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**Participation in schools for young adolescents with
neuropsychiatric disabilities: A cross-sectional study
from the Southern part of Sweden**

LoRDIA

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Abstract

Background: Participation is essential for the enjoyment and exercise of human rights, however children with disabilities often have restricted participation. Participation means to attend an activity and be engaged while being there. Neuropsychiatric disabilities are a group of cognitive impairments, affecting 10% of all children. There are no studies from Sweden investigating participation in schools for young adolescents with neuropsychiatric disabilities.

Aim: Investigate if there are differences between adolescents, with and without neuropsychiatric disabilities regarding participation in school, and also explore external and individual factors associated with restricted participation.

Methods: This cross sectional study consisted of data obtained for the research programme LoRDIA. Data was collected from 1520 adolescents aged 12-13 years, from four municipalities in the south of Sweden, year 2013-2014. Multiple logistic regression was conducted to explore the relationship between having a neuropsychiatric disability and participation, and how other factors effected this relationship.

Results: Young adolescents with neuropsychiatric disabilities had an increased likelihood of restricted participation in school, in comparison to adolescents without neuropsychiatric disabilities. They were also more at risk of bullying victimization, having more negative relationship to their teachers, coming from families with poorer economy, having lower connectedness to their fathers, being boys and more likely to have tried drugs.

Conclusions: Adolescents with neuropsychiatric disabilities are a vulnerable group, who have restricted participation in school, but also a disadvantaged situation in other areas of life. Interventions are needed to ensure their full participation, and further longitudinal research to understand the long term effects of the issue.

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List of Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
ASD	Autism Spectrum Disorders
DALYs	Disability Adjusted Life Years
DAMP	Deficits in Attention, Motor control and Perception
ESSENCE	Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations
ICF	International Classification of Functioning, Disability and Health
LoRDIA	Longitudinal Research on Development in Adolescence
MBD	Minimal Brain Dysfunction
OCD	Obsessive Compulsive Disorder
OECD	Organisation for Economic Co-operation and Development
UN	United Nations
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Glossary of terms

Attention Deficit/Hyperactivity Disorder: Persistent manifestation of hyperactivity-impulsivity and inattention that is influencing development and functioning (1).

Deficits in Attention, Motor control and Perception: Attention deficit/hyperactivity disorder and developmental coordination disorder simultaneously (2).

Minimal Brain Dysfunction: Previously used term that include a combination of disorders within activity regulation, attention, motor control, learning, impulse control, speech, language and perception (3).

Autism Spectrum Syndrome: An umbrella term including diagnosis such as autism, Asperger syndrome and childhood disintegrative disorder (4), causing difficulties with communication, social interaction and restricted/repetitive range of interests and activities (5).

DALYs: A measurement of years lost due to disability and premature death (6).

Dyslexia: Unexpected reading difficulties that are not explained by intelligence or motivation (7).

Dyscalculia: Learning disability affecting the normal ability to achieve arithmetic skills, which cannot be explained by intelligence, motivation or scholastic opportunity (1).

Impairment: A problem in body structure or body function (8).

Intellectual disability: Limitations in intellectual functioning (IQ<60) and restricted ability to function in everyday life in the domains of conceptual, social and practical skills (9).

1. Introduction

Young people with disabilities are reported to experience lower levels of participation in everyday activities. School is an important environment for adolescents and participation in school activities are important for healthy development and well being.

1.1 Disability

More than one billion people in the world live with a disability according to the World Report on Disability, and this is approximately 15 % of the global population, (10). In the upcoming years the prevalence of people living with disability will increase (10). This is caused by a global increase of chronic health conditions such as cancer, mental health diseases, diabetes and cardiovascular diseases, and by an increased ageing population (10). Disability arises in the interaction between a person with a limitation of body function and the environment the person lives in (11). The United Nations (UN) Convention on the Right of Persons with Disabilities defines disabilities as following:

"Disability is an evolving concept and results from the interaction between a person's impairment and obstacles such as physical barriers and prevailing attitudes that prevent their participation in society. The more obstacles there are the more disabled a person becomes.

Persons with disabilities have long-term physical, mental, intellectual, or sensory impairments such as blindness, deafness, impaired mobility, and developmental impairments". (11)

There are two commonly used models of disability (8). The medical model views disability as merely something within the individual caused by a disease, injury or other health problems (8). The social model of disability on the other hand, is defining disability as something caused by the environment, as an example related to barriers in the society (8). Both of these models are important and in the biopsychosocial model, used by the World Health Organization (WHO) framework for International Classification of Functioning, Disability and Health (ICF) they are integrated (8).

Globally, people with disabilities are one of the most vulnerable and least empowered groups (12). They generally have poorer health and face barriers in accessing health and rehabilitation services. They have the same health care needs as the general population but could also confront an increased demand related to their impairment (13). People with disabilities are also exposed to stigma and discrimination, leading to obstacles in their

everyday lives (10). They have a higher unemployment rate (14), lower earnings and are more frequently excluded from development initiatives in the society (12).

Globally at least 93 million children live with a disability, and these children belong to one of the society's most marginalized and excluded groups (15). In a report by United Nations Children's Fund (UNICEF) on the state of the world's children, they conclude that children with disabilities are more likely to be among the poorest and are at higher risk of abuse (16), discrimination and neglect (15). A systematic review found that 1 in 4 children with disabilities were experiencing physical violence, and 1 in 6 experienced sexual victimization (17). Children with disabilities face exclusion, but its form probably depends on the severity of their impairment, socioeconomic class, gender, culture and where in the world they live (15).

1.1.1 Neuropsychiatric disabilities

Neuropsychiatric disability is an umbrella term, which includes various cerebral disorders that often presents in early childhood. Another term for these disabilities is Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations (ESSENCE) (18). Most children with neuropsychiatric disabilities present symptoms before the age of 3 in the areas of communication and language, learning, social interaction, attention, activity, behavior, mood, general development, sleep and/or motor coordination (19). Children who have at least one of these symptoms during childhood often experience long-term problems which frequently have lifelong consequences (18). There are many diagnoses that are included in the terminology and it is common that the children have co-morbidities. Autism spectrum disorders (ASD), attention-deficit/hyperactivity disorder (ADHD), tics, Tourettes syndrome, deficits in attention, motor control and perception (DAMP), obsessive compulsive disorder (OCD) and learning disorders are a few examples of the diagnoses included in the terminology (19).

A study from Denmark from 2007 reported a general increase of incidence for some neuropsychiatric disorders (hyperkinetic disorder, autism spectrum disorder, Tourette syndrome and childhood autism) between 1992 and 1999 (20). This could be attributed to that knowledge about the diagnostic and treatment of neuropsychiatric disorders have considerably increased the last 20 years (21). The prevalence stated today, is 10 % in the general population of children, and boys are overrepresented (19). As an example 1 person per 132 have ASD, estimating 52 million cases globally in 2010 (22). However the prevalence

of ASD varies some across studies, but in the last fifty years the prevalence has been increasing globally (14,15). ADHD is another common problem that often co-exists with ASD, and it affects at least 5% of school-aged children (25). Tourettes syndrome affects around 1 % of all school-aged children and is more common in boys than girls (4-6:1). Around 2/3 of all children with Tourettes syndrome also present with co-morbidities such as ADHD and ASD (26). Dyslexia and dyscalculia are two forms of learning problems that often co-exist with other neuropsychiatric disorders such as ASD, ODD and ADHD (19). These learning problems are rather common, and dyslexia can be found in 5-10% of the population (27), and dyscalculia in 3-6 % (28). The prevalence of other neuropsychiatric disorders are: speech and language impairments 6%, (29), learning disabilities 1-2.5% (30) and behavioral phenotypes syndromes 0.7% (31). These prevalences are mainly reported from high resource setting since the evidence is very limited regarding neuropsychiatric disorders in low- and middle income countries (21).

1.2 Adolescence

Adolescence is defined by the WHO as the period in life between the ages of 10 to 19 years (32). The adolescent group today is the largest in history with 1.8 billion people, comprising 1/4 of the global population (33). This present group is taking a different path through adolescence in comparison to earlier generations, with rapid urbanisation, increased access to information through the internet, globalisation and increased educational demands (34). Adolescence is distinct a period in life associated with cognitive, physical, social and emotional development (33). The early adolescent years are characterized by the onset of puberty, growing capacity for abstract thinking and a struggle with the sense of identity such as feeling awkward about self and worries about being normal (33). The young adolescents are becoming increasingly influenced by their friends and are more prone to test rules and limits (33).

1.2.1 Adolescence health

Adolescence is usually considered as a healthy period in life but many diseases starts in this period, as an example 50% of all mental disorders present before the age of 14 years (35). This period lays the foundation for future adult health since many risk factors for non-communicable diseases, substance misuse, mental health disorders, as well as sexual and reproductive health problems start in the adolescent period (33). Over the last 50 years, the health of young children has improved globally, the same rate of improvement is not seen in the adolescent group (33). No less than 15% of the global disease burden is accounted for by

Disability Adjusted Life Years (DALYs) in adolescents (36). Mental and substance use disorders are two of the leading causes for loss of DALYs in young adolescents aged 10-14 years old (37). The cause and burden of diseases vary between regions, where the low-income countries have the highest mortality rates for adolescents (36).

Adolescents with disabilities are a particularly vulnerable group with an increased risk of poor health outcomes compared to adolescents without disabilities. They are more likely to drink alcohol, smoke, spend time in sedentary activities (38,39) and be overweight (38). Another problem is higher level psycho-social distress (39) and sense of hopelessness (38) in comparison to adolescents without disabilities.

1.3 School

There are many determinants for adolescent's health, and an important one is the education and school environment (40). The schools are central for creating positive peer connections, emotional control and healthy behaviours (33,41). Having strong positive connections with the teachers in school decreases the risk of acquiring substance misuse, violence and other problematic behaviours (33,41). There seems to be a relationship between poor school connectedness and negative health outcomes such as emotional distress, early sexual intercourse and suicidality (42).

According to the World Report on Disability, children with disabilities are not entering the classrooms in low resource settings (10,12), and in high-resource settings the adolescents drop out of school or finish with limited qualifications since the schools cannot meet their special needs (43). The relationship between disability and low educational outcomes is stronger than between other characteristics such as low socio-economic status, gender, rural residence and educational outcome (10). The type of disability also has an impact on school outcomes, and children with intellectual or sensory impairments are less enrolled in school compared to those with physical impairments (10). In a high income settings, adolescents with multiple or emotional disabilities have lower chance to graduate from high school (44).

1.4 Participation in school

According to WHO, "*health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*" (45). This implies that people can live with a disability and be healthy. According to the ICF by WHO, participation is an important health outcome (8). Participation is essential for the enjoyment and exercise of human rights (46). In accordance to both the Convention on the Rights of the Child (47) and the Convention on the

Rights of Persons with Disabilities (11), children with disabilities should have the same rights to community participation as children without disabilities.

Participation means involvement in life situations (8). People with disabilities can have restricted participation as a result of both impaired body functions/structures and environmental factors (8). Participation is an important factor in the educational system and according to The Salamanca Statement and Framework for Action on Special Need Education, all children have the right to participate fully in school (46). Participation in age-appropriate activities contributes to social, physical, and emotional development (48). High participation in school have been found to be associated with increased reports of happiness, higher academic performance and better self-rated health (49). However, there are issues of inclusion of children with disabilities in schools globally (10). Children with disabilities in Europe have restricted participation in schools in comparison to children without disabilities, and this is seen in different diagnoses such as spina bifida (50,51), cerebral palsy (51–54) and other motor disabilities (51). It is also seen in neuropsychiatric disabilities such as intellectual disabilities (55) and ASD (56,57). Participation is determined by environmental and social barriers (15). There seem to be associations between restricted participation for children with disabilities and educational arrangements (55,58), place of residence (53,54) and teachers' (59,60) and classmates' attitudes (57,61–63).

Participation is a complex construct and there is no universally accepted definition (64). However in a systematic review from 2015, it was concluded that participation is constructed by two dimensions, both by attending the activity and by being involved/engaged while being there (64). The attendance component covers whether the child is present in the activity, the frequency of attendance and also the variety of activities the child attends. The involvement/engagement component looks at the experience of taking part in the activity, such as feelings of belonging, persistence and enjoyment (64).

Studies investigating participation in schools have been using a wide variety of measurement instruments. These instruments include different aspects of participation ranging from participation in school dances, recess, physical education, orchestra, field trips, crafts (65), participation in school decisions and rules (66) or social participation with classmates (58). The majority of studies are only measuring the frequency of attending an activity rather than the engagement in it (64).

1.4.1 Engagement

School engagement is defined in various ways and is related to the extent school children are motivated to learn, and their involvement, connectedness and commitment to the school (67).

It is important that adolescents are engaged in school since low school engagement is associated with problematic behaviors such as smoking, substance use, fighting, vandalism and stealing (68). There is an association between alcohol consumption and engagement, as an example students at the age of 13 who were engaged in school were less likely to drink alcohol at the age of 14 (69). School engagement is expected to postpone the initiation of alcohol and other drug use, and therefore decrease the risk of substance addiction. There is also an association between low school engagement and poor academic performance, antisocial behavior, risky behaviors and delinquency (70). School engagement has an effect on the adolescents self-esteem, where high level of school engagement is related to high levels of self-esteem (70).

There are many factors that have an impact on school engagement and an important one is positive parent-adolescent relationships (71,72). Other important factors for school engagement are school climate, social relationships with classmates and teachers (71).

Adolescents who perceive they have support from their peers have an increased motivation in school (73). Gender, socioeconomic status and ethnicity are also moderating school engagement (70). Adolescents with a high consumption of alcohol have a lower school engagement one year later (69). Bullying is another factor that lead to low engagement in school, since students that feel unsafe become less engaged in their school activities (74).

1.4.2 Attendance

Most students have a few days of absence per school year. Non-attendance can be caused by both illness and other accepted causes, but also be due to truancy and school refusal (75).

High non-attendance in school is linked to problems such as teenage pregnancies (76), illicit drug use (77), academic failure, early sexual debut and weapon possession (78). It is also a main predictor of school-drop outs which can lead to economical, health and social problems in adulthood (75). There are many risk factors of non-attendance in school such as school phobia, anxiety, depression, perfectionism, teenage pregnancies, family problems, poverty, criminality, poor adult supervision, bullying and poor school climate (75). There are risk factors in different domains, ranging from psychological, parental, school and environmental (75) and a study from Norway found these many of the risk factors are closely interlinked (79). On the individual level anxiety, depression, feelings of safety in school and parental

unemployment are all risk factors for non-attendance (79). A study from Sweden found that the teachers considered that the most common cause for non-attendance in school was related to family factors and adolescence depression (80).

1.5 Sweden

1.5.1 Disability in Sweden

Around 1.5 million Swedes live with a disability (81). Around 15 % of all children in Sweden self-rate that they have a disability or a long-term health problem (82). There has been an increased prevalence of neuropsychiatric disabilities in Sweden; one example is the prevalence of ASD that has increased almost 3.5 fold among children aged 2-17 years from 2001 to 2011 (83). The main increase occurred in the group of children without intellectual disabilities (83). The increase of ASD in Sweden is likely to be caused by extrinsic factors such as increased diagnostics and awareness (83). The same is seen in ADHD where there has been an increase in Sweden in all age groups, from 1.1 per 1000 persons in 2006, to 4.8 per 1000 persons in 2011 (84).

The Public Health Agency of Sweden did a national survey studying the health of adolescents and found that adolescents with self-reported disabilities rated their health worse in comparison with their peers without disabilities (85). They had worse mental health and experienced more stress (85). There was also a difference in health-related behaviours, where adolescents with disabilities more frequently consumed alcohol, took snuff, smoked and were more physically inactive (85). Children with neuropsychiatric disabilities are a particularly vulnerable group, both when compared to other disability groups and children without disabilities (82). Children with neuropsychiatric disabilities have significantly more psychosomatic problems such as head ache, stomach ache, back pain and dizziness in comparison to children without disabilities (82). When it comes to living situation, more children with neuropsychiatric disabilities have divorced parents and live with only one of the parents (82). The parents of children neuropsychiatric disabilities also have lower education and socio-economic status in comparison to parents of children without disabilities (82).

The Swedish Government has created a disability policy that aims to provide all citizens with equal opportunities, and close the gap between people with and without disabilities (81). The policy wishes to increase the participation in the society for people with disabilities, and that disability issues should be taken in to account in all areas of society (81). According to the

Swedish Education Act, every child has equal rights to participate in education (86). The development and desire to learn should be promoted, and the education should be adapted to each student's capacity and need (86). Children with disabilities have the right to have their education adapted to their individual needs, so that they may participate fully and progress in their knowledge development (86).

1.5.2 Swedish schools

Sweden invests significantly in its educational system and has the tenth highest expenditure per student when compared to other Organisation for Economic Co-operation and Development (OECD) countries (87). However there has been a decline in the quality of the educational system when looking at academic achievement, with a decrease in the students' performance in basic skills, such as reading, mathematics and natural science (88). Sweden is now below the OECD-average in these subjects (88). Another challenge exists in the transition from school to work, where adolescents face problems entering the labor market. This is especially evident for adolescents who have not completed secondary education and adolescents with other ethnic background than Swedish (88). There seems to be a segregation within the Swedish school system where students with different socio-economic backgrounds go to different schools (89). There is also a trend of an increasing gap between the students who perform well and the student who perform poorly in school (87). Another gap is found between gender, where girls are performing better than boys in school (87). Sweden also faces a shortage of teachers, and many teachers in school are not satisfied with their working conditions (89). Despite this, most Swedish students have a positive view of their school (87). In a report from 2012 most students felt safe in school, in the classroom, during recess and to/from school (96-99 % of all students) (90). Most children (94%) in Sweden have at least one close friend in their class, but this decreases slightly as the child grows older (90). Different forms of victimization occur in the Swedish schools, and 3% of the Swedish students in grade 4, aged 10 years old, report that they are physically hurt by another student at least one time each month (90). 1 in 10 children report that the other students do not like them, expressed by teasing and jokes about them. These children more frequently suffer from headache, stomach ache and sleeping difficulties (90). Around 67 % of all students report they feel stressed about school (90).

When it comes to the situation for children with disabilities in Swedish schools, they have lower well-being in school than children without disabilities (85). The group of children with neuropsychiatric disabilities is the group with the overall lowest well-being compared to the

other groups (85). The children with neuropsychiatric disabilities are also performing worse in school according to their parents (85). Out of the parents of children with physical disabilities, 81% rate that their children are doing well in school in comparison with 46% of the parents of children with neuropsychiatric disabilities (85). In Swedish schools children with neuropsychiatric or physical disabilities are three times more likely to get bullied than children without disabilities (85).

1.5.3 Participation in Swedish schools for adolescents with neuropsychiatric disabilities

There are only 4 scientific articles, which have been published the last 15 years that investigate the participation situation in Swedish schools for adolescents with neuropsychiatric disabilities, to the knowledge of the thesis author. One study conclude that children with the neuropsychiatric disabilities DAMP or ADHD were performing worse in school regarding writing and mathematics skills, as an example 60% of the boys with had extensive difficulties in school (91). The girls scored better than the boys (91).

The three other studies investigated the situation for children with ASD (56,57,61), and two of these studies concluded that children with ASD had low participation in school (56,57). The third study found that teachers were aware and had an insight of the students own perception of participation in school, as shown when investigating the agreement between teachers' and students' ratings regarding the students' perceived participation (61). These three studies are including both dimensions of participation, but none are investigating underlying factors for the low participation and they are only focusing on one diagnosis within the neuropsychiatric disability group.

1.6 Research gap

There are no studies, which includes both components of participation: engagement/involvement and attendance, that study the situation for all adolescents within the neuropsychiatric disability group in comparison to adolescents without any of these disabilities. There is also a need to explore the underlying factors that can lead to restricted participation for this group.

1.7 Aim and Objectives

The aim of the thesis is to investigate if there are differences between adolescents aged 12-13 years old, with and without neuropsychiatric disabilities in regard to participation in school.

Another aim is also to evaluate if external or individual factors are associated with the restricted participation.

Specific objectives:

1. To analyze if there is a difference in participation in school between young adolescents with and without neuropsychiatric disabilities, in terms of both engagement and attendance.
2. To investigate if there are differences between the adolescent with and without neuropsychiatric in relation to predictors that is related to restricted participation such as relationships with teachers, bullying, connectedness to parents, family economy, risk behaviors and gender.
3. To examine if the association between restricted participation and neuropsychiatric disabilities is influenced by other external or individual predictors that are associated with restricted participation.

2. Method

2.1 Study Design

Longitudinal Research on Development in Adolescence (LoRDIA) is an ongoing longitudinal multidisciplinary research programme, examining adolescents development into adulthood with an emphasis on social network, health, disability, school, well-being, mental health and use of drugs in Sweden. The cohort consists of 2021 adolescents that are followed from the age of 12-13 years until they are 18 years old. The data is collected at 4 occasions, starting when the adolescents are in the 6th or 7th grade, aged 12 and 13 years (92). The research project is a cooperation between Jönköping University, School of Health and Welfare and the University of Gothenburg (93). The data of the current study was derived from the first data collection of the research project. This is a cross sectional study consisting of a survey filled in by the adolescents themselves and also data from school registers regarding their non-attendance.

2.2 Study Setting

The adolescents came from schools in Gnosjö, Värnamo, Härryda and Vårgårda, which are 4 municipalities in the southern part of Sweden that have between 9000-36000 inhabitants. These municipalities are within close proximity to each other geographically, but there are

differences between them. The Swedish Association of Local Authorities and Regions have categorised Sweden's 290 municipalities in 10 categories based on their characteristics (94). Gnosjö and Värnamo are classified as "Product Manufacturing Municipalities", where 34% or more of the population are working in manufacturing, construction, energy or environment (94). In total 54 out of the 290 municipalities in Sweden belongs to this category (94). Härryda on the other hand belongs to the group of "Suburb to Larger Cities", together with 21 other municipalities (94). In this category, 50% of the people living in the municipality are commuting to work in a large city in another municipality (94). Vårgårda is a "Commuting Municipality" where 40% of the inhabitants are commuting to another municipal. In this category there are 51 municipalities (94). When looking at the proportion of the population with higher education, three of municipalities were below the national average of 26% (10% in Gnosjö, 16% in Värnamo and 16% in Vårgårda). This differs in Härryda where 32% had higher education (95).

Concerning the number of students enrolled in compulsory schooling in the fall of 2013 Härryda had most students with 4385 children. This was followed by Värnamo with 3442 students, then Vårgårda with 1152 students and Gnosjö had the least students with 1024 enrolled in the compulsory school (87). There were also differences between the four municipalities regarding the health of the adolescence and school performance. The percentage of sixth grade students who reached the knowledge target in school differed between the four municipalities (87). Härryda had the highest proportion of sixth grade students who reached the knowledge level in 2015, in comparison to the other municipalities included. They were ranked 26 of the 290 municipalities in Sweden with 88% of their students reaching the knowledge target (90% of the girls and 87% of the boys) (87). Vårgårda was performing the worse with 78% of the students reaching the target (77% of the girls and 70% of the boys), ranking 162 of the 290 municipalities (87). The amount of bullying that occurred in the schools also differed and 21% of the students in 9th grade in Vårgårda answered that someone in their class were bullied (96). This can be compared to 13% in Gnosjö, 17% in Härryda and 18% in Värnamo (96).

Another difference was the mental health status of the adolescents. Vårgårda had the highest proportion (25%) in Sweden of adolescents that reported that they feel unhappy (97). This number can be compared to 7% in Gnosjö, 10% in Värnamo and 13% in Härryda (97). Vårgårda had the higher proportion of adolescents that had psychosomatic problems and low wellbeing in comparison to the other municipalities (59). There seems to be a difference

between the municipalities in the percentage of adolescent that consume extensive amounts of alcohol. In Vårgårda 18% of the adolescents in grade 9 drank vast amounts of alcohol at least twice a month, compared to 6% in Gnosjö, 11% in Värnamo and 14% in Härryda (99).

2.3 Study population and sample size

Every student in the 6th and 7th grade, age 12-13 years, in Gnosjö, Härryda, Vårgårda and Värnamo municipalities was invited to participate. There were 2021 students in these grades during the fall of 2013, of whom 318 declined to participate. Of the remaining 1703 students, 1520 filled in the questionnaire, giving a response-rate of 75%. Data was also gathered from the school administration on the students' grades, attendance, gender and immigration status. This data was collected both from the students who participated and the non-respondents.

2.4 Data collection

The data was collected between November 2013 and April 2014, from 31 schools. The questionnaires for the students were administered within the students' classroom with the support of staff from the LoRDIA research team from Jönköping University. The questionnaire for children with intellectual disabilities or children with difficulties reading and understanding written text was adapted to their cognitive ability. This adapted version was developed after 4 pilot projects. The questionnaire took 1.5-2 hours for the student to complete, including a break. The students who were not in the school the day of data collection received the questionnaire per mail. Data was also collected from the school records regarding the student's non-attendance.

2.5 Variables

The questions used in the questionnaire were based on previously used instruments (100–102). The questionnaire consisted of 374 questions, divided in to 25 scales/indexes. There were two different questionnaires filled in by the adolescents, the original one for adolescents without difficulties reading and writing, and one adapted version. The following study used merged data from these two questionnaires. See annex 3 for more information about the scales used in this study.

2.5.1 Dependent variable - Participation

A summative score for participation was constructed by combining a scale for engagement and hours of non-attendance, with an internal consistency of a Cronbach-alpha of 0.62, see table 1. The summative score was divided in 2 categories: unrestricted and restricted participation. Restricted participation was defined as scores above the median on the

participation scale. The median was calculated from the population that consisted of all adolescents, both with and without disabilities. The median on the participation summative score was 9, and therefore everything equal or above 10 was considered as restricted participation. Participation is context dependent and in this way restricted participation was defined for this particular setting. The scale consisted of the following measurements:

2.5.1.1 Engagement scale

Engagement in school was self-rated by the adolescents using the Engagement in School part of the School Adjustment Scale by Kerr and Stattin (103). This part of the scale has been used in previous studies in Sweden to measure engagement in school, and it focuses in particular on motivation and attitudes concerning school (104). The scale consists of 5 questions: Do you enjoy school?; Do you try to do the best that you can in school?; Do you feel that you are forced to be at school against your will?; How would you describe the relationship between you and school?; Are you satisfied with your school work? In the original scale, each question had five response alternatives, ranging from strongly agree to strongly disagree. The alpha reliability for this scale was 0.80 in a previous study (105). The version used in the current study is adapted to children with cognitive impairments, with only 3 response alternatives, with a Cronbach alpha of 0.66. See table 1. This scale had a summative score ranging from 5-15, where a higher score indicate lower engagement. Also in the previous research, this scale have been used as a numerical variable (103–105).

2.5.1.2 Attendance

The hours of non-attendance during the school year was collected on each student. This data came from the school records, of the same academic year as the questionnaire was carried out. Using school records is a common way to measure non-attendance and have been used in previous studies investigating adolescents absenteeism (79,106,107). In the Swedish school system, the students in grade 1-6 spend on average 755 hours/year (600-850 hours/year) in education (108). The time in education increases as the child grows older, and in the 7th to 9th grade this is 922 hours/year (850-950 hours/year) (108). Each municipality decides locally how they want to divide the hours during the school years. The obligatory education is at the most 190 days and at least 178 days per school year (109). There is no data available on average hours of non-attendance in Swedish schools. However, a report from Stockholm found that 34% of all the girls and 29% of the boys had voluntary absenteeism at least one time in the previous 10-weeks (110). It is common to be absent a few days from school each school year. Problematic non-attendance is defined by Kearney as having more than 15% of

absence during any period of 15 weeks in the school year (75). National studies from the United States of America have been defining chronic school absenteeism as missing 10 % or more of a school year (111). In this study this definition was not used since there was only one person with more than 75 hours of non-attendance during the school year. The population of this study had a low median for hours of non-attendance, with 4.6 hours. The hours of non-attendance was divided in three groups to correspond with the participation scale: 1 point for non-attendance below the median (0-4.6 hours of non-attendance), 2 points for everything between the second and the third quintile (4.7-8 hours of non-attendance), and 3 points for everything above the third quintile (9< hours of non-attendance). These scores were summed together with the scores of the engagement scale to produce the final scale for participation.

Table 1: The items and scoring of the Participation scale.

Participation scale	
Question	Score
Are you satisfied with your schoolwork?	Yes, often: 1 Sometimes: 2 No, rarely: 3
Do you try to do the best that you can in school?	Mostly: 1 Sometimes: 2 Almost never: 3
How do you like school?	Good: 1 Fairly: 2 Bad: 3
Do you feel that you are forced to be at school against your will?	Yes, often: 3 Sometimes: 2 No, rarely: 1
How would you describe the relationship between you and school?	Like best friends: 1 Like friends, but not as close friends: 2 Like enemies: 3
Hours of non-attendance	Median and below: 1 Second to third quintile: 2 Third to fourth quintile: 3
Categories	Unrestricted participation= Equal or below 9 Restricted participation= 10 and above

2.5.2 Key independent variable- Self-rated neuropsychiatric disabilities

The adolescents were asked to report if they had an impairment and rate the severity of the disability. This instrument has previously been used in Sweden, in a study from 2011 by the Public Health Agency of Sweden (82). This study was a part of a Nordic research project investigating the health and welfare for children and adolescents in the Nordic countries (82). The adolescents answered if they had an impairment such as diabetes, visual impairment, hearing impairment, speech problems, epilepsy, motor disability, autism, dyslexia etc.

The current study uses the same classification for neuropsychiatric disabilities as the study by the Public Health Agency of Sweden. The following diagnoses were included as neuropsychiatric disabilities: Attention deficit hyperactivity disorder (ADHD), deficits in attention, motor control and perception (DAMP), minimal brain dysfunction (MBD), psychiatric problems, autism syndrom, Aspergers syndrome, difficulties reading and writing, difficulties counting, speech impairment and intellectual disability (82). The students that had missing values on any of the items, were included as not having that particular impairment.

2.5.3 Other predictor variables

See annex 2 for concept map of the pathways between neuropsychiatric disabilities and restricted participation, and how the predictor variables are interlinked.

2.5.3.1 External factors

Relationships with teachers, was investigated by a scale used in previous research (103,105,112,113). The scale was developed in 2000 (103) and the current one consisted of 12 questions answered by the students: Do the teachers in the school care about you?; Can you talk to the teachers in school about things that do not relate to school?; Does the teachers like you?; If you have problems with something in school, can you then talk to your teacher?; Does the teachers approve talking to you about matters that do not relate to school if you wish?; Are there teachers you can talk to if you have problems in school?; Does the teacher give you compliments when you are doing a good job?; Are the teachers fair to you?; Does the teachers in the school care about the students?; Are the teachers fair to the students?; Does the teachers like the students?; Does the teachers give the students positive feedback?. This was answered with 3 response alternatives. A summative score was created with a Cronbach Alpha of 0.89. This scale was used as a numerical variable as done in previous research (105), and a higher score indicated a more negative relationship.

Bullying/ Peer victimization was assessed the same way as done in previously research on adolescents in Sweden (114). Three of the questions came from a scale that was developed by Alsaker et al in 1999 (115) to measure both bullying victimization and perpetration, and this scale have been used in studies in Sweden with adolescents (116,117). Only the questions regarding being a victim of bullying were included: Have other students signaled that they don't want you to join them, during this semester?; Have you been hit, kicked or attacked in a negative way in school or to/from school? (this semester?); Have you been ridiculed or teased in an unpleasant manner, or called ugly things in school or to/from school? (114). The other five questions measured harassment and asked the adolescents if they had been exposed to personal insulting behaviors, and the questions were: Has anyone said things about the way you look, like fatso, skinny, scrawny, big nose, freak, elephant ears, fatty, fat pig, or anything like that?; Has anyone written condescending things about you, for example on boards, walls, lockers or other spots?; Has anyone commented or made fun of you or the way you look in a derogatory way?; Has anyone told you that you need to change to be accepted, ex. lose weight, change clothes or the way you behave?; Has anyone criticized you for personal matters, as an example told you that you are a loser, freak, dork or stupid? (114). These questions were developed in a study by Jutengren et al. 2010 (114). A summative score was created where a higher score indicate greater bully victimization, and that the adolescent more frequently was exposed to different forms of bullying. The scale had Cronbach Alpha of 0.80.

Relationship to parents was assessed by scales that examined if the adolescent felt connected to their mother and father, if the parent were a foundation of emotional support and a secure base. These scales have been used on adolescents in Sweden in previous research (118) to examine connectedness to parents and was developed by Tilton-Weaver et al. 2009 (119). The original scale had 7 response options while the adapted one used in this study had 3 response options: no, sometimes and yes. The scale consisted of 5 questions that were answered in relation to the mother and the father: I know mum/dad is there when I need her/him; I feel that I can try new things since I know mum/dad support me; I share my private thoughts and feelings with my mum/dad; when I am angry, sad or worried mum/dad can make me feel better; mum/dad encourage me to follow my dreams. A mean summative score was created including all adolescents that had answered at least 4 questions each, with a maximum score of 3, where a higher score indicated a stronger connection to the parent. The connectedness to the mother and father was measured separately, with one score for the mother and one for the father.

Family economy according to the adolescent was measured by 2 questions: How is your economy in comparison to other people where you live?; In comparison with your classmates, do you have more or less money?. There is a significant relationship between these two questions (p-value for Pearson’s chi square test < 0.001). Only the question regarding the family economy in comparison to other people in their living area is included in the analysis.

Table 2: The relationship between the two items to measure economic situation.

	We have less money than other families n (%)	We have the same amount of money as other families n (%)	We have more money than other families n (%)
I have less money than my classmates	88 (53.3)	144 (14.0)	14 (5.0)
I have the same amount of money as my classmates	63 (38.2)	747 (72.8)	115 (41.1)
I have more money than my classmates	14 (8.5)	135 (13.2)	151 (53.9)
Total	165 (100)	1026 (100)	280 (100)

2.5.3.2 Individual factors

Risk behaviors: was measured by examining if the adolescent had tried drugs. This scale had been used by the Swedish Council for Information on Alcohol and Other Drugs (CAN) in the yearly nation-wide survey on adolescent's drug abuse (101). The scale consisted of 6 questions; Have you ever smoked cigarette?; Have you ever used snuff?; Have you ever snorted/boffat?; Have you ever been drinking alcohol?; Have you ever taken narcotics (hash, marijuana, amphetamine, heroin, cocaine, ecstasy, gammahydroxybutyrat (GHB)) or other drugs classed as narcotics?. In this study this variable was divided in two categories: have used drugs and have not used drugs. If the adolescent answered yes on any of the questions they were classified as having used drugs.

Sex: The adolescents answered if they were a boy or a girl.

2.6 Statistical Analysis

Statistical analysis were done using the R statistical software package, version 3.2.2 (120) and the R Commander software (121). The significance level was set at $p < 0.05$ and 95% Confidence Interval (CI) was used for Odds Ratios.

To describe and summarize the data, numerical summaries were carried out to determine mean and standard deviations of the numerical variables (relationship to teachers, connection to parents, bullying) for adolescents with and without disabilities. For the categorical variable (gender, drug use, family economy and participation) frequency distribution was performed for adolescents with and without disabilities. The relationship between adolescents with or without neuropsychiatric disabilities and unrestricted or restricted participation was first investigated by a Pearson's Chi Square Test.

The differences between adolescents with unrestricted and restricted participation was examined to understand what other factors were associated with restricted participation, independent of disability status. Each numerical predictor (bullying, relationship with teachers, relationship with parents) was investigated in relation to participation, visually by a plot of means (data not shown) and by a Welsch Two T-sample since equal variance could not be assumed. Equal variance was tested with a Levene's test, $p < 0.05$. Gender, family economy and risk behavior and the relationship to participation were investigated with a cross table and Pearson's Chi Square Test.

The predictors that were associated with restricted participation was further investigated in relation to neuropsychiatric disabilities, in order to understand if there were differences between adolescents with and without disabilities when it came to other factors that were associated with restricted participation. The numerical predictors were investigated a Welsch Two Sample T-test since equal variance could not be assumed, tested with Levene's test. A Pearson's Chi-square test was performed with the categorical data.

All the predictors were included in a logistic regression model, to explore their relation to each other and restricted participation. Neuropsychiatric disabilities were included to see how the relationship to restricted participation was influenced by the other predictors. First each predictor was tested independently in univariate logistic regression for crude odds ratios. Secondly all significant predictors were included in a multiple logistic regression model.

2.6.1. Bias

There was no risk of selection bias since everyone in the 6th and 7th grades in the four municipalities were invited to participate. The data was collected in the school and parental cooperation was not required since passive consent was taken, reducing the risk of selection bias. However one possible cause for selection bias could have been that the students with high non-attendance were not in school the day of the data collection, but this was not the case since there were no differences between the ones who participated and the ones who did not. There is data from 1965 students, including 262 of the ones who declined to participate, collected from the school registers. A previous study have looked at the differences between the adolescents who answered the questionnaires and the non-respondents. There were no significant difference between the participants and the non-respondents regarding gender ($p=0.216$), immigrant status ($p=0.066$), grades ($p=0.155$) or attendance ($p=0.520$), meaning that there are no known differences between the participants and the population (93).

To assure that the participants included in the thesis analyses were not different from the population, two missing value analysis was conducted. First, the difference between the adolescents that were excluded from the analysis because of missing values on the dependent variable and all the adolescents who answered the questionnaires was investigated. Secondly, an analysis was conducted to explore the differences between the ones included in the analysis and the ones who were missing from the multiple logistic regression analysis. The difference regarding gender, family economy and disability was explored by a Welsh Two sample T-test and Pearson's Chi square test.

There could be some bias introduced as a result of measurement inaccuracy, both in relation to the independent and dependent variable. The main predictor 'neuropsychiatric disability' was self-rated by the adolescents which could be a concern since it is not possible to determine if they had the diagnosis or not. To target this issue, the neuropsychiatric disability group was further investigated, in relation to severity of impairment, to see if there were differences within the group concerning participation. The neuropsychiatric disability group was divided in two groups: the ones who reported that they were suffering/worrying about the impairments and the ones who did not. Univariate logistic regression was carried out and also multiple logistic regression adjusted for the significant predictors of restricted participation.

Another possible source for bias is the complexity of measuring participation. To investigate the dependent variable further, several analysis was conducted. The main analyses presented

in the thesis, were done with restricted participation defined as a score above the median on the scale. However, analysis (the difference between adolescents with and without disabilities, and how this relationship is influenced by other factors) was also conducted with other participation outcomes. The reason for this was to further investigate the participation variable in relation to neuropsychiatric disabilities. The first of these participation outcomes was a categorical variable, defining restricted participation as everything above the third quintile (equal to or above 11 on the participation scale) (data not shown). The second outcome used the participation scale as a numerical variable (data not shown). The differences between the adolescents with and without neuropsychiatric disabilities were also calculated with the engagement scale and hours of non-attendance independently, with a Welsch Two Sample T-test. Univariate and multiple linear regression could not be calculated with hours of non-attendance because of deviations of assumptions.

The strength of the association between neuropsychiatric disabilities and restricted participation was assessed by both univariate and multiple logistic regression model adjusted for the significant predictors. The crude and adjusted odds ratios was compared to assess the issue of confounding, by looking at major changes in odds ratios and significance levels. To check for multicollinearity Variance Inflation Factor was calculated, and everything below 10 was considered as limited multicollinearity.

3. Ethical considerations

The research programme and data collection of LoRDIA was approved by the Region Research Ethics Board in Gothenburg, Sweden (No. 362-13, 2013-09-25). This research is in line with the Helsinki Declarations and it promotes respect for the participants and protect their rights and health (122). An invitation to participate in the study was sent to all parents of the 2012 adolescents. They received an information letter that explained the purpose of the study. Passive consent was taken from the parents, meaning that it was required by the parents to sign and return a form to refuse participation of their child. On the day of the data collection, the students themselves gave a written consent and were informed in oral and written that it is voluntary to participate in the study, that the data will be handed confidentially and that they can withdraw from the study at any time. Every participant was assigned a code number, and their names and contact information was removed and saved on a CD kept in a locked safe. All the questions in the questionnaires have previously been used

on adolescents in Sweden (100–102), without any negative consequences reported. However this research investigates a sensitive topic and if the participants experienced emotional distress they were informed to contact a welfare officer at the school. All students received the contact information of the welfare officer. During the data collection the adolescents were given something to drink and eat, and breaks were scheduled. The benefits of this research will be an increased knowledge about development related to physical and mental health during adolescence into adulthood. The participants of the research could benefit from this study as each school will be given their results from the study, and can therefore use this information when planning activities.

4. Result

4.1 Participants

4.1.1 Missing from the dependent variable

In total 1274 adolescents were included in the final analysis, see figure 1 for a flow-chart of participants. There were 246 adolescents (16% of the ones who completed the survey) that had missing values on the dependent variable and were therefore excluded from the analysis. Out of them, 46 had missing observations on one or more of the items in the engagement scale and for 205 adolescents data was missing from the school registers regarding their attendance. There were no significant differences between the adolescents that were excluded from the analysis and the ones who were included, in regards of disability status, sex or ethnicity, see table 3. The only difference between the groups was that adolescents that came from a family that had less money or more money than other families were more likely to have missing values, in comparison to adolescents that came from families that had the same amount of money as other families ($p: 0.014$), see table 3.

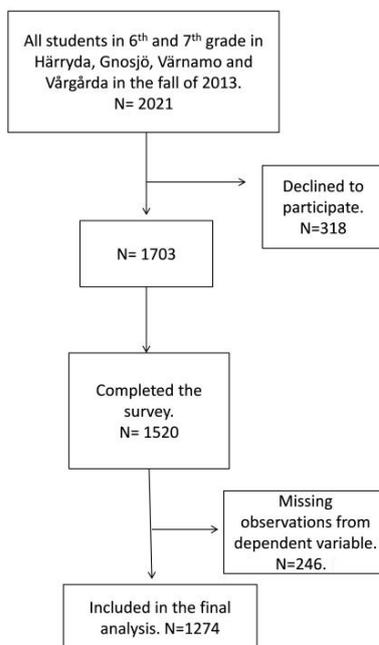


Figure 1: Flow chart of participants in the study, adolescents aged 12-13 years from the south of Sweden. Data obtained from the research project LoRDIA in 2013- 2014.

Table 3 : Presenting the differences between the group of young adolescents that had missing values on the dependent variable and the ones who were included in the final analysis. Presented with rounded column percentages. Data obtained from LoRDIA from four municipalities in the south of Sweden, N=1520

	Missing observations on dependent variable	Included in the final analysis	P-Value for Pearson's chi square test
Neuropsychiatric disability	n (%)	n (%)	
Yes	48 (19.5)	227 (18)	
No	198 (80.5)	1047 (82)	0.527
Sex			
Male	120 (49)	631 (49.5)	
Female	126 (51)	643 (50.5)	0.830
Family economy			
We have more money than other families	55 (24)	227 (18)	
We have the same amount of money as other families	143 (61)	891 (71)	
We have less money than other families	34 (15)	133 (11)	0.014
Country of Birth			
Born in Sweden	234 (95.5)	1195 (94)	0.338
Born abroad	11 (4.5)	77 (6)	
Total	246	1274	

4.1.2 Background characteristics

In total, 1274 adolescents were included in the analysis, 643 girls and 631 boys with a mean age of 12.6 years (11-14 years old). The majority of adolescents were born in Sweden (94%). Out of all the adolescents, 5% did not speak Swedish at home, 13% spoke both Swedish and another language and 82% spoke only Swedish. There were 302 adolescents (24%) that had parents that lived separately. See table 10 in annex 1 for background characteristics.

Out of all the adolescents included, 442 had restricted participation in school (35%) and 832 had unrestricted participation (65%), see table 10 in annex 1. Most adolescent included did not have a neuropsychiatric impairment (82%). Out of the 227 adolescents that had a neuropsychiatric disability, 34 % had more than one impairment. The most common neuropsychiatric impairment was symptoms of dyscalculia and dyslexia, see figure 2. The neuropsychiatric impairments had different impacts in the adolescents lives, and 2% rated that they were suffering or worrying about their impairment a lot, 20% quite a lot, 45% just a little bit, and 33% not at all. When it came to the relationship with friends, 17% of the adolescents with neuropsychiatric impairments said that their disability disturbed this relationship quit a lot or a lot. However, around half of the group (54%) rated that their impairment did not disturb their relationship with their friends at all. Concerning school work, 40% rate that their disability was disturbing this quite a lot or more. See table 10 in annex 1.

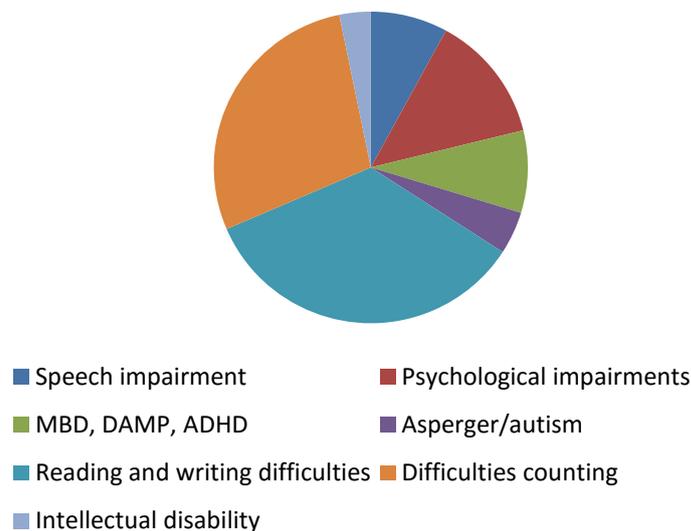


Figure 2: Distribution of different types of disabilities within the group of adolescents with neuropsychiatric disabilities from the South of Sweden, n= 227. Data from LoRDIA, 2013-2014.

Table 4: Neuropsychiatric disabilities among adolescents in the 6th and 7th grade from four municipalities in the south of Sweden included in the research project LoRDIA, 2013-2014. N=1274

Disability	Number	Percentage
Neuropsychiatric disability	227	18
No neuropsychiatric disability	1047	82
Type of neuropsychiatric disability ¹		
Speech impairment	27	2.12
Psychological impairments	45	3.53
MBD, DAMP, ADHD	29	2.28
Asperger/autism	15	1.18
Reading and writing difficulties	117	9.18
Difficulties counting	96	7.54
Intellectual disability	11	0.86
Number of neuropsychiatric impairments the adolescent had ²		
1	150	66
2	61	27
3	6	3
More than 3 (maximum 7)	10	4

¹. Percentage out of total population of adolescents, N=1274. Row percentage. n/N

². Percentage out of population of adolescents with neuropsychiatric disabilities, n=227. Rounded column percentage

4.2 Participation in school for adolescents with and without neuropsychiatric disabilities

The aim of this study was to analyze if there was a difference between adolescents with and without neuropsychiatric disabilities regarding participation in school. The results from Pearson´s chi-square test show that adolescents' with neuropsychiatric disabilities were significantly more likely to have restricted participation in comparison to adolescents without neuropsychiatric disabilities ($p < 0.001$), see table 5. Out of the adolescents with neuropsychiatric disabilities more than half (58%) of the group had restricted participation in comparison to 30% in the group of adolescents without neuropsychiatric disabilities.

Table 5: Presenting the relationship between neuropsychiatric disabilities and restricted/unrestricted participation for adolescents in the 6th and 7th grade from four municipalities in the South of Sweden. Presented with rounded column percentages. N=1274

	Adolescents with neuropsychiatric disabilities n (%)	Adolescents without neuropsychiatric disabilities n (%)	P-Value for Pearson's chi square test
Unrestricted participation (n=832)	95 (42)	737 (70)	<0.001
Restricted participation (n=442)	132 (58)	310 (30)	
Total (N=1274)	227	1047	

4.3 Predictors associated with restricted participation

Another aim of this study was to identify which external and individual factors that were associated with restricted participation in schools among adolescents both with and without neuropsychiatric disabilities. When investigating these factors, there were differences between adolescents with restricted and unrestricted participation. As shown in table 6, adolescents with restricted participation had significantly higher scores ($p < 0.001$) on the scale concerning relationship with their teachers, meaning that they had a more negative relationship to their teachers. Adolescents with restricted participation also had higher scores on the bullying scale ($p < 0.001$) which indicate that they were more frequently exposed to different forms of peer victimization, see table 6. Having the lowest scores (8) on the scales indicate that the adolescent never were exposed to any form of victimization, but more than 8 means that they sometimes or often are exposed to some form of victimization. Regarding connectedness to parents, adolescents with restricted participation had lower scores on the scale ($p < 0.001$) indicating less connection. There was also a significant relationship between family economic situation and participation ($p < 0.001$). Out of the adolescents with restricted participation, 28% had tried drugs in comparison to 11% of the ones with unrestricted participation. There was a significantly greater proportion ($p < 0.001$) of boys in the group of adolescents with restricted participation (57%) in comparison to the group of adolescents with unrestricted participation (46%), see table 6.

Table 6: The relationship between bullying, relationship to parents and teachers, family economy, tried drugs, sex and participation for adolescents in the 6th and 7th grade from four municipalities in the South of Sweden, presented with mean, standard deviation (sd) or number and rounded column percentage, with p-values. Data from LoRIDA, 2013-14.

	Unrestricted participation	Restricted participation	P-value ⁸
	Mean (sd)	Mean (sd)	
Relationship to teachers¹	14.95 (3.44)	19.30 (6.09)	< 0.001
Bullying²	10.06 (2.14)	11.49 (3.18)	< 0.001
Connectedness to mother³	2.77 (0.37)	2.55 (0.52)	< 0.001
Connectedness to father⁴	2.72 (0.41)	2.45 (0.56)	< 0.001
	n (%)	n (%)	
Family economy⁵			
We have more money than other families	151 (18)	76 (17)	
Have the same amount of money as other families	611 (75)	280 (65)	
Have less money than other families	56 (7)	77 (18)	< 0.001
Tried drugs⁶			
No	709 (89)	293 (72)	
Yes	85 (11)	112 (28)	< 0.001
Sex⁷			
Female	452 (54)	191 (43)	
Male	380 (46)	251 (57)	< 0.001

¹. Higher scores indicate a more negative relationship, n=1187

². Higher scores indicate more bullying victimization. n=1236

³. Higher values indicate stronger connectedness, n=1260

⁴. Higher values indicate stronger connectedness, n=1242

⁵. n=1251. ⁶. n=1199. ⁷. n=1274

⁸. P-value for Welsh two sample T-test on 'relationship to mother', 'relationship to father', 'relationship to teachers' and 'bullying'. P-value for Pearson chi square test on 'sex', 'family economy' and 'drugs'

4.4 Predictors related to restricted participation and their association with neuropsychiatric disabilities

When testing the predictors that were associated with restricted participation and their relationship to neuropsychiatric disabilities, differences between the groups were found. Adolescents with neuropsychiatric disabilities had more negative relationships with their teachers ($p = 0.030$) and were more frequently exposed to bullying ($p < 0.001$). They had more negative relationship to their parents ($p < 0.001$) and were more likely to come from families with less money ($p < 0.001$). They were also more likely to have tried drugs (< 0.001) and being boys (0.023), see table 7.

Table 7: Differences between adolescents with and without disabilities, regarding predictors that were significantly associated to restricted participation for adolescents in the 6th and 7th grade from four municipalities in the South of Sweden. Presented with mean or column percentages. Data from LORIDA.

	No neuropsychiatry	Neuropsychiatric disabilities	P-value ¹
	Mean (sd)	Mean (sd)	
Relationship to teachers	16.3 (4.87)	17.2 (5.31)	0.019
Bullying	10.3 (2.42)	11.6 (3.29)	<0.001
Connectedness to mother	2.7 (0.42)	2.6 (0.50)	<0.001
Connectedness to father	2.7 (0.47)	2.5 (0.54)	0.001
	n (%)	n (%)	
Family economy			
Have more money than other families	183 (18)	44 (19.5)	<0.001
Have the same amount of money as other families	754 (73)	137 (61)	
Have less money than other families	89 (9)	44 (19.5)	
Taken drugs			
No	840 (86)	162 (74)	
Yes	140 (14)	57 (26)	<0.001
Sex²			
Female	544(85)	99 (15)	0.023
Male	503 (80)	128 (20)	

¹ P-value for Welsh two sample T-test on relationship to mother', 'relationship to father', 'relationship to teachers' and 'bullying'. P-value for Pearson chi square test on , 'sex', 'family economy' and 'drugs'

² Presented with row percentages

4.5 Analysis of the influence of the predictor variables on the relationship between neuropsychiatric disabilities and restricted participation

As shown in table 8, in crude analysis adolescents with neuropsychiatric disabilities were 3.30 times more likely to have restricted participation (Crude OR: 3.30, 95% CI: 2.46-4.45) in comparison to adolescents without neuropsychiatric disabilities. When adjusting for gender, family economic situation, drugs, exposure to bullying and relationships to mother, father and teachers, the adolescents with neuropsychiatric disabilities were 2.89 times more likely to have restricted participation (AOR: 2.89, 95% CI: 1.99- 4.23).

Concerning the other predictors associated with restricted participation, attachment to mother was not significant after adjusting for the other predictors (AOR: 0.85, 95% CI: 0.52-1.41). The results also show that coming from a family that had less money than other families, as reported by the adolescent, increased the odds of restricted participation with 72% in comparison to the ones who came from families that had more money, however this did not reach significance when adjusted for (AOR: 1.72 , 95% CI: 0.95- 3.12). For each increase (1 point) on the scale of the relationship to teacher, the odds of restricted participation increased with 18% (AOR:1.18, 95% CI: 1.15- 1.23). High scores on the scale indicate a more negative relationship to the teachers. Concerning bullying, each increase (1 point) on the scale increased the likelihood of restricted participation with 7%, (AOR:1.07, 95% 1.007- 1.14, $p=0.028$). For each increase (1 point) on the scale of connectedness to fathers, the odds of having restricted participation decreased by 43% (AOR: 0.57, 95% CI: 0.36- 0.90). An increase on the scale indicated a stronger connectedness to the father. The boys and the ones who had tried drugs had almost two times higher odds for restricted participation (AOR: 1.91, 95% CI: 1.40- 2.61, and AOR: 1.91, 95% CI: 1.28- 2.84 respectively). See table 8 for crude and adjusted odds ratios.

There seems to be no issues of multicollinearity in the model, when looking at the variance inflation factor (VIF). All VIFs are between values of 1.03 and 2.22, see table 10 in annex.

Table 8: Crude and adjusted Odds Ratios (OR) with 95% Confidence Intervals (95% CI) from logistic regression model, presenting the associations between different predictors and restricted participation in school among adolescents 12-13 years in South Sweden (data from LoRIDA 2013-14)

	Crude OR (95%CI)	Adjusted OR (95%CI)¹²
Without neuropsychiatric disability	reference ⁴	reference
Neuropsychiatric disability	3.30 (2.46-4.45)	2.89 (1.99- 4.23)
Relationship to teachers ¹	1.21 (1.18- 1.25) ⁵	1.18 (1.15- 1.23)
Bullying ²	1.23 (1.17-1.29) ⁶	1.07 (1.007- 1.14)
Connectedness to mother ³	0.32 (0.24-0.42) ⁷	0.85 (0.52-1.41)
Connectedness to father ³	0.32 (0.25-0.42) ⁸	0.57 (0.36- 0.90)
Family economy		
We have more money than other families	reference ⁹	reference
We have the same amount of money as other families	0.91 (0.67- 1.25)	1.25 (0.84- 1.88)
We have less money than other families	2.73 (1.76- 4.26)	1.72 (0.95- 3.12)
Tried drugs		
No	reference ¹⁰	reference
Yes	3.19 (2.33-4.37)	1.91 (1.28- 2.84)
Sex		
Female	reference ¹¹	reference
Male	1.56 (1.24-1.97)	1.91 (1.40- 2.61)

¹. Numerical variable, where a higher scores indicate a more negative relationship.

². Numerical variable, where a higher score indicate more bullying victimization.

³ Numerical variable, where a higher score indicate more connectedness to the parent

⁴. n=1274 ⁵. n=118 ⁶. n=1236 ⁷. n=1260 ⁸. n=1242 ⁹. n=1251 ¹⁰. n=1199 ¹¹. n=1274

¹². Adjusted for the variables ‘neuropsychiatric disabilities’, ‘sex’, ‘family economy’, ‘relationship to mother’, ‘relationship to father’, ‘relationship to teachers’, ‘drugs’, and ‘bullying’. N = 1059

Table 12 in annex show the results from crude and adjusted OR when the neuropsychiatric disability group was divided in two groups, i.e. those who reported that they were suffering or worrying about their impairment and the ones who said they were not. There seems to be no differences between the two groups in comparison to one another, neither when looking at

crude or adjusted OR. Both groups had an increased likelihood to have restricted participation in comparison to adolescents without neuropsychiatric disabilities.

4.5.1 The difference between adolescents with and without disabilities when analysed with other participation outcomes

There were no major differences found between the previously presented results and the results analyzed with the other participation outcomes. Adolescents with neuropsychiatric disabilities had higher odds of restricted participation, when restricted participation was defined as a score above the third quintile (COR: 2.70, 95% CI: 1.97- 3.68). The same was found when the participation scale was used as a numerical outcome (β : 1.53, 95% CI: 1.20- 1.85). These other two ways of measuring participation also show an increased likelihood of restricted participation for adolescents with neuropsychiatric disabilities when adjusting for 'sex', 'family economy', 'relationship to mother', 'relationship to father', 'relationship to teachers', 'drugs', and 'bullying' (AOR: 2.26, 95% CI: 1.48- 3.42 and β : 0.94, 95% CI: 0.64- 1.23 respectively). These two measurements also found that negative relationship to teachers, trying drugs and being a boy led to significantly higher likelihood for restricted participation, both in crude and adjusted analysis (data not shown). They also show the same result concerning exposure to bullying, i.e. there is a significant but small association with restricted participation. None of the measurements found that poor connection to the mother was significantly associated to restricted participation when adjusting for the other variables. However there were some small differences, there were no significant association between restricted participation (defined as a score above the third quintile) and poor connection to the father when adjusting for all the other variables. Another difference was that the two measurements still found that being from a poorer family increased the likelihood for restricted participation when adjusting for other variables (data not shown).

When analyzing the engagement scale and hours of non-attendance independently, same results were found (data not shown). Adolescents with neuropsychiatric disabilities had significantly higher scores on the engagement scale, indicating lower engagement in school than for adolescents without neuropsychiatric disabilities (<0.001). Adolescents with neuropsychiatric disabilities also had significantly more hours of non-attendance in comparison to adolescents without neuropsychiatric disabilities (p 0.002). Adolescents with neuropsychiatric disabilities had a mean of 7.22 hours of non-attendance (sd: 6.32), and adolescents without neuropsychiatric disabilities had 5.74 (sd: 6.09).

4.6 Analysis of missing observation

In the adjusted logistic regression 215 adolescents were missing (17%), because of missing data on items within the scales. There were no significant differences between the adolescents that had missing values and the ones who did not in regards of disability status or sex. There were a differences between the groups concerning family economy and ethnicity. Adolescents that came from a family that had less money than other families were more likely to have missing values, in comparison to adolescents that came from families that had the same amount of money as other families or more money than other families. The adolescents that had missing observations were also more likely to be born outside of Sweden, see table 9.

Table 9: Comparison between the young adolescents from the south of Sweden that have missing data on items on the variables: ‘family economy’, ‘relationship to mother’, ‘relationship to father’, ‘sex’, ‘neuropsychiatric disability’ ‘relationship to teachers’, ‘drugs’, and ‘bullying’ and the adolescents that did not have missing values. Presented with rounded column percentages.

	Missing observations	Not missing observations	P-value
Neuropsychiatric disability	n (%)	n (%)	
Yes	45 (21)	182 (17)	0.191
No	170 (79)	877 (83)	
Sex			
Girl	108 (50)	535 (50.5)	0.939
Boy	107 (50)	524 (49.5)	
Family economy			
We have more money than other families	31(16)	196 (18.5)	
We have the same amount of money as other families	130 (68)	761 (72)	
We have less money than other families	31 (16)	102 (9.5)	0.025
Country of birth			
Born in Sweden	195 (91)	1000 (95)	
Born abroad	20 (9)	57 (5)	0.028

5. Discussion

5.1 Key Findings

This study aimed to investigate if there were differences between adolescents with and without neuropsychiatric disabilities when it came to participation in school. The results revealed that young adolescents with neuropsychiatric disabilities were more likely to have restricted participation in school, in comparison to adolescents without neuropsychiatric disabilities. Having a neuropsychiatric disability was also associated with other factors related to restricted participation in school. They were more at risk of bullying victimization, having more negative relationship to their teachers, coming from families with poorer economy, having lower connectedness to their fathers, being boys and more likely to have tried drugs. Yet, when adjusting for these factors that was associated with restricted participation, the relationship between neuropsychiatric disabilities and restricted participation in school was still strong.

5.2 Strengths and limitations

5.2.1 Study design, data collection and population

This study is a cross sectional study and therefore it is not possible to determine what is causing restricted participation since there is no temporal order of the independent and dependent variables. This study is only presenting associations and not causality. However, most neuropsychiatric disabilities are manifested in early childhood (19), meaning that there is a likelihood that the adolescents had symptoms of their neuropsychiatric impairment before their restricted school participation occurred. Still, this might not be the case for all neuropsychiatric symptoms, and reversed causality could be the case. As an example, restricted participation might lead to increased symptoms of dyslexia, dyscalculia (70) and also psychiatric disadvantages (49). In relation to the other predictors (bullying, relationship to teachers, connectedness to parents, drug use and family economy), no conclusion can be drawn on temporal order and it cannot be concluded what leads to restricted participation. There could also be a case of reversed causality where restricted participation itself leads to social isolation (70), involvement in drugs (68,69,77), poor relationship to teachers, remoteness from parents and may predispose the individual to bullying.

This study used data collected for the research programme LoRDIA, which is a cooperation between Jönköping University, School of Health and Welfare and the University of

Gothenburg. The research group involved in the study consisted of 15 people, including professors, associate professors, postdoctoral researchers and PhD students (123). The data collection was done in the adolescents' school with the support of staff from the research group, providing high quality data collection. The questionnaire was based on instruments that have been used before on adolescents in Sweden in previous research (100–102). Most questions had been used in the research project "Sju skolor" by Örebro University, but also in studies by the Public Health Agency of Sweden (124), the Swedish National Council for Crime Prevention (Brottsförebyggande rådet - Brå) (100) and The Swedish Council for Information on Alcohol and Other Drugs (Centralförbundet för alkohol- och narkotikaupplysning - CAN) (101). This is a strength, since the results from LoRDIA can be compared with other research. Another strength of this study is that it included all the adolescents in the ages 12 and 13 years, irrespective of their disability status. This is unique since many studies have excluded adolescents with cognitive impairments due difficulties answering complicated questionnaires (125). The current study used two different questionnaires, one original and one adapted version to include all students.

The aim of this study is to generalize the results on the population of adolescents in the four municipalities of Värnamo, Gnosjö, Härryda and Vårgårda. The study had a relatively high response rate of 75% (126), and there were no significant differences between the adolescents that was invited to participate (n=2021) and the ones who filled in the questionnaire (n=1520), with regards to grades, attendance, gender and immigration status. This implies that no group of student was left out of the study, which is positive since there otherwise could be a risk that adolescents with high non-attendance were not present in school the day of the data collection.

Despite this, it cannot be concluded that the sample studied in this thesis is representative of the population. First, the ones who came from poorer or richer households were more likely to have missing data on the dependent variable. This was mainly caused by missing data from the school registers regarding hours of non-attendance, and not by the adolescent not answering items in the questionnaire. Secondly, adolescents who came from poorer households and those who were born abroad were more likely to have missed answering items within the survey. This led to the fact they were excluded from the multiple logistic analysis, which can alter the results in the adjusted analysis. The ones who were worse off financially or were born abroad were more likely to be included in the crude analysis but not the adjusted. This could have been a contributing factor to the results that coming from family

with poorer economy was not significantly associated with restricted participation in adjusted analysis.

The results of this study can not be generalized on a wider population. When comparing the background characteristics of the study with the national average in Sweden, the study population had lower proportion of adolescents born abroad (6%). The national average of adolescents aged 12 years born aboard in 2014 was 10.7% for the boys and 11.2% for girls (127). Out of the adolescents in the study 24% lived with only one of their parents, and the national average was 20% for children 0-17 years in 2011(128).

5.2.2 Measurement instruments

The main limitation of this study is the complicated circumstances of measuring participation. Participation is a complex and context specific construct that has been defined in several ways (59). Many studies investigating participation for children have been lacking a clear definition of the participation construct, and there is evidently a deficit of clarity around the term (64). The number of studies that have investigated the participation in school for young adolescents are scarce, and they have used a variety of different measurement instruments. One more commonly used instrument in Europe (50,57,57,59) was developed by Simeonsson et al 1999 (65). This instrument investigate participation in approximately 25 different activities, such as participation in different classes, recess, orchestra, school dances, group projects and assignments (65). The instrument used in this research was investigating participation in school more generally by looking at the adolescents overall engagement in school and attendance. It measured if the adolescents attend their classes and their overall motivation and attitude towards school, such as being satisfied with their performance, doing their best, being happy in school and liking to go to school. However it can therefore not be concluded in what specific activities the adolescent are participating in, or how they participate. This instrument does not measure if the child is participating actively in specific assignments or with friends during the classes. The attendance component is only including attendance in class and not during recess. However it can be assumed that the engagement component rated by the students themselves captures both activities in the classroom and during recess. A previous study from Sweden found that adolescents viewed their participation mainly in relation to social interaction with peers and not academic achievement (129). However the engagement component in the current study probably includes both since it asks questions specific towards schoolwork but also overall feelings.

An advantage of the study is that it consists of both components of participation; being present and feeling engagement, motivation and involvement in the activity (130). This is something that has been lacking since many studies in the area have primarily been focusing on the attendance component (131). The current study employed two previously used instruments/measurements to investigate these two components. However since they are merged together this outcome cannot be compared to other studies, since no other studies have measured participation in this way. The participation variable consisted of a summative score that was divided in to restricted and unrestricted participation. There is a limitation with this summative score since only 1/6 of the measurement consists of the attendance component and 5/6 of the engagement components. This makes this measurement mainly focusing on engagement and not attendance. This was chosen since the hours of non-attendance was not a great issue in this population. To be able to compile hours of non-attendance, a continuous variable, with the rest of the participation scale, this variable was categorised in to three categories. This led to an increased risk of losing information and difficulties to compare the results with studies (132). To target this problem the difference between adolescents with and without neuropsychiatric disabilities was also analysed with the attendance component independently as continuous variables. Since the same results were found, it strengthens the validity of the results of the participation scale.

Previous studies have used different scales to measure participation. Some have used the scales as numerical outcomes, comparing the scores between different groups such as children with and without disabilities (56,57,133), different kinds of disabilities (58,59) or within one disability group (134,135) . Other studies have categorized participation as high or low by using the median score of the scale for the study population (53), and this was how it was done in the current study. However the adolescents included in the study had a low score on the scale indicating that they had relatively high engagement and few hours of non-attendance. A systematic review concluded that most studies investigating participation do not explicitly state a definition of restricted participation (64). ICF discusses restricted participation as being ‘determined by comparing an individual's participation to that which is expected of an individual without disability in that culture or society’ (8), and this correspond well to the current study. The participation of adolescents with neuropsychiatric disabilities was compared to their classmates whom were in the same school, with the same teachers and peers. To be certain that the definition of restricted participation was adequate, the analysis was also done with the participation scale in two other ways, with different cut-offs for

restricted participation and as a numerical variable. The same results were found in all analysis which makes the categorization of restricted participation as done in this study more trustworthy.

There are also some limitations with the main independent variable. The neuropsychiatric impairments were self-rated by the adolescents, which mean that the adolescents might not be diagnosed with a neuropsychiatric disability. Also, all the adolescents that have reported any type of neuropsychiatric impairment were included in the group of neuropsychiatric disabilities, no matter what the severity of the impairment. This means that some of the adolescents might only have an impairment and not a disability, since the impairment might not be hindering the adolescent in their everyday life (13). The current study reported a higher prevalence of neuropsychiatric disabilities (18%) than previous research (10%) (19), and the reasons for this could be many. One could be related to the self-reporting, since symptoms of neuropsychiatric disabilities can be found in the general population without being severe enough to lead to a diagnosis. This is mainly concerning the items that do not state the name of a diagnosis, but more describe the symptoms such as difficulties counting or reading, in contrast to autism/ADHD/intellectual disability. Another cause could be related to which disabilities that are included in the term 'neuropsychiatric disabilities'. The current study included dyscalculia, which was not done the previous study (19). Rare epilepsy syndromes and Tourettes syndrome was included in a previous study but not the current one (19). The current study included diagnosis based on the definition by he Public Health Agency of Sweden and the Nordic Study of Children´s Health and Well-being. This is an advantage since the prevalences of the different diagnosis in the current study could be compared to a Swedish sample in previous studies (82).

When looking at each individual diagnosis, some of the prevalence's seems to be more accurate than others. Concerning ADHD/DAMP/MBD the prevalence of the current study (2.28%) is lower than found in previous research (5%) (136). The same situation was found when looking at language/speech impairments that had a prevalence of 2% in this current study and had previously been reported to be 6% (29). However the Nordic Study of Children´s Health and Well-being found a prevalence of speech impairments that is more in line with the current study, with 2.2% (82). Psychiatric problems was found in 3.53% of the adolescents, in comparison to results of other studies that have found that between 3.05% to 23.9% of adolescents are suffering from these disabilities (137,138). The Nordic Study of Children´s Health and Well-being used the same way of measuring psychiatric disabilities and

reported a prevalence of 1.8% (82). The prevalence of ASD was similar to what is found in previous research (139). The proportion of reading and writing difficulties in this study (9%) correspond with previously reported prevalence of dyslexia in the population (5-10%) (27). The prevalence of difficulties with counting (7.54%) was a bit higher than reported in previous studies (3-6 %) (28). Cognitive disabilities occurred in 0.86% of the adolescence, and this can be compared to around 1% in other studies (140). The differences in prevalence between the current study and previous studies, could be related to the definition of the disability, how it was measured or what was the study population (21). However these numbers gives a guidance to interpret the prevalence of the current study, which seems to be rather accurate.

The disabilities included in the neuropsychiatric disability group are many and there are vast differences between them in what difficulties the adolescent face. However there might not be an issues with analysing them all as one group, since previous research have revealed that the type of disability is not related to the extent of the participation restriction (59). Several studies have been investigating participation of different types of disabilities (55,58,59), and found few differences between the different diagnosis, they all had limited participation in comparison to the adolescents without disabilities. The experience of being excluded is the same no matter of the cause for it. However to investigate further how the severity of the disability effected participation, an analysis to compare the ones who reported that they did not suffer from their impairment with the ones who did was conducted.

The three numerical scales for bullying, connectedness to parents and relationship to teachers, did not have any cut-off points leading to difficulties in interpreting the results, since it cannot be conclude what the difference in score really mean in everyday life. However this is the way these scales have been used before and it gives an indication of the situation, if the relationship to teachers are more negative/positive, if the connectedness to parents is stronger/weaker and if the adolescent is more/less exposed to bullying.

5.3 Discussion of the results

5.3.1 Restricted participation

Adolescents with neuropsychiatric disabilities have three times increased likelihood to have restricted participation in school. These results correspond with the findings of previous studies, that conclude that adolescents with neuropsychiatric disabilities have lower overall participation in school (48,56,57). However these previous studies have mainly been

investigating the attendance component and not engagement. The current study cannot conclude exactly where in school the adolescents had the restricted participation, but other studies have investigated this and found that participation was the highest in school outings and the lowest in unsupervised physical activities (48). With regards to particular subjects in schools, practical subjects, mathematics and science, were topics where adolescents with disabilities had lower participation (133). Adolescents with ASD have been found to participate less frequently in social interaction with their peers, however when they actually did they were equally involved (56). Children with disabilities have been found to have fewer friends (133), as an example adolescents with ADHD have fewer close friendships and experience more peer rejection, in comparison to adolescents without ADHD (141).

When investigating each component of participation individually, adolescents with neuropsychiatric disabilities had lower engagement in school. The same results are found in other studies reporting that children with ASD have limited engagement overall in school (142), and students with ADHD have been found to underachieve academically (143). Similar to previous studies, this study reports that adolescents with neuropsychiatric disabilities were more absent from school. Adolescents with ADHD have been found to be more absent during the school year and significantly more likely to drop out of school (144–146). However, the results of non-attendance of the current study should be interpreted carefully since the actual number of hours was low.

The findings also show that no matter how the adolescent rated the severity of their impairment, they all had lower participation than adolescents without neuropsychiatric disabilities. These findings corresponds with previous studies that found that the degree of impairment are of less importance (59), and that overall children with disabilities have lower participation in school in comparison to them without (133). On the contrary, other studies have found that degree of impairment have an impact on participation in for children with disabilities. Studies report that the children with the lowest participation are the ones with the most severe impairment and that there is a link between the severity of disability and participation (50,52–54,135). Perhaps the same results could have been found if the severity of disability was analysed in four groups (not suffering from the impairment, suffering just some, suffering quite a lot and suffering a lot) instead of two. However this was not done since the ones who were suffering a lot from the impairment were so few.

This study was only investigating participation in school, and can not conclude anything about participation in other areas of life. Other studies have found that the participation differs depending on situation and activity (53). However as seen in the background characteristics of the current study, more adolescents rated that they were suffering from the impairment in school than in other areas of life. This indicates that school participation was more problematic than participation at home, during the spare time and with friends.

5.3.2 Other factors associated with neuropsychiatric disabilities and restricted participation

The results also revealed that there were other factors that were associated to restricted participation in school. In adjusted analysis, used drugs, being bullied, having more negative relationship to teachers, poor connectedness to the father and being a boy, were significantly associated with restricted participation in school.

Previous research have found that positive interactions between students with disabilities and their teachers contribute strongly to high participation in school activities (59). Teachers are important to establish equitable participation for all students, and assuring that the child is an active participant in the class (135). A good teacher is described, by children with disabilities, as someone who is flexible, listens to the their own solutions and are not excluding them from the class (60). The teachers attitudes and ability to adapt the curriculum and instructions play a major role in whether the students are able to participate in settings such as the classroom, gym and cafeteria (135). The teachers' attitude towards inclusion of children with disabilities is affected by many factors such as the resources in the class, availability of human and physical support and the severity of the child's disability (147) but also by the teachers age, gender and training (148). Male and older teachers had more negative attitudes towards inclusion, and the same goes for the ones with low self-efficacy in their teaching skills, as presented in a study (148). Teachers have been found to be more prone to include children with sensory and physical disabilities in comparison to children with behavioural, intellectual or learning disabilities (147). These previous findings correspond with the results of the currents study that found that adolescents with neuropsychiatric disabilities had more negative relationships to their teachers in comparison to the adolescents without neuropsychiatric disabilities, and also that a more negative relationship to the teacher was associated with restricted participation.

Bullying is a form of systematic abuse and aggressive behaviour with the intention to harm other peers. When looking at the score on the bullying scale in this study it signals that

students were exposed to bullying victimization, since the mean for the different groups (adolescents with and without neuropsychiatric disabilities) was around 10-11. This means that some students sometimes/often were exposed to at least one form of bullying victimization. Previous studies have found that bullying is associated with low academic attendance, achievement (149) and low participation (150), however the same strong effect was not found in the current study since bullying only slightly increased the odds of restricted participation. Studies have found that merely, perceiving that the overall school climate is characterized by bullying is associated with low involvement and commitment to school, meaning that the negative effects of bullying reaches beyond the individual victims. This can be caused by an overall feeling of insecurity and fear of harassment that is leading to a decreased will to participate in school activities (74). This could be one explanation why no strong effect was found in the current study, since it is not only the individual victim of bullying that will have their school participation affected, but everyone in the class.

In this study population, adolescents with neuropsychiatric disabilities were more exposed to different forms of bullying victimization, in comparison to adolescents without neuropsychiatric disabilities, and this is supported by previous research (151). An explanation for this could be that children who have an impairment that is affecting social interaction skills, such as ASD, could be a target for ridicule and social exclusion as concluded in other studies (62). Children with ASD have been found to experience that their classmates do not understand them and that they are less liked (62). They feel more insecure in the school environment and interact less with their classmates (57). There is also a relationship between other neuropsychiatric diagnoses and bullying such as ADHD (152,153) and intellectual disabilities (154) and speech impairments (155).

The results from the current study found that coming from a family that had less money than other families, as reported by the adolescent, was associated with higher odds of restricted participation in comparison to the ones who came from families that had more money, however this association did not fully reach significance when adjusted for other variables. Still, the trend of the results is similar to what has been found in other studies, where coming from a poor family is significantly associated with low participation in school regarding non-attendance (75,156). And in the current study, when restricted participation was defined as a score above the third quintile, this relationship was significant.

Socioeconomic status and poverty have also been found to be associated with many childhood development disabilities/disorders globally (157). In the current study, adolescents

with neuropsychiatric disabilities were significantly more likely to come from families with less money (19.5%) in comparison to adolescents without neuropsychiatric disabilities (9%). These results should however be interpreted carefully since the family economy was self-reported by the adolescents in comparison to other families where they live. Studies from other high resource settings and the relationship between neuropsychiatric disabilities and socioeconomic status, are scarce. ADHD is the diagnosis where most studies exist and these studies conclude that children with ADHD are more likely to come from disadvantaged families (158–161). A study from Sweden found that lower socioeconomic position is actually a causal factor for ADHD (162). Intellectual disabilities have also been found to be more prevalent in disadvantaged groups (163,164). The opposite relationship has been found in ASD, where a higher socioeconomic status is related to a higher prevalence (165–167), however these results are mainly from United States of America. One explanation for this positive association have been that parental wealth and education increases the chance to acquire the correct diagnosis for the child (168). The same results are not found in studies from Europe, where either no association have been found (169) or that the prevalence of ASD is higher in lower socioeconomic groups (163,170). Dyslexia have not been found to have an association to socioeconomic status (171). However, the overall result of a higher proportion of neuropsychiatric disabilities in the families with lower socioeconomic status found in this study, seems to be correspond well with the few studies on the topic from Europe.

Regarding the connectedness to parents, the relationship to the father, and not the mother, was the only factor associated with restricted participation in adjusted analysis. However it should be interpreted with caution since the actual difference in scores between the adolescents with unrestricted and restricted participation was small. And also when restricted participation was defined as a score above the third quintile, both the connectedness to the mother and father was insignificant in adjusted analysis. Still, other studies have found that attachment to parents contribute to academic success, attendance, classroom participation and later school drop outs (172). The reason why only the connectedness to the fathers was significant seems to be complicated to explain. Both relationships have been found to be equally important but studies have established that the attachment to the father and the mother gives different emotional outcomes in the child's life (173,174). As an example, attachment to the mother predicts how the child functions in smaller groups and the attachment to father is more associated with peer acceptance (173). Perhaps this could explain why the connectedness to

the fathers were more strongly related to participation in school, since there could be an indirect link through peer acceptance (175).

Another explanation could be that 24% of the adolescents in the study lived with only one parent. Previous studies have found that children living in intact families with both parents have better school outcomes such as higher grades and less school absence (176). In Sweden it is more common that children who are living with one of the parents, live with the mother (177). Hence the association between restricted participation in school and poorer connectedness to the fathers can be indirectly explained by the adolescent being more likely to live in a single-parent family.

There is limited research in the area of children with neuropsychiatric disabilities and their connectedness to their parents. However most studies in the area have looked at the association between ADHD and parent-child attachment, and found that ADHD was associated with insecure attachment (178–180). Similar results were found for children with ASD, a meta-analysis from 2004 concluded that children with ASD were less securely attached to their parents in comparison to children without ASD, but this difference was small. There were no differences when the adolescent had higher mental development (181). The results of the current study match with these previous findings, since the results showed that adolescents with neuropsychiatric disabilities had less connectedness to both their parents in comparison to adolescents without neuropsychiatric disabilities. However it should be interpreted carefully since the difference in score was small.

Another study from Sweden found that children with neuropsychiatric disabilities have divorced parents to a greater extent than children without neuropsychiatric disabilities, and they more frequently live with only the mother (82). Fathers of children with ASD have been found to be less involved in the child's learning, in comparison to other fathers. They use a more punitive and coercing parental technique in regards of the child achievement (182). Other studies have found that mothers parenting techniques of overprotecting act as a effect modifier on the relationship between symptoms of ADHD and school adjustment. The negative relationship between hyperactivity and negative relationship to classmates was increased by maternal overprotection (183).

Drugs were strongly related to both low participation in school and to neuropsychiatric disabilities as seen in this and other studies (38,39,68,69). Adolescents with neuropsychiatric disabilities have been found to be more likely to consume alcohol, smoke and take snuff in comparison to adolescents without neuropsychiatric disabilities (85). Studies have also found

that the adolescents with disabilities that are using drugs are at higher risk of negative educational outcomes in comparison to adolescents with disabilities that do not use drugs (44). There are some differences in relation to type of disability and the drug use. As an example, adolescents with emotional or learning disabilities seems to be at higher risk of marijuana use and binge drinking, in comparison to adolescents with other disabilities (44).

The results of the current study also showed that boys are almost two times more likely to have restricted participation than girls, and this corresponds with other studies (70,87,184). Boys have also been seen to be overrepresented in the population with neuropsychiatric disorders, and similar results were found in the current study (19). Even though there was significantly more boys with neuropsychiatric disabilities, they did not outnumber the girls to that extent that has been seen in previous research (2-3:1) (19). On the other hand, the previous research had been done on younger children, and one explanation for the greater proportion of boys could be that girls are often presenting symptoms differently and are detected later (19).

Irrespective of the fact that all of these factors mentioned above are associated with both restricted participation and neuropsychiatric disabilities, the relationship between the two did not change when accounting for these factors. Adolescents with neuropsychiatric disabilities had almost three times higher odds for restricted participation even when all of these factors were adjusted for.

5.4 Public Health Implications

The adolescence period is an important phase that lays the foundation for future opportunities and health outcomes (33). In 2012 Lancet came with a series on adolescence health, emphasising that it is time to focus on this group since their health has improved substantially less when compared to the younger children's, in the last 50 years (33). A focus on adolescence health is vital to succeed with many public health agendas that are aiming at reducing injuries, mental health disorders, communicable and chronic diseases (33). Within this group, adolescents with neuropsychiatric disabilities is a particularly vulnerable group in need of attention, since they are at higher risk of poorer health and educational outcomes that could have implications in their adult lives. When looking at social determinants for adolescent health, then safe and supportive schools are crucial for the healthy development during adolescence. Educational attainment and involvement is linked to later health outcomes (185). Studies have found that one of the most promising strategies to improve

health outcomes for adolescents is to improve the school connectedness and environment (186,187). Every adolescent has the right to participate fully in school (11,46,47), but as seen in this study this is not the case. Adolescents with neuropsychiatric disabilities have restricted participation in school, which could increase their risk for substance use and involvement in delinquency (188,189), mental health problems (190), poor academic achievements (191) and school drop outs (189). This could result in the adolescents not taking the full advantage of the opportunities available in their communities, and it could have long-term effects. There is evidence of a link between some neuropsychiatric disabilities and criminality, such as ADHD (192,193), dyslexia (193–195), cognitive impairments (194) and tics disorders (196).

This study also found that adolescents with neuropsychiatric disabilities are at risk of being exposed to bullying which is a risk factor for poor mental and physical health outcomes both during adolescence (197,198) but also in adulthood (199). Bullying has also been found to give negative consequences on adult social relationships', integration in work and economic independence (198). The same goes for the finding that adolescents with neuropsychiatric disabilities are less connected to their parents, which is a risk factor for negative health outcomes (185,200). Adolescent that have strong connectedness to their family are less likely to be involved in violence and consume less alcohol, marijuana and cigarettes (185). This study found that adolescents with neuropsychiatric disabilities were more likely to have tried drugs. As many as 26% of all adolescents with neuropsychiatric disabilities had tried drugs, which is particularly startling since the group in the study were young adolescents in the age of 12-13 years. An early onset of drug use is associated with later drug use dependency in adulthood, as seen in studies (201–203). Low paternal connectedness, among other factors, can even increase the risk for children with some neuropsychiatric disabilities to later acquire a substance dependency (204).

In Sweden, the government has a disability policy that aims at providing all citizens with equal opportunities, and close the gap between people with and without disabilities (81). Having equal opportunities for inclusion and participation is also a human right (11). However as seen in this study, this is not the case and the inequalities starts already in adolescence for people with neuropsychiatric disabilities. When using the biopsychosocial model of disability, then disability is caused both by an impairment of body structure or function but also by the environmental barriers (13). These barriers could be inaccessibility, negative attitudes, limited social support, lack of provision of services, limited knowledge, problems with service delivery or inadequate funding (205) and they could all lead to

decreased participation. A review from 2011, discussed five environmental factors for participation in school for children with disabilities and those were availability, accessibility, affordability, accommodability and acceptability. Availability is relating to the adolescents' possibility to attend the situation, in terms of resources and facilities. Accessibility illustrate if the adolescent can access the situation where the activity takes place. Affordability describes financial and timely constrains that restricts participation. Accommodability covers the adaptations of the situation. Last, acceptability is including both the adolescent's acceptance of the situation but also if the peers or teachers accept the adolescents with neuropsychiatric disabilities to be included in the situation. (206). The two dimensions of participation are related to different environmental factors. The frequency of attendance is more related to the accessibility and availability of the environment, while the engagement is more linked to if the environment is adapted and if the adolescent is accepted in the context (207). As an example, an adolescent with a neuropsychiatric disability could have received adaptations in form of assistive devices which makes him/her able to attend the activity, however if the other students do not accept this the adolescent will not feel involved and engaged in the activity. The main obstacles for participation in school resides in the environment rather than the adolescent (208), and to promote full inclusion for everyone the societies have to change attitudes, policies, practices and action (209).

School participation is context specific, and these results are specific for the four included municipalities: Gnosjö, Värnamo, Härryda and Vårgårda. The results indicates that interventions are needed in these settings to decrease the inequalities between adolescents with and without neuropsychiatric disabilities. There might also be differences between the four municipalities. One municipality had a more disadvantaged situation in comparison to the others, with the lowest proportion of students reaching the knowledge target (87), more adolescents drinking alcohol (99), reporting being bullied (96) and having psychosomatic problems (59). Even in comparison to the rest of Sweden, this community had the highest proportion of adolescents rating that they feel unhappy (97). Other studies have presented that there are differences between municipalities within a country, as an example children with disabilities living in larger municipalities spend more time together with their ordinary class, compared to children living in small municipalities (55). There is also evidence of differences between European countries when it comes to participation for children with disabilities (53,54). The variation between the countries can be explained by different policies and legislation. It can also be explained by a variation in physical environment, support, social

security, health care services and education (54). Sweden is a high resource setting, and it can be expected that participation is even further restricted for adolescents with neuropsychiatric disabilities in low resource settings. Poverty could lead to increased environmental barriers for participation, when the resources are scarce. With limited resources there is a need to prioritize basic needs, and more personal activities that brings joy and social integration are often neglected for people with disabilities (209). Out of the total number of people with disability, 80 % lives in low and middle income countries (11). In these settings people with disabilities are over-represented among the poorest (12), and in conditions of poverty they are one of the most vulnerable groups (210). It is estimated that around 90% of the children with disabilities in low-income countries do not go to school (12). This indicates that the issues that adolescents with neuropsychiatric disabilities face differs depending on where in the world they live. However there is limited research from low resource settings on the topic of neuropsychiatric disabilities and participation in school. More research is needed especially from low resource areas.

There is also a need for longitudinal research to follow these adolescents during their development into adulthood to gain a better understanding of the long-term effects of their vulnerable situation during early adolescence. Long-term research can also conclude what factors that are actually causing restricted participation, when a temporal order can be proven. LoRDIA is a research programme that is currently investigating these adolescents from the age of 12 until they are 18 years old. This study will give information on causal pathways between bullying, drug use, family relationships, relationship to teachers, socioeconomic status and participation in school for adolescents with neuropsychiatric disabilities (123). It will increase the knowledge in the area of mental and physical health of adolescents with neuropsychiatric disabilities over time, an area where information is lacking.

6. Conclusion

Adolescents with neuropsychiatric disabilities are more likely to have restricted participation in school in comparison to adolescents without neuropsychiatric disabilities. They are also more exposed to factors associated with restricted participation in school, as they are more bullied, have more negative relationship to their teachers, are more likely to have tried drugs, have less connectedness to their parents, come from poorer families and are more boys. These findings need to be interpreted carefully because of methodological limitations of measurement instruments and a sample that is not representing the population. Yet, interventions are needed to ensure that the environment is inclusive so that every adolescent can have their rights fulfilled. A school where all adolescents can participate fully is a matter of social justice and an investment for the development of the society. More longitudinal research is needed to follow the vulnerable group of adolescents with neuropsychiatric disabilities to investigate how their disadvantaged situation will impact future health outcomes.

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References

1. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 5th edition. Arlington, VA., American Psychiatric Association, 2013. In.
2. Gillberg C. Deficits in attention, motor control, and perception: a brief review. *Arch Dis Child*. 2003 Oct;88(10):904–10.
3. Clements SD. Minimal brain dysfunction in children: terminology and identification. NINDB Monograph 3. NINDB, 1966.
4. WHO | Autism spectrum disorders & other developmental disorders [Internet]. WHO. [cited 2015 Feb 11]. Available from: http://www.who.int/mental_health/maternal-child/autism_report/en/
5. WHO | Questions and answers about autism spectrum disorders (ASD) [Internet]. WHO. [cited 2015 Feb 11]. Available from: <http://www.who.int/features/qa/85/en/>
6. WHO | DALYs / YLDs definition [Internet]. WHO. [cited 2016 Apr 17]. Available from: http://www.who.int/mental_health/management/depression/daly/en/
7. Ferrer E, Shaywitz BA, Holahan JM, Marchione K, Shaywitz SE. Uncoupling of Reading and IQ Over Time: Empirical Evidence for a Definition of Dyslexia. *Psychol Sci*. 2010;21(1):93–101.
8. WHO | International Classification of Functioning, Disability and Health (ICF) [Internet]. WHO. [cited 2014 Oct 26]. Available from: <http://www.who.int/classifications/icf/en/>
9. Diagnos och nivåer av utvecklingsstörning [Internet]. FUB. [cited 2016 Mar 31]. Available from: <http://www.fub.se/utvecklingsstorning/diagnos-och-nivaer-av-utvecklingsstorning>
10. World Health Organization, World Bank. World report on disability. Geneva, Switzerland: World Health Organization; 2011. 325 p.
11. Convention on the rights of persons with disabilities [Internet]. [cited 2014 Oct 27]. Available from: <http://www.un.org/disabilities/convention/facts.shtml>
12. Organization WH. Community-based Rehabilitation Cbr Guidelines. World Health Organization, Unesco, ILO, IDDC; 2010. (WHO Library).
13. WHO | Disability and health [Internet]. WHO. [cited 2014 Oct 27]. Available from: <http://who.int/mediacentre/factsheets/fs352/en/>
14. Mitra S, Posarac A, Vick B. Disability and Poverty in Developing Countries: A Multidimensional Study. *World Dev*. 2013 Jan;41:1–18.
15. UNICEF, editor. Children with disabilities. The state of the world’s children. New York, NY: UNICEF; 2013. 154 p.

16. Hershkowitz I, Lamb ME, Horowitz D. Victimization of Children With Disabilities. *Am J Orthopsychiatry*. 2007 Oct;77(4):629–35.
17. Hamby S, Grych J. Essential information about patterns of victimisation among children with disabilities. *Evid Based Nurs*. 2013 Apr 1;16(2):50–1.
18. Gillberg C, Fernell E, Minnis H. Early symptomatic syndromes eliciting neurodevelopmental clinical examinations. *ScientificWorldJournal*. 2014;2014:710570.
19. Gillberg C. The ESSENCE in child psychiatry: Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations. *Res Dev Disabil*. 2010 Nov;31(6):1543–51.
20. Madsen KM. Increasing incidence of some neuropsychiatric disorders in Danish children. *Evid Based Ment Health*. 2007 Nov 1;10(4):127–127.
21. Collishaw S. Annual Research Review: Secular trends in child and adolescent mental health. *J Child Psychol Psychiatry*. 2015 Mar 1;56(3):370–93.
22. Baxter AJ, Brugha TS, Erskine HE, Scheurer RW, Vos T, Scott JG. The epidemiology and global burden of autism spectrum disorders. *Psychol Med*. 2015 Feb;45(3):601–13.
23. Blaxill MF. What’s going on? The question of time trends in autism. *Public Health Rep Wash DC 1974*. 2004 Dec;119(6):536–51.
24. Merrick J, Kandel I, Morad M. Trends in autism. *Int J Adolesc Med Health*. 2004 Mar;16(1):75–8.
25. Faraone SV, Gillberg C, Biederman J, Sergeant JA, Sahlgrenska akademin, Sahlgrenska Academy, et al. The Worldwide prevalence of ADHD: is it an American condition? *World Psychiatry*. 2003;2(2):104–13.
26. KADESJÖ B, GILLBERG C, Sahlgrenska akademin, Sahlgrenska Academy, Institute for the Health of Women and Children, Dept of Child and Adolescent Psychiatry, University of Gothenburg, et al. Tourette’s Disorder: Epidemiology and Comorbidity in Primary School Children. *J Am Acad Child Adolesc Psychiatry*. 2000;39(5):548–55.
27. Siegel LS. Perspectives on dyslexia. *Paediatr Child Health*. 2006 Nov;11(9):581–7.
28. Shalev R., Auerbach J, Manor O, Gross-Tsur V. Developmental dyscalculia: prevalence and prognosis. *Eur Child Adolesc Psychiatry*. 2000 Nov;9(S2):II58–64.
29. Miniscalco C, Westerlund M, Lohmander A, Medicinska och farmaceutiska vetenskapsområdet, Institutionen för kvinnors och barns hälsa, Medicinska fakulteten, et al. Language skills at age 6 years in Swedish children screened for language delay at 2 years of age. *Acta Paediatr*. 2005 Dec;94(12):1798–806.
30. Gillberg C, Söderström H, Institute for the Health of Women and Children, Dept of Child and Adolescent Psychiatry, Sahlgrenska Academy, University of Gothenburg, Göteborgs universitet, et al. Learning disability. *Lancet*. 2003;362(9386):811.
31. O’Brien G. Behavioural phenotypes. *JRSM*. 2000 Dec;93(12):618–20.

32. WHO | Adolescent health [Internet]. WHO. [cited 2015 Nov 18]. Available from: http://www.who.int/topics/adolescent_health/en/
33. Sawyer SM, Afifi RA, Bearinger LH, Blakemore S-J, Dick B, Ezech AC, et al. Adolescence: a foundation for future health. *The Lancet*. 2012;379(9826):1630–40.
34. Blum RW, Bastos FIPM, Kabiru CW, Le LC. Adolescent health in the 21st century. *Lancet Lond Engl*. 2012 Apr 28;379(9826):1567–8.
35. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry*. 2005 Jun;62(6):593–602.
36. Gore FM, Bloem PJN, Patton GC, Ferguson J, Joseph V, Coffey C, et al. Global burden of disease in young people aged 10-24 years: a systematic analysis. *Lancet Lond Engl*. 2011 Jun 18;377(9783):2093–102.
37. GBD Compare | IHME Viz Hub [Internet]. [cited 2015 Nov 19]. Available from: <http://vizhub.healthdata.org/gbd-compare>
38. Everett Jones S, Lollar DJ. Relationship between physical disabilities or long-term health problems and health risk behaviors or conditions among US high school students. *J Sch Health*. 2008 May;78(5):252–7; quiz 298–9.
39. Anthony Hogan AB Lyndall McLellan. Health promotion needs of young people with disabilities-a population study. *Disabil Rehabil*. 2000 Jan 1;22(8):352–7.
40. Bond L, Carlin JB, Thomas L, Rubin K, Patton G. Does Bullying Cause Emotional Problems? A Prospective Study Of Young Teenagers. *BMJ*. 2001 Sep;323(7311):480–4.
41. Patton GC, Bond L, Carlin JB, Thomas L, Butler H, Glover S, et al. Promoting social inclusion in schools: a group-randomized trial of effects on student health risk behavior and well-being. *Am J Public Health*. 2006 Sep;96(9):1582–7.
42. Blum RW, Halcon L, Beuhring T, Pate E, Campell-Forrester S, Venema A. Adolescent Health in the Caribbean: Risk and Protective Factors. *Am J Public Health*. 2003 Mar;93(3):456–60.
43. Ainscow M. Developing inclusive education systems: what are the levers for change? *J Educ Change*. 2005 Jun;6(2):109–24.
44. Hollar D. Risk Behaviors for Varying Categories of Disability in NELS:88. *J Sch Health*. 2005 Nov;75(9):350–8.
45. World Health Organization. WHO definition of Health. In. Available from: <http://www.who.int/about/definition/en/print.html>
46. UNESCO. The Salamanca Statement and Framework for Action on Special Need Education: World Conference on Special Needs Education [Internet]. UNESCO United Nations Educational, Scientific and Cultural Organization; 1994. Available from: http://www.unesco.org/education/pdf/SALAMA_E.PDF

47. Convention on the Rights of the Child [Internet]. UNICEF. [cited 2015 Apr 4]. Available from: <http://www.unicef.org/crc/>
48. Måsse LC, Miller AR, Shen J, Schiariti V, Roxborough L. Patterns of participation across a range of activities among Canadian children with neurodevelopmental disorders and disabilities. *Dev Med Child Neurol*. 2013 Aug 1;55(8):729–36.
49. de Róiste A, Kelly C, Molcho M, Gavin A, Nic Gabhainn S. Is school participation good for children? Associations with health and wellbeing. *Health Educ*. 2012 Feb;112(2):88–104.
50. Peny-Dahlstrand M, Krumlinde-Sundholm L, Gosman-Hedstrom G. Patterns of participation in school-related activities and settings in children with spina bifida. *Disabil Rehabil*. 2013 Oct;35(21):1821–7.
51. Hemmingson H, Borell L. Environmental barriers in mainstream schools. *Child Care Health Dev*. 2002 Jan;28(1):57–63.
52. Parkes J, McCullough N, Madden A. To what extent do children with cerebral palsy participate in everyday life situations? *Health Soc Care Community*. 2010 May;18(3):304–15.
53. Michelsen SI, Flachs EM, Uldall P, Eriksen EL, McManus V, Parkes J, et al. Frequency of participation of 8-12-year-old children with cerebral palsy: a multi-centre cross-sectional European study. *Eur J Paediatr Neurol EJPJN Off J Eur Paediatr Neurol Soc*. 2009 Mar;13(2):165–77.
54. Fauconnier J, Dickinson HO, Beckung E, Marcelli M, McManus V, Michelsen SI, et al. Participation in life situations of 8-12 year old children with cerebral palsy: cross sectional European study. *BMJ*. 2009;338:b1458.
55. Tøssebro J, Wendelborg C. School placement and classroom participation among children with disabilities in primary school in Norway: a longitudinal study. *Eur J Spec Needs Educ*. 2008 Nov;23(4):305–19.
56. Falkmer M, Oehlers K, Granlund M, Falkmer T. Can you see it too? Observed and self-rated participation in mainstream schools in students with and without autism spectrum disorders. *Dev Neurorehabilitation*. 2015 Aug 24;1–10.
57. Falkmer M, Granlund M, Nilholm C, Falkmer T. From my perspective--perceived participation in mainstream schools in students with autism spectrum conditions. *Dev Neurorehabilitation*. 2012;15(3):191–201.
58. Tøssebro J, Wendelborg C. Educational arrangements and social participation with peers amongst children with disabilities in regular schools. *Int J Incl Educ*. 2011 Jun;15(5):497–512.
59. Almqvist L, Granlund M. Participation in school environment of children and youth with disabilities: a person-oriented approach. *Scand J Psychol*. 2005 Jul;46(3):305–14.
60. Asbjørnslett M, Hemmingsson H. Participation at school as experienced by teenagers with physical disabilities. *Scand J Occup Ther*. 2008 Sep;15(3):153–61.

61. Falkmer M, Parsons R, Granlund M. Looking through the Same Eyes? Do Teachers' Participation Ratings Match with Ratings of Students with Autism Spectrum Conditions in Mainstream Schools? *Autism Res Treat.* 2012;2012:656981.
62. Humphrey N, Lewis S. "Make me normal": the views and experiences of pupils on the autistic spectrum in mainstream secondary schools. *Autism Int J Res Pract.* 2008 Jan;12(1):23–46.
63. La Cour K, Hemmingsson H, Gantschnig B, Hälsa, Aktivitet, Vård (HAV), Linköpings universitet, Institutionen för samhälls- och välfärdsstudier, et al. Feeling and Being Involved? Participation Experienced by Children with Disabilities at Regular Schools in Austria. *J Occup Ther Sch Early Interv.* 2011 Jul;4(3):260–75.
64. Imms C, Adair B, Keen D, Ullenhag A, Rosenbaum P, Granlund M. "Participation": A systematic review of language, definitions, and constructs used in intervention research with children with disabilities. *Dev Med Child Neurol.* 2015;
65. J. Simeonsson, Dawn Carlson, Gail S. Huntington, Janey Sturtz McMillen, J. Lytle Brent R. Students with disabilities: a national survey of participation in school activities. *Disabil Rehabil.* 2001;23(2):49–63.
66. John-Akinola YO, Nic-Gabhainn S. Children's participation in school: a cross-sectional study of the relationship between school environments, participation and health and well-being outcomes. *BMC Public Health.* 2014;14:964.
67. Jimerson S, Campos E, Greif J. Toward an Understanding of Definitions and Measures of School Engagement and Related Terms. *Calif Sch Psychol.* 2003 Jan;8(1):7–27.
68. Simons-Morton BG, Crump AD, Haynie DL, Saylor KE. Student-school bonding and adolescent problem behavior. *Health Educ Res.* 1999 Feb;14(1):99–107.
69. Roebroek L, Koning IM. The Reciprocal Relation Between Adolescents' School Engagement and Alcohol Consumption, and the Role of Parental Support. *Prev Sci.* 2016 Feb;17(2):218–26.
70. Maddox SJ, Prinz RJ. School bonding in children and adolescents: conceptualization, assessment, and associated variables. *Clin Child Fam Psychol Rev.* 2003 Mar;6(1):31–49.
71. Simons-Morton B, Chen R. Peer and Parent Influences on School Engagement Among Early Adolescents. *Youth Soc.* 2009 Sep 1;41(1):3–25.
72. Sirin SR, Rogers-Sirin L. Exploring School Engagement of Middle-Class African American Adolescents. *Youth Soc.* 2004 Mar 1;35(3):323–40.
73. You S. Peer influence and adolescents' school engagement. *Procedia - Soc Behav Sci.* 2011;29:829–35.
74. Mehta SB, Cornell D, Fan X, Gregory A. Bullying climate and school engagement in ninth-grade students. *J Sch Health.* 2013 Jan;83(1):45–52.

75. Kearney CA. An Interdisciplinary Model of School Absenteeism in Youth to Inform Professional Practice and Public Policy. *Educ Psychol Rev.* 2008 Jul 12;20(3):257–82.
76. Almeida M da CC, Aquino EML, Barros AP de. School trajectory and teenage pregnancy in three Brazilian state capitals. *Cad Saúde Pública.* 2006 Jul;22(7):1397–409.
77. Chou L-C, Ho C-Y, Chen C-Y, Chen WJ. Truancy and illicit drug use among adolescents surveyed via street outreach. *Addict Behav.* 2006 Jan;31(1):149–54.
78. Guttmacher S, Weitzman BC, Kapadia F. Classroom-based surveys of adolescent risk-taking behaviors: reducing the bias of absenteeism. *Am J Public Health HW Wilson - GS.* 2002 Feb;92(2):235.
79. Ingul JM, Klöckner CA, Silverman WK, Nordahl HM. Adolescent school absenteeism: modelling social and individual risk factors: Modelling risk factors for school absenteeism. *Child Adolesc Ment Health.* 2012 May;17(2):93–100.
80. Gren-Landell M, Allvin CE, Bradley M, Andersson M, Andersson G. Teachers' views on risk factors for problematic school absenteeism in Swedish primary school students. *Educ Psychol Pract.* 2015 Oct 2;31(4):412–23.
81. Sweden's disability policy [Internet]. sweden.se. 2013 [cited 2016 Feb 8]. Available from: <https://sweden.se/society/swedens-disability-policy/>
82. Hälsa och välfärd hos barn och unga med funktionsnedsättning [Internet]. Statens folkhälsoinstitut; 2012. Available from: <https://www.folkhalsomyndigheten.se/pagefiles/12782/A2012-02-Halsa-och-valfard-hos-barn-och-unga-med-funktionsnedsattning.pdf>
83. Idring S, Lundberg M, Sturm H, Dalman C, Gumpert C, Rai D, et al. Changes in Prevalence of Autism Spectrum Disorders in 2001–2011: Findings from the Stockholm Youth Cohort. *J Autism Dev Disord.* 2014 Dec 5;45(6):1766–73.
84. Giacobini M, Medin E, Ahnemark E, Russo LJ, Carlqvist P. Prevalence, Patient Characteristics, and Pharmacological Treatment of Children, Adolescents, and Adults Diagnosed With ADHD in Sweden. *J Atten Disord.* 2014 Nov 5;1087054714554617.
85. Hälsan hos barn och unga med funktionsnedsättning — Folkhälsomyndigheten [Internet]. [cited 2015 Nov 19]. Available from: <http://www.folkhalsomyndigheten.se/publicerat-material/publikationer/Halsan-hos-barn-och-unga-med-funktionsnedsattning/>
86. The Swedish National Agency for Education [Internet]. [cited 2016 Feb 17]. Available from: <http://www.skolverket.se/om-skolverket/andra-sprak-och-lattlast/in-english>
87. Öppna jämförelser - Grundskola 2015 [Internet]. [cited 2016 Feb 10]. Available from: <http://webbutik.skl.se/sv/artiklar/oppna-jamforelser-grundskola-2015.html>
88. OECD (2014): Resources, Policies and Practices in Sweden's Schooling System: an in-depth analysis of PISA 2012 Results.

89. An Assessment of the Situation in the Swedish School System 2015 [Internet]. [cited 2016 Feb 17]. Available from: <http://www.skolverket.se/om-skolverket/>
90. Barns upplevelse av skolan. LEVNADSFÖRHÅLLANDEN RAPPORT 125 [Internet]. Statistiska centralbyrån; 2012. Available from: http://www.scb.se/sv_/Hitta-statistik/Publiceringskalender/Visa-detaljerad-information/?publobjid=19022+
91. Landgren M, Kjellman B, Gillberg C. "A school for all kinds of minds." The impact of neuropsychiatric disorders, gender and ethnicity on school-related tasks administered to 9-10-year-old children. *Eur Child Adolesc Psychiatry*. 2003 Aug;12(4):162–71.
92. Aktiviteter - Center - LoRDIA [Internet]. [cited 2016 Feb 19]. Available from: <http://center.hj.se/lordia/aktiviteter.html>
93. LoRDIA - Center - LoRDIA [Internet]. [cited 2016 Jan 19]. Available from: <http://center.hj.se/lordia.html>
94. Kommungrupsindelning - SKL [Internet]. [cited 2016 Apr 18]. Available from: <http://skl.se/tjanster/kommunerlandsting/faktakommunerochlandsting/kommungruppsindelning.2051.html>
95. Befolkningens utbildning [Internet]. Statistiska Centralbyrån. [cited 2016 Feb 17]. Available from: <http://www.scb.se/uf0506/>
96. Mobbning — Folkhälsomyndigheten [Internet]. [cited 2016 Feb 26]. Available from: <http://www.folkhalsomyndigheten.se/amnesomraden/statistik-och-undersokningar/folkhalsoatlas/rapportblad/barns-och-ungas-psykiska-halsa/mobbning/>
97. Nedstämdhet — Folkhälsomyndigheten [Internet]. [cited 2016 Feb 10]. Available from: <http://www.folkhalsomyndigheten.se/amnesomraden/statistik-och-undersokningar/folkhalsoatlas/rapportblad/barns-och-ungas-psykiska-halsa/nedstamdhet/>
98. Psykosomatiska besvär — Folkhälsomyndigheten [Internet]. [cited 2016 Feb 10]. Available from: <http://www.folkhalsomyndigheten.se/amnesomraden/statistik-och-undersokningar/folkhalsoatlas/rapportblad/barns-och-ungas-psykiska-halsa/psykosomatiska-besvar/>
99. Omfattande alkoholbruk — Folkhälsomyndigheten [Internet]. [cited 2016 Feb 17]. Available from: <http://www.folkhalsomyndigheten.se/amnesomraden/statistik-och-undersokningar/folkhalsoatlas/rapportblad/barns-och-ungas-psykiska-halsa/omfattande-alkoholbruk/>
100. Brå [Internet]. [cited 2016 Feb 12]. Available from: <http://www.bra.se/>
101. CAN. Skolelvers Drogvänor. Centralförbundet för alkohol- och narkotikaupplysning [Internet]. Available from: <http://www.can.se/sv/Undersokningar/Skolelvers-drogvanor1/>
102. Webbsupport. Vad gör unga pojkar till våldsamma män? - Örebro universitet [Internet]. [cited 2016 Feb 12]. Available from:

<http://www.oru.se/Nyheter/Forskningsnyheter/Forskningsnyheter/Vad-gor-unga-pojkar-till-valdsamma-man/>

103. Kerr M, Stattin H, Institutionen för beteende-, social- och rättsvetenskap, Örebro universitet. What Parents Know, How They Know It, and Several Forms of Adolescent Adjustment: Further Support for a Reinterpretation of Monitoring. *Dev Psychol.* 2000 May;36(3):366–80.
104. Matta S, Nurmi J-E, Stattin H, Institutionen för beteende-, social- och rättsvetenskap, Örebro universitet. Achievement Orientations, School Adjustment, and Well-being: A Longitudinal Study. *J Res Adolesc.* 2007 Dec;17(4):789.
105. Aunola K, Stattin H, Nurmi J-E, Institutionen för beteende-, social- och rättsvetenskap, Örebro universitet. Adolescents' Achievement Strategies, School Adjustment, and Externalizing and Internalizing Problem Behaviors. *J Youth Adolesc.* 2000 Jun;29(3):289–306.
106. Schwartz LA, Radcliffe J, Barakat LP. Associates of school absenteeism in adolescents with sickle cell disease. *Pediatr Blood Cancer.* 2009 Jan;52(1):92–6.
107. Kashikar-Zuck S, Johnston M, Ting TV, Graham BT, Lynch-Jordan AM, Verkamp E, et al. Relationship between School Absenteeism and Depressive Symptoms among Adolescents with Juvenile Fibromyalgia. *J Pediatr Psychol.* 2010 Oct 1;35(9):996–1004.
108. Statistiska Centralbyrån. Rapport grundskole- och gymnasienivå. SCB, Svensk utbildning i internationell statistik [Internet]. Available from: http://www.scb.se/statistik/_publikationer/UF0526_2005A01_BR_06_UF100OP0501.pdf
109. Skolverket: Frånvaro och ledighet. Juridisk vägledning [Internet]. 2013 Apr. Available from: http://www.skolverket.se/polopoly_fs/1.179912!/Menu/article/attachment/Mer%20om%20Fr%C3%A5nvaro%20och%20ledighetRevPdf.pdf
110. Sundell K, Karlberg M. SKOLK Sund protest eller riskbeteende? FoU-rapport 2004:1. Stockholm; (Socialtjänstförvaltningen Forsknings- och utvecklingsenheten).
111. Chronic Absence V. Truancy [Internet]. Attendance Works. [cited 2016 Feb 22]. Available from: <http://www.attendanceworks.org/whats-the-difference-between-chronic-absence-and-truancy/>
112. Bayram Özdemir S, Stattin H. Why and when is ethnic harassment a risk for immigrant adolescents' school adjustment? understanding the processes and conditions. *J Youth Adolesc.* 2014 Aug;43(8):1252–65.
113. Määttä S, Stattin H, Nurmi J-E. Achievement strategies at school: types and correlates. *J Adolesc.* 2002 Feb;25(1):31–46.
114. Jutengren G, Kerr M, Stattin H, Akademin för juridik, psykologi och socialt arbete, Örebro universitet. Adolescents' deliberate self-harm, interpersonal stress, and the

- moderating effects of self-regulation: A two-wave longitudinal analysis. *J Sch Psychol.* 2011;49(2):249–64.
115. Wolke D. *The Nature of School Bullying: A Cross-national Perspective.* By P. K. Smith, Y. Morita, J. Junger-Tas, D. Olweus, R. Catalano, and P. Slee. Routledge, Andover, U.K., 1998. pp. 384. £60.00 (hb). *J Child Psychol Psychiatry.* 2000 Mar;41(3):399–404.
 116. Kendrick K, Jutengren G, Stattin H. The protective role of supportive friends against bullying perpetration and victimization. *J Adolesc.* 2012 Aug;35(4):1069–80.
 117. Andershed H, Kerr M, Stattin H, Institutionen för beteende-, social- och rättsvetenskap, Örebro universitet. *Bullying in School and Violence on the Streets: Are the Same People Involved?* *J Scand Stud Criminol Crime Prev.* 2001 Jan;2(1):31–49.
 118. Kakihara F, Tilton-Weaver L, Kerr M, Stattin H. The relationship of parental control to youth adjustment: do youths' feelings about their parents play a role? *J Youth Adolesc.* 2010 Dec;39(12):1442–56.
 119. Tilton-Weaver L, Kerr M, Pakalniskeine V, Tokic A, Salihovic S, Stattin H, et al. Open up or close down: How do parental reactions affect youth information management? *J Adolesc.* 2010;33(2):333–46.
 120. R Core Team (2016). *R: A language and environment for statistical computing.* R Foundation for Statistical Computing, Vienna, Austria. [Internet]. Available from: <https://www.r-project.org/>.
 121. Fox, J. (2005). *The R Commander: A Basic Statistics Graphical User Interface to R.* *Journal of Statistical Software,* 14(9): 1--42.
 122. WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects [Internet]. 2013 [cited 2015 Apr 21]. Available from: <http://www.wma.net/en/30publications/10policies/b3/>
 123. Om oss - Center - LoRDIA [Internet]. [cited 2016 Mar 28]. Available from: <http://center.hj.se/lordia/om-oss.html>
 124. About Folkhälsomyndigheten — Folkhälsomyndigheten [Internet]. [cited 2016 Mar 28]. Available from: <http://www.folkhalsomyndigheten.se/about-folkhalsomyndigheten-the-public-health-agency-of-sweden/>
 125. Walmsley J, Johnson K. *Inclusive research with people with learning disabilities: past, present, and futures* [Internet]. London: J. Kingsley Publishers; 2003 [cited 2016 Apr 8]. 258 p. Available from: <http://ezproxy.its.uu.se/login?url=http://site.ebrary.com/lib/uppsala/Top?id=10064425>
 126. Weitzman B, Guttmacher S, Weinberg S, Kapadia F. Low response rate schools in surveys of adolescent risk taking behaviours: possible biases, possible solutions. *J Epidemiol Community Health.* 2003 Jan;57(1):63–7.
 127. Statistikdatabasen - tabell [Internet]. [cited 2016 Apr 25]. Available from: http://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__BE__BE0101__BE0101E

/UtrikesFoddaR/table/tableViewLayout1/?rxid=29500f6d-5dca-4ef0-b142-6f375f08f23c

128. Kärnfamiljen fortfarande vanligast [Internet]. Statistiska Centralbyrån. [cited 2016 Apr 25]. Available from: http://www.scb.se/sv_/Hitta-statistik/Artiklar/Karntfamiljen-fortfarande-vanligast/
129. Niia A, Almqvist L, Brunberg E, Granlund M. Student Participation and Parental Involvement in Relation to Academic Achievement. *Scand J Educ Res*. 2015 May 4;59(3):297–315.
130. Granlund M, Arvidsson P, Niia A, Björck-Åkesson E, Simeonsson R, Maxwell G, et al. Differentiating Activity and Participation of Children and Youth with Disability in Sweden: A Third Qualifier in the International Classification of Functioning, Disability, and Health for Children and Youth? *Am J Phys Med Rehabil*. 2012 Feb;91:S84–96.
131. Granlund M. Participation - challenges in conceptualization, measurement and intervention. *Child Care Health Dev*. 2013 Jul;39(4):470–3.
132. Bennete C, Vickers A. Against quantiles: categorization of continuous variables in epidemiologic research, and its discontents. *BMC Med Res Methodol*. 2012;12:21.
133. Eriksson L, Welander J, Granlund M, HHJ, Avd. för beteendevetenskap och socialt arbete, HHJ, CHILD, Hälsohögskolan, et al. Participation in Everyday School Activities For Children With and Without Disabilities. *J Dev Phys Disabil*. 2007 Oct;19(5):485–502.
134. Hintermair M. Health-related quality of life and classroom participation of deaf and hard-of-hearing students in general schools. *J Deaf Stud Deaf Educ*. 2011;16(2):254–71.
135. Egilson ST, Traustadottir R. Participation of students with physical disabilities in the school environment. *Am J Occup Ther Off Publ Am Occup Ther Assoc*. 2009 Jun;63(3):264–72.
136. Snapshot [Internet]. [cited 2015 Jan 23]. Available from: <http://www.fasebj.org.ezproxy.its.uu.se/content/28/6/2398.long>
137. Herpertz-Dahlmann B, Bühren K, Remschmidt H. Growing up is hard: mental disorders in adolescence. *Dtsch Ärztebl Int*. 2013 Jun;110(25):432–9; quiz 440.
138. Cartwright-Hatton S, McNicol K, Doubleday E. Anxiety in a neglected population: Prevalence of anxiety disorders in pre-adolescent children. *Clin Psychol Rev*. 2006 Nov;26(7):817–33.
139. Gillberg C, Wing L, Sahlgrenska akademien, Sahlgrenska Academy, Institute for the Health of Women and Children, Dept of Child and Adolescent Psychiatry, University of Gothenburg, et al. Autism: not an extremely rare disorder. *Acta Psychiatr Scand*. 1999 Jun;99(6):399–406.

140. Maulik PK, Mascarenhas MN, Mathers CD, Dua T, Saxena S. Prevalence of intellectual disability: A meta-analysis of population-based studies. *Res Dev Disabil.* 2011 Mar;32(2):419–36.
141. Bagwell CL, Molina BS, Pelham WE, Hoza B. Attention-deficit hyperactivity disorder and problems in peer relations: predictions from childhood to adolescence. *J Am Acad Child Adolesc Psychiatry.* 2001 Nov;40(11):1285–92.
142. Sparapani N, Morgan L, Reinhardt V, Schatschneider C, Wetherby A. Evaluation of Classroom Active Engagement in Elementary Students with Autism Spectrum Disorder. *J Autism Dev Disord.* 2016 Mar;46(3):782–96.
143. DuPaul GJ, Eckert TL. Academic Interventions for Students with Attention-Deficit/Hyperactivity Disorder: A Review of the Literature. *Read Writ Q.* 1998 Jan 1;14(1):59–82.
144. Kent KM, Jr WEP, Molina BSG, Sibley MH, Waschbusch DA, Yu J, et al. The Academic Experience of Male High School Students with ADHD. *J Abnorm Child Psychol.* 2010 Nov 20;39(3):451–62.
145. Basch CE. Inattention and Hyperactivity and the Achievement Gap Among Urban Minority Youth. *J Sch Health.* 2011 Oct;81(10):641–9.
146. Barbaresi WJ, Katusic SK, Colligan RC, Weaver AL, Jacobsen SJ. Long-Term School Outcomes for Children with Attention-Deficit/Hyperactivity Disorder: A Population-Based Perspective. *J Dev Behav Pediatr.* 2007 Aug;28(4):265–73.
147. Avramidis E, Norwich B. Teachers' attitudes towards integration / inclusion: a review of the literature. *Eur J Spec Needs Educ.* 2002 Jun 1;17(2):129–47.
148. Vaz S, Wilson N, Falkmer M, Sim A, Scott M, Cordier R, et al. Factors Associated with Primary School Teachers' Attitudes Towards the Inclusion of Students with Disabilities. *PloS One.* 2015;10(8):e0137002.
149. Feldman MA, Ojanen T, Gesten EL, Smith-Schrandt H, Brannick M, Totura CMW, et al. The effects of middle school bullying and victimization on adjustment through high school: Growth modeling of achievement, school attendance and disciplinary trajectories. *Psychol Sch.* 2014 Dec;51(10):1046–62.
150. Ahlström B, Sociologiska institutionen, Samhällsvetenskapliga fakulteten, Umeå universitet. Student participation and school success: A study about participation, grades and bullying among 9th grade students in Sweden. *Educ Inq.* 2010;1(2):97.
151. Maïano C, Normand CL, Salvat M-C, Moullec G, Aimé A. Prevalence of School Bullying Among Youth with Autism Spectrum Disorders: A Systematic Review and Meta-Analysis. *Autism Res Off J Int Soc Autism Res.* 2015 Oct 9;
152. Unnever JD, Cornell DG. Bullying, Self-Control, and Adhd. *J Interpers Violence.* 2003 Feb 1;18(2):129–47.

153. Kruszewski E, Rajendran K, Halperin JM. The association of early parent support for child autonomy with changes in bullying among children with and without ADHD and ODD. *Compr Psychiatry*. 2013 Nov;54(8):e25–6.
154. Christensen LL, Fraynt RJ, Neece CL, Baker BL. Bullying Adolescents With Intellectual Disability. *J Ment Health Res Intellect Disabil*. 2012 Jan 1;5(1):49–65.
155. Hughes S. Bullying: what speech-language pathologists should know. *Lang Speech Hear Serv Sch*. 2014 Jan;45(1):3.
156. Zhang M. Links Between School Absenteeism and Child Poverty. *Pastor Care Educ*. 2003 Mar 1;21(1):10–7.
157. Victora CG, Wagstaff A, Schellenberg JA, Gwatkin D, Claeson M, Habicht J-P. Applying an equity lens to child health and mortality: more of the same is not enough. *The Lancet*. 2003 Jul 19;362(9379):233–41.
158. Graetz B, Sawyer M, Hazell PL, Arney F, Baghurst P. Validity of DSM-IV ADHD Subtypes in a Nationally Representative Sample of Australian Children and Adolescents. *J Am Acad Child Adolesc Psychiatry*. 2001;40(12):1410–7.
159. Hjern A, Weitoft GR, Lindblad F. Social adversity predicts ADHD-medication in school children--a national cohort study. *Acta Paediatr Oslo Nor 1992*. 2010 Jun;99(6):920–4.
160. Counts CA, Nigg JT, Stawicki JA, Rappley MD, von Eye A. Family adversity in DSM-IV ADHD combined and inattentive subtypes and associated disruptive behavior problems. *J Am Acad Child Adolesc Psychiatry*. 2005 Jul;44(7):690–8.
161. Biederman J, Faraone SV, Monuteaux MC. Differential effect of environmental adversity by gender: Rutter's index of adversity in a group of boys and girls with and without ADHD. *Am J Psychiatry*. 2002 Sep;159(9):1556–62.
162. Larsson H, Sariaslan A, Långström N, D'Onofrio B, Lichtenstein P. Family income in early childhood and subsequent attention deficit/hyperactivity disorder: a quasi-experimental study. *J Child Psychol Psychiatry*. 2014 May;55(5):428–35.
163. Delobel-Ayoub M, Ehlinger V, Klapouszczak D, Maffre T, Raynaud J-P, Delpierre C, et al. Socioeconomic Disparities and Prevalence of Autism Spectrum Disorders and Intellectual Disability. Triche EW, editor. *PLOS ONE*. 2015 Nov 5;10(11):e0141964.
164. Emerson E. Deprivation, ethnicity and the prevalence of intellectual and developmental disabilities. *J Epidemiol Community Health*. 2012 Mar;66(3):218–24.
165. Maenner MJ, Arneson CL, Durkin MS. Socioeconomic disparity in the prevalence of autism spectrum disorder in Wisconsin. *WMJ Off Publ State Med Soc Wis*. 2009 Aug;108(5):253–5.
166. Durkin MS, Maenner MJ, Meaney FJ, Levy SE, DiGuseppi C, Nicholas JS, et al. Socioeconomic Inequality in the Prevalence of Autism Spectrum Disorder: Evidence from a U.S. Cross-Sectional Study. Myer L, editor. *PLoS ONE*. 2010 Jul 12;5(7):e11551.

167. Croen LA, Grether JK, Selvin S. Descriptive epidemiology of autism in a California population: who is at risk? *J Autism Dev Disord.* 2002 Jun;32(3):217–24.
168. Wing L. Childhood autism and social class: a question of selection? *Br J Psychiatry J Ment Sci.* 1980 Nov;137:410–7.
169. Larsson HJ, Eaton WW, Madsen KM, Vestergaard M, Olesen AV, Agerbo E, et al. Risk factors for autism: perinatal factors, parental psychiatric history, and socioeconomic status. *Am J Epidemiol.* 2005 May 15;161(10):916–25; discussion 926–8.
170. Rai D, Lewis G, Lundberg M, Araya R, Svensson A, Dalman C, et al. Parental socioeconomic status and risk of offspring autism spectrum disorders in a Swedish population-based study. *J Am Acad Child Adolesc Psychiatry.* 2012 May;51(5):467–76.e6.
171. Bonifacci P, Montuschi M, Lami L, Snowling MJ. Parents of children with dyslexia: cognitive, emotional and behavioural profile. *Dyslexia Chichester Engl.* 2014 May;20(2):175–90.
172. Ramsdal G, Bergvik S, Wynn R. Parent-child attachment, academic performance and the process of high-school dropout: a narrative review. *Attach Hum Dev.* 2015 Sep;17(5):522–45.
173. Verschueren K, Marcoen A (2005) Perceived security of attachment to mother and father: developmental differences and relation to self-worth and peer relation at school. In: Kerns KA, Richardson RA (eds) *Attachment in middle.*
174. Al-Yagon M. Child–Mother and Child–Father Attachment Security: Links to Internalizing Adjustment Among Children with Learning Disabilities. *Child Psychiatry Hum Dev.* 2014 Feb;45(1):119–31.
175. Wentzel KR, Caldwell K. Friendships, Peer Acceptance, and Group Membership: Realions to Academic Achievement in Middle School. *Child Dev.* 1997 Jun 1;68(6):1198–209.
176. Featherstone DR, Cundick BP, Jensen LC. Differences in school behavior and achievement between children from intact, reconstituted, and single-parent families. *Adolescence.* 1992;27(105):1–12.
177. 50 000 barn är med om en separation varje år [Internet]. Statistiska Centralbyrån. [cited 2016 Apr 29]. Available from: http://www.scb.se/sv_/Hitta-statistik/Artiklar/50-000-barn-ar-med-om-en-separation-varje-ar/
178. Thorell L, Rydell A, Bohlin G. Parent-child attachment and executive functioning in relation to ADHD symptoms in middle childhood. *Attach Hum Dev.* 2012;14(5):517.
179. Clarke L, Ungerer J, Chahoud K, Johnson S, Stiefel I. Attention Deficit Hyperactivity Disorder is Associated with Attachment Insecurity. *Clin Child Psychol Psychiatry.* 2002 Apr 1;7(2):179–98.

180. Storebø OJ, Rasmussen PD, Simonsen E. Association Between Insecure Attachment and ADHD Environmental Mediating Factors. *J Atten Disord*. 2016 Feb 1;20(2):187–96.
181. Rutgers AH, Bakermans-Kranenburg MJ, Ijzendoorn MH, Berckelaer-Onnes IA. Autism and attachment: a meta-analytic review. *J Child Psychol Psychiatry*. 2004 Sep;45(6):1123–34.
182. Rogers MA, Wiener J, Marton I, Tannock R. Parental involvement in children’s learning: Comparing parents of children with and without Attention-Deficit/Hyperactivity Disorder (ADHD). *J Sch Psychol*. 2009;47(3):167–85.
183. Kawabata Y, Tseng W-L, Gau SS-F. Symptoms of Attention-Deficit/Hyperactivity Disorder and Social and School Adjustment: The Moderating Roles of Age and Parenting. *J Abnorm Child Psychol*. 2011 Aug 20;40(2):177–88.
184. Hinnerich BT, Höglin E, Johannesson M. Are boys discriminated in Swedish high schools? *Econ Educ Rev*. 2011 Aug;30(4):682–90.
185. Viner RM, Ozer EM, Denny S, Marmot M, Resnick M, Fatusi A, et al. Adolescence and the social determinants of health. *The Lancet*. 2012 May 4;379(9826):1641–52.
186. Flay BR, Graumlich S, Segawa E, Burns JL, Holliday MY. Effects of 2 prevention programs on high-risk behaviors among african american youth: A randomized trial. *Arch Pediatr Adolesc Med*. 2004 Apr 1;158(4):377–84.
187. Bond L, Patton G, Glover S, Carlin JB, Butler H, Thomas L, et al. The Gatehouse Project: can a multilevel school intervention affect emotional wellbeing and health risk behaviours? *J Epidemiol Community Health*. 2004 Dec 1;58(12):997–1003.
188. Li Y, Zhang W, Liu J, Arbeit MR, Schwartz SJ, Bowers EP, et al. The role of school engagement in preventing adolescent delinquency and substance use: A survival analysis. *J Adolesc*. 2011 Dec;34(6):1181–92.
189. Wang M, Fredricks JA. The Reciprocal Links Between School Engagement, Youth Problem Behaviors, and School Dropout During Adolescence. *Child Dev*. 2014 Mar;85(2):722–37.
190. McLeod JD, Uemura R, Rohrman S. Adolescent Mental Health, Behavior Problems, and Academic Achievement. *J Health Soc Behav*. 2012;53(4):482–97.
191. Li Y, Lerner RM. Trajectories of School Engagement During Adolescence: Implications for Grades, Depression, Delinquency, and Substance Use. *Dev Psychol*. 2011 Jan;47(1):233–47.
192. Belcher JR. Attention Deficit Hyperactivity Disorder in Offenders and the Need for Early Intervention. *Int J Offender Ther Comp Criminol*. 2014 Jan 1;58(1):27–40.
193. Lindgren M, Jensen J, Dalteg A, Meurling AW, Ingvar DH, Levander S. Dyslexia and AD/HD among Swedish Prison Inmates. *J Scand Stud Criminol Crime Prev*. 2002 Jan;3(1):84–95.

194. Jensen J, Lindgren M, Meurling A, Ingvar D, Levander S. Dyslexia among Swedish prison inmates in relation to neuropsychology and personality. *J Int Neuropsychol Soc.* 1999 Jul;5(5):452–61.
195. Macdonald SJ. Biographical pathways into criminality: understanding the relationship between dyslexia and educational disengagement. *Disabil Soc.* 2012 May 1;27(3):427–40.
196. Lundström S, Forsman M, Larsson H, Kerekes N, Serlachius E, Långström N, et al. Childhood Neurodevelopmental Disorders and Violent Criminality: A Sibling Control Study. *J Autism Dev Disord.* 2013 Jun 27;44(11):2707–16.
197. Gini G, Pozzoli T. Bullied children and psychosomatic problems: a meta-analysis. *Pediatrics.* 2013 Oct;132(4):720–9.
198. Wolke D, Lereya ST. Long-term effects of bullying. *Arch Dis Child.* 2015 Sep;100(9):879–85.
199. Allison S, Roeger L, Reinfeld-Kirkman N. Does school bullying affect adult health? Population survey of health-related quality of life and past victimization. *Aust N Z J Psychiatry.* 2009 Dec;43(12):1163–70.
200. Resnick MD, Bearman PS, Blum Rm, et al. Protecting adolescents from harm: Findings from the national longitudinal study on adolescent health. *JAMA.* 1997 Sep 10;278(10):823–32.
201. Trenez RC, Scherer M, Harrell P, Zur J, Sinha A, Latimer W. Early onset of drug and polysubstance use as predictors of injection drug use among adult drug users. *Addict Behav.* 2012 Apr;37(4):367–72.
202. King KM, Chassin L. A Prospective Study of the Effects of Age of Initiation of Alcohol and Drug Use on Young Adult Substance Dependence*. *J Stud Alcohol Drugs.* 2007 Mar;68(2):256–65.
203. Anthony JC, Petronis KR. Early-onset drug use and risk of later drug problems. *Drug Alcohol Depend.* 1995 Nov;40(1):9–15.
204. Tandon M, Tillman R, Spitznagel E, Luby J. Parental warmth and risks of substance use in children with attention-deficit/hyperactivity disorder. *Addict Res Theory.* 2014 Jun 1;22(3):239–50.
205. WHO/World Bank. World report on disability 2011. Report No.: ISBN 978 92 4 156418 2.
206. Maxwell G, Alves I, Granlund M. Participation and environmental aspects in education and the ICF and the ICF-CY: Findings from a systematic literature review. *Dev Neurorehabilitation.* 2012 Feb 1;15(1):63–78.
207. Maxwell G. Bringing more to participation: Participation in school activities of persons with disability within the framework of the International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY) [Dissertation. School of

- Education and Communication, ISSN 1652-7933 ; 16]. Jönköping: School of Education and Communication , 2012;
208. UNICEF, Innocenti Research Centre. Promoting the rights of children with disabilities. [Florence, Italy]: UNICEF, Innocenti Research Centre; 2007.
 209. Majnemer, A., Keiko, T., Novak., Elliot, C., Imms, C., Granlund, M., Bornman, J. Chapter 4. Participation and environment in relation to child disability UNICEF-tool. New York: UNICEF. In.
 210. Dalal AK. Social interventions to moderate discriminatory attitudes: The case of the physically challenged in India. Psychol Health Med. 2006 Aug;11(3):374–82.

Annex 1: Tables

Table 10: Background characteristics of adolescents aged 12-13 years from the south of Sweden. Data obtained from the research project LoRDIA in 2013- 2014. N=1274

Background characteristics	
Age¹ (years)	12.6 (11-14)
Gender²	
Girl	643 (50.5)
Boy	631 (49.5)
Country of Birth²	
Born in Sweden	1195 (94)
Born abroad	77 (6)
Language spoken at home²	
Swedish	1043 (82)
Swedish and another language	169 (13)
Other language and Swedish	59 (5)
Live with both parents²	
Yes	965 (76)
No	302 (24)
Connectedness to mother³	2.70 (0.44)
Connectedness to father³	2.63 (0.48)
Family economy²	
We have more money than other families	227 (18)
Have the same amount of money as other families	891 (71)
Have less money than other families	133 (11)
Drugs⁴	
Have smoked cigarettes	77 (6)
Have used snuff	31 (2.5)
Have snorted/boffat	31 (2.5)
Have been drinking alcohol	172 (14)
Have taken narcotics	12 (1)
Have tried 2 or more different drugs	69 (6)

Have not tried drugs	1002 (84)
Relationship to teachers⁵	16.43 (4.96)
Bullying⁶	10.55 (2.63)
Restricted participation in school²	
Yes	442 (35)
No	832 (65)

Neuropsychiatric disabilities (N=227)

Worry about or suffer from the impairment²	n (%)
Not at all	60 (33)
Just some	82 (45)
Quite a lot	37 (20)
A lot	4 (2)
 Suffer from the impairment at home with family²	
Not at all	104 (60)
Just some	43 (25)
Quite a lot	22 (13)
A lot	4 (2)
 Suffer from the impairment among friends²	
Not at all	95 (54)
Just some	50 (29)
Quite a lot	26 (15)
A lot	4 (2)
 Suffer from the impairment in school²	
Not at all	48 (27)
Just some	58 (33)
Quite a lot	40 (23)
A lot	29 (17)
 Suffer from the impairment during spare time²	
Not at all	95 (55)
Just some	48 (28)
Quite a lot	22 (13)
A lot	6 (4)

¹. Mean and minimum and maximum age

². n (%), rounded row percentage.

³. Mean on the scale and standard deviation (sd). Higher values indicate stronger connectedness, scores 1-3.

⁴. n (%). Only presenting the ones who have tried the drug

⁵. Mean on the scale and standard deviation (sd). Higher scores indicate a more negative relationship, scores 12-36

⁶. Mean on the scale and standard deviation (sd). Higher scores indicate a more bullying victimization, score 8-24.

Table 11: Presenting the variance inflation factor for all the independent variables included in the multiple logistic regression model. Dependent variable: participation.

	GVIF	GVIF ^{1/(2*Df)}
Neuropsychiatric disability	1.026916	1.013368
Bullying	1.125847	1.061060
Attachment to mother	2.218907	1.474737
Attachment to father	2.218907	1.489600
Relationship to teachers	1.119009	1.057832
Family economy	1.082141	1.019931
Gender	1.065495	1.032228
Drugs	1.049036	1.024225

Table 12: Crude and adjusted Odds Ratios (OR) with 95% Confidence Intervals (95% CI) presenting the associations between neuropsychiatric disabilities with different severities and no neuropsychiatric disabilities with restricted participation.

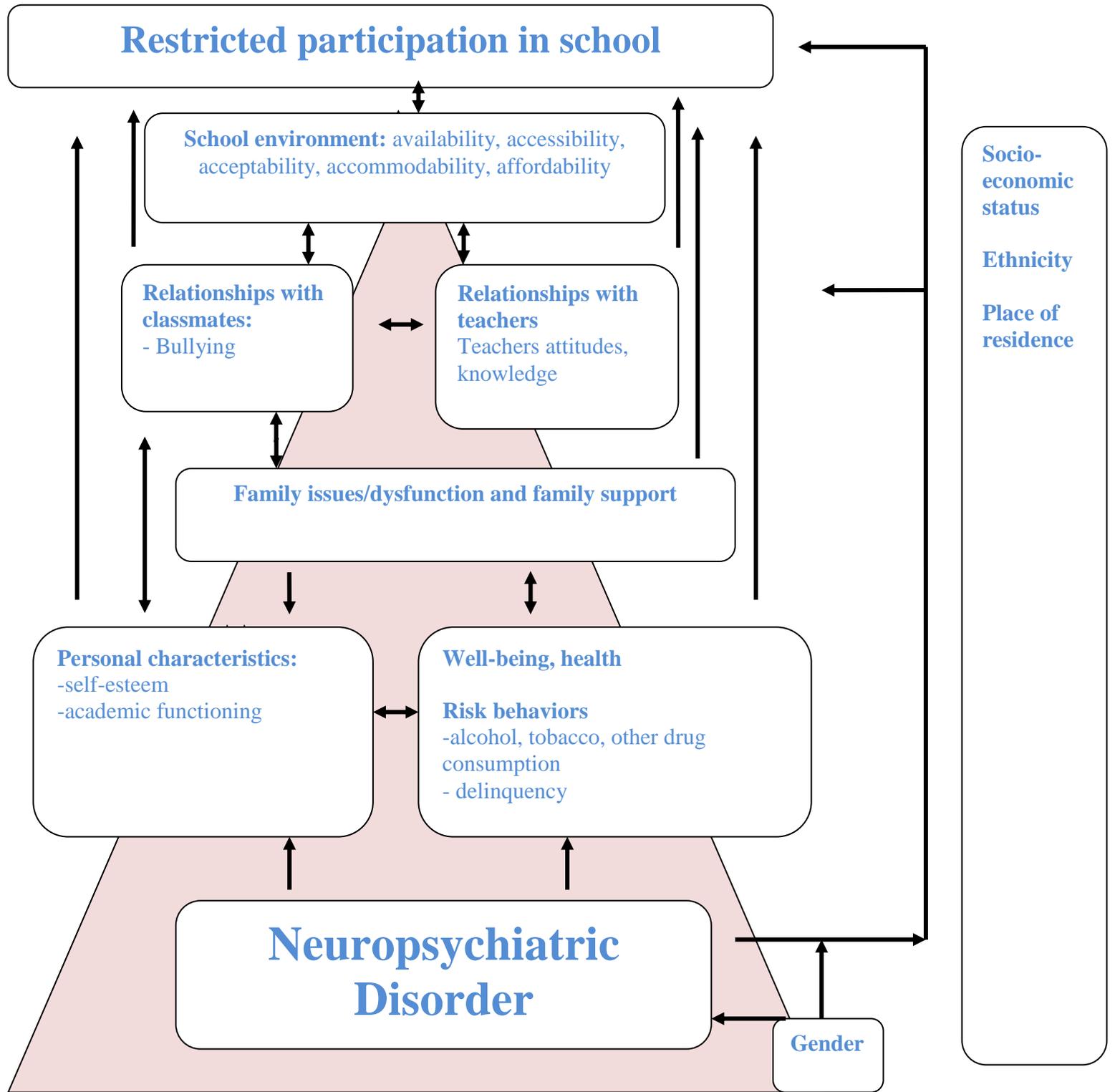
	Crude OR (95%CI)	Adjusted OR (95%CI) ¹	Crude OR (95%CI)	Adjusted OR (95%CI) ¹
Adolescents with neuropsychiatric disabilities reporting suffering or worrying about their impairment	ref	ref	3.53 (2.41- 5.21)	2.71 (1.64-4.48)
Adolescents with neuropsychiatric disabilities that do not suffer or worry about their impairment	0.73 (0.39- 1.37)	0.87 (0.40- 1.89)	2.58 (1.53- 4.38)	2.36 (1.25-4.44)
Adolescents without neuropsychiatric disabilities	0.28 (0.19- 0.42)	0.37 (0.22- 0.61)	ref	ref

¹ Adjusted for the variables ‘neuropsychiatric disabilities’, ‘sex’, ‘family economy’, ‘relationship to mother’, ‘relationship to father’, ‘relationship to teachers’, ‘drugs’, and ‘bullying’. N = 1059

Annex 2: Concept map

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Annex 3: Table of variables

Name	Items	Categorical or numerical variable	Missing observation (% of total 1274)	Cronbach's Alpha ¹
The outcome variable				
Participation	<ol style="list-style-type: none"> 1. Are you satisfied with your schoolwork? 2. Do you try to do the best that you can in school? 3. How do you like school? 4. Do you feel that you are forced to be in school against your will? 5. How would you describe the relationship between you and school? 6. Hours of non-attendance 	Categorical: Unrestricted participation= equal or below 9 Restricted participation= 10 and above	246. engagement 46 and non-attendance: 205 (16%) (% of total 1520)	
The predictor variables				
Neuropsychiatric disabilities	Included any of the following: Attention Deficit Hyperactivity Disorder (ADHD), Deficits in Attention, Motor control and Perception (DAMP), Minimal Brain Dysfunction (MBD), psychiatric problems, Autism Syndrom, Aspergers, dyslexia (difficulties reading and writing), dyscalculia (difficulties counting), speech defect and intellectual disability	Categorical: all of the mentioned disabilities were included in the neuropsychiatric disability group	0	
Relationship to teachers	<ol style="list-style-type: none"> 1. Does the teachers in the school care about you? 2. Can you talk to the teachers in school about things that do not relate to school? 3. Does the teachers like you? 4. If you have problems with something in school, can you then talk to your teacher? 5. Does the teachers approve talking to you about matters that do not relating to school if you wish? 6. Are there teachers you can talk to if you have problems in school? 7. Does the teacher give you compliments when you are doing a good job? 8. Are the teachers fair to you? 9. Does the teachers in the school care about the students? 10. Are the teachers fair to the students? 11. Does the teachers like the students? 12. Does the teachers gives the students positive feedback? 	Numerical: 12-36. Higher scores indicate a more negative relationship	87 (7%)	0.89

	Response options: ex: all teachers like me=1, all teachers besides one like me=2, most teacher do not like me=3.			
Attachment to mother	<ol style="list-style-type: none"> 1. I know mum is there when I need her 2. I feel that I can try new things since I know mum support me 3. I share my private thoughts and feelings with my mum 4. When I am angry, sad or worried mum can make me feel better 5. Mum encourage me to follow my dreams. Response options: no=1, sometimes=2, yes=3	Numerical 1-3 Mean summative score. Included everyone who answered at least 4 questions. Higher values indicate more connectedness.	14 (1%)	0.78
Attachment to father	<ol style="list-style-type: none"> 1. I know dad is there when I need him 2. I feel that I can try new things since I know dad support me 3. I share my private thoughts and feelings with my dad 4. When I am angry, sad or worried dad can make me feel better 5. Dad encourage me to follow my dreams. Response options: no=1, sometimes=2, yes=3	Numerical 1-3 Mean summative score. Included everyone who answered at least 4 questions. Higher values indicate more connectedness.	32 (2.5%)	0.80
Bullying	<ol style="list-style-type: none"> 1. Has anyone commented on the way you look in a condescending way, like called you fatty, skinny, big ears, big nose? 2. Have anyone written condescending things about you, for example on boards, walls, lockers or other spots? 3. Has anyone commented or made jokes about you in a negative way? 4. Has anyone told you that you need to change to be accepted, ex. lose weight, change clothes or the way you behave? 5. Has anyone criticized you for personal matters, as an example told you that you are a loser, freak, dork or stupid? 6. Have other students signaled that they don't want you to join them, during this semester? 7. Have you been hit, kicked or attacked in a negative way in school or to/from school? (this semester?) 8. Have you been ridiculed or teased in an unpleasant manner, or called ugly things in school or to/from school? Response options: no, never=1, yes, sometimes=2, yes, often=3	Numerical: 8-24 Higher scores indicate more bullying victimization	38 (3%)	0.80
Risk behaviour: Tried drugs	<ol style="list-style-type: none"> 1. Have you ever smoked cigarette? 2. Have you ever used snuff? 	Categorized in: Have not tried drugs	75 (6%)	

	3. Have you ever snorted/boffat? 4. Have you ever been drinking alcohol? 5. Have you ever taken narcotics (hash, marijuana, amphetamine, heroin, cocaine, ecstasy, gammahydroxybutyrat (GHB) or other drugs classed as narcotics? Response options: no=0, yes=1	Have tried drugs		
Family economy	How is your economy in comparison to the other people in your neighborhood? Response options: we have more money than other families, we have the same amount of money as other families, we have less money than other families	Categorical	23 (2%)	
Gender	Female Male	Categorical	0	

¹ Cronbachs alpha is a measurement of internal consistency. It gives an indication to what extent the items in the test are measuring the same construct or concept, if the items in the score are closely related to each other. It can take a number from 0-1, where a higher number indicate a higher internal consistency.