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Research and Report

Children's behavioural problems are perceived differently by their teachers and parents: The Hamamatsu School Survey

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Abstract

Background: Studies have suggested that failure to detect behavioural problems at a young age will directly result in more incidents of problem behaviour as well as serious behavioural problems after school age. Therefore, the early detection of such problems is crucial to prevent difficulties after adolescence. Researchers have

attempted to evaluate the proportion of children with behavioural problems based on parent and teacher ratings, although discrepancies between the two sets of ratings have been noted. This study aimed to quantify the discrepancy in ratings between parents and teachers of children regarded as having behavioural problems, and to explore explanatory variables associated with the quantified discrepancy.

Methods: The Strength and Difficulty Questionnaire (SDQ) for evaluating child behaviours was completed by parents and teachers of second graders ($N = 798$) in elementary schools recruited by community-based sampling. Among the questionnaires collected, scores for 219 children with behavioural problems, defined as those whose parent or teacher scores were ≥ 13 points on the SDQ, were analysed. Mean difference in score (discrepancy score) between the parent and the teacher of each participating child was tested, and then the discrepancy score was linearly regressed onto potential explanatory variables.

Results: Mean parent rating was significantly higher than mean teacher

rating for both boys and girls. For boys with an assigned assistant and with a mother of older age, the discrepancy score was significant; that is, parents gave a lower score (fewer problems) than teachers. In the case of girls, the discrepancy score was significant for those with poor parental attachment; that is, parents gave a higher score (more problems) than teachers.

Conclusion: In studies using the SDQ with elementary school students, the relationship of explanatory variables with discrepancy score needs to be taken into consideration and, on this basis, parent and teacher evaluations should be carefully interpreted

Introduction

In 2010, the rate of violence, including violent acts among students, against teachers, and destruction of school properties (i.e. vandalism), in Japanese elementary, middle, and high schools was 4.4 per 1,000 students, up slightly from 4.3 per 1,000 in 2009. Hospital treatment was required in as high as 25.8% of the entire number of violent incidents, compared to 19.2% in 2009. In recent years, alongside increased awareness of violent

behaviours occurring in schools, attention has also been focused on incidents of bullying in Japan. The rate of school bullying was 5.6 per 1,000 students in elementary, middle, and high schools in 2010, compared to 5.1 in 2009. Victimization of bullying may be followed by suicide ^[1] and four such incidents were recognized by schools in 2010 compared to two incidents in 2009. In schools, there have been attempts to tighten links between school teachers and other professionals such as physicians, social case workers, and policy makers and to increase the number of school counselors and assistance available. However, these attempts have not reduced the number of child behavioural issues represented by school violence, bullying, and suicide after victimization of bullying.

Behavioural problems in childhood have been known to lead to early substance abuse, depressive symptoms, adolescent delinquency, or repeating a grade ^[2,3]. Furthermore, these negative outcomes not only affect the individual children themselves, but also communities and society as a whole ^[4]. Thus, early detection and intervention of

children's behavioural problems are pivotal. The Strength and Difficulties Questionnaire (SDQ) ^[5] has been widely used to assess these behavioural problems quickly and objectively, and the scale has been found to be effective in predicting long-term outcomes ^[6]. The scale has also been translated into Japanese and used in surveys ^[7].

SDQ scores have been reported to differ depending on whether the rater of the scale is the child's parent or teacher ^[8,9]. Previous research has reported that the total scores of parents, in general, tended to be higher, i.e. more problematic, than those of teachers ^[8,10,11]. However, parents are more likely to fail to detect behavioural problems than teachers are ^[9]. Of concern is that the discrepancy in score between these raters might limit the practical use of the SDQ, since one rater's score might indicate behavioural problems while the other rater's might not, leaving the interpretation of the scores obscure. Thus, the extent of the discrepancy between parent and teacher scores for individual children needs to be addressed, by focusing on those children regarded as having behavioural

problems by either their parent or teacher, or both. Knowledge on what produces such a discrepancy could lead us to correctly predict the risks of under- or overestimation of child behavioural problems and to evaluate the problems more accurately. To date, however, factors explaining the extent of the discrepancy in SDQ scores between parent and teacher raters have not been identified.

Our aim is to investigate the discrepancy in SDQ scores between parent and teacher raters and explored the explanatory factors explaining the discrepancy.

Methods

Design and subjects

This cross-sectional study, the Hamamatsu School Survey, was conducted in Hamamatsu city, Japan (population of approximately 800,000) and administered a paper-pencil survey. The city's 107 public elementary schools had a total of 7,342 second graders at the time of the study (July 2011). The sample studied was randomly selected on a school basis; 24 elementary schools (25%) were determined by probability sampling, for a total of 1848

second-grade children.

Measures

The SDQ was used to measure children's behavioural problems. The scale is used to evaluate the behaviours of children from young childhood to adolescence. Correlations between the scale and the Children Behavior Checklist (CBCL) ^[12] have been reported ^[5,13], and the validity and reliability of a Japanese language version of the SDQ have been shown to be equivalent to the original version using a large sample of Japanese children with age of 4 to 12 years ^[7].

The SDQ has five domains consisted of 5 items for each domain. The five domains are emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviour. The questionnaire is easily administered and has versions for parents, teachers, and the children themselves. Subscale scores (range: 0–10 points for each of the 5 domains) suggest specific areas of problematic behaviours and are useful for clinical evaluation and reevaluation of treatment outcomes ^[14]. Among the five domains, a

sum of the four domain scores excluding that for prosocial behaviour is referred to as the total difficulties score (TDS; range 0–40 points) and is used to measure the severity of the child's behavioural problems. For the Japanese version of the SDQ, Matsuishi and colleagues reported that, along with the original version of SDQ^[5], a TDS is suggestive of clinical relevance: a TDS of 0 to 12 points indicating "Normal" (no behavioural problems), 13 to 15 points indicating "Borderline" (behavioural problems likely), and 16 to 40 indicating "Abnormal" (behavioural problems of clinical concerns)^[7]. This study also proposed a cut-off of a TDS of 13 as indicative of the presence of behavioural problems. In the present study, therefore, the presence of behavioural problem was defined as TDS \geq 13 points.

Both a parent and a teacher of each participating child were asked to complete the SDQ. The correlation coefficient of parent TDS and teacher TDS was 0.35 ($p<0.001$). The difference between their TDSs were calculated as parent TDS subtracted by teacher TDS. The difference in the score was defined as the discrepancy score. A discrepancy

score lower than zero indicates the parent TDS was lower than the teacher TDS.

Then, to collect information on variables that may be associated with the discrepancy score, parents were asked to indicate their marital status, physical health history, psychiatric history, education, age, income (total household income), and diagnosis of a developmental disorder for their child. They were also asked to complete the Japanese version of Mother-Infant Bonding Questionnaire (MIBQ). The Japanese version of the MIBQ^[16] consists of 10 items and allows measurement of maternal attachment. Following a guideline for exploring childhood risk factors for childhood delinquency^[17], teachers in the present study were asked to report their own age and gender as well as the gender of the child, and to rate "the child's abilities to converse, write, and read equivalent to expected achievements for their grade" on a 4-point scale ranging from 1 (not equivalent) to 4 (equivalent or higher) on the basis of their test results and learning activity evaluations, which have been standardized in the Education

Board of Hamamatsu City. The two responses of not equivalent and not quite equivalent were categorized as “abilities to converse/write/read not equivalent to expected level” and the remainder as “abilities to converse/write/read equivalent to expected level”. Teachers were then asked to indicate whether standard curricula could be applied to the child or whether personalised arrangement of the curricula was necessary, by answering the following specific questions based on a 4-point scale ranging from 1 (always necessary) to 4 (not necessary): whether it was necessary to talk more to the child individually than for other children, to modify study materials to the child’s actual learning level (modifying and assigning the content and volume of the materials different from those for other children when studying a specific subject), to provide a personalised milieu where the child learns individually outside the classroom, and to assign an assistant to individually support the child’s learning and school life. Among the responses provided for these four questions, always necessary and

sometimes necessary were grouped as modifications considered necessary; the remaining two responses were categorized as modifications unnecessary. As a point of note, the term assistants in Japan refers to special education assistants who aid children with disabilities in their daily activities at kindergartens and schools, such as eating, toileting, and moving classrooms. They also support learning activities for children with developmental disorders. The above variables concerning the teacher’s individual care for a child were thus dichotomized and then they were examined as potential explanatory variables associated with the discrepancy scores.

One set of questionnaires including the SDQ was distributed to a parent of the participating child as well as to the teacher in charge in July 2011 through Hamamatsu City Board of Education, and the due date for return was set as the end of August 2011. A stamped addressed envelope to return the questionnaires was provided and a website for online participation was also prepared.

Statistical analyses

Of the 1848 questionnaires distributed, 834 complete sets of responses were collected (collection rate 45.2%, for 408 boys and 426 girls). Responses from mothers accounted for 95% of the total parent respondents. Among the 834 participants, responses were received from both a parent and the teacher for 798 children. Using these data, we categorized the participating children either as "behavioural problems present" or "behavioural problems absent," based on the assessment of either their parent or teacher. This categorization divided all the participating children into one of four groups: a group where both the teacher and parent noted the presence of behavioural problems (P+/T+) (n = 45); a group where only the parent noted the presence of behavioural problems (P+/T-) (n = 140); a group where only the teacher noted the presence of behavioural problems (P-/T+) (n = 34); and a group where neither the parent nor teacher recognized behavioural problems (P-/T-) (n = 597).

In line with the study's aim of examining the discrepancy between parent and teacher evaluations of

children regarded to have behavioural problems, the P-/T- group was excluded from analysis, and data from the three remaining groups (n = 219) were analyzed. That is, we analyzed data from 219 participants (P-/T+, P+/T-, P+/T+ groups) who were either a parent or teacher and who gave a score ≥ 13 on the TDS.

All analyses were conducted separately by gender of the child because the behavioural problems of boys and girls were expected to be qualitatively different, and the parent and teacher evaluations of the child's behaviours may be affected by the gender of the child. In the first analysis, mean TDS was compared between that of the parents and the teachers, separately by gender of the child. In the second analysis, differences in mean TDS, if any, among the three groups (P-/T+, P+/T-, P+/T+ groups) were examined to explore explanatory variables that may be associated with the discrepancy score. Among the potential explanatory variables, categorical variables were tested with a chi-square test, and continuous variables with one-way ANOVA.

Furthermore, for the P-/T+ and P+/T- groups that showed a prominent discrepancy between the parent and teacher scores, a post-hoc comparison with Bonferroni correction was performed. Along with these test statistics, considering the potentially confounding effects of these variables, we selected the potential explanatory variables with p value set at 0.20 in order to extract as many explanatory variables as possible. The selected variables were then used in the subsequent analysis.

In the third analysis, discrepancy scores were entered into a multiple linear regression model as the dependent variable. We preliminarily found that the distribution of the discrepancy scores was approximately normal, so we adopted multiple linear regression models, with backward stepwise selection of the potential explanatory variables. During the selection process, potential explanatory variables with a p value greater than 0.05 were excluded one by one and the remaining variables were kept in the final model.

Ethical considerations

This study followed the Ethical Guidelines for Epidemiological Research specified by the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Health, Labor and Welfare of Japan. The study protocol was approved by the Ethics Committee of Hamamatsu University School of Medicine as a part of "Research on child development (No. 20-82)". Written informed consent to participate in this study, allowing for withdrawal at any time in the study, was obtained from one of the child's parents.

Results

Comparison of mean TDS for the parents and teachers

Table 1 shows the mean TDS for the parents and teachers, stratified by gender of the child, for 219 children (125 boys and 94 girls) who were judged to have TDS ≥ 13 (i.e. behavioural problems present) by either the parent or teacher.

Mean parent TDS was significantly higher than mean teacher TDS for both boys and girls: about 4.4 points higher for the boys ($t = 5.2$, $p < 0.001$) and about 6.8 points higher for the girls ($t = 8.7$, $p < 0.001$).

There was no significant difference in mean parent TDS between boys and girls ($p = 0.98$). However, mean teacher TDS was significantly higher for boys ($M = 10.7$, $SD = 6.8$) than for girls ($M = 8.3$, $SD = 5.8$; $t = 2.8$, $p = 0.005$).

Statistical associations with potential explanatory variables among the three groups divided based on parent and teacher TDS

Table 2 shows a comparison of the means and frequencies of potential explanatory variables among the three groups divided on the basis of whether the parents and teachers of boys ($n = 125$) had a TDS ≥ 13 (P-/T+, P+/T-, and P+/T+ groups). The following 10 items were potential explanatory variables that showed significant differences between the three groups in regard to their means and frequency: conversational ability (not equivalent to expected level), writing ability (not equivalent to expected level), talking more to the child individually (necessary), modifying study materials (necessary), providing a personalised milieu (necessary), assigning an assistant (necessary), diagnosis of developmental disorder, other's psychiatric history, and mother's

age (all $p < 0.05$). In addition to these, Bonding Scale scores showed a trend towards significant difference among the three groups ($p=0.09$; the higher the Bonding Scale scores were, the more problematic the parent found attachment to the child). These 11 variables were entered into the multiple linear regression models in subsequent analyses.

Post-hoc pair comparison of the P-/T+ and P+/T- groups, where the most prominent discrepancy was expected between the parent and teacher TDS from the other pair-wise comparisons, showed significant differences in the following six potential explanatory variables: conversational ability (not equivalent to expected level) (P-/T+ group = 22.7%, P+/T- group = 6.4%, $p = 0.01$); reading ability (not equivalent to expected level) (P-/T+ = 36.4%, P+/T- = 9.2%, $p = 0.002$); writing ability (not equivalent to expected level) (P-/T+ = 40.9 %, P+/T- = 14.5%, $p = 0.007$); assigning an assistant (necessary) (P-/T+ = 40.9%, P+/T- = 19.7%, $p = 0.04$), Bonding Scale score ($M = 5.0$, $SD = 2.9$ for P-/T+ , $M = 6.7$, $SD = 3.7$ for P+/T- , $p = 0.04$); and mother's age ($M =$

38.5, SD = 4.1 for P-/T+, M = 36.0, SD = 4.9 for P+/T-, $p = 0.02$.

We conducted the same analysis for girls ($n = 94$) for the P-/T+, P+/T-, and P+/T+ groups (Table 3). The following six potential explanatory variables showed significant differences between the three groups in regard to their means and frequency: writing ability (not equivalent to expected level), talking more to the child individually (necessary), modifying study materials (necessary), household income, and mothers' years of education, Bonding Scale score (all $p < 0.05$). Together with the above six variables, the following five variables that had p values less than 0.20 were entered into the linear regression models: conversational ability (not equivalent to expected level), reading (not equivalent to expected level), providing a personalised milieu (necessary), mother's divorce history (present), and father's years of education.

Post-hoc comparison of the P-/T+ and P+/T- groups showed a significant difference in Bonding Scale score ($M = 3.9$, SD = 2.5 for P-/T+, $M = 7.0$, SD = 4.3 for P+/T-, $p = 0.002$). In addition to

these, there were differences in trend levels for conversational ability (not equivalent to expected level) (P-/T+ = 25.0%, P+/T- = 7.8%, $p = 0.075$) and mothers' divorce history (P-/T+ = 25.0%, P+/T- = 7.8%, $p = 0.075$).

Variables explaining difference between parent TDS and teacher TDS (discrepancy score) for an individual child

A stepwise multiple linear regression model was built to determine the variables that account for the discrepancy score ($M = 4.4$, SD = 9.3 for boys; $M = 6.8$, SD = 7.8 for girls) as a dependent variable. For boys, the 11 variables previously listed were entered as independent variables. Table 4 showed that the discrepancy score was significantly associated with assigning an assistant (necessary) and with mother's age (both $p < 0.05$). When a boy was assigned an assistant, the discrepancy score was 6.5 points lower than for boys who did not have an assistant assigned (95% confidence interval [CI] -9.9 to -3.1). This indicates that the parents of the boys perceived the degree of behavioural problems to be 6.5 points less serious than the

teacher did. In addition, as the mother's age increased by 10 years, the discrepancy score was lowered by 4.3 points (95% CI -7.7 to -1.0). This suggests that the older the mother, the less serious she perceived the behavioural problems to be compared to the teacher.

The same analysis was conducted for girls (Table 4). The results showed that the discrepancy score was significantly associated with Bonding Scale score and talking more to the child individually (necessary) (both $p < 0.05$). The higher the Bonding Scale score was, the more difficult the parent found attachment towards the child. For girls, as the Bonding Scale score increased by 10 points, the discrepancy score decreased by 4.8 points (95% CI 1.1 to 7.9). This indicates that the more problematic the parent's attachment to the girl, the more seriously the parent would perceive her behavioural problems than did the teacher. In addition, when encouragement from the teacher was necessary, the discrepancy was lowered by 4.8 points (95% CI -7.9 to -1.8). This indicates that when the teacher considered it necessary to talk

to and encourage the girl more often, her parent would perceive her behavioural problems less seriously than the teacher would.

Discussion

In this study, we conducted a random sample of second grade elementary school students within a middle-sized city in Japan. Parents and teachers independently evaluated the behaviours of their children using the SDQ; parent and teacher TDS for the same child were found to be different. Our study clearly show that the assessment of behavioural problems among young children, based on data from both a parent and teacher, should be interpreted with caution. Because the scores from two sources tend to differ and the magnitude of the discrepancy between them varies depending on the presence of background variables, this may increase the likelihood of inaccurate judgments being made.

Parent and teacher TDS

As shown in Table 1, the mean parent TDS was significantly higher than the teacher TDS for both boys and girls. The discrepancy score was +4.4 for boys and +6.8 for girls. Overall, parents

tended to perceive their children's behavioural problems more seriously than the teachers did. This tendency is consistent with previous studies [7,8].

A comparison of parent TDS and of teacher TDS between boys and girls, showed that only teachers tended to perceive behavioural problems more seriously in boys than in girls (Table 1). Parent TDS showed no significant difference between boys and girls, consistent with a prior study using maternal reports [18].

Variables associated with the discrepancy score: need to assign an assistant for boys and need to talk more to the child individually for girls

As shown in Table 4, for boys who were assigned an assistant, the discrepancy score was 6.49 point lower than boys who were not assigned an assistant; that is, parent TDS was significantly lower than teacher TDS for boys needing help from an assistant. In practice, a teacher's judgment that a child needs assistance from trained personnel might be related to the teacher's own perception that the child has or may have behavioural problems, although this judgment must be also

influenced by the fact that the child has a diagnosed developmental disorder or difficulties in conversation, writing, or reading abilities. Thus, all of these variables may lead to an increase in teacher TDS and therefore to a negative discrepancy score. However, the association between the discrepancy score and assigning an assistant (necessary) remained significant even when controlling for diagnosis of a developmental disorder and conversational, writing, and reading abilities in multiple regression. Thus, even when teachers perceive boys with behavioural problems to need an assistant, the parents might not perceive the problems to be as serious as the teachers, irrespective of whether the boys have a developmental disorder or problems with conversation, writing, or reading. This particular perception of teachers that boys with behavioural problems need an assistant points to the possibility that the parents tend to overlook their children's behavioural problems.

In Japan, the educational system is designed so that all children will adjust themselves to school life. There are

several methods available to support individual children who cannot adjust themselves. The assignment of an assistant is one of these methods. In the case of the present findings which related to boys, it is expected that the boy's parent and the teacher who demanded the assignment have a common understanding that he needs support which can be best provided by an assistant. However, this might not be the case, partly because parents may not acknowledge their children's behavioural problems. Intriguingly, in Asian countries in particular, people tend to have a hostile attitude towards those with behavioural problems or disabilities [19], and the parents of such children may be reluctant to acknowledge behavioural problems in their children. Furthermore, we found that when teachers identify boys who need supports because of behavioural problems, the parents may not be as aware of those problems, perhaps because of the parents' reluctance to perceive the problems.

On the other hand, the same finding was not replicated in girls. However, the absence of such findings should be interpreted with caution because of the

following results. For girls that teachers perceived needed more talking to individually compared to other children, the discrepancy score was 4.83 points lower than girls perceived to have no such need; in other words, parent TDS was significantly lower than teacher TDS for the girls with such a need. A teacher's judgment that a girl needs more talking to individually might be related to his or her perception that the girl has or may have behavioural problems, although this judgment would also influenced by the girl having a diagnosed developmental disorder or difficulties with conversation, writing, or reading abilities. Thus, similar to the findings for boys, all of these variables may lead to an increase in teacher TDS and therefore to a negative discrepancy score. However, the association between the discrepancy score and needing to talk more individually to the girl remained significant even when controlling for diagnosis of a developmental disorder and conversational, writing, and reading abilities in multiple regression. Accordingly, even when teachers perceive girls to need more talking

individually because of behavioural problems, the parents might not perceive the problems to be as serious as the teachers, irrespective of whether the girls have a developmental disorder or conversation, writing, or reading problems. This particular perception of teachers suggests the possibility that the parents of these girls tend to overlook their children's behavioural problems.

Clearly, these results for girls seem to parallel those for assigning an assistant for boys. Considering the fact that girls' behaviour problems tend to be internalised while boys' problems including hyperactivity tend to be externalised^[20], teachers may have been more likely to cope with girls' behaviour problems by themselves, rather than looking to appoint them an assistant. In our sample, therefore, the teacher's perceptions that boys need an assistant and girls need more talking to individually are equivalent in terms of the teacher's perception of behavioural problems. In addition, when the teacher perceives as such, the parents of the child tend to underestimate the problems, since teacher TDS has been reported to be more sensitive for

detecting children's behavioural problems than parent TDS^[21,22]. Variables associated with the discrepancy score: mother's age and Bonding Scale score

Among boys, as the mother's age increased, the discrepancy score became smaller towards a negative value with the coefficient of -0.43 point per year, indicating that when the teacher's TDS held constant, younger mothers would have higher TDS than older mothers. A previous report in Japan has indicated that mothers under the age of 35, compared to mothers in a control group, were significantly more likely to use physical punishment and scolding^[23]. Furthermore, the younger mothers were more likely to compare their children to other children and desire to control them while finding it difficult to communicate with them or provide good parenting effectively. On the other hand, in a longitudinal study on parent TDS, TDS score decreased as the child's age increased^[24]. This is consistent with our findings in boys. However, if the parent TDS increases as mother's age increases regardless of the gender of the child, we would have

obtained the same results for girls. In the analyses for girls though, there was no significant association between the discrepancy score and parent age. Thus, the findings of previous studies that increased mother's age was associated with a lower TDS resulting in a negative discrepancy score regardless of the gender of the child may not be generalized.

In contrast, for girls, higher Bonding Scale scores were associated with a larger discrepancy score towards a positive value, indicating that poorer parental attachment to the child results in higher parent TDS. Intriguingly, given the above finding for boys that the association between maternal age and discrepancy score was accounted for by mothering behaviours including poor attachment, the poor attachment of a mother to her child may be regarded as commonly related to her TDS for both boys and girls.

Indeed, Sugawara and colleagues suggested that poor maternal attachment negatively affects the child's cognition of his or her relationship with the mother^[25]. At the same time, the child's negative cognition about the

mother-child relationship predicts emergence of behavioural problem such as depression^[26,27] and violence^[28] in the child. Although a causal relationship cannot be drawn from our finding, poor attachment of a mother to her child is associated with behavioural problems in the child, which in turn increases parent TDS and can be connected with a positive discrepancy score.

However, caution needs to be applied in the interpretation of our findings. First, not only the mother's TDS, but also the teacher's TDS would be expected to be higher if the mother's poor attachment increases the risk of her child having behavioural problems. Our results do not support this. One explanation is that teachers may not appropriately address such a child's behavioural problems, but it is unlikely that teachers of children who have poor attachment with their mothers are selectively failing to address the children's behavioural problems. In addition, previous studies on children's behavioural problems using the SDQ have shown that teachers are more sensitive in detecting such problems than parents are^[10,21,22]. Consequently, it is also possible that

mothers with poor attachment to their children may have an overestimated TDS even when their children's actual behavioural problems are relatively mild.

Second, we are not able to account for why the Bonding Scale score was unrelated to the discrepancy score among boys. One study has indicated that the attachment between a mother and daughter might be closer than that between a mother and son, and a mother's expectations for maintaining her relationship with her daughter over time is much stronger than that with her son [29], which results in a close but stressful relationship. Also, mothers are sensitive in responding to achievement of their children, especially of girls, and easily have ambivalent feelings [30]. In the present study, 95% of the respondents were mothers. Thus, the effect of poor attachment increasing the parent TDS, found only among girls, might have reflected the mother-daughter relationship, which is closer and would be more stressful than a mother-son relationship. Due to the less stressful mother-son relationship, we did not find this association among boys, although the association was

reflected for boys with younger mothers.

Clinical implications

Brown and colleagues reported that parents are more likely to miss behavioural problems of the children compared to teachers, and thus pointed out that it is crucial to establish an algorithm to accurately detect behavioural problems among school-aged children using SDQ [9]. Considering this, we identified explanatory variables that might contribute to the discrepancy between parents' and teachers' evaluation of children's behavioural problems. Assigning an assistant for boys and providing more individual talks for girls than for other children are different variables themselves, but they merely reflect differences in how teachers handle the emergence of behavioural problems in boys and girls, and thus these two variables inherently share common components. In addition, they may be variables related to parents overlooking or underestimating the degree of behavioural problems in their children.

Many previous studies have reported that poor attachment of parents,

especially mothers, to their children is a predictive factor of behavioural problems in their children. In contrast, our study showed that, rather than poor attachment being a factor predictive of a child's behavioural problems, it may lead to the parents' overestimation of their children's behaviour. There was also a gender difference in how higher TDS manifests on the basis of a mother's poor attachment to her children.

In studies using the SDQ with elementary school students, the relationship of explanatory variables with discrepancy scores need to be taken into consideration and, on this basis, the evaluations of parents and teachers should be carefully interpreted. Appropriate interpretations would assist in providing preventive interventions for child behavioural problems. Interventions as early as the second grade, as targeted in the present study, could help prevent the exacerbation of problems and development of secondary disorders [2]. Specifically, improving the mother's attachment to her child might modify her TDS and prevent the child from developing negative cognitions towards her. These

preventive measures require multidimensional approaches that involve not only school teachers but also school counselors, as well as external institutions specializing in medicine and policy making. Use of SDQ, with the greatest care of the background variables, may be of particular significance in predicting and preventing manifestations of behavioural problems [22].

Limitations

The first limitation is that the inference of a causal relationship is not possible because the design of this study was cross-sectional. The second limitation is that the study focused only on children with behavioural problems who need to receive intervention and support. Thus, our findings can be applied only to children with suspected or potential behavioural problems, not to children without such problems. It should be noted that because of the modest response rate of our sample (45%), if a larger proportion of the children who did not participate had in fact been included in the analysis, the proportion of children found to have behavioural problems would likely have

been higher than the 27% (219/798) we actually had. In addition, we may not have included children whose parents and teachers would show a prominent discrepancy. However, such selection bias would lead to a null value, instead of strengthening the observed associations. Our results are thus likely to underestimate the reality and unlikely to overestimate it.

Finally, when evaluating the presence of behavioural problems on the basis of TDS, whether the score indicates the rater is overlooking or overestimating such problems is not easy to determine. This is because the discrepancy score, the index we used, is relative not absolute. Assuming that the teacher's rating is more reliable than the parent's when using the SDQ [21], the overall tendencies shown in Table 1, which included a significantly higher mean TDS for the parents compared to the teachers and the parents' tendency to overestimate the behavioural problems, would be directly supported. This is not testable though, because we did not have our own direct evaluation data on the children. Further research that directly evaluates children's

behaviours is needed to verify this.

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Table 1 . Comparison of total difficulties score (TDS) on the Strengths and Differences Questionnaire completed by parents and teachers of 2nd-grade children.

| | Parent TDS | | Teacher TDS | | | |
|----------------|------------|-----|-------------|-----|---------------|---------|
| | Mean | SD | Mean | SD | Statistics | p value |
| Boys (n = 125) | 15.1 | 4.8 | 10.7 | 6.8 | t (124) = 5.2 | <0.001 |
| Girls (n = 94) | 15.1 | 3.9 | 8.3 | 5.8 | t (93) = 8.7 | <0.001 |

Table 2. Comparisons of variables between three groups of boys (n = 125) whose parent or teacher scored ≥ 13 on the Strength and Difficulties Questionnaire.

| Items | Groups* | | | | p value |
|-------------------------------------------------------------|---------|-------|-------|------------------|---------|
| | P-/T+ | P+/T- | P+/T+ | Statistics | |
| Conversational ability not equivalent to expected level (%) | 23 | 5 | 19 | $\chi^2(2)=7.1$ | 0.03 |
| Reading ability not equivalent to expected level (%) | 36 | 9 | 30 | $\chi^2(2)=11.3$ | 0.004 |
| Writing ability not equivalent to expected level (%) | 41 | 15 | 37 | $\chi^2(2)=9.7$ | 0.008 |
| Necessary to talking more to the child individually (%) | 64 | 46 | 85 | $\chi^2(2)=12.9$ | 0.002 |
| Necessary to modify study materials (%) | 41 | 24 | 56 | $\chi^2(2)=9.7$ | 0.008 |
| Necessary to provide a personalised milieu (%) | 32 | 20 | 48 | $\chi^2(2)=8.2$ | 0.02 |
| Necessary to assign an assistant (%) | 41 | 20 | 46 | $\chi^2(2)=8.4$ | 0.02 |
| Developmental disorder diagnosis (Yes: %) | 27 | 13 | 48 | $\chi^2(2)=13.9$ | 0.001 |
| Mother's history of divorce (Yes: %) | 19 | 18 | 28 | $\chi^2(2)=1.1$ | 0.58 |
| Father's history of divorce (Yes: %) | 15 | 12 | 13 | $\chi^2(2)=0.1$ | 0.94 |
| Mother's history of psychiatric problems (Yes: %) | 0 | 8 | 22 | $\chi^2(2)=7.5$ | 0.02 |
| Mother's history of physical health problems (Yes: %) | 5 | 7 | 4 | $\chi^2(2)=0.3$ | 0.85 |
| Father's history of psychiatric problems (Yes: %) | 5 | 5 | 15 | $\chi^2(2)=3.0$ | 0.22 |
| Father's history of physical health problems (Yes: %) | 0 | 3 | 5 | $\chi^2(2)=0.9$ | 0.65 |
| Bonding Scale score (mean) | 5.0 | 6.7 | 7.1 | $F(2,122)=2.4$ | 0.09 |
| Income (mean in million JPY) | 5.9 | 5.3 | 6.1 | $F(2,122)=1.3$ | 0.28 |
| Mother's education (mean in years) | 13.1 | 12.8 | 13.3 | $F(2,122)=1.1$ | 0.35 |

| | | | | | |
|------------------------------------|------|------|------|-----------------|-------|
| Father's education (mean in years) | 13.6 | 13.6 | 13.6 | $F(2,122)=0.1$ | 0.99 |
| Mother's age (mean in years) | 38.5 | 36.0 | 37.6 | $F(2,122)=3.0$ | 0.050 |
| Teacher's age (mean in years) | 39.4 | 39.2 | 43 | $F(2,122)=1.4$ | 0.24 |
| Teacher's sex (male: %) | 14 | 21 | 19 | $\chi^2(2)=0.6$ | 0.74 |

* P-/T+: a group where only the teacher noted the presence of behavioural problems,
 P+/T-: a group where only the parent noted the presence of behavioural problems, and
 P+/T+: a group where both the teacher and parent noted the presence of behavioural problems.

Table 3. Comparisons of variables between three groups of girls (n = 94) whose parent or teacher scored ≥ 13 on the Strength and Difficulties Questionnaire.

| Items | Groups* | | | | Statistics | p value |
|-------------------------------------------------------------|---------|-------|-------|------------------|------------|---------|
| | P-/T+ | P+/T- | P+/T+ | | | |
| Conversational ability not equivalent to expected level (%) | 25 | 8 | 17 | $\chi^2(2)=3.4$ | 0.18 | |
| Reading ability not equivalent to expected level (%) | 25 | 11 | 33 | $\chi^2(2)=5.6$ | 0.06 | |
| Writing ability not equivalent to expected level (%) | 25 | 13 | 39 | $\chi^2(2)=6.6$ | 0.04 | |
| Necessary to talking more to the child individually (%) | 42 | 31 | 78 | $\chi^2(2)=12.5$ | 0.002 | |
| Necessary to modify study materials (%) | 33 | 33 | 61 | $\chi^2(2)=3.4$ | 0.048 | |
| Necessary to provide a personalised milieu (%) | 17 | 20 | 44 | $\chi^2(2)=4.9$ | 0.09 | |
| Necessary to assign an assistant (%) | 17 | 23 | 39 | $\chi^2(2)=2.3$ | 0.31 | |
| Developmental disorder diagnosis (Yes: %) | 25 | 9 | 17 | $\chi^2(2)=2.5$ | 0.28 | |
| Mother's history of divorce (Yes: %) | 0 | 20 | 44 | $\chi^2(2)=8.7$ | 0.13 | |
| Father's history of divorce (Yes: %) | 8 | 19 | 23 | $\chi^2(2)=1.0$ | 0.61 | |
| Mother's history of psychiatric problems (Yes: %) | 0 | 17 | 22 | $\chi^2(2)=2.9$ | 0.24 | |
| Mother's history of physical health problems (Yes: %) | 8 | 5 | 0 | $\chi^2(2)=1.3$ | 0.53 | |
| Father's history of psychiatric problems (Yes: %) | 0 | 11 | 6 | $\chi^2(2)=1.8$ | 0.41 | |
| Father's history of physical health problems (Yes: %) | 0 | 13 | 8 | $\chi^2(2)=1.8$ | 0.40 | |
| Bonding Scale score (mean) | 3.9 | 7.0 | 8.3 | $F(2,91)=4.0$ | 0.02 | |
| Income (mean in million JPY) | 6.5 | 5.3 | 4.0 | $F(2,91)=3.8$ | 0.03 | |
| Mother's education (mean in years) | 13.8 | 13.1 | 12.1 | $F(2,91)=3.5$ | 0.03 | |

| | | | | | |
|------------------------------------|------|------|------|-----------------|------|
| Father's education (mean in years) | 14.0 | 13.8 | 12.8 | F(2,91)=2.0 | 0.16 |
| Mother's age (mean in years) | 38.2 | 37.9 | 35.9 | F(2,91)=1.1 | 0.33 |
| Teacher's age (mean in years) | 37.2 | 39.1 | 42.9 | F(2,91)=1.6 | 0.21 |
| Teacher's sex (male: %) | 17 | 13 | 22 | $\chi^2(2)=1.1$ | 0.59 |

* P-/T+: a group where only the teacher noted the presence of behavioural problems,
 P+/T-: a group where only the parent noted the presence of behavioural problems, and
 P+/T+: a group where both the teacher and parent noted the presence of behavioural
 problems.

Table 4. Results of multivariate analysis of discrepancy scores where the parent or teacher scored ≥ 13 points.

| Boys | coefficient | t | 95% CI | p value |
|-----------------------------------------------------|-------------|-------|----------------|---------|
| Necessary to assign an assistant | -6.49 | -3.75 | -9.93 to -3.06 | 0.001 |
| Mother's age (years) | -0.43 | -2.58 | -0.77 to -0.10 | 0.011 |
| Girls | | | | |
| Necessary to talking more to the child individually | -4.83 | -3.15 | -7.88 to -1.79 | 0.002 |
| Bonding Scale score (points) | 0.45 | 2.59 | 0.11 to 0.79 | 0.011 |