Adaptive functioning in children with an Autism Spectrum Disorder with- and without comorbid disruptive disorders.

"Am I looking sad or happy in the appropriate places?"

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Contents

1. Abstract

This study investigated the adaptive skills of children with an Autism Spectrum Disorder (ASD) in comparison to normal developing children and to children with comorbid ADHD and ADHD/ODD-CD. The sample consisted of parents of children aged 4-12 years (M_{age} 8.58 years; SD = 2.26). In the study two questionnaires were used; the 'Adaptieve Vragenlijst voor Jeugdigen' (AVJ) to measure the general adaptive skills in children, and the Social Emotional Questionnaire (SEV) to measure disorder symptoms. Results showed lowe adaptive scores of children with ASD and/or comorbid ADHD or ODD-CD on the AVJ-subscales a. relation with peers, b. relation with parents, c. focus on school, work and future, and d. self-direction, when compared to normally developing children. Regardless of comorbidity, the skills that were the severest impaired in children with autism were related to competently and maintaining relationships with peers and recognizing emotions in peers. Competently maintaining relationships with adults is the least impaired skill in children with autism, meaning they can flexibly handle contacts with parents, teachers and authorities. Age, gender and cultural background did not interact with these differences and similarities. In children with autism the adaptive skills accounted for respectively 44% of the explained variance of social functioning as measured with the SEV. This implicates that there are possible other factors associated to the disorder related adaptive behaviors of children with ASD. Further research should focus on intelligence as a contributing variable, for IQ seems to be a strong predictor of adaptive behavior. And as the grading of adaptive behavior is influenced by the expectations of the people who grade them, an implication would be that questionnaires should be completed by teachers as well as by parents.

2. Introduction

Autism is a lifelong persistent handicap, which influences different areas of life across different stages of age. It is a pervasive heterogeneous impairment that is often accompanied with cognitive impairments and adaptive disfunctioning (Liss et al. 2001). Autism is a pervasive disorder, meaning that there is not just one social behavior that is typical for autistic children (Rodrigue, Morgan & Geffken, 1991). The heterogeneity of the Autism spectrum disorder is shown in the variability in symptom severity, adaptive functioning and cognitive ability (Kanne et al, 2011). In autistic individuals impairments in adaptive functioning seem to be more severe than the impairments in cognitive functioning, even when matched for age and IQ. Moreover the discrepancy between adaptive and cognitive functioning increases over time (Jonsdottir et al., 2006). Therefore adaptive functioning appears to be a better indicator of how well individuals perform in their environment than cognitive functioning (Liss et al., 2001). This is also underlined by findings that children with autism have impairments in social functioning relative to their overall functioning (Rodrigue, Morgan & Geffken, 1991). The heterogeneity in the Autism spectrum disorder can be defined by the level of adaptive functioning a person has; the age-appropriate degree in which a person is capable of executing everyday situations needed to function personally and socially in an adequate manner (Sparrow, Cicchetti & Balla, 2005). Although a lot is still unknown about the adaptive skills in autistic children and adults, there are some important implications from findings thus far. For example, adaptive behavior seems to be determined by the level of intelligence a person has. Research from Liss and colleagues (2001) shows that although with the same cognitive abilities, children with autism function less in their environment and that especially social functioning is affected. Furthermore, adaptive behavior is correlated with autistic behaviors as social interaction, communication and restrictive or repetitive behaviors. More autistic behavior is related to less adaptive functioning in autistic children with a normal intelligence (Liss et al, 2005). Autistic children with a below-average intelligence show equal levels of low adaptive- and cognitive functioning. So the difference between adaptive- and cognitive functioning is greater in autistic children with an average intelligence (Liss et al, 2005). Hence, adaptive behavior is strongly related to the cognitive level, as intellectual disabilities predict lower adaptive functioning in children with autism (Bernheimer et al. 2006). A study of Matson and colleagues (2009) found that children with an intellectual disability and autism had a lower level of adaptive- and social functioning, compared to children with an intellectual disability and other psychopathology. However, in respect to the pervasiveness and heterogeneity of the disorder, differences in adaptive behavior exist irrespective of the level of intelligence of autistic children. The study of Lord and Resi (2000) found that some autistic children, with intelligence in the

normal-range, show responsive behavior towards their parents and other adults. Difficulties in social contact with peers were not being noticed, as these children had little contact with other children or the contacts were strongly coordinated by adults.

Information about the variability in adaptive behavior among children with autism is helpful in understanding the development trajectory of autism (Gillham et al. 2003). The level of adaptive functioning of a person determines the amount of supervision that is necessary for a person to function independently (Liss et al., 2001). This information is helpful in determining treatment targets (Gillham et al. 2003). The importance of investigating the level of adaptive skills on different areas among autistic children is evident in that adaptive functioning and skills, in respect of cognitive ability, appears to be strongly related to success and self-sufficiency in adulthood (Farley et al, 2009; Kanne et al, 2011). The current study investigates disabilities in adaptive functioning in autistic children, in order to find directions for interventions. This research focuses at the general adaptive skills of children and adolescents needed for daily-life-functioning. Examples of these skills are: building relationships with peers, taking the perspective of other people, a sense of gender, empathy, the formation of a personal identity and taking responsibility for schoolwork and jobs (DeHart, Sroufe & Cooper, 2005).

Research Aim

This study investigates to what end children with a disorder in the autistic spectrum (ASD) differ in adaptive functioning, as compared to normal developing children and to children with an autism spectrum disorder with other comorbid impairments. Knowledge of differences between groups can be used in the future development of interventions aimed at promoting adaptive skills in children with autism spectrum disorders.

The layout of the thesis is as follows. First, an orientation of the theoretic concepts and information about adaptive functioning from recent studies will be represented. Second, the research design of the empirical study will be defined and the statistical methods used to analyze the data will be described. Following that the results will be presented. In the final chapter the results and implications will be discusses as well as the strengths and limitations of this study.

3. Theoretic Background

Introduction

This thesis investigates the development of adaptive functioning in autistic children. To this end a comparison of adaptive functioning of normal developing children to children with an autism spectrum disorder and to children with co morbid impairments in addition to their autism spectrum disorder will be made. According to the authors of the 'Adaptieve Vragenlijst voor Jeugdigen' (AVJ) adaptive functioning is measured in the following areas; interaction with peers, parents, adults and authorities; school, work and focus towards the future; autonomy and self-control (Scholte & Van der Ploeg, 2010).

As the severity of the disorder does not relate to adaptive functioning (Kanne et al, 2011), in this thesis the concept autism includes all 5 subtypes of the Autistic Spectrum Disorder: Autistic Disorder, Pervasive Developmental Disorder Not Otherwise Specified, RETT Syndrome, Asperger Syndrome and Childhood Disintegrative Disorder (DSM-IV-TR, APA, 2002).

3.1 Autism

Clinical Features

Autism, first described by Kanner in 1943, is a severe disability involving abnormalities in social relationships, language, behavior, and cognition. The three characteristic impairments in children and adults with autism are problems in social communication and social interaction, and rigidity in behavior and interests (Wenar & Kerig, 2005). According to the Diagnostic Statistic Manual of Mental Disorders (DSM-IV-TR, APA, 2002) autism is a spectrum disorder; this implies that the nature and severity in of the impairments are on different domains. On one side of the spectrum the single handicaps are found as learning impairments or a specific disorder, on the other side of the spectrum plural handicaps are found. Autism is a gathering collection of several severe disorders (Minderaa, 2009). Autism can be divided in five subgroups; Classic autism, Asperger's disorder, PDD-NOS, Rett-syndrome and the Disintegration Disorder of Childhood. To be given the diagnose autism one has to fulfill various criteria, which include qualitative impairments in social interaction and communication and restrictive, repetitive or stereotyped patterns of behavior, interests and activities (DSM-IV-TR; APA, 2002). The features of qualitative impairments in social interaction are: disability to engage in or maintain relationships appropriate to age and development level; deficiency in spontaneous seeking of shared interests, enjoyment or achievements; deficiency in social or emotional mutuality; disability in using non-verbal behaviors. The features of qualitative impairments in communication are: delay or lack of developing verbal language; inability to maintain conversations with other

people; using language in a stereotyped manner; absence of symbolic or social imitative play appropriate to the level of development. The features of limited repetitive and stereotyped behavior, interests and activities are: a preoccupation with restricted interests, eccentric in degree of focus; habitual preoccupation with parts of objects; stereotyped and repetitive movements; obvious inflexible attachment to particular nonfunctional routines or rituals.

In addition to the three key characteristics, individuals with autism have impairments in at least six areas. These are: contact, talking, responding to internal and external information, development of movement and kinetics, social intelligence, social intuition and social interaction. With autism the impairment in contact is most obvious, and autism is therefore often abbreviated to 'contact disorder' (Minderaa, 2009). Autism is a developmental disorder; developmental disorders evolve over time and autistic children of different ages show various symptoms. The severity of the handicap can thereby decrease from the age of 6-7 years or even later on. Through development and modeling children may improve in functioning, learning to behave and act appropriate in social circumstances (Minderaa, 2009). Furthermore, in investigating the development of autistic children, it appears that in autistic children some skills develop earlier and some skills later, compared to normally developing children. More specifically, children with autism develop skills such as memory, rule following and skills related to written language, earlier than skills concerning joint attention and social reciprocity (VanMeter, Fein, Morris, Waterhouse & Allen, 1997). McEvoy, Rogers and Pennington (1991) found that autistic children showed fewer joint attention skills and social interaction. This confirms the notion that development is deviant instead of delayed, and is consistent with the social and communicative impairments autistic children face (Liss et al., 2001). Research shows that more gifted able people compensate for their lack of social intuition due to autism through applying alternative strategies such as verbal skills or logical thinking (Dissanayake, Sigman & Kasari, 1996). When taking a closer look at the five subgroups of autism, it appears that children with PDD-NOS interact more with the environment. Because of this, impairments are often described in terms of 'weaknesses in social understanding'. Many children with PDD-NOS receive special care which enables them to function in a regular primary- or secondary school (Van der Gaag, 2008).

Beside the autism spectrum disorder other disorders can be present in the same person; this is called comorbidity. The comorbid disorders that frequently occur with autism are: Attention Deficit Hyperactivity Disorder, anxiety disorders, depression, schizophrenia, oppositional defiant disorder, mental retardation, tics and Gilles de la Tourette syndrome (Matson & Nebel-Schwalm, 2007).

Prevalence and Causes

According to the Health Council of the Netherlands (2009) approximately 60-100 per 10.000 people in the Netherlands have autism, which corresponds to 1% of the total Dutch population. The true prevalence has not increased or decreased significantly, as the criteria for the diagnosis autism were extended in 1980-1990 and the community demands higher standards for social and communication skills and flexibility, so the disorder more often gives difficulties and problems (Health Council of the Netherlands, 2009). Autism rates are higher among men than among women (Lowry, 2011). Among autistic children and adolescents comorbid problems frequently occur. In autistic children and adults 7-84% have anxiety comorbid problems and 4-58% have depressive comorbid problems. Data of other comorbid problems are still unknown (Scholte & Van der Ploeg, 2007). The variability of the percentages is due to the various methods and criteria used in different studies to determine whether or not somebody has autism. An autism spectrum disorder is strongly hereditary. When using the broader definition of autism, in monozygotic twins when one of the twins had autism, in 90% of the cases the other twin had autism too (Bailey et al., 1995).

There are several causes for autism. As mentioned above, causes can be genetic but also neurologic, infectious, metabolic, immunologic or environmental. The cognitive level of functioning in autistic children is in 25-40% of the cases at a mentally retarded level, having an IQ of 70 or lower (Chakrabarti & Fombonne 2001). This means that these autistic children suffer from two handicaps: the mental disability and the autistic disorder. The high records of prevalence assume there is one cause for both disabilities (Kraijer, 1998). The brains of autistic children are of a greater volume than that of children without autism. This seems to be related to the relative stronger increases of brain growth before the age of two. The cerebral cortex especially is of more volum in autistic children (Lowry, 2011). The brain of the autistic child is significantly larger and heavier from the age of 2-4 years (Courchesne et al., 2001).

3.2 Theories explaining Autism

As described above, children with autism have deficits in adaptive functioning. Three theories aim to explain this: these are the Social Coherence Theory, the Theory of Mind and the theory of Executive Functioning.

Theory of Mind

According to Wellman (1990), Theory of Mind (ToM) is the ability to think about the thinking of others. It is the ability to replace yourself in the minds, thoughts, wishes and intentions of someone else so that that behavior can be understood and predicted. It requires meta-representation. Language has an important role in the development of ToM, words, like thoughts can be referrals and can refer to reality (Serra, 2003). Because frontal brain areas do not develop well in autistic children, children with autism have disorders in executive functioning and in theory of mind. The ToM theory is important in the investigation of the social problems that children with autism face (Serra, 2002). The social and communication problems that autistic children experience can be explained by the ToM-model. Children with autism have impairments in understanding and ascribing mental processes to themselves and others and therefore have an inability to form a concept of the inner world of others; to form meta-representatives (Serra, 2002). In many autistic children ToM is absent and they experience difficulties in fantasy play, in communicative language usage, and in using signs which influence mental processes, such as showing consolation or shame (Serra, 2002). However, not all children with autism lack ToM, therefore ToM-theory cannot be used as a generally accepted explanation for the social- and communication impairments of autistic children (Klin, 2000). Research shows that in autistic children Theory of Mind and executive functioning show little improvement during development, which means that lack of ToM and executive functioning cannot be explained by a delayed development, but rather is a consistent disorder (Ozonoff & McEvoy, 1994). Although, according to Pellicano (2010), ToM changes also in children with autism, a developmental ceiling seems to be reached in the Theory of Mind development in autistic children (Ozonoff & McEvoy, 1994). The separate domains of adaptive behavior increase at different levels. For example, the domain Motor Skills develops until the age of six and the end of the domain 'Communication' is reached at the age of eleven. Domains such as 'Daily Living Skills' and 'Socialization' plateau around the age of nine (Van Duijn et al., 2009). It has been suggested that deficits in adaptive behavior remain and show little improvement in time as age increases (Ozonoff & McEvoy, 1994).

Social Coherence Theory

Another theory that explains the adaptive impairments children with autism face is the Social Coherence Theory (Frith, 2004). This theory relates to the general information processes. Information becomes meaningful in the context in which it is given. Words and signs have various meanings in different situations (Vermeulen, 1999). For example 'raising your hand' can mean that

you have a quation if you are in classroom, but if you are in traffic it is a command to stop . For most people this process of integrating and assigning information occurs automatically. However, according to the social coherence theory, in children and adults with autism this process does not occur so naturally (Happé, 1999). As described by Mottron et al. (2000) autistic children and adults have difficulties in integrating information in a 'gestalt'. This implies hat they have problems discovering the cohesion between different details and giving meaning within the context(Vermeulen, 1999). This implies that autistic children have difficulties with plural meanings of words and signs; they experience failure when applying more intentions to one object. Because of this lack of cohesion, children and adults with autism have several impairments in social functioning. The inclination to the visible and concrete makes them insensitive to social rules, communication and adaptation: rules are taken explicitly and are applied in all situations. In communication this means that autistic children listen to facts instead of the meaning behind those facts, which is determined by the context and characteristics of the situation (Serra, 2002). Thinking in cohesion and understanding the use and meaning of situations makes adaption of behavior possible: the details can be viewed in respect of importance. Autistic children have problems with cohesive thinking and therefore cannot distinguish between the importance of different details: to them every detail is important. Recognition of these details give them support and predictability (Vermeulen, 1999). A number of pieces of research confirm the implications of the Central Coherence Theory (Klin, 2000).

Theory of Executive Functioning

The impairments that autistic children and adults face in flexibility and swerves can be explained by the theory of Executive Functioning. Executive functioning consists of behaviors that are linked to the frontal lobes, and in particular to the frontal cortex. Behaviors include planning, impulse-control, flexibility of thought and action, response inhibition (Ozonoff & McEvoy, 1994). The executive dysfunction explains the social and non-social impairments that children with autism face. Behaviors such as rigidity and perseveration are explained by the failure to plan new actions and continue with a task. Routine actions are, however, excellent and reflect the strong tendency towards repetitive behavior or rituals. Autistic children show many repetitive actions, they benefit from prompts and predictability as these help them in establishing routines or altering them (Hill, 2004).

In summary, the three theories described above seem to explain some of the impairments of autistic children. The Theory of Mind provides an explanation for the social difficulties, the theory of Social Coherence focuses on the perception that explains particular behavior and the theory of Executive

Functioning clarifies the attention deficits and resistance towards change that autistic children experience (Hill & Frith, 2003).

3.3 Development of normal developing children and children with autism

Emotional Development

Emotions are the primary form of communication in children, as emotions have a direct link with the relationship with others (Dunn, 2003). Emotions create relationships, and emotions are created in relationships (Halberstadt, Denham & Dunsmore, 2001).

In normal developing children the socialization of emotions begins at the age of three, from this age on children can mask or suppress their emotions because they can regulate whether or not their behavior is appropriate (Zernan et al., 2006). The most prominent accomplishment in the school age period is an awareness of oneself in the community (Marsh, 1990). To be able to develop a sense of self, a child needs to have adults to look up to and who will help with regulating their emotions. Children with autism have an atypical usage of understanding someone's emotional expressions in order to interpret his actions (Vivanti et al., 2011). Imitation is difficult for children with autism. This impairment accompanies simple motor movements and affects both expressions and symbolic imitations. Imitation is important in the early infant-mother social reciprocity and inter-subjectivity, affective sharing and social learning. Thus, deficits in imitation affect the social and affective development (Rogers & Pennington, 1991). The study of Downs and Smith (2004) shows that autistic children had no more trouble than normally developing children in recognizing emotional expressions in schematic drawings. They did have more difficulty in recognizing emotional expressions in photographs (Downs & Smith, 2004). These findings state that autistic children have a specific deficit in visually processing people's faces that may stem assimilating a variety of underlying important cues at the same time and may not be due to difficulties in general attention or perception. In addition, the response to these emotions is atypical as impairments in identifying emotion and showing socially inappropriate behavior remains. Children with autism have some impairment in attending and interpreting contextual cues in order to understand someone's intentions (Vivanti et al., 2011). The sharing of emotion, imitation and theory of mind are all impaired in children with autism (Rogers & Pennington, 1991). Impairment in identifying emotion and showing socially inappropriate behavior remains (Downs & Smith, 2004). For example, children with autism at one year of age show no differences to normal developing to children in expressive behavior (Palomo et al., 2006). However, autistic children from 4 years of age are less expressive, as they show more neutral and flat expressions (Czapinski & Bryson, 2003). These older autistic children less frequently

shared emotions or affection with others or made eye-contact (Bieberich & Morgan, 2004). Although they do not laugh less, their laughter is less frequently shared with others (Reddy, Wiliams & Vaughter, 2002). Considering their cognitive impairments, autistic children have more difficulty in differentiating between emotions and in describing emotions. They are able to perceive basic emotions (Hill, Berthoz & Frith, 2004), but have more difficulties in perceiving and differentiating more complex emotions (Rieffe, Meerur Terwogt & Kotronopoulou, 2007).

Responding to emotions is a different area of development and is strongly linked with age and intelligence. Infants look for the emotional responses of others in altering their own behavior. Reciprocity and empathy towards others is already present at birth and increases through infancy (Begeer, Koot, Riefke, Terwogt & Stegge, 2008). Autistic children appear to be less focused on the affective behavior of others and are less alert towards faces (Maestro et al., 2005). The reduced responsiveness to other people's emotions seem to stabilize around five years of age (Dissanayake et al., 1996). So, as the reciprocity in emotions and empathy in normally developing children extends in infancy, in children with autism this consolidates around the age of five and is thereby reduced.

Cognitive Development

The cognitive development is measured by the level of concrete operational thinking, according to Jean Piaget (Piaget, 1948). Classification and conservation are two important aspects of concrete operational thinking. In classification the child learns to group objects together by their properties. Conservation is the ability to recognize material when changes are made in shape or size. Operational thinking is important in the achievement of reading and mathematic skills and to guide social interactions, which increase in their complexity (Sadker, 1995). During middle childhood, attention becomes more selective; children learn to plan before action (Scholnick, 1995). In school-age children Theory of Mind becomes more sophisticated as children's minds become more active and reflective. Self-regulation is just beginning to develop as children obtain more knowledge of their inner speech, choices and memory-strategies (Kuhn, 2000). In addition to the concrete operational thinking, according to Piaget (1948), children also learn morality; the interpretation and understanding of rules.

Classification and conservation are difficult for children with autism. Focusing on details together with an inability to integrate stimuli in the context, the overall and contextual meaning is forgotten and configuration fails. Children with autism face problems with the central coherence (Frith, 1989). As a result of the difficulties in operational thinking, children with autism score significantly lower on reading achievement and on cognitive linguistic skill compared to normal developing children.

Reading comprehension tasks are especially difficult for autistic children (Turner, 2010). As for the relative strengths and weaknesses of children with autism, Happé (1999) suggests that children with autism have a particular cognitive style rather than cognitive deficits. This is confirmed by a study of Pellicano (2010) who found that children with autism show poor false belief perception, the ability to plan and set shifting, but show differing cognitive profiles at the individual level. At the individual level, autistic children have different cognitive profiles, which can change over a period of three years (Pellicano, 2010).

Concluding, children with autism show impairments in cognitive linguistic tasks that require phonological processing, rapid automatic naming, verbal language and reading comprehension (Turner, 2010).   Cognitive increases are associated with the improvement of social-communicative behaviors (Itzchak, Lahat, Burgin & Zachor, 2008). These findings may help in the identification of children with autism.

3.4 Adaptive Behavior

Adaptive behavior in normal developing children

The American Association on Intellectual and Developmental Disabilities (AAIDD, 2008) describes adaptive behavior as the set of conceptual, social and practical skills that people have learned in order to function in their everyday lives. Adaptive behavior can be defined as the degree to which a person is capable of executing the everyday situations needed to function personally and socially in an adequate manner (Sparrow, Cicchetti & Balla, 2005). Adaptive behavior can be divided into four basic categories: communicative skills, emotional skills, daily skills, and kinetic skills. There are three principles towards adaptive behavior. Firstly, that adaptive behavior is age-related; in normally developing children the complexity of adaptive behavior increases with age. Secondly, adaptive behavior is determined through the expectations or requirements that other people have. Lastly, adaptive behavior is not defined in possible behavior but in everyday behavior; the actual behavior. Although possibilities determine whether a person can execute certain tasks, in adaptive behavior it is important to show the adaptive skills when necessary (Sparrow, Cicchetti & Balla, 2005).

In normally developing children, as children grow up, social interactions take place: from looking at infancy to strong discussions with parents in pre-adolescence. In toddlerhood, children search for more independence; they become more self-reliant and show more advanced forms of social interactions as they become more aware of the self and other people. Toddler become more socially competent by learning general rules and by complying with parents' requests and expectations. Motor skills are developing which allows 3-4 year olds to become more independent. Also their

cognitive abilities, like planning and problem solving, increase. The 3-4 year olds become more able to concentrate and focus. Emotions are better controlled as well. From the age of 4 relationships with friends become more important and children are more able to maintain friendships. These early relationships are supportive in learning the concepts of cooperation, reciprocity and fairness. In this phase of early childhood, the ability to take the perspective of other persons and respond to the needs of others increases (DeHart, Sroufe & Cooper, 2005). In middle-childhood the concept of the self is further developed in awareness that the self is tied to others. Closely related to this is the comparison of the self with others. Another aspect of the self that develops, particularly in 5-11 year olds is the sense of gender: knowing their gender and the behaviors, activities and personality traits that are appropriate for their gender in their culture. Peers become more important in middle-childhood; children spend a lot of time in elementary school with peers and peer groups are important for the learning experiences and in the development of interaction skills through which they gain social competence. Feelings and wishes are communicated more than actions and during middle-childhood children gain a better understanding of the complexity of emotions and this accompanies an increase in empathy. In adolescence the urge towards independence already shown in toddlerhood is expanded in the formation of a personal identity, as they become separate individuals. This includes taking responsibility for their schoolwork and jobs, making choices as future adults. Peer-relations have an important contribution in this process (DeHart, Sroufe & Cooper, 2005).

Adaptive behavior in children with an autistic spectrum disorder

According to Kanner (1943), in autistic children deficits in socialization emerge in the first years of life. Compared to normal children, autistic children have deficits in the acquisition of adaptive skills and show a greater variability in adaptive skills (Matson et al, 2009). Their impairments in social functioning are greater relative to their overall functioning and have more impairment in socio-communicative adaptive skills compared to general self-help skills (Rodrigue, Morgan & Geffken, 1991; Klin et al, 2007).   In fact, there seems to be a specific autistic profile with greatest delays in socialization, fewer delays in adaptive communication and more strength in the daily living skills (Klin et al, 2007). Considering the remaining deficits in adaptive functioning, there seems to be improvement in daily living skills, changes in socialization and communication (Eaves et al. 2006). Autistic behaviors such as social interaction, communication and restrictive or repetitive behaviors are correlated with adaptive functioning in that more autistic behavior is related to less adaptive functioning in autistic children with an average intelligent level (Liss et al., 2005). There seems to be a

correlation between adaptive functioning and intelligence. Research from Liss et al. (2001) shows that autistic children and adolescents with an IQ of ≥100 have higher levels of adaptive behavior. Autistic children with an IQ of ≤ 70 show low levels of adaptive, equal to their cognitive functioning. So adaptive functioning is more impaired in children with autism with a below-average IQ (Liss et al., 2005). This suggests that autistic individuals are unable to attain skills proportional to their chronological and cognitive growth, for the impairments in adaptive functioning are apparently becoming more pronounced as age increases (Klin et al, 2007). Overall can be stated that IQ seems to be a strong predictor of adaptive behavior (Kanne et al, 2011).

The presence of comorbid psychopathology in children with an Autistic Spectrum Disorder affects the level of adaptive skills the child has. Especially children with autism, comorbid psychopathology and an intellectual disability have the greatest deficits in adaptive functioning. Stated is that comorbid psychopathology influences the adjustment of autistic children (Matson, Rivet, Fodstad, Dempsey & Boisjoli, 2009).

Summarizing it can be concluded that compared to normal developing children or children with other developmental disorders, autistic children will show fewer gains in adaptive functioning and that impairments in social reciprocity and communication will remain most pronounced (Matson et al, 2009). In the following section empirical research is used to picture the shortcomings children with autism have.

4. Method

4.1 Research questions

The main aim of this study is to determine to what end children with a disorder in the autistic spectrum (ASD) differ in basic adaptive daily life skills compared to normal developing children and children with an autism spectrum disorder with other comorbid impairments. In line with this the following research questions are formulated for the empirical study:

1. What differences and similarities exist between *normally developing children, children with an Autism Spectrum Disorder and children with an Autism Spectrum Disorder and comorbid psychopathology* in basic daily life skills, defined as: a. interaction and communication with *peers, b.* interaction and communication with *parents, adults and authorities; c.* attitude towards *school, work and future; d. autonomy and self-control*?

2. To what extend are these similarities and differences related to gender, age and cultural background?

3. Which deficiencies in adaptive skills are the most distinctive for an Autism Spectrum Disorder?

4.2 Design

The study design is cross-sectional. Various consecutive groups, normal developing children, children with Autism, and children with autism and co-morbid impairments, are investigated at the same moment in time.

4.3 Procedures

Multiple students collected the sample for this research. To obtain a representative sample, the schools were randomly drawn from all schools in each of the twelve provinces of The Netherlands. The participating schools consisted of primary schools and special education schools. Schools were contacted between November 2011 and February 2012. Schools were contacted by telephone and the director was asked to give his consent for participation in the research. Information was given or sent by letter in which the purpose of the study was defined, as well as the expectations of the school. After a school had given consent for participation in the research, the school received letters for the parents and children with the purpose of this study and the instructions for completing the questionnaires. Teachers were asked to hand out the letters to the students. The letters were coded with a unique participant number. The research took place centrally, via the Internet. Parents could

login with the participant number. Parents automatically gave their consent for participation of their child by their own participation in the research. Participation was voluntary and anonymous use of data was guaranteed. Completing the questionnaires took about 20 minutes. Because of the limited response by February 2012, the data collection period was extended to include March 2012.

4.4 Sample

The sample consisted of children between the ages of 4 and 18 years old and their parents. In answering the research question, a random subsample of the total sample was used. In this sample, the participating schools consisted of primary schools and special education schools. Respondents in the research where parents answering the questions for their children between the ages of 4 and 12 years old. The subsample contained 531 children, of which 322 (61%) were boys and 209 (39%) were girls with a mean age of 8 years and 6 months (range 4 to 12 years, SD= 2 years and 2 months). Of the children 20% were aged between 4 and 6 years old, 41% were aged between 7 and 9 years and 39% were aged between 10 and 12 years old. Of the participants, 87% had a Dutch cultural background. The cultural backgrounds of the other students were mainly from Western countries (11%) and to lesser extend from non-Western countries (2%). Figure 1 shows the distribution of disorders in the sample. Of the subsample, 370 children (70%) were normally developing children and had no disorder, 20% had a (comorbid) disorder of autism and 10% were children with ADHD, ODD-CD or ADHD/ODD-CD. Of the children with a disorder only the children with autism were included in the statistical analyses. In total 110 (21%) children had an Autism Spectrum Disorder according to the SEV. Parents reported that 62 (12%) children had an indication of autism, with 13 (2.5%) children there was a suspicion of autism. As for comorbidity, 44 (8.5%) children had autism, 22 (4%) children had autism and ADHD, 8 (1.5%) children had autism and ODD-CD and 36 (7%) children had autism, ADHD/ODD-CD.
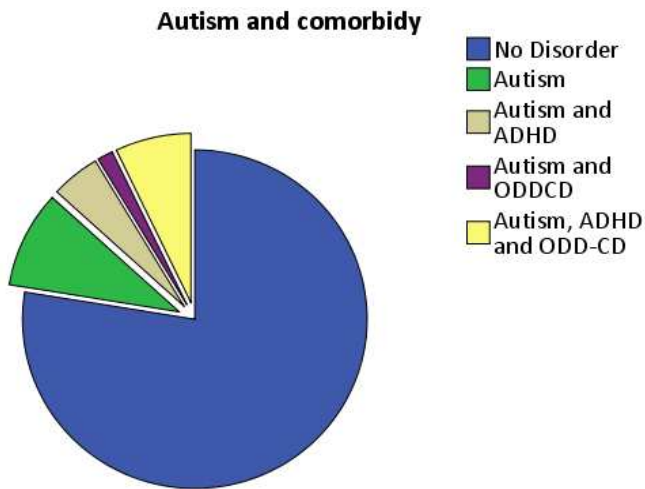
Figure 1. Pie chart of the distribution of normal developing children and children with Autism.

4.5 Research instruments

In this research, two instruments are used: The Social Emotional Questionnaire (SEQ) and the Questionnaire Adaptive Skills of Youth (Vragenlijst Adaptieve Vaardigheden Jeugdigen (AVJ). In addition to these two questionnaires, participants were asked to supply relevant demographical data. Besides the SEV and the AVJ parents were asked to give information about the possible existence or formal diagnosis of a developmental disorder.

4.5.1 The Social Emotional Questionnaire

The Social Emotional Questionnaire (SEQ) is a questionnaire measuring symptoms of the four most prominent disorders in childhood. The social-emotional problems are divided into: Attention Deficit Hyperactivity Disorder, Autism Spectrum Disorder, Oppositional Defiant Disorder and Anxious-Depressed Disorder. The SEQ consists of 72 items that meet the associated symptoms of these four disorders, as specified by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). Parents or teachers fill in the questionnaire on which answers can be given on a five-point Likert scale ('the behavior does not occur' to 'the behavior occurs frequently, to daily'. The SEQ is subdivided in the following four scales: Attention Deficit Hyperactivity Disorder (ADHD), social behavior problems, anxious-depressed behavior and autism (Oosterlaan & Veerman, 2009). Scores on the various subscales are derived by the sum of subscale scores. The minimum score on a subscale is 0. The maximum score one can obtain on a subscale is 4 times the total number of items of which the scale consists. Higher scores indicate an increasing incidence of problems on the subscales. The degree in which certain behavioral symptoms occur on a scale is determined by comparing the individual test scores with the norms, cut-off-scores, which determine the presence of a behavioral problem. As

children who obtain a score just above or below the clinical range can still have behavioral problems that need clinical attention, the clinical range is followed by the sub-clinical range. Scores below the clinical sub range are considered to be normal (refernte).

Social-emotional problems refer to the social, psychological or emotional behavioral problems that children during development can face. Therefore it is important to investigate what these problems are and what there features are (Scholte & Van der Ploeg, 2007). This research focuses on children with an Autism Spectrum Disorder, the other scales of the SEQ will be used to determine the group of autism with comorbid disorders ADHD and/or CD-ODD. Autistic behavior refers to social- and communicational deficits and to the stereotyped behavior children with autism display (Scholte & Van der Ploeg, 2007). The reliability and validity of the SEV are judged as good by the Dutch 'Commissie van Test Aangelegenheden' (Drenth & Sijtsma, 2006)

4.5.2 Adaptive Skills for Youth

The questionnaire 'Adaptieve Vaardigheden Jeugdigen' (AVJ) is a Dutch experimental questionnaire that measures the age-appropriate social and emotional skills needed to accomplish and satisfactorily execute tasks in everyday situations (Scholte & Van der Ploeg, 2010). It measures those skills adolescents are thought to be internalized from childhood through adolescence to become responsible adults that will contribute actively and constructively in modern society. Skills such as forming and maintaining positive relationships with peers, forming and maintaining generally accepted relationships with parents, adults and authorities, a positive focus at school, work and the future, as well as self and social reliance, autonomy and self-control are being measured by the AVJ (DeHart et al., 2004; Goudena, 1994; Slot & Spanjaard, 2009). The AVJ consists of 40 questions about the behavior of children and adolescents in these areas. Questions are answered through a five-point Likert-scale, ranging from (1) totally disagree to (5) totally agree. The absolute average of the scale is 3, higher scores refer to more adequate general skills. The instrument can be divided in four scales: relationships with peers, relationships with adults, attitude towards school, work and future, and autonomy and self-control. The scale 'relationships with peers' refer to the degree to which adolescents can form friendships and maintain them. The scale consists of items such as 'hanging on with friends' and 'emotions in recognizing friends'. The scale 'relationships with adults' refer to the degree to which adolescents can competently handle contact with parents, teachers, managers and authorities. The scale consists of items such as 'being positive about parents' and 'having no problems in following the directions of others' and 'accepting the leadership of adults'. The scale 'attitudes towards school, work and future' measures the degree of a positive focus towards school,

work and future. The scale consists of items such as 'always finishes homework on time' and 'being focused on the future'. The scale 'autonomy and self-control' refers to the setting of boundaries, the degree of self-control and social life skills. This scale consists of items such as 'standing up for your rights in conflicts' and 'to know what you want and don't want' and 'understanding of what can be said to certain people'. The AVJ is filled in through behavior reports by parents who have children from 4 years of age (Scholte & Van der Ploeg, 2010). Because the AVJ is an experimental questionnaire, no information is present about the psychometric characteristics of the test. The reliability of the scales and subscales is investigated in this study by computing the Cronbach Alpha. To get an impression of the level to which the items contributed to the scales, the interdependence was calculated between the scores on the items and the scores on the scale. Table 1 shows that in all the groups the Cronbach's Alpha was .77 or more. Reliability measures of .70 are considered acceptable, .80 or .90 are considered sufficient, reliability levels of .90 or higher are considered as good. This means that all the scales are acceptable or good and satisfy the reliability condition that is set for diagnostic instruments.

Table 1 *Reliability analysis of the AVJ*

AVJ Scales and Subscales	Cronbach's α
Relationships with peers	.90
Interaction with peers	.84
Communication with peers	.89
Relationships with parents, adults and authorities	.88
Contact with parents and adults	.77
Contact with authorities	.87
School, work, future:	.75
School, work	.78
Future	.87
Autonomy and self-control	.87
Autonomy	.77
Self-appliance	.78
Total scale	.95

4.6 Statistical Analyses

In answering the research questions statistical analyses were executed on AVJ- and SEV-data of the parents for their 4 -12 year old children. The main aim of this study is to determine to what end children with a disorder in the *autistic spectrum* (ASD) differ in basic *adaptive daily life skills* compared to normally developing children and children with an autism spectrum disorder with other comorbid impairments. In line with this, the following research questions were formulated that are answered by applying analysis of variance.

The first two research questions are: 'What differences and similarities exists between normally developing children, children with an Autism Spectrum Disorder and children with an Autism Spectrum Disorder and comorbid psychopathology in basic daily life skills, i.e. a. interaction and communication with peers, b. interaction and communication with parents, adults and authorities; c. attitude towards school, work and future; d. autonomy and self-control. And to what extend are these similarities and differences related to gender, age and cultural background?'. In answering these questions a Four-way Analysis of Variance is executed. First the core independent variable or factor, the variable Type of Disorder was constructed, consisting of three categories: normally developing children, children with autism, and children with autism and comorbid impairment. To examine the influence of the age, children are divided into three groups by age: 4-6 years, 7-9 years and 10-12 years of age. These groups form the second independent variable or factor in the analysis of variance. To examine the influence of gender, boys and girls form separate groups and become the third independent variable or factor in the analysis of variance. In order to research the influence of cultural background, the categories native and non-native are based on the country of birth of the mother and father, and form together the fourth independent variable or factor in the analyses of variance. To test interrelationships between type of disorder, age, gender and cultural background, the interactions between the four independent factors were calculated. To test whether these analyses could reliably be applied the following assumptions were studied: normality of the distribution, the variances of every experimental condition are similar, independency of observations and the independent variable should be measured on an interval scale. On all the statistical analyses the null-hypotheses is rejected by an alpha of $\leq .05$. The post-hoc testing Bonferroni-correction is used to determine which groups differ. The explained variance is calculated to estimate the effect sizes.

The third research question is formulated as: Which (lacks in) adaptive skills are the most distinctive for an Autism Spectrum Disorder? This question was answered by a Multiple Regression analysis with symptoms of Autism according to the SEV as the criterion variable and the following variables as the

predictors; scores on the AVJ-scales, age, gender, cultural background. Assumptions of these analyses that were tested are: homoscedasticity, normality of the distribution and the distributed errors, linearity and independent observations.

The effect size is shown by the Squared multiple correlation R^2. The Beta-coefficients are also estimated. These indicate the relative importance of every independent variable. The variable with the highest standardized beta explains the biggest part of variance in children with symptoms of ASD.

5. Results

Data-inspection

Before statistical analyses were performed, the data was checked for missing values and outliers. When participants only filled in a part of the questionnaire instead of the whole questionnaire, the whole questionnaire was deleted from the sample because too little information is available. This only happened for one case in which the participant failed to fill in the SEV. Several times participants failed to answer a question in the questionnaire. The missing values were filled in using the individual means on that scale. So, al the missing values were deleted or replaced in the sample.

Next, the data is checked for outliers. Several outliers were found when using boxplots. Scores were checked for outliers (>1,5-3 x IQR2) or extreme values (>3 x IQR). The scores on the subject number were found and changed into a value, one point above the lowest of below the highest value, 2 or 4. It is remarkable that almost all of the outliers were found in the group of non-autistics. Analysis was been run with and without outliers and missing values: the results didn't change significantly.

When considering the data-analyses first an univariate data-inspection was executed for the variables: adaptive functioning according to the AVJ, symptoms of autism according to the SEV, type of disorder, age, gender and cultural background. The general features as means, standard deviation, range, standard kurtosis and standard skewness of these variables are displayed in table 3, to check for normality. Normality of the distribution is inspected using a histogram with a normal-curve and according to a quartile plot. To this end, the Kolmogorov-Smirnoff test is also executed (Field, 2009). The level of the skewness and kurtosis is measured by dividing the skewness and kurtosis by the standard error. When this value lies between -3.0 and 3.0 the distribution will be considered normal (Kroonenberg & Linting, 2006). Table 2 shows the skewed distribution of the variables: relation with parents and authorities, relation with peers and symptoms of autism according to the SEV. The standardized kurtosis and skewness of the other variables lie within the range of -3.0 and 3.0, meaning that these values are significant, *p*< .05 and the null hypothesis that the distribution is normal can be rejected. The quartile plots show the skewness of the distribution, as not all points lie on a straight line. However the sample is fairly large and thereby offers an acceptable representation of the normal distribution (Field, 2009). Moreover, because this study investigates adaptive functioning in normal developing children, children with autism or other comorbid developmental disorders, normality of the distribution cannot be expected.

Table 2. *General features of numerical variables*

	N	M	Std.Dev	Range	Std.Kurt.	Std.Skew.
AVJ Scales:						
-Relation with peers	526	3.78	.65	3.2	1.432	-6.472
-Relation with parents, authorities	526	3.76	.59	3.1	.873	-3.802
-Focus on school, work future	526	3.75	.51	2.6	-.343	-2.679
-Autonomy and Selfcontrol	526	3.52	.59	3.1	.085	-2.698
Autism according to the SEV	526	.20	.40	1	.864	13.943

N= total *M*= mean*; Std.Dev*= standard deviation; *Range*= minimum t/m maximum; *Std. Skew*= standardized skewness; *Std. Kurt*= standardized kurtosis

The mean age of the children is 8 years and 6 moths *(SD = 2.26, range = 7-10 years)*. More children in the sample are male, 61% were boys and 39% of the children in the sample were girls. It is apparent that almost all of the children, 87 % are of Dutch nationality and are Dutch. When one of the parents is born outside the Netherlands, the child is considered an immigrant, 11 % percent of the children were from western countries and 2% came from Non-Western countries. Only a very small percentage of the sample has an autism spectrum disorder (20%) or autism and other comorbid disorders (10%), of the sample 70% had no disorder. In table 3 the general features are shown of children with autism and/or other comorbid impairments on the subscales of the AVJ.

Table 3. *General features of children with a disorder on the AVJ*

	Normal population			Autism			Autism and ADHD			Autism, ADHD/ODD-CD		
	N	*M*	*S.D.*	*N*	*M*	*S.D.*	*N*	*M*	*S.D.*	*N*	*M*	*S.D.*
	370			44			22			34		
Relation with peers		4.03	.65		3.10	.66		3.04	.60		2.71	.53
Relation with parents		3.98	.59		3.51	.48		3.20	.49		2.71	.46
School, work, future		3.90	.51		3.48	.51		3.38	.51		3.18	.52
Autonomy and selfcontrol		3.75	.59		3.21	.51		2.81	.50		2.52	.378

N= total; *M*= mean*; S.D.*= standard deviation.

In analyzing the spread of the data a scatterplot matrix was made; through this bivariate-outliers and homoscedasticity were examined. The scatterplot matrix with a regression line shows that there are eight outliers on the total scales of the AVJ. Of these, four of them are outliers on several variables, these subject numbers were deleted. The remaining four are outliers on only one or two variables; these outlying scores, on the presenting subject numbers, were transformed into the outlying score plus or minus one point of that score, so the scores would remain low or high scores, instead of changing them to the mean. When the analysis is run without these outliers and the changed scores, now all the points are close to the regression line or form a separate group together. There is homoscedasticity, all points are close to the regression line and there are no outlying values.

The homogeneity of the variances is investigated using the Levene's test (Field, 2009). Whenever this value is not significant, (p> .05) variances are homogenate. For the scales of the AVJ: *self direction*, $F(4, 472)= .92$, *ns*; *school work and future* $F(4, 472)= 2.14$, *ns; relation with parents and authorities* $F(4, 472)= .89$, *ns;* and the variables cultural background $F(2, 433)= 1.61$, *ns*; and age $F(4, 472)= .75$, *ns*, the variances were equal for normally developing children, children with an autism spectrum disorder and children with other comorbid impairments. But for the variable *relation with peers*, $F(4, 472)= 3.99$, $p <.001$; and gender, $F(3, 466)= 86.42$, $p <. 001$. The variances were significantly different in the three groups. This can be explained by the fact that autism is a disorder that occurs more frequently in boys.

A correlation matrix is made by checking multicollinearity, When the conditions of spread, normality and homogeneity of variances are not met, the test results must be interpreted with caution. However, with this size of sample the confounding effects are less influential (Field, 2009). Multicollineariteit is checked using a correlation matrix. Multicollinearity is identified if any of the predictor variables correlate hihgly, .80 of .90. No multicollinearity was found for the numerical variables, although significant correlations for all of the subscales of the AVJ were found at the 0.01 level. Only one of the correlations between the subscales exceeded the .8 level and all the others were below .76 indicating no multicolinearity. The scales of the AVJ *realtion with parents and authorities* and *selfcontrol* correlate highly .84 with significance level of .001. The separate scales of the AVJ were examined to see whether multicollinearity was present, not using the total scores of the AVJ. All correlations between the subscales were .79 or below at the 0.01 level.

Analyses

1. What differences and similarities in basic daily life skills exists between normal developing children, compared to children with an Autism Spectrum Disorder and to children with comorbid psychopathology in basic daily life skills?

There was a statistically significant difference between children's type of disorder and their total adaptive skills, $F (40, 1757) = 12.46$, $p \leq .01$; Wilk's $\lambda = 0.39$, partial $\varepsilon^2 = .21$. This implies that children with developmental problems score lower on adaptive skills. Equal variances are not assumed of all the variables using Levene's test. Not all values were below the 0.05 level. However, because the sample size is fairly large and therefore representative and analyses can proceed.

Analysis shows that type of disorder has a statistically significant effect on the scales *relation with peers* ($F (4, 472) = 107.20$; $p \leq .01$; partial $\varepsilon^2 = .48$), *relation with parents, adults and authorities* ($F (4, 472) = 82.28$; $p \leq .01$; partial $\varepsilon^2 = .41$), *focus on school, work and future* ($F (4, 472) = 31.03$; $p \leq .01$; partial $\varepsilon^2 = .21$) and on *self-control* ($F (2, 57) = 87.45$; $p \leq .01$; partial $\varepsilon^2 = .43$).

The type of disorder has the least effect on *focus on school, work and future*; this is the type of adaptive skills that is the least lacking among children with autism. A Bonferroni correction is made to account for multiple ANOVAs being run. A statistical significance of $p < .025$ is accepted.

The significant ANOVAs are followed up with Tukey's HSD post-hoc tests, as shown in table's 4a-4d. Table 4a shows that mean scores for *relation with peers* were statistically significantly higher for normally developing children compared to children with autism and children with autism and other comorbid disorders ($p < .05$). So Interaction and Communication with peers is most lacking among children with autism and children with autism and comorbid ADHD and/or ODD-CD.

Table 4a. *Post-Hoc test of AVJ subscale Relation with peers*

	Normal Population		Autism		Autism and ADHD		Autism, ADHD/ODD-CD	
	M	*Std.Error*	*M*	*Std.Error*	*M*	*Std.Error*	*M*	*Std.Error*
Normal population	-	-						
Autism	.94*	.08	-	-				
Autism and ADHD	.99*	.11	.05	.13	-	-		
Autism and ADHD/ODD-CD	1.33*	.09	.39*	.11	.33	.13	-	-

M= mean difference*; Std.Error*= standard error. * Significant at the 0.05 level (2-tailed).

Table 4b shows that mean scores for *relation with parents, adults and authorities* were statistically significantly higher for normally developing children compared to children with autism and children with autism and other comorbid impairments ($p < .01$). Furthermore, children with autism and/or ADHD score higher levels for *relation with parents* compared to children with autism and ADHD/ODD-CD ($p < .01$). *Relation with parents, adults and authorities* is the type of adaptive skills that is more lacking among children with autism and ADHD/ODD-CD.

Table 4b. *Post-Hoc test of AVJ subscale Relation with parents, adults and authorities*

	Normal Population		Autism		Autism and ADHD		Autism, ADHD/ODD-CD	
	M	Std.Error	M	Std.Error	M	Std.Error	M	Std.Error
Normal population	-	-						
Autism	.48*	.07	-	-				
Autism and ADHD	.78*	.09	.31	.12	-	-		
Autism and ADHD/ODD-CD	1.27*	.08	.80*	.10	.49*	.12	-	-

M= mean difference*; Std.Error*= standard error. * Significant at the 0.05 level (2-tailed).

Table 4c shows that mean scores on *focus on school, work and future* were statistically significantly higher for normally developing children compared to children with autism and autism and ADHD and/or ODD-CD ($p < .01$). *Focus on school, work and future* is the type of adaptive skills that is more lacking among children with Autism and ADHD-ODD-CD compared to children with Autism.

Table 4c. *Post-Hoc test of AVJ subscale Focus on school, work and future*

	Normal Population		Autism		Autism and ADHD		Autism, ADHD/ODD-CD	
	M	Std.Error	M	Std.Error	M	Std.Error	M	Std.Error
Normal population	-	-						
Autism	.41*	.07	-	-				
Autism and ADHD	.52*	.09	.10	.12	-	-		
Autism and ADHD/ODD-CD	.72*	.08	.30*	.10	.19	.12	-	-

M= mean difference*; Std.Error*= standard error. * Significant at the 0.05 level (2-tailed).

Table 4d shows that, for the last scale of the AVJ, *autonomy and self-control,* mean scores were statistically significantly higher for normally developing children compared to children with autism and autism and other comorbid impairments ($p < .01$), and mean scores were higher for children with autism compared to children with autism and ADHD/ODD-CD ($p < .01$). *Autonomy and self-control* is the type of adaptive skills that is most lacking among children with autism and AHD and/or ODD-CD.

Table 4d. *Post-Hoc test of AVJ subscale Autonomy and self-control*

	Normal Population		Autism		Autism and ADHD		Autism, ADHD/ODD-CD	
	M	Std.Error	M	Std.Error	M	Std.Error	M	Std.Error
Normal population	-	-						
Autism	.54*	.07	-	-				
Autism and ADHD	.94*	.10	.40*	.12	-	-		
Autism and ADHD/ODD-CD	1.23*	.08	.67*	.10	.29	.12	-	-

M= mean difference*; Std.Error*= standard error. * Significant at the 0.05 level (2-tailed).

2. To what extend are these similarities and differences related to gender, age and cultural background?

In this study gender, age and cultural background are not related to the differences and similarities in adaptive skills among normally developing children, children with autism and children with autism and ADHD and/or ODD-CD. There was no statistically significant difference between scores on the four scales of the AVJ, type of disorder and gender, *F* (12, 1235) = 1.70, *p* = .06; Wilk's λ = 0.95. So the differences and similarities between scores on the four scales of the AVJ and type of disorder are not related to gender. There was also no statistically significant difference between cultural background, scores on the four scales of the AVJ and type of disorder, *F* (12, 1135) = 1.21, *p* =.27; Wilk's λ = 0.97. There was a statistically significant difference between scores on the four scales of the AVJ, type of disorder and age, F (28, 1548) = 1.79, *p* < .05; Wilk's λ = 0.89. This indicates that the differences and similarities between scores on the four scales of the AVJ and type of disorder are related to age. Analysis further shows that Type of disorder and Age had a statistically significant effect on *relation with peers* (*F* (7, 432) = 3.51; *p* < .01) and on *relation with parents, adults and authorities* (*F* (7, 432) = 2.14; *p* < .05). A Bonferronni correction is made and statistical significance is accepted at *p* < .025. We can follow up these significant ANOVAs with a second order interaction as shown in table 5. The table shows that gender, cultural background and age do not have a significant effect on adaptive

functioning, as measured by the AVJ. When further analyzing the influence of age on the subscales of the AVJ in the different age groups there appears no significant effect, all p's are above the significance level of .05.

Table 5. *Second order interaction of Type of disorder and gender, age, and cultural background with the scales of the AVJ as dependent variables.*

		F	df	Sig.
Type of disorder X gender child	Relation with peers	2.83*	3	.04
	Relation with parents, adults and authorities	.88	3	.45
	Focus on school, work future	.32	3	.81
	Self- direction	.99	3	.39
Type of disorder X age child	Relation with peers	.75**	7	.001
	Relation with parents, adults and authorities	.41*	7	.04
	Focus on school, work future	.21	7	.36
	Self- direction	.36	7	.07
Type of disorder X cultural background child	Relation with peers	.56	3	.64
	Relation with parents, adults and authorities	.86	3	.46
	School, work future	.39	3	.76
	Self- direction	.09	3	.97

* Significant at the 0.05 level (2-tailed). ** Significant at the 0.001 level (2-tailed).

3. Which (deficiencies in) adaptive skills are the most distinctive for an Autism Spectrum Disorder?

Table 6 shows the correlations between the subscales of the AVJ and autism according to the SEV. The Pearson correlation was for each of the variables between -1 and +1. Multicollinearity was found between the scales of the AVJ: *school, work future* and *relation with parents, adults and authorities*, *r* = .84 (*p* = < .001). This makes it difficult to assess the individual importance of the predictors. For all the other variables no multicollinearity was found although significant correlations for all the subscales of the AVJ and the SEV were found at the 0.001 level. The scales of the AVJ were correlated at the significant level, *r* = .59 (*p* < .01. All of the AVJ scales were significantly negatively correlated *r* = -.40 (*p* < .01).

Table 6. *Correlations between AVJ subscales and Autism according to the SEV*

	Relation with peers	Relation with parents, adults	School, work, future	Autonomy and self-control	Autism according the SEV
Relation with peers	-				
Relation with parents	.33**	-			
School, work future	.25**	.68**	-		
Autonomy and self-control	.31**	.84**	.72**	-	
Autism according the SEV	-.34**	-.52**	-.41**	-.55**	-

** Correlation is significant at the 0.001 level (2-tailed).

In table 7, the regressions of the scores of autism, autism and ADHD, autism and ADHD/ODD-CD according to the SEV based on the four scales of the AVJ are presented. As shown, all scales of the AVJ are significant predictors of autism on the SEV. However, the variable *relationship with peers* has the highest contribution to the overall variance explained ($β$ -.53, *p* = ≤.001) in the group of children with autism as well as in the group of children with autism and comorbid impairments. This means that *relationship with peers* reflects the type of adaptive skills that is lacking most strongly among autistic children, regardless of comorbidity. *Relationship with parents, adults and authorities* is the type of adaptive skills that is the least lacking among children with autism ($β$ -.02, *p* = .79) and children with autism, ADHD/ODD-CD ($β$ .17, *p* = .79). For children with autism, the adaptive skills account for respectively 44% of the explained variance in the SEV. So approximately 36% of the variability is still to be accounted for by other variables.

Table 7. *Multiple regression with AVJ scales and SEV-scores for autism*

	SEV Autism					SEV Autism and ADHD					SEV Autism, ADHD/ODD-CD				
	N	F	β	Std. Error	p	N	F	β	Std. Error	p	N	F	β	Std. Error	p
(Constant)	44	59.45		.12	≤.001	22	70.19		.147	≤.001	34	63.25		.15	≤.001
		(7,52)*					(8,52)*					(9,52)*			
Relation with peers			-.53	.03	≤.001			-.54	.03	≤.001			-.54	.03	≤.001
Relation with parents			-.02	.05	.79			.06	.04	.31			.01	.04	.79
School, work, future			.03	.04	.54			.06	.04	.21			.08	.04	.09
Self direction			-.12	.05	.078			.08	.05	.28			.07	.05	.29

* Significant at the 0.001 level (2-tailed). R^2 autism: .44; R^2 autism and ADHD: .51, R^2 autism, ADHD /ODD-CD: .52.

6. Discussion

Differences in adaptive functioning

First, this study investigated the differences and similarities that exist in adaptive functioning between normally developing children, children with an Autism Spectrum Disorder and children with an Autism Spectrum Disorder and comorbid psychopathology. Agreeing with earlier research that children with autism have impairments in social functioning relative to their overall functioning (Rodrigue, Morgan & Geffken, 1991). This study found a statistically significant difference between children's type of disorder and their adaptive skills. Children with autism scored lower on adaptive skills compared to normally developing children. The type of disorder has a statistically significant effect on all the subscales of the AVJ; a. *relation with peers; b. relation with parents, adults and authorities; c. focus on school, work and future; and d. self-direction.* The skills that are most lacking among children with autism and children with autism and comorbid impairments are the interactional skills. This is in line with earlier research that found that individuals with autism had impairments in adaptive functioning (Jonsdottir et al., 2006). Moreover, other research shows that autistic behavior in children with autism was related to less adaptive functioning (Liss et al, 2005).

Taking a closer look at the subscales of the AVJ, *relationship with peers* reflects the type of adaptive skills that is most lacking in autistic children, regardless of comorbidity. This corresponds to earlier research where children with autism were found to have the greatest delays in socialization (Klin et al, 2007). It also supports the conclusion of others that the impairment in contact is the most important basic skill that is lacking in children with autism (Minderaa, 2009).

Relationship with parents, adults and authorities is the type of adaptive skills that is most present in children with autism and children with autism, ADHD/ODD-CD. An explanation for this could be that parents filled in the questionnaires, grading their own children, and therefore were subjective in their opinion. Compared to children with autism, the type of adaptive skill that is most lacking in children with autism and ADHD/ODD-CD is *relationship with parents, adults and authorities.* So, comorbid disorders influence the level of adaptive skills. An explanation for this is that ADHD is a disorder where children are lacking in attention and/or are hyperactive and impulsive; these children face difficulties, for example, in listening to parents or in social interaction with peers (Gunning, 2009). ODD-CD is a disorder where children show antisocial and rebellious behavior towards adults and others. This is often accompanied with problems with authorities (Matthys, 2009).

Type of disorder has the smallest effect on *focus on school, work and future*; this is the type of adaptive skill that is, next to *relationship with parents, adults and authorities*, the least lacking among children with autism. In children with autism and ADHD/ODD-CD f*ocus on school, work and future* is

more deficient compared to children with autism. This is in agreement with another study where it is stated that the presence of comorbid psychopathology in children with an Autistic Spectrum Disorder affects the level of adaptive skills that the child has (Matson, Rivet, Fodstad, Dempsey & Boisjoli, 2009). The impulsive behaviors and difficulties with attention, accompanied with the rebellious and antisocial behaviors of children with comorbid ADHD/ODD-CD are an explanation for this. *Autonomy and self-control* is lacking among children with autism and children with autism and other comorbid impairments, compared to normal children. Among children with autism and ADHD and ADHD/ODD-CD *autonomy and self-control* is the type of adaptive skill that is most lacking. An explanation for this is that children with ADHD have difficulties with impulse control and therefore with self-control (Gunning, 2009). The antisocial, aggressive and rebellious behavior, the stealing, lying and tantrums of children with ODD-CD are explained by their lack of autonomy and self-control (Matthys, 2009).

Influence of age, gender and cultural background
Next, the study investigated to what extend these differences and similarities in adaptive skills were related to gender, age and cultural background. There was no significant difference between scores on the AVJ, type of disorder, age, gender or cultural background. Thus the differences and similarities between scores on the AVJ and type of disorder are not linked to age, gender or cultural background. This is in line with earlier research that shows that deficits in adaptive behavior persist and show little improvement in time as age increases (Ozonoff & McEvoy, 1994). It also confirms the notion that development is deviant instead of delayed, and is consistent with the social and communicative impairments that children with autism face (Liss et al., 2001). A study of Klin et al. (2007) suggests that individuals with autism are unable to attain skills proportional to their chronological and cognitive growth. The impairments in adaptive functioning apparently become more pronounced as age increases (Klin et al., 2007).
In children with autism, adaptive skills account for respectively 44% of the explained variance in the SEV. This implies that there are other factors that have an influence on the adaptive skills of children with an Autism Spectrum Disorder.

In conclusion, this research has investigated wether children with autism and other comorbid impairments are lacking in adaptive skills, compared to normally developing children. Children with autism, regardless of comorbidity, have the most pronounced deficiencies in making relationships with peers and maintaining them. This subscale consists of items such as 'hanging on to friends' and

'recognizing emotions in friends'. Age, gender and cultural background seem to have no significant effect on these differences and similarities.

Limitations and recommendations

Results of this study must be interpreted with caution. The limitations of this study are described below.

The first shortcoming in this study is that not all the assumptions were met for the parametric tests. For example multicollinearity was found between the scales of the AVJ: *school, work future* and *relation with parents, adults and authorities*, r = .84 (p = < .001). This makes it difficult to assess the individual importance of the predictors. Missing values were filled in by the mean value on that scale of all the participants; this is less reliable than, for example, using the mean value on that scale of the individual participant.

A second shortcoming in this study is that the sample in this research was not drawn randomly. A first recommendation would be for future research to select the sample at random so that all the provinces in the Netherlands are equally represented, as well as the various types of school (Elementary schools and Special education schools).

Another shortcoming in this research is the limited participation of Special Education schools. Only a small percentage of children in this sample had an Autism Spectrum Disorder. Extensive participation of Special Education schools would provide a representative sample and make a good comparison possible between normally developing children and children with autism and/or comorbid impairments. A second recommendation, therefore, would be to carry out this research again, using a greater sample of children from Special Educational schools.

A third recommendation would be to ask parents as well as teachers to fill in the questionnaires and then to compare these, to determine whether or not parents and teachers differ in their answers about the adaptive skills of children aged 4 to 12 years. It should be borne in mind that the grading of adaptive behavior is influenced by the expectations of the people who grade them (Sparrow, Ciccetti & Balla, 2005). Next it is important to consider the intelligence of the children in future research. Various studies reflect on the important influence of intelligence on adaptive skills (Liss et al, 2005; Matson et al, 2009; Lord & Resi, 2000). Moreover, IQ seems to be a strong predictor of adaptive behavior (Kanne et al. 2011). A fifth implication for further research would be to investigate the influence of intelligence/IQ of children with an Autism Spectrum Disorder and children with autism and other comorbid impairments.

Differences in adaptive skills must be interpreted with caution, for the current study has investigated differences in basic daily life skills between groups, instead of within groups. This is important for further research, as Matson and colleagues (2009) states that children with autism show a great variability in adaptive skills.

7. References

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Appendix

Faculteit der Sociale Wetenschappen
Instituut Pedagogische Wetenschappen
Afdeling Orthopedagogiek

Universiteit Leiden

Leiden, voorjaar 2011/najaar 2012

Geachte heer of mevrouw,

Het ene kind heeft het gemakkelijker dan het andere. Dit hangt met een groot aantal factoren samen. Niet alleen de zelfredzaamheid en het zelfbeeld van het kind spelen een rol, ook de relaties met leeftijdgenoten en volwassenen zijn van belang. Om te voorkomen dat kinderen in moeilijkheden raken en vastlopen is het belangrijk zo vroeg mogelijk vast te stellen of een kind op de genoemde gebieden problemen heeft. Er kan dan op tijd passende begeleiding worden geboden.

De Universiteit Leiden heeft op verzoek van meerdere instellingen besloten een onderzoek uit te voeren om de sterke en zwakke kanten bij kinderen in beeld te brengen en na te gaan hoe daar mee om te gaan. Hiervoor is het nodig dat een groot aantal ouders en jongeren meewerken en een vragenlijst invullen. Dit neemt circa 30 minuten in beslag en verloopt via het internet. Alle gegevens worden volstrekt anoniem verwerkt en vertrouwelijk behandeld.

Wat vragen wij van u?
Ziet u als school het belang van dit onderzoek in dan vragen wij uw toestemming om via uw school ouders en jongeren te vragen deel te nemen aan het onderzoek.
Van de school wordt verwacht dat leraren een uitnodigingsbrief voor de ouders aan de leerlingen meegeven. De deelname door ouders en leerlingen is geheel vrijwillig. Van de school wordt alleen gevraagd de uitnodigingsbrieven te verspreiden.

Indien u wilt meewerken verzoek ik u te berichten voor hoeveel leraren en kinderen u brieven wenst te ontvangen, en deze informatie op te sturen aan: [naam coördinator], FSW, Afdeling Orthopedagogiek, antwoordnummer 10302, 2300 WB Leiden. U kunt de informatie ook mailen op het adres: [E-mail adres coördinator]

U dank zeggend voor uw aandacht en hopend op uw medewerking,

Met vriendelijke groet,

Prof. Dr. E.M. Scholte
Afdeling Orthopedagogiek
Universiteit Leiden

Faculteit der Sociale Wetenschappen
Instituut Pedagogische Wetenschappen
Afdeling Orthopedagogiek

Leiden, najaar 2011/voorjaar 2012

Beste ouder(s) en/of verzorger(s),

Het ene kind heeft het gemakkelijker dan het andere. Dit hangt met een groot aantal factoren samen. Niet alleen de zelfredzaamheid van het kind speelt een rol, ook de relaties met leeftijdgenoten en volwassenen zijn van belang. Om te voorkomen dat kinderen in moeilijkheden raken en vastlopen is het belangrijk zo vroeg mogelijk vast te stellen of kinderen aanpassingsmoeilijkheden hebben. Er kan dan op tijd passende begeleiding worden geboden.

De Universiteit Leiden heeft op verzoek van meerdere instellingen besloten een onderzoek uit te voeren om sterke en zwakke kanten van kinderen in beeld te brengen. Hiervoor is het nodig dat een groot aantal ouders en kinderen een vragenlijst invult.

Uw school heeft toestemming gegeven om u voor dit onderzoek te benaderen. Graag vragen wij aan u, uw eventuele partner en uw kind – indien ouder dan 9 jaar – om de vragenlijst onafhankelijk van elkaar in te vullen. Tot slot verzoeken we u, uw partner en uw kind de lijst over twee weken weer in te vullen. Hierdoor krijgen we een indruk van de betrouwbaarheid van het onderzoek. Het beantwoorden van de vragen duurt circa 20 minuten. Deelname aan het onderzoek is geheel vrijwillig. Alle gegevens worden anoniem verwerkt en vertrouwelijk behandeld. Met uw deelname geeft u automatisch toestemming voor de deelname van uw kind.

De vragenlijst wordt ingevuld via het internet. U gaat daarbij als volgt te werk:
1. Ga naar de website: www.onderzoekleiden.nl
2. Klik bij '**ONDERZOEK ADAPTIEVE VAARDIGHEDEN op ►Starten**'
3. Bij password vult u in (kleine letters):
4. Klik daarna op het vakje '**login**'
5. Vervolgens ziet u een introductie van de vragenlijst. Vul bij 'deelnamenummer' het nummer in dat onderaan de brief staat; hetzelfde nummer moet worden gebruikt door u, uw partner en uw kind; vult u dit nummer ook in als u de enquête over twee weken weer invult voor dit kind
6. U dient alle vragen achter elkaar te beantwoorden. Kiest u voor het invullen daarom een moment dat u even de tijd hebt.

Mocht u nog vragen hebben over het onderzoek, dan kunt u contact opnemen via het volgende emailadres: [E-mailadres coördinator]

Alvast hartelijk dank voor uw medewerking,

[Naam student]   Prof. Dr. E.M. Scholte
Masterstudent Orthopedagogiek   Coördinator onderzoek
Universiteit Leiden   Universiteit Leiden

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Deelnamenummer: