

**Autism and Social-emotional Attachment: A Pilot Study of the Psychometric Properties of
the Attachment Development Autism Instrument**

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Abstract

Attachment research in autism is important to inform the development of effective clinical interventions. Currently, there are only a few instruments to assess the development of attachment in autistic spectrum disorders (ASD). The *Attachment Development Autism* (ADAut) is a new instrument which delineates developmental levels of attachment according to the self-initiated orientation of attention. This study provides an initial examination of the psychometric properties of the ADAut to stimulate further interest in refining the instrument. The data were collected from a Dutch psychiatric outpatient population by two raters. All the participants ($n=31$, $M_{age} = 44.7$ years; 24-63 years) were recently diagnosed. The inter-rater reliability and internal consistency of the respective ADAut scales were analyzed. The concurrent and convergent validity was explored, hypothesizing that the attachment developmental stages were related to the formation of friendship as assessed with the *Friendship Questionnaire* (FQ). The results indicate a high interrater reliability, except for one outlier on scale B (focus on the self). Good internal consistency was demonstrated by two of the scales (scale A, focus on the primary attachment person and scale C, focus on others). As hypothesized, subscales B and C showed significantly strong positive correlation with the FQ. The results indicate that the ADAut has promising psychometric properties which justifies further inquiry. Recommendations for future studies are provided.

Keywords: autistic spectrum disorder, attachment, ADAut

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Autism spectrum disorder (ASD) is a life-long neurodevelopmental disorder which is defined by observed behaviors that start unfolding in early childhood (Ecker, 2017). Affected individuals typically present difficulties in social communication and social interaction, repetitive behavior and limited interests (American Psychiatric Association, 2013; World Health Organization, 2020). Recent prevalence estimates suggest that one in 68 children are diagnosed with ASD (Harmsen, 2019). There is significant heterogeneity in the etiology, severity and the constellation of the ASD behavioral symptoms (Wolff et al., 2018).

The atypical social–emotional characteristics that are associated with ASD may be connected to deficits in emotional engagement and attachment (Lambert-Brown et al., 2015; Rutgers et al., 2007). According to Delfos (2011) attachment types and development stages develop later and slower in ASD than in a typical development. Research consistently demonstrates a delay in the development of theory of mind for children with ASD (Montgomery et al., 2016).

The social development difficulties have also been reflected in neurodevelopmental studies. Hua et al. (2011) found that children with autism show abnormal brain development in brain areas that are associated with social interaction, communication and repetitive behaviors which continues into adolescence. Lange et al. (2015) added that autism is a dynamic condition which causes complex brain changes into adulthood. Neuroanatomical markers of ASD can be mapped within the four major neurofunctional networks that are associated with social cognition: the amygdal network, the mentalizing network, the empathy network and the mirror/simulation/action-perception network (Ecker, 2017; Happé & Frith, 2014; Patriquin et al.,

2016). Despite former interest to attribute ASD social difficulties to a ‘broken mirror hypothesis’, there has been little evidence of dysfunction of the mirror neural mechanisms of people with ASD (Hamilton, 2013). Several findings suggest that people with ASD have an intact mirror neuron system which they do not learn to automatically utilize to understand other’s emotions (Gordon et al., 2020, Schulte-Rüther et al., 2017). Dual process models are evolving to explain how the underlying interaction between preserved and affected neural mechanisms may provide the ASD behavioral phenotype (Gaigg, 2012; Happé, et al., 2017; Southgate & Hamilton, 2008; Wang & Hamilton, 2012). Following a review of neuroimaging studies, Wolf et al. (2018) concluded that ASD stems from the coming together of numerous developmental factors and that it is “not limited to any single point of vulnerability” (p.491).

Various studies have demonstrated improvements in social functioning across the life-span of people who have been diagnosed with autism (McGovern & Sigman, 2005; Seltzer et al., 2004; Shattuck et al., 2007; Scheeren et al., 2013; Woodman, et al., 2015). This has also been supported by neurodevelopmental inquiries. Bastiaanse et al. (2011) demonstrated an age-related neurocognitive improvement that was associated with improved social functioning.

Social development difficulties can be addressed by systematic and focused dyadic interventions which should start as early as possible. This involves shared emotional states and joint activities which can assist the individual to learn the link to understand and anticipate internal experiences (Schulte-Rüther et al., 2017). Attachment is an important vehicle to anchor social interventions on both the neurobiological and interpersonal levels (Schore, 2014).

Although a large body of literature exists concerning ASD and also attachment, research concerning the relationship between attachment and social emotional attachment and ASD is still scarce. Review studies (Rutgers et al., 2004; Teague et al., 2017) confirm that children with ASD

are able to form attachments but indicate that more work is required to investigate the clinical application of attachment theory. For both adolescents and adults, the opportunities for treatment remain unmet (Hua, et al., 2011).

Loekemeijer-Verheijden (2015) proposes a developmental model for attachment which involves sequential stages. These stages are related to and linked with emotional and social development, as well as the development and integration of sensory, emotional and social information processing throughout the life-course. The model assumes that people with autism essentially have to go through the same attachment phases than children with average development need to do. This resonates with Shapiro et al. (1987) study, which demonstrated no significant difference in attachment behavior between children with ASD and the attachment behavior of neurotypical children at younger ages.

The basis of Loekemeijer-Verheijden's attachment theory (2015) is that attachment development in ASD is being halted because of the absence of an automatic self-initiated curiosity which is required for the orientation of attention. As a result, attachment development in ASD starts with a significant delay. It is further slowed down by the consequent dependence on external stimulation interventions to develop the necessary curiosity and awareness. For attachment to develop, a person needs to become curious to self-orientate their attention on the inner experiences of the primary attachment figure, themselves, and others. The focus on the primary attachment person enables the development of attachment relationships. The focus on the self is required for emotional development and the focus on others, in turn, stimulates social development. The Loekemeijer Method (Loekemeijer-Verheijden, 2015) focusses on the role of the *primary attachment person (eerste gehechtheidspersoon)* to utilize an *active togetherness (actieve nabijheid)* to match and align interventions with the specific current stage of an

individual's attachment development in order to stimulate further development to the subsequent stage. An active togetherness involves the primary attachment person providing a continuous, equal, emotionally supportive, experience validating, reflective and practical presence. Such a presence is utilized to stimulate awareness and curiosity in the person with ASD.

Loekemeijer-Verheijden (2015) developed an instrument which can differentiate and delineate the attachment developmental stages of individuals with autism. The instrument, Attachment Development Autism (ADAut), focusses on the emotional experience of attachment rather than cognition. Although it is not a neuropsychological model per se, the basis of Loekemeijer-Verheijden's model can be positioned within the dual information processing models of social cognition. The ADAut addresses curiosity and self-initiated attention orientation as prerequisites to attachment development; hereby significantly involving the executive functioning system. The successive integration of the social cognition systems with the emotional awareness of the primary attachment person, the self and others, suggest that improvement on the attachment development scales should be demonstrable by neuro-imaging studies.

To my knowledge, there is no other validated instrument that measures the stages of social and emotional attachment of a person with ASD. Implementation of the ADAut in my clinical practice has demonstrated that people with ASD do develop their attachment systematically. Shortly after being diagnosed, their attachment was assessed to be in a lower developmental stage. After intensive treatment, this was re-assessed and found to be rated in a higher developmental stage. As emotional attachment in autism has not received much research attention, this instrument has the potential to give a significant contribution to expand knowledge in this area.

Clarifying the nature of an individual's social-emotional attachment development can inform treatment to focused not only on stage related issues, but also on interventions to progress attachment to higher developmental stages.

Method

An observational, cross-sectional study was utilized to explore the psychometric properties of a newly developed instrument.

Participants

All participants were recruited from the "Autism-Team" population of outpatients of a mental health organization in Amsterdam, The Netherlands. Participants were eligible for this study if they were aged 18 years or older and were all just diagnosed with ASD according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) criteria (American Psychiatric Association [APA], 2013). Exclusion criteria were the following: younger than 18 years, an IQ below 70 (determined at the time of diagnosis) and not native/primary Dutch language speakers.

Over a period of 16 months, a total of 31 eligible participants were interviewed after providing informed consent for the study. The participants consisted of 11 women (35.5%) and 20 men (64.5%), with a mean age of 44.7 years and age range of 24-65 years old.

Measures

Attachment Development Autism

The ADAut (Loekemeijer-Verheijden, 2015) assesses the developmental stages within the domain of attachment. The ADAut specifies three thematic scales for the self-initiated orientation of attention across the stages: Scale A focuses on the inner experiences of the primary

attachment person; Scale B focuses on the inner experiences of the self; and Scale C focuses on the inner experience of others. Each of these three scales consists of subscales. Scale A has five subscales (A1-A5); B six subscales (B1-B6) and C has four (C1-C4) subscales (Table 1). These 15 subscales are based on insights from the ecological application of developmental psychology principles and Loekemeijer-Verheijden's clinical experience. An individual's performance across the three scales may give a varied attachment profile. Attachment may for instance be classified as higher on scales A (focus on the primary attachment person) and C (focus on others) and lower on scale B (focus on the self).

The respective subscales are also graded according to the developmental stages of attachment (stages 1-7), as described in Table 2. The three scales are organized as decision trees in which the decision flow determines in which developmental stage (stage 0-7) a participant is functioning in terms of their attachment. The decision tree uses control questions to ensure that participants are rated at the correct level by asking them to provide appropriate examples and describe relevant situations in which they have experienced the emotion being assessed. This controls for the influence of cognition (saying 'the right thing'). If the rater mistakenly continues to ask further questions within a specific branch of the decision tree, they will be 'thrown back' by the following branch to a previous level. In the case of a pre-mature exiting at a lower stage of the decision tree, several questions will follow which will no longer be applicable. By providing such control questions, a more valid diagnosis of the attachment stage can be ensured. At every subscale the raters start at development stage 1 again and then have to work through the decision tree with stage 7 being the highest developmental stage that can be reached.

Table 1

Attachment Developmental Autism Scales (children and adults)

| Self-initiated orientation of attention | | |
|--|--|-------------------------------------|
| Focus on primary attachment person (A) | Focus on the self (B) | Focus on others (C) |
| Subscale A | Subscale B | Subscale C |
| A1. Clinginess | B1. Own will | C1. Feeling safe with |
| A2. Proximity, attachment and emotional support | B2. Area of interest and sustained attention | unknown or lesser known people |
| A3. Showing interest | B3. Feelings and emotions | C2. Showing interest |
| A4. Feelings and emotions of the primary attachment person | B4. Emotional evaluation | C3. Feelings and emotions of others |
| A5. Social evaluation and reasoning | B5. Emotional reasoning | C4. Social evaluation and reasoning |
| | B6. Self-image | |

Note 1. The text in the columns is from ADAut (Loekemeijer Method, 2015).

Table 2

Attachment Developmental Stagess (children and adults)

| Self-initiated orientation of attention | | | |
|---|---|---|--|
| Stages | Focus on primary attachment person (A) | Focus on the self (B) | Focus on others (C) |
| Stage 0 | Does not attend to the primary attachment person or their voice. | Not conscious or barely conscious of basic needs. Attends to noises in the environment, objects and natural phenomena and not yet on human voices. | Does not attend to humans or human voices. |
| Stage 1 | Attends to the voice of the primary attachment person. | Not conscious or barely conscious of basic needs. | Attends to human voices. Gets the attention of random others for proximity. |
| Stage 2 | Makes a distinction between the primary attachment person and others. | Deliberately draws attention to fulfill basic needs. | Is still open to others in general. |

| Self-initiated orientation of attention | | | |
|---|---|--|---|
| Stages | Focus on primary attachment person (A) | Focus on the self (B) | Focus on others (C) |
| | <p>Orientates focus to primary attachment person to fulfill basic needs.</p> <p>Imitates primary attachment person and examines them physically.</p> | | <p>Imitates others and examines them physically.</p> |
| Stage 3 | <p>Focuses very strongly on the attachment person in a clinging way.</p> <p>Shows fear/panic with separation and fear of strangers.</p> | <p>Shows fear/stress with (approaching) separation and with (approaching) presence or interaction with strangers.</p> | <p>Shows fear of strangers.</p> |
| Stage 4 | <p>Requires confirmation and support from the primary attachment person to process and continue from an experience.</p> | <p>Has a strong focus on self (self-centered).</p> <p>Is strong-willed and shows strong resistance when this is hindered.</p> <p>No self-regulation yet.</p> | <p>Feels comfortable with strangers that are trusted.</p> <p>Trusts people who share the same interests.</p> |

| Self-initiated orientation of attention | | | |
|---|--|--|---|
| Stages | Focus on primary attachment person (A) | Focus on the self (B) | Focus on others (C) |
| | Responds appropriately with the accompaniment and support from the primary attached person. Tries to get undivided attention. | Explores boundaries. | Explores own physical strength by trying it out on others. |
| | Begins to attach to important people in the support system. Shows basic interest in primary attachment person. | The strong focus on self and own will begins to decline. | Shows basic interest in others. Recognizes and tries to consider basic emotions of others. |
| Stage 5 | Identifies the basic emotions of the primary attachment person and tries to take these into account. | Recognizes own basic emotions and regulates them with support. Forms a self-image through attributing characteristics. | |

| Self-initiated orientation of attention | | | |
|---|---|--|--|
| Stages | Focus on primary attachment person (A) | Focus on the self (B) | Focus on others (C) |
| Stage 6 | Forms attachment with important people in the support system. Shows more interest in empathy with and consideration for the emotions and feelings of attachment persons. Compares attachment persons with other adults. | Starts self-regulation: recognizes and evaluates secondary emotions, their origin and their impact. Considers, plans, monitors and reflects on own behavior. Forms a self-image through social comparisons. | Focuses more automatically on others. Shows more interest in the emotions and feelings of others. Shows basic compassion, consideration and empathy for others' emotions and feelings. |
| | Basic independence. Show more depth in friendships and relationships; mutual interaction; can show basic empathy, and adequately responds to the emotions, feelings, and | Basic self-regulation of and adequate responding to own emotions, feelings, thoughts, wishes and yearnings. Monitors, evaluates, and adjusts own behavior | Basic empathy with and appropriate response to the feelings, emotions, and intentions of others. Basic reciprocal interaction of mutual interaction. |
| Stage 7 | | | |

| Self-initiated orientation of attention | | |
|---|--|----------------------------|
| Stages | Focus on primary attachment person (A) | Focus on the self (B) |
| | intentions of attachment | according to the situation |
| | people. | and reflects on it. |
| | Basic reciprocal interaction. | |

Note 2. The stages are all based on emotions and empathy, not on cognition or on learned cognitive strategies.

The aim of the ADAut is to determine the current stage of an individual's attachment in order to therapeutically stimulate development to progress to a higher stage of attachment. The outcomes of the assessment can thus be matched with appropriate treatment intervention according to the needs required by the specific developmental stage.

Friendship Questionnaire

The FQ, adapted from Baron-Cohen and Wheelwright (2003), was utilized for the exploration of the validity of the ADAut. The FQ is a self-report questionnaire which has been applied to people with ASD (Baron-Cohen & Wheelwright, 2003). It is a 35-item questionnaire of which 27 items derive a possible score. The maximum score for these items is 5 points. According to Baron-Cohen and Wheelwright (2003) participants score high on the FQ if they like and are interested in people, enjoy interaction for its own sake, and find friendships important. A correlation between the FQ and the ADAut's scales was regarded as an indication of both the convergent and concurrent validity of the ADAut. Thus, it was hypothesized that a statistically significant positive correlation would exist between the attained levels of attachment, as indicated by the ADAut, and the probability that the person forms friendships, as assessed by the FQ.

Procedures

The data were collected between June 2016 and October 2017 under strict anonymity. The practitioner involved with the diagnostic process introduced potential participants to the study. If they indicated an interest to take part in it, the study information letter and the informed consent was read to them before they were invited to sign the consent form. Prior to the first meeting, participants received a self-positioning questionnaire by e-mail. The questionnaire

consists of items from the ADAut. This provided a general depiction of how clients rated themselves and prepared them for the type of questions they would be asked during the interview itself. Hereafter they were approached by the researcher who introduced to the study by means of face to face contact with the author who read the information letter and consent form again with the participant. The interviews took place at one of the locations of the mental health services [Geestelijke Gezondheidszorg (GGZ)] in The Netherlands. Participants were first requested to provide informed consent to participate in the study. The study information letter and the informed consent was read to them before they were invited to sign the consent form. The data were gathered with a semi-structured interview (ADAut; Loekemeijer-Verheijden, 2015) by two raters and with the self-report questionnaire (FQ; Baron-Cohen & Wheelwright, 2003). The process took on average 2 hours. The two raters were trained by the developer of the Loekemeijer instrument (2015). Both were psychologists and scored directly, each independently during the interview on the same participants at the same time, enabling interrater reliability assessment. The two raters scored the ADAut on paper and the results were then imported through Qualtrics software into the Statistical Package for the Social Sciences (SPSS).

Statistical Analysis

The following statistical analyses were done using SPSS version 25.0 (level of significance: $p \leq 0.05$):

1. Interrater reliability was determined by calculating the intraclass correlation coefficient (ICC) of the two raters of the ADAut 2.
2. Internal consistency of the ADAut subscales and the instrument as a whole was determined by using Cronbach's Alpha coefficient.

3. Concurrent and convergent validity was explored by calculating the correlation (Pearson, one tailed) of FQ with the respective ADAut subscales (A, B and C).

The ICC and Cronbach's alpha variables were re-coded 1-7, similar to the format that is used in the ADAut where 1 provides the lowest stage of attachment development and 7 the highest possible stage.

Results

Two ADAut results for each of the assessment interviews and the FQ results were analyzed for all 31 participants. Table 3 shows the descriptive statistics, namely the mean scores of the ADAut (scales A, B and C), the mean FQ scores and the standard deviations (SD) of the ADAut and FQ.

Table 3

Mean and Standard deviations on the ADAut scales (A, B and C) and the FQ

| | Self-initiated orientation of attention | | | Friendship Questionnaire |
|--------------|---|----------------------------------|--------------------------------|-------------------------------------|
| Scale | Focus on the primary attachment person (A) | Focus on the self (B) | Focus on others (C) | |
| Mean | 4.5 | 4.6 | 4.3 | 63.16 |
| SD | .40 | .26 | .39 | 23.65 |

Interrater reliability:

The ICC of all the ADAut scales ranged from $ICC = .77$ to $ICC = .99$, with B1 being an outlier on scale B ($ICC = .66$). The results indicate a high interrater reliability, except for one outlier on scale B (orientation of attention on the self).

Internal consistency:

The Cronbach's alpha coefficient for the total ADAut was $.69$. The Cronbach's alpha coefficients for the respective scales varied: Scale A (focus on the primary attachment person) yielded a Cronbach alpha of $.79$, indicating good internal consistency. The Cronbach's alpha for Scale B (focus on the self) was $.38$, indicating low internal consistency. All the Cronbach's alpha coefficients on the subscales of Scale B were around $.4$. A high internal consistency was found for Scale C (focus on others) with a Cronbach's alpha coefficient of $.88$.

Concurrent and convergent validity:

The relationship between an individual's orientation of attention to focus on the primary attachment person, self and others (as measured by the respective ADAut scales) and the probability that they would form friendships (as measured by the FQ) was investigated using Pearson correlation (one-tailed). The correlation between Scale A (focus on the primary attachment person) and the total FQ score was marginally significant, $r(31) = .27, p = .073$. There was a statistically significant positive correlation between Scale B (focus on the self) and the FQ, $r(31) = .39, p = .015$. There was a strong statistically significant positive correlation between Scale C (focus on others) and the FQ, $r(31) = .53, p = .001$.

Discussion

This is the first study on the psychometric properties of the ADAut. The ADAut uniquely provides a developmental staging of attachment. It refines the concept in terms of the self-initiated orientation of attention towards the inner experiences of the primary attachment person, the self and others respectively. The instrument can enable both more discriminatory and refined assessment of attachment and better-informed therapeutic interventions for people with ASD.

The results of this study indicate that the intraclass correlations for the two raters of the ADAut were good, with high interrater reliability, except for B1 (own will) as an outlier on the scale B which measures attention to the self (scale B). This variable involves emotional development and more specifically, sub-scale B1 (own will). This sub-scale assesses people's inflexibility to shift from their own wants, needs and interests. An explanation for the rater's inconsistency is that the specific decision tree options can be open to various interpretations. The item thus needs more clarification.

Overall, the ADAut demonstrated good internal consistency, suggesting that the items were assessing a similar construct, in this case the orientation of self-initiated attention. Low internal consistency was however found on one of the three scales, namely the orientation of attention towards the self (scale B). This may be attributed to the fewer number of items on this scale or could suggest that the scale has not been conceptualized well enough yet.

To explore concurrent validity, it was hypothesized that there would be a relationship between an individual's developmental level of attachment (as measured by the ADAut) and the probability that they form friendships (as measured by the FQ). It was expected that higher attained levels of attachment would be associated with a higher probability to form friendships.

As predicted, higher attained levels of attachment were associated with the probability that an individual forms friendship which indicated good concurrent validity. The results confirmed that there was a strong likelihood of a theoretically well conceivable relationship between the concept of self-initiated orientation of attention towards others (as measured by scale C) and the probability to make friendships (as measured by the FQ). Similarly, the results confirmed that the variable which is about recognizing and expressing one's own emotions (as measured by scale B) was also relevant for forming friendships

Convergent validity would be reflected by the respective subscales having a positive but differential relationship with the FQ. The finding that the probability to form friendships had a highly significant association with the orientation of attention towards other's inner experiences (scale C), somewhat less so with the self (scale B) and little with the primary attachment person (scale A), pointed towards convergent validity. As a whole, the ADAut compared well with the FQ, which is a reliable and valid instrument. The positive correlations between the ADAut and the FQ, with sufficient differentiation in strength of correlation between the three respective scales with the FQ demonstrated both concurrent and convergent validity.

The findings of this pilot study should be interpreted in the context of a number of limitations. Only a relatively small number of participants (n=31) took part in the study. Also, only one research setting was used. In addition, the participants were fairly homogenous as there was little variation in their AUAut staging. Although this is attributable to the small sample size, it was likely also caused by the fact that the participants had not yet received treatment or guidance to improve their development of attachment.

The following recommendations are offered for the further refinement of the instrument:

a) Future studies should involve larger, more heterogeneous samples in various settings and with

people who are at different stages post-diagnosis of ASD; b) The ADAut should be used in comparative studies between people without ASD and people with ASD. It is expected that people without ASD should rate at higher stages which would allow for the determination of cutoff values for attachment levels in ASD diagnosis; c) Since the ADAut is constructed as a decision tree, the homogeneous sample prevented the items towards the end of the decision-tree to be included in the study. Larger scale studies and more heterogeneous populations are necessary to investigate all the items and to apply confirmatory factor analysis for the three factors; d) Although the ADAut is comprehensive, and whilst participants found it interesting to engage with, it took long to administer (average 1.5 hours). The identification of redundant items could assist to make the instrument shorter.

In conclusion the ADAut demonstrated acceptable reliability and validity to support its use in regular mental health care for adults in ASD populations. The instrument provides an estimation of the person's self-initiated orientation of attention towards their primary attachment person, themselves, and others. This informs therapy and can monitor the development of attachment for both children and adults. The ADAut's promising psychometric properties would justify larger scaled studies to refine it as a valuable instrument in the important field of social development. With good psychometric properties, this instrument can be useful in both research and clinical practice.

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