Chapter 21

Autism Spectrum Disorders in People with Sensory and Intellectual Disabilities Symptom Overlap and Differentiating Characteristics

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Additional information is available at the end of the chapter

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1. Introduction

Autism Spectrum Disorders (ASD) are developmental disorders that people are burdened with for their whole life. They origin in childhood and are featured by restrictions in social and emotional development, communication, interests and motor skills [1]. People with autism are characterized by three major deficits as defined by the most recent version of diagnostic and statistical manual of mental disorders (DSM-IV-TR). These deficits include qualitative impairments in social interaction, qualitative impairments in communication and restricted, repetitive and stereotyped patterns of behaviour [2]. Behaviours within these main components of ASD may differ per individual because they are expressed in unique ways for each individual. Variations can be found in the way, the intensity and the perseverance with which the symptoms are expressed. Also the core characteristics may vary per individual. Where skills, interests and intellectual levels differ between people, so do the characteristics of autism, only the main problem areas remain the same [3]. In the current chapter, not only autism as defined by DSM-IV-TR, but also all variations within the autistic spectrum will be included.

Several symptoms of ASD are not unique but also found in other groups of people with disabilities. Similar behaviours, overlapping symptoms, or even the exact same behavioural characteristics can be found in people with hearing disabilities [4], visual impairments [5], intellectual disabilities [6] and combinations of these impairments, such as deafblindness [7]. All three of the main components of autism that the DSM-IV-TR describes, are also found in non autistic people with sensory and intellectual disabilities.

Furthermore, the prevalence of ASD seems to be much higher in people with one or more of these disabilities. In the entire population ASD is estimated to occur in at least between 0,1 and 0,6 percent [8, 9] and at most 2,64 percent [10]. In people with intellectual disabilities reported prevalences are much higher, ranging from 4 up to 60 percent [11]. Without giving exact rates the prevalence of ASD and autistic features in people with sensory disabilities is reported to be much higher than in typically developing people [12-14] It is an interesting question what cause this increase in prevalence when other impairments are involved. An obvious explanation could be a relationship between ASD and sensory or intellectual disabilities. An alternative explanation is an overlap of symptoms, but not of the underlying mechanisms, between autistic people without other disabilities and people with sensory and intellectual impairments. If the latter is the case, some people might be unfairly diagnosed as autistic when in fact they are not. False positive diagnoses then causes the increase in prevalence of ASD in sensory, intellectually and multiply impaired people.

The overlap in symptoms between people with ASD and people with sensory, intellectual and multiple impairments interferes with the right classification of the behaviour of people with sensory and intellectual disabilities. Several authors stress that even though the symptoms are similar, the processes that underlie these symptoms are different for autistic versus non autistic people [4, 15, 16]. Nevertheless, when behaviours are the same, there is the risk that ASD is either missed or unjustly diagnosed. A wrong classification may lead to a wrong treatment plan, which is especially problematic if the treatment plan is counterproductive for the true underlying cause. A treatment is most effective if it tackles the cause of the behaviours. An example is the stopping of stereotyped movements. Whereas in the blind these are usually caused by a lack of stimulation from the environment [17, 18], in people with ASD stereotyped movements can occur to get away from too much stimulation from the environment [19, 20].

The current chapter will give a comprehensive overview of the overlapping symptoms between autistic and non autistic people; it will elaborate on the categories that the DSM-IV-TR distinguishes as well as on the overlap within these categories for autistic and non-autistic people, it will describe the differences between the two groups and finally explain why a better differentiation is necessary.

2. Qualitative impairments in social interaction

The first characteristic of autism, according to DSM-IV-TR is defined as qualitative impairments in social interaction. These impairments can express through a variety of symptoms: problems in reciprocity and sharing of interests and emotions; impairments in non-verbal behaviours and impairments in joint attention, either in sharing, following or directing [2]. All of these problems in social behaviours contribute to problems in the development of proper peer relations.

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2.1. Reciprocity and peer relationships

Some children with ASD prefer doing things alone and might avoid all kinds of social play [2]. Lack of reciprocity is also shown in an aversion to social touch and in problems with responding to your own name [21]. In young children impairments in this area are often expressed as inappropriate responses towards other people and being more interested in objects than people [19].

Autistic people may find it difficult to engage in peer relationships. However, they are not the only ones that have trouble in this area. A recent study about the popularity of deaf children showed that deaf children were less accepted and less popular than their hearing peers. This was explained by them being, amongst others variables, more withdrawn, less prosocial and worse at monitoring a conversation [22], behaviours also typical for ASD in a hearing population.

People with intellectual disabilities show problems in the area of reciprocity and relationships too. Often, intellectual disabilities are caused by abnormalities in the brain. It is not surprising to find that these abnormalities cause problems in people's emotional and social behaviours. However, not everyone with serious intellectual disabilities has social or emotional problems, some of them are even overly interested in social contact. Reciprocity and engagement are definitely present while communicating with them [3]. According to Wing [23] one can spot the difference between impaired social behaviour in intellectually impaired people with ASD versus intellectually impaired people without ASD by looking at the severity of the social impairments.

The problems in reciprocity and developing relationships are not limited to people with ASD, and auditory or mental disabilities. In 1977 Selma Fraiberg described the development of blind children. She noticed that blind children do not reach out to their parents as much as their sighted peers do. This may appear as a lack of reciprocity, when in fact seeing a parent makes sighted children reach out. Blind children obviously lack this ability [24]. This explains their less frequent attempts in reaching out, without any relationship with reciprocity. Moreover, according to Fraiberg, the absence of reaching out could make parents less responsive to their children, restraining them in their development of relationships. She explains that in the sighted, the smallest amount of eye contact with a baby can make an adult talk or play with them [24]. When signals such as reaching out and making eye contact are absent, the development of reciprocity and relationships could be impaired because of this. In fact, because the care for a blind child is so much more challenging and reciprocal signals are easily missed, lack of vision may increase the risk of problems in attachment [18]. However, Warren stressed that despite an increased risk, attachment problems can be avoided if the parents of a blind child respond appropriately. Assessing attachment highlights another problem, that is the reliability and validity of assessment instruments and procedures in children with disabilities. Attachment in sighted children is often tested by the strange situation method [25] where a child's reaction upon reunion with its mother is assessed after it has been left alone or in the presence of a stranger. Children with visual impairments, especially blind children, may not notice the departure and reappearance of their mother and may therefore fail to respond like sighted children would do [18]. In this case

the perception problems interfere with possible affirmations of attachment problems. The same problems occur when observing people whilst looking for signals of reciprocity or interest in other people. Because of a loss of sight children with visual impairment or blindness may not notice other people or other people's behaviour. In extreme cases they do not show any interest in their surroundings because of poor vision and direct all their attention to objects within arm's reach or to their own body. This is especially the case in deafblind children who have not only problems in vision but also hearing, the two distant senses. Their remaining senses (touch, smell, taste and proprioception) only function in nearby space, giving the impression that deafblind children are ego-centred. This ego-centeredness is however of a different origin than it is in ASD [4].

2.2. Verbal and non-verbal social behaviours

In people with ASD, much verbal and non-verbal behaviour is impaired. This can express itself in to unnatural eye-to-eye gaze, a failure to correctly understand and execute facial expressions, atypical body postures and gestures to regulate social interaction. People with ASD often show less eye contact and fewer social smiles to others. They may also show problems in understanding facial expressions and the underlying emotions [19].

Non-verbal behaviours are very important in social communication and are used to make messages more clear. It's hard to imagine communicating without facial expressions, gestures, posture or understanding gaze direction. People with impairments miss a lot of these signals while communicating. In a visually impaired group it may be hard to distinguish autistic people from non-autistic people based on non-verbal behaviours. Non-verbal skills that come natural to people without impairments need to be taught specifically to people with visual impairments [20], for example by explaining gestures in a tactile way and in natural situations. So even though people with sensory impairments show problems in expressing themselves non-verbally, Gense and Gense [20] do believe that many behaviours can be taught. On the other hand, in visually impaired people some behaviours may be impossible to teach. Making eye contact and following gaze direction are simply infeasible for people with visual impairments. One cannot expect them to show these behaviours. Since their impairments make some social behaviours impossible to execute, they may use other signs to show their social skills. A blind person will not look someone in the eye when interested in what they have to say, but they may aim their ears towards this person and will thus aim their face in another direction. This behaviour is inappropriate for someone with adequate visual abilities, but the visually impaired will orient with their ears more than with their eyes and it may even point to social interest in another person.

Another complication is that it is important to take into account the severity of intellectual disability when analysing a person's social behaviours. If mental and chronological age do not match, age inappropriate social behaviours might be seen. An example is that people with intellectual disabilities show few gestures and joint attention signs [26]. On the other hand, people with mental retardation and autism responded to their name much less frequently than did people with mental retardation alone [26], making orientation after hearing ones name a characteristic that may help in differentiating autistic from non-autistic people.

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When trying to differentiate autistic behaviours from behaviours due to multiple impairments, Hoevenaars-van den Boom et al. (2009) showed that even though social behaviours appear similar it is possible to differentiate autistic from non-autistic behaviours. They have found a significant difference between autistic and non-autistic deafblind children with profound intellectual disabilities in the areas of social and communicative behaviours in that these children showed and openness for contact and pleasure while in social contact [7].

2.3. Joint attention and theory of mind

Autistic people have trouble sharing interests, emotions and activities [2]. Related to this is problems in joint attention. Joint attention refers to the ability to share your attention, by looking where someone else is looking at and by sharing your own interests through pointing, gazing, or other non-verbal behaviour [19]. People with ASD may fail to share their emotions, feelings and thoughts but they also can have problems in sharing attention, which is expressed in their inability to follow a pointing finger or the direction of a gaze. This is interesting, because in non-autistic children, both pointing and following a finger or gaze not only relates to the object itself, but also to the other person's feelings and interests for this object. Autistic people fail to point or gaze and follow somebody else's pointing or gazing because they fail to understand other people's interests in the objects [19].

Joint attention is often said to be a precursor of theory of mind (ToM) [27]. Someone has a ToM when they are capable of attributing a mental state to themselves and to others [28]. ToM is one of the most important constructs regarding a deeper understanding of ASD [29] and can explain many of the symptoms of ASD. Not only social behaviours as joint attention, but also symbolic play and language problems such as echolalia and reversal of pronouns can be attributed to not having a ToM [12, 30]. In simple terms, its refers to being able to realize what people think, feel and want [3]. Having a ToM also entails understanding irony and non-literal language, and can therefore also explain some of the deficits in communication. Another aspect of ToM is being able to take someone else's point of view or perspective. Perspective taking is often measured with false belief tasks, such as the Sally-Anne-task [31]. Baron-Cohen and colleagues used this task to measure false belief in autistic children by showing them two dolls, one called Sally and the other called Anne. They played out a story where Sally had a marble in her basket. Sally left and Anne put the marble in her own basket. By asking children questions on where the marble really is and where Sally would think the marble is, perspective taking can be measured [32] and give an indication of the development of a ToM. This is a typical false belief task, but many variations have been used since then. Where in sighted children ToM is tested with a false belief task such as the Sally-Anne task [32] or joint attention tasks, these tasks may not be applicable sufficiently enough for children with visual impairment. In addition, joint attention is often measured with gaze direction or pointing, something that blind children are for obvious reasons incapable of showing and is limited in visually impaired children. Peréz-Pereira and Conti-Ramsden do point out that it is not the pointing or gazing what matters, it is the function of this pointing that is of interest [30]. To measure this, things need to be seen from a blind person's perspective.

Seeing things from a blind person's perspective is difficult when it comes to ToM tasks. Conventional ToM tasks have been carried out on people with impaired vision, showing that visually impaired children invariably performed worse than sighted children. McAlpine and Moore did a false belief task using containers with unexpected contents and asked what another person would think was in it. Many of the blind children failed this task, even though sighted children are able to do this at a younger age [33, 34]. A similar study by Minter, Hobson and Bishop (1998) compared visually impaired with sighted children of the same verbal intelligence, and showed similar results. In their first experiment, they did a similar task as the container task McAlpine and Moore used. They used a warm teapot, filled with sand instead of tea. Whereas almost all sighted children were able to pass this task, almost half of the visually impaired children failed to answer false belief questions such as: "What did you think was in here?" and "What would he/she think is in here?" The authors note that blind people may have less experience with hot teapots because of the extra danger their lack of vision provides. Their second experiment was done with three boxes, where the participants helped the experimenter hide a pencil for another experimenter and false belief questions were asked. Again, the visually impaired children performed worse than the sighted, but much better than on the previous task. The authors think this was because they were more involved in this task, because they helped with the hiding [35]. These findings show that children with visual impairments do worse on conventional ToM tasks than do their hearing peers. One could assume that blind children do not have a ToM, or develop it slower. However, other findings indicate that visually impaired children can pass a ToM task, given an adapted task. In line with the notion that things need to be seen more from a blind person's perspective, it could be possible that visually impaired people have just as much a ToM as sighted people do; it's only measured in the wrong way. Peterson and her colleagues confirmed this. They state that blind people may very well rely on completely different features of an object than sighted people do in order to decide what another person thinks about an object [36]. They tested if this was true by adapting frequently used false belief tasks. For example, they have changed the famous Sally-Anne task to a Sally-Bill task. In this task, there were no dolls or pictures of children with baskets and marbles, but it was a purely narrative story. The experimenters performed four ToM tasks, including similar tasks to the container tasks, a location change task and a story. On average, the children performed best on the Sally-Bill task, 73% of the children passed this task. Despite this result and the careful adaptation of test methods, test methods were not found to be a factor influencing ToM development. Degree of visual impairment was also not found to be of influence in developing a ToM, age was the only significant factor these authors found [36]. These are some interesting findings, firstly because they indicate that visually impaired people can show signs of having a ToM, secondly, because the question is raised where the difference lies between visually impaired and sighted people. According to Minter et al. [35] tasks need to be adapted to the qualities of visually impaired but Peterson et al. [37] did not find a difference between tasks they used. Brambring and Ashbrock [38] elaborated on this question. They used a large variety of different tasks that did not require vision and found that performance was better than with traditional tasks but the blind children were on average 19 months older when they were able to perform the same tasks as sighted children. A

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more recent study [39] found that children with varying levels of congenital visual impairment when compared with sighted children matched on age and verbal intelligence, had a similar performance on advanced ToM stories (second order false belief, that is beliefs about beliefs) and non-literal stories. Despite a limited access to visual information during interactions, children with congenital visual impairment can develop an effective ToM.

Peterson has not only studied ToM in visually impaired children, but also in deaf children [37, 40]. It looks as if deaf children are strongly delayed or even impaired in their ability to have a ToM. In their 1995 study, Peterson and Siegal tested the Sally-Anne paradigm on several deaf children who were able to communicate in sign language. Even though hearing children with or without intellectual disabilities can pass this task around a mental age of four, only 35% of these deaf children were able to pass at a mental age of 8. Furthermore, these results were similar to results of people with ASD, but worse than the performance of children with Down syndrome. Notwithstanding the lack of ToM, these deaf children were not autistic as they did not show any of the other characteristics of ASD [40]. According to Peterson and Siegel deaf children lack a ToM, because of the lack of understanding the communicative signals of others. It also appears that deaf children, especially those with hearing parents, communicate less at home than hearing children. On the one hand this is because a deaf child does not hear nor understand spoken language and on the other hand because their parents are not very fluent in sign language as an alternative for spoken language [41]. A direct consequence of the lower frequency of communication is that deaf children also communicate less about mental states, feelings and thoughts, which hinders the development of a ToM [37, 40]. This idea was supported in a more recent study that assessed the amount of communication in play sessions for pairs of hearing mothers with their deaf children and compared them to hearing mothers with hearing children. They found that these signing mothers of deaf children do not necessarily communicate less than mothers of hearing children, but they do communicate less about mental states. Additionally, a relationship was found between the amount of communication about mental states of mothers of deaf children and the performance on false belief tasks of their children [42]. Despite the similar way in which the lack of ToM expresses itself in people with ASD and in deaf, the cause is different. In children who are deaf it is often attributed to a lack of communication about mental states, thoughts and feelings, whereas in ASD it is caused by inability to take someone else's perspective.

Another possibility for why hearing children outperform deaf children on ToM tasks could be that deaf children do have a ToM but only fail on certain aspects related to ToM and conventional tasks fail to test these aspects. Where normally false belief tests and variations of this are undertaken, a recent study addressed other aspects of ToM as well. Ketelaar, Rieffe, Wiefferink and Frijns [43] assessed deaf children that have received a cochlear implant (CI) at a young age, and compared them to hearing children. They tested other aspects of ToM than false belief, which are the understanding of other's intentions and others desires. The tasks were similar to false belief tasks, only instead of asking what someone would think or believe, it was asked what an other person intended to do with an object (after failing this

action) or what someone would want to eat (after showing them pictures of food they liked). It appeared that the deaf children and hearing children performed equally well on the intention tasks, but the hearing children outperformed the deaf on false belief tasks and on the desire tasks [43].This study indicates that deaf children may possess some abilities related to a theory of mind. It should be noted, however, that this study only included children with a CI. These children thus had some hearing abilities, though different from hearing children. The study did not include a group that was completely deaf and so conclusions about completely deaf children cannot be drawn.

When children are completely deaf there is, however, still the possibility that, as seen in the visually impaired group, testing methods are not adequate for them. Peterson and Siegal [40] tried to make their intentions more clear in their false belief questions. They reasoned that someone with limited experience in conversation might expect that the experimenter just wants them to tell the location of Sally's marble, when they ask "Where will Sally look for her marble?" For this reason they altered the question to "Where will Sally first look for her marble?" By adding the word "first" they more clearly imply that they are looking for what sally thinks instead of where the marble really is. This slight alteration improved the deaf children's performance slightly, but not enough to overcome differences in ToM development [40] as the different tasks in the study by Ketalaar et al. [43] did. Peterson and Siegal only investigated false belief, though, whereas Ketelaar et al. adressesd other aspects of ToM and tested children with a CI who do have some hearing abilities, instead of children who are completely unable to hear. The question still remains whether a more appropriate methodology for deaf children could increase their scores on conventional ToM tasks and more research has to be done in order to clarify this.

Finally, people with intellectual disabilities often show ToM impairments as well. Typical developing children start to solve ToM tasks around the age of four to five years of age. A general characteristic of people with intellectual disabilities is that they have mental ages not corresponding to their chronological ages. If mental age is below five, which is the case in profoundly and severely intellectually disabled people, and sometimes also in moderately intellectually impaired people they will probably fail ToM tasks irrespective of their chronological age [44]. Interpretations of ToM tasks should be done cautiously, when intellectually disabled people likely fail this task unrelated to the presence of ASD, to prevent unnecessary suspicion of ASD.

3. Qualitative impairments in communication

Qualitative impairments in communication form the second criterion that is defined in DSM-IV-TR, and this can refer to the use of language but also to problems in make belief or imitative play. When it comes to language one can find a lack of or delay in language, but also use of repetitive or idiosyncratic language. Autistic people may also find it troubling to initiate and maintain a conversation with others [2].

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3.1. Making conversation

Language is something people use for communication, and so the willingness to communicate is related to their use of language [19].Despite possible technical problems in language the low desire for communication is one of the aspects of ASD that is mentioned in the DSM-IV-TR, that is not only problems in initiating and maintaining a conversation with others but also a lack of an internal willingness or desire to communicate [2]. If people with ASD are simply uninterested in communication, they will not put effort in initiating a social conversation spontaneously. This lack in willingness to communicate also contributes to the language problems found in ASD.

Initiating and maintaining a conversation can be difficult for people with sensory and intellectual disabilities too. The presence of others may go unnoticed for people with visual impairments, and communicative signs may be missed because of blindness or deafness. It has been found that deaf children communicate less with their hearing parents because of their poor skills in spoken language and their parents poor sign language skills [41]. In people with intellectual disabilities conversational skills may be worse than expected based on their chronological age, moreover, their initiations to communicate may be different, inadequate or even awkward.

Even though all of these impaired groups may show impaired conversation making skills, there are differences between autistic and non-autistic people. An example derived from a deaf population shows that despite other problems in the field of communication, such as monitoring a conversation and pragmatic use of language, non-autistic deaf children are not different from their hearing peers in initiating and maintaining a conversation [22]. But even though deaf children without ASD don't seem to have problems in initiating and maintaining a conversation, they still differ from their hearing peers in pragmatics and monitoring, hampering their conversational skills nevertheless. On the contrary, the impaired conversational skills in autistic people lie in the area of the initiation and maintenance of a conversation [2]. It also appeared that one of the areas in which the autistic and non-autistic children with deafblindness and profound intellectual disability differed significantly from each other was the openness and willingness to take initiatives for contact [7]. It is evident that conversation looks different for people with sensory or intellectual impairments versus people without impairments, and conversation skills are hampered by their lack of sensory and intellectual abilities. The difference with autistic people shows itself in the interest for this contact. Non-autistic sensory and/or intellectually impaired people still look for opportunities to make this contact or respond to other people's efforts to make contact, while people with autism lack the interest for this contact.

3.2. Language

Besides a lower interest in communication than people without ASD, people with ASD show some technical language impairments as well. Some autistic people do not speak at all and in others the development of language can be seriously delayed or altered [19]. Furthermore, it appears that joint attention and imitation behaviours, which are known to be impaired in ASD, can predict language abilities [27], which raises the question whether

language is directly or indirectly related to ASD. In addition, ToM can be involved as well, one needs to know that one can influence others with their language and how to do so. Typical ASD language problems include direct or delayed echolalia, reversal of pronouns and lack of understanding of emotional meaning in language. People often describe it as 'robot-like' [45]. People with ASD often interpret the meaning of words literally. The literal meaning of a word does not change over contexts, but the figural meaning does. This is especially vivid in jokes, metaphors and irony. This may also be due to the previously mentioned problems in ToM. Being unable to understand what people mean, people with ASD interpret the words incorrectly [19]. A review about language and communication in ASD confirmed this idea by concluding that the language and communication problems are caused by processing problems when interacting with other people [46].

People with intellectual disabilities show delays in language as well as atypical language skills that can easily be confused with ASD. A study about the language abilities of a group of autistic children showed that there was a relationship between language abilities and IQ [46]. This study was done on autistic people only, but it is a rather expectable finding, even within people without ASD. It makes sense that the language abilities of someone with an intellectual disability are delayed as compared to peers with the same chronological age. This may be confused with the language deficits found in ASD, when in fact they are due to their intellectual disability. For this reason, we should not immediately attribute language issues in people with intellectual disabilities to ASD.

Deaf and people with hearing disabilities often show delays in acquiring language, but can also show peculiar uses of words [4]. Even delays in developing sign language are found for this is often not fully learned until children go to a school for the deaf. Parents are not fluent signers and fail to teach children the full scope of signs they could learn from a signer that is fluent [41]. Atypical language development can also be found in the blind. Without seeing things to potentially talk about, language is centred around other experiences in the blind compared to sighted people [18]. Children with congenital visual impairment have been shown to have difficulties with the use of language for pragmatic and social purposes, while structural language (e.g. articulation, grammar, vocabulary) was good or even superior [47, 48]. This delay or odd language use can be confused with what is found in autistic individuals. However, this language delay may be corrected if it is taught in the right way. It's important to realise that when a child misses its vision, they need to get stimulation through the other senses which affects their understanding of the meaning of words [18].

Several language problems that are found in autistic individuals are also found in people with other impairments. A typical example is echolalia, which is also found in visually and intellectually impaired people [23]. Echolalia is the apparently useless repeating of words or phrases, either immediately after they were spoken or after some time. Even in typically developing children, echolalia is sometimes used to learn language [20], so it's not surprising to find this in people with intellectual disabilities who may have a mental age comparable to when it is normal to use this type of speech. According to Schlesinger, it can be expected for a typically developing 20 month year old to repeat words to indicate more than one (e.g. "apple, apple" for "two apples") [49]. Another author described a child of 15 – 18 months

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old who often repeated her mother's words to learn the names of objects, but also to practice these words [50]. It can therefore be expected that a person with a mental age below two years of age to still show signs of echolalia. These examples consist of people with typically developing vision, but blind children use echolalia even more than typically developing children. In part echolalia serves as a means to stay in contact with people that cannot be seen, but it is also suggested that blind children practice their language by using echolalic speech. In this way they try to get a grip on the meaning of words in the absence of vision [30]. Extra practicing of words and phrases also results in more imitations and use of routines in speech. In the blind, one will also find egocentric speech and reversal of personal pronouns(I, you, he etc.), and improper use of deictic terms (e.g. here, there) which could be mistaken for autistic language, because of its atypical nature. Reversal of personal pronouns, which is found in about a third of the speech of blind children and egocentric speech may be caused by a lack of ToM, resulting in these impairments [12]. However, a logical explanation can also be based on the visual impairment. The direction of speech and who is speaking to whom determines which personal pronoun is used. Absence of vision makes it difficult to understand that the "I" who is speaking about the self is suddenly referred to as "you" by a person who became the "I" instead. 'Here' and 'there' are relative terms depending on ones spatial position. Without sight it is hard to adopt an allocentric position, most blind people use an egocentric position in processing spatial information. For instance, in way finding one cannot use landmark information to guide people who are blind, because they cannot see these landmarks. Instead one has to give route information related to the blind person's body position in space [30].

3.3. Imitation and make-belief or symbolic play

Finally, imitative and make-belief play are impaired in people with ASD according to the DSM-IV-TR. People with intellectually disabilities normally show delays or absence of imitation too. In one study, the experimenters showed intellectually disabled participants an action that could be done with an object, afterwards they asked the participants what could be done with the object. All participants with intellectual disabilities had trouble recalling what could be done with the object. Participants with intellectual disability and ASD performed the worst [51].

Symbolic play can be troubled in people with intellectual disabilities as well. Wing and colleagues [52] showed that even though only two people of their sample of intellectually disabled people showed the full autistic syndrome, more than half of their participants showed problems in symbolic play. These problems were either characterized as stereotyped play that was a persevering repetitive copy of other's play or no symbolic play at all, but just repetitive manipulations of a part of an object. Despite the fact that only two of their participants had an ASD diagnosis, many showed autistic features. In the group that was able to show symbolic play (43 of 108 participants), only two participants had slight autistic features [52].This finding shows that many intellectual disabled people show impairments in symbolic or make-belief play, and this can therefore not be used as a differentiating characteristic of ASD versus no ASD in this group.

When these people with intellectual disabilities have an additional sensory impairment, problems in symbolic play and imitation can become more evident. It is reasonable to think that people with impaired vision or hearing have more difficulties in imitating because they are less able to perceive actions of others, than people without these impairments. Similarly, symbolic play can be affected. People have less modalities to perceive a toy with, and therefore also see less ways in which they may use it. Combined with an intellectual impairment they can also have troubles in understanding the function the object is intended to have.

Lack of symbolic play was demonstrated to be related to abnormalities in language development that are typical of ASD, such as repetitive speech [52]. Similar to many of the impairments in ASD that were discussed, this too can be attributed to a lack of ToM. According to Brown et al. [12] ASD is characterized by problems in ToM, symbolic play, and context dependent language. Shared features of these three skills in childhood are: 1) there has to be a communication pattern between parent and child regarding feelings and thoughts; 2) one has to see and understand the direction of someone else's attitudes towards a shared world; and 3) feel inclined to identify oneself with this shared world. People with ASD have problems with all three features. Children who are deaf encounter problems with the first feature. They are offered less ToM related language. Children who are blind have trouble with the second feature and subsequently children who are deafblind have trouble with the first and second feature.

4. Restricted, repetitive and stereotyped patterns of behaviour

As the last of three important characteristics, the DSM-IV-TR mentions restricted, repetitive and stereotyped patterns of behaviour, interests and activities. This can refer to motoric stereotypies or mannerisms, preoccupations with objects, parts of objects or interests, or their inflexibility in deviating from routines [2].

4.1. Stereotyped use of objects

Uta Frith confirms that autistic people are often very interested in details, which may appear as restricted interests to others [3] and that routines and repetitions are also of importance for them [19].These behaviour can be explained by the central coherence theory. This theory poses that autistic people have a weak central coherence, meaning that they have the tendency perceive objects and situations in parts rather than perceiving the whole picture or combine information to holistic patterns [3]. As a consequence information is often processed out of context [31]. This theory explains the focus on details, but possibly also the need for repetition and routines shown by people with ASD. The ability to generalize parts to the whole keeps situations similar and predictable, and therefore less frightening. If one misses this ability then a coping mechanism is to stick to routines in order to keep situations predictable and safe. If preformed to the extreme these routines become stereotyped behaviours.

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Repetitive and stereotyped use of objects is not only seen in autistic people but also in people with intellectual disabilities. In a study where 108 children with severe and profound mental disabilities were included less than two percent suffered from ASD. However, repetitive routines and stereotyped play were found in 60 percent of this group with a mental age below 20 months [52]. Also in children who are blind strong interest in parts of objects and repetitive use of objects can be seen. Mainly this is the result of the blindness-specific constraints on the use of play material that require visual-manual skills. Blind children, when playing alone, prefer toys and materials that produce distinctive tactile or auditory effects [53]. Toys are often articles of daily living and objects in their surroundings such as spoons, walls and furniture. Activities are often aimed at making noise [53, 54].This behaviour is thought to be a way of getting hold on the function of an object and in contrast to children with ASD this behaviour can be relatively easily stopped or interrupted.

4.2. Self Stimulation

Finally, autistic people show stereotyped movements with their own bodies or parts of their body. These are often thought to be self-stimulatory. Stereotyped movements can be performed with every body part but often involve the hands or walking [55, 56] and sometimes become self-injurious [57, 58]. These movements occur in other developmental disorders as well [55, 56], but are especially common in ASD. According to Kraijer self-stimulatory behaviours are often caused by lack of stimulation from the environment [44]. In these situations people use their own bodies to provide themselves with the stimulation they need at that moment. He adds to this that the amount of self-stimulatory behaviour and also intensity and severity, that is whether it is self-injurious, is related to the level of functioning. The lower the functional level of the person, the more the self-stimulatory behaviour increases in amount and severity [44].

Stereotyped behaviours occur in people with visual impairments as well. Typical stereotyped behaviours in people who are blind are body rocking, head shaking, eye poking and hand flapping Because these behaviours often occur in the blind, they are sometimes referred to as blindisms, [18, 20]. Actually this term is not entirely correct, because these stereotyped behaviours are not unique for people who are blind; mannerisms would be a better term. Body rocking and head movements, for instance, are typical examples of behaviours that can be seen in people with visual impairment, intellectual disabilities and ASD [18, 20, 24]. Stereotyped behaviours were seen in nearly all [59] and in all [60] blind children, but in children with visual impairment the prevalence is still 10-45% [59]. There also seems to be an age dependency in stereotyped behaviours in blind children. In the first two years stereotyped behaviours increase in frequency to decline thereafter [61]. Stereotyped movements are also found in people with multiple disabilities. Heather Murdoch [62] suggests that stereotyped behaviours may be a part of normal motor development but that in people with multiple disabilities, these behaviours do not develop further. In a typically developing child, repetitive behaviours appear as well but develop into conscious movements later on, whereas in people with multiple disabilities they may remain repetitive movements. Trying to stop these behaviours may hamper the development of other motor activities or communicative signs [62].

Whereas stereotyped movements in people without ASD are part of a normal development, in people with ASD they are part of their syndrome. Gense and Gense [20] believe that the differences between these behaviours in visually impaired people with or without ASD can be found in the severity and perseverance of this behaviour. People with ASD show higher intensities and stronger persistence in stereotypical behaviours [20, 57]. Similar to the behaviours in the intellectually disabled, this could be due to a lack of external stimulation. Especially in the blind, where stimulation from visual input is missing, self-stimulatory stereotyped movements could provide the necessary sensory stimulation [18]. Another difference between people with ASD and people without, is that stereotyped behaviour can more easily be interrupted or stopped in people with visual impairments alone [20]. Sometimes not much more has to be undertaken than making the blind person conscious of these unconsciously executed stereotyped behaviour patterns.

5. Differentiation: Why and how?

5.1. Overlap and differences

The overlap in symptoms between autistic and non-autistic people with sensory and intellectual disabilities must be clear after reading this chapter. The diagnoses of ASD is usually based on behavioural characteristics and these can be similar in autistic and non-autistic people with additional impairments. An additional problem is that, although instruments are available for people with intellectual disabilities [63, 64], most of the current test instruments do not have separate norms for people with sensory and/or intellectual disabilities. No valid instruments are available for deaf people according to Jure and colleagues [14], nor for visually impaired people [7]. The overlap in symptoms and trouble in diagnosis cause a distorted representation of ASD in people with sensory, intellectual and multiple impairments. Some people are diagnosed as autistic when they are not, while others do not get the autistic label when they should. So there is both an overdiagnosis [5, 15] of ASD in this group, meaning that more people are diagnosed as autistic than necessary because of these overlapping symptoms, as well as an underdiagnosis [14, 65]. In a group of deaf children, for example, the diagnosis of ASD was established significantly later than in a group of hearing children. Autistic behaviours were probably missed because of an earlier diagnosis of hearing impairments or other developmental disabilities [65]. The main problem in assessment of ASD can be attributed to a diagnostic overshadowing bias. The diagnostic overshadowing bias was first described for people with intellectual disabilities and is the tendency of clinicians to overlook symptoms of mental health problems in this group and attribute them to being part of “having an intellectual disability” [66]. In the presence of mental retardation it seems that the diagnostic importance of abnormal behaviour decreases. Blindness, deafness or deafblindness all might add an extra overshadowing bias next to intellectual disability, leading to either false positive or false negative diagnoses of ASD in people with these disabilities.

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Despite the obvious similarities between autistic and non-autistic people with sensory and intellectual disabilities, this chapter also outlines that even though the symptoms appear the same, sometimes subtle difference can still be found. This may be due to the possibility that underlying processes of the behaviours are different for autistic and non-autistic individuals [4, 5, 15]. If attempted, a differentiation can thus be made by studying the subtle differences and underlying causes. A couple of years ago, this was done by making a valid instrument to diagnose ASD in people one of the most challenging combination of disabilities, namely deafblindness and profound intellectual disabilities. Hoevenaars-van den Boom and colleagues were able to confirm the huge overlap in behavioural symptoms between autistic and non-autistic people, but were also able to successfully distinguish the autistic from non-autistic people with their approach that was suited to the developmental level of the participants. They found that differences in this group can be found in the social communicative field, mostly in openness for contact, reciprocity and joint attention and communicative functions [7]. It is clear that when using a careful and sophisticated approach, a distinction can be made between autistic and non-autistic people with sensory and intellectual disabilities

5.2. Interaction, treatment and teaching

A fair diagnosis of ASD, or no ASD, is very important for the treatment and interaction with people with sensory and intellectual disabilities. An ASD diagnosis or a lack thereof will affect how a person will be treated, as autistic or not. If a child with ASD is placed in a setting where his or her ASD goes unrecognized, the clinicians and care takers might fail to respond to the needs of this person [65]. An important example of why recognition of ASD is so important is the treatment of stereotyped behaviour. Stereotyped movements can be a way to reduce stress [19, 20]. In someone with no ASD but with blindness or deafblindness, this behaviour is usually caused when the person does not get enough stimulation from their environment [17, 18], whereas in persons with ASD stereotyped behaviours can be a way to escape from overstimulation or as a way to ensure the optimal level of arousal. In both cases the way to treat stereotyped behaviour will be different, give extra stimulation or reduce overstimulation, respectively. A valid diagnosis would be very helpful in cases where clinicians or parents have to decide what kind of intervention to give. If it is clear whether someone has ASD or not treatment and interaction can be adjusted. Someone with ASD needs a more structured environment, and needs clear instructions when something needs to be done. In someone with ASD, things need to be re-explained in new situations, because of their difficulties in generalizing [6]. It also seems that the sooner we are aware of ASD the better. People with ASD need to be approached in way that is accommodated to their needs [65], and for the wellbeing of the child, it is best if this is done as soon as possible. A recent meta-analysis on intensive early intervention programs for ASD shows that programs that intervene early are most effective and can produce changes in the area of language and adaptive behaviour [67]. Adaptive behaviour was also found to increase as well when additional behavioural treatments were given to children with ASD and intellectual disabilities [68]. These studies showed that if ASD is treated, successful results can be achieved.

As can be seen throughout this chapter, people with visual impairments show many behaviours that are similar to ASD, such as the lack of understanding of social situations, ego-centeredness, and lack of understanding gestures and facial expressions. But, according to Gense and Gense [20], these behaviours may still be taught. Teaching appropriate behaviours is especially important, because inappropriate behaviours may interfere with regular social interactions [18], depriving disabled children of these otherwise valuable experiences. And whereas for non-autistic people without visual impairments these behaviours are implicitly learned, in non-autistic visually impaired people, they need to be explicitly taught. With the right type of education, visually impaired people may still learn to interpret social situations, read and understand gestures and facial expressions and learn to play with others [20]. This was also found for two severely mentally disabled deafblind young men, of whom the social interaction became significantly better after tailored training sessions [58]. Although this was only a small study with two participants, it does indicate what a specialized training can mean for children that are not restrained by ASD. The same applies to language. When a delay in language is caused by a lack of seeing things to talk about, parents need to offer more tactile or auditory stimuli [18]. Basically, it is important to take into account everything that singular or multiple disabled people lack. When sensory and intellectual impairments are involved, one needs to try and substitute the missing modality for others as much as possible.

6. Summary and Conclusion

Many characteristics of ASD seem to overlap with characteristics that are naturally present in people with sensory disabilities, intellectual impairments or a combination of disabilities. The characteristics appear the same whether ASD is present or not, which makes it difficult to make a valid diagnosis of ASD in this group. All of the criteria that are used in DSM-IV-TR to define ASD are, to some extent, also present in people with one or more of these disabilities. However, if one would look closer to these criteria, and the way they are expressed within people with sensory and intellectual impairments, slight and subtle differences can be found. There are differences in the way the symptoms express themselves, the severity of the symptoms and the underlying causes for the behaviours. Problems also occur in methodology. Paradigms that are used to assess problems that are related to ASD, such as ToM tasks, fail to be successful in differentiating people with sensory or multiple impairments. This overlap and these problems in methodology make it a major challenge to diagnose ASD within people with sensory and intellectual disabilities.

The slight differences in the way symptoms are expressed show that a distinction between autistic behaviours and non-autistic behaviours can be made. Making this distinction is very important to do, because the needs of people with ASD differ very much from people without ASD. To make sure the needs of every individual are met, people should be diagnosed in the right way. This is especially important for those groups with problems in communicating their wants and needs. In order to do this, subtle differences need to be taken into account. Up until this day, no instrument is suited to diagnose ASD or assess autistic behaviours within multiply

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impaired people. Ideally, a new way to assess autistic behaviours in sensory and intellectually disabled people that takes into account all the difficulties that assessing this group brings forth will be developed. An instrument that can make accurate diagnosis in people with multiple disabilities should account for all the overlapping symptoms and differences that have been described. First of all, intellectual disabilities should be taken into account. Some behaviours that are typical for ASD in people without intellectual disabilities can be simply explained by a person's mental age or shortcomings in intellectual abilities. An example of this is theory of mind, and related to that joint attention, symbolic play and language abilities, that do not develop until a certain age. If an intellectually disabled person has not reached a sufficient mental age, these behaviours should not be used to assess ASD. Secondly, it's important to realise that sensory disabilities withhold a person from perceiving objects and situations the same way a person without sensory disabilities would and may follow a completely different path. When someone is visually impaired or blind, eye contact, following gaze and sharing attention through pointing cannot be used as differentiating characteristics. Furthermore, it's important to take into account that a person may not always be aware of the presence of objects or people, so failures to respond like a person without ASD can be caused by being unaware of their presence in the first place. Similar precautions should be made for deaf people, who are unable to respond to calling their names, other sounds, and may not even notice the arrival or departure of a person. Finally, a combination of these disabilities can make it more challenging to make diagnostic evaluations of a person. People with multiple disabilities may need more time to process their surroundings and to realise what is expected of them. Furthermore, unexpected and sudden movements or actions, or giving too much information at once may cause a lot of stress that interferes with their performance. Many characteristics that normally differentiate people with ASD from people without ASD should not be assessed or assessed differently in people with multiple impairments. Still, some characteristics of the autistic spectrum are left that can be included in an assessment. Examples that cannot be forgotten include interest in, response to and looking for contact, resistance to change and interest in new items or situations. Sharing of feelings or interests may not occur through pointing or gaze, but may show itself in a more tactile way. It is important to be aware of the different way in which multiply disabled people express themselves. Finally, to account for intellectual disabilities, it is important to assess everything on a level that is suitable for the participants. Do not use complicated questionnaires, but simple toys as much as possible. Only if all of this can be done successfully, autistic people can be differentiated from non-autistic people and personal needs can be met.

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References

[1] Nevid JS, Rathus SA, Greene B. Abnormal psychology in a changing world. 7th ed. Upper Saddle River, NJ: Pearson Education; 2008.

[2] American Psychiatric Association. Diagnostic and statistical manual of mental disorders, fourth edition, text revision (DSM-IV-TR). Washington, DC: American Psychiatric Association; 2000.

[3] Frith U. Autism: A very short introduction. Oxford, United Kingdom: Oxford University Press; 2008.

[4] Knoors H, Vervloed MPJ. Educational programming for deaf children with multiple disabilities: Accomodating special needs. In: Marschark M, Spencer PE, editors. The Oxford Handbook of Deaf Studies, Language and Education. 2 ed. New York: Oxford University Press; 2011. p. 82-96.

[5] Cass H. Visual Impairment and Autism. Autism. 1998 June 1, 1998;2(2):117-38.

[6] De Bildt A, Sytema S, Kraijer D, Minderaa R. Prevalence of pervasive developmental disorders in children and adolescents with mental retardation. Journal of Child Psychology and Psychiatry. 2005;46(3):275-86.

[7] Hoevenaars-van den Boom MAA, Antonissen ACFM, Knoors H, Vervloed MPJ. Differentiating characteristics of deafblindness and autism in people with congenital deafblindness and profound intellectual disability. Journal of Intellectual Disability Research. 2009;53(6):548-58.

[8] Fombonne E. The prevalence of autism. JAMA: The Journal of the American Medical Association. 2003;289(1):87-9.

[9] Fombonne E. Epidemiological Surveys of Autism and Other Pervasive Developmental Disorders: An Update. Journal of Autism and Developmental Disorders. 2003;33(4):365-82.

[10] Kim YS, Leventhal BL, Koh Y-J, Fombonne E, Laska E, Lim E-C, et al. Prevalence of Autism Spectrum Disorders in a Total Population Sample. American Journal of Psychiatry. 2011;168:904-12.

[11] Matson JL, Shoemaker M. Intellectual disability and its relationship to autism spectrum disorders. Research in Developmental Disabilities. 2009;30(6):1107-14.

[12] Brown R, Hobson RP, Lee A, Stevenson J. Are There "Autistic-like" Features in Congenitally Blind Children? Journal of Child Psychology and Psychiatry. 1997;38(6): 693-703.

[13] Hobson RP, Lee A, Brown R. Autism and Congenital Blindness. Journal of Autism and Developmental Disorders. 1999;29(1):45-56.

http://dx.doi.org/10.5772/53714

[14] Jure R, Rapin I, Tuchman RF. Hearing-impaired autistic children. Developmental Medicine & Child Neurology. 1991;33(12):1062-72.

[15] Andrews R, Wyver S. Autistic tendencies: Are there different pathways for blindness and Autism Spectrum Disorder? British Journal of Visual Impairment. 2005 May 1, 2005;23(2):52-7.

[16] Hobson RP. Why connect? On the relation between autism and blindness. In: Pring L, editor. Autism and Blindness: Research and reflections. London, United Kingdom: Whurr Publishers; 2005. p. 10-25.

[17] Van Dijk J, Janssen M. Doofblinde kinderen [Deafblind children]. In: Nakken H, editor. Meervoudig gehandicapten: een zorg apart. Rotterdam, the Netherlands: Lemniscaat; 1993.

[18] Warren DH. Blindness and Children: An individual differences approach. Cambridge, UK: Cambridge University Press; 1994.

[19] Frith U. Autism: Explaining the enigma. 2nd ed. Oxford, UK: Blackwell Publishing; 2003.

[20] Gense MH, Gense DJ. Autism Spectrum Disorders and Visual Impairment: Meeting Student's Learning Needs. New York, NY: American Foundation for the Blind Press; 2005.

[21] Baranek GT. Autism During Infancy: A Retrospective Video Analysis of Sensory-Motor and Social Behaviors at 9–12 Months of Age. Journal of Autism and Developmental Disorders. 1999;29(3):213-24.

[22] Wolters N, Knoors HET, Cillessen AHN, Verhoeven L. Predicting acceptance and popularity in early adolescence as a function of hearing status, gender, and educational setting. Research in Developmental Disabilities. 2011;32(6):2553-65.

[23] Wing L, Gould J. Severe impairments of social interaction and associated abnormalities in children: Epidemiology and classification. Journal of Autism and Developmental Disorders. 1979;9(1):11-29.

[24] Fraiberg S. Insights from the blind. New York, NY: Basic Books; 1977.

[25] Ainsworth MDS, Bell SM. Attachment, Exploration, and Separation: Illustrated by the Behavior of One-Year-Olds in a Strange Situation. Child Development. 1970;41(1):49-67.

[26] Osterling JA, Dawson G, Munson JA. Early recognition of 1-year-old infants with autism spectrum disorder versus mental retardation. Development and Psychopathology. 2002;14(02):239-51.

[27] Charman T, Baron-Cohen S, Swettenham J, Baird G, Cox A, Drew A. Testing joint attention, imitation, and play as infancy precursors to language and theory of mind. Cognitive Development. 2000;15(4):481-98.

[28] Premack D, Woodruff G. Does the chimpanzee have a theory of mind? Behavioral and Brain Sciences. 1978;1(04):515-26.

[29] Noens I, van Berckelaer-Onnes I. Making Sense in a Fragmentary World. Autism. 2004 June 1, 2004;8(2):197-218.

[30] Pérez-Pereira M, Conti-Ramsden G. Language development and social interaction in blind children. East Sussex, UK: Psychology Press; 1999.

[31] Hill EL, Frith U. Understanding autism: insights from mind and brain. Philosophical Transactions of the Royal Society of London Series B: Biological Sciences. 2003 February 28, 2003;358(1430):281-9.

[32] Baron-Cohen S, Leslie AM, Frith U. Does the autistic child have a "theory of mind" ? Cognition. 1985;21(1):37-46.

[33] McAlpine LM, Moore CL. The development of social understanding in children with visual impairments. Journal of Visual Impairment & Blindness. 1995;89(4):349-58.

[34] Pérez-Pereira M, Conti-Ramsden G. Do blind children show autistic features? In: Pring L, editor. Autism and blindness: Research and reflections. London, UK: Whurr Publishers; 2005.

[35] Minter M, Hobson RP, Bishop M. Congenital visual impairment and 'theory of mind'. British Journal of Developmental Psychology. 1998;16(2):183-96.

[36] Peterson CC, Peterson JL, Webb J. Factors influencing the development of a theory of mind in blind children. British Journal of Developmental Psychology. 2000;18(3): 431-47.

[37] Peterson CC, Siegal M. Insights into Theory of Mind from Deafness and Autism. Mind & Language. 2000;15(1):123-45.

[38] Brambring M, Asbrock D. Validity of False Belief Tasks in Blind Children. Journal of Autism and Developmental Disorders. 2010;40(12):1471-84.

[39] Pijnacker J, Vervloed M, Steenbergen B. Pragmatic Abilities in Children with Congenital Visual Impairment: An Exploration of Non-literal Language and Advanced Theory of Mind Understanding. Journal of Autism and Developmental Disorders. 1-10.

[40] Peterson CC, Siegal M. Deafness, Conversation and Theory of Mind. Journal of Child Psychology and Psychiatry. 1995;36(3):459-74.

[41] Vaccari C, Marschark M. Communication between Parents and Deaf Children: Implications for Social-emotional Development. Journal of Child Psychology and Psychiatry. 1997;38(7):793-801.

[42] Moeller MP, Schick B. Relations Between Maternal Input and Theory of Mind Understanding in Deaf Children. Child Development. 2006;77(3):751-66.

http://dx.doi.org/10.5772/53714

[43] Ketelaar L, Rieffe C, Wiefferink CH, Frijns JHM. Does Hearing Lead to Understanding? Theory of Mind in Toddlers and Preschoolers With Cochlear Implants. Journal of Pediatric Psychology. 2012 July 29, 2012.

[44] Kraijer D. Handboek autismespectrumstoornissen en verstandelijke beperking [Handbook autism spectrum disorders and intellectual disability]. Lisse, the Netherlands: Harcourt; 2004.

[45] Nederlandse Vereniging voor Psychiatrie. Richtlijn Diagnostiek en behandeling autismespectrumstoornissen bij kinderen en jeugdigen [Guideline diagnostics and treatment of autism spectrum disorders in children and youth] Utrecht, Netherlands: de Tijdstroom; 2009.

[46] Tager-Flusberg H, Paul R, Lord C. Language and Communication in Autism. In: Volkmar FR, Paul R, Klin A, Cohen DJ, editors. Handbook of Autism and Pervasive Developmental Disorders. 3rd ed2005.

[47] James DM, Stojanovik V. Communication skills in blind children: a preliminary investigation. Child: Care, Health and Development. 2007;33(1):4-10.

[48] Tadić V, Pring L, Dale N. Are language and social communication intact in children with congenital visual impairment at school age? Journal of Child Psychology and Psychiatry. 2010;51(6):696-705.

[49] Schlesinger IM. Steps to Language. Toward a theory of native language aquisition. Hillsdale, NJ: Lawrence Erlbaum Associates; 1982.

[50] Dore J. A pragmatic description of early language development. Journal of Psycholinguistic Research. 1974;3(4):343-50.

[51] Charman T, Swettenham J, Baron-Cohen S, Cox A, Baird G, Drew A. Infants with autism: An investigation of empathy, pretend play, joint attention, and imitation. Developmental Psychology. 1997;33(5):781-9.

[52] Wing L, Gould J, Yeates SR, Brierly LM. Symbolic play in severely mentally retared and in autistic children. Journal of Child Psychology and Psychiatry. 1977;18(2): 167-78.

[53] Tröster H, Brambring M. The play behavior and play materials of blind and sighted infants and preschoolers. Journal of Visual Impairment & Blindness. 1994;88(5): 421-32.

[54] Preisler GM. A descriptive study of blind children in nurseries with sighted children. Child: Care, Health and Development. 1993;19(5):295-315.

[55] Goldman S, Wang C, Salgado MW, Greene PE, Kim M, Rapin I. Motor stereotypies in children with autism and other developmental disorders. Developmental Medicine & Child Neurology. 2009;51(1):30-8.

[56] Militerni R, Bravaccio C, Falco C, Fico C, Palermo MT. Repetitive behaviors in autistic disorder. European Child & Adolescent Psychiatry. 2002;11(5):210-8.

[57] Bodfish JW, Symons FJ, Parker DE, Lewis MH. Varieties of Repetitive Behavior in Autism: Comparisons to Mental Retardation. Journal of Autism and Developmental Disorders. 2000;30(3):237-43.

[58] Van Hasselt VB, Hersen M, Egan BS, Mckelvey JL, Sisson LA. Increasing Social Interactions in Deaf-Blind Severely Handicapped Young Adults. Behavior Modification. 1989 April 1, 1989;13(2):257-72.

[59] Jan JE, Freeman RD, Scott EP. Visual impairment in children and adolescents. New York, NY: Grune & Stratton; 1977.

[60] Tröster H, Brambring M, Beelmann A. Prevalence and situational causes of stereotyped behaviors in blind infants and preschoolers. Journal of Abnormal Child Psychology. 1991;19(5):569-90.

[61] Tröster H, Brambring M, Beelmann A. The age dependence of stereotyped behaviours in blind infants and preschoolers. Child: Care, Health and Development. 1991;17(2):137-57.

[62] Murdoch H. Stereotyped Behaviours: How Should We Think About Them? British Journal of Special Education. 1997;24(2):71-5.

[63] Kraijer D, Bildt A. The PDD-MRS: An Instrument for Identification of Autism Spectrum Disorders in Persons with Mental Retardation. Journal of Autism and Developmental Disorders. 2005;35(4):499-513.

[64] Matson JL, Boisjoli JA. Autism spectrum disorders in adults with intellectual disability and comorbid psychopathology: Scale development and reliability of the ASD-CA. Research in Autism Spectrum Disorders. 2008;2(2):276-87.

[65] Roper L, Arnold P, Monteiro B. Co-Occurrence of Autism and Deafness. Autism. 2003 September 1, 2003;7(3):245-53.

[66] Mason J, Scior K. 'Diagnostic Overshadowing' Amongst Clinicians Working with People with Intellectual Disabilities in the UK. Journal of Applied Research in Intellectual Disabilities. 2004;17(2):85-90.

[67] Peters-Scheffer N, Didden R, Korzilius H, Sturmey P. A meta-analytic study on the effectiveness of comprehensive ABA-based early intervention programs for children with Autism Spectrum Disorders. Research in Autism Spectrum Disorders. 2011;5(1): 60-9.

[68] Peters-Scheffer N, Didden R, Green VA, Sigafoos J, Korzilius H, Pituch K, et al. The behavior flexibility rating scale-revised (BFRS-R): Factor analysis, internal consistency, inter-rater and intra-rater reliability, and convergent validity. Research in Developmental Disabilities. 2008;29(5):398-407.