addition to providing a summary score, the PEDI includes the following subscales with a total of 65 capability items (five items in each subscale): *Comprehension of word meanings, Comprehension of sentence meanings, Functional use of communication, Complexity of expressive communication, Problem resolution, Social interactive play* (with adults), *Social interactions* (with child of a similar age), *Play with*

objects, Self-information, Time orientation, Household chores, Self-protection and *Community*. Items are scored either 1 (able to perform) or 0 (unable to perform). The analysis included the raw scores, both with the first four communication-oriented subscales (possible range 0 - 65) and without them (possible range 0 – 45), and the raw summary scores for each subscale (possible range 0 - 5). The internal consistency of the PEDI social function domain has been determined to be excellent (Cronbach's $\alpha = .98$) [43].

Nonverbal mental ability. Nonverbal mental ability was assessed using the *Block Design* subtest from the *Wechsler Preschool and Primary Scale of Intelligence III* (WIPPSI III) [45]. The children were shown a pattern made of blocks and asked to make the same pattern using the blocks given to them (12 items). For one item, both a model and a picture were presented, and for the last 7 items, they were given only pictures to copy their block models from. The analyses used a sum of the raw score (possible range 0 - 40). **Vocabulary.** Vocabulary was assessed using the Norwegian version of the *British Picture Vocabulary Scale* II (BPVS-II) [46] by Lyster, Horn and Rygvold [47] and a combination of the *Picture Naming* test from the WIPPSI–III [45] and the *Expressive Vocabulary Test II* (EVT-II) [48]. The BPVS-II is a receptive test in which the children were shown four pictures and had to point to the picture that corresponded to the stimulus word that the examiner said. The child earned one point for every correct answer. The test consisted of 144 items and had specified starting points and discontinuation rules. *Picture Naming* (WIPPSI–III/EVT-11) is an expressive test on which the children were shown a sequence of pictures and had to name them. The children earned one point for every correct answer and were not penalized for systematic articulation mistakes. The test consisted of 38 items and included specified starting points and discontinuation rules. **Grammar.** Grammar was assessed using the Norwegian version of the *Test for Reception of Grammar* (TROG-2) [49]; Norwegian version by Lyster and Horn [50] and *Grammatic Closure* (ITPA) [51]. For the TROG-2, which is a receptive test, the children

were shown four pictures on each trial and were asked to point to the target picture that corresponded to the sentence the examiner said. The children earned one point for every correct answer out of the 80 items on the test. All of the children started on item 1 and continued until they reached the discontinuation point. For the *Grammatical Closure* test, which is an expressive test, the examiner said a model sentence followed by the beginning of a new sentence, and the child was asked to complete the new sentence. Different forms of verbs, adjectives, and nouns, in addition to prepositions and possessive pronouns, were included. The children earned one point for every correct answer with no penalty for systematic articulation errors. The test consisted of 33 items. All of the children started on item 1 and continued until they reached the discontinuation point.

Socioeconomic status. *SES* was assessed using an electronic parent questionnaire. SES is based on the parents' highest education level achieved, with 0 indicating elementary school only and 4 indicating 4 years or more of university-level education. A summary mean score of the mother's and the father's level of education was used.

Hearing. *Hearing* was assessed using the electronic parent questionnaire. Permanent hearing disability was coded 1, and no permanent hearing disability was coded 0.

Form of communication. The parents of children with DS also reported whether their child used oral language as their main form for communication and whether they used any form of alternative or augmentative communication (AAC), including sign language, pictures/symbols/objects and/or technical devices. Oral language use was coded 0 (the non-use of oral language was coded 1). AAC use was coded 1, and non-use was coded 0.

Data analyses

Bivariate group differences in demographic information were calculated using Pearson's chi-square or Student's t-test. General linear regression models were used to

analyse group differences in social capabilities and nonverbal and language abilities. A multiple general linear regression model was used to analyse predictors of social capabilities as measured with the PEDI summary score. Items related to communication capabilities were excluded from the PEDI summary score in the analyses of predictors. Gender, mean parental education levels, the children's mental ability levels, and the results from the four individual clinical tests of language abilities were entered simultaneously as independent variables. Both the dependent variable of social capabilities and the independent variables of parental education, mental abilities and language abilities were standardized before they were entered into the models. Thus, the regression coefficients show how many standard deviations there are between the groups and provide an estimation of effect size similar to Cohen's *d*. Cohen's $d \geq .2 < .5$ is interpreted as small, $d \geq .5 < .8$ is seen as a medium effect size, and $d \geq .8$ is seen as a large effect size [52]. The multiple general linear model included all of the two-way interaction terms between groups and all of the independent variables to investigate whether the predictors differed significantly between the groups. The model was run again with the groups reversed to determine the regression coefficient for the typically developing children. The model was rerun for only the children with DS and thus did not include any interaction terms to analyse whether hearing disabilities, AAC use or oral language use were related to social capabilities.

IBM SPSS Statistics Version 22 was used to analyse the data. A significance level of 5% was used for all tests.

Results

The group differences in social capabilities are presented in Table 1.

Insert Table 1 approximately here

As Table 1 shows, the children with DS had weaker total scores for social capabilities as measured by PEDI than the typical developing children did, both when all original items were included and when items directly related to communication were excluded. The children with DS were also significantly behind the typically developing children in most of the social capabilities subareas before the analysis was controlled for covariates. These delayed subareas included Comprehension of words, Functional communication, Complexity of expressive communication, Problem-solving, Social interactive play with adults, Self-information, Time-orientation and Self-protection. All of these group differences except social interactive play with adults were also significant after controlling for gender, mean parental education level and nonverbal mental age. The children with DS had statistically significantly lower scores than the typically developing children on grammatic closure, reception of grammar and picture naming tasks. General linear regression models were used to analyse the predictors of social capability levels as measured by PEDI in the different samples (Table 2). We hypothesized that language would be an important variable for the development of social capabilities. The first four subscales of the PEDI (Comprehension of words, Comprehension of sentences, Functional communication and Complexity of expressive communication) are in reality measures of language functioning. Thus, these language-related areas were excluded from the total social capabilities factor measured with the PEDI when predictors of social capabilities were investigated. The general linear model used social capabilities as the dependent variable and gender, mean parental education, nonverbal mental abilities, and the four measures of language abilities as independent variables. In addition, two-way interaction terms between group and all of the independent variables were entered into the models to investigate whether there were significant differences between the groups in the relationship between the independent variables and social capabilities.

Insert Table 2 approximately here

As Table 2 shows, for the children with DS, male gender and higher expressive vocabulary levels were significantly related to higher social capabilities. For the typically developing children with a similar nonverbal mental age, there was a tendency for the same predictors to be related to their social capabilities as for the children with DS, but none of the predictors were statistically significant (Table 2). Thus, there were no significant differences between the two groups in terms of their predictors' estimates. The model explained 42.1% of the variance in social capabilities.

The children with DS who had hearing disability did not have significantly weaker social capabilities than those without hearing problems (bivariate Cohen's $d = 0.45$, $p = .13$). However, children who used oral language had significantly better social capabilities than those who did not use oral language (bivariate Cohen's $d = 0.98$, $p = .02$). The children who used AAC also had significantly weaker social abilities compared with the children who did not use AAC (bivariate Cohen's $d = 0.77$, $p = .03$). However, neither oral language nor AAC were significant predictors of social capabilities when the covariates were controlled for (all $p > .05$).

Study 2

Study 2 is a cross-sectional empirical study that compares the social problems of children with DS with two groups of typically developing children, one group of the same nonverbal mental age level and one group of the same chronological age.

Methods

Participants

Study 2 included 41 children with DS (48.8% girls, mean age = 75.93 months, *SD* = 3.41, range 69.23 to 81.11 months, mean nonverbal mental ability raw score [Block Design] = 12.44, *SD* = 5.37) and 55 children with a similar nonverbal mental age (50.9% girls, mean age = 36.50 months, *SD* = 4.11, range 29.11 to 43.10 months, mean nonverbal mental ability raw score [Block Design] = 12.64, *SD* = 4.46). These children were drawn from the same pool of children as the participants in Study 1, and no significant differences existed between the two groups in nonverbal mental age (*b* = 0.20, *p* = .85). In addition, a group of 150 typically developing children (47.3% girls, mean age = 75.69 months, *SD* = 2.04, range 71.50 to 81.00 months) who were chronological age-matched with the children with DS participated, along with their parents. The chronological age-matched peers were all recruited from one municipality, and parental consent was given. Based on the information their parents provided, these children met the same inclusion criteria as the nonverbal mental age-matched children in Study 1 and were approximately the same chronological age as the children with DS (*b* = 0.24, *p* = .58). There were no significant gender differences among the groups (chi-square = 0.21, *p* = .90). The lifetime history of hearing disabilities was unknown for the chronological age-matched typically developing children, but none were reported to have a permanent hearing impairment at the time of testing. There were no significant differences in education level among the three groups (*F* (244, 2) = 0.62; *p* = .54). Information about parental education level was missing for one mother and five fathers of the typically developing children with similar nonverbal mental age and for two mothers and five fathers of the chronological age-matched children. Thus, the information about mean parental education was missing for one child in the chronological age-matched group.

Data collection procedure

Two different methods were used to collect the empirical data presented in this sub-study: parental questionnaires and clinical testing of the children.

One parent per child answered two different electronic questionnaires via email. If no answer was received, up to two reminders were sent.

Measures

The Strengths and Difficulties Questionnaire (SDQ) [53]. The parental questionnaire SDQ was used to measure the children's social problems and social capabilities. It measures five subfactors using five statements for each subfactor: four subfactors measure problems (emotional symptoms, conduct problems, hyperactivity, peer problems) and one subfactor measures capabilities (prosocial behaviour). Each statement can be answered *not true*, *somewhat true*, or *definitely true*, which are rated 0, 1 and 2, respectively. Five statements phrased in opposite direction of related items are reversed before scoring. The total self-reported difficulty scores, based on 20 statements in the four problem-oriented subfactors (possible range = 0–40) had an acceptable level of internal consistency (α = .82) and were used as the measure of social problems; the prosocial behaviour subfactor was used to measure social capabilities. The SDQ was previously translated and used in a comprehensive, population-based study of adolescents in Norway [54].

Predictor variables

The same predictors that were used in Study 1 were applied, except that no measure of expressive vocabulary was applied because expressive vocabulary was assessed in the typically developing children with similar chronological age with a different test than the one that was administered to the two other groups.

Data analyses

Similar analyses that were used for Study 1 were used in Study 2. Social problems, as measured using the SDQ, were the dependent variables; because the analyses included three groups, one-way analyses of variance were used to analyse bivariate differences in age and education. Because the nonverbal mental abilities of the typically developing children were assessed two years prior to the other assessments, standard scores were used for this variable in the analysis. The multiple general linear model for predicting social problems was rerun twice to facilitate information about the regression coefficient for all three groups.

Results

The group differences in social problems and social capabilities were analysed both bivariately and controlling for gender, parental education and nonverbal mental abilities (Table 3).

Insert Table 3 approximately here

The children with DS had significantly more social problems than both groups of typically developing children based on the sum of problems on the SDQ, even after the covariates of gender, parental education and nonverbal mental abilities were taken into account. There were no significant differences between the groups in terms of emotional symptoms (F (246, 2) =.02; p = .98). However, there were significant group differences in all other problem-oriented subscales, even after gender, parental education level and nonverbal mental abilities were taken into account ($p \leq .05$; Table 3). The children with DS had significantly more conduct problems than the typically developing children with a similar

chronological age but not more than the typically developing children with a similar nonverbal mental age. They were also more hyperactive and had significantly more peer problems than both groups of typically developing children; Cohen's *d* was greater than one (Table 3) even after controlling for covariates. Although the children with DS in general had slightly weaker prosocial behaviour scores than the other groups, these group differences were statistically significant only when controlled for covariates (Table 3).

Insert Table 4 approximately here

For the children with DS, gender, parental education level and nonverbal mental abilities were not significantly related to the children's total score on the SDQ. The only variable that was a significant predictor of social problems for the children with DS was receptive vocabulary in that a larger vocabulary size was associated with fewer social problems.

Within the group of typically developing children with a similar nonverbal mental age, nonverbal mental abilities were significantly related to social problems, with higher abilities related to more social problems. Gender was the only predictor significantly related to social problems within the group of typically developing children with a similar chronological age; in that group, the boys had more problems than the girls did.

Vocabulary was the only predictor of social problems that differed significantly among the groups (see Table 4). Whereas higher receptive vocabulary scores were related to fewer social problems in the group with DS, there was no such significant relationship among the typically developing children of similar chronological age. Bivariate analyses showed similar results, with correlations between social problems and receptive vocabulary of $r = .45$ ($p = .004$) for children with DS and $r = .11$ ($p = .19$) for typically developing children of similar chronological age.

Having a hearing impairment, using verbal communication or using AAC were not significantly related to the total social problems score for the children with DS in either the bivariate analysis or multiple analyses (all $p > .05$). However, the children with DS who had hearing impairments had significantly fewer emotional problems compared with the children with DS without hearing disabilities (bivariate Cohen's $d = 0.65$, $p = .01$).

Discussion

The present study investigated social functioning in children with DS compared to typically developing controls. The children with DS showed weaknesses in social capabilities and had more social problems compared to the controls. Although vocabulary and gender were found to be strong predictors of social capabilities for children with DS and mental age-matched controls, no significant differences in concurrent predictors of social capabilities between the groups were found. Vocabulary was also a significant predictor of social problems for children with DS and a more important predictor of social problems in those children compared with the typically developing children of similar chronological age.

Between-group differences across different areas of social capabilities and social problems

Social capabilities. Although the children with DS had weaker social capabilities overall compared to the typically developing controls, this finding did not apply to all subareas. In terms of social interactive play with children, function in the community, play with objects, household chores (from PEDI) and prosocial behaviour (from SDQ), the children with DS were in line with their nonverbal mental age-matched controls. These capabilities may be interpreted as concrete behaviours that do not necessarily demand much abstract thought. In opposition to this result, Fidler et al. [17] found that object play was a relative weakness in children with DS. The reason for this discrepancy in result may be that Fidler et al. measured

novel functional actions, whereas the questions in the present study may tap more *concrete play* with objects. In contrast, the areas that revealed the largest group differences - self-information, problem-solving, self-protection and time-orientation - seem to reflect higher-order abstract thought. These findings are in accordance with previous research that found that executive functioning and planning were relative weaknesses in adolescents with DS [16]. However, the relative weakness in self-information may also be because four of the five items were related to expressive language, another area where children with DS have shown weak skills, both in this study and in earlier research [e.g. 55]. It should be mentioned, however, that AAC may have been a functional alternative means of expressing self-information for children with extensive expressive language deficits.

The fact that the prosocial behaviour of the children with DS was in line with that of the nonverbal mental age-matched controls according to the parent reports means that the children with DS seem to take care of other people and show empathic behaviours similar to those of typically developing children with a similar nonverbal mental age. Prosocial abilities may ensure that these children are included in social arenas for a longer time than the levels of their other social abilities would suggest. This hypothesis is supported by the findings that social interplay with children was on the same level as that of typically developing children with a similar nonverbal mental age. This is in accordance with a previous study finding that children with DS often comfort others without necessarily having more abstract empathy abilities [13]. This indicates that prosocial behaviour may be a relative strength compared with their other social abilities, even though their prosocial behaviour is not a strength when compared with that of typically developing children.

Our findings are also in accordance with studies indicating that children with DS have emotion knowledge similar to that of typically developing children of a similar mental age [18]. It should be mentioned, however, that others have found that children with DS had

weaker emotion recognition skills compared to typically developing children of a similar mental age [15]. The differences in results among studies may arise from methodological differences, such as the participants' age or the use of static vs dynamic or visual vs oral stimuli [18]. In the present study, although the children with DS had levels of prosocial behaviours similar to those of nonverbal mental age-matched controls, they did not show as much prosocial behaviour as typically developing children of a similar chronological age when gender, parental education and nonverbal mental age were controlled for. Previous studies' reports of high levels of prosocial behaviour in children with DS [e.g. 9] may therefore stem from comparing them with other groups of children with intellectual disability rather than with typically developing children [e.g. 11] and not controlling for actual nonverbal mental age or important demographic information, such as SES or gender [56]. Our results indicate that even though the children with DS showed prosocial abilities and capabilities for social interactive play with children that were in line with those of their nonverbal mental age-matched peers, we cannot conclude that these areas are strengths of children with DS relative to their general nonverbal mental abilities or relative to their chronological age.

Social problems. In terms of social problems, the largest group differences were found for peer problems. The children with DS were more than one standard deviation below the two control groups on this variable independent of gender, parental education level and nonverbal mental age. This means that they had fewer friends and were less popular than typically developing children at both the same chronological age and the same nonverbal mental age. Previous studies have reported that people with a disability, such as DS, are more socially isolated [57], but the results of this study reveal that this situation exists as early as the children's entry into school. It has been suggested that among other causal mechanisms, these children lack specific capabilities, such as mutual gazing [58,59], interpreting the facial

expressions of peers [60] and emotional recognition [12], that affect their capabilities to understand and interact socially with other children. However, as discussed above, the results across studies regarding these related social capabilities of children with DS are inconclusive.

In the present study, the high level of peer problems may seem to contradict the above-mentioned results showing levels of prosocial behaviour and play with other children that are approximately similar to those of typically developing children of a similar nonverbal mental age. However, while both prosocial behaviour (as measured using the SDQ) and play with peers (as measured using the PEDI) examine how the child acts, the peer problems items from the SDQ measuring are more related to whether the child has friends and is included by other children. Thus, it appears that the children with DS have the social capabilities to play with other children but are still not included by others to the same degree as the children in the typical developing control groups. It may therefore be important to develop an understanding of how best to facilitate the social inclusion of children with DS.

The children with DS also had more conduct problems compared with typically developing children of a similar chronological age but not compared with typically developing children with a similar mental age. It is commonly known that conduct problems, for example hitting others, begin to decrease in kindergarten and continue to decline until early school age [61]. Thus, the difference in conduct problems between children with DS and typically developing children seem to be more related to nonverbal mental age and developmental pathways than to chronological age and experience. Our findings are in accordance with previous studies that have also found that children with DS exhibit more behaviour problems than typical developing children of a similar chronological age [e.g. 2].

The children with DS had more reported hyperactivity than the typically developing control groups. At first sight, this seems surprising, as hypotonia is among the most frequently

reported conditions associated with DS; in combination with lax ligaments, hypotonia may lead to slower body activity [62]. Obesity is also common among people with DS [63], however, three of the five questions included in the hyperactivity factor are related to inattention rather than to physical activity level. It is becoming well known that children with DS have specific problems with executive functions [64] and attention [2,23,24]. It is also important to remember that the SDQ relies on parents' reports of the children's functioning. Thus, it may be a measure of the discrepancy between parental expectations and the child's functioning more than a measure of functioning in itself. Therefore, it is possible that what may be a typical activity level in children with DS is interpreted as higher activity level than expected because of the motor ability problems common to children with DS [62].

The parents did not report more emotional symptoms for the children with DS than for either group of typically developing children. This is in line with previous studies. For example, van Gameren-Oosterom et al. [2] found in their large-scale study of eight-year-old children with DS that the children exhibited similar levels of internalizing problems and positive and negative emotions and even less anxiety and fewer depressive symptoms compared to the norms for typically developing children of a similar chronological age.

Differences between the groups in concurrent predictors of social functioning

Social capabilities. There were no significant differences in the predictors' estimates of social capabilities between the DS group and the control group matched for nonverbal mental age. The fact that vocabulary and gender were predictors in both groups was expected based on findings from earlier studies that focused on each group separately [2,26,27]. However, because the children with DS scored significantly lower in social capabilities than the younger group of typically developing children, and they also had weaker language skills, it was not obvious that the relationship between the variables would be similar for the two groups. The

results, however, indicate that these variables are related regardless of the children's capabilities.

The role of gender as an equal important predictor in both children with DS and typically developing children also supports studies of these groups that show weaker social capabilities in boys compared to girls [2,34]. The reason for these gender differences is uncertain, and we do not fully understand why gender differences exist in both social capabilities and several cognitive abilities [65]. A study by Barbu, Cabanes, & Le Maner-Idrissi [66] found that both the choice of measures and the age of the participants may play an important role in uncovering the relationship between gender and social capabilities in both typically developing children and children with DS. What we can conclude is that gender predicts the social capabilities measured by the parental questionnaire at the specific developmental level examined in Study 1.

Social problems. In line with the results for social capabilities, no significant group differences exist between children with DS and nonverbal mental age in the predictors for social problems. In contrast, there were significant differences in predictors between the group of children with DS and the group of children matched by chronological age. This finding applied to receptive vocabulary. The results show that there may be different relationships between vocabulary and social problems in the two groups. The finding that vocabulary was a stronger predictor of social problems in the children with DS, who have language problems, than in the typically developing children matched by chronological age without language problems supports the existence of the strong overlap that earlier research found between the two areas in children with language difficulties [26-28,67]. Redmond and Rice [67] suggest a co-occurrence rate between disorders in the two areas of approximately 50-70% for children with language impairment. However, based on concurrent data, the relationship between social problems and vocabulary problems may be explained in at least

four different ways [based on an extension of 67]: 1) Social problems may be a result of vocabulary problems. 2) Vocabulary problems may be a result of inherent social problems based on an underlying socioemotional trait structure. 3) The co-occurrence of social problems and vocabulary problems may be a result of an overlap as social problems and vocabulary problems occur simultaneously and have a reciprocal relationship. 4) The co-occurrence of social problems and vocabulary problems could be a result of a shared underlying third factor.

Cross-sectional data cannot directly determine which of these four alternatives may explain the relationship between social problems and vocabulary abilities for the two groups. However, the fact that both language and social functioning are weaker compared with typically developing nonverbal mental age-matched controls may indicate that these two variables are specific areas of weaknesses in children with DS.

Although we did not find any differences in predictors between the children with DS and the controls matched for nonverbal mental age, the direction of the differences between the groups was similar to the comparison between the children with DS and the children matched by chronological age.

Implications for further research and practice

Our results reveal several important implications for research and practice. In further research, longitudinal studies that follow the natural development of social functioning and vocabulary in children with DS will help to inform the reciprocal relationship between these variables over time. Because the results of this study may indicate that receptive vocabulary predicts social problems and that expressive vocabulary predicts social capabilities, it will also be important to more clearly specify the vocabulary measures in future research (e.g., choosing specific types of words to include in the vocabulary tests based on frequency, age

of acquisition, nouns, and verbs) to obtain a purer comparative measure of receptive and expressive vocabulary skills, to reduce multicollinearity and to further investigate these possible results. Intervention studies comparing programmes that integrate the training of social functioning and vocabulary may also be relevant to confirm the results of this study and to reveal knowledge about whether one type of vocabulary measure would outperform another to predict social functioning development. To develop broader and more detailed knowledge about what type of vocabulary to include in interventions to facilitate social functioning, it would also be suitable to investigate the relationship between social functioning and language depth (i.e., the quality of the words) because in this study, only measures related to vocabulary breadth (how many words the child knows) were included.

To optimize the opportunities for children with DS to successfully participate in mainstream education, systematic training of social functioning in daily life settings is needed. Based on the results of this study, it is essential to begin this stimulation at an early age to optimize social capabilities and prevent social problems in school-age children.

Because vocabulary emerged as an important predictor of social functioning, it should be a focus of early interventions for children with DS. Improvements in vocabulary skills as a result of early systematic, high-frequency intervention have been observed in those with DS [68,69], although these benefits do not seem to be generalizable beyond specifically trained tasks [e.g. 68]. Based on the results of this study, systematic and explicit vocabulary learning of words that are important for social interaction with peers and for conflict solutions should be emphasized. Although vocabulary in general is poorly developed in children with DS, it is important to provide systematic vocabulary training in a syntactic context that highlights the sematic properties of the words and supports their grammatical development. In summary, the results of this study show that there is a need for intervention studies that focus on how social

functioning and vocabulary can best be trained in the DS population. As indicated above, a programme integrating social functioning with vocabulary training may be an effective way to meet both the vocabulary and social functioning challenges in the DS population if abilities in these areas support each other.

Limitations

A number of studies have concluded that parent reports are a suitable method for collecting information about a child's functioning [70-73]. However, some studies maintain that parent reports have a higher validity in relation to the child's expressive skills than for his/her receptive skills [e.g. 74]. It is therefore important to be aware of this challenge when using parental reporting as the only mapping form. However, social functioning is heavily dependent on interaction; therefore, it is important to gather information from someone who interacts with the child. However, it has been shown that parents tend to score their children higher than kindergarten teachers do in areas such as functional use of communication, peer interaction and playing with objects [75]. The social context at home and in kindergarten differs and may account for different results across the raters. Therefore, future studies should collect information about a child's social functioning from both parents and teachers.

Conclusions

The children with DS scored lower on social functioning compared to the typically developing controls. These comparatively low scores applied to both social capabilities compared to nonverbal mental age-matched controls and to social problems compared to typically developing controls of a similar nonverbal mental age and those of a similar chronological age. However, the social functioning profile of the children with DS varied across the different social capability and social problem subscales. No significant differences were found for social interactive play, community functioning and prosocial behaviour compared to nonverbal mental age-matched controls, nor were significant differences found

for emotional symptoms compared to nonverbal mental age-matched controls or chronological age-matched controls. Regarding social capabilities, no significant differences in predictors were found between the two groups; vocabulary was an important predictor for both the children with DS and the nonverbal mental age-matched typically developing controls. Regarding social problems, no significant differences in predictors were found between the group of children with DS and the nonverbal mental age-matched control group. However, language was a more important predictor of social problems in the children with DS than in the chronological age-matched, typically developing control children. It is worth noting that the children with DS seemed to have some social capabilities to play with other children, but they were still not included by others to the same degree as the children in the typical developing control groups were.

In sum, social functioning in children with DS varies across different subdomains, and statements about their social strengths seem to be a myth. In general, social functioning seems to be more of an area of weakness than of strength when compared with typically developing controls. Therefore, social skills are an important area for intervention. Because social functioning seems to be strongly related to language abilities, our results underline the need for more knowledge about how to facilitate both language and social functioning in children with DS at both a system (society) level and an individual level. This includes social inclusion efforts, such as promoting acceptance and positive attitudes toward children with DS at the society level and language and social functioning instruction for children with DS at the individual level.

Declaration of interest

The authors report no declaration of interest.

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Capture and Legends

Table 1

Descriptive statistics and social capabilities (PEDI) for children with Down syndrome and typically developing children with a similar nonverbal mental age

Table 2

Predictors of social capabilities, as measured with the PEDI, for children with Down syndrome and typically developing children with a similar nonverbal mental age

Table 3

Descriptive statistics and social problems (SDQ) for children with Down syndrome, typically developing children with a similar nonverbal mental age and typically developing children with a similar chronological age

Table 4

Predictors of social problems, as measured with the SDQ, for children with Down syndrome and typically developing children with a similar nonverbal mental age and a similar chronological age.

Table 1

Descriptive statistic and social capabilities (PEDI) for the children with Down syndrome and typically developing children with a similar nonverbal mental age

	Down syndrome *(n = 43)*		*Typically developing* *(n = 36)*		*Group difference*		*Group difference controlled for gender, parent education level and nonverbal mental abilities*[a]	
	Mean	*SD*	Mean	*SD*	Cohen's *d*	*p*-value	Cohen's *d*	*p*-value
Block Design[b]	12.23	5.40	12.47	4.77	.05	.84	-.01	.97
British Picture Vocabulary Scale	23.23	11.40	24.75	11.54	.13	.56	.12	.55
Picture Naming	8.60	5.76	12.19	4.36	**.66**	**.003**	**.66**	**.002**
Grammatic Closure	1.37	1.99	4.56	4.02	**.92**	**< .001**	**.94**	**< .001**
Test for Reception of Grammar	9.12	5.67	15.25	8.83	**.78**	**< .001**	**.79**	**< .001**
PEDI total social capabilities	47.23	8.05	52.92	3.69	**.81**	**< .001**	**.79**	**< .001**
PEDI total social capabilities, communication items excluded	32.72	6.45	36.97	3.78	**.74**	**.001**	**.72**	**< .005**
PEDI comprehension words	4.74	.54	5.00	.00	**.62**	**.006**	**.59**	**.004**
PEDI comprehension sentences	4.67	.84	4.86	.42	.27	.23	.24	.28
PEDI functional communication	4.37	1.00	4.92	.50	**.64**	**.004**	**.60**	**.002**
PEDI complexity expressive communication	4.00	1.23	4.94	.23	**.91**	**< .001**	**.89**	**< .001**

PEDI problem solving	3.67	.78	4.31	.89	**.71**	**.001**	**.69**	**.001**
PEDI social interactive play with adults	4.72	.63	4.94	.023	**.45**	**.05**	.42	.07
PEDI social interactive play with children	4.12	1.18	4.00	1.74	-.08	.73	-.08	.73
PEDI play with objects	4.09	.84	4.39	.55	.40	.07	.41	.07
PEDI self-information	2.51	1.49	3.89	.78	**.99**	**< .001**	**.98**	**< .001**
PEDI time orientation	2.42	1.28	3.11	.82	**.61**	**.006**	**.59**	**.007**
PEDI household chores	3.49	1.24	3.75	.44	.27	.23	.27	.24
PEDI self-protection	1.79	.77	2.28	.74	**.62**	**.006**	**.62**	**.006**
PEDI community	2.63	1.20	2.53	.65	-.10	.66	-.13	.56

Note: All variables were originally based on raw scores. Mean sum of raw scores for each group (the possible ranges for PEDI subscales are 0 to 5). The mean standardized group difference was calculated using general linear regression analyses of all three groups simultaneously in which the levels of functioning were standardized (*z*-values) before being entered into the models; thus, the figures resemble Cohen's *d* values. Multiple significance of group differences were tested using linear regression controlled for gender, mean parental education, and the child's nonverbal mental ability levels (the Block Design task from the WISC-R, nonverbal mental abilities, were not controlled for in the multiple analyses of nonverbal abilities). The Down syndrome group was set to zero in the analyses; thus, a positive regression coefficient indicates that the children with Down syndrome had the lowest mean score. Significant ($p \leq .05$) group differences are marked with bold text.

[a]*n* = 43 children with Down syndrome and 35 typically developing children because of missing information about parental education (*n* = 1).

[b]Nonverbal mental ability levels were measured using the Block Design task from the WISC-R.

PEDI = Pediatric Evaluation of Disability Inventory

Table 2

Predictors of social capabilities as measured with the PEDI for the children with Down syndrome and typically developing children with a similar nonverbal mental age.

	Down syndrome (n = 43)				*Typically developing children with a similar nonverbal mental age (n = 35)*				*Sign. test of differences in beta between groups*	
	b	95% CI	Partial eta squared	*p*-value	*b*	95% CI	Partial eta squared	*p*-value	*b*	*p*-value
Intercept	.05	-.37 to .47	.00	.82	.37	-.07 to .80	.04	.10		
Gender[a]	**-.54**	**-1.02 to -.06**	**.07**	**.03**	-.38	-.98 to .21	.03	.20	Girls = .47	.13
									Boys = .32	.30
Mean parental education	.06	-.19 to .31	.00	.64	-.06	-.34 to .22	.00	.69	-.12	.54
Block Design	.28	-.01 to .57	.06	.06	.16	-.22 to .54	.01	.41	-.12	.61
British Picture Vocabulary Scale	-.10	-.46 to .26	.01	.59	-.33	-.80 to .14	.03	.17	-.23	.44
Picture Naming	**.55**	**.18 to .91**	**.13**	**.004**	.42	-.08 to .92	.04	.10	-.13	.69
Grammatic Closure	-.39	-.95 to .18	.03	.17	.18	-.22 to .57	.01	.37	.56	.11
Test for Reception of Grammar	.33	-.10 to .75	.04	.13	.03	-.30 to .36	.00	.87	-.30	.28

Explained variance (adjusted R^2)	42.1%

Note: All variables were originally based on raw scores. General linear models were used to analyse which predictors were related to social capabilities, as measured with the total social capabilities score on the PEDI, excluding communication capabilities (Questions 21 to 65). The model included all two-way interaction terms between predictors and group, thus analysing whether the difference in the regression coefficient between the groups was significant. The model was rerun with the groups reversed to determine the regression coefficient of the typically developing children. Both the dependent variable of social capabilities and the independent variables of parental education, nonverbal mental ability levels (the Block Design task from the WISC-R) and language levels were standardized (*z*-values) before they were entered into the models. Significant ($p \leq .05$) predictors of group differences are marked with bold text.

[a]The parameters for boys were set to 0 in the model.

PEDI = Pediatric Evaluation of Disability Inventory

Table 3

Descriptive statistics and social problems (SDQ) for the children with Down syndrome, typically developing children with a similar nonverbal mental age and typically developing children with a similar chronological age

	Down syndrome *(n = 41)*		*Typically developing children with a similar nonverbal mental age* *(n = 55)*		*Typically developing children with a similar chronological age (n = 150)*		*Mean standardized difference:* *Children with Down syndrome vs typically developing children with a similar nonverbal mental age*		*Mean standardized difference:* *Children with Down syndrome vs typically developing children with a similar chronological age*		*Group difference controlled for gender, parent education level and nonverbal mental abilities: Children with Down syndrome vs typically developing children with a similar nonverbal mental age*[a]		*Group difference controlled for gender, parent education level and nonverbal mental abilities: Children with Down syndrome vs typically developing children with a similar chronological age*[a]	
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Cohen's *d*	*p*-value	Cohen's *d*	*p*-value	Cohen's *d*	*p*-value	Cohen's *d*	*p*-value
Block Design[b]	1.83	1.46	9.27	2.68	10.96	2.81	**1.77**	< **.001**	**2.17**	< **.001**	**1.77**	< **.001**	**2.16**	< **.001**
British Picture Vocabulary Scale	23.80	11.35	26.25	11.18	74.79	11.44	.09	.30	**1.91**	< **.001**	-.12	.28	**1.64**	< **.001**
Grammatic	1.44	2.01	4.76	3.79	19.07	3.61	**.39**	<	**2.08**	<	**.22**[c]	**.05**	**1.86**[c]	< **.001**

Closure[a]								**.001**		**.001**				
Test for Reception of Grammar	9.32	5.66	15.91	9.60	61.89	12.56	**.25**	**.004**	**2.00**	**< .001**	-.04	.73	**1.64**	**< .001**
SDQ total	10.71	5.06	6.75	3.60	6.10	4.88	**-.80**	**< .001**	**-.93**	**< .001**	**-.96**	**< .001**	**-1.12**	**< .001**
SDQ emotional symptoms	1.39	1.20	1.44	1.34	1.39	1.75	.03	.89	.00	.99	-.18	.53	-.25	.38
SDQ conduct problems	2.20	1.47	1.91	1.66	1.20	1.27	-.20	.32	**-.68**	**< .001**	-.44	.10	**-.99**	**< .001**
SDQ hyperactivity	4.59	2.33	2.71	1.89	2.69	2.15	**-.84**	**< .001**	**-.85**	**< .001**	**-.69**	**.008**	**-.66**	**.01**
SDQ peer problems	2.54	1.73	.69	.96	.85	1.44	**-1.20**	**< .001**	**-1.10**	**< .001**	**-1.47**	**< .001**	**-1.44**	**< .001**
SDQ prosocial behaviour	7.88	1.71	8.15	1.57	8.35	1.70	.16	.44	.28	.11	**.64**	**.02**	**.92**	**.001**

Note: Descriptive statistics for all variables were raw scores, except Block Design. For Block Design, standard scores were used. Possible ranges per SDQ subscale are 0 to 10. The mean standardized group differences were calculated using general linear regression analyses of all three groups simultaneously, in which the levels of functioning were standardized (*z*-values) before they were entered into the models; thus, the regression coefficients resemble Cohen's *d* values. The multiple significance of group differences was tested using linear regression controlled for gender, mean parental education level and child's nonverbal mental ability level (Block Design task from the WISC-R; nonverbal mental abilities were not controlled for in the multiple analyses of nonverbal abilities). The Down syndrome group's values were set to zero in the

analyses; thus, a positive regression coefficient indicated that the children with Down syndrome had the lowest mean score. Significant ($p \leq .05$) group differences are marked with bold text.

[a]*n* = 41 children with Down syndrome, 55 typically developing children with a similar mental age and 149 typically developing children with a similar chronological age.

[b]Nonverbal mental ability levels were measured using the Block Design task from the WISC-R.

[c]*n* = 148 typically developing children with a similar chronological age.

SDQ = Strengths and Difficulties Questionnaire

Table 4

Predictors of social problems, as measured with the SDQ, for the children with Down syndrome and typically developing children with a similar nonverbal mental age and a similar chronological age

	Children with Down syndrome (n = 41)				*Typically developing children with a similar nonverbal mental age (n = 55)*				*Typically developing children with a similar chronological age (n = 148)*				*Sign. test of group differences in beta:* *Children with Down syndrome vs typically developing children with a similar nonverbal mental age*		*Sign. test of group differences in beta:* *Children with Down syndrome vs typically developing children with a similar chronological age*	
	b	95% CI	Partial eta squared	*p*-value	*b*	95% CI	Partial eta squared	*p*-value	*b*	95% CI	Partial eta squared	*p*-value	*b*	*p*-value	*b*	*p*-value
Intercept	-.41	-2.63 to 1.83	.00	.72	-.17	-1.11 to .76	.00	.72	.13	-.26 to .53	.00	.51				
Gender[a]	.33	-.23 to .89	.01	.25	-.34	-.83 to .16	.01	.18	**-.29**	**-.57 to -.00**	**.02**	**.05**	Girls = -.43 Boys =	.71 .85	Girls = -.08 Boys =	.94 .64

												.23		.54	
Mean parental education	.26	-.05 to .57	.01	.10	-.05	-.28 to .18	.00	.70	-.06	-.21 to .09	.00	.41	-.31	.12	-.32	.06
Block Design	.25	-0.73 to 1.24	.00	.61	**.41**	**.02 to .80**	**.02**	**.04**	.06	-.16 to .28	.00	.59	.16	.77	-.19	.71
British Picture Vocabulary Scale	**-1.24**	**-2.09 to -.39**	**.04**	**.004**	-.72	-1.55 to .12	.01	.09	-.04	-.40 to .33	.00	.84	.53	.39	**1.20**	**.01**
Grammatic Closure	0.96	-.43 to 2.35	.01	.18	.43	-.31 to 1.16	.01	.25	-.15	-.50 to .21	.00	.42	-.53	.51	-1.10	.13
Test for Reception of Grammar	-1.01	-2.72 to 0.70	.01	.25	.11	-.74 to .95	.00	.80	-.14	-.47 to .19	.00	.39	1.12	.25	.87	.33
Explained variance (adjusted R^2)													17.6%			

Note: All variables were originally based on raw scores, except Block Design. For Block Design, standard scores were used. General linear models were used to analyse which predictors were related to social problems, as measured with the total social capabilities score on the PEDI (Questions 21 to 65). The model included all two-way interaction terms between predictors and group, thus analysing whether the regression

coefficients of the children with Down syndrome were significantly different from either of the two comparison groups. The model was rerun twice with the groups reversed to determine the regression coefficients of the two groups of typically developing children. Total social problems, parental education, nonverbal mental ability levels (Block Design) and language levels were standardized (*z*-values) before they were entered into the models. Significant ($p \leq .05$) predictors of group differences are marked with bold text.

[a]The parameters for boys were set to 0 in the model.

SDQ = Strengths and Difficulties Questionnaire