Early Detection and Referral of Young Children with Psychosocial Problems in the Preventive Child Health Care

An Evaluation of the Use of the Strengths and Difficulties Questionnaire

Cathelijne Mieloo

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Signalering en doorverwijzing van jonge kinderen met psychosociale problemen in de preventieve gezondheidszorg

Een evaluatie van het gebruik van de SDQ

Proefschrift

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	Prof.dr. H. Raat
Overige leden:	Prof.dr. V. Jaddoe
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	Prof.dr. H. Tiemeier
Copromotor:	Dr.ir. W. Jansen

CONTENTS

1 General Introduction

The detection and treatment of psychosocial problems at an early age is increasingly recognized as being of the utmost importance [1], more so since we know that these problems can influence the daily lives of children negatively [2] and tend to become persistent if left untreated [3-4]. That is why the development of empirically informed public health policies in order to respond adequately to such problems in young children has become a health priority globally [5-6].

One way of treating psychosocial problems in young children is by offering specialist mental health care. However, before entering treatment children first need to be identified as having psychosocial problems and consequently need to be referred to proper care.

In the Netherlands, early detection of psychosocial problems is a task of the preventive care system [7]. For this task the parent reported Strength and Difficulties Questionnaire (SDQ) is recommended by the Health care Inspectorate of the Dutch government [8].

The SDQ is widely used and it was validated in many countries with satisfying results. However, the SDQ has not yet been validated for children in the younger age groups, nor in children of different ethnic backgrounds. Furthermore, little is known about the process of identification of psychosocial problems and referral for these problems in young children by the preventive child health care professional (CHP) who are making use of early detection instruments.

Therefore, the main aim of this thesis is to explore the role of the SDQ in identifying psychosocial problems in young children by the preventive youth health care professional as well as the role of the SDQ in referral for these problems. Initially, the reliability and validity of the parent and teacher reported SDQ was determined in 5 to 6 year old children as well as in subgroups with the same background characteristics.

In the next paragraphs a theoretical model for help-seeking behaviour will be presented. Psychosocial problems, the Dutch preventive child health care, different ways of identification of psychosocial problems and the SDQ will be explained in more detail. Finally, the research questions and the outline of this thesis will be presented.

SPECTRUM OF HELP SEEKING BEHAVIOUR AND PROVIDER RECOMMENDATIONS

To place the aim of this thesis in perspective, it will be necessary to understand the theory behind the process of help-seeking behaviour. There are several theoretical models for understanding help-seeking behaviour and service use. Most models suggest that an individual must have problem recognition, decide to seek help, make an action plan and then take action [9-11]. In young children the parent(s) and/or the teacher play a role as an intermediate. They have to recognize the problem and the need to ask for help. However, the model of help-seeking is influenced by all kinds of determinants.

The levels and filters model of Verhulst & Koot describes levels at which mental health problems can be manifested [10]. Their model is an adaptation of the model of Goldberg and Huxley [9]. The model distinguishes four levels:

1. the community level,
2. clients of primary care level,
3. recognition by the provider,
4. entering into specialist care.

The first level refers to mental health problems in the community as measured by surveys. To go to the next level one has to pass through a filter. The first filter is the decision to ask for help and the step of actually consulting a primary care professional. Level two refers to all mental health problems that are presented to the primary care, and filter two determines the proportion of these problems that are actually recognized by the primary care professional. Level three refers to all the mental health problems that are recognized by the primary care system, and filter three is the recognition of the problems by the patient and the actual referral to care. Level four refers to all mental health problems that are presented to specialist mental health care. Each filter can be influ-

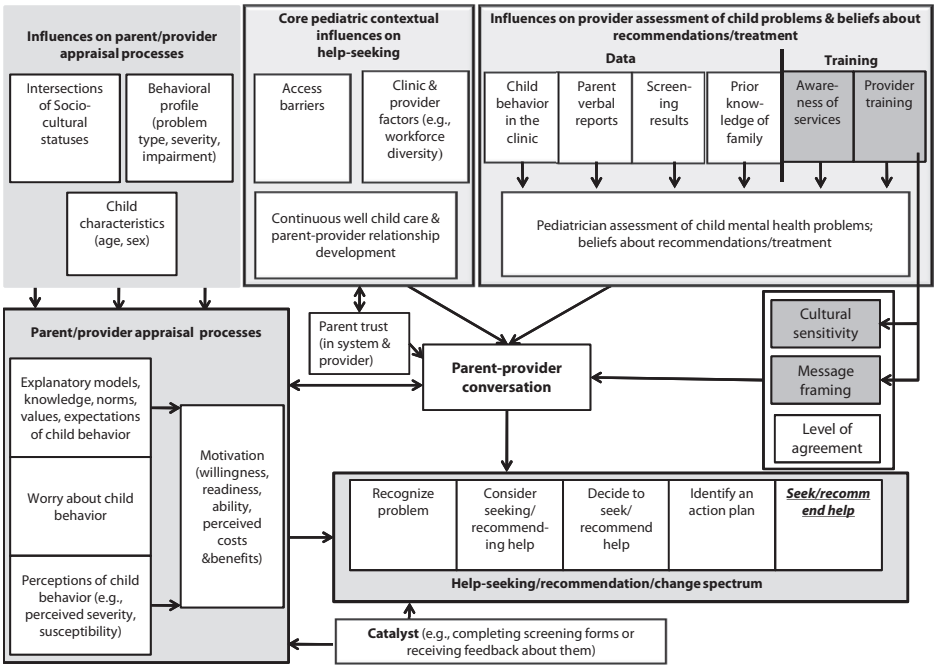

Figure 1 Influences on parent help-seeking and provider recommendation [12]

enced by several factors and circumstances. For instance, gender, ethnic background or educational level. However, this model does not clearly show the role of early detection tools with regard to the help seeking process.

Godoy & Carter (2013) developed a theoretical model that describes factors that influence help seeking behaviour and provider recommendations [12]. This model has the advantage that it takes into account the role of early detection tools in the help seeking process (figure 1). The model shows that the help seeking and recommendation spectrum, which consists of recognition of the problem, considering to ask for help or recommending help, and deciding to ask for help or recommend help, action plan and action, is influenced by the parent-provider conversation and the use of early detection tools.

Early detection tools can play a role as a catalyst in the help-seeking spectrum. This means that an early detection tool can trigger the parent(s) or the child health professional to recognise or discuss possible problems. Moreover, the model shows that the parent-provider assessment is influenced by many determinants in four categories. Firstly by core paediatric contextual influences in the system the CHP is operating in, like access barriers, workforce diversity, and continuous preventive child health care. Secondly, by influences on provider assessment, such as information from client records, training, beliefs about recommendations, and cultural sensitivity. Thirdly, there are influences on the appraisal process; this is the process of valuation of the problem. Factors

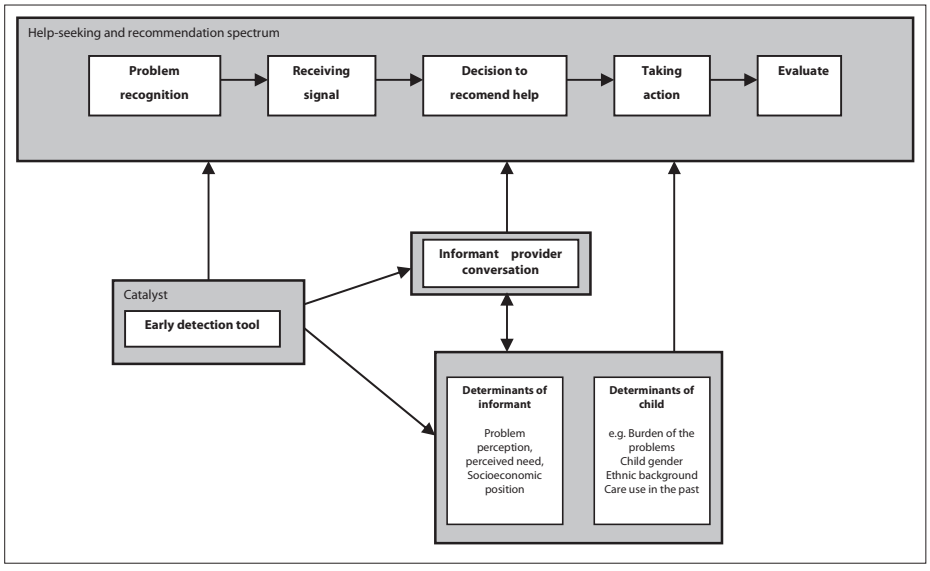

Figure 2 Spectrum of identification and referral as applied in this thesis, based on Godoy et al. 2013 [12] Reproduced with permission

that influence the appraisal process are for example socio-cultural status, behavioural profile and child characteristics. And finally the appraisal process itself, for example norms, motivation, problem perception, and burden of the problems [12].

Figure 2 shows a simplification of the model of Godoy & Carter (2013), it highlights the steps and determinants which are discussed in this thesis [12]. In the frame at the top the five steps of both the helping seeking process by the parent or teacher and the recommendation process of the CHP is shown. This model shows that an early detection tool, in this thesis the parent and teacher reported SDQ, can influence the help-seeking and recommendation spectrum and the informant-provider converstation. An early detection tool can also influence determinants of the informant and child. By completing an early detection tool the informant can become aware of the child's problems and the burden of these problems to the the child. Furthemore, this model shows that the determinants of the informant and the child influence the informant-provider conversation and vice versa.

PSYCHOSOCIAL PROBLEMS

A rather large part of the Dutch youth experience psychosocial problems. Among 0 to 12 year olds this is 11% to 28% [13]. Estimates of the prevalence of severe and chronic psychosocial problems with a negative impact in later adult life in Dutch children are 2 to 5% [14]. It is known that girls more often experience emotional problems and that boys more often experience behavioural problems [15]. For migrant children, studies are ambiguous with regard to the possible increased risk of mental health problems. This depends on the informant, characteristics of the group and characteristics of the host country [16]. Several studies showed remarkably different pictures in reported problems between ethnic groups [17-18]. For instance, Moroccan youths in the Netherlands reported fewer externalising problems than native youths. On the other hand, there were no differences between parent reports. Teachers reported many more externalising problems for Moroccan youths as compared to youths of Dutch origin [17]. Several studies compared native children with a mixed group of migrant children [18-20]. In these studies it is assumed that migration in itself is the important variable. However, studies which distinguished between migrant groups and native children, found differences between all groups [17, 21-22]. For example, teachers reported less problem behaviour of Turkish children and more of Moroccan children than of native Children [22]. These differences could be caused by differences in background characteristics such as socioeconomic status (SES) [23] or cultural background [24]. In addition to characteristics of the migrant group, characteristics of the host country play an important

role. For instance the attitude towards migrants, but also the general child wellbeing in the host country [16].

But, what is the definition of psychosocial problems? In general the definition is: "Psychosocial problems are the issues related to the psychological development of a person." However, this is a very broad definition. The Dutch Centre of child health (Nederlands Centrum Jeugdgezondheid) defines these psychosocial problems in three categories [25]:

- Emotional problems (internalising problems), such as fear, introverted, depressive feelings and psychosomatic problems.
- Behavioural problems (externalising problems), such as aggressive, restless and delinquent behaviour.
- Social problems, such as problems in making and keeping in contact with others.

This last definition is consistent with the underlying problems measured by the SDQ and therefore used in this thesis. Emotional problems, also called internalising problems, refer to problems which are focussed inwards and therefore mainly form a burden to the child itself. Behavioural problems or externalising problems are focussed outwards and will mainly cause a burden to others. Social problems appear as dependency, social clumsiness, being a bully victim or preferring to play with younger children. Psychosocial problems are often a precursor for more severe disorders, for example anxiety disorders, mood disorders or antisocial personality disorders [26-30].

PREVENTIVE CHILD HEALTH CARE

The Dutch preventive child health care is traditionally focussed on physical health, but in the last decades this service has developed from a strictly medical orientation to a service which is aimed at health and a safe development in the broadest sense (physical, psychosocial and socially) [31]. Tasks of the preventive child health care are [7]:

1. Monitoring and identification of developmental and health problems,
2. Estimating need for care,
3. Screening and immunisation,
4. Health promotion, advice, instruction and support
5. Supporting other health care workers, by consultation and collaboration.

To fulfill these tasks the preventive child healthcare program offers child immunization programs as well as health assessments for children from 0 to 19 years old. Health assessments are offered at around 16 stages of a child's development, 13 at pre-school age (0

to 4 years old) and 3 during school age. The first assesment for school-aged children is in grade 2 (5 to 6 years old), the second in grade 7 (10 to 11 years old) and the last one at the secondary school [32]. During each assessment, the physical health and mental health of the child are evaluated by a CHP, a specially trained nurse or doctor. During this assessment the CHP can discuss the physical and mental well being of the child. When there are concerns the CHP can offer advice for mild problems, make a new appointment for further diagnosis, offer counselling at the preventive child healthcare centre or refer the child to professional care, for example to a general practitioner, specialist medical care, youth care or mental health care, or refer the parents to a parenting support program.

IDENTIFICATION OF PSYCHOSOCIAL PROBLEMS

Identification of psychosocial problems is especially important in the group of the youngest school-aged children. For these children the transition from pre-school to elementary school forms a major milestone. Children must accommodate to daily schedules, new adult authority, peers and academic challenges through which emotional and behavioural problems can become apparent [33].

Detection of psychological problems can take place in many ways. There is a normative approach, which include interviews with one or more informants. Population rates of identification of psychosocial problems by the CHP have shown to vary from 6 to 48 [34-39]. In this way, sensitivity of the identification is generally low and varies from 4% -54%, with one exception of 85%, but in this study most children indicated that they came for mental health problems [35-37, 40]. Moreover, Sayal et al. (2004) showed that sensitivity of identification by the CHP increased from 26% to 88% when parents were asked to express their concerns [36]. In most studies CHPs were blinded for early detection tools [35-39]. Most studies were enrolled in populations with a broad age band [34, 36, 38-40]. Only two of these studies described identification of psychosocial problems in young children. Theunissen et al. (2011) found a rate of identification by the CHP between 22 to 26% in 5-6 year old children. Sensitivity was between 56-58% [35]. Lavigne et al. (1993) found a sensitivity of 21% in children of 4-5 year old. Because of the low rates of identification without using an early detection tool, these findings plead for a more empirical approach in the preventive child health care to improve identification, which most studies also recommend [40]. An empirical approach can consist of a protocol, a (semi)structured interview or the use of a validated early detection tool.

Several instruments to identify psychosocial problems are available, for instance the Short Instrument for Psychological and pedagogical inventory (KIPPPI) [41], Brief Infant Toddler Social and Emotional Assessment (BITSEA) [42], Children's Depression Inventory (CDI), Short indicative questionnaire for psychosocial problems in Adolescents (KIVPA) [43], Screen for

Child Anxiety Related Emotional Disorders (SCARED) [44], Social Anxiety Scale for Children (SAS-K) [45], and the Fear Survey Schedule for Children-Revised (FSSCR, in Dutch VAK) [46]. However, most of these instruments are designed to measure just one aspect of psychosocial problems or are not designed for young children or have not yet been validated.

The Child behaviour checklist (CBCL) and the Teacher report form (TRF) have been designed to measure more aspects of psychosocial problems and were thoroughly validated with good results. However, these questionnaires are extensive and calculating the score on these questionnaires by hand is difficult. The CBCL/TRF contains 118 problem items, which are scored on seven empirically based syndromes: emotional reactive problems, anxiousness/depressed, somatic complaints, being withdrawn, sleep problems, attention problems, and aggressive behaviour. Each item is scored 0 = not true, 1 = somewhat true, and 2 = very true or often true. The Total Problems score is made up by the sum score of all the subscales. Good reliability and validity have been reported for the CBCL and the TRF [47].

Another instrument is the Strengths and Difficulties Questionnaire (SDQ), which has several benefits. The SDQ is a relatively short instrument developed to look for emotional and behavioural problems in children aged 3-16 years and is easy to score by hand [48]. The SDQ is a 25-item questionnaire with three response categories from zero to two (not true, somewhat true, and certainly true). Of all 25 items, 15 are phrased negatively and 10 are phrased positively. The questionnaire has five subscales of five items each: emotional problems, conduct problems, hyperactivity/inattention problems, peer problems, and prosocial behaviour. The sum of the first four subscales provides a total difficulties score; a high score being less favourable. The prosocial scale provides information on protective factors of the child; a low score is less favourable. The extended version of the SDQ contains an impact supplement. In this supplement is asked whether the respondent thinks the young person has a problem, and if so, finds out more about chronicity, distress, social impairment, and if the problems of the child are a burden to others. However, the SDQ has not yet been validated in the Netherlands for children under the age of seven.

RESEARCH QUESTIONS

The following research questions are addressed in this thesis:

1. Reliability and validity of the SDQ in 5-6 year olds
    1.1. What is the reliability and validity of the SDQ in 5-6 year old children (**chapter 2 and 3)**?
    1.2. Are there any differences in reliability and validity of the SDQ in subgroups by gender, parental education level, and ethnic background (**chapter 2 and 3**)?
    1.3. What is the discriminative power of the SDQ in 5 to 6 year old (**chapter 4**)?

2. Identification and referral by the preventive child health care
   2.1. What is the role of the SDQ total problem score and impact score on the identification of psychosocial problems and referral by the CHP (**chapter 5**)?
   2.2. Are there ethnic differences in parental and teachers' problem perception and perceived need for care in 5 to 6 year olds with psychosocial problems (**chapter 6**)?
   2.3. Are ethnic differences in parental and teachers' problem perception and perceived need for care associated with ethnic differences with regard to referral of 5 to 6 year olds with psychosocial problems by the CHP (**chapter 7**)?
3. Mental health care use
   3.1. Are ethnicity, socioeconomic position and severity of problems associated with mental health care use in 5 to 8 year old children with psychosocial problems (**chapter 8**)?

OUTLINE AND METHODS

In this thesis seven studies are described in three subsequent parts.

In the first part, the reliability and the validity of the SDQ are described in 5 to 6 year old children (**chapter 2, 3 and 4**), making use of cross sectional data of more than 11.000 children. The reliability and validity are determined in subgroups by gender, parental education level (**chapter 2**), and ethnic background of the child (**chapter 3**). Furthermore, the discriminatory power of the SDQ is determined and also the differences in subgroups by gender and ethnic background are explored (**chapter 4**).

In the second part, the association between the total difficulties score on the parent and teacher reported SDQ and identification and referral for psychosocial problems was determined as well as the role of problem perception and the burden of problems on this association (**chapter 5**). Ethnic differences in problem perception and perceived need are addressed (**chapter 6**) as well as ethnic differences in referral (**chapter 7**).

In the third part, the use of mental health care of children with an unfavourable score on the SDQ was determined as well as the association between mental health care use and ethnic background, socioeconomic position and severity of the problems (**chapter 8**). In table 1 an overview of the study methods is presented.

In **chapter 9** the results of these studies are summarised and interpreted. Strengths and limitations are discussed. Further on, recommendations for future research, implications for practice and an overall conclusion will be presented.

Table 1 Population and methods

Chapter	Sample	n	Measure	Determinants	Main results
2	Sub sample of community sample consisting of Dutch children	4.750 parent reports 4.516 teacher reports	SDQ, parent reported SDQ, teacher reported	Gender and parental education level	Factor structure, Interrater reliability, Internal consistency, Concurrent and Divergent validity
3	Community sample	8.115 parent reports 9.355 teacher reports	SDQ, parent reported SDQ, teacher reported	Ethnic background	Factor structure, Interrater reliability, Internal consistency, Concurrent and Divergent validity
4	Community sample and clinical sample	14.221 parent reports 16.106 teacher reports	SDQ, parent reported SDQ, teacher reported	Gender and ethnic background	Area under the curve, sensitivity and specificity
5	Sub sample of community sample	1.549 parent reports 2.037 teacher reports	Identification of psychosocial problems and referral by the CHP	SDQ score, and impact score on parent and teacher reported SDQ	Association between SDQ score, impact score and identification, and referral
6	Sub sample of community sample consisting of children with a high SDQ score	1.215	Problem perception and perceived need of parent and teacher	Ethnic background	Ethnic differences in problem perception and perceived need
7	Sub sample of community sample	1.034	Referral, problem perception, and perceived need of parent and teacher	Ethnic background	Association between problem perception, and perceived need and referral
8	Sub sample of community sample consisting of follow up data	1.269	Mental health care use	Ethnic background, socioeconomic position and severity of problems	Association between ethnic background, socioeconomic position severity of problems and mental health care use

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Part I

RELIABILITY AND VALIDITY OF
THE SDQ IN 5-6 YEAR OLDS

2

Validity and Reliability of the Strengths and Difficulties Questionnaire in 5-6 Year Olds: Differences by Gender or by Parental Education?

Cathelijne Mieloo, Hein Raat, Floor van Oort, Floor Bevaart, Ineke Vogel, Marianne Donker, Wilma Jansen

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SDQ

ABSTRACT

Introduction

The Strengths and Difficulties Questionnaire (SDQ) is a relatively short instrument developed to detect psychosocial problems in children aged 3-16 years. It addresses four dimensions: emotional problems, conduct problems, hyperactivity/inattention problems, peer problems that count up to the total difficulties score, and a fifth dimension; prosocial behaviour. The validity and reliability of the SDQ has not been fully investigated in younger age groups. Therefore, this study assesses the validity and reliability of the parent and teacher versions of the SDQ in children aged 5-6 years in the total sample, and in subgroups according to child gender and parental education level.

Methods

The SDQ was administered as part of the Dutch regularly provided preventive health check for children aged 5-6 years. Parents provided information on 4,750 children and teachers on 4,516 children.

Results

Factor analyses of the parent and teacher SDQ confirmed that the original five scales were present (parent RMSEA=0.05; teacher RMSEA=0.07). Interrater correlations between parents and teachers were small (ICCs of 0.21-0.44) but comparable to what is generally found for psychosocial problem assessments in children. These correlations were larger for males than for females. Cronbach's alphas for the total difficulties score were 0.77 for the parent SDQ and 0.81 for the teacher SDQ. Four of the subscales on the parent SDQ and two of the subscales on the teacher SDQ had an alpha <0.70. Alphas were generally higher for male children and for low parental education level.

Discussion

The validity and reliability of the total difficulties score of the parent and teacher SDQ are satisfactory in all groups by informant, child gender, and parental education level. Our results support the use of the SDQ in younger age groups. However, some subscales are less reliable and we recommend only using the total difficulties score for screening purposes.

INTRODUCTION

Early detection and treatment of emotional and behavioural problems in childhood may lead to considerable benefits regarding child development, wellbeing, and health [1]. To detect these problems, valid and reliable screening instruments are needed.

The Strengths and Difficulties Questionnaire (SDQ) is a relatively short instrument developed to screen for emotional and behavioural problems in children aged 3-16 years [2]. The SDQ is a 25-item questionnaire with three response categories from zero to two (not true, somewhat true, and certainly true). Of all 25 items, 15 are phrased negatively and 10 are phrased positively. The questionnaire has five subscales of five items each: emotional problems, conduct problems, hyperactivity/inattention problems, peer problems, and prosocial behaviour. The sum of the first four subscales provides a total difficulties score; a high score being less favourable. The prosocial scale provides information on protective factors of the child; a low score is less favourable. The items and scores are shown in the supporting table S1. Versions of the SDQ are available for parents and teachers, and children aged 11-16 years can complete an almost identical version. To facilitate proper screening by the preventive health care a short, easy to use, and validated instrument is needed.

The SDQ has been applied and evaluated in many countries, and seems to be a suitable instrument to detect emotional and behavioural problems in secondary school aged children [3]. Although the SDQ was developed for children aged 3 years and older, few evaluations have been made in children under 7 years of age [4-10]. Because different phases of a child's development coincide with age-specific problem behaviour [11], some items in the SDQ might be less applicable or more difficult to interpret in younger children.

Most studies targeted at young children explored the factor structure of either the parent or the teacher version of the SDQ. Five and three factor solutions have been reported [7-8,12]. Furthermore, different patterns were found for item loadings by gender [7-8] but not for item loadings by parental education level [8]. Although the factor structure was invariant between groups based on parental education level, the reliability may differ between groups. Some studies reported moderate to strong internal consistency but not for all SDQ subscales [4,7-9,12]. External validity of the parent version has shown good results [5,10]. The interrater correlation between the parent and teacher versions of the SDQ has been investigated only once [12]. Thus, although the few studies that investigated 5-6 year old children elucidated different aspects of the validity and reliability of the SDQ [4-9,12], the overall picture remains fragmented.

In order to use the SDQ as an early detection instrument in children aged 5-6 years, more data are needed on the validity and reliability of the SDQ in this age group. Therefore, the aim of this study is to determine if the SDQ is a reliable and valid instrument for detecting emotional and behavioural problems in children aged 5-6 years.

Data for this study were gathered as part of a regular preventive health care check of a large population sample. The Child Behavior Check List (CBCL) and corresponding Teacher Report Form (TRF) were administered in a subsample of participants to enable comparisons between the SDQ and CBCL/TRF. The CBCL and the TRF are widely used and well validated instruments for assessing emotional and behavioural problems and both contain eight syndrome scales: Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Psychiatric Problems, Rule-Breaking Behaviour and Aggressive Behaviour, Attention Problems, and Social Problems [13]. The scales are comparable to the SDQ scales emotional problems (CBCL/TRF scales Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints), conduct problems (CBCL/TRF scales Rule-Breaking Behaviour and Aggressive Behaviour), hyperactivity/inattention problems (CBCL/TRF scales Attention Problems), and peer problems (CBCL/TRF scales Social Problems). Although, the CBCL/TRF is well validated, it has several disadvantages for use in the preventive health care setting. For example, the questionnaire is long (118 questions), it contains only negative formulated questions, and it was developed for use in a clinical setting.

To consider the SDQ as a reliable and valid instrument in young children, we hypothesize the following:

1. The original five-factor structure of the SDQ can be reproduced in a sample of parents and teachers of 5 to 6 year old children.
2. The degree of agreement between the parent and teacher report in young children is higher or comparable to what is generally found for psychosocial problem assessments in children, namely a Pearson r of 0.27 [14].
3. The internal consistency of the total difficulties score and the subscales for the parent and teacher SDQ is at least 0.7 as recommended for screening instruments intended for use in groups and individuals [15].
4. The degree of agreement of the SDQ total difficulties score and subscales with the corresponding scales of the CBCL and TRF is larger than 0.4 [16] and larger than for all other scales (concurrent validity). The degree of agreement of the SDQ total difficulties score and subscales with the opposite scales of the CBCL and TRF is zero or negative (divergent validity).
5. The validity and reliability of the parent and teacher versions of the SDQ are similar in subgroups by child gender and parental education level.

METHODS

Ethics statement

Non-identifiable data gathered as part of the usual governmental preventive healthcare program were used. Informed consent was obtained from parents for all questionnaires

that were gathered in addition to the usual practice (CBCL and TRF). This study was approved by the Medical Ethics Committee of the Erasmus University Medical Center Rotterdam, the Netherlands. This study was conducted according to the Declaration of Helsinki code of ethics.

Data collection

In the Rotterdam-Rijnmond area, the SDQ is routinely administered to parents and teachers as part of the preventive health check for children in grade 2 at elementary school (5-6 year olds). This assessment is routinely provided to all children in this age group as part of the Dutch preventive child healthcare program. The Dutch preventive child healthcare program offers child immunization programs as well as screening assessments for children from 0 to 19 year olds. Screening assessments are offered at 14 stages of a child's development. At each screening, the physical health and psychosocial health of the child are assessed by a specially trained nurse or doctor.

A total of 11,987 children were eligible for the preventive health check in the school year 2008-2009. In this study, we only included children of Dutch origin to limit any cross-cultural bias as ethnic background was correlated to parental education level in the present study. In accordance with the classification system used by Statistics Netherlands, we classified a child as being Dutch when both parents were born in the Netherlands [17]. Parents provided questionnaire information on 4,750 (85%) children and teachers provided information on 4,516 (84%) children. The sample consisted of 2,808 males (51%) and 2,706 females (49%). Mean age was 5.3 (SD 0.52) years. There were no differences in child age by gender ($p<0.05$). Parental education level was low in 13%, middle in 36% and high in 51% of the parents. There were no differences between child gender or by parental education level ($p<0.05$) (Table 1). Non-response in parents was more likely when children had an elevated score on the total difficulties score of

Table 1 Demographic characteristics of the study population

	Parent completed forms		Teacher completed forms	
	SDQ	**CBCL**	**SDQ**	**TRF**
Number (n)	4,750	397	4,516	517
Gender of child (male %)	51%	55%	51%	52%
Mean age child; years (SD)	5.3 (0.52)	5.2 (0.51)	5.3 (0.51)	5.2 (0.42)
Parental education level*				
Low	14%	15%	14%	8%
Middle	36%	37%	35%	19%
High	50%	48%	51%	74%

Note: SDQ = Strengths and difficulties Questionnaire; CBCL = Child Behavior Checklist; TRF = Teacher Report Form

* see text for explanation of each level

the teacher SDQ ($p<0.05$, eta=0.09). Non-response in teachers was more likely when parental education was middle to high ($p<0.05$, eta=0.03).

Parents and teacher of a sub sample of children were invited to fill out the CBCL/TRF in addition to SDQ. This sample was selected in two ways: one part consisted of a random selection of children and the other part consisted of children with an SDQ score above the 90th percent cut-off (p90) of 14 on the parent report or 13 on the teacher report of the SDQ. These cut offs were based on a pilot study among children eligible for a preventive health check for children in grade 2 at elementary school in the Rotterdam-Rijnmond area. In addition to the SDQ, parents of 397 children completed the CBCL and teachers of 517 children completed the TRF. Although there were differences in child age, child gender and total difficulties score of the parent and teacher SDQ between children with and without a CBCL, the effect size was small (age $\eta 2=0.005$, gender $\eta 2=0.001$, and total difficulties score parent $\eta 2=0.014$ and teacher $\eta 2=0.008$). There were differences between children with and without a TRF for child age, level of parental education and total difficulties score of the parent SDQ, but effect sizes were small (age $\eta 2=0.014$, parental education level $\eta 2=0.016$ and total difficulties score $\eta 2= 0.001$).

Measures

The official Dutch version of SDQ was administered to parents and scored in the standard manner [18]. SDQ items and scores are shown in supporting table S1. A sub sample of parents and teachers received the CBCL/TRF [13].

Socio-demographic characteristics included child gender, child age and educational level of the parents. Parental education level was recorded as the parent with the highest education level. This was used to divide the sample into three educational levels: low (no education, primary education, or pre-vocational education), middle (secondary or vocational education), and high (bachelor or master's degree).

Statistical analyses

All analyses were performed with SPSS 19.0 (SPSS Inc. 2010). Differences between parent and teacher mean scores were analyzed with a paired-sample t-test. Differences between mean scores of males and females and subgroups by parental education level were analyzed in two separate ANOVA's with post-hoc test Games Howell because equal variance and equal group sizes were not present.

Confirmatory factor analysis was carried out to examine the factor structure of the SDQ. We used the software package MPLUS, version 4.2 [19]. Because the measurement level of the SDQ items is ordered-categorical, the weighted least squares estimator with a mean and variance adjusted chi-square statistic (WLSMV) was used [19]. For the teacher report, the COMPLEX procedure in MPLUS was used. Because children are nested within classes within schools, the data have a multilevel structure and cannot be considered

as independent. Model fit was evaluated within multiple indicators of model fit, namely the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the root mean square error of approximation (RMSEA). Values of CFI above 0.95 are preferred [20] but should not be lower than 0.90 [21]. Values of RMSEA lower than 0.05 are preferable but values between 0.05 and 0.08 are indicative of fair fit [22].

Interrater agreement between parents and teachers was determined with intra-class correlations (ICC) using a two-way random effect model with absolute agreement [23] and Pearson correlations. An ICC above 0.75 was considered excellent, an ICC from 0.75 to 0.40 as moderate to good, and an ICC below 0.40 as poor [16]. Differences between correlations of all subgroups were analyzed by means of the Fisher R to Z transformation [24]. A Pearson r of 0.27 or higher is comparable to what is generally found for psychosocial problem assessments in children [14]

The internal consistency of the different SDQ scales was determined by the Cronbach's alpha coefficient. A Cronbach's alpha of at least 0.7 is recommended for screening instruments intended for use in groups and individuals [15]. Differences between Cronbach's alphas of all subgroups were analyzed by calculating F-statistics [25].

Concurrent validity and divergent validity of the parent and teacher SDQ were assessed by calculating the Pearson correlation between the SDQ and CBCL and the SDQ and TRF. The hypothesis for concurrent validity was that the emotional symptoms scale of the SDQ has higher correlations with the Internalizing, Anxious/depressed, Withdrawn/depressed, and Somatic complaints scale of the CBCL and TRF than all other scales. Furthermore, a higher correlation was hypothesized between the conduct problem scale of the SDQ with the Externalizing, Rule-breaking, and Aggressive scale of the CBCL/TRF, between the hyperactivity scale of the SDQ and the Attention problem scale of the CBCL/TRF, between the peer problem scale of the SDQ and the Social problem scale of the CBCL/TRF than all other scales. Finally, a high correlation was hypothesized between the total problem score of the SDQ and CBCL/TRF. For divergent validity, a negative association between the prosocial scale of the SDQ and all scales of the CBCL/TRF was hypothesized. Furthermore, a low correlation was hypothesized between the emotional symptoms of the SDQ with the externalizing subscales of the CBCL and TRF subscales, and a low correlation between the conduct problem scale, the hyperactivity scale of the SDQ, and the internalizing subscales of the CBCL/TRF scales.

All analyses were repeated separately for each subgroup by gender and by parental education level.

RESULTS

Distribution of scales

Table 2 presents mean scores and p90 cut-offs for parent and teacher ratings for the total group, by gender, and by parental education level. Teachers reported a lower level of psychosocial problems than parents did for all scales (all significant at $p<0.01$). Parents and teachers reported a significantly higher level of difficulties in males than in females on the total difficulties score and on four of the five subscales ($p<0.05$). Parents and teachers reported a significantly higher level of difficulties on the total difficulties score and on four of the five subscales in children with low parental education level than all other groups by parental education level ($p<0.05$).

Factor structure

Confirmatory factor analyses in 4,325 complete cases with parent data and 4,314 complete cases with teacher data tested whether the theoretical 5-factor model of the SDQ was confirmed, namely emotional problems, conduct problems, hyperactivity/inattention problems, peer problems, and prosocial behaviour. Fit indices for the parent report approached the preferred levels ($\chi2=2249.57$, $p<0.001$; CFI= 0.88; TLI=.92; and RMSEA=0.05). Also, the fit indices for the teacher report approached the preferred levels ($\chi2=1402.83$, $p<.001$; CFI= 0.89; TLI=.95; and RMSEA=0.07) (Table 3).

Interrater correlations

Interrater agreement between parent and teacher SDQ scores was determined with ICC and Pearson correlations for all children for which a parent and a teacher report were present (n=3,718). Correlations (ICC and Pearson) between the parent and teacher scores of complete cases in the total population were significant for all scales. The total difficulties and hyperactivity scale had an ICC ≥ 0.4 ($p<0.001$). Total difficulties score and three of the five subscales had a larger Pearson correlation than the meta-analytic mean of 0.27 [14] (Table 4).

Internal consistency

Cronbach's alphas were calculated for each subscale. Cronbach's alphas for the total difficulties score and hyperactivity scale of the parent SDQ in the total population were ≥ 0.7. Cronbach's alphas for total difficulties score and three of the five subscales of the teacher SDQ in the total population were ≥ 0.7 (Table 5). Cronbach's alphas did not improve substantially when items were deleted in both the parent and teacher version.

Table 2 Mean scores and p90 for parent and teacher SDQ by gender and parental education level

	Total		Gender of child				Parental education level					
			Male		Female		Low		Middle		High	
	Mean (SD)	p90	Mean (SD)	p90	Mean (SD)	p90	Mean (SD)	p90	Mean (SD)	p90	Mean (SD)	p90
SDQ parent report	n=4,732		n=2,402		n=2,323		n=522		n=1,414		n=2,002	
Emotional Symptoms	1.39 (1.65)	4	1.38 (1.67)	4	1.40 (1.67)	4	1.59 (1.76)^{ab}	4	1.38 (1.65)^{a}	4	1.26 (1.56)^{b}	4
Conduct problems	1.14 (1.36)	3	1.29 (1.47)*	3	1.00 (1.27)*	2	1.47 (1.52)^{ab}	4	1.12 (1.34)^{ac}	3	0.96 (1.25)^{bc}	3
Hyperactivity	2.76 (2.41)	6	3.14 (2.52)*	7	2.34 (2.19)*	5	3.62 (2.59)^{ab}	7	2.90 (2.42)^{ac}	6	2.22 (2.16)^{bc}	5
Peer problems	0.81 (1.23)	2	0.89 (1.30)*	3	0.72 (1.28)*	2	1.13 (1.47)^{ab}	3	0.77 (1.15)^{ac}	2	0.63 (1.07)^{bc}	2
Prosocial behaviour	8.31 (1.65)	6	8.02 (1.75)*	6	8.60 (1.54)*	7	8.22 (1.76)	6	8.33 (1.63)	6	8.34 (1.62)	6
Total difficulties score	6.10 (4.58)	12	6.69 (4.88)*	14	5.48 (4.34)*	11	7.80 (5.21)^{ab}	15	6.18 (4.46)^{ac}	13	5.07 (3.96)^{bc}	10
SDQ teacher report	n=4,5101		n=2,318		n=2,184		n=414		n=1,072		n=1,610	
Emotional Symptoms	0.97 (1.56)	3	0.94 (1.52)	3	1.00 (1.60)	3	1.26 (1.79)^{ab}	4	0.93 (1.54)^{a}	3	0.81 (1.43)^{b}	3
Conduct problems	0.64 (1.22)	2	0.84 (1.39)*	3	0.43 (0.97)*	2	0.79 (1.31)^{ab}	3	0.58 (1.09)^{a}	2	0.480 (1.04)^{b}	2
Hyperactivity	2.05 (2.52)	6	2.60 (2.75)*	7	1.47 (2.10)*	5	2.59 (2.73)^{ab}	7	1.98 (2.46)^{ac}	6	1.53 (2.18)^{bc}	5
Peer problems	0.77 (1.29)	3	0.84 (1.34)*	3	0.69 (1.22)*	2	0.91 (1.42)^{ab}	3	0.70 (1.25)^{a}	2	0.64 (1.15)^{b}	2
Prosocial behaviour	8.36 (2.07)	5	7.92 (2.27)*	5	8.83 (1.71)*	6	8.29 (2.04)^{b}	5	8.43 (1.98)^{c}	6	8.63 (1.90)^{bc}	6
Total difficulties score	4.43 (4.54)	11	5.22 (4.88)*	12	3.59 (4.00)*	9	5.55 (5.06)^{ab}	12	4.18 (4.26)^{ac}	10	3.47 (3.84)^{bc}	9

Note: *= significant difference across gender p<0.05; a = significant difference between low and middle level at p<0.05; b = significant difference between low and high level at p<0.05; c = significant difference between middle and high level at p<0.05.

Table 3 Goodness-of-fit indices of the SDQ by gender and by parental education level

	χ^2	df	p-value	CFI	TLI	RMSEA
SDQ parent report						
Total (n=4,325)	2,249.57	173	<0.001	0.88	0.92	0.05
Gender						
Male (n=2,192)	1,201.94	156	<0.001	0.88	0.93	0.06
Female (n=2,094)	1,016.13	158	<0.001	0.86	0.90	0.05
Parental education level						
Low (n=460)	252.60	98	<0.001	0.90	0.93	0.06
Middle (n=1,297)	637.65	145	<0.001	0.89	0.91	0.05
High (n=1,847)	819.50	148	<0.001	0.88	0.91	0.05
SDQ teacher report						
Total (n=4,314)	1,402.83	69	<0.001	0.89	0.95	0.07
Gender						
Male (n=2,205)	891.06	68	<0.001	0.90	0.94	0.07
Female (n=2,102)	635.47	64	<0.001	0.91	0.94	0.07
Parental education level						
Low (n=396)	203.84	50	<0.001	0.89	0.94	0.09
Middle (n=1,037)	307.02	55	<0.001	0.93	0.95	0.07
High (n=1,535)	308.88	49	<0.001	0.94	0.95	0.06

Note: SDQ = Strengths and difficulties Questionnaire; df=degrees of freedom; CFI= Comparative Fit Index; TLI= Tucker-Lewis Index; RMSEA= Root Mean Square Error of Approximation.

Table 4 Inter-rater agreement for SDQ scores Parent x Teacher

ICC (Pearson)	**Total**	**Gender of child**		**Parental education level**		
		Male	**Female**	**Low**	**Middle**	**High**
	n=3,718	n=1,913	n=1,810	n=411	n=1,068	n=1,607
SDQ scales						
Emotional Symptoms	0.28 (0.29)	0.27 (0.28)	0.28 (0.29)	0.26 (0.27)	0.29 (0.30)	0.29 (0.30)
Conduct problems	0.23 (0.25)	0.25 (0.26)*	0.16 (0.20)*	0.21 (0.24)	0.20 (0.23)	0.25 (0.27)
Hyperactivity	0.42 (0.45)	0.44 (0.46)*	0.34 (0.38)*	0.43 (0.46)	0.42 (0.46)	0.38 (0.40)
Peer problems	0.29 (0.29)	0.33 (0.33)*	0.24 (0.24)*	0.26 (0.26)	0.28 (0.28)	0.28 (0.28)
Prosocial behaviour	0.21 (0.22)	0.20 (0.21)	0.15 (0.15)	0.32(0.32)[a]	0.18(0.18)[a]	0.22 (0.22)
Total difficulties score	0.41(0.41)	0.42 (0.42)*	0.35 (0.35)*	0.44 (0.44)	0.39 (0.40)	0.37 (0.37)

Note: All correlations significant at p<0.001; *= significant difference across gender p<0.05; a = significant difference between low and middle level at p<0.05.

Table 5 Internal consistency of the SDQ scales by gender and by parental education level

Cronbach's α	Total	Gender		Parental education level		
		Male	Female	Low	Middle	High
SDQ parent report	n=4,384	n=2,377	n=2,303	n=473	n=1,320	n=1,886
Emotional symptoms	0.61	0.63*	0.60*	0.64	0.61	0.60
Conduct problems	0.51	0.55*	0.44*	0.53	0.50	0.49
Hyperactivity	0.78	0.79*	0.75*	0.79[b]	0.77	0.75[b]
Peer problems	0.49	0.50	0.47	0.51[a]	0.40[a]	0.46[c]
Prosocial behaviour	0.63	0.64*	0.59*	0.67[b]	0.63	0.62[b]
Total difficulties score	0.77	0.79*	0.74*	0.81[ab]	0.75[a]	0.73[b]
SDQ teacher report	n=4,342	n=2,220	n=2,115	n=398	n=1,041	n=1,546
Emotional Symptoms	0.71	0.70	0.72	0.75[a]	0.70[a]	0.72
Conduct problems	0.60	0.62*	0.51*	0.57	0.53	0.54
Hyperactivity	0.85	0.85*	0.81*	0.87[ab]	0.84[ac]	0.82[bc]
Peer problems	0.56	0.56	0.55	0.58[b]	0.57[c]	0.51[bc]
Prosocial behaviour	0.81	0.82*	0.76*	0.76[b]	0.79	0.80[b]
Total difficulties score	0.81	0.81*	0.79*	0.83[ab]	0.79[a]	0.77[b]

Note: *= significant difference across gender p<0.05; a = significant difference between low and middle level at p<0.05; b = significant different between low and high level at p<0.05; c = significant difference between middle and high level at p<0.05.

Concurrent and divergent validity

For all cases in which the SDQ and either the CBCL or TRF was present, concurrent and divergent validity of the parent and teacher SDQ were assessed by calculating the Pearson correlation between the SDQ and CBCL subscales and the SDQ and TRF subscales . Generally, the hypothesized pattern of correlation coefficients for concurrent and divergent validity between the parent/teacher report of the SDQ and CBCL/TRF was present. However, the emotional problems scale of the parent SDQ also had a substantial correlation with the CBCL's thought problems subscale. The emotional symptoms scale of the teacher SDQ had a low correlation with the somatic complaints subscale of the TRF. Furthermore, the peer problem scale of both reports also showed substantial correlations with other CBCL/TRF scales than was hypothesized (Table 6).

Scale differences by child gender and by parental education levels

Factor structure

When confirmatory factor analyses were performed for each group separately, the original five-factor structure of the SDQ was confirmed and fit indices approached the preferred levels in all subgroups by gender and by parental education level (Table 3).

Table 6 Concurrent and divergent validity between SDQ and CBCL/TRF

	SDQ parent report (n=344)						SDQ teacher report (n=496)					
	Emotional	**conduct**	**Hyperactivity**	**Peer**	**Prosocial**	**Total**	**Emotional**	**conduct**	**Hyperactivity**	**Peer**	**Prosocial**	**Total**
CBCL scale												
Internalizing	**0.62**	*0.24*	*0.27*	0.33	*-0.09*[c]	0.51	**0.64**	*0.05*[c]	*0.16*	0.34	*-0.23*	0.42
Anxious depressed	**0.59**	*0.23*	*0.25*	0.29	*-0.10*[c]	0.48	**0.61**	*0.02*[c]	*0.12*	0.23	*-0.15*	0.35
Withdrawn/depressed	**0.43**	*0.27*	*0.19*	0.48	*-0.19*	0.46	**0.45**	*0.06*[c]	*0.16*	0.41	*-0.28*	0.38
Somatic complaints	**0.47**	*0.12*[b]	*0.16*	0.13[b]	*0.00*[c]	0.31	**0.22**	*0.07*[c]	*0.07*[c]	0.00[c]	*-0.01*[c]	0.13
Externalizing	*0.36*	**0.60**	0.47	0.38	*-0.28*	0.63	*0.09*[b]	**0.68**	0.45	0.32	*-0.44*	0.58
Rule-breaking	*0.28*	**0.54**	0.41	0.27	*-0.23*	0.52	*0.05*[c]	**0.61**	0.38	0.27	*-0.36*	0.49
Aggressive	*0.36*	**0.58**	0.47	0.39	*-0.27*	0.63	*0.10*[b]	**0.66**	0.45	0.32	*-0.43*	0.57
Social problems	0.43	0.36	0.34	**0.47**	*-0.24*	0.55	0.27	0.25	0.44	**0.43**	*-0.34*	0.54
Thought problems	0.51	0.37	0.40	0.38	*-0.17*	0.59	0.23	0.29	0.38	0.33	*-0.32*	0.47
Attention problems	0.35	0.47	**0.75**	0.31	*-0.23*	0.71	0.15	0.44	**0.76**	0.38	*-0.40*	0.72
Total	0.52	0.51	0.56	0.42	*-0.23*	**0.72**	0.32	0.51	0.64	0.46	*-0.47*	**0.76**

Note: Numbers printed **bold** are hypothesized to be high. Numbers printed *italic* are hypothesized to be low
All correlations significant at p<0.001, b=significant at p<0.05; c=not significant.

Interrater correlations

The R to Z transformation showed that the ICCs for the total difficulties score and three of the four subscales were significantly higher for males than females (Table 4). In females, none of the scales had a moderate ICC and only two of the five subscales had a higher correlation than the meta-analytic mean (Table 3). The ICC for the prosocial behaviour scale was larger in low parental education compared to middle parental education level ($p<0.05$) but for all other scales there were no significant differences (Table 4).

Internal consistency

Calculation of the F-statistics between Cronbach's alphas for males and females showed that the alphas of the SDQ parent version were higher for males than females for conduct problems, hyperactivity, prosocial behaviour, and total difficulties score ($p<0.05$). For the SDQ teacher version, almost all Cronbach's alphas were higher for males than females (0.05) (Table 5). Cronbach's alphas did not improve substantially when items were deleted.

By calculating the F-statistics between Cronbach's alphas for low, middle, and high parental education level, it showed that alphas for peer problems and the total difficulties score of the parent SDQ were higher for low parental education than for both other groups ($p<0.05$). The alpha for hyperactivity of the parent SDQ was higher among low parental education level than high parental education level ($p<0.05$). With the exception of emotional symptoms and impact score, alphas of the teacher SDQ for low parental education were generally higher than middle or high parental education level ($p<0.05$) (Table 5). For all groups, alphas did not improve substantially when items were deleted.

Concurrent and divergent validity

When Pearson correlations between the SDQ and CBCL/TRF were calculated for each subgroup by gender and separately by parental education level, the pattern for males and females appeared to be similar to the total population. Only for females did the emotional problems scale of the parent SDQ also have substantial correlations on the externalizing scale of the CBCL (data not shown).

The pattern for subgroups by parental education level was similar to that in the total population (data not shown).

DISCUSSION

The present study, conducted in a community sample of Dutch children aged 5-6 years, is the first study, as we know, to investigate the psychometric properties (factor structure, interrater reliability, internal consistency, and concurrent and divergent validity)

of the parent and teacher SDQ with an additional focus on differences by child gender and by parental education level. The results show that, in general, reliability and validity of the parent and teacher version of the SDQ in this age group are satisfactory, but there are concerns regarding reliability of the subscales. The reliability and validity of the teacher SDQ is better in all samples than the parent report, and both versions of the SDQ perform slightly better in males and in children of parents with a low education level.

Mean SDQ scores for males and the subgroup with low parental education level were less favourable than for all other subgroups. This is in line with other reports [4,9,12,18,26-30]. Furthermore, other studies found higher mean scores in younger children compared with older children [18,26,31]. In the present study, mean scores were also higher compared to a group of Dutch children aged 10-14 years [30]. It seems that SDQ mean total difficulties scores are slightly higher and, consequently, less favourable for younger children than for older children.

The original five factor structure of the SDQ, as hypothesized by Goodman et al. [2], was reproduced in a sample of parents and teachers of 5 to 6 year old children. This five-factor model was also confirmed when the data was split by child gender and by parental education level. This is in line with other research [8,10]. Van Leeuwen et al. [10] also tested a three-factor solution, but this did not improve model fit. Additional analyses in our population using a three-factor solution also did not show improved model fit.

Interrater agreement was acceptable for the total difficulties score and three subscales in the total sample and in the sub samples by gender and parental education level, but not for the conduct problem and prosocial behaviour scale. This is inline with research among older children [3,10]. It is possible that these behaviours are more difficult to observe and rate for parents, for example, because teachers see children interact more with other children in the classroom. Another explanation is that these behaviours are more influenced by the setting (e.g classroom versus at home) or that subjective norms of parents and teachers differ more on these types of behaviour.

Internal consistency for the total difficulties score and the hyperactivity/inattention scale of the parent SDQ and teacher SDQ was acceptable. Internal consistency of the parent SDQ was not acceptable for the four other subscales. Internal consistency for the teacher SDQ was generally higher than for the parent SDQ. Only the alpha of the conduct problems and peer problems scales of the teacher SDQ was lower then 0.7. In the present study, a similar pattern was found by gender and by parental education level. Our findings are comparable to studies on older children where weighted mean alphas for almost all subscales of the parent SDQ were smaller than 0.7 and weighted mean alphas for the teacher SDQ on conduct problems and peer problems were lower than 0.7. [3]. Because the scales contain just five items, it should be kept in mind that scales with a small number of items are generally less reliable than scales with more

items [32]. Another explanation for smaller reliability of the subscales is that the items are less one- dimensional than assumed. For instance, the conduct problems scale asks about aggressive behaviour as well as rule-breaking behaviour.

For all scales except the peer problems scale, concurrent and divergent validity of the parent and teacher SDQ was acceptable and implies that, as hypothesized, the SDQ scores correlate with CBCL/TRF scores. However, our data should be interpreted with caution due to the small sample sizes in the subgroups by gender and by parental education level. The concurrent validity found in this study is slightly lower than that found by Goodman et al. [5] but is similar to that found in children aged 8-16 years in the Netherlands [18] and in children aged 5-8 years in Flanders [5,12].

Finally, there were differences in validity and reliability between subgroups by gender and by parental education level. The outcomes of reliability and validity measures of the parent and teacher SDQ are better in males than females. When analyzed by parental education level, we found better internal consistency for parents with a low education level. However, differences between gender and parental education level were small and conclusions on the acceptability of the psychometric properties stayed the same for all subgroups.

It should be acknowledged that the present study has a few shortcomings. First, among parents non-response was more likely when children had an elevated score on the total difficulties score of the teacher SDQ ($p<0.05$). It is possible that these children were already receiving care and the parents did not wish to participate in this study; however, the effect size was very small and did not influence our results (Eta=0.09). Teacher non-response was higher when parental education was middle to high. Parents were allowed to raise objections about scores on the teacher report; perhaps higher educated parents are more likely to raise objections than lower educated parents. Also, higher educated parents gave their children lower total difficulties scores than low educated parents. However, the effect size was again small (Eta=0.03). Also, because no measure was included to validate the prosocial behaviour scale, we could only investigate the divergent validity and not the concurrent validity of this positively phrased subscale. Finally, because this study did not include a retest, the test-retest reliability could not be investigated.

A strength of the study is the large sample of young children for whom parent and teacher versions of the SDQ (including the impact scale) were available. This large sample was compiled in the preventive youth healthcare setting; therefore, the questionnaires (as filled out by parents and teachers) were used in the preventive child healthcare system and were not anonymous. Theoretically, this could have caused lower or higher mean outcomes, interrater agreement, and reliability than in the case of an anonymous questionnaire. Thus, generalizing our findings to an anonymous research setting probably requires caution. Finally, our study was conducted in a sample of Dutch children

only. Reviews indicate that the reliability and validity of the SDQ in Western countries is comparable [3,33]. Although Dutch children seem to have lower mean scale scores, we expect that our results can be generalized to other young populations.

In general, reliability and validity of the total difficulties score of the SDQ were satisfactory in a population of parents and teachers of young Dutch children. Overall it seems that reliability and validity were comparable to findings in populations of older children; however, as also found in older children [3], concerns regarding the reliability of the subscales remain. Because most subscales have low internal consistency and some subscales have low interrater agreement, we recommend using only the total difficulties score for screening purposes. This means that child health professionals should only use the total difficulties score as an indicator for psychosocial problems and not the individual scores on the subscales. The subscales could be further explored in their consult with the parent and child to get an indication of the kind of problems if necessary. For epidemiological studies or outcome measures in research, we recommend only using the total difficulties score. Additionally, because of the low interrater agreement we recommend to use the parent and the teacher report in combination, because this gives a more complete picture of the child's psychosocial well-being.

Since we found similar validity and reliability in subgroups by gender and parental education level the SDQ is suitable for large screening programs in the general population. To use the SDQ as a screening tool, cut offs are needed. For Dutch children aged 7 to 12 years old cut offs are available. As our findings indicate that mean scores for young children are higher than for older children we recommend to define separate cut offs for young children as is available for British, Australian and American children [34].

In conclusion, the validity and reliability of the total difficulties score of the parent and teacher SDQ are satisfactory in all groups by informant, child gender, and parental education level. Our results support the use of the SDQ in younger age groups. However, some subscales are less reliable and we recommend only using the total difficulties score for screening purposes.

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Table S1 SDQ scales and scale descriptions for the parent and teacher report

SDQ scales	Items (n)	Score range	Item description
Emotional symptoms	5	0-10	Nervous or clingy
			Fears, scared
			Worries
			Unhappy, downhearted
			Somatic complaints
Conduct problems	5	0-10	Fights or bullies
			Lies or cheats
			Steals
			Tempers
			Obedient
Hyperactivity/inattention problems	5	0-10	Distractible
			Persistent
			Restless or overactive
			Fidgety or squirming
			Reflective
Peer problems	5	0-10	Solitary
			Best with adults
			Has one good friend
			Liked by others (popular)
			Picked on or bullied
Prosocial behaviour	5	0-10	Caring
			Helps out
			Considerate
			Shares
			Kind to kids
Total difficulties score	20	0-40	Emotional symptoms
			Conduct problems
			Hyperactivity/inattention
			Peer problems

3 Validity and Reliability of the SDQ in a Multi Ethnic Population of Young Children

Cathelijne Mieloo, Floor Bevaart, Marianne Donker, Floor van Oort, Hein Raat, Wilma Jansen

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ABSTRACT

Background

The Strengths and Difficulties Questionnaire (SDQ) is a valuable screening tool for identifying psychosocial problems. Its performance in a multi-ethnic society, common to many paediatric healthcare workers, has not been investigated. Because it is important that screening instruments are valid and reliable for all ethnic groups within one society, we examined differences in the SDQ's psychometric properties in a multi-ethnic society.

Methods

The SDQ parent (n=8,114) and teacher form (n=9,355) were completed as part of a preventive health check for children aged 5-6 years of Dutch and non-Dutch background. The CBCL/TRF was administered to a subsample.

Results

Factor analysis of the parent-rated SDQ showed different rating patterns for two of the five subscales in non-Dutch children as compared to Dutch children. Cronbach's alpha for the total difficulties score varied by ethnic group (0.73-0.78 parent-rated SDQ, 0.80-0.83 teacher-rated SDQ) and coefficients were generally smaller for non-Dutch than for Dutch children ($p<0.05$). Alpha coefficients for subscales varied between 0.31-0.85 for ethnic groups. Inter-rater correlations between parents and teachers for the total difficulties score varied between 0.20-0.41 between ethnic groups and were larger for Dutch than for non-Dutch children ($p<0.05$). Concurrent validity was acceptable for most scales and most ethnic groups.

Conclusion

The total difficulties score of the parent- and teacher-rated SDQ is valid and reliable for different ethnic groups within the Dutch society. However, there are differences in reliability and validity of the subscales, which makes interpretation of the subscales difficult for certain ethnic groups.

INTRODUCTION

Prevalence of psychosocial problems varies between eight and eighteen percent in young children [1-2]. Early detection and treatment have an important role in preventing psychosocial problems and may benefit the child's development, well-being, and future health [3]. For early detection, professionals in paediatric care need valid and reliable screening instruments. Because societies all over the world are becoming increasingly multi-ethnic and prevalence of psychosocial problems in some minority children is higher than in native children [4-6], it is even more important that these instruments are valid and reliable for all ethnic groups within a society.

The Strengths and Difficulties Questionnaire (SDQ) is a relatively short instrument developed to screen for emotional and behavioural problems in children aged 3-16 years [7]. It was validated in many countries with satisfying results. The psychometric properties of the SDQ are strong, especially for the teacher version [8]. However, studies performed in non-western countries showed different reliability and validity outcomes than studies in western countries. Studies of African, Chinese and Arab children indicated only partial agreement with the five-factor structure and certain items did not load on their theoretical factors [9-11]. Furthermore, studies in China and Japan showed lower reliability of the subscales than studies in Great Britain, where the SDQ was developed [11-12]. A possible explanation is that parents in non-western countries have different perceptions of deviant behaviour than parents in western countries [13]. Language and cultural differences in how emotions are expressed could also play a role [14].

Because differences in validity are found between countries, questions arise on the reliability and validity of the SDQ when used in multi-ethnic societies. Two studies reported the factor structure of the SDQ in a multi-ethnic society [15-16]. These studies confirm a similar structure in migrant groups for the self-report and teacher-rated SDQ, but the psychometric properties of the parent-rated SDQ are not yet investigated in groups by ethnic background, although parents are very important informants on the well being of their young child. Furthermore, questions remain about the parent- and teacher-rated SDQ with regard to its internal consistency, inter-rater agreement and construct validity for children of different ethnic groups within one society.

Therefore, in the present study we examined differences in the psychometric properties (factor structure, internal consistency, inter-rater agreement, and concurrent and divergent validity) of the parent and teacher version of the SDQ by ethnicity of the child. We used data from the regular preventive child healthcare in 5-6 old children living in the Rotterdam-Rijnmond area in the Netherlands. Among these children there are five major ethnic groups with parents who are labour migrants or who come from former Dutch colonies. In the Netherlands, one in four children is of non-Dutch background [17].

This prevalence is even higher in the larger cities, such as in the Rotterdam-Rijnmond area, were one in two children is of non-Dutch background [17].

METHODS

Sample and design

The SDQ was administered to parents and teachers as part of the regular preventive child healthcare program for children in grade 2 at elementary school (5 to 6 years of age). A total of 11,987 children, living in the Rotterdam-Rijnmond area in the Netherlands, were eligible for this preventive health check in the school year 2008-2009.

Parents provided questionnaire information on 8,114 (67%) children, and teachers on 9,355 (80%) children. For 6,525 (59.6%) children, both parent and teacher reports were available. Parental non-response was more likely when children had an elevated score on the total difficulties scale of the teacher-rated SDQ (mean (SD) non-responders 6.03 (5.31) versus responders 4.86 (4.79), η^2=0.01, p<0.001). Parental non-response was also more likely when children were of non-Dutch background (non-response among Dutch children 14% versus non-Dutch children 38%, η^2=0.01, p<0.001). Teacher non-response was more likely when children were of Dutch background (non-response among Dutch children 19% versus non-Dutch children 11%, η^2=0.07, p<0.001), but was independent of the total difficulties score of the parent report (p=0.81).

In addition to the SDQ 801 parents filled out the Child Behaviour Checklist (CBCL) and 898 teachers filled out the Teacher Report Form (TRF) for validation purposes [18]. This sample of parents and teachers was selected in two ways. One way was enrolling a random selection of children. This sample received the SDQ and CBCL/TRF at the same time. The other way was enrolling children with an SDQ score above the p90 cut off on the parent and/or teacher-rated SDQ. Parents and teachers received the CBCL/TRF within four weeks of returning the SDQ. For Turkish and Moroccan parents questionnaires with double language (Dutch/Turkish or Dutch/Arabic) were used.

This study was approved by the medical ethics committee of the Erasmus Medical Centre Rotterdam, the Netherlands.

Measures

The SDQ is a 25-item questionnaire with three response categories (not true, somewhat true, and certainly true). The questionnaire has five subscales: emotional symptoms, conduct problems, hyperactivity/inattention problems, peer problems, and prosocial behaviour (Table S1, available online). Each scale consists of 5 items. The summed score of the first four subscales provides a total difficulties score. A high total difficulties score indicates more problems. The prosocial behaviour scale provides information about the

child's protective factors. On this scale, a low score indicates more problems. The SDQ was scored in the standard manner, which means that for all children with less than two items missing on a subscale a score was calculated. Further information on the SDQ and scoring is available at www.sdqinfo.com.

The CBCL and the TRF were used to obtain standardized parent and teacher reports of children's problem behaviour. The CBCL and TRF contain 118 problem items with three response categories (not true, somewhat true, and very true or often true). The questionnaire asks about eight empirically based syndromes: Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule-Breaking Behaviour, and Aggressive Behaviour.

Socio-demographic characteristics included gender, age, and country of birth of the child and the child's parents. Irrespective of the child's country of birth, a child's ethnic background was defined as Dutch when both parents were born in the Netherlands. Ethnic background of a child was defined as Surinamese, Antillean/Aruban, Moroccan or Turkish when one or both parents were born in one of these countries. This is according to the definition as used by Statistics Netherlands [19].

Statistical analyses

All analyses were performed with SPSS 19.0 (SPSS Inc. 2010) and repeated separately for each subgroup by ethnic background. Differences in mean scores between parents and teachers were analysed with a paired sample t-test. Differences in mean scores between subgroups by ethnic background were analysed with ANOVA with post hoc test Games Howell because equal variance and equal group sizes were not present.

Principle component analyses with a forced five-factor model were carried out to examine the factor structure of the SDQ. Oblimin rotation was used as correlated factors were hypothesised. A criterion of 0.3 was chosen to reveal cross-loadings.

Internal consistency was determined by means of Cronbach's alpha coefficient. A Cronbach's alpha of at least 0.7 is recommended for instruments intended for use in groups and individuals [20]. Differences in Cronbach's alpha by ethnic background were analysed by means of F-statistics [21].

Inter-rater agreement between parents and teachers was determined with intra-class correlations (ICC) using a two-way random effect model with absolute agreement [22] and with Pearson correlations. Differences in correlations by ethnic background were analysed by means of the Fisher R to Z transformation [23]. A Pearson correlation coefficient of 0.27 was considered as normal as this is the meta-analytic mean between parent and teacher reports of emotional and behavioural problems in children [24].

Concurrent and divergent validity of the parent- and teacher-rated SDQ was assessed by calculating Pearson's correlation coefficient with the CBCL and the TRF. For concurrent validity, we expected stronger correlations between the SDQ scales and the CBCL scales

that rated similar problems. Therefore, the emotional symptoms scale of the SDQ was expected to correlate more strongly with the Internalising scales of the CBCL and TRF than with all other scales. The conduct problems scale and the hyperactivity/inattention scale of the SDQ were expected to correlate strongly with the Externalising scales of the CBCL/TRF, and the peer problems scale of the SDQ was expected to correlate more strongly with the Social Problems scale of the CBCL/TRF as compared to all other scales. For divergent validity we expected negative or no correlations between the SDQ scales and the CBCL/TRF scales rating opposite problems. Therefore, the SDQ prosocial behaviour scale, which contains items about strengths, would have a negative or zero correlation with all scales of the CBCL/TRF, which contain only items about difficulties. The scale emotional symptoms of the SDQ would have a weak correlation with the Externalising subscales of the CBCL and TRF subscales and the SDQ conduct problem scale and the hyperactivity/inattention scale would have a weak correlation with the CBCL/TRF Internalising subscales.

RESULTS

The population consisted of 5,555 boys (51%) and 5,036 girls (49%). Mean age was 5.3 years (Table 1). There were no significant differences in age or gender by ethnic background. There were significant differences in age and ethnicity by rater ($p<0.001$), but the effect size was small (Cohen's $d=0.12$, Cramer's $\varphi=0.05$). There were no significant differences in child gender by rater. Parents and teachers reported higher total difficulties scores on almost all subscales in non-Dutch children than in Dutch children. Parents

Table 1 Population characteristics

	Parent-rated forms		**Teacher-rated forms**	
Questionnaire	SDQ (n=8,114)	CBCL (n=801)	SDQ (n=9,355)	TRF (n=898)
Mean age of child (SD)	5.3 (0.51)	5.2 (0.5)**	5.3 (0.51)	5.2 (0.4)**
Gender of child (male)	4107 (50.7%)	402 (55.5%)**	4778 (51.3%)	449 (51.7%)
Ethnicity of child*				
Dutch	4,750 (58.6%)	350 (49.9%)**	4,516 (53.0%)	498 (62.2%)**
Surinamese	521 (6.4%)	58 (8.3%)**	619 (7.3%)	60 (7.5%)**
Antillean/Aruban	264 (3.8%)	34 (4.8%)**	339 (4.0%)	21 (2.6%)**
Turkish	661 (8.2 %)	69 (9.8%)**	759 (8.9%)	36 (4.5%)**
Moroccan	623 (7.7%)	46 (6.6%)**	811 (9.5%)	55 (6.9%)**
Other	1,281 (15.8%)	145 (20.6%)**	1,481 (17.4%)	131 (16.3%)**

*= significant difference between parent and teacher report ($p<0.05$)

**= significant difference between SDQ and ASEBA form ($p<0.05$)

reported more difficulties than teachers on all scales for Dutch and Surinamese children ($p<0.01$). With the exception of the prosocial behaviour scale, parents of Turkish and Moroccan children reported more difficulties than teachers on all scales (Table S2, available online).

Factor structure

Principal component analyses of the parent SDQ in Dutch children showed that the first five factors all had Eigen values >1.0 and accounted for 42.6% of the total variance. For parent ratings, all items loaded on the predicted factors (Table S3, available online). Total variance explained by ethnic group was 42.6% for Surinamese, 46.0% for Antillean/Aruban, 42.1% for Turkish and 41.6% for Moroccan children. Analyses of the parent SDQ for Antillean/Aruban and Turkish children showed that the items on the prosocial behaviour scale, emotional symptoms scale, and hyperactivity/inattention scale loaded on the predicted factors, for Surinamese children only the items of the hyperactivity/inattention scale and prosocial behaviour scale loaded on the predicted factors, and for Moroccan children only the items of the emotional symptoms scale and prosocial behaviour scale loaded on the predicted factors. Items of the peer problems scale and conduct problems scale mainly loaded on the emotional symptoms and prosocial behaviour scale in almost all groups (Table S3, available online).

Principal component analyses of the teacher SDQ for Dutch children showed that the five factors all had Eigen values >1.0 and accounted for 51.5% of the total variance. All items loaded on the predicted factors (Table S4, available online). Total variance explained by ethnic group was 54.7% for Surinamese, 54.6% for Antillean/Aruban, 54.9% for Turkish and 52.4 % for Moroccan children. Analysis of the teacher SDQ for Turkish and Moroccan children showed that several items of the peer problems scale loaded on the prosocial behaviour scale. Analyses of the teacher SDQ for Surinamese and Antillean/Aruban children showed that several items of the conduct problems scale loaded on the hyperactivity/inattention scale and items of the peer problems scale loaded on the emotional problems scale (Table S4, available online).

Internal consistency

Cronbach's alpha's of the total difficulties score and the hyperactivity/inattention scale were above 0.70 for the parent report of Dutch, Surinamese and Antillean/Aruban children (Table 2). For parent reports of Turkish and Moroccan children, only the total difficulties score was above 0.70. Cronbach's alpha's of the hyperactivity/inattention scale on the parent SDQ were higher for Dutch children than for all other ethnic groups. Cronbach's alpha coefficients for the parent report of Moroccan children were generally lower than for Dutch children ($p<0.05$). Internal consistency did not improve by deleting items.

Cronbach's alpha was above 0.70 for the total difficulties score, emotional symptoms (only Dutch and Turkish children), hyperactivity/inattention and the prosocial behaviour scale in teacher reports (Table 2). Alpha's for the teacher report of Moroccan children for the emotional symptoms scale and hyperactivity/inattention scale were lower than for Dutch children ($p<0.05$). The difference, however, was small between the ethnic groups (difference α emotional problems 0.08 and hyperactivity/inattention scale 0.02). Internal consistency did not improve by deleting items.

Table 2 Internal consistency by ethnic background

Parent report (Cronbach alpha)					
	Dutch	**Surinamese**	**Antillean/Aruban**	**Turkish**	**Moroccan**
	n=4,384	n=460	n=200	n=537	n=480
Emotional symptoms	0.61	0.52*	0.50*	0.60	0.58
Conduct problems	0.51	0.51	0.55	0.48	0.44*
Hyperactivity/inattention	0.78	0.74*	0.72*	0.67*	0.65*
Peer problems	0.49	0.50	0.51	0.31*	0.35*
Prosocial behaviour	0.63	0.58	0.68	0.61	0.60
Total difficulties score	0.77	0.77	0.78	0.77	0.73*
Teacher report (Cronbach alpha)					
	n=4,342	n=596	n=322	n=739	n=783
Emotional symptoms	0.71	0.65	0.69	0.73	0.67*
Conduct problems	0.60	0.68	0.66	0.64	0.66
Hyperactivity/inattention	0.85	0.84	0.85	0.84	0.83*
Peer problems	0.56	0.62	0.58	0.59	0.53
Prosocial behaviour	0.81	0.82	0.82	0.83	0.82
Total difficulties score	0.81	0.82	0.83	0.82	0.80

* = significant difference with Dutch sample ($p<0.05$)

Inter-rater agreement

ICCs and Pearson correlations were significant for all scales. Pearson correlation coefficients of the total difficulties score and three out of five subscales in Dutch children were larger than the meta-analytic mean of 0.27 [24]. In Turkish and Moroccan children, only the hyperactivity/inattention scale showed a Pearson correlation coefficient larger than the meta-analytic mean. ICCs of the emotional symptoms scale and the total difficulties scale were significantly larger for Dutch children than all other groups ($p<0.05$). ICCs of three out of five subscales for Turkish and Moroccan children were smaller than for Dutch children (Table 3).

Table 3 Inter-rater agreement for SDQ scores Parent x Teacher

ICC (Pearson)					
	Ethnicity of child				
	Dutch	**Surinamese**	**Antillean/Aruban**	**Turkish**	**Moroccan**
SDQ	n=3,718	n=435	n=207	n=535	n=516
Emotional Symptoms	0.28 (0.29)	0.11 (0.11)*	0.11 (0.12)*	0.13 (0.14)*	0.09 (0.10)*
Conduct problems	0.23 (0.25)	0.22 (0.23)	0.27 (0.28)	0.17 (0.19)	0.16 (0.17)
Hyperactivity/inattention	0.42 (0.45)	0.41 (0.42)	0.40 (0.41)	0.31 (0.32)*	0.29 (0.29)*
Peer problems	0.29 (0.29)	0.23 (0.24)	0.22 (0.23)	0.18 (0.21)*	0.08 (0.09)*
Prosocial behaviour	0.21 (0.22)	0.12 (0.14)	0.32 (0.32)*	0.18 (0.18)	0.12 (0.13)
Total difficulties score	0.41(0.41)	0.28 (0.30)*	0.32 (0.35)*	0.23 (0.26)*	0.20 (0.22)*

* = significant difference with Dutch sample ($p<0.05$)

Concurrent and divergent validity

The pattern of correlation coefficients of the concurrent and divergent validity between the SDQ and CBCL/TRF was as hypothesized for the emotional symptoms, conduct problems, hyperactivity/inattention and prosocial behaviour scale in all groups for the teacher report and in Dutch, Surinamese, Antillean/Aruban, and Turkish children for the parent report (Table 4).

In all groups the peer problems scale showed larger correlations with the Withdrawn/Depressed scale of the CBCL than with the social problems scale of the CBCL. In Surinamese and Moroccan children, the Anxious/Depressed scale of the CBCL was only correlated moderately with the emotional behaviour scale of the SDQ. Further, in Moroccan children the conduct problem scale showed larger correlations with the Withdrawn/Depressed scale than the externalizing CBCL scales.

The emotional symptoms scale of the teacher SDQ has small correlations with the Somatic Complaints subscale of the TRF for all groups except for Moroccan children. Further, in Antillean/Aruban and Turkish children the peer problems scale showed, next to the hypothesized Social Problems scale, substantial correlations with the Anxious/Depressed scale of the TRF.

DISCUSSION

The present study conducted in a multi-ethnic community sample of young children was the first study, as we know, investigating the psychometric properties (factor structure, inter-rater reliability, internal consistency, and concurrent and divergent validity) of the parent-rated and teacher-rated SDQ for different ethnic groups living in one society. Our findings indicate that although the total difficulties score of the parent and teacher SDQ

Table 4 Concurrent and divergent validity by ethnic background

		Ethnicity of child				
		Dutch	**Surinamese**	**Antillean/ Aruban**	**Turkish**	**Moroccan**
SDQ scale	**CBCL/TRF scale**					
Parent report		n=344	n=54	n=29	n=63	n=38
Emotional symptoms	Internalizing problems	0.62	0.49	0.68	0.58	0.49
	Externalising problems	0.36	0.27	0.56	0.43	0.36
	Anxious/Depressed	0.60	0.38*	0.65	0.63	0.27*
Conduct problems	Internalizing	0.25	0.32	0.51	0.26	0.27
	Externalising	0.60	0.55	0.47	0.45	0.24*
	Withdrawn/Depressed	0.27	0.39	0.33	0.23	0.33
Hyperactivity/inattention	Internalising	0.26	0.41	0.33	0.13	0.38
	Externalising	0.47	0.65	0.29	0.34	0.62
Peer problems	Social problems	0.47	0.37	0.53	0.10*	0.04
	Withdrawn/ Depressed	0.48	0.42	0.57	0.14*	0.18
Prosocial	Internalizing	-0.09	-0.03	-0.50*	-0.15	-0.12
	Externalising	-0.28	-0.24	-0.53	-0.02	-0.11
Teacher report		n=516	n=60	n=21	n=37	n=58
Emotional symptoms	Internalizing	0.64	0.47	0.34	0.73	0.72
	Externalising	0.09	0.23	0.16	-0.30*	0.10
	Somatic Complaints	0.22	0.23	0.30	0.35	0.53*
Conduct problems	Internalizing	0.05	-0.04	0.29	-0.23	0.20
	Externalising	0.68	0.63	0.57	0.82	0.82*
Hyperactivity/inattention	Internalizing	0.16	0.15	0.31	0.04	-0.05
	Externalising	0.45	0.56	0.60	0.38	0.16*
Peer problems	Social problems	0.43	0.32	0.59	0.53	0.49
	Anxious/Depressed	0.23	0.09	0.61*	0.58*	0.40
Prosocial	Internalizing	-0.23	-0.20	-0.71*	-0.18	-0.13
	Externalising	-0.44	-0.24	-0.52	-0.52	-0.46

* = significant difference with Dutch sample ($p<0.05$)

is valid and reliable in all ethnic groups, there are differences in validity and reliability of the subscales across the different ethnic groups. Further, both versions of the SDQ had higher reliability and validity in Dutch children than in non-Dutch children and the teacher-rated SDQ had higher reliability and validity in all groups than the parent SDQ.

In more detail, our analysis showed that in the non-Dutch groups the five-factor structure was not similar to the hypothesized factors. More specifically, items of the conduct problems scale and the peer problems scale did not load on the hypothesised factors.

Closer inspection revealed that the items *lies* and *tempers* of the conduct problems scale of the parent-rated SDQ showed higher loadings on emotional problems in non-Dutch children. This was also seen in studies among African and Chinese children [10-11]. It is possible that in non-western countries, certain behaviours are an expression of other emotions than in western countries or that these items are interpreted or valued differently and therefore correlate higher with items from other subscales [14,25]. For example, in collective societies children learn to suppress the expression of anger because this is regarded as disrespectful; in individual societies, the expression of anger is seen as assertive behaviour [25]. This could also be an explanation for the lower inter-rater agreement in non-Dutch children, because most teachers are of Dutch ethnicity whereas one in two parents are of non-Dutch ethnicity [26]. Another explanation could be that the difference in child behaviour at home and at school is more prominent for non-Dutch children. Further, it is also possible that stereotypes and biases can influence the teacher report of emotional and behavioural problems in non-Dutch children [27-28], since we found differences in reliability and validity of the teacher-rated SDQ between ethnic groups. This is in agreement with other studies where no or low correlations were found between parental reported psychosocial problems and teacher reported problems among asylum seekers and migrant children [29-30]. In general the inter-rater agreement between parent and teacher reports of emotional and behavioural problems in children is low (Pearson r=0.27) [24]. For Turkish and Moroccan children we found somewhat lower agreement. However, all other reliability and the validity measures of the total difficulties score remain satisfactory in all ethnic groups.

Although internal consistency of the total difficulties scale was satisfactory in all groups, this did not account for most subscales of the parent SDQ. These findings are in-line with other studies [8,31]. Because the scales contain just five items, it should be kept in mind that scales with less items are generally less reliable than scales with more items [32]. Although we found some differences in internal consistency by ethnic background, these differences were small.

Finally, the concurrent and divergent validity of the parent- and teacher-rated SDQ were generally acceptable in almost all ethnic groups. However, these analyses included very small groups and should be interpreted with care.

In previous studies differences in factor structure, internal consistency and inter-rater agreement between boys and girls were found [33-35]. It is possible that these differences show dissimilarity between the ethnic groups. We therefore have repeated all analyses in subgroups by gender for each group by ethnic background (data not shown). However, dissimilarities were not significant and conclusions about reliability and validity remained the same for boys and girls in subgroups by ethnic background.

It should be acknowledged that the present study has a few shortcomings. First, there was a bias in response. However, the effect size was small. Therefore, we do not expect

that non-response influenced the outcomes. Finally, as no measure was included to validate the prosocial behaviour scale, we could not investigate the concurrent validity of this positively phrased subscale.

Our study has several strengths: the large sample of children, reports of multiple informants were available for most children, and our study was conducted in a sample of Dutch, Surinamese, Antillean/Aruban, Moroccan and Turkish children. These ethnic minority groups are also found in large cities in other western European countries. Finally, this sample was derived in the setting of the regular preventive youth health care programme. In other words, questionnaire responses were not anonymous and were used for further care decisions. The outcomes are therefore representive for the daily practice in the preventive healthcare. However this also means that our findings can not be generalized to an anonymous research setting. Also, our sample is of a specific age group, namely 5 to 6 year old children. Thus, generalizing our findings to an anonymous research setting or children of older age probably needs further research.

The present study generates a number of additional research questions. For example, we found differences in the factor structure of the parent- and teacher-rated SDQ for various ethnic groups. This should be further investigated with confirmatory factor analyses to see if these inconsistencies remain. Further, differences in reliability were found between ethnic groups. To investigate the underlying causes of these differences, the item response theory could be applied to investigate if differential item functioning (DIF) is present for specific items [36]. Finally, less favourable SDQ scores were found for non-Dutch children. This was also found in other studies, but the question remains if these children really show more problem behaviour or that ratings are just higher for these groups [4-6]. This could partly be investigated by receiver operating characteristic (ROC) curves and comparison with a clinical sample.

Societies are becoming increasingly multi-ethnic and for the reason that there are differences in validity and reliability between ethnic groups, there are implications for research and for the professionals working in the preventive child health care. As some SDQ subscales have lower reliability compared to cut points seen as acceptable and have an even lower reliability in non-Dutch groups than in Dutch groups, the subscales should be interpreted with care and should only be used as a guideline. Furthermore, the inter-rater reliability is low for non-Dutch groups. For this reason, it is important that professionals consult both parents and teachers when evaluating behaviour of a child from a migrant family.

In conclusion, this study provides further support for the validity and reliability of the total difficulties score of the parent-rated and teacher-rated SDQ for detecting psychosocial problems in children in a multi-ethnic society. The total difficulties score of the parent and teacher SDQ is valid and reliable for different ethnic groups within the Dutch society. However, there are differences in reliability and validity of the subscales between

ethnic groups. Especially the lower interrater reliability for certain ethnic groups can make interpretation of the SDQ subscales more difficult. Therefore we only recommend the use of the total difficulties score for screening purposes. Further investigation is needed to understand the underlying causes for these differences.

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4 Discriminatory Power of the Strengths and Difficulties Questionnaire in 5-6 Year Old Children

Cathelijne Mieloo, Tamara van Batenburg-Eddes, FLoor Bevaart, Ingrid Kruizinga, Hein Raat , Wilma Jansen

Submitted

ABSTRACT

Introduction

The Strengths and Difficulties Questionnaire (SDQ) is a short instrument developed to detect psychosocial problems in children. The discriminatory power of the parent and teacher SDQ is neither evaluated for young children nor in subgroups by gender and ethnic background. Therefore, the aim of this study was to explore discriminatory power of the parent and teacher reported SDQ in 5 to 6 year old children.

Methods

SDQs of 14,561 parents and 17,135 teachers were collected. Two golden standards were used; a clinical score on the Child Behaviour Checklist (CBCL, n=2,907) or Teacher Report Form (TRF, n=1,495) and a clinical population (n=538 parents, n=302 teachers). Receiver Operating Characteristics (ROC) curves, sensitivity, specificity, and the diagnostic odds (OR^D) of the total difficulties score of the parent and teacher SDQ were examined. All analyses were repeated in subgroups by gender and ethnic background.

Results

The area under curve (AUC) ranged between 0.81-0.94 for the parent and 0.83-0.94 for the teacher SDQ in all groups. The AUC of the parent SDQ was significantly lower for non-native children. Further, OR^D of the parent and teacher SDQ were suboptimal for non-native children.There were no statistical differences across gender. Sensitivity, specificity and OR^D are presented for several cut-offs.

Conclusions

The total difficulties score of the parent and teacher SDQ has good discriminatory power in young children and in subgroups by gender and ethnic background. Our results support the suitability of the total difficulties score of the parent and teacher SDQ for screening purposes in young children.

INTRODUCTION

The prevalence of psychosocial problems varies between eight and eighteen percent in young children [1-2]. Early detection and treatment plays an important role in preventing psychosocial problems and benefits the child's development, well-being, and future health [3]. For early detection, professionals in paediatric care need valid and reliable screening instruments.

The Strengths and Difficulties Questionnaire (SDQ) is a relatively short instrument developed to screen for emotional and behavioural problems in children aged 3-16 years [4] and is validated in many countries with satisfying results. The psychometric properties of the SDQ are strong, especially for the teacher version [5]. The SDQ contains 25-items with three response categories from zero to two (not true, somewhat true, and certainly true). Of all 25 items, 15 are phrased negatively and 10 are phrased positively. The questionnaire has five subscales of five items each: emotional problems, conduct problems, hyperactivity/inattention problems, peer problems, and prosocial behaviour. The sum of the first four subscales provides a total difficulties score; a high score being less favourable. The prosocial scale provides information on protective factors of the child; a low score is less favourable. Versions of the SDQ are available for parents and teachers; children aged 11-16 years can complete an almost identical version.

Although the SDQ was developed for children aged 3 years and older and is validated extensively, just a minority of the studies made evaluations in children under 7 years of age [6-14]. An age group in which early detection of psychosocial problems is highly relevant, are children of 5-6 year old, because children have to adapt from a more home based life to life at school where other skills are needed to learn and to cooperate with peers. Also, since different phases of a child's development coincide with age-specific problem behaviour [15], some items of the SDQ might be less applicable or more difficult to interpret in younger children. So far, the validation studies in younger age groups show good reliability and validity in terms of factor structure [9-10, 13-14, 12], internal consistency [6, 9-11, 13-14, 12], inter-rater reliability [13-14, 12], and convergent and divergent validity [13]. However, little is known on discriminant power of the SDQ in these younger age groups.

The discriminatory power of a screening instrument tells us whether the instrument is sufficiently good in detecting children with psychosocial problems. A valid and reliable instrument with low discriminative power does not detect the children with problems sufficiently in a general population, and is therefore not suitable as a screening instrument in the preventive setting. For diagnostic purposes a low discriminatory power may be sufficient, because it is already clear that there is problem. However, for the preventive setting an instrument with high discriminatory power is needed, so children with psychosocial problems can be detected in the general population. In a study by

Goodman et al. (1999) analyses of Receiver Operating Characteristics (ROC) were used to determine the discriminatory power of the SDQ in four to seven year olds by using a low risk sample from a dental hospital and high risk sample from psychiatric clinics as a golden standard [7]. An area under curve (AUC) of 0.93 was found for the total difficulties score of parent SDQ. An AUC of >0.90 indicates high accuracy [16]. In this study the discriminatory power of the teacher SDQ was not evaluated. Just a few studies evaluated the discriminatory power of the total difficulties score of the teacher SDQ [17-23]. In general, they found better discriminatory power for the teacher SDQ than for the parent SDQ [17-20, 22]. However, these studies are conducted in populations with a broad age band and in most studies a mean age above the age of seven. In order to use the parent and teacher SDQ as an early detection instrument in young children, data are needed on the discriminative power of the SDQ in young children.

Therefore, the aim of this study was to explore discriminatory power of the parent and teacher reported Strengths and Difficulties Questionnaire (SDQ). Receiver Operating Characteristics (ROC) curves, sensitivity, specificity, the positive and negative likelihood ratios (LHR+ and LHR-), and diagnostic odds (OR^D) were examined with two reference measures. The first reference is the Child Behavior Checklist (CBCL) or the Teacher Report Form (TRF); the second reference is a clinical sample (i.e. a sample of children who were referred to or entered a youth (mental) health care institution). The discriminatory power of the parent and teacher SDQ is also explored in subgroups by gender and ethnic background, since earlier studies in young children found differences in mean SDQ scores by gender [13] and ethnicity [24].

METHODS

Sample

For this study, data from several sources were combined (Figure 1). First, data from the general population were gathered as part of the preventive health check for children in grade 2 at elementary school (5-6 year olds) in the Rotterdam-Rijnmond area in school year 2008-2009 and 2009-2010. This assessment is routinely provided to all children in this age group as part of the Dutch governmental preventive child healthcare program. The Dutch governmental preventive child healthcare program offers child immunization programs as well as screening assessments for children from 0 to 19 year olds. Screening assessments are offered at 14 stages in a child's development. At each screening, the physical health and psychosocial health of the child are assessed by a specially trained nurse or doctor. The SDQ is routinely administered to parents and teachers as part of this preventive health check. In total 14,561 parent SDQs and 17,135 teacher SDQs were collected. Children who were in care for more than 3 months at the time of assessment

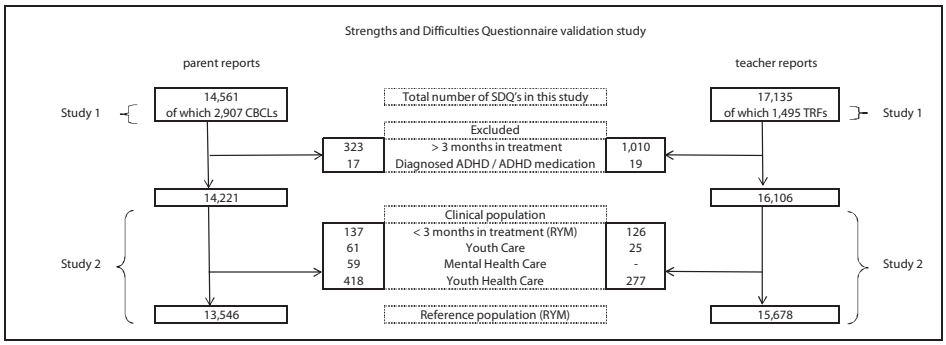

Figure 1 Flow chart

were excluded (n=323 parent reports; n=1010 teacher reports). Additionally, children whose parent or teacher reported that the child uses medication for attention-deficit hyperactivity disorder were excluded (n=17 parent reports; n=19 teacher reports). Finally the general population consists of 13,546 children with a parent SDQ and 15,678 children with teacher SDQ (Figure 1).

Questionnaires were completed by parents and teachers on a voluntary basis. Parents received written information and were free to object to the participation of the teacher for their own child. Non-identifiable data were used.

For the first part of this study the CBCL and TRF were used as a reference (study 1). A random sample of parents were asked to complete the CBCL in addition to the SDQ. If parents gave their consent, teachers completed the TRF. The study 1 consisted of 2747 children with a normal score on the CBCL and 160 children with a clinical score on the CBCL (total n=2,907), and 1445 children with a normal score on the TRF and 50 children with a clinical score on TRF (total n=1495). Informed consent was obtained from parents for all questionnaires that were gathered in addition to the usual practice (CBCL and TRF) (Figure 1).

For the second part of this study the SDQ score of children in a clinical sample was used as a reference (study 2). The clinical sample consisted of children that entered Youth (Health) Care and Mental Health Care institutions (675 parent and 428 teacher reported SDQs). First, from Youth Care 61 parent and 25 teacher reported SDQs were available. Second, as part of the intake at a Mental Health Care institution, 59 parents completed the SDQ. Third, 418 parent reported and 277 teacher reported SDQ´s were available from Youth Health Care institutions. Finally, if parents in the general population reported that their child was (currently) under treatment of a general practitioner, (medical) specialist, or other health care or social worker for behavioural and/or emotional problems, and the child received less than 3 months treatment, the child was categorized as clinical (n=137). Likewise, when teachers reported that a child had behavioural or emotional

problems and if the child was in treatment less than 3 months, the child was categorized as clinical (n=126) (Figure 1).

This study was approved by the Medical Ethics Committee of the Erasmus University Medical Center Rotterdam, the Netherlands. This study was conducted according to the Declaration of Helsinki code of ethics.

Measures

The official version of SDQ was administered to parents and teachers and scored in the standard manner [25].

The CBCL/TRF was used to obtain standardized parent and teacher reports of children's problem behaviours [26]. The CBCL/TRF contains 118 problem items, which are scored on seven empirically based syndromes: Emotionally Reactive, Anxious/Depressed, Somatic Complaints, Withdrawn, Sleep Problems, Attention Problems, and Aggressive Behaviour. Each item is scored 0 = not true, 1 = somewhat true, and 2 = very true or often true. The Total Problems score is the sum score of all subscales. Good reliability and validity have been reported for the CBCL and the TRF [26]. A high score was defined as having a score above the 90^{th} percentile.

Irrespective of the child's country of birth, a child's ethnic background was defined as Dutch when both parents were born in the Netherlands. Ethnic background of a child was defined as non-Dutch when one or both parents were born outside the Netherlands. This is according to the definition as used by Statistics Netherlands [27].

Statistical Analyses

Discriminatory power of the parent and teacher reported SDQ was studied by calculating the Receiver Operating Characteristic (ROC) curves and the Area Under the Curve (AUC). In a ROC curve the sensitivity (the proportion of true positive results) with a range from 0 to 1 (0-100%) is shown on the *y*-axis and 1-specificity (the proportion of false positive results) ranging from 0 to 1 (0-100%) is shown on the *x*-axis. The diagonal reference line shows where the AUC is 0.50 and the discriminatory power is at chance level [16]. The higher the ROC curve extends to the upper left corner, the higher the discriminatory power of the test is. In other words: the greater the AUC is, the greater is the discriminatory power [17]. An AUC of >0.90 indicates high discriminatory power an AUC of 0.70-0.90 indicates good to moderate discriminatory power [16]. The Youden index is calculated to determine the optimal cut point. This is defined as the maximum vertical distance between the ROC curve and the reference line and is calculated as Youden index=sensitivity+specificity-1 [28].

Screening efficiency was determined in terms of sensitivity, specificity, positive and negative likelihood ratio (LHR^+ and LHR^-), and the diagnostic odds ratio (OR^D). These measures were computed for various cut-offs. Sensitivity and specificity were used to

quantify the screening accuracy of the SDQ [29]. Sensitivity refers to the proportion of 'diseased' that was correctly classified by the test (i.e. the SDQ). The specificity refers to the proportion of 'non-diseased' that was correctly classified by the test. Likelihood ratios were determined, because they provide information about the probability that a person with a certain test result is correctly classified as such [30]. They are a good substitute for predictive values, which could not be used in our study since predictive values depend on the prevalence of the disorder [30]. The likelihood ratio is the ratio between two probabilities, namely the probability that a specific test result is obtained in a person with a diagnosis divided by the probability of obtaining that same test result in a person without a diagnosis [30]. The LHR^+ was calculated as follows: LHR^+ = *sensitivity / (1-specificity)* and the LHR^- was calculated by: *(1-sensitivity) / specificity*. The OR^D is a measure which is hardly influenced by changes in spectrum or in prevalence, and therefore is a robust measure for dichotomised results. The OR^D was calculated as LHR+/LHR- [30]. Fischer et al (2003) suggested a rule of thumb to interpret the LHR^+, LHR^- and OR^D. Potentially useful tests are characterised by an OR^D above 20 (e.g. a $LHR^+ > 7$, $LHR^- < 0.3$) [30].

All analyses were performed for two golden standards: (1) SDQ scores of children with a Total Problem Score on the CBCL or theTRF in the clinical range, (2) SDQ scores of children entering clinical youth mental health care.

All analyses were done for the total sample and for sub samples by gender and ethnic background.

RESULTS

Sample characteristics

Table 1 shows sample characteristics of the population in study 1 (reference = children with a clinical score on the CBCL and/or TRF) and study 2 (reference = children entering youth mental health care). In both studies the mean total difficulties score of the parent and teacher SDQ in the general sample was significantly lower than the mean in the reference sample ($p<0.05$). There were no significant differences in mean total difficulties score between the two reference samples (parent $p=0.07$, teacher ==0.20). In the general sample boys had a higher mean total difficulties score on the parent and teacher SDQ than girls ($p<0.05$). Also children of non-Dutch background had a higher mean total difficulties score on the parent and teacher SDQ than Dutch children ($p<0.05$). Children of non-Dutch background of both references had a higher mean total difficulties score on the teacher SDQ than Dutch children ($p<0.05$).

Table 1 Sample characteristics study 1 and study 2

	Study 1[a]		Study 2[a]	
	Normal score CBCL/TRF	**Clinical score CBCL/TRF**	**Non-clinical population**	**Clinical population**
Parent report SDQ				
Total population	*n=2,747*	*n=160*	*n=13,552*	*n=675*
M (SD)	6.5 (4.5)	16.2 (5.3)	6.4 (4.5)	15.8 (6.6)
Median (95% range)	6 (0-17)	17 (5-26)	6 (0-17)	16 (3-29)
Median (90% range)	6 (1-15)	17 (8-25)	6 (1-15)	16 (5-26)
Min-max	0-26	0-28	0-30	0-33
Gender, boys	*n=1,366 (50%)*	*n=110 (69%)*	*n=6,766 (50%)*	*n=484 (72%)*
M (SD)	6.9 (4.5)*	16.1 (5.5)	6.8 (4.7)*	16.2 (6.6)
Median (95% range)	6 (0-17)	16 (5-26)	6 (0-18)	16 (5-29)
Median (90% range)	6 (1-15)	16 (5-25)	6 (1-16)	16 (5-27)
Min-max	0-21	0-28	0-30	0-33
Gender, girl	*1,380 (50%)*	*50 (31%)*	*n=676 (50%)*	*n=188 (28%)*
M (SD)	6.0 (4.4)*	16.3 (4.7)	6.0 (4.4)*	14.5 (6.4)
Median (95% range)	5 (0-17)	17 (7-26)	5 (0-17)	15 (3-26)
Median (90% range)	5 (0-15)	17 (8-24)	5 (0-15)	15 (4-24)
Min-max	0-26	6-26	0-26	1-29
Ethnicity, Dutch	*1,638(61%)*	*78 (49%)*	*n=8,930 (67%)*	*n=328 (61%)*
M (SD)	5.9 (4.3)*	16.5 (4.5)	5.8 (4.3)*	16.5 (6.5)
Median (95% range)	5 (0-16)	17 (8-24)	5 (0-17)	17 (4-29)
Median (90% range)	5 (0-15)	17 (8-24)	5 (0-14)	17 (5-27)
Min-max	0-21	5-28	0-30	1-33
Ethnicity, non-Dutch	*n=1,067 (39%)*	*n=80 (51%)*[b]	*n=4,482 (33.4%)*	*n=206 (39%)*[c]
M (SD)	7.3 (4.5)*	15.9 (6.0)	7.5 (4.8)*	14.2 (6.1)
Median (95% range)	7 (0-17)	16 (4-26)	7 (0-19)	14 (3-26)
Median (90% range)	7(1-16)	16 (5-26)	7 (1-17)	14 (3-25)
Min-max	0-26	0-26	0-30	0-30
Teacher report SDQ				
Total population	*n=1,445*	*n=50*	*n=15,685*	*n=428*
M (SD)	4.3 (4.2)	14.5 (6.4)	4.7 (4.5)	13.1 (6.7)
Median (95% range)	3 (0-15)	15 (3-29)	4 (0-16)	13 (1-27)
Median (90% range)	3 (0-13)	15 (4-26)	4 (0-16)	13 (2-24)
Min-max	0-27	3-29	0-33	0-37
Gender, boy	*n=741 (51%)*	*n=30 (60%)*	*n=7,839 (50%)*	*n=304 (71%)*
M (SD)	5.3 (4.5)*	16.1 (6.1)*	5.4 (4.9)*	13.9 (6.6)*
Median (95% range)	4 (0-16)	17 (4-29)	4 (0-18)	14 (2-27)
Median (90% range)	4 (0-14)	17 (4-28)	4 (0-15)	14 (3-25)
Min-max	0-27	4-29	0-31	0-37

Table 1 Sample characteristics study 1 and study 2 (continued)

	Study 1[a]		Study 2[a]	
	Normal score CBCL/TRF	**Clinical score CBCL/TRF**	**Non-clinical population**	**Clinical population**
Gender, girl	*n=704 (49%)*	*n=20 (40%)*	*n=7,808 (50%)*	*n=122 (29%)*
M (SD)	3.3 (3.5)*	12.1 (6.1)*	3.9 (4.1)*	11.0 (6.6)*
Median (95% range)	2 (0-13)	12 (3-24)	3 (0-14)	11 (0-23)
Median (90% range)	2 (0-11)	12 (3-24)	3 (0-12)	11 (1-21)
Min-max	0-20	3-24	0-33	0-33
Ethnicity, Dutch	*n=844 (66%)*	*n=22 (52%)*	*n=7,242 (60%)*	*n=188 (58%)*
M (SD)	3.8 (3.8)*	14.5 (5.7)	3.9 (4.1)*	12.4 (7.2)
Median (95% range)	3 (0-14)	15 (3-24)	3 (0-14)	13 (0-27)
Median (90% range)	3 (0-12)	15 (4-24)	3 (0-12)	13 (1-24)
Min-max	0-21	3-24	0-31	0-37
Ethnicity, non-Dutch	*n=440 (34%)[b]*	*n=20 (48%)[b]*	*n=4,814 (40%)[c]*	*n=137 (42%)[c]*
M (SD)	5.2 (4.5)*	14.5 (7.7)	5.3 (4.7)*	13.9 (6.1)
Median (95% range)	4 (0-16)	14 (3-29)	4 (0-17)	13 (3-28)
Median (90% range)	4 (0-14)	3 (3-29)	4 (0-14)	13 (4-24)
Min-max	0-27	3-29	0-29	0-33

*=sign. difference within groups by gender or ethnic background ($p<0.05$); [a]= differences between the normal/non-clinical population and the reference measure are significant ($p<0.05$), there are no sign differences between both references. [b]= missing; 1% of parent reports and 11-16% of teacher reports; [c]= missing; 21% of parent reports and 23-24% of teacher reports

AUC analyses

Figure 2 shows the ROC curves for the parent reported SDQ total difficulties score in study 1 for the total population and subpopulations by gender and ethnic background. All ROC curves show good discriminatory power (AUC ≥ 0.87, Table 2). AUC's in study 2 ranged from 0.81 to 0.91 for the parent SDQ (Table 2). In both samples the discriminatory

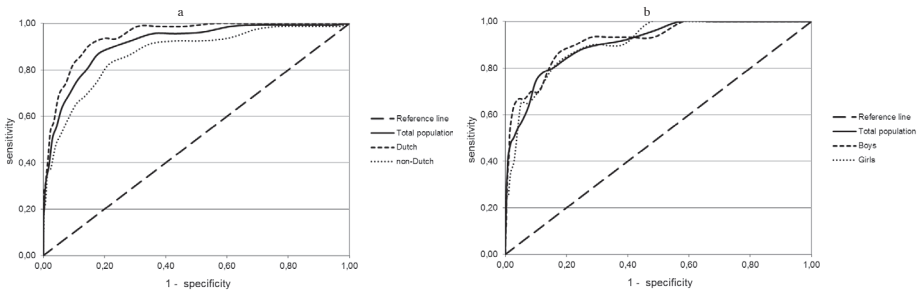

Figure 2 ROC curves for parent reported SDQ for the total population, across ethnic background (a) and gender (b) in study 1

Table 2 Area Under the Curve (AUC) characteristics

	Study 1[1]			Study 2[2]		
	AUC	**95% CI**	**p-value**	**AUC**	**95% CI**	**p-value**
Parent reported SDQ						
Total population	0.91	(0.89-0.94)	<.001	0.88	(0.86-0.89)	<.001
Boys	0.90	(0.86-0.93)	<.001	0.88	(0.86-0.89)	<.001
Girls	0.94	(0.91-0.96)	<.001	0.86	(0.83-0.89)	<.001
Dutch	0.94	(0.94-0.96)	0.010	0.91	(0.89-0.93)	<.001
Non-Dutch	0.87	(0.83-0.91)	<.001	0.81	(0.78-0.84)	<.001
Teacher reported SDQ						
Total population	0.91	(0.87-0.95)	<.001	0.85	(0.83-0.87)	<.001
Boys	0.92	(0.87-0.97)	<.001	0.85	(0.83-0.87)	<.001
Girls	0.91	(0.85-0.96)	<.001	0.83	(0.79-0.87)	<.001
Dutch	0.94	(0.89-0.98)	<.001	0.85	(0.82-0.88)	<.001
Non-Dutch	0.85	(0.77-0.94)	<.001	0.87	(0.85-0.90)	<.001

[1] Study 1: Parent report, CBCL- clinical (n=160) versus normal score(n=2747) ; teacher report, TRF- clinical (n=50) versus normal score (n=1,445); [2] Study 2: Parent report, Clinical (n=675) versus non-clinical population (n=13,546); teacher report, Clinical (n=428) versus non-clinical population (n=15,676)

power for children of non-Dutch background was significantly lower than for children of Dutch background. There were no statistical differences between boys and girls (i.e no overlapping 95% CI).

Figure 3 shows the ROC curves for the teacher reported SDQ total difficulties score in study 1 for the total population and subpopulations by gender and ethnic background. All ROC curves show good discriminatory power (AUC ≥ 0.85, Table 2). AUC's in study 2 ranged from 0.83 to 0.87 for the teacher SDQ (Table 2). There were no statistical differences between ethnic background and subgroups by gender (i.e no overlapping 95% CI).

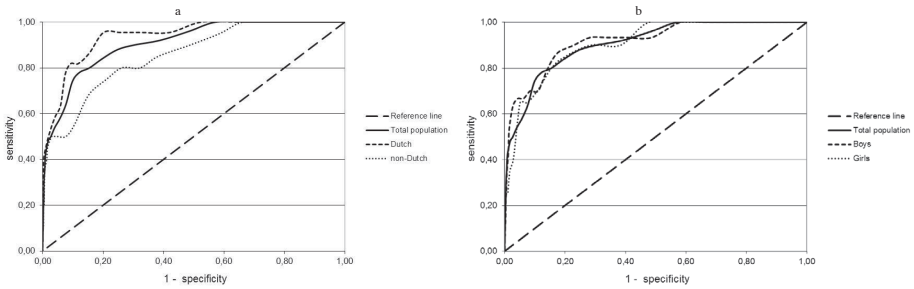

Figure 3 ROC curves for teacher reported SDQ for the total population, across ethnic background (a) and gender (b) in study 1

Sensitivity, specificity, Youden optimum and OR^D

Table 3 shows the sensitivity, specificity, likelihood ratios, OR^D and the Youden Index in sample 1 for several cut-offs of the parent and teacher SDQ total score. The Youden optimum is indicated in bold. The OR^D of the parent and teacher SDQ for the given cut-offs is higher than 20.00 for almost all groups, except for children of non-Dutch background (Table 3). The OR^D of the parent SDQ for non-Dutch children reaches 20.00 at a cut off of >=17 (OR^D=21.71). The OR^D of the teacher SDQ for non-Dutch children reaches 20.00 at a cut off of ≥15 (ORD=22.81).

Table 4 shows the sensitivity, specificity, likelihood ratios, OR^D and the Youden index in study 2 for several cut-offs of the parent and teacher SDQ total score. The OR^D of the parent SDQ for the given cut-offs is only for girls and the Dutch children higher than 20.00 (Table 4).

For the teacher SDQ the OR^D of the teacher SDQ for the given cut-offs is only for children of Dutch background higher than 20.00 (Table 4). For girls an OR^D greater than 20.00 is not reached at any cut point.

Table 3 Sensitivity, specificity and likelihood ratios for various cut-offs (study 1)

Parent SDQ		**Sensitivity**	**Specificity**	**LHR+[1]**	**LHR-[2]**	**OR^D [3]**	**Youden index**
Cut-off >= 10	Total	0.90	0.77	3.90	0.13	29.96	0.67
	Boys	0.88	0.73	3.28	0.16	20.31	0.61
	Girls	0.94	0.81	4.87	0.07	65.50	0.75
	Dutch	0.94	0.80	4.73	0.08	59.24	0.74
	Non-Dutch	0.86	0.72	3.09	0.19	16.28	0.58
Cut-off >= 11	Total	0.87	0.82	4.85	0.16	30.43	**0.69**
	Boys	0.85	0.79	3.99	0.20	20.26	0.63
	Girls	0.92	0.85	6.30	0.09	67.27	**0.77**
	Dutch	0.91	0.85	5.91	0.11	55.55	**0.76**
	Non-Dutch	0.83	0.79	3.84	0.22	17.21	**0.61**
Cut-off >= 12	Total	0.81	0.86	5.60	0.23	24.70	0.66
	Boys	0.81	0.83	4.87	0.23	21.28	**0.64**
	Girls	0.80	0.88	6.56	0.23	28.79	0.68
	Dutch	0.86	0.88	7.10	0.16	44.26	0.74
	Non-Dutch	0.75	0.82	4.26	0.30	14.05	0.57
Cut-off >= 13	Total	0.76	0.89	6.75	0.27	24.57	0.64
	Boys	0.76	0.87	5.92	0.27	21.86	0.64
	Girls	0.74	0.90	7.71	0.29	26.80	0.64
	Dutch	0.82	0.90	8.55	0.20	43.19	0.73
	Non-Dutch	0.69	0.86	5.06	0.36	14.01	0.55

Table 3 Sensitivity, specificity and likelihood ratios for various cut-offs (study 1) (continued)

Parent SDQ		**Sensitivity**	**Specificity**	**LHR+[1]**	**LHR-[2]**	**OR[D] [3]**	**Youden index**
Cut-off >=14	Total	0.70	0.91	8.05	0.33	24.49	0.61
	Boys	0.70	0.90	6.86	0.33	20.54	0.60
	Girls	0.70	0.93	9.72	0.32	30.07	0.63
	Dutch	0.74	0.93	10.05	0.28	36.37	0.67
	Non-Dutch	0.65	0.89	6.13	0.39	15.66	0.54
Teacher SDQ							
Cut-off >= 8	Total	0.84	0.80	4.22	0.20	21.13	0.64
	Boys	0.93	0.72	3.31	0.09	35.45	0.65
	Girls	0.70	0.89	6.19	0.34	18.31	0.59
	Dutch	0.86	0.84	5.54	0.16	34.37	0.71
	Non-Dutch	0.80	0.74	3.04	0.27	11.21	**0.54**
Cut-off >= 9	Total	0.80	0.84	5.10	0.24	21.48	0.64
	Boys	0.90	0.77	3.93	0.13	30.30	0.67
	Girls	0.65	0.92	7.93	0.38	20.79	0.57
	Dutch	0.82	0.88	6.87	0.21	33.27	0.70
	Non-Dutch	0.75	0.79	3.50	0.32	11.01	0.54
Cut-off >= 10	Total	0.78	0.88	6.29	0.25	25.05	**0.66**
	Boys	0.87	0.82	4.93	0.16	30.52	**0.69**
	Girls	0.65	0.93	9.15	0.38	24.30	0.58
	Dutch	0.82	0.91	8.61	0.20	42.82	**0.72**
	Non-Dutch	0.70	0.83	4.19	0.36	11.64	0.53
Cut-off >=11	Total	0.74	0.90	7.33	0.29	25.33	0.64
	Boys	0.80	0.86	5.52	0.23	23.59	0.66
	Girls	0.65	0.94	11.40	0.37	30.72	**0.59**
	Dutch	0.77	0.92	9.91	0.25	40.25	0.70
	Non-Dutch	0.65	0.86	4.55	0.41	11.13	0.51
Cut-off >=12	Total	0.64	0.92	8.10	0.39	20.73	0.56
	Boys	0.70	0.89	6.31	0.34	18.68	0.60
	Girls	0.55	0.95	11.96	0.47	25.35	0.50
	Dutch	0.64	0.94	10.10	0.39	25.99	0.57
	Non-Dutch	0.55	0.90	5.24	0.50	10.41	0.45

[1] LHR^+= Likelihood ratio positive test; [2] LHR^-= Likelihood ratio negative test; [3] OR^D = Diagnostic odds ratio; **bold type**=Youden optimum

Table 4 Sensitivity, specificity and likelihood ratios for various cut-offs (study 2)

		Sensitivity	Specificity	LHR+[1]	LHR-[2]	OR[D][3]	Youden index
Parent SDQ							
Cut-off >= 10	Total	0.82	0.76	3.37	0.24	14.10	0.58
	Boys	0.84	0.71	3.42	0.23	12.88	0.55
	Girls	0.77	0.80	3.83	0.29	13.09	0.57
	Dutch	0.85	0.80	4.21	0.19	22.56	0.65
	Non-Dutch	0.75	0.69	2.43	0.36	6.75	0.44
Cut-off >= 11	Total	0.77	0.81	4.16	0.28	14.90	**0.59**
	Boys	0.81	0.76	3.42	0.25	13.45	**0.57**
	Girls	0.69	0.86	4.90	0.37	13.42	0.55
	Dutch	0.81	0.84	5.17	0.22	23.04	0.65
	Non-Dutch	0.70	0.76	2.98	0.39	7.70	**0.47**
Cut-off >=12	Total	0.73	0.85	4.99	0.32	15.73	0.58
	Boys	0.75	0.80	3.80	0.31	12.10	0.55
	Girls	0.68	0.90	6.83	0.36	18.99	**0.58**
	Dutch	0.78	0.88	6.58	0.25	26.04	**0.66**
	Non-Dutch	0.66	0.81	3.40	0.42	8.06	0.47
Cut-off >=13	Total	0.68	0.89	5.96	0.36	16.44	0.57
	Boys	0.70	0.84	4.35	0.36	12.16	0.54
	Girls	0.62	0.93	8.81	0.41	21.40	0.55
	Dutch	0.74	0.92	8.86	0.29	30.64	0.65
	Non-Dutch	0.59	0.84	3.59	0.49	7.34	0.43
Cut-off >= 14	Total	0.63	0.91	7.17	0.40	17.72	0.54
	Boys	0.65	0.88	5.19	0.40	12.94	0.52
	Girls	0.58	0.95	10.94	0.44	24.67	0.53
	Dutch	0.70	0.94	11.78	0.32	36.34	0.64
	Non-Dutch	0.52	0.87	3.91	0.55	7.11	0.39
Teacher SDQ							
Cut-off >= 8	Total	0.77	0.78	3.55	0.30	11.88	**0.55**
	Boys	0.81	0.74	3.08	0.26	11.70	0.54
	Girls	0.67	0.84	4.12	0.39	10.52	**0.51**
	Dutch	0.71	0.85	4.63	0.34	13.65	**0.56**
	Non-Dutch	0.84	0.72	2.99	0.22	13.33	**0.56**
Cut-off >= 9	Total	0.72	0.82	3.93	0.34	11.63	0.54
	Boys	0.78	0.78	3.48	0.28	12.28	**0.56**
	Girls	0.59	0.86	4.34	0.47	9.14	0.45
	Dutch	0.67	0.88	5.63	0.37	15.03	0.55
	Non-Dutch	0.79	0.74	2.97	0.29	10.31	0.52

Table 4 Sensitivity, specificity and likelihood ratios for various cut-offs (study 2) (continued)

		Sensitivity	Specificity	LHR+[1]	LHR-[2]	OR[D] [3]	Youden index
Cut-off >=10	Total	0.68	0.85	4.67	0.37	12.54	0.54
	Boys	0.74	0.82	4.05	0.32	15.59	0.56
	Girls	0.55	0.90	5.28	0.50	10.49	0.45
	Dutch	0.64	0.91	7.24	0.39	18.52	0.56
	Non-Dutch	0.75	0.78	3.43	0.33	10.54	0.53
Cut-off >=11	Total	0.64	0.89	5.66	0.41	13.95	0.53
	Boys	0.69	0.85	4.73	0.36	13.08	0.55
	Girls	0.52	0.93	7.17	0.52	13.74	0.44
	Dutch	0.60	0.93	8.59	0.43	20.01	0.53
	Non-Dutch	0.71	0.83	4.19	0.35	11.92	0.54
Cut-off >=12	Total	0.60	0.91	6.77	0.44	15.29	0.51
	Boys	0.64	0.89	5.67	0.40	14.05	0.53
	Girls	0.48	0.94	8.64	0.55	15.81	0.43
	Dutch	0.56	0.95	10.96	0.46	23.59	0.51
	Non-Dutch	0.65	0.86	4.61	0.41	11.31	0.51

[1] LHR+= Likelihood ratio positive test; [2] LHR-= Likelihood ratio negative test; [3] ORD = Diagnostic odds ratio; **bold type**=Youden optimum

DISCUSSION

The present study explored the discriminatory power of the parent and teacher reported SDQ in 5 to 6 year old children for the total population and in subgroups by gender and ethnic background. The discriminatory power was determined by making use of two reference measures, i.e. a population of children with a clinical score on the CBCL/TRF and a population of children entering Youth (Health) Care or Youth Mental Care. Our results indicate that the SDQ total difficulties score of the parent and teacher have moderate to high screening accuracy (AUC range: 0.81-0.94). This is in accordance with what is generally found in older age groups [5].

In both studies, the discriminatory power of the parent and teacher SDQ was not significantly different for boys and girls. The discriminatory power of the parent SDQ for children of Dutch background was significantly better than for children of non-Dutch background. However, it was still acceptable for children of non-Dutch background [16]. To our knowledge, no other studies looked at differences in AUC in subgroups by gender or ethnic background. In general, the discriminatory power of the total difficulties score on the parent and teacher SDQ determined by using a clinical score on the CBCL/TRF as reference was slightly better in all groups than by using a clinical sample as reference. This is not very surprising. The SDQ and the CBCL/TRF both are developed to measure psychosocial problems. Therefore a high AUC was expected. The clinical sample consists

of children entering to Youth (Health) Care institutions. These children are not always entering care for their own psychosocial problems, but may also enter care due to adversities in their direct environment such as (social emotional) problems in other members of the family, domestic violence, abuse, educational or pedagogic problems. This may have contributed to the lower observed AUC in the clinical sample.

In this study we present the sensitivity and specificity for a range of SDQ total score cut-offs, because different settings necessitate different cut-offs. In the preventive screening one can choose a cut off with a high sensitivity (so one does not fail to signal children with psychosocial problems). However, in the preventive setting it is not acceptable to falsely label too many children as having psychosocial problems. Therefore, a cutoff with less sensitivity and higher specificity may be choosen. For epidemiological research you might need other cut-offs depending on your research question.

If we compare our results of sensitivity and specificity with other studies, we can conclude that our findings are comparable to the findings of other studies [19, 23, 31-32]. Although, cut-offs may differ across studies. Overall sensitivity of the parent SDQ is slightly higher in our study. Goodman et al. (2001) found for the parent SDQ a sensitivity of 47% and a specificity of 94% [19]. Our results indicate a sensitivity of 60% with a specificity of 94%. Further, Lai et al. (2009) found for the parent SDQ a sensitivity rate of 53% and for the teacher SDQ a sensitivity of 47% with a specificity of 84% [23], whereas at the same specificity, we observed a sensitivity rate for the parent SDQ of 67% and for the teacher SDQ of 64%. The use of dissimilar references across studies, may have contributed to the seemingly inconsistent findings. However, all studies, including ours, show high specificity but somewhat lower sensitivity.

We found that the Youden optimum for the parent SDQ in the total sample did not differ across reference measures. With one exception, the Youden optimum for the teacher SDQ was lower in the study with the clinical group than in the group with a clinical score on the TRF. It is possible that bias plays a role in this finding. However, the mean parent SDQ score in the clinical group did not significantly differ between the groups with and without teacher SDQ (p=0.18). Also, the mean teacher SDQ score in the clinical group did not significantly differ between the groups with and without parent SDQ (p=0.42). Therefore, selection bias did not a play a role. This implicates that when a cutoff for the teacher SDQ is chosen the purpose of the screening must be clearly stated. When it is to screen purely for psychosocial problems you can choose a higher cut off than when to screen for need of care (e.g. adversities in the direct environment) . Further, we found differences in Youden optimum in subgroups by gender and ethnic background for both the parent and teacher SDQ. These differences could not fully be explained by score range or differences in means between the subgroups. However, the Youden optimum is not in all situations the best way to choose an appropriate cut off, and different cut-offs for different subgroups are not always necessary. For example, in the preventive child

health care it is not always necessary and mostly not wanted for practical reasons to use separate cut-offs, because in most cases the child health care worker only uses the SDQ as an indication and explores the actual problems during the preventive child health visit. On the other hand, when the SDQ is used in an epidemiological study different cut-offs by subgroups are recommended to avoid over or under reporting.

Finally, we found that in children with non-Dutch background the OR^D was lower than 20.00 for most cut off scores of the parent and teacher SDQ. Although the AUC was still acceptable this needs further research.

Our study has a few limitations. First, there was no information available about diagnoses of the children. Therefore we were not able to determine the discriminatory power for specific problems. Second, as the sample of children with a clinical score on the TRF was small (n=50), outcomes of these analyses should be interpreted with care. Finally, this study was conducted in a population of children living in the Netherlands. Goodman, A. et al. (2012) found that nation specific norms are necessary [33]. Therefore, the cut-offs we found in this study can not be generalized to other countries. However, differences between references and differences between subgroups by gender and ethnic background are most probably also present in other countries.

Strengths of our study are first the large total population and the large clinical population. Second, we used two references: (1) a clinical score on the CBCL/TRF an instrument that measures psychosocial problems and is widely used in the clinical setting and (2) a clinical sample so we were able to determine how well the SDQ is in screening children in need for care. Finally, we presented AUC's, sensitivity and specificity, likelihood ratios and the Youden index for subgroups by gender and ethnic background. As far as we know this was never published before.

The present study extensively explored the sensitivity and specificity of the parent and teacher reported SDQ. To this aim two reference measures were used and all analyses were repeated across gender and ethnic background for several cut-offs. Results can be used to facilitate choosing an appropriate cut off. Before choosing a cut off it is necessary to clearly state the situation and the purpose of the screening because from our results it appears that cut-offs differ between golden standards for the teacher SDQ and in subgroups by gender and ethnic background for both informants. Additional, we recommend to do further research to cut-offs for children of non-Dutch background since diagnostics odds were suboptimal.

In conclusion, the total difficulties score of the parent and teacher SDQ has good discriminatory power in a total population of 5 to 6 year children as well as for subgroups by gender and ethnic background when compared with clinical score on the CBCL/TRF as well as with a clinical sample. This indicates that the total difficulties score of the parent and teacher SDQ is suitable for screening purposes in the preventive child health care.

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Part II

IDENTIFICATION AND REFERRAL BY
THE PREVENTIVE CHILD HEALTH CARE

5 The Role of the SDQ Total Problem Score and the Impact Score on Identification and Referral of Psychosocial Problems by the Preventive Child Health Care

Cathelijne Mieloo, Hein Raat, Floor Bevaart, Frouwkje de Waart, Marianne Donker, Wilma Jansen

Submitted

ABSTRACT

Introduction

Rates of identification of psychosocial problems in young children by the child health care professionals (CHP) are generally low. Early detection tools, such as the Strengths and Difficulties Questionnaire (SDQ), can improve problem identification. Few studies have explored the role of early detection tools by CHPs. In this study, the role of the SDQ total problem and impact score on identification and referral by the CHP was determined in 5 to 6 year old children. The potential mediation role of the SDQ impact score reflecting the burden of problems on the daily lives of children was determined.

Methods

The SDQ was administered to parents and teachers as part of the regular preventive child healthcare program for children aged 5 to 6 years. A sample of 2,666 parents consented to the study. The complete data of 1,549 SDQ parent reports (53%) and 2,037 SDQ teacher reports (70%) were matched to CHP recordings on identification and referral. The children's path in the process of identification and referral was described. Mediation analysis was performed using the method of Baron and Kenny with binary logistic regression.

Results

CHPs identified 47% of the children with a high total problem score on the parent or teacher SDQ report as having psychosocial problems, and referred 22-23% of the children with a high score. A high total problem score on the SDQ is related to identification (parent SDQ OR 2.40, 95%CI 1.85-3.12; teacher SDQ OR 2.73, 95%CI 2.17-3.45) and referral (parent SDQ OR 1.94, 95%CI 1.45-2.59; teacher SDQ OR 1.83, 95%CI 1.42-2.34). The SDQ impact score is a partial mediator for identification (parent Sobel=4.16, $p<.001$; teacher Sobel=7.08, $p<.001$). The impact score is also a partial mediator in the relation between the parent SDQ and referral (Sobel=2.97, $p<.001$). More so, the impact score is a complete mediator in the relation between the teacher SDQ and referral (Sobel=4.10, $p<.001$).

Conclusion

The burden of psychosocial problems, as measured by the SDQ impact score, plays an important role in identification and referral for psychosocial problems by the CHP. Therefore, we recommend, when using the SDQ as an early detection tool, to use the total problem score as well as the impact score. More so it deserves consideration to use only the impact score of the teacher SDQ.

INTRODUCTION

Early identification and treatment of psychosocial problems in children is important [1], especially since these problems may influence children's daily lives negatively [2] and tend to persist if left untreated [3-4]. Therefore, public policies using an empirically based response to such problems in young children are a priority on the global health agenda [5-6]. One remedy to psychosocial problems in young children is specialist mental health care. However, in order to provide such care children first must be identified as having psychosocial problems, followed by an appropriate referral.

Identification and referral are especially important in the group of the youngest school-aged children (5-6 year olds). For these children the transition from pre-school to elementary school forms a major milestone. Children must accommodate to daily schedules, new adult authority, peers and academic challenges, a transition in which psychosocial problems can become apparent [7]. To identify problems in this age group, we need both parent- and teacher reports since inter-rater differences are reported frequently [8-9].

In general, in preventive health care practices 6 to 48 percent of the children have psychosocial problems according to the child health care professionals (CHP) [10-15]. However, sensitivity rates of identification are generally low and vary from 4% -54% [10-13, 16]. Besides a low sensitivity of problem identification by CHPs, referral of young children with psychosocial problems seems to be low as well. Only a few studies looked into referral decisions by the CHP and found referral rates of 8 to 75% percent in children identified as having psychosocial problems by the CHP [12-15]. However, in most studies CHPs were blinded for early detection tools [11-15] and most studies were enrolled in populations with a broad age band [10, 12, 14-16]. Whereas rates of identification of psychosocial problems and referral without using an early detection tool are low, most studies plead for the use of valid and reliable early detection instruments in the preventive child health care to improve identification and referral decisions [16]. Furthermore, Sayal et al. (2004) showed that sensitivity of identification by the CHP increased from 26% to 88% when parents expressed their concerns about their child's behaviour [12].

In the Netherlands, early identification of psychosocial problems is a task of the preventive child health care system. For an early identification of psychosocial problems, the Dutch government recommends the use of the Strength and Difficulties Questionnaire (SDQ). The SDQ is widely used and was validated in many countries with satisfactory results [17]. The psychometric properties of the SDQ are strong, especially for the teacher version [17-18]. The SDQ can be extended with an additional supplement that inquires about concerns with regard to the problems, chronicity of the reported problems, distress, social impairment, burden and burden to others. With this supplement

an impact score can be computed which further enhances the sensitivity of the early detection tool [19].

Whereas rates of early identification by the CHP without making use of an early detection tool are frequently studied, exact numbers on rates of early identification and referral by the CHP using an early detection tool in the youngest school-aged children are not available. Therefore, the aim of this study is to explore the identification of psychosocial problems in young children and referral for these problems by the CHP using the extended version of the SDQ, in a population of 5-6 year olds. In this study the SDQ was filled out by parents and teachers and scored by the CHP prior to the routine health assessment visit of parent(s) and child to the CHP. To understand more of the process of identification and referral for psychosocial problems in young children we determined the role of the SDQ total problem score on identification and referral. In addition, we determined if the SDQ impact score, reflecting problem perception, concern, chronicity, and burden of the problems on the daily lives of children, explains this association by acting as a mediator.

METHODS

Population

The Dutch governmental preventive child healthcare program offers child immunisation programs as well as health assessments for children of 0 to 19 years old. Health assessments are offered at 14 stages of a child's development. At each screening, the physical health and psychosocial health of the child are assessed by a specially trained nurse or doctor. Since 2007 the SDQ has been administered routinely to parents and teachers of children in grade 2 of the elementary school (5 to 6 year olds) in the Rotterdam-Rijnmond area as part of this screening assessment. SDQ scores were calculated in advance and used by the CHP in their estimation of the child's health.

A total of 11,987 children, who live in the Rotterdam-Rijnmond area in the Netherlands, were eligible for this preventive health check in the school year 2008-2009. Parents provided questionnaire information on 8,114 (67%) children, and teachers on 9,355 (80%) children. Parents were free to refuse participation of their child's teacher. For the population used in this study 2,919 parents were asked to participate in a study on preventive child health care and to give written consent for using data of the electronic child record (ECR) of the preventive child health care. This sample was selected in two ways. The first part of the sample (47%, N=1,372) was selected randomly from the total population. The second part (53%, N=1,547) consisted of children with an SDQ score above the p90 cut off on the parent and/or teacher-rated SDQ to enrol a sufficient amount of children with a high SDQ score in order to increase statistical power.

Informed consent was obtained from 2,666 parents (91%) of the study population. Data were matched using unique child codes. We were able to match questionnaire data and ECR data of 2,257 children (77%) of which 1,668 parent reports (57%) and 2,063 teacher reports (71%). Matching failed when the SDQ was completed after the routine health assessment, children moved outside the Rotterdam-Rijnmond area, or when children had incomplete or missed required identifiers (unique child code). Only cases with complete data on the SDQ and impact scale were included in the population for analyses (parent reported SDQ n=1,549, 53%; teacher reported SDQ n=2,037, 70%).

This study was approved by the Medical Ethics Committee of the Erasmus University Medical Center Rotterdam, the Netherlands. This study was conducted according to the Declaration of Helsinki code of ethics.

Measures

The SDQ is a relatively short instrument developed to look for emotional and behavioural problems in children aged 3-16 years consisting of 25-items with three response categories from zero to two (not true, somewhat true, and certainly true) [20]. Of all 25 items, 15 are phrased negatively and 10 are phrased positively. The questionnaire has five subscales of five items each: emotional problems, conduct problems, hyperactivity/inattention problems, peer problems, and prosocial behaviour. The sum of the first four subscales provides a total difficulties score; a high score being less favourable. The prosocial scale provides information on protective factors of the child; a low score is less favourable. The extended version of the SDQ contains an impact supplement with eight questions on the parent SDQ and six questions on the teacher SDQ. An impact score is calculated when the respondent answers 'yes' to the first question about perceived problems. The items on overall distress and impairment, with four response categories from 0-2 (Not at all=0, Only a little=0, Quite a lot=1, and a great deal=2), can be summed up to generate the impact score that ranges from 0-10 for the parent report and 0-6 for the teacher report. Responses to the last two questions on chronicity and burden to others are not included in the impact score.

The extended version of the SDQ was administered to parents and teachers and scored in the standard manner [21]. Double language forms were administered to Turkish (Dutch/Turkish) and Moroccan parents (Dutch/Arabic). The total difficulties score of the parent and teacher SDQ was used to measure psychosocial problems in 5-6 year olds. A high score on the parent and teacher SDQ was defined as having a score above the 90th percentile in the total population (further mentioned as *the p90 group*). The 90th percentile was ≥14 for the parent and ≥13 for the teacher SDQ. These cut-offs were based on a pilot study among 5-6 year olds (N=231). The impact score was used to measure the severity and burden of the problems. A high score on the parent or teacher impact score was defined as having a score of ≥2.

Data about whether the CHP identified the child as having psychosocial problems and data about referral for psychosocial problems at time of the preventive health check were drawn from the electronic child record (ECR) of the preventive child health care. A child was defined as being at risk for psychosocial problems (further mentioned as *at risk*) when the CHP had registered that the situation was at risk, slightly critical or critical. Referral was defined as actual referral of the child to child (mental) health care or Youth care, or a new appointment with the CHP for further assessment and/or counselling. Advice to ask for professional care was also counted as referral.

Previous mental health care use was assessed by the question to the parents: *"Has your child received any professional care in the past two years for problems in one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other children?"* (yes/no). Current mental health care use for psychosocial problems was assessed by the question to the parents: "*Does your child receive any professional care for problems in one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other children?*" (yes/no).

Socio-demographic characteristics included gender, age, and country of birth of the child and the child's parents. Irrespective of the child's country of birth, a child's ethnic background was defined as being Dutch when both parents were born in the Netherlands. Ethnic background of a child was defined as non-Dutch when one or both parents were born outside the Netherlands. This is according to the definition as used by Statistics Netherlands [22].

Analyses

Analyses were done separately for the parent reported SDQ and the teacher reported SDQ. Differences in background characteristics between children with a normal SDQ score and children with a high SDQ score were examined using t-test and χ^2 test. To describe the process of early detection and referral we examined differences in background characteristics between the group with a high and low SDQ score separately for the parent and teacher reported SDQ using the χ^2 test. After these tests we examined differences in background characteristics between the group with a high and low impact score separately for children with a high and low SDQ score on the parent reported and teacher reported SDQ using the χ^2 test.

The role of the SDQ total problem score on identification and referral was analyzed by binary logistic regression analyses. In order to assess if the impact score explains this association, and therefore plays a role as a mediator in the relation between the identification or referral by the CHP with the total difficulties score (figure 1), the method of Baron and Kenny was used [23]. This mediation analyses was done within a binary logistic regression analyses in which the impact score was controlled for the effect of the total difficulties score on identification of the CHP or referral. In block 1 identification

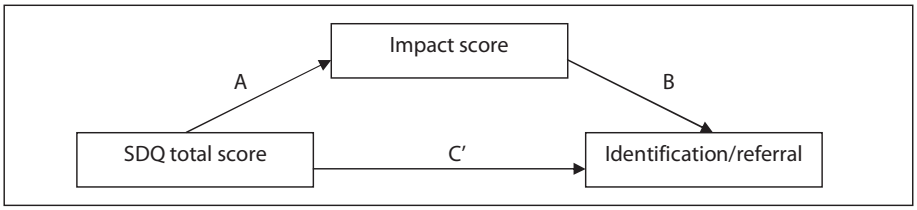

Figure 1 Model for mediation of the impact score

by the CHP or referral was included as the dependent variable and the total difficulties score was included as independent variable. In block 2 the impact score was included as an independent variable. Two models were run for each of the research questions. The first model only included the total difficulties score and/or the impact score and the dependent variables of interest. In addition the second model included the confounders; gender, ethnic background, current treatment for psychosocial problems and treatment for psychosocial problems in the past two years. An effect of the impact score was a possible mediation effect when the association between identification by the CHP or referral, the total difficulties score and impact score was significant. To test whether the impact score was an actual mediator a Sobel test was done. The coefficients and Standard Errors (SE) of both the association between the total difficulties score and impact score, and between the impact score and identification by the CHP or referral were used to calculate the Sobel test statistics. For all analyses a significance level of $p<.05$ and a confidence interval of 95% (95% CI) was used. The critical value of the Sobel test statistic ratio with a two tailed level of significance ($\alpha=.025$) is > 1.96 [24]. All analyses were done for the parent and teacher SDQ separately and were corrected for current mental health care use, mental health care use in the past, gender and ethnicity. All analyses were performed with SPSS 19.0 (SPSS Inc. 2010).

RESULTS

Background characteristics

Table 1 shows background characteristics in subgroups by informant and SDQ score. For both the parent and teacher SDQ, children with a high SDQ total score were more often boys and of non-Dutch background ($p<0.05$). The mean age at time of the assessment was lower in children with a high score in the teacher reported sample (Table 1). For both parent and teacher reported SDQ, children with a high SDQ score more often showed a high impact score, were more often identified as being at risk for psychosocial problems and were more often referred, and received or had received care more often ($p<0.05$).

Table 1 Background characteristics of the population

	Parent reported SDQ		**Teacher reported SDQ**	
	Normal score SDQ (n=960)	High score SDQ (n=589)	Normal score SDQ (n=1,377)	High score SDQ (n=658)
Gender (male)	53.5%	60.4%*	51.9%	69.3%*
Age				
Mean age at time of SDQ (SD)	5.3 (0.48)	5.3 (0.51)	5.3 (0.49)	5.3 (0.52)
Mean age at time of consult (SD)	5.5 (0.54)	5.6 (0.56)	5.6 (0.57)	5.5 (0.56)*
Ethnic background				
Dutch	56.8%	44.1%*	48.3%	38.4%*
Non-Dutch	43.2%	55.9%*	51.7%	61.6%*
SDQ				
Mean score SDQ (SD)	6.4 (3.67)	17.0 (2.94)*	4.6 (3.62)	16.4 (3.38)*
High impact score	3.2%	26.8%*	4.6%	48.3%*
Low impact score	96.8%	73.2%*	95.4%	51.7%*
Identification CHP				
No risk	77.0%	53.5%*	77.2%	53.0%*
At risk	23.0%	46.5%*	22.8%	47.0%*
Referral				
Yes	11.5%	22.2%*	13.0%	23.1%*
No	88.5%	77.8%*	87.0%	76.9%*
In care in past 2 years (yes)				
Yes	5.5%	19.8%*	8.6%	14.8%*
No	94.5%	80.2%*	91.4%	85.2%*
Currently in care (Yes)				
Yes	3.5%	14.4%*	4.8%	13.1%*
No	96.5%	85.6%*	95.2%	86.9%*
Time between SDQ and health assessment (in weeks)	13.5 (17.87)	13.9 (19.12)	16.6 (19.40)	15.0 (22.13)

* Significant different from children with normal SDQ score at p<0.05.

Screening process parent reported SDQ

Figure 1 shows the screening process according to the total difficulties score and the impact score of the parent SDQ report. Children with a high parental SDQ total score are more often identified by the CHP and are more often referred than children with a normal SDQ score (identified; 37.9% versus 19.2%, χ^2= 75,98, df=1, p<.001, referred; 22.2% versus 11.5%, χ^2= 32,31, df=1, p<.001, table 1). Children with a high parental score and a high parental impact score are more often male (χ^2=7.61, df=1, p<.05) and of Dutch ethnic background (χ^2=18.97 , df=1, p<.00, figure 1). These children are also more often identified as having psychosocial problems (χ^2=33.42, df=1, p<.001) and are more often

referred than children with a high SDQ score and a low impact score (χ^2=14.22 , df=1, p<.001, figure 1).

Children with a high parental SDQ total score and high impact score who are identified are more often of a Dutch ethnic background than children who are not identified by the CHP (χ^2=5.83 , df=1, p<.05). Children with a high parental total score and a high impact score who are referred are less often of Dutch ethnic background than children who are not referred by the CHP (χ^2=10.93 , df=1, p<.01).

Children with a low parental SDQ total score but a high impact score are more often identified as having psychosocial problems than children with a low parental SDQ total score and a low impact score. There are no significant differences for referral, in subgroups by gender or ethnic background.

Screening process teacher reported SDQ

Figure 2 shows the screening process according to the total difficulties score and the impact score of the teacher reported SDQ. Children with a high SDQ total score are more often identified and are more often referred than children with a normal SDQ score (identified; 47.0% versus 22.8% χ^2=95.6, df=1, p<.001, referred 23.1% versus 13.0%, χ^2=33.25 , df=1, p<.001).

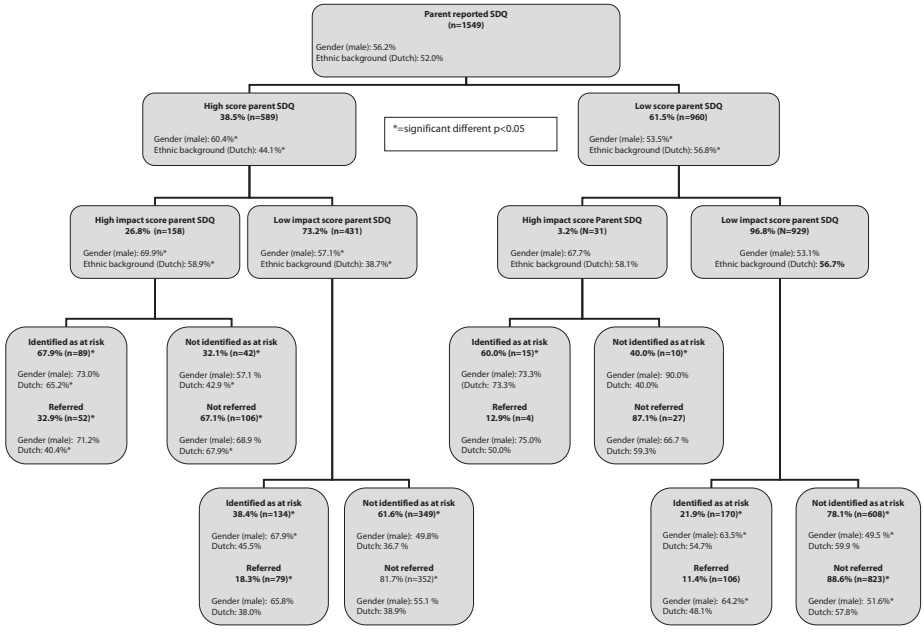

Figure 2 Flowchart screening process parent reported SDQ

Children with a high score on the teacher SDQ and a high impact score are more often identified as having psychosocial problems (χ^2=28.52, df=1, p<.001) and are more often referred than children with a high total score and a low impact score (χ^2=11.92, df=1, p<.01). There were no significant differences by gender or ethnic background.

Children with a high total and impact score on the teacher SDQ who are identified are more often male (χ^2=11.89 , df=1, p<.01). There were no significant differences by gender or ethnic background in the referred group.

Children with a low total score on the teacher SDQ but a high impact score are more often identified as having psychosocial problems and are more often referred (χ^2=8.57 , df=1, p<.01). There are no significant differences in referral, gender and ethnic background.

Mediation analyses

There is a significant association between the SDQ total score and identification of psychosocial problems, and referral in the crude model and the adjusted model for the parent as well as the teacher report (table 2). There is also a significant association between the SDQ total score and the impact score in the crude model and the adjusted model for the parent as well as the teacher report (table 3). Furthermore, there is a significant association between the impact score and identification of psychosocial problems, and referral in the crude model and the adjusted model for both the parent and teacher report (table 5). The first three steps for mediation of the impact score are met for identification and referral. Comparing the OR of the total difficulties score from table 2 and table 5; shows that the OR in the complete models are lower. Also all Sobel test statistics are significant (p<.001), thus the impact score is a partial mediator in the association between SDQ score and identification of psychosocial problems, and referral by the CHP. In the full model of the association between the teacher SDQ and referral, the impact score is a complete mediator, because the effect of the SDQ total score is no longer significant (OR 1.34; 95% CI 1.00-1.80, table 5).

Table 2 Association between SDQ score and identification/referral by the CHP by informant

Informant	Model	Reference	Identified as at risk			Referral		
		OR	OR (95% CI)	β	SE	OR (95% CI)	β	SE
Parent	Model 1	1.00	2.90 (2.27-3.70)*	1.06	0.124	2.21 (1.67-2.92)*	0.79	0.142
	Model 2[a]	1.00	2.40 (1.85-3.12)*	0.88	0.133	1.94 (1.45-2.59)*	0.66	0.148
Teacher	Model 1	1.00	3.00 (2.39-3.76)*	1.10	0.115	2.01 (1.58-2.55)*	0.70	0.122
	Model 2[a]	1.00	2.73 (2.17-3.45)*	1.05	0.119	1.83 (1.42-2.34)*	0.60	0.128

a=adjusted for gender, ethnic background, treatment for psychosocial problem in the past two years, and current treatment for psychosocial problems; *=significant at p<0.05.

Table 3 Association between SDQ total difficulties score and SDQ impact score by informant

Informant	Model	Low SDQ score	High SDQ score		
		OR (95% CI)	OR (95% CI)	β	SE
Parent	Model 1	1.00	10.99 (7.35-16.41)*	2.40	0.205
	Model 2[a]	1.00	8.87 (5.82-13.53)*	2.18	0.215
Teacher	Model 1	1.00	19.15 (14.27-25.68)*	2.95	0.150
	Model 2[a]	1.00	16.91 (12.53-22.80)*	2.825	0.153

a=adjusted for gender, ethnic background, treatment for psychosocial problem in the past two years, and current treatment for psychosocial problems; *=significant at p<0.05.

Table 4 Association between SDQ impact score and identification/referral by the CHP by informant

Informant	Model	Reference	At risk			Referral		
		OR	OR (95% CI)	β	SE	OR (95% CI)	β	SE
Parent	Model 1	1.00	5.41 (3.79-7.75)*	1.69	0.183	2.67 (1.89-3.79)*	0.98	0.178
	Model 2[a]	1.00	3.52 (2.39-5.20)*	1.26	0.198	2.39 (1.62-3.54)*	0.87	0.200
Teacher	Model 1	1.00	4.87 (3.72-6.37)*	1.58	0.138	2.53 (1.95-3.30)*	0.93	0.135
	Model 2[a]	1.00	4.47 (3.39-5.89)*	1.50	0.141	2.36 (1.80-3.11)*	0.86	0.140

a=adjusted for gender, ethnic background, treatment for psychosocial problem in the past two years, and current treatment for psychosocial problems; *=significant at p<0.05.

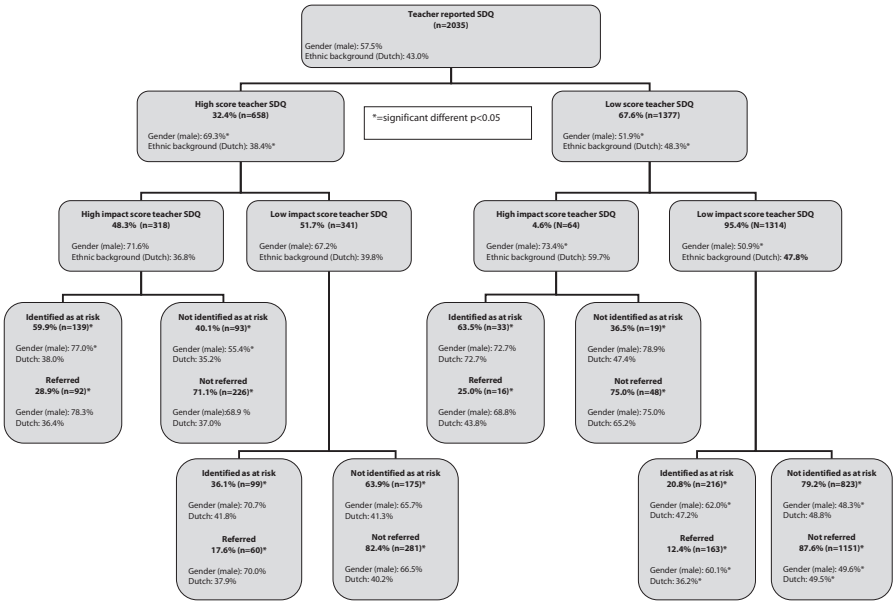

Figure 3 Flowchart screening process teacher reported SDQ

Table 5 Mediation effect of the total impact score on identification and referral by the CHP by informant

Informant	Model	Reference	P90 SDQ	High Impact score	β^{impact}	SE^{mpact}	Sobel test	p-value
		OR	OR (95% CI)					
Identification								
Parent								
	Model 1	1.00	2.14 (1.65-2.78)*	3.76 (2.57-5.49)*	1.32	0.194	5.88*	<.001
	Model 2[a]	1.00	1.99 (1.52-2.62)*	2.60 (1.73-3.90)*	0.95	0.208	4.16*	<.001
Teacher								
	Model 1	1.00	1.82 (1.40-2.37)*	3.45 (2.53-4.68)*	1.237	0.157	7.33*	<.001
	Model 2[a]	1.00	1.70 (1.30-2.23)*	3.35 (2.45-4.56)*	1.208	0.158	7.08*	<.001
Referral								
Parent								
	Model 1	1.00	1.85 (1.37-2.49)*	1.98 (1.36-2.89)*	0.69	0.192	3.44*	<.001
	Model 2[a]	1.00	1.70 (1.25-2.30)*	1.91 (1.27-2.88)*	0.65	0.209	2.97*	.002
Teacher								
	Model 1	1.00	1.44 (1.08-1.93)*	2.02 (1.47-2.77)*	0.70	0.162	4.22*	<.001
	Model 2[a]	1.00	1.34 (1.00-1.80)	2.00 (1.45-2.75)*	0.69	0.164	4.10*	<.001

a=adjusted for gender, ethnic background, treatment for psychosocial problem in the past two years, and current treatment for psychosocial problems; *=significant at $p<0.05$.

DISCUSSION

In the present study we explored the identification and referral of children by the preventive child health care making use of the extended version of the SDQ in the total population of 5-6 year olds. Furthermore, this is the first study that determined if the impact supplement, which measures concern and burden of the problems, plays a role as a mediator in the decision of the child health professional.

Our results indicated that 47% of the children with a high score on the parent or teacher reported SDQ were identified by the CHP as having psychosocial problems. This is comparable with the results of other studies where CHP were blinded for early detection tools (sensitivity between 4% -58%) [11-13, 16]. However, a comparison between our results and results of other studies should be done with great caution. Sensitivity is the proportion of the true cases amongst the screen positives [25]. In studies mentioned previously it means that it is the proportion of the children who are identified as having psychosocial problems by the CHP among children with a high score on an early detection tool. That is why the sensitivity of identification depends on the sensitivity of the early detection tool used. For example, the sensitivity of an early detection tool is 70% (which is comparable to what is mostly found for the SDQ [17]), the specificity is 90% and the prevalence of the disorder is 10%. In a population of a 1000 children this means that 70 children are properly indicated with a high score, 90 children are unfairly indicated by a high score, 30 children are unfairly indicated by a low score, and 810 children are properly indicated with a low score. This means that in an ideal situation you want that the CHP identifies 44% of the positively screened children (70 divided by 160 screened positives) and 3.6% of the children screened negatively (30 divided by 840 screened negatives). When sensitivity was 60% instead of 70% the CHP would identify 40% of the children. Besides, the sensitivity of an early detection tool depends on the prevalence of a disorder in the population [26]. In the case of psychosocial problems the prevalence depends on the measurement that was used, unlike the prevalence of a specific disease such as measles or cancer. Therefore, we could not expect a very high rate of identification by the CHP. Furthermore, it is possible that expectations for improving identification are too high. Several studies showed no improvement of early detection by the CHP after interventions for improvement. Theunissen et al. (2012) showed no improvement of early detection of psychosocial problems in young children after a number of interventions to improve identification from 1997 to 2003 [11]. A randomised controlled trial by Wiefferink et al. (2006) showed an improvement of sensitivity after training of the CHP in a structured method, but showed a decrease after 6 months [27].

Nevertheless 15% of the children without a high total problem score have been identified as having psychosocial problems. Although this seems odd, it is possible that these children suffer from other problems such as eating problems, developmental delay or

specific psychiatric disorders, such as autism, psychosis, and tics for which the SDQ is less sensitive. It is also possible that their problems developed in the time between the administration of the SDQ and the assessment and that parents became aware of these problems during the assessment or that information from the teacher played a role.

Lavigne et al. (1993) looked into referral decisions in 2-5 year olds and found that paediatricians provided counselling in 69% of the children they identified as having behaviour problems and 42% of the children they identified were referred to mental health care [13]. Our results indicate much lower rates of referral, around 22%. However, in our study only referrals of the present visit were included, while in the study by Lavigne et al. (1993) rates of referral are defined as referral of the present visit or previous visits [13].

The impact score reflects problem perception, concern about the problems, and burden of the problems. A study by Bevaart et al. (2014) among 5 to year 6 old children with a high score on the SDQ showed that problem perception was associated with referral to mental heath care [28]. Therefore the impact score was expected to play a role as a mediator. Our results indicate that a high score on the parent or teacher SDQ is related to identification of psychosocial problems and referral by the CHP. Furthermore, our results indicated that the impact score is a partial mediator for identification for psychosocial problems. The impact score is also a partial mediator in the relation between the parent SDQ and referral. Even so, the impact score is a complete mediator in the relation between the teacher SDQ and referral. That the impact score plays a role as a mediator can be explained by several reasons. It could be possible that parents of children with a high impact score are more likely to discuss the problems with the CHP than parents of children with a low impact score. However, in a study by Sayal et al. (2004) expression of concerns was not associated with the perception of difficulties [12]. Furthermore, it is possible that teachers who give the child a high impact score are more likely to discuss these problems with the parents and/or the CHP during a school visit. Our findings indicate that both the impact score of the parent as well as the teacher SDQ are valuable supplements for usage in the preventive child health care. Even so, when the teacher is the informant, one could consider only using the impact supplement. This saves a great amount of the teacher's time, but also of the time of the CHP in calculating the score.

We did our analyses separately for the parent and teacher SDQ since in general practice mostly there is only one informant and the interrater agreement is generally low [18, 29]. In this study the overlap in high SDQ total difficulties scores was also low (5%, n=120). However, the separate analyses could have attenuated the OR because children with a low score on the parent SDQ could have a high score in the teacher SDQ and the other way around. We repeated our analyses for children of whom both reports were completely available (n=1,348). In this model the SDQ score was split into three levels of which a normal score was the reference (normal score, high score on parent or teacher SDQ, high score on both parent and teacher SDQ). In this analysis we generally

found higher OR for identification and referral in all groups. However, the impact score remained a mediator in identification and referral.

The present study explored identification of psychosocial problems and referral for these problems by the CHP. Due to the design of this study we cannot conclude that identification and referral were improved by using the SDQ as an early detection tool. This could have several reasons as stated earlier. However, identification of psychosocial problems among children with a normal score on the SDQ seems high and referral rates among children with a high score seem low. Further research is needed to determine if identification and referral is actually too low or that most of the problem behaviour measured with the SDQ is temporary and dissolves with time. To get a better understanding of the screening process, for instance what are motives to refer or not to refer; we recommend doing more in depth qualitative research into this field. Furthermore, we showed that the SDQ was related to identification and referral and that problem perception, concern about the problems, and burden of the problems as measured by the impact scale of the SDQ explains a large part of this association. Therefore, it remains important to improve identification and to improve the use of early detection tools. To do this, regular training of the CHP in looking for psychosocial problems is needed to keep them aware of and to inform them about the latest developments in this field.

To conclude, we found an association between the SDQ total problem score and identification and referral for psychosocial problems in young children by the CHP. Furthermore, we found that the impact score of the SDQ plays an important role in the identification and referral for psychosocial problems by the CHP. Therefore, we recommend when using the SDQ as an early detection tool to use the total problem score as well as the impact score. More so, when using the teacher reported SDQ, it is to consider only using the impact score of the SDQ.

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6 Ethnic Differences in Problem Perception and Perceived Need for Care for Young Children with Problem Behaviour

Floor Bevaart, Cathelijne Mieloo, Wilma Jansen, Hein Raat, Marianne Donker, Frank Verhulst, Floor van Oort

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ABSTRACT

Background

Problem perception and perceived need for professional care are important determinants that can contribute to ethnic differences in the use of mental health care. Therefore, we studied ethnic differences in problem perception and perceived need for professional care in the parents and teachers of 5-6-year old children from the general population who were selected for having emotional and behavioural problems.

Methods

A cross-sectional study with data of 10,951 children from grade two of the elementary schools in the Rotterdam-Rijnmond area, the Netherlands. Parents and teachers completed the Strengths and Difficulties Questionnaire (SDQ) as well as questions on problem perception and perceived need for care. The SDQ was used to identify children with emotional and behavioural problems. We included Dutch, Surinamese, Antillean, Moroccan and Turkish children in our sample with high (>P90) SDQ scores (N=1,215), who were not currently receiving professional care for their problems.

Results

Amongst children with high SDQ scores problem perception was lower in non-Dutch parents than in Dutch parents (49% vs. 81%, $p < 0.01$). These lower rates of problem perception could not be explained by differences in socioeconomic position or severity of the problems. No ethnic differences were found in parental perceived need and in problem perception and perceived need reported by teachers. Higher levels of problem perception and perceived need were reported by teachers than by parents in all ethnic groups (PP: 87% vs. 63% and PN: 48% vs. 23%).

Conclusions

Child health professionals should be aware of ethnic variations in problem perception since low problem perception in parents of non-Dutch children may lead to miscommunication and unmet need for professional care for the child.

INTRODUCTION

Emotional and behavioural problems, if left untreated, often interfere with the everyday functioning of children and their families and are predictive of problems later in life [1]. The prevalence of emotional and behavioural problems as reported by parents and teachers in young children is high, and according to some studies these problems are reported even more frequently in children belonging to an ethnic minority group than in children of the ethnic majority groups [2-4]. Furthermore, recent evidence suggests that children from an ethnic minority group less often receive treatment for emotional and behavioural problems than children of ethnic majority groups [5-7]. For example, lower rates of mental health services use were reported for Latino and African American children than for White children in a cohort study of 7-14 year old children in the U.S. [6]. In contrast, there is evidence that children from some ethnic minority groups have a mental health advantage and hence may have a lower need for professional mental health care [8]. To explain how ethnicity exactly influences the process of help-seeking, more insight is needed in ethnic differences in the determinants of help-seeking behaviour.

The 'Levels and Filters model' explains the relationship between different determinants of help-seeking behaviour on the one hand and actual help seeking for mental health problems on the other [9-12]. This model is refined by Verhulst and Koot (1992) and made applicable for the process of seeking help for children, mostly through their parents. Help seeking is regarded as a stage-like process in which parents must move through different levels and filters before actually receiving help. The first filter in this model is problem recognition by the parents and their decision to consult a professional.

According to Logan and King (2001) several stages in parental problem recognition can be distinguished, among which: parents' initial acknowledgment of their child's distress and parents recognizing that the problem is psychological and severe enough to merit professional attention [13]. These stages are comparable to the respective concepts problem perception and perceived need for professional care, as will be used in our study. In most previous studies problem recognition is measured as a high score on a screening questionnaire or diagnostic interview [14], although this does not imply that parents also perceive the behaviour of their child as problematic and consider professional help. Zwaanswijk et al. (2006) found a large discrepancy between problem perception by parents when asked directly and problem behaviour as determined by a high problem score on a parent screening questionnaire. Less than half of the parents of 4-17 year old children who reported child problems in the deviant range of the Child Behavior Checklist [15] had a corresponding problem perception [16]. Therefore, problem perception and perceived need for care should be studied as separate determinants of the process of help seeking for children with mental health problems, besides measures of problem behaviour.

Ethnic differences in emotional and behavioural problems have been found in parent [2,4] and teacher reports [7,17]. Problem perception and perceived need for care may also differ between ethnic groups. For example, African American parents reported less problem perception of ADHD-symptoms than Native American parents of school-aged children [18] . Similarly, for adolescents European American caregivers were more likely than minority parents to report problems [19]. Further, parents of 9-17 year old children reported less need of mental health care services in ethnic minority children than in majority children [20]. However, studies on ethnic differences in problem perception and perceived need for care in young children are scarce, especially studies that also include problem perception and perceived need of teachers. It is important to include parents' as well as teachers' perception of problems and need for care, as both are important predictors of referral and mental health care use in children [21-22]. Further, besides inter-rater differences in level of problems [23-24], inter-rater differences may also be present for problem perception and perceived need for professional care. Inter-rater differences can reflect both perceptual bias [25] or true differences in the problem behaviour of children across settings [26].

Hence, the first aim of this study was to examine ethnic differences in problem perception and perceived need for professional care in parents and teachers of young children. We studied this in a large group of 5-6-year old children, with a high score on the Strengths and Difficulties Questionnaire (SDQ), belonging to one of the five largest ethnic groups in the Netherlands (from a Dutch, Moroccan, Turkish, Antillean or Surinamese society of origin). The largest ethnic minority groups living in the Netherlands migrated from Mediterranean countries, mainly Turkey and Morocco, as labour migrants since the 1960s and early 1970s. Surinamese and Antillean migrants came from South America and the Caribbean respectively, to the Netherlands during the process of decolonization after 1975. We hypothesized that both parental problem perception and perceived need would be lower for non-Dutch children than for Dutch children, based on previous findings [18-20]. As ethnic differences in teachers' problem perception and perceived need for professional care have not been studied previously, we did not have any a-priori hypotheses about teachers. To take into account the context of the socio-economic position of ethnic minorities, we investigated whether any ethnic differences may be explained by differences in socio-economic position [14,27].

METHODS

Sample

In the school year 2008-2009, from a total of 11,987 children enrolled in grade two (5-6 years old) of 94% of all mainstream elementary schools in the Rotterdam-Rijnmond

area in the Netherlands, 10,951 children were screened. This area consists of both urban and rural communities, which allows generalization of the results. Questionnaires were distributed through schools to parents and teachers for use as a screening tool in the preventive child health care. The flowchart in figure 1 shows the sampling process and the ethnic distribution for the group used in analyses.

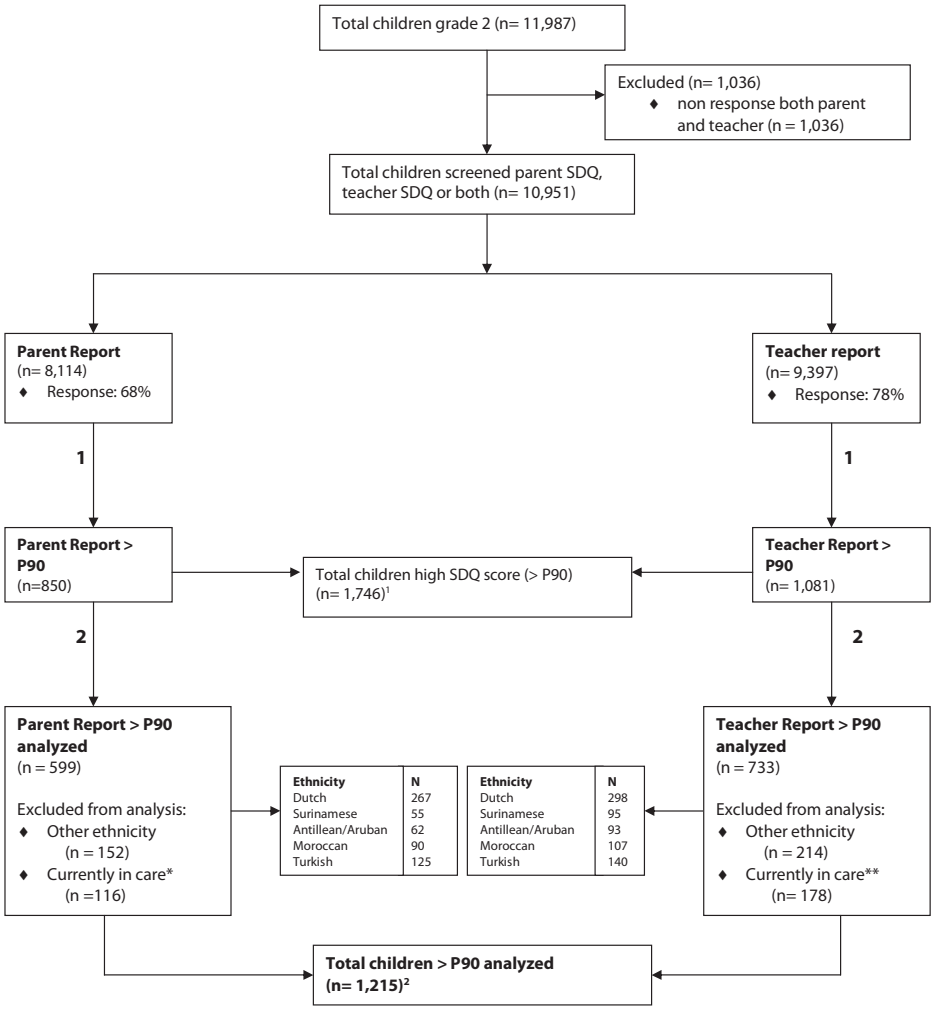

Figure 1 Flowchart of the sampling process and ethnic distribution
1) Only children with high SDQ-scores (> P90) were included in the study sample
2) Children already in treatment for emotional and/or behavioural problems and/or children with 'other' ethnicity were excluded from the study sample
[1]: 185 both >P90 on parent- and teacher report [2]: 117 both >P90 on parent- and teacher report
· of whom 17 from other ethnicity ** of whom 44 from other ethnicity

In total 8,114 (68%) parents and 9,397 (78%) teachers filled out the questionnaire. Non-response in parents was more likely when children were non-Dutch (38% non-response versus 14% in Dutch children, p <0.001). Non-response in teachers was more likely when children were Dutch (18% non-response versus 11% in non-Dutch children, p <0.001). Parental and teacher non-response were not related to sex or age of the child. Teacher non-response was also not related to parental level of educational. We could not test the latter for parental response. A total of 1,746 children had a high SDQ score reported by parent, teacher or both. A high SDQ total score was defined as a score above the 90th percentile (P90) in the total group of 10,951 children. The same P90 cut-off points were used for all ethnic groups (non-ethnic specific cut-off points). The cut-off point for parents was 14 and for teachers 12. Children already in treatment for emotional and/or behavioural problems at the moment of screening were excluded from the analyses, as well as children of an other ethnic origin than Dutch, Surinamese, Antillean, Moroccan or Turkish (N= 531) (see figure 1). In total, we included 1,215 children with high SDQ scores in our analyses (figure 1). The parent questionnaire was completed by the mother (71%), by both parents (12%), by father (7%) or by another caregiver (10%).

A child was classified as ethnic Dutch, Surinamese, Antillean, Moroccan or Turkish, as based on the country of birth of the child and/or at least one of his/her parents. If the country of birth of at least one of the parents was outside the Netherlands, the child was classified as non-Dutch [28]. Of the children with a non-Dutch ethnicity, 87% was born in the Netherlands ('second generation residents of migrant descent'). The study protocol was approved by the Medical-Ethical Committee of the Erasmus Medical Center of Rotterdam. All parents and teachers gave informed consent.

Measures

Parents and teachers completed the Dutch, Arabic or Turkish version of the Strengths and Difficulties Questionnaire (SDQ). The SDQ is a reliable and valid 25-item screening measure to identify 3-16 years old children with emotional and behavioural problems [29-31]. The SDQ has five subscales: conduct problems, inattention-hyperactivity, emotional problems, peer problems and prosocial behaviour and an optional impact supplement. We used the first item of Goodman's impact supplement as measure for problem perception [32], and the following items about distress and social impairment to compute the impact score. The impact score ranges from 0-10 for parents and 0-6 for teachers. The SDQ total score and SDQ impact score were used as indicators of severity.

To measure problem perception the first impact question of the SDQ was used: '*Do you think the child has a problem on one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other people?*'. This question was scored on a 4-point scale, ranging from (1) no problems to (4) yes, severe problems. The item was recoded as yes (little to severe problems) or no (no problems). Perceived need for care

was measured with the question: '*Do you think the child needs professional help in one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other people?*'. This question could be answered with yes or no.

Indicators of socio-economic position (SEP) were parental level of education, parental employment status, mean family income, mean home value appraisal and family composition. The level of education of the parents had four levels ranging from 1 (low) to 4 (high). A low education was defined as no education at all, or only elementary school. A high education was defined as higher vocational education or university degree. Parental employment status had two categories: 1) none of the parents is employed and 2) at least one of the parents is employed part-time. Further, mean family income and home value appraisal, based on the six-digit postal code system as used in the Netherlands, were obtained from Statistics Netherlands (CBS, 2004). The indicator of family composition had 3 categories: 1) a two-parent family, 2) a single-parent family and 3) any other family composition.

Current mental health care use for emotional and behavioural problems was assessed with the following question in the parent questionnaire: '*Does the child receive professional care for problems in one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other people?*'. This question could be answered with yes or no. Health care use in the past two years was assessed with the following question: '*Did the child received professional care in the last two years for problems in one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other people?*' (yes or no). Only the children who received professional care at the moment of screening were excluded from analyses.

Data analyses

To describe the screen-positive sample (N =1,746) we examined ethnic differences in problem rates and in current mental health care use with χ^2 tests. To describe the final study sample (N= 1,215) we examined ethnic differences in SEP and severity using ANOVA or χ^2 tests. To investigate the main aim of this study, we examined ethnic differences in problem perception and perceived need of parents and teachers using χ^2 tests. With logistic regression analyses we adjusted the associations between ethnicity and parental problem perception and ethnicity and perceived need, for SEP and severity indicators. To adjust for teacher-level clustering, we conducted multilevel logistic regression analyses for teacher-reported problem perception and perceived need. These analyses were also adjusted for SEP and severity indicators. The levels we used included individual and teacher.

In the analyses on parent and teacher reports we first included ethnicity and gender in the model; then SEP indicators, and finally both SEP and severity indicators. In the analyses on teacher reports we only included mean family income and home value appraisal as SEP indicators as for 33% no parent reports were available to provide data on parental education, employment and family composition. The total SDQ impact score was only included

as a severity indicator in the analyses (both parent and teacher report) of perceived need, not in the analyses of problem perception, as problem perception was one of the items of the impact score. Dutch ethnicity was the reference ethnicity. A significance level of ≤ .05 was used for all analyses. Finally, we conducted additional analyses which were intended as sensitivity analyses. We repeated the analyses with ethnic specific cut-off points and with a higher cut-off point (P95) for all ethnic groups. These show whether our results depend on a-priori, arbitrary, choices for the cut-off point used.

To account for missing values (table 1) we used multiple imputation based on twenty imputed data sets ('multiple imputation' procedure in SPSS 17.0). In the analyses on parents we only included children with parental response on the questionnaire and in the analyses on teachers we included only children with teacher response. The data were imputed only for general characteristics and socio-economic indicators, but not for severity indicators. Statistical analyses were performed using Statistical Package of Social Sciences, version 17.0 for Windows (SPSS Inc, Chicago, IL, USA). Multilevel analyses on teacher-reported data were performed using Mplus 6.11.

RESULTS

Table 1 shows ethnic differences in problem rates. The proportion of Dutch children scoring above the SDQ cut-off point (>P90) was lower than the proportion of children from the non-Dutch ethnic groups in both parent- ($\chi^2(5) = 159.6$, $p<0.001$) and teacher report ($\chi^2(5) = 92.3$, $p<0.001$). The proportion of Dutch children scoring above the P95 cut-off point was also lower than the proportion of children from non-Dutch ethnic groups in both parent- ($\chi^2(5) = 74.5$, $p<0.001$) and teacher report ($\chi^2(5) = 52.5$, $p<0.001$). Of all children scoring above P90, 14% were currently receiving mental health care. Ethnic minority children were underrepresented: 17% Dutch, 14% Surinamese, 16% Antillean, 7% Turkish and 9% Moroccan children received mental health care ($\chi^2(4) = 20.2$, $p<0.001$.

Table 1 Problem behaviour rates according to parent and teacher SDQ

Ethnicity	**N (parents)**	**> P90 (parents)[1], %**	**> P95 (parents)[2], %**	**N (teachers)**	**> P90 (teachers)[1], %**	**> P95 (teachers)[2], %**
Dutch	4.750	7.5	4.6	4,553	8.5	4.0
Surinamese	521	10.0	6.7	620	14.4	6.8
Antillean	264	21.7	14.3	340	19.3	9.5
Turkish	661	19.7	12.6	759	17.1	8.7
Moroccan	623	15.3	7.8	811	13.1	6.4
P-value		**<0.001**	**<0.001**		**<0.001**	**<0.001**

[1]: SDQ cut-off point >P90 parents ≥14, teachers ≥ 12

[2:] SDQ cut-off point >P95 parents ≥ 16, teachers ≥ 15

Table 2 Characteristics of the study population (n =1.215)

	Ethnicity					Percentage Missing*	p-value**
General characteristics	Dutch	Surinamese	Antillean	Turkish	Moroccan		
Gender (% boy)	63.6	66.4	59.5	61.9	53.8	*0*	**0.13**
Age (mean(SE))	5.3 (0.03)	5.4 (0.07)	5.4 (0.07)	5.4 (0.06)	5.5 (0.08)	*1.0*	**0.20**
Past mental health care use[1] (%)	30.9	13.3	14.2	7.7	9.3	*1.3*	**< 0.001**
Socio economic indicators							
Income in euro (mean (SE))	2212.0 (36.0)	1696.8 (57.1)	1605.4 (70.5)	1584.9 (50.9)	1532.8 (33.5)	*18.0*	**<0.001**
Home appraisal (K euro) (mean (SE))	126.9 (2.9)	81.6(3.8)	76.9 (5.2)	72.8(2.6)	72.9 (2.4)	*17.8*	**<0.001**
Education (%)							
high	27.4	10.1	15.7	5.2	8.2	*35.3*	**<0.001**
middle 2	39.3	38.0	30.4	29.2	14.5		
middle 1	26.7	35.8	26.6	27.4	28.2		
low	6.5	16.0	23.1	38.2	49.2		
Employment(% ≥ 1 parent)	92.2	74.5	53.7	61.2	41.9	*16.6*	**<0.001**
Family composition (%)							
two parents	71.8	48.1	21.8	60.1	69.3	*4.7*	**<0.001**
single parent	18.6	35.6	50.5	19.2	11.2		
other	9.7	16.3	27.8	20.0	19.6		
Severity indicators							
SDQ score parents (mean (SE))	16.6 (0.2)	17.6 (0.5)	17.0 (0.4)	16.9 (0.3)	16.3 (0.3)	*NA*	**0.05**
SDQ score teachers (mean (SE))	15.1 (0.2)	15.5 (0.4)	15.6 (0.5)	15.4 (0.3)	15.2 (0.3)	*NA*	**0.37**
SDQ impact score parents (mean (SE))	1.1 (0.1)	1.3 0.3)	1.0 (0.3)	0.9 (0.2)	1.1 (0.4)	*NA*	**0.18**
SDQ impact score teachers (mean (SE))	1.4 (0.1)	1.4 (0.2)	1.5 (0.2)	1.6 (0.2)	1.3 (0.1)	*NA*	**0.30**

*: % missing before multiple imputations **: P-value for differences between the ethnic groups

[1] current mental health care use is not included in past mental health care use

Note: all children have a high SDQ total score (above > P90) according to parent, teacher or both

Table 2 shows the characteristics of the final study sample (N= 1.215) by ethnicity. Mean age of the children was 5.5 years and 63% was male. No ethnic differences were found in gender and age. Ethnic differences were found in past mental health care use ($\chi^2(4)$ = 47.5, p<0.001).

Table 2 also shows the socio-economic and severity characteristics of the study population. Significant ethnic differences were found in mean family income, mean home value appraisal, parental employment status, parental education level and in family composition. Ethnic differences were found in the mean SDQ total scores in parent reports (p =0.05) but not in the mean impact score. No ethnic differences were found in mean SDQ total and impact score in teacher reports.

Problem perception

Overall, 63.1% of parents of screen positive children perceived their child to have emotional or behavioural problems. Table 3 shows clear ethnic differences in parental problem perception (χ^2 (4) =72.5, p < 0.001). Higher levels of problem perception were found in Dutch parents (81%), versus 74% in Surinamese parents, 48% in Antillean parents, 47% in Moroccan parents and only 40% in Turkish parents. The lower level of problem perception in Antillean (OR: 0.2, 95% CI: 0.1-0.4), Turkish (OR: 0.2, 95% CI: 0.1-0.3), and Moroccan parents (OR: 0.3, 95% CI: 0.1-0.5) could not be explained by SEP or severity indicators. Differences between Surinamese and Dutch parents were smaller and not significantly different.

Overall, 87.2% of teachers perceived the child to have emotional or behavioural problems and problem perception varied between 81% and 89% across ethnicities (table 3). No significant associations between problem perception and ethnicity were found for teachers of children with high SDQ total scores (table 3), except for a lower problem perception for Turkish children (OR: 0.4, 95% CI.:0.2-0.9).

Perceived need

Overall, 22.9% of parents of screen positive children reported perceived need for mental health care for their child and perceived need ranged across ethnic groups between 16% and 26% (table 3). No ethnic differences were found in perceived need in parents of children with high SDQ total scores except for a lower perceived need in Surinamese children after adjustment for SEP and severity indicators (OR: 0.3, 95% C.I.: 0.1-0.9). Overall, 47.8% of teachers reported perceived need for mental health care for the child and perceived need ranged across ethnic groups between 45% and 53%. No ethnic differences were found in perceived need in teachers of children with high SDQ total scores (table 3).

TABLE 3 Odds ratios (OR) for Ethnicity, Problem Perception and Perceived Need for parent and teacher report (children with high SDQ total scores, n=599 parents, n=733 teachers)

	Problem perception (%)	**Problem perception (95% CI)**			**Perceived need (%)**	**Perceived need (95% CI)**		
		OR 1 (+ gender)	**OR 2** (+ SEP)	**OR 3** (+ severity)		**OR 1** (+ gender)	**OR 2** (+ SEP)	**OR 3** (+severity)
Parent								
Dutch	80.6	1.0	1.0	1.0	25.6	1.0	1.0	1.0
Surinamese	74.0	0.7 (0.3-1.5)	0.7 (0.3-1.6)	0.7 (0.3-1.4)	15.5	0.5 (0.2-1.2)	0.5 (0.2-1.1)	**0.3 (0.1-0.9)**
Antillean	47.8	**0.2 (0.1-0.4)**	**0.2 (0.1-0.4)**	**0.2 (0.1-0.4)**	22.6	0.9 (0.4-1.8)	0.7 (0.3-1.5)	0.8 (0.3-1.9)
Turkish	40.0	**0.2 (0.1-0.3)**	**0.2 (0.1-0.3)**	**0.2 (0.1-0.3)**	22.8	0.9 (0.5-1.5)	0.7 (0.3-1.4)	0.8 (0.4-1.7)
Moroccan	46.9	**0.2 (0.1-0.4)**	**0.2 (0.1-0.5)**	**0.3 (0.1-0.5)**	19.5	0.8 (0.4-1.5)	0.8 (0.3-1.7)	0.9 (0.4-2.3)
p-value[1]	<0.001				0.46			
Teacher								
Dutch	89.4	1.0	1.0	1.0	45.2	1.0	1.0	1.0
Surinamese	88.2	0.7 (0.3-1.7)	0.6 (0.3-1.6)	0.6 (0.2-1.6)	53.0	1.3 (0.8-2.8)	1.1 (0.6-2.4)	1.4 (0.6-4.0)
Antillean	87.9	0.8 (0.3-2.2)	0.7 (0.3-2.0)	0.7 (0.2-2.1)	52.2	1.3 (0.7-2.6)	1.0 (0.5-2.2)	1.0 (0.4-2.9)
Turkish	81.3	0.5 (0.2-1.1)	**0.4 (0.2-1.0)**	**0.4 (0.2-0.9)**	49.2	1.2 (0.7-2.1)	0.9 (0.5-1.7)	0.9 (0.4-2.1)
Moroccan	88.9	0.9 (0.5-2.8)	0.8 (0.4-2.4)	0.8 (0.3-2.7)	44.5	1.0 (0.5-1.9)	0.8 (0.4-1.6)	0.9 (0.4-2.3)
p-value[1]	0.15				0.43			

*Boldface type indicates statistically significant results at P<.05 [1]: p-value for difference between ethnic groups

OR 1 parents/teachers: odds ratios adjusted for **gender**

OR 2 parents: adjusted odds ratios for gender + **SEP** (parental education level, employment status, home appraisal, income, family composition)

OR 2 teachers: adjusted odds ratios for gender + **SEP** (income and home appraisal of parents)

OR 3 problem perception parents/teachers: adjusted odds ratio for gender + SEP + **severity characteristics** (SDQ total score)

OR 3 perceived need parents/teachers: adjusted odds ratio for gender + SEP + **severity characteristics** (SDQ total score and SDQ impact score)

Additional analyses

Additional analyses including only children with very high SDQ scores (> P95) showed similar ethnic differences: problem perception was lower in Antillean, Turkish and Moroccan parents after correcting for SEP and severity. Selecting the P90 group based on ethnic specific P90 cut-offs did not change the findings in table 3. When children with a score above the P95 cut-off were selected, problem perception and perceived need were higher in parents (PP: 69% and PN: 30%) as well as in teachers (PP: 93% and PN: 63%) than for children with a score above the P90.

DISCUSSION

The current study shows that parental problem perception, regardless of high problem scores, is lower for parents with young children belonging to ethnic minority groups than for parents belonging to the ethnic majority, whereas teachers reported higher problem perception and perceived need with no ethnic differentiation.

Mental health care use was lower in young children from ethnic minority groups before and at the moment of screening for problem behaviour at age 5-6 years. This extends findings in older age groups [6-7] and therefore, underlines the importance to gain more insight in the stages of help-seeking that precede care use, such as problem perception and perceived need for professional care. Our study confirms that problem perception and perceived need can be treated as two separate stages in the help-seeking models, like the Level and Filter model, as suggested by Logan and King [13]. According to the Levels and Filters model the first step in help-seeking is parental problem recognition. Consistent with previous investigations we identified ethnic differences in problem rates reported by parents and teachers and we did find higher problem rates in ethnic minority children [7,17]. Moreover, we demonstrated that in spite of the higher levels of reported problem behaviour the parental acknowledgement of these problems is lower in ethnic minority groups. Therefore, it seems plausible to distinguish in help-seeking models between parental problem recognition measured with screening questionnaires and the concept of problem perception by parents, as suggested earlier by Zwaanswijk and colleagues [16]. Furthermore, perceived need was lower than problem perception in both parents and teachers, indicating two different concepts. Surprisingly, no ethnic differences in perceived need for parents and teachers were found. Whereas parental problem perception was low only in some ethnic minority groups, parental perceived need was low for all the ethnic groups. Teachers reported a higher problem perception and perceived need than parents in all ethnic groups.

The low problem perception in Antillean, Moroccan and Turkish parents may be influenced by several cultural factors and migration factors, since differences in problem

perception could not be explained by a lower socio-economic status or by ethnic variations in the severity of the problems. Four explanations, not mutually exclusive, will be discussed. First, Weisz et al (1988) showed that cultural differences in concern and the expression of concern for psychosocial problems exist [33]. The degree of disturbance (the threshold) that is needed to label behaviour as problematic may vary across ethnicity. If this were the case, using a higher cut-off point would show smaller ethnic differences in problem perception. However, even at higher cut-off point (> P95), or when using ethnic-specific cut-off points ethnic variations in problem perception were not smaller. Second, the definition of what constitutes a problem may vary by ethnicity. For this explanation, the degree of disturbance is not relevant, but the nature of the behaviour is. The same behaviour may be interpreted differently across cultures [34]. Third, parents in ethnic minority groups may feel afraid or ashamed to share their worries with outsiders or may fear negative consequences for their child or stigmatization [35]. Finally, familiarity with the Dutch way of monitoring, measuring and organizing care for children with problem behaviour may vary by migration factors. For example, Moroccan and Turkish migrants (parents) have to bridge a wider gap in terms of mastering Dutch language and habits, than migrants from former Dutch colonies. To fully understand the underlying mechanisms that affect these ethnic differences in parental problem perception qualitative research can be very valuable. Qualitative research can help bridge the gap between scientific evidence and clinical practice [36]. Furthermore, investigating whether the lower parental problem perception of children from ethnic minority groups is a reason for less mental health care use in these groups and/or if ethnic and rater differences in problem perception and perceived need for care play a role in referral decisions by child health professionals would be very valuable. However, such research must be conducted prospectively in children who have not received care yet.

The findings of this study are subject to some limitations. First, cultural differences could account for different responding to the questionnaire, and therefore could have biased our results. Questionnaires were translated into Turkish and Arabic, but we did not provide any further interpretation services. Second, a drawback of using country of birth of the parents as an indicator for ethnicity is that we were not able to indentify the third generation migrant children; they were now categorized as Dutch. Third, the analyses were executed on cross-sectional data and we could not relate problem perception and perceived need to referral of the children by a Child Health Professional (CHP). Fourth, the adjustment for socio-economic characteristics was based on data of income level of 2003 and home appraisal from 1999. In absolute terms these will have changed, yet we expect that the ranking changed less. This is supported by significant correlations with current educational level of the parents: $R = .35$ for home appraisal and $R = .31$ for income level, $p < 0.01$. Fifth, since there was selective non-response in both teachers and parents there could have been an underestimation of parental problem perception and

perceived need and an overestimation of teachers' problem perception and perceived need in ethnic minority groups. Last, we did not know the ethnic background of the teachers. However, since 86% of the teachers in the Rotterdam-Rijnmond area in the school year 2008-2009 had a Dutch ethnicity [37], bias by ethnic background of teachers may have existed but probably affected the results for all ethnic groups in a similar way.

Despite its limitations, the present study contributes to the growing body of evidence suggesting that ethnic differences in the determinants of help-seeking behaviour exist. The low level of problem perception in non-Dutch parents may lead to their children receiving less professional care than Dutch children. Although early screening by a CHP in children is routine in the Dutch preventive health care system, parents can be regarded as the main gatekeepers for access to professional care for emotional and behavioural problems [38]. Parental problem perception is a strong predictor of service use [21] and without it, it is very unlikely that the CHP will refer the child to specialist mental health services. Teachers may therefore, also play an important role in help seeking, as CHPs can ask them to share their visions with the parents. It is important to have good communication between teachers and parents and for CHPs to have the teacher's vision on problem perception and perceived need, which correlated strongly with SDQ score, when discussing the high SDQ score in a screening setting. Using only parental problem perception and perceived need may lead to underestimation of the impact of the child's problems and his/her need for care. Therefore, child health professionals should be aware of these ethnic differences and rater differences in problem perception and perceived need for professional care when assessing the the need for referral in ethnic minority children.

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7 Ethnic Differences in Problem Perception and Perceived Need as Determinants of Referral in Young Children with Problem Behaviour

Floor Bevaart, Cathelijne Mieloo, Marianne Donker, Wilma Jansen, Hein Raat, Frank Verhulst, Floor van Oort

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ABSTRACT

Background

An underrepresentation of ethnic minority children in mental health care settings is consistently reported. Parents of ethnic minority children are, however, less likely to perceive problem behaviour in their children. Our hypothesis was that, as a result of ethnic differences in problem perception, referral to care by a child health professional (CHP) would be lower for 5-6-year old (high-risk) children from ethnic minority backgrounds than for their peers from the ethnic majority (Dutch origin).

Methods

For 10,951 children in grade two of elementary school, parents and/or teachers completed the Strengths and Difficulties Questionnaire (SDQ) as well as questions on problem perception (PP) and perceived need for professional care (PN). Referral information was obtained from the Electronic Child Records (ECR) for 1,034 of these children. These children had a high (>90th percentile) SDQ score, and were not receiving mental health care.

Results

CHPs referred 144 children (14%) during the routine health assessments. A lower problem perception was reported by parents of ethnic minority children (40-72%) than by parents of the ethnic majority group (80%; $p<0.001$), but there were no ethnic differences in referral (OR range 0.9 to 1.9;$p>0.05$). No ethnic differences were found for parental PN, nor for teacher's PP or PN.

Conclusions

Despite a lower problem perception in ethnic minority parents when compared to ethnic majority parents, no ethnic differences were found in referral of children with problem behaviour in a preventive health care setting.

INTRODUCTION

The prevalence of emotional and behavioural problems as reported by parents and teachers in young children is high [1]. Early detection and treatment of these problems in childhood leads to benefits regarding development, well-being and health [2, 3]. However, research describing the help-seeking process in children with emotional or behavioural problems suggests that children from ethnic minority groups with emotional and behavioural problems less often use professional services than ethnic majority children [4-6]. For example, ethnic minority children in the Netherlands (aged 5-11 years old) less often receive treatment for emotional and behavioural problems than ethnic majority children, after adjusting for level of problem behaviour [6]. Determinants of referral should be studied to explain these ethnic differences in care use,. Problem perception and perceived need for professional care are important determinants of referral and service use and differ by ethnicity [7-10]. For example, at equally high rates of problem behavior, ethnic minority parents less often perceive problems in their children than ethnic majority parents [7]. However, if and how ethnic differences in problem perception and perceived need for care influence referral decisions in professionals remains unclear.

Models that describe help-seeking pathways, such as the 'Levels and Filters model' by Goldberg and Huxley (1980, 1992), consider help-seeking as a stage-like process [11-13]. For young children, parental problem recognition is usually considered the first filter of the help-seeking process. This filter is followed by problem recognition and referral by a professional. Logan and King (2001) proposed that the 'problem recognition' level of the Level and Filters model should consist of several stages, among which the initial acknowledgment of a child's distress and the recognition that the problem is psychological and severe enough to merit professional attention [14]. These stages are comparable to the concepts of problem perception and perceived need for professional care that we use in this study. Beside parental problem perception and perceived need for care, teachers' perception of problems and need for care are important predictors of referral and care use in children [15, 16]. It is important to include perceptions of both parents and teachers, as the assessment of problem behaviour in different ethnic groups depends upon the informant used [10, 17]. These inter-rater differences can reflect perceptual bias [18] as well as actual differences in the problem behaviour of children across settings [19].

In light of the comparatively lower problem perception in ethnic minority parents, it is especially important to investigate the influence of ethnic differences in problem recognition on referral [7]. The recognition of problems in children by a child health professional (CHP) seems to depend largely on parental problem recognition. For example in the United Kingdom, parental problem perception and expression of concern during

a consultation with a CHP increased the sensitivity of problem recognition in the CHP from 26% to 88% [20]. In the Netherlands, ethnic minority children, whose parents reported problems in the deviant range of the Child Behavior Checklist [21], were less often identified by a CHP as suffering a problem than ethnic majority children [22]. However, earlier research does neither provide a clear picture on the number of children that are referred following problem identification by a CHP, nor on whether ethnic differences in problem recognition by parents and teachers influence referral decisions. Referral may be lower for ethnic minority children than for ethnic majority children if ethnic minority parents - as a result of a low problem perception - do not discuss problems with the CHP.

Therefore, in this study we investigated the influence of ethnic differences in problem perception and perceived need on referral by a CHP in a preventive care setting in the Netherlands. In countries where preventive health screening is used, such as the Netherlands, more than 90% of all children, accompanied by their parents, regularly consult a CHP (a pediatrician or nurse working in the preventive child health care) for a mental and physical check-up during a 'routine health assessment' [23]. The main aim of this study was to investigate if ethnic differences in referral by a CHP already occur at a very young age. We studied this in a large group of 5-6 year old children, which belong to the largest ethnic groups in the Netherlands (Dutch, Moroccan, Turkish, Antillean, Surinamese or other ethnic background), and reported a high score on the Strengths and Difficulties Questionnaire (SDQ). As problem perception [7] as well as problem identification by CHPs [22] and professional care use [6] are lower for ethnic minority children than for Dutch children, we hypothesised that ethnic minority children in this high risk group would be referred less often than ethnic majority children. A pre-requisite for the hypothesis is that problem perception and perceived need for care positively associate with referral. This has never been confirmed for a preventive care setting, in which not only parents who actively seek help for their child, but all parents are seen.

METHODS

Setting

The Dutch preventive care system offers publicly funded preventive programs for all children from birth to 19 years. As part of this system, more than 90% of all children undergo 3 to 4 routine health assessments by a CHP during their school careers; the first in grade two of primary school (mean age: 5-6 years). Screening questionnaires, including the Strengths and Difficulties Questionnaire (SDQ), are used to identify children with emotional and/or behavioural problems before the appointment with the CHP. The CHP can give parents of children with problem behaviour advice or reassurance, the CHP can make a new appointment with the parents and the child for further diagnosis and/

or counselling, or the CHP can refer these children to professional care. Children can be referred to preventive care (for example to enhance parenting skills), to specialized youth social work or child protective services, to the child mental health system or to other sources of care (e.g. care provided by school). Child mental health services in the Netherlands provide psychiatric diagnostic assessment, out-patient and in-patient treatment.

In this study, referral was defined as actual referral of the child or a new appointment with the CHP after the routine health assessment for more in-depth diagnostic assessment and/or counselling for the problem behaviour. The referral decisions were recorded by CHPs in Electronic Child Records (ECR). The ECR is a digital medical record that follows the child from birth until he/she is 19 years of age. It is used in the Dutch preventive care system to monitor the development of children.

Subjects

In the school year 2008-2009, from a total of 11,987 children enrolled in grade two (5-6 years old) of 94% of all mainstream elementary schools in the Rotterdam-Rijnmond area, 10,951 (91%) children were screened with the Strengths and Difficulties Questionnaire (SDQ). The flowchart in figure 1 shows the sampling process. In total 8,114 (68%) parents and 9,397 (78%) teachers filled out the questionnaire, of which 1,559 children had a high SDQ total difficulties score reported by parent, teacher or both. For this study we aimed to select the children with the upper 10% SDQ scores (>P90). This cut-off reflects children with both clinical and subclinical levels of problem behaviour [24]. As no Dutch norm data for parents and teachers were available for this age group, the P90 cut-off point was based on British and American norm data (sdqinfo.org) Dutch norm data for 7-12-year-old children [25, 26] and on a pilot study among children eligible for the preventive health assessment in grade 2 at elementary school in the Rotterdam-Rijnmond area (n=145). We set the P90 cut-off point for teacher report at 13 and for parent report at 14. In the final sample with teacher-report (n=9,397) the cut-off of 13 corresponded with the 90.8th percentile, and a total of 863 children had a high SDQ total difficulties score reported by their teacher. In the final sample with parent-report (n=8,114), the cut-off of 14 corresponded with the 90.0th percentile, and a total of 850 children had a high SDQ total difficulties score reported by their parents.

In the group of 1,559 children with a high SDQ score, parental consent for linkage with the ECR was refused for 34 children (3%), and 282 children (18%) could not be linked to the ECR for various reasons, among which: the SDQ was completed after the routine health assessment, children moved outside the Rotterdam-Rijnmond area, or children missed required identifiers (unique child codes) for the linkage. Children in treatment for emotional and/or behavioural problems at the moment of screening were also excluded from the analyses (n=209). In total, data on referral by CHPs was available for

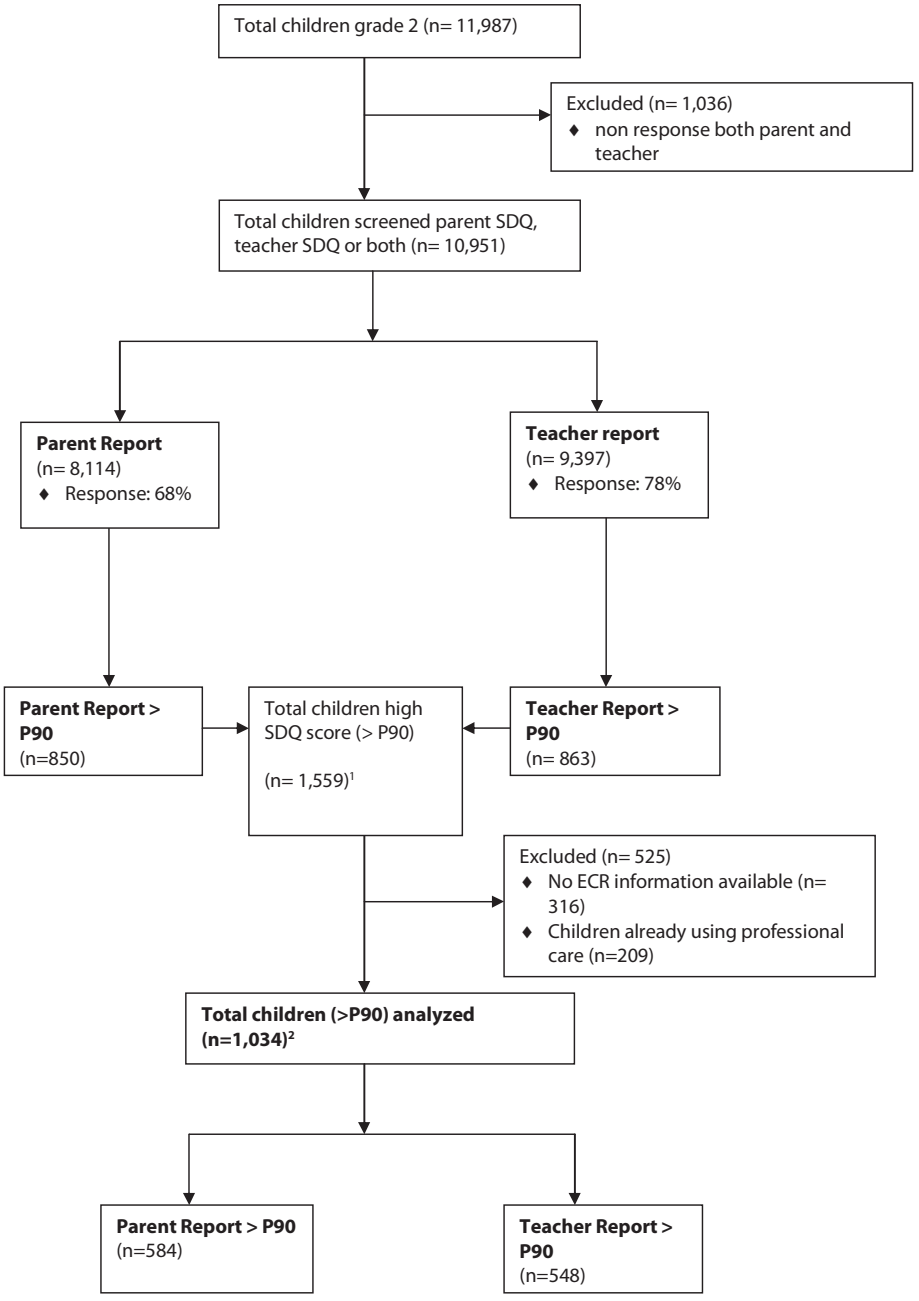

Figure 1 Flowchart of the sampling process
[1]: 154 both >P90 parent-and teacher report
[2]: 98 both >P90 teacher-and parent report

1,034 (77%) of the 1,350 children not in treatment. Of these 1,034 children, 584 children had a high score on the SDQ according to parent report, 548 children had a high score according to teacher report and 98 children had a high SDQ score according to both parent and teacher report. Note that not for all children both parent and teacher reports were available. As we previously reported, there was an overrepresentation of ethnic minority children in the screen positive (>P90) group [7]; 14% of Surinamese children, 19% Antillean, 17% Turkish, 13% Moroccan children in comparison with 9% of Dutch children.

The group of children with and the group without ECR information did not differ significantly from each other on the measures used in this study, except for teacher's perceived need. Teachers in the group of children with ECR information had a significant lower perceived need (57% versus 69%, p=0.007) than teachers in the group without ECR information available.

The study protocol was approved by the Medical-Ethical Committee of the Erasmus Medical Center of Rotterdam. All parents and teachers included in the study gave informed consent for the use of ECR information.

Measures

A child was classified as ethnic Dutch, Surinamese, Antillean, Turkish, Moroccan or other, based on the country of birth of the child or at least one of his/her parents [27]. If the country of birth of one of the parents was outside the Netherlands, the child was classified as non-Dutch [27].

The ECR provided information about referral decisions made by CHPs. The ECR data were linked to the children with high SDQ scores using unique child codes. Anonymity of the subjects was adequately protected, since these unique codes are not traceable to individual patients.

Parents and teachers completed the Dutch, Arabic or Turkish version of the Strengths and Difficulties Questionnaire (SDQ). The SDQ is a reliable and valid 25-item screening measure to identify 3-17 year-old children with emotional and behavioural problems [28-31]. The SDQ measures conduct problems, inattention-hyperactivity, emotional problems, peer problems and prosocial behaviour and measures the impact of the problems. The SDQ total score was used as an indicator of severity of problems in the analyses.

To measure problem perception the first impact question of the SDQ [28] was used: '*Do you think the child has a problem on one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other people?*'. This question was scored on a 4-point scale, ranging from (1) no problems to (4) yes, severe problems. The item was recoded as yes (little to severe problems) or no (no problems). Perceived need for care was measured with the question: '*Do you think the child needs professional help in*

one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other people?'. This question could be answered with yes or no.

Indicators of socio-economic position (SEP) were parental level of education and average neighbourhood family income. Average neighbourhood family income based on the six-digit postal code system as used in the Netherlands, was obtained from Statistics Netherlands (CBS, 2004). Family income was classified in three groups: low, middle and high. A low family income was defined as equal as or lower than the established minimum income in the Netherlands (<€1,401). A high family income was defined as equal as or higher than the established modal income in the Netherlands (>€ 2,508). Parental educational level ranged from 1. A low education was defined as no education at all, or only elementary school. A high education was defined as higher vocational education or university degree.

Current mental health care use for emotional and behavioural problems was assessed with the following question in the parent questionnaire: 'Does the child receive professional care for problems in one or more of the following areas: emotions, concentration, behaviour or the ability to get along with other people?'. Children who received professional care at the moment of screening were excluded from analyses.

Data analyses

We examined differences in referral by ethnicity, SEP and severity of the problems using ANOVA or χ^2 tests. In all subsequent analyses, data were analysed separately for children who scored >p90 on the SDQ according to their parents, and for children who scored >p90 according to their teachers. First, we analysed ethnic differences in referral with multivariate logistic regression analyses. Second, we analysed referral by problem perception and perceived need for care and the interaction between ethnicity and problem perception. Two models were run for each of the research questions, the first including gender and the dependent variables of interest and the second additionally including parental education level and family income (SEP) and SDQ total score. In the analyses on teacher reports we only included family income as SEP indicator, as for 33% no parent reports were available to provide data on parental education. A significance level of ≤ .05 was used for all analyses. For teacher data we adjusted for clustering by using multilevel logistic regression.

Finally, we conducted additional analyses, intended as sensitivity analyses. We repeated the analyses with a stricter definition of problem perception (i.e. only reports of severe and definite problems were coded as a problem perception) for all ethnic groups. These analyses show whether our results depend on a-priori, arbitrary choices for the definition of problem perception.

To account for missing values we used multiple imputation based on twenty imputed data sets ('multiple imputation' procedure in SPSS 17.0). The data were imputed for

general characteristics (age, ethnicity, current care use and gender), socio-economic indicators and not for SDQ variables or for ECR data. Statistical analyses were performed using Statistical Package of Social Sciences, version 17.0 for Windows (SPSS Inc, Chicago, IL, USA). Multilevel analyses on teacher-reported data were performed using Mplus 6.11 [32].

RESULTS

Table 1 shows the general characteristics of the study sample (N=1,034) by referral. Mean age of the children was 5.5 years and 62% were male. In the group of children with a high parent SDQ score (n=584), referral rate was 15.2% and in the group children with a high teacher SDQ score (n=548), the referral rate was 14.1%. There were no socio-economic differences in referral. Further, the mean SDQ score of the parents and teachers were similar in the referred group and the non-referred group. More boys (16%) were referred than girls (11%), ($\chi^2(1)=5.2$, p=*0.02)*.

For children with a high SDQ score according to parental report (N=584), 60% of the parents had a problem perception (of whom 59% minor difficulties, 32% definite difficulties, and 9% severe difficulties) and 22% reported a perceived need for professional care. Table 2 shows that problem perception differed across ethnic groups: 80% for Dutch parents, 73% for Surinamese parents, 50% for Antillean parents, 43% for Moroccan parents, 40% for Turkish parents, and 50% for parents from another ethnic origin (χ^2 (5)=*71.5*, p<*0.001)*. No ethnic differences in problem perception were found when a stricter definition of problem perception was used (Table 2). Perceived need did not differ across ethnic groups ($\chi^2(5)=2.3$, p=0.81*)*. For children with a high score according to the teacher report (N=548), 89% of the teachers had a corresponding problem perception (of whom 33% minor difficulties, 52% definite difficulties, and 15 % severe difficulties) and 53% reported a perceived need for care, with no ethnic differences (Table 2).

Problem perception and perceived need for care reported by parents were related to higher referral rates (Table 3). When problem perception was defined more strictly it was also related to higher referral rates in parents (OR:2.09;CI:1.2-3.6). 18% of the children whom their parents perceived minor, severe of definite problems were referred after the routine health assessment; 14% of the children whom their teachers perceived problems were referred. When problem perception was defined more strictly 24% of the children with problems according to their parents were referred and 16% of the children with problems according to teacher. Similarly, higher perceived need for care by teachers was related to higher referral rates (Table 3). Interactions of ethnicity with PP and PN were not significant (all p-values >0.15). Although, problem perception was lower in ethnic minority parents, there were no ethnic differences in referral.

Table 1 Characteristics of the study population by referral (n=1,034)

General characteristics	**N**	**Referral *(%/SE)***	**p-value***
Gender[1]			
- Boy	638	101 *(15.8)*	**0.02**
- Girl	396	42 *(10.6)*	
Age[2]	1,034	5.5 (0.17)	**0.29**
Ethnicity[1]			
- Dutch	372	46 *(12.4)*	**0.52**
- Surinamese	101	16 *(15.8)*	
- Antillean	74	9 *(12.2)*	
- Turkish	159	29 (*18.2)*	
- Moroccan	137	17 *(12.4)*	
- Other	191	28 *(14.7)*	
Socio economic indicators (SEP)			
Income[2] (euro)			
Continuous	1,034	1785.9 (64.66)	**0.39**
High (> €2508)	162	18 *(11.1)*	
Middle (€1401-€2508)	534	73 *(13.7)*	
Low (< €1401)	338	53 *(15.7)*	
Education[1]			
-high	113	19 *(16.8)*	**0.53**
-middle 2	272	41 *(15.1)*	
-middle 1	339	44 *(13.0)*	
-low	310	40 *(12.9)*	
SDQ score parents[2]	584	17.3 (0.34)	**0.24**
SDQ score teachers[2]	548	16.9 (0.45)	**0.06**

*: P-value for differences between referred vs. non referred groups [1]: percentage [2]: mean (SE)
Note: all children have a high SDQ total score (above > P90) according to parent, teacher or both

Table 4 (upper panel) shows referral by ethnicity for children with a high SDQ score according to parental report. Compared with Dutch children, Turkish children were more referred. This difference was borderline significant after adjustment for confounders (OR:1.9;CI:0.9-3.7). In the group of children with a high SDQ score according to teacher report, there were no ethnic differences in referral (Table 4, lower panel).

DISCUSSION

Despite a lower problem perception in ethnic minority parents when compared to ethnic majority parents, this study found no ethnic differences in referral of 5-6 year old

Table 2 Problem perception and perceived need for care by ethnicity for children with high SDQ scores (>P90)

Parent >P90 (n=584)	**N**	**Mean SDQ score**	**Problem perception* (%)**	**Severe problem perception** (%)**	**Perceived need for care (%)**
Dutch	219	16.6	175 (79.9)	67 (30.6)	53 (24.2)
Surinamese	44	17.4	32 (72.7)	10 (22.7)	8 (18.2)
Antillean	40	16.4	20 (50.0)	7 (17.5)	9 (22.5)
Turkish	92	16.9	37 (40.2)	19 (20.7)	23 (25.0)
Moroccan	74	16.4	32 (43.2)	16 (21.6)	15 (20.3)
Other	115	16.9	57 (49.7)	25 (21.7)	24 (20.7)
	p-value	**0.30**	**<0.001**	**0.18**	**0.81**
Teacher >P90 (n=548)	**N**				
Dutch	188	16.0	167 (88.8)	105 (55.9)	94 (50.0)
Surinamese	66	16.0	58 (87.9)	43 (65.2)	39 (59.1)
Antillean	41	16.0	37 (90.2)	21 (51.2)	22 (53.6)
Turkish	87	16.3	73 (83.9)	51 (58.6)	44 (50.5)
Moroccan	72	15.8	66 (91.7)	42 (58.3)	36 (50.0)
Other	94	17.1	87 (92.6)	65 (69.1)	56 (59.6)
	p-value	**0.06**	**0.48**	**0.17**	**0.43**

* Problem perception is defined as minor, severe or definite problems reported by parent/teacher

** Problem perception is defined as severe or definite problems reported by parent/teacher

children with emotional and behavioural problems in a preventive health care setting. Parental problem recognition was positively associated with referral. Perceived need of teachers was also positively associated with referral.

As hypothesised, problem perception and perceived need for professional care are important predictors of referral in a monitoring setting. However, contrary to our expectations, low parental problem perception in ethnic minority groups did not lead to less referral. In the Netherlands, earlier studies by Brugman et al. (2001) and Crone et al. (2010) showed ethnic minority status to be unrelated to problem identification and referral by a CHP during a routine health assessment among older children (5-15 years) of the general population. Yet, when children were preselected based on a high score (>p90) on the Child Behavior Checklist (CBCL), problem identification by a CHP during a routine health assessment was less likely among children of economic immigrant parents than among children of ethnic majority parents [22]. However, problem identification by a CHP is different from referral by a CHP, since not all children identified will be referred. Therefore, problem identification in CHPs may be influenced by ethnic

Table 3 Associations between referral, problem perception and perceived need for children with high SDQ scores (>P90)

	N **Referral (%)**	**OR 1** *(95% C.I.)* (+ gender)*	**OR 2** *(95% C.I.)* (+ SEP & severity)
Parent > P90 (n=584)			
No problem perception	26 (11.2)	1.0	1.0
Problem perception	64 (18.0)	**1.7 (1.0-2.9)**	**1.9 (1.1-3.6)**
p-value[1]	*0.02*		
No perceived need	60 (13.3)	1.0	1.0
Perceived need	29 (22.3)	**1.8 (1.1-3.1)**	1.7 (0.9-3.0)
p-value[1]	*0.01*		
Teacher > P90 (n=548)			
No problem perception	6 (10.5)	1.0	1.0
Problem perception	70 (14.4)	1.4 (0.5-3.8)	1.2 (0.4-3.5)
p-value[1]	*0.37*		
No perceived need	21 (8.3)	1.0	1.0
Perceived need	55 (18.8)	**2.5 (1.4-4.4)**	**2.4 (1.3-4.3)**
p-value[1]	*< 0.001*		

Boldface type indicates statistically significant results at P<.05 [1]: P-value for difference between referred vs non referred groups
OR 1 parents/teachers: odds ratios adjusted for **gender**
OR 2 parents: adjusted odds ratio for gender + **SEP**+ **severity characteristics** (parental educational level, family income and SDQ total score) **+ ethnicity**
OR 2 teacher: adjusted odds ratio for gender + **SEP**+ **severity characteristics** (family income and teacher SDQ total score) **+ ethnicity**

differences in parental problem perception, whereas referral is not. When investigating determinants of help seeking for young children, future studies should differentiate between problem identification and referral by a professional. Furthermore, in most literature on the help-seeking process, no clear distinction is made between referral to and of use of professional care [33]. Studies examining professional care use/referral in different ethnic groups report mixed findings regarding the underrepresentation of ethnic minority children in professional care across countries [34]. However, in the Netherlands, ethnic minority children less often receive treatment for emotional and behavioural problems than ethnic majority children [6], whereas we found no ethnic differences in referral of children with problem behaviour. This means that following referral barriers to receiving care may exist. Many children do not access the recommended mental health services within six months after referral [35]. Ethnic differences in other barriers to access to care, such as scheduling and waiting lists, may explain the lower service use as reported in ethnic minority children [6].

Table 4 Associations between referral and ethnicity for children with high SDQ scores (>P90)

	N Referral (%)	OR 1 (+ gender)*	OR 2 (+SEP+ severity)
Parent > P90 (n=584)		**(95% C.I.)**	
Dutch	29 (13.4)	1.0	1.0
Surinamese	8 (18.1)	1.4 (0.6-3.3)	1.3 (0.5-3.2)
Antillean	4 (10.0)	0.7 (0.2-2.2)	0.7 (0.2-2.3)
Turkish	21 (22.8)	**2.0 (1.1-3.7)**	1.9 (0.9-3.7)
Moroccan	9 (12.1)	1.0 (0.4-2.2)	0.9 (0.4-2.2)
Other	18 (15.7)	1.3 (0.7-2.4)	1.2 (0.6-2.3)
p-value[1]	*0.26*		
Teacher > P90 (n=549)			
Dutch	25 (13.5)	1.0	1.0
Surinamese	11 (17.3)	1.3 (0.6-3.1)	1.3 (0.5-3.2)
Antillean	7 (15.9)	1.2 (0.4-3.6)	1.2 (0.4-3.4)
Turkish	12 (13.2)	1.0 (0.4-2.3)	1.0 (0.4-2.3)
Moroccan	9 (12.4)	0.9 (0.3-2.3)	0.9 (0.3-2.5)
Other	13 (15.7)	0.9 (0.4-2.3)	0.9 (0.3-2.2)
p-value[1]	*0.38*		

Boldface type indicates statistically significant results at P<.05 [1]: P-value for difference between ethnic groups

OR 1 parents/teachers: odds ratios adjusted for **gender**

OR 2 parents: adjusted odds ratio for gender + **SEP + severity characteristics** (parental educational level, family income and SDQ total score) OR 2: teachers: adjusted odds ratio for gender + **SEP + severity characteristics** (family income and teachers SDQ total score)

Another plausible explanation for the finding that problem perception did not influence referral was the low referral rates in all ethnic groups; only 15% in the group of children with a high teacher SDQ score were referred and only 14% in the group of children with a high parent SDQ score. Recently, public debates have focused on the low (specialist) care use in children worldwide; this phenomenon has often been described in literature [33, 34]. The low referral rate in preventive care which we found in this study, may offer an explanation for this low service use, although other sources of referral (e.g. the general practitioner) are available for this age group. Furthermore, we need to bear in mind that parents and teachers do not perceive all emotional and behavioural problems in children as problematic or consider these a reason for need for care, as clearly demonstrated by our study. Even when a more conservative definition of problem perception was used, in which only report of severe problems by parents and teachers was considered as problem perception, referral rates were still low. It was therefore more surprising that the correspondence between perceived need for professional care and referral was not very strong; only 22% of the children whom parents reported

a need for professional care were actually referred. This may mean there is a large group of children in which their parents experience unmet need for care. However, we do not know if parents actually expressed their need for care during the health assessment and how urgent this need for professional care still was at the time of the routine health assessment. While CHPs had access to the SDQ scores and the additional information concerning parental problem perception and perceived need for professional care, we have no report of the actual conversation between them and the parents about potential referral of the child. Studies in the United States showed that there are many parents with concerns about their child's behaviour, who nevertheless refrain from discussing their concerns with professionals [36, 37]. The reasons for parental non-disclosure can be diverse. For example, parents may perceive a stigma of mental health problems, they may fear being blamed for their child's behaviour or they may be skeptic about the ability of mental health care providers to treat problems effectively [38]. Another reason for the weak connection between perceived need and referral may be that the problems of the child became less severe or less disturbing for parents and/or teachers during the period between assessing the problems with the SDQ and the health assessment. Mean time between completing the SDQ and the visit to the CHP was 14 weeks (SD: 19.4).

In summary, since no ethnic differences in referral by a professional were found, future research should strive to discover where in the other stages of the help-seeking process the ethnic differences in care use originate. Furthermore, future research should seek to understand if the low referral rate in young children with emotional and behavioural problems leads to unmet need for care.

The findings of this study are subject to some limitations. First, this study did not provide data on the monitoring process after the routine health assessment. Second, a drawback of using country of birth of the parents as an indicator for ethnicity is that we were not able to identify the third generation migrant children; they were now categorized as Dutch. Third, there existed no systematic record of conversations between parents and CHPs during the routine health assessment. Therefore, it remains unknown whether and how exactly the problem behaviour of children was discussed. Unfortunately, it was not possible to include a measure of functional impairment in the analyses, which could have offered some indication of the likelihood of parents discussing the problems with the CHP. Finally, cultural differences could account for different responses to the questions about problem perception and perceived need for care. The definition of what constitutes a problem may differ across ethnicity. The same behaviour may be interpreted differently across cultures [39]. Questionnaires were translated into Turkish and Arabic, but we did not provide any further interpretation services.

Conclusion

In the past two decades, there has been an increasing awareness of the importance of early identification of emotional and/or behavioural problems [40]. This resulted in several initiatives and interventions aimed at improving identification in preventive health care systems. The effectiveness of preventive services, however, will be determined by their ability to reach those children most in need of services. Our study showed no ethnic differences in referral in a group of 5-6 year old children with problem behaviour. However, only a small percentage of children in whom parents and/or teachers reported perceived need for professional care, was referred to professional care. Therefore, future research should focus on other determinants of referral besides problem recognition. It is important that we find ways to determine which children are really in need of professional care and to find out whether unmet need for care already exists among very young children.

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Part III

HEALTH CARE USE

8 Ethnicity, Socioeconomic Position and Severity of Problems as Predictors of Mental Health Care Use in 5 to 8 Year Old Children with Problem Behaviour

Floor Bevaart & Cathelijne Mieloo, André Wierdsma, Marianne Donker, Wilma Jansen, Hein Raat, Frank Verhulst, Floor van Oort

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F. Bevaart and C.L. Mieloo are both first co-authors

SDQ

ABSTRACT

Background

Empirical research on mental health care use and its determinants in young school-aged children is still scarce. In this study, we investigated the role of ethnicity, socioeconomic position (SEP) and perceived severity by both parents and teachers on mental health care use in 5-8 year old children with emotional and/or behavioural problems.

Methods

Data from 1,269 children with a high score (>P90) on the Strengths and Difficulties Questionnaire (SDQ) in the school year 2008-2009, were linked to psychiatric case register data over the years 2010-2011. Cox proportional hazards models were used to predict mental health care use from ethnicity, SEP and perceived severity of the child's problems.

Results

During the follow-up period 117 children with high SDQ scores (9.2%) had used mental health care for the first time. Ethnic minority children were less likely to receive care than Dutch children (HR Moroccan/Turkish: 0.26; 95% CI: 0.13-0.54, HR other ethnicity: 0.26; 95% CI: 0.12-0.58). No socioeconomic differences were found. After correction for previous care use, ethnicity and parental perceived severity, impact score as reported by teachers was significantly associated with mental health care use (HR: 1.58; 95% CI: 1.01-2.46).

Conclusions

Ethnicity is an important predictor of mental health care use in young children. Already in the youngest school-aged children, ethnic differences in the use of mental health care are present. A distinct predictor of care use in this age group is severity of emotional and behavioural problems as perceived by teachers. Therefore, teachers may be especially helpful in the process of identifying young children who need specialist mental health care.

INTRODUCTION

Detection and treatment of emotional and behavioural problems at an early age is becoming more and more important [1], especially since we know that these problems can influence children's daily lives negatively [2] and tend to be persistent if left untreated [3, 4]. Therefore, the development of empirically informed public policies with regard to a proper response to such problems in young children is a priority on the global health agenda [5, 6]. One way of treating emotional and behavioural problems in young children is through offering specialist mental health care. However, research on exact rates and characteristics of mental health care use in the youngest school-aged children (5-8 years old) is still scarce.

Rates of mental health care use in children differ within and across countries [7, 8], since service organisation and availability of services differ greatly [9]. In Western countries, between 5% and 21% of all children in the community have used some sort of service for mental health problems in the previous year [8]. Rates of specialist mental health treatment for children across countries are lower: up to 8% of all children have used these services [8]. Most of the large community studies on child psychopathology and care use, however, do not include the youngest school-aged children [7]. The Great Smoky Mountains study and the Methodology for Epidemiology in Children and Adolescents study (MECA), for example, both begin at age 9 [9, 10]. A rare exception is a study in the United States that described mental health care use in a nationally representative sample including 3-5 year old children as well as older children [11].

Studying the characteristics of children receiving mental health care is complex, since there are large differences in sample selection, diagnostic criteria, definition of service use and age range across studies [12]. Nevertheless, studying these characteristics is important, since differences in mental health care use across ethnicities and socioeconomic position groups have been consistently reported in older children [7, 8, 13]. A review by Flores et al. (2010) indicated lower service use and under-treatment for ADHD in ethnic minority groups [14]. Other studies examining ethnicity as predictor of service use in children, however, show both over- and underrepresentation of mental health care use in ethnic minority groups [7]. The association between gender and service use seems quite clear throughout literature: several studies indicated female gender being a strong barrier to mental health service use [15, 16]; one recent study showed that, after controlling for the number of problem areas, boys were twice as likely as girls to be in contact with a mental health care service [17]. The association between socioeconomic position (SEP) and service use is somewhat more contradictory throughout literature. Whereas some studies reported no associations with SEP [8, 18], other studies reported that low SEP was slightly associated with more service use [19-21]. Furthermore, other research indicates greatest use in middle or high socioeconomic position groups [22,

23]. These findings may reflect differences in care use and accessibility across countries [8], or may reflect methodological differences between studies, like sample size and different definitions of SEP. Finally, severity of emotional and behavioural problems is one of the most important predictors of service use [24-27]. Most studies that use questionnaires to measure emotional and behavioural problems, suggest that total symptom scores and impairment ratings are robust predictors of mental health care use [26].

Describing mental health care use and its determinants is especially important in the group of the youngest school-aged children. For these children a major milestone takes place; the transition from pre-school to elementary school. Children must accommodate to daily schedules, new adult authority, peers and academic challenges through which emotional and behavioural problems can become apparent [28]. To detect such problems in this age group, both parent and teacher report of problems are important, since inter-rater differences in level of problems are reported frequently [29, 30]. These differences may have a significant impact on the identification and treatment of mental health problems in children [29]. Inter-rater differences can reflect both perceptual bias [31], or true differences in the problem behaviour of children across settings [32]. In the Netherlands, signalling for emotional and behavioural problems is a part of the preventive care system and is based on both the parent and teacher report. Although signalling is frequently conducted in the youngest school-aged children, exact numbers on mental health care use after signalling are still lacking.

Hence, the main aim of this study was to describe specialist mental health care use in children of 5-8 years old with high scores for emotional and behavioural problems and to examine whether SEP and ethnicity were related to the likelihood of receiving mental health care. In a group of 1,269 children, with a high score (>P90) on the Strengths and Difficulties Questionnaire (SDQ) at age 5-6 years, we described service use during 24 months following signalling. The second goal of this study was to test whether both parental perceived severity of emotional and behavioural problems and perceived severity by teachers are predictive of mental health care use.

METHODS

Setting

In the Netherlands, the Dutch preventive care system is responsible for monitoring and safeguarding the development of all children, for example through identification of children with emotional and/or behavioural problems with signalling questionnaires. The Dutch preventive care system offers publicly funded preventive programs for all children from birth to 19 years. As part of this system, more than 90% of all children undergo 3 to 4 routine health assessments by a CHP during their school careers; the

first in grade two of primary school (mean age: 5-6 years). Screening questionnaires, including the Strengths and Difficulties Questionnaire (SDQ) [33-36], are used to identify children with emotional and/or behavioural problems before the appointment with the CHP. During the health assessment the CHP discusses psychosocial well-being of the child with the parents. The CHP can give parents of children with problem behaviour advice or reassurance, the CHP can make a new appointment with the parents and the child for further diagnosis and/or counselling, or the CHP can refer these children to professional care. Children can be referred to preventive care (for example to enhance parenting skills), to specialized youth social work or child protective services, to the child mental health system or to other sources of care (e.g. care provided by school). Child mental health care in the Netherlands comprises institutes for ambulatory mental health care, and psychiatric outpatient and inpatient clinics, which provide diagnostic assessment, treatment and assistance to children and their caregivers.

Subjects

In the school year 2008-2009, from a total of 11,987 children enrolled in grade two (5-6 years old) of 94% of all mainstream elementary schools in the Rotterdam-Rijnmond area, the SDQ was completed for 10,951 (91%) children. Questionnaires were distributed through schools to parents and teachers for use as a signalling tool in the preventive child health care. In total, for 8,114 (67%) children parents filled out the questionnaire and in total for 9,397 (80%) children teachers filled out the questionnaire. A total of 1,552 children had a high SDQ total difficulties score reported by parent, teacher or both. A high SDQ total score was defined as a score above the 90th percentile (>P90) in the total group of 10,951 children. This cut-off reflects children with both clinical and subclinical levels of problem behaviour [37] and is suggested by the test developers (www.sdq-info.org). The cut-off point in this population was 14 for parents and 13 for teachers.

In the group of 1,552 children with a high SDQ score, parental consent for linkage was refused for 34 children (2%) and 248 children (16%) could not be linked to the Psychiatric Case Register (PCR) for various reasons, among which: the SDQ was completed after the start of the follow-up period, children moved outside the Rotterdam-Rijnmond area, or children missed required identifiers for the linkage. In total, data on mental health care use was available for 1,269 children (82% of the target population). Non-response was higher among female children ($p=0.004$), among children living in a family composition other than both biological parents ($p=0.005$), and among children with a low severity perception according to their parents ($p<0.001$) and teachers ($p<0.001$).

Informed consent was obtained from parents in the study population. This study was approved by the Medical Ethics Committee of the Erasmus University Medical Centre Rotterdam, the Netherlands. This study was conducted according to the Declaration of Helsinki code of ethics.

Measures

Problem behaviour and severity: The Strengths and Difficulties Questionnaire (SDQ) was used to obtain standardised reports of children's problem behaviour and problem severity, as reported by parents and teachers. The SDQ is a reliable and valid 25-item measure to identify 3-16 year old children with emotional and behavioural problems [33-36]. The SDQ measures conduct problems, inattention-hyperactivity, emotional problems, peer problems and prosocial behaviour and impact of the problems. Goodman's impact supplement [38] starts with an item about perceived problems and if confirmed, it follows with items about distress, social impairment, burden and chronicity. The impact score ranges from 0-10 for parents and 0-6 for teachers. A high impact score was defined as having a score of two or higher on the impact questions [38]. SDQ total score and SDQ impact score were used as separate indicators of severity.

Demographic variables: Socioeconomic position (SEP) of the parents and ethnicity of the child were included as predictors. Gender of the child and previous use of care were included as confounders. Indicators of SEP were parental level of education and average neighbourhood family income. The level of education of the parents was classified into three levels, ranging from 1 (low) to 3 (high). A low education was defined as no education at all, or only elementary school. A high education was defined as higher vocational education or university degree. Average neighbourhood family income (further referred to as family income), based on the six-digit postal code system as used in the Netherlands, was obtained from Statistics Netherlands (CBS, 2004). Family income was classified in three groups: low, middle and high. A low family income was defined as equal as or lower than the established minimum income in the Netherlands (<€1,401 per month). A high family income was defined as equal as or higher than the established modal income in the Netherlands (>€ 2,508 per month).

A child was classified as ethnic Dutch, Surinamese, Antillean, Turkish, Moroccan or other, based on the country of birth of the child and at least one of his/her parents [39]. If the country of birth of one of the parents was outside the Netherlands, the child was classified as non-Dutch [39]. The children were divided in four groups: Dutch, Antillean/Surinamese (children from former colony migrants), Moroccan/Turkish (children from labour migrants) and children with other ethnicities. The largest ethnic minority groups living in the Netherlands migrated from Mediterranean countries, mainly Turkey and Morocco, as labour migrants since the 1960s and early 1970s. Surinamese and Antillean migrants came from South America and the Caribbean respectively, to the Netherlands during the process of decolonisation after 1975. The group containing other ethnicities is very diverse, since this group is comprised of, among others, labour migrants, refugees and knowledge migrants.

Use of mental health care: Most studies of mental health care in children use self-report of children and/or parents, which can be biased by recall problems or unwilling-

ness to report referral. Therefore, in this study data on the use of child and adolescent mental health services (CAMH) were obtained from the Psychiatric Case Register Rotterdam-Rijnmond. A psychiatric case register is a "patient-centred longitudinal record of contacts with a defined set of psychiatric services, originating from a defined population" [40]. This prevents patients from being counted more than once, while at the same time keeping track of all patient contacts over time. The Psychiatric Case Register Rotterdam-Rijnmond contains information on all mental health care services in the area: the Regional Institutes for Outpatient Mental Health Care, other outpatient services and clinics for psychiatric care, crisis intervention services, sheltered homes, day centres and (general) psychiatric hospitals. A negligible proportion of the children and adolescents in care in the Netherlands use other mental health services, e.g. mental health care programs provided by the private sector. In most cases these patients have consulted the public sector first [41].

The register data were linked to the children with high SDQ scores using the probabilistic linkage method [42], including the first two letters of the last name, date of birth, gender, country of birth, and partial postal code as identifiers. Anonymity of the subjects was adequately protected, since probabilistic record linkage is based on data that are not traceable to individual patients [42]. The case register provided information on the starting date of treatment. Information on both previous and new service use was obtained from the Psychiatric Case Register (PCR). Previous service use was defined as one or more contacts with the mental health care system before or during signalling problems with the SDQ. New service use was defined as at least one contact with a mental health care service in the follow-up period, after signalling emotional and behavioural problems. Use of mental health services was assessed for a follow-up period of 24 months after signalling. The follow-up period was defined as the length of time (days) between completing the SDQ by parents or teachers and the first contact with mental health services of the child. Mean length of the follow-up period was 696.6 days (SD: 121.2, range: 6.0-730.0). Mean age at the end of the follow-up was 7.6 years (SD: 0.6); 8% was 6 years old or younger, 64% was 7 years old, 27% was 8 years old and 1% was 9 years old.

Data analyses

Cox continuous-time proportional hazards models were used to test demographic and severity variables as predictors of mental health service use. "Survival time" was defined as the length of time (days) between completing the SDQ and the first contact with mental health services. All Cox regression analyses were adjusted for service use prior to signalling problems with the SDQ (previous service use). We applied a stepwise approach using likelihood-ratio tests to assess significant change in model deviance. Model fit was checked with observed versus expected plots assessing the proportional hazard

assumption and by testing the correlation of Schoenfeld residuals for each predictor with survival time.

A significance level of <.05 was used for all analyses. To account for missing values we used multiple imputation based on twenty imputed data sets ('multiple imputation' procedure in SPSS 17.0). In the analyses on parent reports we only included children with parental response on the questionnaire and in the analyses on teacher reports we included only children with teacher response. The data were imputed only for general characteristics and socioeconomic indicators, but not for severity indicators and mental health care use. Statistical analyses were performed using Statistical Package of Social Sciences, version 17.0 for Windows (SPSS Inc, Chicago, IL, USA).

RESULTS

Table 1 shows the characteristics of the study population. Mean age of children at baseline was 5.3 (SD: 0.5) years and 64.2% of the children were male. Mean parent SDQ score was 14.3 (SD: 5.1) and mean teacher SDQ score was 12.3 (SD: 6.3). Correlation between the parent SDQ total score and the teacher SDQ total score was low (Pearson $r = -0.38$, $p<0.001$). The minority of the children had a high impact score according to parents (20.7%), or according to teachers (31.1%). Most children in the study sample were Dutch (36.8%), had parents with a middle educational level (57.6%) and a middle income (43.6%).

In the study sample (n=1,269) 97 (7.6%) children received care before the initial signalling with the SDQ (previous care use). During the follow-up period, 117 (9.2%) children had newly entered the Psychiatric Case Register, indicating that they had at least one contact with mental health service in the region. Mean survival time was 696.61 days (SD 121.21; min. 6; max. 730).

Table 2 shows the service use by ethnicity, SEP measures and severity, adjusted only for previous service use. Child ethnicity was significantly related to new mental health care use. Mental health care use was lower in non-Dutch children than in Dutch children: 7.4% in Antillean/Surinamese children, 3.4% in Moroccan/Turkish children, 5.5% in children with other ethnicity versus 16.2% in Dutch children (HR Antillean/Surinamese: 0.39, HR Moroccan/Turkish: 0.18, HR other ethnicity: 0.30). Severity of the problems, in terms of total difficulties score and impact score, was related to a higher chance of service use (HR total score parents: 1.06, HR total score teachers: 1.05, HR impact score parents: 2.15 and HR impact score teachers: 1.85). Parental educational level and family income were not related to service use.

Table 1 Characteristics of the study population (n=1,269)

	No.	Percentage/mean (SD)
Gender of the child		
Female	454	35.8%
Male	815	64.2%
Ethnicity of the child		
Dutch	468	36.8%
Antillean/Surinamese	231	18.2%
Moroccan/Turkish	354	27.9%
Other	217	17.1%
Parental education level		
High	361	28.4%
Middle	731	57.6%
Low	176	13.9%
Family income		
Continuous		1842 (697)
High (above >€2,508)	251	19.8%
Middle (€1,401-€2,508)	554	43.6%
Low (<€1,401)	464	36.6%
Mean age of the child at start (SD)		5.3 (0.5)
Mean age of the child at end follow up (SD)		7.6 (0.6)
Mean follow up period in days (SD)		696.6 (121.2)
Parent SDQ report		
Total score (mean (SD))		14.3 (5.1)
Low	286	29.5%
High	682	70.5%
Impact score		0.82 (1.54)
Low	716	79.3%
High	187	20.7%
Teacher SDQ report		
Total score (mean)		12.3 (6.3)
Low	464	39.1%
High	722	60.9%
Impact score (mean)		1.2 (1.4)
Low	781	66.4%
High	395	31.1%
Service use in follow up period	117	9.2%
Service before start follow up	97	7.6%

Table 2 Hazard ratios between predictor variables and service use[†]

	Percentage in care	HR	95% CI	p	β	SE
Gender of the child						
Female	4.6%	1.00				
Male	11.8%	2.68*	1.67-4.30	<0.001	0.99	0.24
Ethnicity of the child						
Dutch	16.2%	1.00				
Antillean/Surinamese	7.4%	0.39*	0.22-0.69	0.001	-0.94	0.29
Moroccan/Turkish	3.4%	0.18*	0.10-0.33	<0.001	-1.73	0.32
Other	5.5%	0.30*	0.16-0.56	<0.001	-1.19	0.32
Parental education level						
High	7.5%	1.00				
Middle	10.5%	1.43	0.82-2.48	0.21	0.36	0.28
Low	7.4%	0.97	0.40-2.34	0.95	-0.03	0.45
Family income						
High (above >€2 508)	11.1%	1.00				
Middle (€1 401-€2 508)	10.3%	0.93	0.58-1.50	0.77	-0.07	0.24
Low (<€1 401)	6.9%	0.60	0.34-1.06	0.08	-0.51	0.29
Parent SDQ report						
Total score (continuous)	*NA*	1.06*	1.01-1.10	0.009	0.06	0.02
Impact score						
Low	8.9%	1.00				
High	15.5%	2.15*	1.39-3.34	0.001	0.77	0.22
Teacher SDQ report						
Total score (continuous)	*NA*	1.05*	1.01-1.08	0.005	0.04	0.02
Impact score						
Low	7.4%	1.00				
High	12.4%	1.85*	1.27-2.71	0.001	0.62	0.19

[†]: all associations are corrected for previous service use.
*: significant at p<0.05.

Table 3 shows the results of the multivariate Cox regression model. This model included child gender, previous care, child ethnicity, impact score parent or impact score teacher, total SDQ difficulties score of the parent report or total SDQ difficulties score of the teacher report. Inclusion of parental educational level, family income, and impact score of the parent SDQ and impact score of the teacher SDQ did not improve the model significantly. Child ethnicity was still significantly related to new service use. Mental health care use was lower in Moroccan/Turkish children and in children with other ethnicity than in Dutch children. Severity was related to a higher HR for service use for the total SDQ scores rated by parents and teachers.

Table 3 Hazard ratios of multivariate analyses for ethnicity, problem severity and service use corrected for gender and previous care use

	HR	95% CI	p	β	SE
Model 1† (n=899)					
Gender of the child					
Female	1.00				
Male	2.08*	1.29-3.35	0.004	0.73	0.26
Ethnicity of the child					
Dutch	1.00				
Antillean/Surinamese	0.67	0.37-1.20	0.18	-0.40	0.30
Moroccan/Turkish	0.25*	0.12-0.49	<0.001	-1.41	0.40
Other	0.31*	0.15-0.66	0.002	-1.16	0.38
Parent SDQ report					
Total score	1.04	1.00-2.31	0.07	0.04	0.02
Impact score					
Low	1.00				
High	1.50	0.97-2.31	0.11	0.40	0.25
Model 2† (n=1,088)					
Gender of the child					
Female	1.00				
Male	2.45*	1.47-4.08	0.001	0.90	0.26
Ethnicity of the child					
Dutch	1.00				
Antillean/Surinamese	0.35*	0.19-0.68	0.002	-1.04	0.33
Moroccan/Turkish	0.19*	0.10-0.36	<0.001	-1.68	0.33
Other	0.30*	0.16-0.58	<0.001	-1.21	0.34
Teacher SDQ report					
Total score	1.03	0.99-1.07	0.11	0.03	0.02
Impact score					
Low	1.00				
High	1.58*	1.01-2.46	0.04	0.46	0.23

†: Analyses corrected for: gender of the child, previous care, ethnicity of the child, impact score parent/teacher, total difficulties score parent/teacher SDQ report.
*: significant at p<0.05

DISCUSSION

To our knowledge, this study is the first to provide estimates of specialist mental health care use in a population of the youngest school-aged children, after signalling for emotional and behavioural problems through parents and teachers. Overall, the data showed that 9.2% of children with emotional and behavioural problems receive

specialist mental health care within 24 months after signalling and that ethnic minority children are underrepresented in this group. It should be emphasised, however, that the results concern numbers of children with high SDQ scores that receive *specialist* mental health care and do not reflect the total rates of *any* service use throughout the general population.

Role of ethnicity

The lower service use in Moroccan and Turkish children and in children from other ethnicities was not related to a lower socioeconomic position or to ethnic variations in the severity of the problems, whereas the lower service use in Antillean and Surinamese children was. It is possible that the migration history of these groups plays a role in these differences. Familiarity with the Dutch way of monitoring and organising care for children may vary with migration factors. For example, Moroccan and Turkish migrants (parents) have had a wider bridge to gap in terms of mastering Dutch language than migrants from former colonies. Besides migration factors, cultural factors may explain ethnic differences in service use. A plausible cultural factor is ethnic differences in care preferences, since there are indications that more ethnic differences in care use exists in specialist care, than in primary care [43]. For example, parents of ethnic minority children may prefer care outside the mental health care system, such as care provided by school or informal care, to solve the problems of their child. Such care preferences may be linked to ethnic differences in parents' attitudes about mental health care services, since these attitudes are associated with whether and which care children receive [44]. Research has suggested that ethnic minority groups have less positive expectations about child mental health services [45].

Furthermore, a clearer understanding is required about predisposing factors and barriers to service use. First of all, it is important to consider that young children are dependent on others, mostly on their parents to access mental health care, to negotiate the system, to make appointments and to pay for their treatment. Characteristics of the family such as a family history of mental illness are associated with a child's chance of receiving specialist mental health care [46]. A study by Farmer et al. (1999) showed that the psychiatric history of a child's primary parent figure was positively associated with persistence and intensity of mental health care use in children [24]. On the other hand, potential barriers can be structural constraints (e.g. lack of availability of providers, long waiting lists), barriers related to perceptions about mental health problems (e.g. parents' and/or teachers' inability to identify children's need for specialist care) and barriers related to perceptions about mental health care services (e.g. lack of trust in mental health care providers). These barriers can be more prevalent in certain ethnic groups than in others, and so lead to differences in service use. Whereas one study showed that all three types of aforementioned barriers to mental health care were relatively common

among poor urban African-American families in the United States [47], research in other ethnic groups and in other geographic areas is still scarce. More information about the role of barriers to service use in different ethnic groups can aid the development of interventions that address these (potential) barriers. It is important to know which of the suggested barriers are actually perceived as barriers, or act as barriers to service use for young children.

Role of perceived severity

Perceived severity of the problems according to the parent and teacher, were both related to the child receiving specialist mental health care. This extends earlier findings which show that severity of the symptoms perceived by parents, and to a lesser extent by teachers is strongly associated with service use [8, 48-50]. Interestingly, we showed that the SDQ total score reported by both teachers and parents was related with service use, whereas teacher reported severity in terms of impact score predicted service use in children stronger than parent reported impact. Cohen et al. (1991) reported that teachers were the professionals with whom parents most commonly discuss the problems of their child [50] and that thereby teachers can play an important role in initiating children's use of mental health services. Moreover, the Great Smoky Mountains study showed that the education sector was the most common point of entry into mental health care [51]. The association between teacher reported severity and service use we found in our study was, therefore, not entirely unexpected. This association can be important in the light of low problem perception in parents. The majority of parents of children with high problem scores for emotional and/or behavioural problems, especially ethnic minority parents, do not perceive problems [52], whereas problem perception is an important predictor of service use [53, 54]. In contrast, teachers' problem perception was much higher than that of parents, and was not related to ethnic background in the same population of young school-aged children [52]. Therefore, teachers' perception of severity of the problems can be important for identifying children that need (professional) care.

The role of teachers in helping children with emotional and behavioural problems should not be limited to detecting problems and initiating specialist care, however. Teachers can also play an important role in facilitating adequate care through school, especially for children with minor problems that do not require specialist care. Although the threshold to use mental health care for young children has lowered, many parents still prefer to seek help within a familiar context for their children; teachers, nurses and school psychologists [55]. This could be one of the reasons why approximately 90% of the children in our study did not receive specialist care. Therefore, more attention should be paid to the possibilities of school-based care and to the training of teachers to enhance their ability to identify and act upon emotional and behavioural problems in young school-aged children. School care can offer parents a low, informal way of dealing

with the problems of their child. Furthermore, school care could mitigate the need for future (specialist) intervention.

Role of socioeconomic differences

Our findings of a lack of socioeconomic differences related to mental health service use are interesting. Mental health care services in the Netherlands seem to be accessible at every socioeconomic level. The results of studies in other European countries with well-developed and easily accessible social and health services are similar to those of the present study [18, 55]. However, the absence of socioeconomic inequalities in service use cannot be generalised to other countries. Different conclusions are likely to be found in countries where the health care system is organised differently, or in countries where socioeconomic inequalities are larger than in the Netherlands.

Mental health care use in young children

The interest in early detection of emotional and behavioural problems has increased [1], since several studies have demonstrated the stability of problem behaviour from childhood to adolescence as well as into adulthood [3, 4]. Data collected in studies like this study are sometimes used by those lobbying for services for children [7]. Such mandates are mainly based on the claim that child health care professionals under-identify children with mental health care problems, in particular in ethnic minorities [56]. Indeed, only a small part of the screened-positive children received specialist care and we found lower service use in ethnic minority children than in ethnic majority children. However, we must keep in mind that the use of precise numerical estimates of rates of service contact to determine service need can obscure the fact that not all parents perceive emotional and behavioural problems in their child as a problem for which treatment is needed. A low service use in this group is not a good estimation of unmet need for care, as perceived need for care in this study is 23% by parents and 48% by teachers [52]. There will be a substantial group of children left that does not need specialist care. No care or less specialised care may be more appropriate, and sometimes preferred by parents. Therefore, we should focus on the role of other sources of care as well, since it seems unlikely and undesirable that specialised mental health care can provide care to every child [7].

Limitations

For the interpretation of our results, we must take into consideration several limitations. First, the follow-up period of 24 months could be too short to detect all children that received specialist care after signalling. Ethnic minority children may enter treatment with a greater delay than ethnic majority children, whereby we missed them. A study by Laitinen-Krispijn and colleagues (1997) showed that the predictive power of most

forms of problem behaviour on service use was as high directly after signalling as it was 5 years later [18]. Their study showed a remarkable delay between the awareness of these problems in parents and their (adolescent) children and actually receiving care. Longitudinal research is needed to examine the processes for different ethnic groups of entry into and on-going contact with specialist services. Second, the Psychiatric Case Register does not provide information on alternative sources of care outside the specialist mental health system, such as care provided by schools, general practitioners and youth welfare. The case register does not include psychiatric services provided by the private sector, either. However, the exclusion of private psychiatry or psychotherapy practices is unlikely to affect our conclusions because in the Netherlands these services form only a relatively small part of the outpatient mental health care. Third, we used the SDQ to assess emotional and behavioural problems. A high SDQ score (>P90) only indicates a possible need for care, since the SDQ discerns a spectrum of emotional and behavioural problems in children, including minor problems that do not require specialist care. The cut-off of >P90 includes both subclinical and clinical levels of problem behaviour. Finally, there was selective non-response. Non-response was higher among female children, among children living in a family composition other than both biological parents , and among children with a low severity perception according to their parents and teachers. Therefore, it is possible that these groups were underrepresented in our population. However, effect sizes were small (η^2 between 0.005 and 0.022) and analyses were corrected for these variables; we therefore expect that the selective non-reponse did not influence our outcomes.

Conclusion

Already in the youngest school-aged children (5-8 years old), ethnic differences in the use of specialist mental health care are present. These differences could not be explained by ethnic variations in socioeconomic position or in parental perceived severity. Future research should explore other underlying mechanisms that can explain the ethnic differences and investigate if the lower specialist care use in ethnic minority groups is linked to an unmet need for care. Further, since perceived severity by teachers was an important predictor of health care use, teachers may be especially helpful in advising child health professionals in the process of identifying children that need (professional) care.

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9 General Discussion

This thesis reports on the role of an early identification tool in the process of identification as well as referral of psychosocial problems in the preventive youth health care setting. This thesis starts by determining the reliability and validity of the SDQ in children in grade two of primary schools (5 to 6 year olds).

The following research questions are addressed:

1. Reliability and validity of the SDQ in 5-6 year olds
   1.1. What is the reliability and validity of the SDQ in 5-6 year old children (**chapter 2 and 3**)?
   1.2. Are there any differences in reliability and validity of the SDQ in subgroups by gender, parental education level, and ethnic background (**chapter 2 and 3**)?
   1.3. What is the discriminative power of the SDQ in 5 to 6 year old (**chapter 4**)?
2. Identification and referral by the preventive child health care
   2.1. What is the role of the SDQ total problem score and impact score on the identification of psychosocial problems and referral by the CHP (**chapter 5**)?
   2.2. Are there ethnic differences in parental and teachers' problem perception and perceived need for care in 5 to 6 year olds with psychosocial problems (**chapter 6**)?
   2.3. Are ethnic differences in parental and teachers' problem perception and perceived need for care associated with ethnic differences with regard to referral of 5 to 6 year olds with psychosocial problems by the CHP (**chapter 7**)?
3. Mental health care use
   3.1. Are ethnicity, socioeconomic position and severity of problems associated with mental health care use in 5 to 8 year old children with psychosocial problems (**chapter 8**)?

In this chapter the main findings are summarized and discussed. Furthermore, implications for further research and general practice are given.

MAIN FINDINGS

Part I Reliability and validity of the SDQ in 5-6 year olds

What is the reliability and validity of the SDQ in 5-6 year old children?

In **chapter 2 and 3** the validity and reliability of the parent and teacher reported SDQ are described in a population of 5 to 6 year old children. The results from these studies show that the validity and the reliability of both the parent and teacher reported SDQ are satisfactory. However, there are some concerns about the subscales of the SDQ.

The total difficulties score and the subscale hyperactivity/inattention problems have good psychometric properties on the parent as well as the teacher SDQ. The subscales emotional symptoms and prosocial behaviour have good properties on the teacher SDQ only. All other subscales show not as good psychometric properties especially in subgroups by ethnic background.

In more detail, the original five factor structure of the parent and teacher reported SDQ was confirmed by principal component and confirmatory factor analyses. The five factor structure was also found in other studies [1, 2]. Van Leeuwen et al. [2] also tested a three-factor solution, but this did not improve model fit. Additional analyses in our population using a three-factor solution also did not show improved model fit. Interrater agreement was acceptable for the total difficulties score and three subscales, but not for the conduct problem and prosocial behaviour scale. This is in line with research among older children [2, 3]. It is possible that for parents these behaviours are more difficult to observe and rate, because teachers see children interact more often with other children in the classroom. Another explanation is that these behaviours are more influenced by the setting (e.g. classroom versus home) or that subjective norms of parents and of teachers differ more with regard to these types of behaviour.

The internal consistency of the total difficulties score and the hyperactivity/inattention scale of the parent reported SDQ was acceptable. Internal consistency of the parent SDQ was not acceptable for the four other subscales. The internal consistency of the teacher SDQ was generally higher than of the parent SDQ, only for the scales conduct and peer problems the internal consistency was below acceptable. Our findings are comparable to studies on older children where weighted mean alphas for almost all subscales of the parent SDQ were lower than 0.7 and weighted mean alphas for the teacher SDQ on conduct problems and peer problems were lower than 0.7. [3]. Because the scales contain just five items, it should be kept in mind that scales with a small number of items are generally less reliable than scales with more items [4]. Another explanation for lower reliability of the subscales is that the items are less one- dimensional than assumed. For instance, the conduct problems scale inquires about aggressive behaviour as well as rule-breaking behaviour. For all scales except the peer problems scale, concurrent and divergent validity of the parent and teacher SDQ was acceptable and implies that, as hypothesized, the SDQ scales correlate with CBCL/TRF scales. Overall these findings are in line with other research. The concurrent validity found in this study is slightly lower than that found by Goodman et al. [5] but is similar to that found in children aged 8-16 years in the Netherlands [6] and in children aged 5-8 years in Flanders [2, 5].

Are there differences by gender or by parental education level?

Mean scores on the parent and teacher SDQ differ between subgroups by gender and parental education level. In general, mean scores in boys and children with a low

parental education level were higher than in girls and children with a middle or high parental education level, except for the prosocial behaviour scale. The outcomes of reliability and validity measures also show differences in subgroups by gender and parental education level. In more detail, the reliability and validity of the parent and teacher SDQ are better in males than females. When analyzed by parental education level, we found better internal consistency for parents with a low education level. However, differences between gender and parental education level were small and conclusions on the acceptability of the psychometric properties were the same for all subgroups (**chapter 2**). The findings in subgroups by gender are comparable to other studies [1, 2, 6-12]. As far as we know there are no other studies where differences in reliability and validity of the SDQ in subgroups by parent educational level were examined.

Are there differences according to ethnic background?

Mean total difficulties scores on the parent and teacher SDQ differ between subgroups by ethnic background. In general children of Dutch ethnic background have lower total difficulties scores than children of ethnic minority groups. There are also differences in reliability and validity of the parent and teacher reported SDQ between ethnic groups in 5 to 6 year olds. These differences appear mainly on the subscales. However, the total difficulties score of the parent and teacher SDQ is valid and reliable for all ethnic groups within the Dutch society (**Chapter 3**). Differences between ethnic groups were also found in other studies [13, 14]. It is possible that in non-western countries, certain behaviours are an expression of other emotions than in western countries or that these items are interpreted or valued differently and therefore correlate higher with items from other subscales [15, 16]. For example, in collective societies children learn to suppress the expression of anger because this is regarded as disrespectful; in individual societies, the expression of anger is seen as assertive behaviour [15]. Since we found differences in reliability and validity measures of the teacher-rated SDQ between ethnic groups, it is possible that the difference in child behaviour at home and at school is more prominent for non-Dutch children. Furthermore, it is also possible that stereotypes and biases can influence the teacher report with regard to emotional and behavioural problems in non-Dutch children [17, 18].

What is the discriminative power of the SDQ in 5 to 6 year olds?

In **chapter 4** the discriminatory power of the parent and teacher reported SDQ is described and differences by gender and ethnic background are explored. The total difficulties score of the parent and teacher SDQ shows a good discriminatory power in a total population of 5 to 6 old year children as well as for subgroups by gender and ethnic background when compared with a clinical score on the CBCL/TRF and in comparison with a clinical sample. This indicates that the total difficulties score of

the parent and teacher SDQ is suitable for screening purposes in the preventive child health care. This is in accordance with what is generally found in older age groups [3]. In general, the discriminatory power of the total difficulties score on the parent and teacher SDQ determined by using a clinical score on the CBCL/TRF as reference was slightly better in all groups than when using a clinical sample as reference. This is not very surprising. The SDQ and the CBCL/TRF both are developed to measure psychosocial problems. Therefore a high AUC was expected. The clinical sample consists of children entering in to Youth (Health) Care institutions. These children are not always entering care for their own psychosocial problems, but may also enter care due to adversities in their direct environment such as (social emotional) problems of other members of the family, domestic violence, abuse, educational or pedagogic problems. This may have contributed to the lower observed AUC in the clinical sample. The results of this study can also be used in choosing an appropriate cut off. Before choosing a cut off it is necessary to clearly state the situation and the purpose of the screening because from our results it appears that cut-offs differ between reference measures for the teacher SDQ and in subgroups by gender and ethnic background for both informants. In general cut offs, when determined by a reference measure, appear to be lower than the p90. Furthermore, cut offs appear to be lower in comparison with a clinical group than in comparison with the CBCL/TRF.

To summarise, in the first part of this thesis the reliability and validity of the SDQ were examined in a population of 5-6 year olds. The total difficulties score of the parent and teacher SDQ appears to be valid and reliable for screening in young children. The total difficulties score is valid and reliable in subgroups by gender, ethnic background and parental education level. The reliability of the subscales peer problems, prosocial behaviour and conduct problems appear to be less valid and reliable. Therefore, we recommend only using the total difficulties score for early detection purposes. Scores on subscales can only be used to give direction during the child's health assessment. These scores cannot be used on their own for early detection.

Part II Identification and referral by the preventive child health care

What is the role of the SDQ total problem score and impact score on identification of psychosocial problems and referral by the CHP?

In **chapter 5** the association between the parent and teacher reported SDQ and identification of psychosocial problems in young children and referral for these problems by the CHP are determined as well as the role of problem perception and the burden of these problems (measured by the impact score of the SDQ) in this association. A child was identified as having psychosocial problems when the CHP registered the child as at

risk for these problems in the child's electronic health record. In this study an association between the parent and teacher reported SDQ and identification and referral by the CHP was found. A high score on the parent and teacher reported SDQ is related positively to identification and referral. The impact score of the parent as well as the teacher reported SDQ plays an important role as a mediator in the relation between the SDQ total difficulties score and identification of psychosocial problems by the CHP. The impact score also plays an important role as partial mediator in the relation between the parent SDQ and referral. More so, the impact score is a complete mediator in the relation between the teacher SDQ and referral. This means that the relation between the teacher SDQ and referral can completely be explained by the impact score. Furthermore, in this study ethnic differences were found in identification and referral rates. In the group of children with a high score on the parent SDQ and a high impact score, Dutch children are more often identified as having psychosocial problems.

Are there ethnic differences in parental and teacher's problem perception and perceived need for care in 5 to 6 year olds with psychosocial problems?

In **chapter 6** ethnic differences in parental and teacher's problem perception and perceived need for care in 5 to 6 year olds with psychosocial problems were determined. This study showed that among children with high SDQ scores, problem perception was lower in non-Dutch parents than in Dutch parents. These lower rates of problem perception could not be explained by differences in socioeconomic position or severity of the problems. No ethnic differences were found in parental perceived need and in problem perception and perceived need as reported by teachers. Teachers reported higher levels of problem perception and perceived need than parents in all ethnic groups. Furthermore, perceived need was lower than problem perception in both parents and teachers, indicating that problem perception and perceived need are two different concepts. Therefore, these findings confirm that problem perception and perceived need can be treated as two separate stages in the help-seeking and recommendation model, as suggested by Logan and King [19].

Are ethnic differences in parental and teachers' problem perception and perceived need for care associated with ethnic differences with regard to referral of 5 to 6 year olds with psychosocial problems by the CHP?

In **chapter 7** the association between ethnic differences in parental and teacher's problem perception and perceived need for care and ethnic differences in referral by the CHP in a population of 5 to 6 year olds with psychosocial problems was determined. CHPs referred 144 children (14%) of the children with a high total difficulties score on the parent and/or teacher SDQ during the routine health assessments. Parental problem perception differed among ethnic groups. No ethnic differences in problem perception

were found when a stricter definition of problem perception was used. Parental problem perception was positively associated with referral. Perceived need of teachers was also positively associated with referral. Despite a lower problem perception in ethnic minority parents when compared to ethnic majority parents, no ethnic differences were found in referral of children with problem behaviour in a preventive health care setting. These findings are confirmed by earlier studies in the Netherlands [20, 21]. It is possible that only severe problem perception is related to referral. However, this was not analyzed in this study.

To summarise, in the second part of this thesis we assessed the association between the SDQ, problem perception, perceived need, and burden of the problems and identification and referral for psychosocial problems. An association between the SDQ and identification and referral by the CHP was found. A high score on the parent or teacher reported SDQ is positively related to identification and referral. Problem perception and burden of the problems, as measured by the impact score, play an important role in this association. Furthermore, among children with high SDQ scores, problem perception reported by parents of ethnic minority children and identification of psychosocial problems was lower than problem perception of parents and identification of psychosocial problems in the ethnic majority group. No ethnic differences were found in perceived need and referral. From these findings it seems that problem perception (in other words problem recognition) and perceived need (in other words deciding tot ask for help) or recommending help of the help-seeking and the recommendation model form two different stages and they are influenced by different determinants of the child.

Part III Mental health care use

In **chapter 8** we describe the use of mental health care by young children with psychosocial problems. This cohort study showed that 9.2% of the children with a high SDQ score on the parent and/teacher reported SDQ receive care within the child mental health care. A distinct predictor of care use in this age group is the severity of emotional and behavioural problems as perceived by teachers. This is in line with earlier findings which show that the severity of the symptoms perceived by parents, and to a lesser extent by teachers is strongly associated with service use [22-25]. Interestingly, we showed that the SDQ total score reported in both teachers and parents was related to service use, whereas teacher reported severity, in terms of impact score, predicted service use in children more strongly than parent reported impact. Cohen et al. (1991) reported that teachers were the professionals with whom parents most commonly discuss the problems of their child [25] and that as a result teachers can play an important role in initiating children's use of mental health services. Moreover, the Great Smoky Mountains study showed that the education sector was the most common point of entry into men-

tal health care [26]. Therefore, the association we found in our study between teacher reported severity and service use was not entirely unexpected.

Indeed, only a small part of the children with a high SDQ score received specialist mental health care and a lower service use was found in ethnic minority children than in ethnic majority children. However, only 14% of the children with a high SDQ score in this study were referred by the CHP. These referrals included also referrals to other types of care besides specialist mental health care. It must be kept in mind that not all parents perceive emotional and behavioural problems in their child as a problem for which treatment is needed. A low service use in the group with a high SDQ score is therefore not a good estimate of unmet need for care, as perceived need for care in this study is estimated at 23% by parents and 48% by teachers [27]. A substantial group of children will remain that does not need specialist care. Since specificity of the SDQ at the used cut points is not 100%, no care or less specialised care may be more appropriate, and sometimes preferred by parents.

Are ethnicity, socioeconomic position and severity of problems predictors of mental health care use in 5 to 8 year old children with psychosocial problems?

The cohort study in **chapter 8** shows that ethnicity is an important predictor of mental health care use in young children. Already in the youngest school-aged children, gender and ethnic differences are present in the use of mental health care, whereas the service use was lower in children of ethnic minority groups. There were no differences found according to socioeconomic position. Mental health care services in the Netherlands seem to be accessible to every socioeconomic level. The results of studies in other European countries with well-developed and easily accessible social and health services are similar to those of the present study [28, 29]. However, the absence of socioeconomic inequalities in service use cannot be generalised to other countries. Different conclusions are likely to be found in countries where the health care system is organised differently, or in countries where socioeconomic inequalities are larger than in the Netherlands. Gender differences can be explained by a difference in expression of problems. Boys more often show externalising problems and girls more often show internalising problems [30]. Differences in subgroups by ethnic background could be explained by less familiarity with the Dutch way of monitoring and organising care for children. For example, Moroccan and Turkish migrants (parents) have had a wider gap to bridge in terms of mastering the Dutch language than migrants from former colonies. Besides migration factors, cultural factors could also explain ethnic differences in service use. A plausible cultural factor is ethnic difference in care preferences, since there are indications that more ethnic differences in care use exist in specialist care, than in primary care [31]. For example, parents of ethnic minority children may prefer care outside the mental health care system, such as care provided by school or informal care, to solve the problems of their child. Such

care preferences may be linked to ethnic differences in the attitudes of parents towards mental health care services, since these attitudes are associated with if and which care children receive [32]. Research has suggested that ethnic minority groups have less positive expectations about child mental health services [33].

To summarise, in the third and last part of this study mental health care use in children with a non-beneficial score on a screening tool was assessed. The results showed that 9.2% of the children with a high SDQ score on the parent and/teacher reported SDQ receive at least one contact within the child mental health care. A distinct predictor of care use in this age group, in other words the step taking action in the help-seeking and recommendation spectrum, is severity of emotional and behavioural problems as perceived by teachers, ethnic background of the child, and gender. However, only a small part of the children with a high SDQ score received specialist care. It must be kept in mind that a low service use in this group is not a good estimate of unmet need for care. Also there will be a substantial group of children that does not need specialist care. No care or less specialised care may be more appropriate, and sometimes preferred by parents.

METHODOLOGICAL CONSIDERATIONS

There are some methodological considerations that need to be taken into account when interpreting the findings of the studies discussed. All studies were based on the data collected in the study 'Good screening, Good care' (in Dutch: 'Goede signalering, Goede zorg'). The studies in the first two parts of this thesis (**chapter 2 thru 7**) were based on cross sectional data. The study in the third and last part of this thesis (**chapter 8**) was based on data of a cohort.

Cross-sectional studies

The studies in the first two parts of this thesis (**chapter 2 thru 7**) were based on a cross sectional design to study the reliability and validity of the SDQ and to study associations between the SDQ score, problem perception, perceived need, and socio-demographic backgrounds and identification of problems by the CHP and referral. During cross sectional studies data can be collected on individual characteristics and the outcome, in this case the SDQ score, and identification and referral by the CHP. Cross sectional studies are often used to determine prevalence and are useful to identify associations [34]. The samples are generally taken from the whole population. With limitations due to the cross-sectional design, the results can be used for public health planning, i.e. de-

velopment of interventions, development of protocols. Also the cross-sectional design is considered efficient for generating stronger hypotheses for further research.

Cohort studies

The study in the last part of this thesis (**chapter 8**) was based on a cohort design to study if children, who were identified as having emotional and behavioural problems according to the SDQ, were receiving care within 24 months after screening. Cohort studies are designed to follow a group of individuals over a period of time. A cohort study involves measuring the occurrence of an event, in this case receiving specialist youth mental health care. Typically, a cohort comprises persons with a common characteristic, in this case a non-beneficial score on the parent and/or teacher SDQ. Cohort studies are often used to estimate a risk or incidence rate [34]. With limitations due to a cohort study, the results can be used for public health planning, i.e. development of interventions, development of protocols and is considered efficient for generating stronger hypotheses for further research. It is important to note that because cohort studies are carried out over a period of time and there is no control over events happening during this period, it is impossible to infer causality between a high SDQ score at the beginning of the study and mental health care use during the follow-up period [34].

Measurements

This study used data collected through questionnaires and patient files. In the data collected by questionnaires, misclassification could have occurred because questionnaire responses were not anonymous and were used for further care decisions, e.g. parents could have given socially desirable answers. This could have resulted in an underestimation of children with psychosocial problems according to the SDQ. It is also possible that parents who were worried about their child's behaviour, could have exaggerated the problems of the child in order to get help. This would have led to an overestimation of problems. Both situations could have led to an underestimation of significant associations between the SDQ and identification and referral found in this thesis. On the other hand, several studies have shown that differences in anonymous data collection versus non-anonymous data collection are small [35-37].

Unique in this study is the use of a clinical reference group. However, in this study there were no data available of specific diagnoses in the clinical sample. This could have attenuated the outcomes in **chapter 4**. If it was possible to distinguish between children with psychosocial problems, as the SDQ measures, and other problems for which children received care, we might have found a better discriminatory power in terms of AUC and predictive value. Then again, the discriminatory power when using a clinical population as reference was comparable to the discriminatory power when using the CBCL and TRF as reference. Therefore, we showed that the discriminatory power of the SDQ is

also suitable in a group with diverse problems. Furthermore, because specific diagnoses were not available, it was not possible to distinguish between specific problems in the clinical sample and therefore it was not possible to investigate the reliability, validity and the discriminatory power of the subscales.

Also unique in this study was the use of electronic records for data about identification, referral and mental health care use, instead of questionnaire data collected in most studies. Because of the use of electronic records our data are not influenced by memory bias. On the other hand, these systems have not been built for research purposes. Important information is often registered in text fields and therefore not always available for analyses.

Non-response

Non-response is a common problem in studies. Response rates in surveys vary considerably.

Low response rates could limit the generalizability of the results because of selection bias [34]. Furthermore, low response rates could also limit the ability to measure an accurate association. Reminders can improve the response rate in surveys [38]. Techniques such as financial incentives are associated with higher response rates [38]. Data for this study were collected as part of the preventive health check for children in grade 2 at elementary school (5-6 year olds). No specific actions were taken to encourage parents and teachers to fill out the SDQ. In addition to the SDQ, parents and teachers of a sub sample were asked to fill out the Child Behaviour Checklist (CBCL) or Teacher Report Form (TRF) for validation purposes [39] and were asked to participate in a follow-up study, including using information from the electronic child records and data of the psychiatric case registry. In this sample two reminders were sent and incentives were given. In the total population as well as in the sub sample there was some response bias. However, effect sizes were small and therefore did not influence the outcomes.

Data linkage

Parents provided questionnaire information on 67% of the children, and teachers on 80% of the children. For 60% of the children, both parent and teacher reports were available. Matching failed when parents did not give consent to the teacher, or children had incomplete or missed required identifiers (unique child code). Parents were free to refuse the participation of the teacher, this was not registered. Therefore, it is not possible to determine the percentage of refusal.

Questionnaire data and ECR data of 77% of the children could be matched (57% of parent reports and 71% of teacher reports. Matching failed when the SDQ was completed after the routine health assessment, children moved outside the Rotterdam-Rijnmond area, or children had incomplete or missing required identifiers (unique child code).

In the group of children with a high SDQ score, parental consent for linkage was refused for 2% of the children and 16% of the children could not be linked to the Psychiatric Case Register (PCR) for various reasons: among which the SDQ was completed after the start of the follow-up period, children moved outside the Rotterdam-Rijnmond area or children missed required identifiers for the linkage. In total, data on mental health care use were available for 82% of the target population. Mismatching was higher among female children (p=0.004), among children living in a family composition other than both biological parents (p=0.005) and among children with a low severity perception according to their parents (p<0.001) and teachers (p<0.001). Therefore, it is possible that these groups were underrepresented in our population. However, effect sizes were small (η^2 between 0.005 and 0.022) and analyses were corrected for these variables; we therefore expect no influence on our outcomes.

Time between SDQ and health assessment

In the second part of this thesis the association between the SDQ and identification and referral decision was determined. This part was based on a cross sectional design. Nevertheless, mean time between administration of the SDQ and the preventive health assessment was 13 weeks for the parent and 16 weeks for the teacher SDQ. This means that also characteristics of a cohort design play a role. We could not include data on events happening during this period. The total difficulties score of the SDQ shows good test-retest stability over time [3]. However, it is possible that minor problems were already resolved and that the CHP therefore did not identify the child as having psychosocial problems. It is also possible, that the child already received professional help before the actual health assessment and that the CHP therefore did not refer the child. Another possibility is that seemingly minor problems had progressed in the time between SDQ and assessment. All options could have led to a discrepancy between the SDQ score and identification and referral, which could have attenuated the associations discussed in the second part of this thesis.

Generalizability

Conducting the study in daily practice of preventive youth health care centres, which have a high attendance rate, is one of the strengths of the study, together with the large population size and making use of multiple informants and multiple reference measures, such as the CBCL/TRF and a clinical population. However, the methods and population used in this study have some implications for the generalizabilty of the results. First, as data were collected in daily practice of the preventive youth health care centres, questionnaire responses were not anonymous and were used for further care decisions. The outcomes are therefore representative for the daily practice in the preventive healthcare in contrast to studies conducted in a research setting.

Secondly, our sample is of a specific age group, namely 5 to 6 year old children. Thus, generalizing our findings to older children probably needs further research. Thirdly, this study was conducted in a population of children living in the Netherlands. Goodman, A. et al. (2012) found that nation specific norms are necessary [40]. Therefore, the cut-offs we found in this study cannot be generalized to other countries. However, differences between reference measures and differences between subgroups by gender and ethnic background are most probably also present in other countries. As well as differences in identification and mental health care use between ethnic groups. Finally, the findings of a lack of socioeconomic differences related to mental health service use are interesting. Mental health care services in the Netherlands seem to be accessible at every socioeconomic level. The results of studies in other European countries with well-developed and easily accessible social and health services are similar to those of the present study [28, 29]. However, the absence of socioeconomic inequalities in service use cannot be generalised to other countries. Different conclusions are likely to be found in countries where the health care system is organised differently, or in countries where socioeconomic inequalities are larger than in the Netherlands.

FUTURE RESEARCH

In this thesis the reliability and validity of the parent and teacher SDQ has already been extensively determined. However, some questions remain. Therefore, future research is needed on the reliability and validity of the parent and teacher SDQ in young children to determine the divergent validity of the prosocial scale, to determine the test-retest reliability, and to determine the discriminatory power for specific problems since these measures were not available in this study. Since the sample of children with a clinical score on the TRF was small (n=50), we recommend to repeat these analyses in comparison with a larger sample. Furthermore, differences in reliability were found between ethnic groups. To investigate the underlying causes of these differences, item response theory could be applied to investigate if differential item functioning (DIF) is present for specific items [41]. Also, since classification measures, in means of diagnostics odds, in non-Dutch children were suboptimal, we recommend to do further research with regard to cut-offs for children of non-Dutch background.

Next to questions about reliability and validity the present study also generates a number of additional research questions about the role of the SDQ in identification and referral by the CHP. In this study the SDQ was used to assess psychosocial problems. A high SDQ score indicates psychosocial problems, including minor problems that do not require specialist care. In this study information of the psychiatric case register was used to determine care use, however it is possible that most children received more preven-

tive forms of care. Therefore, for future research we recommend to also determine the use of other and lighter forms of care to measure actual care use in children with an elevated SDQ score. Moreover, since from this study it appears that it will be possible to only use the impact scale of the teacher SDQ, future research should be addressed to the impact scale of the teacher reported SDQ. Also, to determine if referral and service use is actually too low, research should be done to outcomes of referral and non referral decisions in later life.

In this thesis it is shown that an early detection tool can play an important role in the help-seeking and recommendation process, as suggested by Godoy et al. (2013) [42]. We also showed that aspects of the parent/provider appraisal process, such as problem perception, burden of the problems to the child, and ethnicity of the child, are determinants of the help-seeking and recommendation spectrum. In this thesis we only discuss a small part of the model of Godoy (2013) [42]. Many questions remain about influences on the help-seeking and recommendation spectrum. Most of the research in this field is focussed on determinants of the parents and the child, such as gender and socio economic position, however little is known about determinants of the provider. For instance, what are the exact motives to refer or not to refer, do access barriers to care play a role in referral; we recommend to do more in depth qualitative research into this field.

IMPLICATIONS FOR PRACTICE

This study provides further support for the validity and reliability of the total difficulties score of the parent-rated and teacher-rated SDQ for detecting psychosocial problems in 5 to 6 year old children. However, the reliability and validity of the subscales are not satisfactory. Also a significant association was found between the total difficulties score of the SDQ and the identification and referral. We were able to explain this association by the impact score of the SDQ.

These results show that the SDQ and its impact score play an important role in the early detection of psychosocial problems and referral for these problems by the preventive child health care. Therefore we recommend to continue to use the SDQ in the preventive child health care and to extend the use of the SDQ with the impact score. Since reliability and validity of the subscales are not satisfactory, we recommend using only the total difficulties score of the SDQ for early detection purposes in 5 to 6 year old children. It should be kept in mind that the SDQ has not been designed as a diagnostic tool and therefore the SDQ and the impact score should only be used as a guide in the health assessment between the CHP, the child and the child's parents.

Furthermore, the results showed that the parent and teacher reports of the SDQ are independent sources of valuable information on the behaviour of the child. The parent gives information about the behaviour of the child at home. The teacher gives information of the child's behaviour at school. In addition, problem severity as reported by the teacher is a distinct predictor for service use. Therefore, we recommend to use the parent as well as the teacher reported SDQ for early detection purposes.

In addition, the results showed differences in reliability and validity of the SDQ between subgroups by gender, ethnic background and parental education. However, these differences were small and reliability and validity were satisfactory in all groups. The results also showed differences in problem perception in subgroups by ethnic background. Parents of children of ethnic minority groups with a high score on the SDQ showed less problem perception than parents of Dutch children with a high score on the SDQ. The CHP should be aware of this difference between ethnic groups. Therefore, we recommend to pay special attention to problem perception in the health assessment with parents of children with a high score on the SDQ and of an ethnic minority background.

In this study we also extensively explored the sensitivity and specificity of the parent and teacher reported SDQ. Herefore we used two references, a clinical sample and the CBCL/TRF, and all analyses were repeated across groups by gender and ethnic background for several cut-offs. These results can be used to facilitate choosing an appropriate cut off. Before choosing a cut off it is necessary to clearly state the situation and the purpose of the early detection because from our results it appears that cut-offs differ between reference measures for the teacher SDQ and in subgroups by gender and ethnic background of both informants. In the Netherlands no standard cut offs have been established for the SDQ for children under the age of seven. Since the SDQ is recommend by the Dutch government in order to look for psychosocial problems in children and this study shows its important role in identification and referral, it is now important to choose an appropriate cut off for use in the Dutch preventive child health care. This could further improve early detection by the preventive child health care. The determination of a cut off should preferably be done by a group of experts including, child health professionals and experts on child behaviour.

Many studies recommend using early detections tools to improve identification. In this study we showed an association between the score on the SDQ and identification and referral by the CHP. Because of the design of the study we were not able to show that identification and referral improved. However, the results showed that referrals for psychosocial problems to professional care are still low when an early detection tool for psychosocial problems is used. Therefore, it remains important to improve the use of early detection tools. To do so, regular training of the CHP in using early detection tools is needed to keep them aware and to inform them about the latest developments. We

recommend integrating the use of early detection tools in the curriculum of the CHP training.

CONCLUSION

In this thesis we aimed to explore the role of an early identification tool in the process of identification as well as referral of psychosocial problems in the preventive youth health care setting. The preventive child health care has an important role in identifying and referring children with psychosocial problems. In the first part of this thesis it is shown that the parent and the teacher SDQ are valid and reliable to determine psychosocial problems in young children. In the second part of this thesis, it is shown that there is a positive association between the outcomes of an early detection tool and identification of psychosocial problems in young children and referral for these problems by the CHP. Therefore, it seems that the SDQ plays a role as a catalyst in the help seeking and recommendation spectrum. Furthermore, problem perception and ethnic background are important determinants in the help seeking and recommendation process. More so, perceived need and burden of the problems explain a large part of the association between the SDQ and identification and referral. In the last part of this thesis we show that predictors for the use of specialist care are severity of the problems and ethnic background of the child. Severity is positively associated with use of specialist care. Being a young child with an ethnic minority background is associated negatively with use of specialist care.

Some recommendations can be made to improve the process of identification and referral for psychosocial problems by the CHP. For identification only the total difficulties score of the SDQ and the impact score should be used, preferably of more than one informant. To identify children with psychosocial problems, it is necessary that an appropriate cut off is chosen to be used in daily practice. Finally, it is important that CHPs are properly trained to use early detection tools and that these become a routine in their daily practice. Furthermore, research should be done to determine motives of the CHP to refer or not to refer a child to professional care.

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SUMMARY

Detection and treatment of psychosocial problems at an early age is increasingly recognized to be of the utmost importance, especially since we know that these problems can influence children's daily lives negatively and tend to be persistent if left untreated. In the Netherlands, early detection of psychosocial problems is a task of the preventive care system. For this task the parent reported Strength and Difficulties Questionnaire (SDQ) is recommended by the Health care Inspectorate if the Dutch government. However, the SDQ was not yet validated in children in the younger age groups, nor in children of different ethnic background. Further, little is known about the process of identification of psychosocial problems by the preventive child health and referral for these problems making use of screening instruments. In this thesis we aimed to explore the role of the SDQ in the process of identification as well as referral of psychosocial problems in the preventive youth health care setting. The following research questions were addressed:

1. Reliability and validity of the SDQ in 5-6 year olds
   1.4. What is the reliability and validity of the SDQ in 5-6 year old children (**chapter 2 and 3**)?
   1.5. Are there differences in reliability and validity of the SDQ by gender, parental education level, and ethnic background (**chapter 2 and 3**)?
   1.6. What is the discriminative power of the SDQ in 5 to 6 year old (**chapter 4**)?
2. Identification and referral by the preventive child health care
   2.1. What is the role of the SDQ total problem score and impact score on identification of psychosocial problems and referral by the CHP (**chapter 5**)?
   2.2. Are there ethnic differences in parental and teachers' problem perception and perceived need for care in 5 to 6 year olds with psychosocial problems (**chapter 6**)?
   2.3. Are ethnic differences in parental and teachers' problem perception and perceived need for care associated with ethnic differences in referral of 5 to 6 year olds with psychosocial problems by the CHP (**chapter 7**)?
3. Use of youth mental health care
   3.1. Are ethnicity, socioeconomic position and severity of problems associated with mental health care use in 5 to 8 year old children with psychosocial problems (**chapter 8**)?

The first part of this thesis was focussed on the reliability and the validity of the SDQ in 5 to 6 year old children, making use of cross-sectional data of more than 11.000 children. In **chapter 2 and 3** the reliability and validity are determined in the total population

and in subgroups by gender, parental education level and by ethnic background of the child. We used data gathered through routine health surveys (Youth Health Monitor Rotterdam-Rijnmond) among 5 to 6 year olds including the parent and teacher reported SDQ. In a sub sample both the Child Behaviour Checklist (CBCL) and the Teacher Report Form (TRF) were available. Our main findings were that the validity and the reliability of both the parent and teacher reported SDQ are satisfactory. Though, there are some concerns about the subscales of the SDQ. The total difficulties score and the subscale hyperactivity/inattention problems have good psychometric properties on the parent as well as the teacher SDQ. The subscales emotional symptoms and prosocial behaviour have good properties on only the teacher SDQ. All other subscales show less good psychometric properties especially in subgroups by ethnic background. The outcomes of reliability and validity measures show differences in subgroups by gender, parental education level, and by ethnic background of the child. However, differences between subgroups were small and conclusions on the acceptability of the psychometric properties were the same for all subgroups. We concluded that the total difficulties score is valid and reliable in de total population and in subgroups by gender, ethnic background and parental education level.

In **chapter 4** the discriminatory power of the SDQ was determined in the total population and differences in subgroups by gender and ethnic background were explored. We used data gathered through routine health surveys (Youth Health Monitor Rotterdam) among 5 to 6 year olds including the parent and teacher reported SDQ. In this study two reference measures were used; a clinical score on the CBCL or the TRF and a clinical population of children who entered Youth (Health) Care or Mental Health Care institutions. Our main findings were that the total difficulties score of the parent and teacher SDQ has good discriminatory power in a total population of 5 to 6 year children as well as for subgroups by gender and ethnic background when compared with clinical score on the CBCL/TRF and in comparison with a clinical sample. We conclude that the total difficulties score of the parent and teacher SDQ is suitable for early detection in the preventive child health care. The results of this study also can be used in choosing an appropriate cut off.

The second part of this thesis focussed on the role of the SDQ in identification and referral by the preventive child health care professional. In **chapter 5** the association between the total difficulties score on the parent and teacher reported SDQ and identification and referral for psychosocial problems was determined as well as the role of the impact score of the SDQ in this association. The parent and teacher reported SDQ was gathered as part of the regular preventive child healthcare program for children aged 5 to 6 years. Parents were asked to give consent for using data of the electronic

child record (ECR). Complete SDQ data were matched to the ECR. Our main findings were that there is an association between the parent and teacher reported SDQ and identification and referral by the CHP. A high score on the parent and teacher reported SDQ is positively related to identification and referral. The impact score of the parent as well as the teacher reported SDQ plays an important role in this association. The impact score of the SDQ explains a part of the relation between the SDQ total difficulties score and identification of psychosocial problems by the CHP. The impact score also explains a part of the relation between the parent SDQ and referral. Even more, the impact score explains the relation between the teacher SDQ and referral completely. We found ethnic differences in identification and referral rates. In the group of children with a high score on the parent SDQ and a high impact score, Dutch children are more often identified as having psychosocial problems, but children of non-Dutch ethnic background are more often referred. We concluded that problem perception and burden of psychosocial problems, as measured by the impact score of the SDQ, play an important role in the identification and referral for psychosocial problems by the CHP.

In **chapter 6** ethnic differences in problem perception and perceived need for care were addressed. We used data gathered through routine health surveys (Youth Health Monitor Rotterdam) on health topics among 5 to 6 year olds including the parent and teacher reported SDQ. We included Dutch, Surinamese, Antillean, Moroccan and Turkish children with a high (>P90) SDQ score, who were not currently receiving professional care for psychosocial problems. Our main findings were that amongst children with high SDQ scores, problem perception was lower in non-Dutch parents than in Dutch parents. These lower rates of problem perception could not be explained by differences in socioeconomic position or severity of the problems. No ethnic differences were found in parental perceived need and in problem perception and perceived need reported by teachers. Higher levels of problem perception and perceived need were reported by teachers than by parents in all ethnic groups. Further, perceived need was lower than problem perception in both parents and teachers, indicating two different concepts. We concluded that problem perception and perceived need can be treated as two separate stages in the help-seeking model, and that child health professionals should be aware of ethnic variations in problem perception since low problem perception in parents of non-Dutch children may lead to miscommunication and unmet need for professional care for the child.

In **chapter 7** we determined if ethnic differences in problem perception and perceived need for care predict ethnic differences in referral by the CHP. We used data gathered through the routine health survey (Youth Health Monitor Rotterdam) for 5 to 6 year olds including the parent and teacher reported SDQ. We included all children with a high

(>P90) SDQ score, who were not currently receiving professional care for their problems. Parents were asked to give consent for using data of the electronic child record (ECR). Complete SDQ data were matched to the ECR. Our main findings were that parental problem perception was positively associated with referral. Perceived need of teachers was also positively associated with referral. There were no ethnic differences in referral. We concluded that despite a lower problem perception in ethnic minority parents when compared to ethnic majority parents, there are ethnic differences in referral of children with problem behaviour in a preventive health care setting.

In the third part, this thesis focussed on the use of mental health care among 5 to 8 year old children. In **chapter 8** the association between ethnicity, socioeconomic position, and severity of problems and mental health care use in 5- to 8-year-old children with a high score on the SDQ was determined.

We used data gathered through the routine health survey (Youth Health Monitor Rotterdam) for 5 to 6 year olds including the parent and teacher reported SDQ. We included all children with a high (>P90) SDQ score, who were not currently receiving professional care for their problems. Parents were asked to give consent for using data of the Psychiatric Case Register (PCR). Complete SDQ data were matched to the PCR. Our main findings were that 9.2% of the children with a high SDQ score on the parent and/or teacher reported SDQ receive care in the child mental health care. We showed that the SDQ total score reported by both teachers and parents was related with service use, whereas teacher reported severity in terms of impact score predicted service use in children stronger than parent-reported impact. We also showed that ethnic differences were present in the use of mental health care, whereas the service use was lower in children of ethnic minority groups. There were no differences found according to socioeconomic position. We concluded that ethnicity is an important predictor of mental health care use in young children. A distinct predictor of care use in this age group is severity of emotional and behavioural problems as perceived by teachers. Therefore, teachers may be especially helpful in the process of identifying young children who need specialist mental health care.

In **chapter 9** the findings are summarised and interpreted. Strengths and limitations are discussed. Further, recommendation for future research, implications for practice and an overall conclusion are presented. The main conclusions of this thesis are: first that the total difficulties score of the parent and the teacher reported SDQ is valid and reliable in a multi cultural population of young children and the SDQ is suitable for early detection of psychosocial problems in the preventive child health care. The reliability of the subscales appears to be less valid and reliable. Therefore, we recommend only using the total difficulties score for early detection purposes. Scores on subscales can

only be used to give direction during the child health assessment, but can not be used for early detection on their own. Secondly, we can conclude that there is a positive association between the outcome of the SDQ and identification of psychosocial problems in young children and referral for these problems by the CHP. Therefore, the SDQ seems to play a role as a catalyst in the help seeking spectrum. Thirdly, we can conclude that problem perception and ethnic background are important determinants in the help recommendation process. Even more, perceived need and burden of the problems play an important role as mediator. Fourthly, we can conclude that predictors for use of specialist care are severity of the problems and ethnic background of the child. Severity is positively associated with use of specialist care are.

From these findings some recommendations can be made. For identification only the total difficulties score of the SDQ and the impact score should be used, preferably of more than one informant. Further, it is necessary that an appropriate cut off is chosen to be used in daily practice. Finally, it is important that CHPs are properly trained to use early detection tools and that these become a routine in their daily practice.

SAMENVATTING

Signalering en behandeling van psychosociale problemen op een jonge leeftijd is belangrijk. Zeker sinds we weten dat deze problemen het dagelijkse leven van kinderen negatief kunnen beïnvloeden en blijvend zijn wanneer deze problemen niet worden behandeld.

In Nederland is vroege signalering van psychosociale problemen een taak van de preventieve jeugdgezondheidszorg. Om deze taak goed te kunnen uitvoeren beveelt de Nederlandse Gezondheidsinspectie het gebruik van de Strength and Difficulties Questionnaire (SDQ) aan. De SDQ is echter nog niet gevalideerd voor jonge kinderen en ook niet voor kinderen met een niet-Nederlandse achtergrond. Daarnaast is er weinig bekend over het proces van herkenning van psychosociale problemen door de preventieve jeugdgezondheidszorg, die gebruik maakt van een signaleringsinstrument. Ook is er weinig bekend over het proces van doorverwijzing van deze problemen naar professionele hulp.

In dit proefschrift wordt de rol van de SDQ bekeken in het proces van identificatie en doorverwijzing voor psychosociale problemen in de preventieve jeugdgezondheidszorg bij jongeren in de leeftijd van 5–6 jaar.

De volgende onderzoeksvragen komen aan de orde:

1. De betrouwbaarheid en validiteit van de SDQ bij 5-6 jarigen
   - 1.1. Wat is de betrouwbaarheid en validiteit van de SDQ bij 5-6 jarigen (**hoofdstuk 2 en 3**)?
   - 1.2. Zijn er verschillen in betrouwbaarheid en validiteit van de SDQ in groepen naar geslacht, opleidingsniveau van de ouders en etnische achtergrond (**hoofdstuk 2 en 3**)?
   - 1.3. Wat is het onderscheidend vermogen van de SDQ bij 5-6 jarigen (**hoofdstuk 4**)?
2. Herkenning en doorverwijzing door de preventieve jeugdgezondheidszorg
   - 2.1. Wat is de rol van de SDQ totaal probleemscore en de impact score bij herkenning van psychosociale problemen en doorverwijzing door de professional in de preventieve jeugdgezondheidszorg (**hoofdstuk 5**)?
   - 2.2. Zijn er etnische verschillen in probleemperceptie en zorgbehoefte van ouders en leerkrachten bij 5-6 jarigen met psychosociale problemen (**hoofdstuk 6**)?
   - 2.3. Zijn etnische verschillen in probleemperceptie en zorgbehoefte bij ouders en leerkrachten geassocieerd met etnische verschillen in doorverwijzing van 5-6 jarigen met psychosociale problemen door de preventieve jeugdgezondheidszorg (**hoofdstuk 7**)?

3. Gebruik van geestelijke gezondheidszorg
    3.1. Zijn etniciteit, sociaal economische positie en ernst van de problemen geassocieerd met het gebruik van geestelijke gezondheidszorg door 5 tot 8 jarigen met psychosociale problemen (**hoofdstuk 8**)?

Het eerste deel van dit proefschrift is gericht op de betrouwbaarheid en validiteit van de SDQ bij 5-6 jarigen. Daarbij is gebruik gemaakt van cross-sectionele gegevens van meer dan 11.000 kinderen.

In **hoofdstuk 2 en 3** worden de betrouwbaarheid en validiteit vastgesteld in groepen naar geslacht, opleidingsniveau van de ouders en etnische achtergrond van het kind. Hiervoor zijn gegevens gebruikt die zijn verzameld tijdens het periodieke gezondheidsonderzoek (de Jeugdmonitor Rotterdam-Rijnmond) voor 5-6 jarigen waaronder de SDQ van ouders en leerkrachten. Voor een deel van deze populatie waren ook de Child Behaviour Checklist (CBCL) en de Teacher Report Form (TRF) ingevuld. De belangrijkste bevindingen uit dit onderzoek zijn dat de betrouwbaarheid en validiteit van zowel de ouder als leerkracht SDQ voldoende zijn. Er zijn wel zorgen over de betrouwbaarheid en validiteit van de subschalen. De totaal probleemscore en de subschaal hyperactiviteit/aandachtsproblemen hebben goede psychometrische eigenschappen bij zowel de ouder als leerkracht SDQ. De subschalen emotionele problemen en prosociaal gedrag hebben alleen goede psychometrische eigenschappen bij de leerkracht SDQ. Alle andere subschalen hebben minder goede psychometrische eigenschappen, helemaal in subgroepen naar etnische achtergrond. Er zijn verschillen in de uitkomsten van betrouwbaarheid en validiteit tussen groepen naar geslacht, opleidingsniveau van de ouders en etnische achtergrond van het kind. De verschillen zijn echter klein en de conclusie over psychometrische eigenschappen van de SDQ is in alle groepen hetzelfde.

We concluderen dat de totaalprobleemschaal van de SDQ betrouwbaar en valide is in de totale populatie en in groepen naar geslacht, opleidingsniveau van de ouders en etnische achtergrond.

In **hoofdstuk 4** is het onderscheidende vermogen van de SDQ bepaald in de totale populatie en in groepen naar geslacht en etnische achtergrond. Hiervoor zijn gegevens gebruikt die zijn verzameld tijdens het periodieke gezondheidsonderzoek (de Jeugdmonitor Rotterdam-Rijnmond) voor 5-6 jarigen waaronder de SDQ van ouders en leerkrachten. In dit onderzoek zijn twee referentiematen gebruikt, namelijk een klinische score op de CBCL of de TRF; en een populatie van kinderen die gebruik maken van Jeugd (Gezondheids-) Zorg of geestelijke gezondheidszorg (de klinische populatie).

De belangrijkste bevindingen zijn dat zowel de ouder als leerkracht SDQ een goed onderscheidend vermogen hebben in de totale populatie, maar ook in groepen naar geslacht en etnische achtergrond.

We concluderen dat de totaalprobleemscore van de ouder en leerkracht SDQ geschikt is voor vroege signalering van psychosociale problemen door de preventieve jeugdgezondheidszorg. De resultaten van dit onderzoek kunnen ook worden gebruikt voor het bepalen van geschikte afkappunten.

Het tweede deel van dit proefschrift is gericht op de rol van de SDQ bij herkenning en doorverwijzing door de professional in de preventieve jeugdgezondheidszorg.

In **hoofdstuk 5** is gekeken naar de associatie tussen de totaalprobleemscore van de ouder en leerkracht SDQ en herkenning en doorverwijzing voor psychosociale problemen. Ook is gekeken naar de rol van de impactscore. De ouder en leerkracht SDQ was verzameld als onderdeel van het periodieke gezondheidsonderzoek door de preventieve jeugdgezondheidszorg. Aan de ouders is toestemming gevraagd voor het gebruik van gegevens uit het kinddossier (KIDOS).

SDQ gegevens zijn gekoppeld aan de gegevens uit het KIDOS. De belangrijkste bevindingen zijn dat er een positieve associatie is tussen de ouder en leerkracht SDQ en herkenning en doorverwijzing door de professional in de preventieve jeugdgezondheidszorg. De impactscore van de ouder en leerkracht SDQ speelt een belangrijke rol in deze associatie. De impactscore van de SDQ verklaart een deel van de relatie tussen de SDQ totaalprobleemscore en herkenning van psychosociale problemen door de professional. De impactscore verklaart ook een deel van de relatie tussen de totaalprobleemscore van de ouder SDQ en doorverwijzing. Bij de leerkracht wordt de gehele relatie tussen de SDQ en doorverwijzing verklaard door de impact score. Daarnaast vonden we verschillen in het percentage van probleemherkenning en doorverwijzing tussen etnische groepen. In de groep kinderen met een hoge score op de ouder SDQ en een hoge impactscore werden bij Nederlandse kinderen vaker van psychosociale problemen herkend, maar kinderen met een niet-Nederlandse achtergrond werden vaker doorverwezen. We concluderen dat probleemperceptie en last van psychosociale problemen, zoals gemeten door de impact score, een belangrijke rol spelen in het herkennen van psychosociale problemen en het doorverwijzen daarvoor door de professional in de preventieve jeugdgezondheidszorg.

In **hoofdstuk 6** zijn etnische verschillen in probleemperceptie en zorgbehoefte bepaald. Hiervoor zijn gegevens gebruikt die zijn verzameld tijdens het periodieke gezondheidsonderzoek (de Jeugdmonitor Rotterdam-Rijnmond) voor 5-6 jarigen waaronder de SDQ van ouders en leerkrachten. In dit onderzoek zijn alleen Nederlandse, Surinaamse, Antilliaanse, Marokkaanse en Turkse kinderen meegenomen met een hoge score (>P90) op de SDQ die geen professionele zorg ontvingen voor psychosociale problemen.

De belangrijkste bevindingen zijn dat probleemperceptie onder niet-Nederlandse ouders van kinderen met een hoge SDQ score lager was dan onder Nederlandse ouders.

Deze lagere probleemperceptie kan niet worden verklaard door verschillen in sociaal economische positie of ernst van de problemen. Er zijn geen verschillen gevonden tussen verschillende etnische groepen in zorgbehoefte bij ouders, en in probleemperceptie én zorgbehoefte bij leerkrachten. Probleemperceptie en zorgbehoefte waren in alle etnische groepen hoger bij leerkrachten dan bij ouders. Daarnaast was zorgbehoefte van zowel ouders als leerkrachten lager dan probleemperceptie. Dit laat zien dat probleemperceptie en zorgbehoefte twee verschillende concepten zijn. Probleemperceptie en zorgbehoefte kunnen als twee verschillende stappen in het model van hulpzoeken worden beschouwd. Daarnaast moeten professionals in de preventieve jeugdgezondheidszorg alert zijn op etnische verschillen in probleemperceptie, omdat bij ouders van niet Nederlandse kinderen probleemperceptie lager is en dat kan leiden tot miscommunicatie en een onbeantwoorde zorgvraag voor het kind .

In **hoofdstuk 7** is gekeken of verschillen in probleemperceptie en zorgbehoefte tussen verschillende etnische groepen, verschillen in doorverwijzing door de professional in de preventieve jeugdgezondheidszorg voorspellen. Hiervoor zijn gegevens gebruikt die zijn verzameld tijdens het periodieke gezondheidsonderzoek (de Jeugdmonitor Rotterdam-Rijnmond) voor 5-6 jarigen waaronder de SDQ van ouders en leerkrachten. In dit onderzoek zijn alleen kinderen meegenomen met een hoge score (>P90) op de SDQ die geen professionele zorg ontvingen voor psychosociale problemen. Aan de ouders is toestemming gevraagd voor het gebruik van gegevens uit het kinddossier (KIDOS). SDQ gegevens zijn gekoppeld aan de gegevens uit het KIDOS.

De belangrijkste bevindingen zijn dat probleemperceptie bij de ouders positief is geassocieerd met doorverwijzing. Bij leerkrachten is zorgbehoefte eveneens positief geassocieerd met doorverwijzing. Er waren geen verschillen in doorverwijzing tussen etnische groepen.

We concluderen dat ondanks de lagere probleemperceptie bij ouders van niet-Nederlandse kinderen er geen verschillen zijn tussen etnische groepen in doorverwijzing van kinderen met psychosociale problemen in de preventieve jeugdgezondheidszorg.

Het derde deel van dit proefschrift richt zich op het gebruik van geestelijke gezondheidszorg door 5 tot 8 jarigen.

In **hoofdstuk 8** is gekeken naar de associatie tussen etniciteit, sociaal economische status en ernst van de problemen en gebruik van geestelijke gezondheidszorg door 5 tot 8 jarigen met een hoge score op de SDQ. Hiervoor zijn gegevens gebruikt die zijn verzameld tijdens het periodieke gezondheidsonderzoek (de Jeugdmonitor Rotterdam-Rijnmond) voor 5-6 jarigen waaronder de SDQ van ouders en leerkrachten. In dit onderzoek zijn alleen kinderen meegenomen met een hoge score (>P90) op de SDQ die geen professionele zorg ontvingen voor psychosociale problemen. Aan de ouders

is toestemming gevraagd voor het gebruik van gegevens uit het psychiatrisch casus register (PCR). SDQ gegevens zijn gekoppeld aan de gegevens uit het PCR.

De belangrijkste bevindingen zijn dat 9,2% van de kinderen met een hoge SDQ score op ouder en/of leerkracht SDQ geestelijke jeugdgezondheidszorg ontvangen. De SDQ totaalprobleemscore, zoals gerapporteerd door ouders en leerkrachten, is gerelateerd aan zorggebruik. Hierbij was ernst van de problemen, zoals gerapporteerd door de impactscore door de leerkracht, een sterkere voorspeller van zorggebruik dan de ernst van de problemen, zoals gerapporteerd door de ouders. Daarnaast is aangetoond dat er etnische verschillen zijn in het gebruik van geestelijke gezondheidszorg, waarbij het zorggebruik lager was onder niet-Nederlandse kinderen. Sociaal-economische verschillen zijn geen voorspeller van zorggebruik.

We concluderen dat etniciteit een belangrijke voorspeller is van gebruik van geestelijke gezondheidszorg door jonge kinderen. In deze leeftijdsgroep is ernst van de problemen zoals aangegeven door de leerkracht een onderscheidende voorspeller. Daardoor kunnen leerkrachten in het bijzonder behulpzaam zijn in het proces van probleemherkenning bij jonge kinderen die geestelijke gezondheidszorg nodig hebben.

In **hoofdstuk 9** zijn alle bevindingen samengevat en geïnterpreteerd. Sterke kanten en beperkingen worden besproken. Verder worden er aanbevelingen gedaan voor verder onderzoek en implicaties aangegeven voor de praktijk. Ook wordt er een conclusie getrokken over het geheel.

Als eerste is de belangrijkste conclusie dat de totaalprobleemscore op de ouder en leerkracht SDQ betrouwbaar en valide is in een multiculturele groep van jonge kinderen en dat de SDQ geschikt is voor vroegsignalering in de preventieve jeugdgezondheidszorg.

De subschalen van de SDQ zijn minder betrouwbaar, daarom adviseren we om alleen de totaal probleemscore te gebruiken voor vroeg signalering. Scores op de subschalen kunnen alleen gebruikt worden om richting te geven in het gesprek met de ouders, maar geven op zichzelf geen uitsluitsel over de specifieke aard van de problemen.

Als tweede wordt geconcludeerd dat er een positieve associatie is tussen de SDQ en herkenning van psychosociale problemen bij jonge kinderen en doorverwijzing voor deze problemen door de professional in de preventieve jeugdgezondheidszorg. De SDQ lijkt daarmee een rol te spelen als katalysator in het hulpzoekgedrag en het doorverwijzingspectrum.

Als derde wordt geconcludeerd dat probleemperceptie en etnische achtergrond belangrijke determinanten zijn in het hulpzoekgedrag en doorverwijzingspectrum. Hulpbehoefte en ervaren last zijn zelfs verklarende factoren.

Als vierde wordt geconcludeerd dat ernst van de problemen, en etnische achtergrond van het kind voorspellers zijn voor gebruik van geestelijke gezondheidszorg. Hierbij is ernst van de problemen positief geassocieerd met zorggebruik.

Vanuit de bevindingen in dit proefschrift kunnen enkele aanbevelingen voor de praktijk worden gedaan. Voor signalering van psychosociale problemen mag alleen de totaalprobleemscore en de impact score van de SDQ gebruikt worden, bijvoorkeur van meerdere informanten. Verder is het nodig om geschikte afkappunten te bepalen voor gebruik in de preventieve jeugdgezondheidszorg. Als laatste is het belangrijk dat professionals in de preventieve jeugdgezondheidszorg goed getraind worden in het gebruik van signaleringsinstrumenten en dat het een routine wordt in hun dagelijkse praktijk.

LIST OF ABBREVIATIONS

ANOVA	Analysis of variance
AUC	Area under the curve
BITSEA	Brief Infant Toddler Social and Emotional Assessment
CBCL	Child Behaviour Checklist
CBS	Centraal Bureau voor Statistiek (Statistics Netherlans)
CDI	Children's Depression Inventory
CFI	Comparative fit index
CHP	Child health care professional
CI	Confidence interval
DIF	Differential item functioning
ECR	Electronic child record
FSSCR	Fear Survey Schedule for Children-Revised
HR	Hazard ratio
ICC	Intra-class correlation
KIPPPI	Kort Instrument voor Psychologische en Pedagogische Probleem Inventarisatie (Short Instrument for Psychological and pedagogical inventory)
KIVPA	Korte Indicatieve Vragenlijst voor Psychosociale problematiek bij Adolescenten (Short indicative questionnaire for psychosocial problems in Adolescents)
LHR-	Negative likelihood ratio
LHR+	Positive likelihood ratio
OR	Odds ratio
OR^D	Diagnostic odds ratio
p90	90^{th} percentile
p95	95^{th} percentile
PCR	Psychiatric Case Register
PN	Perceived need
PP	Problem perception
RMSEA	Root mean square error of approximation
ROC	Receiver operating characteristics
SAS-K	Social Anxiety Scale for Children
SCARED	Screen for Child Anxiety Related Emotional Disorders
SD	Standard deviation
SDQ	Strengths and Difficulties Questionaire
SE	Standard error
SEP	Socioeconomic position

SPSS	Statistical Package of Social Sciences
TLI	Tucker-Lewis index
TRF	Teacher report form
WLSMV	Weighted least squares estimator with a mean and variance adjusted chi-square statistic

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CURRICULUM VITAE

Cathelijne Mieloo werd geboren op 8 november 1978 in Gouda. Zij volgde haar middelbare schoolopleiding aan het Coornhert Gymnasium te Gouda en behaalde haar diploma in 1997. In dat zelfde jaar begon zij met haar studie economie aan de Erasmus Universiteit in Rotterdam. In 2001 begon ze de opleiding Voeding en Diëtetiek in Den Haag. Zij behaalde haar diploma in 2005 en vervolgde haar master opleiding aan de Wageningen Universiteit, richting Epidemiologie en Publieke Gezondheid. Als onderdeel van deze studie deed zij onderzoek naar de invloed van vitamine D op de ontwikkeling van dikke darm adenomen. Zij liep haar stage bij de GGD Rotterdam-Rijnmond alwaar zij onderzoek deed naar seizoens invloeden op zelfgerapporteerde gezondheid en leefstijl bij jongeren. In 2007 rondde zij haar studie af.

Na haar afstuderen begon ze als onderzoeker/epidemioloog bij het cluster Jeugd van de GGD Rotterdam-Rijnmond. In 2008 begon zij in het kader van de academische werkplaats CEPHIR (Centre of Effective Public Health In the larger Rotterdam area) aan haar promotie onderzoek, waarvan de bevindingen zijn beschreven in dit proefschrift. Daarnaast bleef zij onderzoek doen bij de GGD Rotterdam-Rijnmond. Zij werkte onder andere aan onderzoek naar gezondheid en leefstijl van jongeren op het ROC, vraagontwikkelingsonderzoek in de jeugdzorg en de laatste jaren houdt zij zich vooral bezig met onderzoek in het kader van de decentralisatie van de jeugdzorg.

LIST OF PUBLICATIONS

Jansen PW, Verlinden M, Dommisse-van Berkel A, Mieloo CL, Raat H, Hofman A, Jaddoe VW, Verhulst FC, Jansen W, Tiemeier H. Teacher and peer reports of overweight and bullying among young primary school children. *Pediatrics.* 2014 Sep;134(3):473-80

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Mieloo C, Raat H, van Oort F, Bevaart F, Vogel I, Donker M, Jansen W. Validity and reliability of the strengths and difficulties questionnaire in 5-6 year olds: differences by gender or by parental education? *PLoS One*. 2012;7(5)

Vogel I, van de Looij-Jansen PM, Mieloo CL, Burdorf A, de Waart F. Risky music-listening behaviors and associated health-risk behaviors. *Pediatrics.* 2012 Jun;129(6):1097-103.

van de Looij-Jansen PM, de Wilde EJ, Mieloo CL, Donker MC, Verhulst FC. Seasonal variation in self-reported health and health-related behaviour in Dutch adolescents. *Public Health.* 2009 Oct;123(10):686-8.

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Cathelijne Mieloo, Tamara van Batenburg-Eddes, FLoor Bevaart, Ingrid Kruizinga, Hein Raat , Wilma Jansen. Discriminatory Power of the Strengths and Difficulties Questionnaire in 5-6 Year Old Children. *Submitted for publication*.

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Jansen P.W., Zwirs B., Verlinden M., Mieloo C.L., Verhulst F.C., Jansen W., van IJzendoorn M.H., Tiemeier H. Observed and parent-reported conscience development:relations with bullying involvement in early primary school. *Submitted for publication*.

PHD PORTFOLIO

Name PhD student: Cathelijne Mieloo
Erasmus MC Department: MGZ

PhD period: January 2008-January 2015
Promotor(s): Prof.dr. M.H.E. Donker and Prof.dr. H. Raat
Supervisor: dr.ir. W. Jansen

1. PhD training

Courses	**Year**	**Workload (ECTS)**
Multilevel analyses	2010	0.9
Causal inference	2010	0.7
Methods of health services research	2010	0.7
Primary and secondary prevention research	2010	0.7
Social epidemiology	2010	0.7
How to write biomedical articles	2010	0.6

2. Conferences and Symposia

(Inter)national conferences-participation and presentations	**Year**	**Workload (ECTS)**
Seminars at the Department of Public Health, Erasmus MC, Rotterdam	2008-2012	0.5
CEPHIR Seminars, Rotterdam	2008-2012	0.5
Nederlands Congres Volksgezondheid (NCVGZ), Groningen *(poster)*	2008	1.3
Jeugd in Onderzoek, Utrecht. *(poster)*	2009	0.7
Retraite Jeugd en Onderzoek, Soest. (*Oral presentation)*	2010	0.5
Jeugd in Onderzoek, Utrecht	2010	0.5
Nederlands Congres Volksgezondheid (NCVGZ), Rotterdam. *(poster)*	2010	1.3
European Congres of Epidemiology, Florence, Italy. (*Oral presentation)*	2010	2
Crosscultural psychology symposium, Tilburg. (*Oral presentation)*	2011	0.5
Jaarcongres JGZ, Ede *(poster)*	2012	0.5
Dwars seminar, Rotterdam. (*Oral presentation)*	2013	0.5
European Congress of Psychology, Stockholm, Sweden. (*Oral presentation)*	2013	2

2. Teaching

Activity	**Year**	**Workload (ECTS)**
Supervising Master thesis Seloua el Hajjari, student Psychology, Leiden University.	2011	2.0
SDQ Training Youth professionals	2008	1.0
SDQ training Youth health professionals	2012	1.0

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