

Social motivation in children with autism and differences in social motivation among the
different social subtypes of autism.

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Abstract

Recently, the question has been raised if social interaction problems expressed by people with Autism Spectrum Disorder (ASD), are caused by an underlying deficit in social motivation. People with ASD are also known to be very heterogeneous and the disorder is marked by three distinctive subtypes of social interaction (aloof, passive, and active-but-odd). It therefore seems possible that social motivation differs across these different subtypes of social interaction. The current study examined whether adolescents ($n = 14$; 12-17 years) with high-functioning ASD (HFASD) have less social motivation than their typically developing (TD) peers. It was also examined whether the subtypes of social interaction of autism are predictive of the amount of social motivation reported by children with HFASD. Using the social subscale of the “Pleasure Scale”, a self report measure typically used to assess anhedonia, no differences were found between children with HFASD and TD children in reported pleasure for interaction with familiar people. These results are not in line with the social motivation theory. The possibility is discussed of context being a factor in the extent to which social motivation in people with ASD is expressed. The study’s results also indicate the subtypes of social interaction to not be significantly predictive of social motivation. It appears that this may have been due to a lack of power and further research is therefore important. Suggestions for future research and clinical implications are discussed.

Keywords: Autism Spectrum Disorder, children, social motivation, social interaction, social subtype, social interaction type

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Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is characterized by restricted and repetitive patterns of behaviors, interests, or actions, and deficits in social interaction and communication (American Psychiatric Association, 2013). Deficits in social interaction and communication are expressed in many different ways. Children with ASD spend less time interacting socially than typically developing (TD) children and if they do have social interactions, it is often of lower quality than that of their TD peers (McConnell, 2002). These problems in social interaction often have a very early onset. Even as young as 3 to 4 years old, children with ASD show worse results on measurements of social orienting, joint attention, and attention to another's distress than TD children of the same mental age (Dawson et al., 2004). These social interaction deficits are seen as the core problems in ASD. This is why there are many interventions that focus on stimulating children with ASD to engage in social interaction (McConnell, 2002). For these interventions to be successful, however, we need a better understanding of why children with ASD demonstrate such problems in social interaction. This paper will therefore focus on possible underlying mechanisms for social interaction deficits in children with ASD.

The social deficits demonstrated by people with ASD have often been explained as a deficit in Theory of Mind (ToM). ToM is described as the ability to ascribe mental states to people (Baron-Cohen, Leslie, & Frith, 1985). According to the ToM hypothesis of autism, people with ASD are limited in mentalizing or taking other people's mental states into account (Rajendran & Mitchell, 2007). This means that the social interaction deficits shown by people with ASD are a result of a poor understanding of how to behave in the social world. Evidence for this deficit in ToM comes from findings that most children with ASD do not pass false belief tasks (Baron-Cohen, Leslie, & Frith, 1985). These are tasks that attempt to measure ToM by requiring a child to predict a character's thoughts or actions based on a false

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belief (for further information about the original false belief task, see Baron-Cohen, Leslie, & Frith, 1985). Many children with ASD are unable to pass these tasks (Baron-Cohen, Leslie, & Frith, 1985; Rejendran, Mitchell, 2007). More recent research has focused on the performance of people with ASD on advanced ToM tasks (tests that attempt to measure ToM with social stories that require inferences about someone's thoughts or feelings; Scheeren, Rosnay, Koot, & Begeer, 2013). Results of these studies have been mixed. While impairments in advanced ToM have been found in people with high-functioning ASD (HFASD; people with ASD of normal to high intelligence) (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997), in other studies, no such impairments were found (Roeyers, Buysse, Ponnet, & Pichal, 2001; Scheeren, Rosnay, Koot, & Begeer, 2013). These contradicting results on different tests designed to measure ToM lead to questions about the ToM hypothesis. Peterson, Garnett, Kelly, and Attwood (2009) found that children who passed ToM tests in laboratory settings do not necessarily have better social-conversational interaction skills. They found that many children who passed ToM tasks still had poorer everyday skills than TD children who failed these tasks. It seems that even when children with ASD may have no trouble mentalizing during a ToM task, real social situations may be too complicated for them to apply this ability. It is possible that factors such as attention for social signals or the amount to which children with ASD find social interactions rewarding play a part in whether or not ToM is applied.

Contradicting findings like the ones mentioned above have led to the proposal of a new theory in order to explain the social deficits that are found in people with ASD: the social motivation theory. The social motivation theory states that the deficits in social interaction demonstrated by children with ASD are caused by a problem with social motivation (Chevallier et al., 2012). Social interest or social motivation is expressed in at least three different ways: social orienting (attention for social signals is prioritized: we orient to the

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social world), seeking and liking (social interactions are rewarding: we want and like social interaction), and social maintaining (the desire to maintain and improve social relationships) (Chevalier et al., 2012). There is evidence that suggests that all three of these aspects of social motivation are disrupted in children with ASD (Chevallier et al., 2012), and that there is indeed less desire for social interaction in children with ASD (Deckers, Roelofs, Muris, & Rinck, 2014). So according to this theory, a child with ASD has a diminished social interest, which deprives the child of social learning opportunities and in turn causes them to have impaired social cognition. Social deficits are thus a result of a diminished social motivation. This is contrary to the explanation provided by the ToM theory, according to which the lack of interest in the social world is a result of a poor understanding of the social world.

However, deficits in social interaction are not the same in all people with ASD, as people with ASD form a very heterogeneous group. Wing and Gould (1979) first made the distinction between three different subtypes of abnormal social interaction that can be seen in autism: social aloofness, passive interaction, and active, but odd interaction. Socially aloof children are characterized by very severe impairments of social interaction. They are generally indifferent to social interaction, though sometimes they do enjoy simple physical contact with adults. Passive children generally do not make social contact themselves, but do accept initiations for social contact by others. Active-but-odd children do make social approaches to both adults and children, but their behavior is usually inappropriate or abnormal. These subtypes were found to have sufficient validity (Borden & Ollendick, 1994). So while children with ASD generally show impairments in social interaction, the types of impairments they demonstrate can vary.

Applying the existence of these three subtypes to the social motivation theory, it seems likely that the amount of social motivation in a child with ASD varies across the subtypes, as they are each characterized by different types of social deficits. Both the aloof

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and the passive subtypes do not generally make social approaches, while the active-but-odd group is characterized by the making of (often abnormal) social approaches. These differences in social approach behavior suggest a difference in social motivation. Moreover, a study by Mazurek (2013) suggests that some people with ASD do have social motivation. The study found a relation between the amount of loneliness a person with ASD experiences and an increase in depression, anxiety, and reduced well-being. It is therefore possible that the social motivation theory does not apply for all subtypes. Active-but-odd children in particular appear to show genuine signs of social motivation. It is therefore possible that active-but-odd children have more social motivation than aloof and passive children with ASD, or possibly even the same amount as their TD peers.

The social motivation theory has important clinical implications. Many interventions focus on teaching or training children with ASD to improve social functioning (McConnell, 2002). This is often done by attempting to improve social skills by means of behavioral approaches, in which learning and conditioning is important (Lovaas, 1987). If, however, an impairment of social motivation lies at the core of the social interaction deficits in children with ASD, training specific social skills alone would not be enough. It seems important to focus on boosting social motivation and attention, preferably at a young age. For, according to the social motivation theory, if social motivation is increased, a child with ASD will engage in more social interaction and experience more social learning opportunities, which lead to an improved social cognition compared to children without these early interventions.

Researchers such as Mohammadzaheri, Koegel, Rezaee, & Rafiee (2014) have already incorporated motivational components in interventions for children with ASD that aim to improve social communication. Indeed, it appears that interventions that incorporate these motivational components are more effective than interventions with a strictly behavioral approach. The question remains, however, if all children with ASD would benefit from such

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interventions. If it is true that the amount of social motivation in children with ASD depends on their subtype of interaction, this subtype should be able to tell us which children with ASD might benefit from interventions aimed at increasing social motivation. The effectiveness of interventions can then be increased.

It is of great importance to gain more knowledge regarding the social interaction deficits in children with ASD, as it can lead to improved effectiveness of possible interventions. This paper will therefore focus on two important questions. Firstly, this paper aims to determine whether children with ASD have less social motivation than TD children. Secondly, it aims to determine whether the amount of social motivation in children with ASD can be explained by their social interaction subtype. Based on the social motivation theory, the following hypotheses were proposed: (1) children with ASD as a group have less social motivation than their TD peers, and (2) the amounts of passive, aloof, active-but-odd, and typical behavior are predictive of the amount of social motivation within children with ASD. Specifically, it is expected that more active-but-odd behavior is associated with more social motivation.

Method

Participants

The participants for this study were 17 Dutch adolescents with HFASD. They were recruited via a specialized school for normally intelligent children and adolescents with ASD (Berg en Boschschool), as part of a bigger, longitudinal study on individual differences among children with HFASD. The diagnostic classification of ASD was given by a psychiatrist or psychologist according to DSM-IV-TR criteria. A TD comparison group was recruited via public secondary schools. Of the 17 adolescents with HFASD, two were excluded from the study because of incomplete data on the Pleasure Scale (the instrument used to measure social motivation). One more participant was excluded because the data

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concerning his/her verbal IQ was missing, and there was no way to check if this participant had a verbal IQ above 70. Thus, the final sample consisted of 14 adolescents in the HFASD group and 27 adolescents in the comparison group. The participants in this sample were all boys and the groups were comparable in age and verbal IQ (see Table 1).

Table 1. T-test results to check for differences between the HFASD group and the TD comparison group

	<u>HFASD group (n=14)</u>		<u>TD comparison group (n=27)</u>		T(39)	p
	M (SD)	Range	M (SD)	Range		
Age	15.30 (1.17)	12.33 – 17.75	15.53 (1.81)	12.81 – 18.54	.40	.69
Verbal IQ	108.36 (13.79)	72 – 126	101.52 (10.63)	84 – 121	-1.76	.09

Measures

The “Pleasure Scale” (Kazdin, 1989) was administered to measure social motivation. It was translated to Dutch for the present study. The Pleasure Scale is originally used to assess anhedonia (a reduced ability to experience pleasure; Chapman, Chapman, & Raulin, 1976) in children by means of self report. The test consists of a total of 39 items which can be divided into three subscales: physical pleasure (7 items and a maximum score of 21; e.g. “You are eating your favorite candy bar.”), social pleasure (17 items and a maximum score of 51; e.g. “Your friend tells you that ‘you are the best friend he/she has ever had.’”), and other sources of pleasure (15 items and a maximum score of 45; e.g. “While playing your favorite video game, you beat the high score listed on the game board.”). All the scores of the items belonging to one scale are added up to get the total score on said scale. After each item, participants are asked to rate how happy they would be on a 3-point scale: 1 for “Very happy”, 2 for “Happy”, or 3 for “Neither happy nor unhappy”. This means that the higher a

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score, the less pleasure, and the more anhedonia. The social subscale was used for this study as a way to measure the participants' social motivation (a higher score meaning lower social motivation). Items of the social subscale all concern pleasure for social interaction with either friends, parents, or teachers. Kazdin (1989) reported high levels of internal consistency for the whole scale (Cronbach's alpha = .96). Internal consistency is sufficient at an alpha of .7, according to DeVellis (2012). In the current study, the social subscale of the Pleasure Scale has sufficient internal consistency (Cronbach's alpha = .82). The Pleasure Scale's construct validity was also sufficient (for further information of the scale's validity, see Kazdin, 1989).

A parent or teacher questionnaire called the Wing Subgroups Questionnaire (WSQ; Castelloe, & Dawson, 1993) was used to assess the scores on the three different social interaction subtypes for each child with HFASD. This questionnaire was translated to Dutch using a forward-backward-translation method (Scheeren, Koot, & Begeer, 2012). The questionnaire contains 13 descriptions of each of the Wing subtypes (aloof, passive, and active-but-odd) and 13 descriptions of typical social behavior. Parents or teachers are asked to evaluate to what extent the described behavior is in accordance with the child's behavior by indicating their answer on a 7-point Likert scale ranging from 0 (never) to 6 (always). This means that the higher the score, the more this type of behavior is displayed. All the items belonging to one subtype are added up to form a scale score. The WSQ is often used to ascribe a person with ASD to one particular social subtype, based on which scale they score highest on. In this study however, the continuous scales were used for the analyses. This means that every individual participant has four different scores for the four different social interaction styles. These were the raw scores on the different interaction styles. Therefore, a higher score on, for example, the active-but-odd scale, means that this child shows more active-but-odd behavior. See Table 2 for an overview of the descriptive statistics for the raw scores of the WSQ. In the original paper, Castelloe and Dawson (1993) reported sufficient

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internal consistency, with a Cronbach's alpha of .77 for the items describing aloof behavior, .63 for the items describing passive behavior, and .85 for the items describing active-but-odd behavior. They also reported adequate external validity. In a more recent study, Scheeren, Begeer, and Koot (2012) reported a Cronbach's alpha of .84 for the active-but-odd group, .73 for the passive group, .69 for the aloof group, and .86 for the typical group. O'Brien (1996) reported moderate to good internal consistency and construct validity as well.

Table 2. Descriptive statistics for the raw scores on the WSQ subtypes of social interaction

	<i>Mean</i>	<i>SD</i>	<i>Range</i>
Passive	46.21	10.61	27-62
Active-but-odd	45.07	12.99	20-61
Aloof	34.29	10.58	18-52
Typical	46.43	16.01	16-71

Procedure

After receiving informed consent from the parents and the children, the parents filled out questionnaires about their child's behavior, which included the WSQ. After these questionnaires were filled out, each child was individually tested at school. The Pleasure Scale was part of a larger test battery that took about 40 minutes in total to complete.

Analyses

To determine if the HFASD group and the TD comparison group differ in social motivation, an independent samples t-test is conducted, with the score on the social subscale of the Pleasure Scale as the dependent variable and the group (HFASD or comparison) as the independent variable. To determine if the scores on the WSQ subscales are able to explain the amount of social motivation, a multiple regression analysis is conducted. The score on the social subscale of the Pleasure Scale (which measures social motivation) is the dependent

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variable. The scores on the aloof, passive, active-but-odd, and typical subscales of the WSQ are four independent variables, that are all added in the regression model at the same time. To ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity, preliminary analyses are conducted.

Results

Independent samples t-test. Contrary to the first hypothesis, no significant difference between the social motivation scores of the HFASD group ($M = 15.43$, $SD = 6.66$) and the comparison group ($M = 14.81$, $SD = 4.27$) was found ($t(39) = -.36$, $p = .72$). Cohen's d is $-.12$, which means the effect size is small (Pallant, 2013).

Multiple regression analysis. The preliminary analyses showed that there were no violations of the assumptions. Table 3 shows the bivariate Pearson's correlations between the scores on the WSQ social subtypes and the score on the social subscale of the Pleasure Scale. None of the correlations of the social subtype scores with the social subscale of the Pleasure Scale are significant. The regression analysis (see Table 4) showed that the aloof, passive, active-but-odd, and typical interaction style scores do not significantly explain any of the variance in social motivation. However, the effect size of the model is medium to large ($f^2 = 0.23$). Both the active-but-odd and the aloof interaction style scores have negative coefficients, while the passive subscale and the typical interaction style scores have positive coefficients. The active-but-odd score has the strongest coefficient. This is a negative coefficient, which suggests that the more active-but-odd behavior a participant displays, the less social anhedonia and, therefore, the more social motivation. None of the coefficients, however, are significantly predictive of social motivation. A post hoc power analysis for a multiple regression with four predictors was conducted using G*power (Faul, Erdfelder, Buchner, & Lang, 2009), to check if nonsignificant results could have been due to a lack of

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power. Using an alpha of 0.5, a power of 0.80, and a medium effect size ($f^2 = 0.15$), the analysis showed that a sample size of at least 85 was desired.

Table 3. Bivariate Pearson's Correlations among the social subscale of the Pleasure Scale and the social interaction type scores.

	1	2	3	4	5
1. Passive score					
2. Active score	,697**				
3. Aloof score	,681**	,485			
4. Typical score	-,627*	-,777**	-,731**		
5. Social Pleasure Scale score	-,291	-,407	-,303	,384	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 4. Summary of regression analyses for variables predicting the score on the social subscale of the Pleasure Scale

Variable	<i>B</i>	<i>SE B</i>	β
Passive behavior	.063	.326	.100
Active behavior	-.184	.304	-.358
Aloof behavior	-.100	.343	-.159
Typical behavior	.022	.268	.053
R^2			.185
F			.511
p			.730

Discussion

The present study examined whether children with HFASD display less social motivation than their TD peers and to what extent the scores on the Wing subtypes of social interaction are predictive of social motivation within children with HFASD. Contrary to the initial hypotheses, the results of this study indicate no differences in social motivation between children with HFASD and TD children. The study also did not find the amounts of passive, aloof, active-but-odd, and typical behavior to be predictive of social motivation within children with ASD. Therefore, neither of the hypotheses were confirmed.

According to the social motivation theory, as proposed by Chevallier et al. (2012), deficits in social motivation underlie the social interaction problems that characterize ASD. A difference in social motivation between children with ASD and TD children was thus to be expected. In this study, however, children with ASD did not report less pleasure for interaction with friends, parents, and teachers than TD children did, as was measured by the social subscale of the Pleasure Scale. It seems therefore that the results of the present study are not in line with the social motivation theory as proposed by Chevallier (2012).

However, it has been suggested by Deckers, Roelofs, Muris, and Rinck (2014) that the desire for social contact in people with ASD may be context dependent. They studied social desire in children with ASD on both explicit and implicit measures. The explicit measure consisted of a series of yes/no questions concerning their desire to engage in social activities with an unknown individual that participants were asked to answer after seeing a picture of this person. The implicit measure consisted of similar pictures of unknown individuals as well as control images that participants could either pull away from or push towards with a joystick. They found that children with ASD displayed less social desire than TD children on the explicit measures, but this difference was not found on the implicit measures. The writers suggested that it may be possible that children with ASD do have an implicit desire for social

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interaction, but that this may only be expressed in certain situation or with familiar people.

Chen et al. (2015) indeed found that people with ASD appear to be more motivated to engage in social situations with friends than social situations with strangers. They also reportedly enjoyed these social situations with friends. Although they used no comparison group, which makes it difficult to draw conclusions, they did emphasize the importance of context when exploring social motivation in people with ASD. These studies suggest that social motivation may be context dependent for people with ASD and that contexts of interaction with familiar people are the ones in which social motivation is usually expressed, as opposed to contexts of interaction with unknown individuals. This might be able to explain why the Pleasure Scale was unable to detect a difference in social motivation between children with ASD and TD children in the present study.

Chevallier et al. (2012) also suggested the possibility of differences in social motivation for the different social subtypes in children with ASD. It seemed especially likely that active-but-odd children would display more social motivation than the other subtypes of social interaction. The present study found no direct evidence for this hypothesis, as the scores on passive, aloof, active-but-odd, and typical behavior do not appear to significantly predict social motivation in children with HFASD. However, with only 14 children in the ASD group, the sample size of this study was very small. The results also showed a medium to large effect for the predictive value of these four types of behavior. This suggest that this study may not have found the social interaction types to be significantly predictive of social motivation, because of a lack of power. Indeed, a post hoc power analysis showed that a sample size of at least 85 was desired, meaning there was indeed a lack of power in the current study. The hypothesis can therefore not simply be rejected based on the results of this study. Because of the lack of power, it is not unlikely that the interaction styles are indeed predictive of social motivation, but a larger sample size is necessary to detect this effect. It

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also remains a possibility that the active-but-odd subtype does display more social motivation than the other social interaction subtypes, because the results of this study suggest that this type of behavior might have the strongest positive association with social motivation. If significance is reached with a larger sample size, it seems likely that the association of active-but-odd behavior with social motivation remains similar to the one found in this study.

The small effect size forms one of the limitations of this study. It made it difficult to draw conclusions about the results. As has been mentioned before, especially the results concerning the predictive value of the social interaction subtypes for social motivation were difficult to interpret, because significance may not have been reached due to a lack of power. Another limitation is that the instrument used to measure social motivation made no distinction between contexts that may play a part in when a social motivation deficit is expressed in individuals with ASD. All items of the Pleasure Scale, after all, concerned people that the children with ASD were familiar with. Therefore, there was no way to see if less social motivation would be reported in different unfamiliar contexts. An approach similar to the one used by Deckers, Roelofs, Muris, and Rinck (2014) may be more desirable, as it can make a distinction between implicit and explicit social motivation. At the same time, it appears important to use an instrument that can make a distinction between different contexts that might determine when social motivation is or is not expressed, such as interaction with familiar versus unfamiliar people. A strong point in the present study is that an attempt was made to distinguish between the different social interaction subtypes in measuring social motivation. This is a factor that may be relevant in the application of the social motivation theory and it might help create a better understanding of the way social motivation plays a part in the deficits in social interaction expressed by people with ASD.

Taking the results of this study and possible explanations into account, it appears that social motivation remains a relevant topic for ASD research. More research about the social

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motivation theory is necessary. Firstly, it remains unclear to what extent social motivation plays a part in the deficits in social interaction displayed by people with ASD. In future studies, therefore, the difference in social motivation between people with ASD and neurotypical people should be further examined by means of other measurements than the one used in the present study. It is also important to examine to what extent context is a factor contributing to whether or not social motivation is expressed by people with ASD.

Specifically, it should be examined if there is a difference in social motivation in contexts with familiar people and in contexts with unfamiliar people. Based on studies by Deckers, Roelofs, Muris, and Rinck (2014) and Chen et al. (2015), such a difference in contexts might be expected. Investigating to what extent context plays a part in social motivation among people with ASD can give better insight into the extent to which the social motivation theory applies. Another question for future research that remains relevant is whether or not the social interaction subtypes of ASD are predictive of social motivation. The present study's results suggest that this is possibly the case, based on the relatively large effect size. However, more research seems necessary to draw conclusions about this. A larger sample size than the one in the present study is necessary for this ($N \geq 85$).

The aforementioned propositions for future research are important, since gaining more knowledge about social motivation in people with ASD may have clinical implication as well. While motivational elements are already being integrated in interventions for social communication (Mahammadzeheri, Koegel, Rezaee, & Rafiee, 2014), it may not be helpful to aim interventions at improving social motivation specifically. The current study found no differences in social motivation between children with HFASD and TD children for interaction with familiar people and other studies have also suggested that social motivation may only be impaired in specific contexts or with unfamiliar people (Chen et al., 2015; Deckers, Roelofs, Muris, and Rinck, 2014). It is also a possibility that interventions focusing

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on social motivation are only helpful for ASD people of a specific subtype of social interaction. According to the results of the present study and previous speculations (Chevallier, 2012), it seems possible that especially the active-but-odd subtype may have no need for intervention in the area of social motivation. Interventions aimed at social motivation may not be as helpful as the social motivation theory suggests, or they may at least not be necessary for every individual with ASD. For more effective interventions it is therefore important that more research about social motivation in people with ASD is conducted.

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