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Academic and Social Profiles of Adolescents with Autism

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Abstract:

The INSIDE project is a longitudinal study of pupils who are in schools that provide inclusive education. At the beginning of the secondary school tier, there were 22 pupils with an autism diagnosis, two of them female, at ages 11 to 14 years. A comparison group with case-control matching in terms of gender and exact age in months was created by randomly selecting datasets of pupils from a large INSIDE panel (N = 2693). Adolescents with autism had the same level of competence in reading and mathematics as the comparison group but language grades were lower, most likely because of shortcomings in classroom discussion contributions. Factor analysis of questionnaires about the academic and social self-concept and school inclusion explained between 66.8% to 80.1% of the variance. In adolescents with autism, clear psychological dimensions of positive self-esteem, self-control, and peer relationships emerged. In contrast, in the comparison group, peer relationships were relevant for nearly every dimension showing the importance of social context for mainstream pupils. There was also a difference insofar as for adolescents with autism, critical thinking and evaluation was an important dimension, while for the comparison group, independent decision-making and speaking up was more relevant. Thus, while there was some common ground, there were differences revealed in both the composition of the main factors as well as in crucial anchor items of factors that explained less variance.

Keywords: Autism, Self-Concept, Peer Relationships, Self-Regulation

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1 Introduction

In Germany, childhood autism is diagnosed on average at age six and Asperger even later at eight years, although parents can already be concerned when children are about two years old (Höfer et al., 2019). However, there are several indicators available for diagnosis already in early childhood (Volkmar et al., 2005; Worley et al., 2011). These two diagnoses are no longer made according to the American DSM5 (see the discussions in Lobar, 2016; Swedo et al., 2012; Wing et al., 2011) but fall under one category of 'Autism spectrum disorder' (299.00; F84.0) (American Psychiatric Association, 2013). The prevalence rate of autism in Germany is lower than in other European countries (Bachmann et al., 2018). Nevertheless, the prevalence rate increased between 2006 and 2012 for adolescents and adults, but not for children. The current study is examining a sample of adolescents between 11 and 14 years of age who have been diagnosed with autism. All adolescents in this study attended schools with inclusive education, which means they were attending mainstream schools and not special schools. The aim of the study was to compare academic performance and psychological dimensions of items from self-concept questionnaires that this group would have in common with mainstream pupils, or that would be specific to them.

1.1. What is Autism?

Autism was first described in the monograph of Leo Kanner in the United States in 1943 (Rutter, 2011) and by Hans Asperger in Austria in 1944 (Asperger, 1944; Asperger & Frith, 1991). Autism is more prevalent among boys (Baron-Cohen & Hammer, 1997; Rutter & Sroufe, 2000). Already in the first studies of Hans Asperger, it showed that the fathers of boys with autism often worked in the technical professions (Asperger, 1944). A recent study found that technical toys are more often selected than role-play or educational toys when there is even just one boy in the family (Lange-Küttner et al., 2019). If the father, however, is the only male family member because he has only daughters and no son, the daughters can change the father's preference for technical toys even if his autism quotient (AQ) is high.

The three personality features that are especially indicative of autism are a lack of social interaction, communication, and imagination (Wing, 1989). Moreover, the ability to interpret emotions in others or express own emotions may not be developed, which can result in repetition, monotony, and missing intonation (prosody) in their language (Hubbard & Trauner, 2007). In behavior, there is also a strong dependence on repeating rituals and orderly procedures, which can lead to the expression of rage and disappointment if change happens (McDougle et al., 2000).

There is a differentiation between low functioning (Boucher et al., 2008; Nadel et al., 2004) and high functioning persons with autism (Tsai, 1992) who with an IQ > 70 do not fulfil the criterion of a learning disability (Minshew et al., 1995). The verbal IQ does not necessarily need to be lower than the non-verbal IQ (Siegel et al., 1996). On the contrary, obsessive *savant* learning can occur, that is learning without instruction,

tuition or supervision that children with autism can show in drawing, reading and memory which may show outstanding achievement levels and can even skip some usually occurring stages (e.g. Baron-Cohen et al., 2007; Lange-Küttner, 2024c, chapt. 5; Neumann et al., 2010; O'Connor, & Hermelin, 1991; Ratey et al., 1992; Selfe, 2011).

While the unusual *savant* strength only occurs in special cases, social anxieties and avoidance of contact are very common, and can also be observed in mothers of children with autism (Kuusikko-Gauffin et al., 2013). There may be delays in language development and even mutism, which do not occur when social phobia is diagnosed (Tyson & Cruess, 2012). In recent years, descriptions such as the distinction of low and high functioning individuals with autism have become controversial because they can lead to stigma and unwanted negative or condescending attention towards individuals with autism (Bottema-Beutel et al., 2020; Fletcher-Watson, & Happé, 2019; Lord et al., 2022). Interestingly, in children with autism attending inclusive schooling, the social contacts to teachers are equally well established as in mainstream pupils, but relations to same-age peers are rarely initiated (Koegel et al., 2001). This lack of communicative initiative could also be the reason why adolescents find it hard to see themselves from the perspective of their peers (Farley et al., 2010).

1.2. The Current Study

The self-concept of pupils in secondary schools has been investigated by educational psychologists because it measures intrinsic motivation and achievement aspirations (Möller, & Trautwein, 2009). Nevertheless, it is a multi-faceted construct that develops early and outside school in the first year of life when infants recognize themselves in the mirror (Bertenthal, & Fischer, 1978). Infants' self-recognition in the mirror is significantly correlated with objects' place memory (Bertenthal, & Fischer, 1978) and imitation (Asendorpf et al., 1996) although not in a systematic fashion in the individual child. Typically, young children have a happy and positive self-concept that gradually becomes more realistic during school years even though it is often perceived by the public to be in turbulence during adolescence (Dusek et al., 1981; Onetti et al., 2019; Shapka, & Keating, 2005). However, this downward trend seems to be particularly the case for school performance-related aspects of the self-concept such as language and mathematics, while self-esteem, general academic self-concept, academic self-efficacy, and achievement goals were stable (Scherrer, & Preckel, 2019). The current study measured the adolescents' concept of their independent learning as well as their self-concept including their self-esteem and peer relationships. In addition, school grades and competencies were assessed.

The self-concept in individuals with autism has more rarely been investigated. It is assumed that rather than the global self-concept, only selective aspects would be different in individuals with autism (Huang et al., 2017). However, another study showed that global self-esteem was significantly and positively associated with perceptions of giftedness, emotional resilience and power (Nguyen et al., 2020). Thus, it is not

entirely clear whether specific or global aspects of the self-concept are affected in individuals with autism.

A recent study from the Netherlands compared the academic, physical appearance, and prosocial self-concept of two groups, 35 male teenagers with autism and 34 male teenagers without autism (van der Cruijsen et al., 2024). Autism was measured with an autism quotient (AQ) questionnaire with 28 items rather than with a clinical diagnosis. This study showed that more autism traits were related to less positive self-concept ratings in physical appearance and prosocial domains but not for the academic self-concept. More autism traits were also associated with more distinction between their own and the assumed peer-perception of the prosocial self-concept. Interestingly, while evaluating the self-concept statements in the scanner, in both groups the pre-frontal cortex was activated, although in neighboring areas. While autism is seen as having a neuropsychological basis (American Psychiatric Association, 2013), this study that controlled for gender, age and IQ could not find neurological differences that survived corrections for multiple testing in the two groups with and without autism traits.

The current study is part of the nationwide INSIDE research project in Germany. IN-SIDE stands for 'Inclusion in and after lower secondary tier in Germany' which is an interdisciplinary research project (sociology, education, psychology) that investigates the outcomes of inclusive schooling in Germany. In particular, pupils with autism, learning disabilities, language delays, emotional difficulties, and sensory impairments used to be schooled in special schools. However, since 2006 according to the UN convention, persons with disabilities have the right to attend mainstream schools, thereby participating in general education: 'Respect for the evolving capacities of children with disabilities and respect for the right of children with disabilities to preserve their identities' (United Nations, 2008). Inclusive education is now a legal requirement in European states but educational systems face several challenges when implementing such changes at the national level (Buchner et al., 2021; Byrne, 2022) as well as at the federal level in Germany (Lange, 2017). Thus, INSIDE is a governmentfunded project to evaluate the outcome of this gradual process of moving teaching staff from special schools to mainstream schools and the teaching in shared classrooms (Schmitt et al., 2023). This can entail a rise in problem behavior, not because of the pupils with special needs and disabilities (SEND) as such, but because they occur more often in areas where parents with low economic incomes live (Labsch et al., 2021). Thus, the INSIDE project collected a 'big data' set that, for instance, allowed to analyze whether school grades for pupils with and without SEND fairly matched their competencies (Lange-Küttner, 2024a). This was the case and all adolescents improved their competencies independently of their SEND status. More variability of competencies and school grades emerged only at the tail ends of the scales of fail and best scores. Correlations between competencies and grades were consistently higher in mathematics than in German language for both pupils with and without SEND indicating a more objective and reliable evaluation.

Within this project, the current study investigates a small sample of pupils with a clinical diagnosis of autism. A previous study with INSIDE data comparing a group of pupils with various developmental problems showed that they experienced less social participation and contact, fewer friendships and more negative self-perception compared to mainstream pupils (Labsch et al., 2024). The current study takes a different approach as pupils with SEND may have different self-concepts depending on their specific diagnosis. Thus, here it is investigated whether, firstly, the frequency of autism diagnosis of pupils who have taken part in the nationwide INSIDE project matches the prevalence rate in Germany. Secondly, the academic and social self-concepts of adolescents with an autism diagnosis and an age-matched and gendermatched comparison group without autism are compared. Several questionnaires were analyzed separately for each group and items that were the same and those that differed were identified. As such, this study is exploratory.

2 Method

2.1. Participants

The INSIDE total sample was recruited nationwide only in schools with inclusive education in Germany, with the exception of the Bundesländer Berlin and Brandenburg. The sample of adolescents with an official diagnosis of autism consisted of 22 adolescents, with a gender distribution of 90.9 percent male and 9.1 percent female. SPSS 28.0 was used to randomly select a comparison group of adolescents without special educational needs and disabilities (SEND) (n = 2693, case control matching) whose gender and age in months were identical. Thus, the total sample for this study consists of N = 44 participants. The mean age of both groups was identical (years;months), M = 12;10 months (*Min* 11;10; *Max* 14;1). T-tests (two tailed) for independent samples showed that there was no significant difference between the two groups with respect to non-verbal intelligence assessed with the BEFKI Test measuring crystalized intelligence (Schipolowski et al., 2013), t(40, 42) = -1.15, p = .256 [CI -3.57; .98] Cohen's d = -.36 (with autism M = 9.80, comparison group M = 8.50), or reading test completion time, t(42, 44) = -.49, p = .625 [CI -3.51; 5.79] Cohen's d = .15 (with autism M = 20.9, comparison group M = 22.1).

Pupils with SEND can have multiple problems such as learning difficulties, deafness, and blindness. It was determined if the adolescents with autism had comorbid disorders. Twelve of the 22 participants with autism had no comorbidities. The most common comorbidity involved problems of emotional and social development (n = 8), then learning difficulties (n = 2), motor development problems (n = 2), hearing problems (n = 2), visual problems (n = 1), reading and writing problems (n = 2) and ADHS (n = 3). Most of the ten adolescents with autism who had comorbid disorders showed only one additional problem (n = 8), one had three additional problems, and another one had five additional problems.

2.2. Materials and Measurement

The questionnaires were completed in the classroom with helpful assistance being available. Because nobody refused to answer all, or the majority of questions, no dataset was completely excluded, thus, the N can vary in some tests. Diagnoses and school grades were entered by the participating school coordinator. Items from the German questionnaires were translated by the author into English for this article.

2.2.1. Academic Performance (4 items)

School grades. School grades were assessed in Year 6. Some schools used a points system, while others used the traditional scale with 1 for the best mark and 6 for the worst mark. School grades and points were recoded into the traditional scale using publicly accessible conversion tables. A grade of 1 is very good, 2 is good, 3 is satisfactory, 4 is sufficient, 5 is fail (with compensation option by better marks in other subjects for progression) and 6 is a total fail (without compensation option). Indications of an upward or downward trend of a mark with a star or plus/minus were not considered. For the statistical analysis, no difference was made between the grades of pupils with and without SEND because both were on the same scale, however, marking criteria can vary (Bosch, 2023).

Competencies. Competencies were assessed in Year 6. Assessment of competencies in German language and mathematics was not part of the regular school exams. Instead, experimenters from a research institute conducted tests within the school context. Knowledge of German was assessed using factual texts, public relations texts, literary texts and text comprehension (Berendes et al., 2013). The reading test involved 51 items to be completed within two minutes. Assessment of competencies in mathematics were carried out with established tests that have been used in previous as well as ongoing national assessments of educational trajectories (Bos et al., 2009). There was no time limit. The language test had a duration of about 30 minutes, and the test in mathematics lasted about 45 minutes. The variables of the competencies are based on item response theory and are weighted maximum likelihood estimates (Stegenwallner-Schütz et al., 2022; Warm, 1989).

2.2.2. Academic Self-Concept (10 items)

The questionnaire was based on Kullmann et al. (2015). Ten items measured strategies of independent learning: In school I learn to (1) work on tasks independently, (2) take decisions independently, (3) think critically about topics, (4) solve problems, (5) say if I do not understand something, (6) say if something is presented too fast, (7) realize my own goals, (8) perceive what my strengths are, (9) be confident about my skills, (10) identify my strengths and weaknesses. The Cronbach's Alpha coefficients for these ten items were for the pupils without autism (n = 20) α = .88, and for those with autism (n = 18) α = .91, for the entire sample (N = 38) α = .90.

2.2.3. The Social Self-Concept (11 items)

A new set of items was drawn from three tests because the length of each one would have been forbidding in a large project where pupils were assessed on various dimensions of their experience and development (Külker et al., 2021). The response scales of a total of eleven items varied from 1 to 4 (I do not agree, somewhat not agree, somewhat agree, completely agree) whatever scale was used in the original test items, in order to avoid participants always ticking the center of the scale. This new set of items with 11 items has Cronbach's Alpha coefficients for the pupils without autism (n = 17) were $\alpha = .69$, and for those with autism (n = 18) $\alpha = .83$, and for the entire sample (N = 35) $\alpha = .80$. In the following paragraphs, the items taken from the three tests are described with the original item numbers and reliability of the original test.

Self-Description Questionnaire I (SDQ). The measurement of self-esteem drew on Arens et al. (2011, Appendix A) German version of the Self-Description Questionnaire I (SDQ) with five items (factor loading in brackets): (1) in general, I like how I am (item 45, .50), (2) all in all, I can be proud of many things (item 53, .63), (3) I can do most things just as well as other people (item 67, .58), (4) many things are good about me (item 72, .66), (5) if I do something, I do it well (item 76, .61). The original test items had a Likert scale of 1-5.

Inventory for Measurement of Impulsivity, Risk taking and Empathy in 9- to 14-yearold Children (IVE). From this test, three items from the factor 'Impulsivity' were included (item numbers and factor loadings refer to the original test version) (Stadler et al., 2004, see pages 26-27): (6) I do and say things without thinking too much about it (item 9, .52), (7) I am often in trouble because I do things without thinking, (item 28, total .60), (8) I am often in trouble because I cannot sufficiently control myself (item 34, .50). In the original test version of Stadler et al., only a 'yes' or 'no' option was given.

Emotional Competency Questionnaire (EKF). The three items for emotional regulation were drawn from Rindermann (2009): (9) if others are sad, I can make them feel better (item 17, 'recognition of own emotions', .55), (10) others say that I am helpful if they don't feel well (item 22, 'recognition of others' emotions', .72), (11) I can calm down others in difficult situations (item 10, 'emotional expressiveness', .64). In the original test, the Likert scale was 1-5.

2.2.4. Social Inclusion (16 items)

A second set of questions included 16 items selected from the two questionnaires specified below about pupils' perception of being included in school, with the same scale of 1-4 as before. The Cronbach's Alpha coefficients were for the pupils without autism (n = 20) α = .61, and for those with autism (n = 17) α = .61, for the entire sample (N = 37) α = .66.

Perceptions of Inclusion Questionnaire (PIQ). The PIQ (Venetz et al., 2015) is based on the German Questionnaire for Assessing Dimensions of Integration of Students (FDI) by Haeberlin, Moser, Bless and Klaghofer (Haeberlin et al., 2003) which comprised of 45 items. The current study used a short version of the questionnaire by Venetz (Venetz et al., 2014, Table 4) consisting of 12 Items: (1) I like to go to school (item 1, .84), (2) I have many friends in class (item 2, .68), (3) I learn quickly (item 3, .65), (4) I don't feel like going to school (item 4, .78), (5) I get along with my peers (item 5, .68), (6) I can also solve difficult tasks (item 6, .68), (7) I like being in school (item 7, .71), (8) I feel lonely in class (item 8, .62), (9) I am a good pupil (item 9, .63), (10) I have fun in school (item 10, .78), (11) I am friendly with my peers (item 11, .69), (12) school is difficult for me (item 12, .58). For the responses to these items Likert scales of 1-4 were used.

Social Participation Questionnaire (SPQ). Three additional items from the SPQ (Schwab, 2015, Table 1) were rephrased because the SPQ is a teacher questionnaire about their perception of pupils, with and without SEND. However, for the current study the questions were rephrased into statements from a pupil's perspective and simplified: (13) my peers like me the way I am (item 21, .68) (14) my peers help me if I'm not treated well in class or school by others (item 15, .18), (15) I have fun with my peers (item 1, .61), (16) My peers like to work together with me in a group (Item 19, .75). The Likert scale of the original teacher rating items was 1-5.

2.3. Procedure

The data collection was approved by the education resp. culture ministries of the Bundesländer. All schools, teachers, and parents on behalf of their pupils had consented to the voluntary participation in the project. They received a data protection sheet detailing their rights to refuse participation without disadvantage. Data collection was carried out in all Bundesländer apart from Berlin and Brandenburg because of their different school pathways. The data collection was outsourced to the International Association for the Evaluation of Educational Achievement (IEA) (Stichting I.E.A. Secretariaat Nederland), Hamburg branch and Infas, Bonn, Germany. Competencies were tested in the classroom by their experienced and trained external experimenters. School coordinators reported pupils' school grades and SEND certificates.

3 Results

Data were analyzed with SPSS28. The statistical analyses were two-tailed t-tests for independent samples for grades and competencies, with 95% confidence intervals (CI) for the difference and Cohen's d as effect size estimate. If the Levene's Test was significant, degrees of freedom were corrected.

For the questionnaire data, factor analyses (split sample for autism/comparison group) were used. The data were analyzed with SPSS factor analyses (principal component

analysis, PCA) separately (split-sample) for pupils with and without autism (Kubinger, 2009, pp. 244). The split-sample method was not used as a confirmatory PCA, but on the contrary, it was hypothesized that the factorial structure would vary between the two groups, with additional factors capturing specific items that pupils with and without autism were concerned with. The unrotated factor analyses are reported here because the explorative PCA was used to identify items that would be of special importance to either group. This is a different approach than monitoring crossloadings in the various rotation techniques (Fabrigar et al., 1999; Scharf, & Nestler, 2019) because there was no search for fundamental intelligence or personality components, only for indicative items that would differ between two groups. Factor values were extracted when the Initial Eigenvalue was larger than 1 and confirmed by an inspection of the scree plots (Cattell, 1966). The dictum is that in factor analysis, rotation must be used to clean up the factor structure from error variance because otherwise the factor structure would be too complex to be interpretable (Cattell, 1966). However, this is debated (Fabrigar et al., 1999; Fog, 2020; Scharf, & Nestler, 2019). One concern is that there are too many types of rotation available that may yield studies non-comparable, while a non-rotated solution would be the same for all and thus allows for comparisons.

Exploratory factor analysis with synthetic (random) data with the same general structure as observed in an empirical meta-analysis data explained 50.2% of the variance, with an average factor loading of .21 (Peterson, 2000). Thus, observed data should exceed 50% of explained variance and would be in need of a higher magnitude of factor loadings. Peterson (2000) found no agreement in the literature on what constitutes an acceptable factor loading, nor a rationale for a threshold. Scientists rely on their intuition or use a rule of thumb as a heuristic. A reasonable suggestion was that factor loadings greater than .30 meet a minimal level; loadings of .40 are more important and loadings of .50 or greater could be considered practically significant. In the current study, an item with a factor loading was seen as contributing to a factor if it was above .50.

Incidence rate. 22 adolescents with a diagnosis of autism given a total sample size of N = 3620 pupils in total amounted to an incidence rate of 0.61 %.

School grades and Competencies. The t-tests were two-tailed. Adjusted degrees of freedom are quoted if the Levene's test for equality of variances was significant. The grades in German language were significantly different, t(40, 42) = -2.94, p = .005 [CI -1.45; -.27], Cohen's d = -.91. Adolescents with autism had an average German language school grade of M = 3.36, while adolescents in the comparison group had an average school grade of M = 2.50. However, there was no significant difference in reading competence, t(34.08, 44) = -.91, p = .367 [CI -1.22; .46], Cohen's d = -.27 (Autism = .50, Controls M = .12). Correlations of the German language school grade with reading competence were not significant, neither for adolescents with autism, r = -.06, p = .807, nor for the comparison group, r = -.14, p = .564.

School grades in mathematics did not differ significantly between the two groups, t(38, 40) = -1.01, p = .319, [CI -1.11; .37] Cohen's d = -.32 (Autism M = 3.0, Controls

M = 2.63) and competencies in mathematics also did not differ significantly, t(41, 43) = -1.34, p = .187, [CI -1.16; .23] Cohen's d = -.41 (Autism M = .63, Controls M = .17). The correlation of school grades and competencies in mathematics was significant in pupils with autism, with a medium-sized correlation coefficient, r (20) = -.52, p = .017 and explained about half of the variance. In the comparison group, there was only a trend, r(19) = -.41, p = .085.

Academic self-concept (independent learning). The factor analysis of the 10 items for empowerment and personality development showed a two factor solution for both groups, see **Table 1**. For the group of adolescents with autism, the factors explained 76.3% of variance, while for the comparison group, they explained 66.8% of the variance. In both groups, all items loaded on the first factor, except for thinking critically in the autism group. However, this item loaded highly on the second factor of this group. In the comparison group, different items loaded on the second factor, namely taking decisions independently and realizing own goals as well as speaking up. This shows that while the factor structure was the same, with the first factor explaining most of the variance, there was a fine difference between the two groups, with the pupils with autism being self-critical while the comparison group worried more about independence.

Table 1

Academic Self-concept: Autism/Controls Split-sample Factor Loadings

		1 14(15)11	(11 10)	compan	ion (n	20
Iter	n	1	2	1	2	-
1.	I work on tasks independently	.750	.387	.520	052	_
2.	I take decisions independently	.518	207	.710	.577	
3.	I think critically about topics	.282	.875	.541	125	
4.	I solve problems	.692	538	.826	.292	
5.	I say if I do not understand something	.906	195	.665	.027	
6.	I say if something is presented too fast	.879	035	.580	.753	
7.	I realize my own goals	.914	261	.520	634	
8.	I perceive what my strengths are	.932	.117	.857	379	
9.	I am confident about my skills	.788	198	.793	466	
10.	I identify my strengths and weaknesses	.781	.556	.868	.014	
%	Variance explained	59.1	17.2	41.2	17.7	

Autism (n – 18) Comparison (

Comparison (n = 20)

Note. Principal component analysis of questionnaire items (Kullmann et al., 2015). Factor loadings set in bold are > .50.

	r Loadings
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ble 2.	cial Self-
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		Au	tism (n =	18)	Contr	<u>ols (n =</u>	: 17)		
It	ue	1	2	3	1	2	3	4	
	In general, I like how I am	.624	357	.511	598	602	.022	385	
<i>.</i>	All in all, I can be proud of many things	.822	181	.309	.778	321	005	085	
3.	I can do most things just as well as other people	.785	006	.381	.122	660	.195	.498	
4	Many things are good about me	.731	046	045	.813	117	.183	356	
5.	If I do something, I do it well	.489	384	.265	.646	555	.148	.285	
6.	I do and say things without thinking too much about it	.242	.904	188	.656	.464	366	.101	
۲.	I am often in trouble because I do things without thinking	.362	808.	.125	909 .	.562	366	.308	
×.	I am often in trouble because I cannot sufficiently control myself	.378	.847	.290	.552	.675	025	.267	
9.	If others are sad, I can make them feel better	.590	118	761	061	.525	.774	067	
10	. Others say that I am helpful if they don't feel well	.870	138	220	.165	.347	058	636	
=	. I can calm down others in difficult situations	.659	066	663	.320	.314	.798	.132	
%	Variance explained	39.3	23.0	16.1	29.9	24.6	14.6	11.0	
$Fa \geq 0$	te. Principal Component Analyses of questionnaire items by ctor loadings set in bold are > .50.	Arens et	al. (2011	l), Stadler	et al. (2	004) an	d (Rind	lermann,	2009).

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Social Self-Concept. The factor analyses of the 11 items measuring self-esteem and integration with peers showed three factors for adolescents with autism which in total explained 78.5% of the variance. In contrast, in the comparison group four factors emerged that in total explained 80.1% of the variance. Table 2 shows that in adolescents with autism, items on the first factor show high loadings for self-esteem and relating to others in difficult situations. The second factor showed clear-cut item loadings on inhibition. The third factor showed a component that showed a basic positive feeling about oneself, but rather feeling unable to help others in distressing situations.

This profile was different in the comparison group where four factors emerged. The first factor included items that loaded on self-esteem and inhibition but not relating to others in difficult situations. The competitive item that one can do most things just as well as other people was not loading on the first factor, but loaded negatively on the second factor along with negative self-esteem and being in trouble because of lack of self-control. The third and four factor were only loading on items about relating to others in difficult situations, calming them down and making them feel better (factor 3) and being perceived as helpless to make them feel better (factor 4). Thus, the comparison group shows a positive 'self' factor plus a sort of negative twin factor, as well as a positive 'others' factor with a kind of negative twin factor.

Inclusion. The factor analyses of the 16 items measuring self-esteem and integration with peers showed four factors for adolescents with autism which in total explained 76.8% of the variance and five factors for the comparison group explaining 78.1% of the variance. Table 3 shows the factor structure and item loadings for the inclusion questionnaire.

For pupils with autism, the first factor has a strong factor loading of liking to go to school of .89 which is accompanied by learning quickly, the rejection of not liking to go to school, liking to be in school, having fun, and school being easy. One could call this a happy school life factor. The only drawback was peers not working in a group. The second factor is a positive peer factor: many friends and several items are showing that the pupil is getting along with peers and not feeling lonely. The third and fourth factor explain less variance. The third factor shows a pupil is feeling lonely despite being liked, while the fourth factor has only one relevant item showing that school is difficult. In conclusion, positive statements about school and peer relationships explain much more variance for pupils with autism than a few negative items.

In the comparison group, the first factor is also positive but also contains quite some items that relate to their peers such as having many friends and being friendly with them.

			Autism	(n = 17)			Com	parison ((n = 20)	
Item			2	3	4	-	2	3	4	5
1.	I like to go to school	889.	.142	.262	680.	909.	383	.567	110	.182
2.	I have many friends in class	.133	.837	193	.188	.565	.612	004	198	.063
3.	I learn quickly	.634	.024	405	.316	.480	436	557	.355	.016
4.	I don't feel like going to school	788	.048	312	.144	508	.511	108	045	475
5.	I get along with my peers	211	.790	.245	159	.659	.385	.310	.269	180
6.	I can also solve difficult tasks	.043	.347	-TTT	115	.472	486	543	.166	157
7.	I like being in school	.873	.314	.221	.241	.604	416	.336	271	217
8.	I feel lonely in class	232	540	.539	.362	303	428	.257	.336	.413
9.	I am a good pupil	.434	.002	.498	484	.641	523	412	.122	170
10.	I have fun in school	.848	.256	.124	.110	.545	426	.576	123	126
11.	I am friendly with my peers	238	.791	.166	.041	069.	.223	.100	.429	004
12.	School is difficult for me	643	019	.429	.527	144	.407	.278	698.	.261
13.	My peers like me the way I am	075	.622	.507	.143	.474	.667	194	.004	.124
14.	My peers help me if I'm not treated well	.016	.753	394	.284	.475	.413	063	454	060.
15.	I have fun with my peers	170	.748	.242	227	.737	.577	139	.087	.084
16.	My peers work with me in a group	-609	.560	.163	145	.160	083	349	384	.677
γ %	ariance explained	28.0	27.3	14.6	6.8	28.2	20.9	12.4	9.5	7.1
<i>Note.</i> set in	Principal component analysis of the shored bold are > .50	t questio	nnaire c	of Venetz	(Venetz et al	., 2014; V	enetz et	al., 2015). Facto	r loadings

Table 3. Inclusion: Autism/Controls Split-sample Factor Loadings

The second factor also has a highly loaded peer relationship item, but this is accompanied by feelings like not going to school and not being a good pupil. The third factor has a more somber note with a factor loading of not learning quickly, not being able to solve difficult tasks but still having fun in school. Like in the pupils with autism, the last two factors explain less variance and have only one remarkable factor loading. The fourth factor loading has school being difficult as the highest factor loading, while the fifth factor shows that working with peers is a central issue. There may be a dependency on the work of others, as the only other item loading that is borderline relevant with -.475 concerns the expression of not feeling like going to school.

When comparing the social concept and the inclusion factor analyses, it appears as if the pupils with autism show clearer dimensions of positive self and school evaluations and relating to others than the comparison group where the social context is constantly present.

4 Discussion

This study investigated academic performance and self-concepts of adolescents with an autism diagnosis which is being awarded much less frequently in Germany than, for instance, in Great Britain (Bachmann et al., 2018). With regards to the first hypothesis, the incidence rate of 0.61% within an age range of 11 to 14 years in the INSIDE project was found to be comparable with other research in Germany that showed a prevalence rate of about 0.38% within an age range of 12 to 17 years (Bachmann et al., 2018). The second hypothesis was exploratory, assuming that there would be differences in item loadings in the factor analyses of the two groups. And indeed, there were similarities and differences. Also the assessment of academic performance yielded some significant results.

There were differences in German language grades, but not in reading competence, or mathematics grades and competencies. Adolescents with autism were awarded lower school grades in German even though they did not perform significantly lower in reading competence tests. If at all, the competency score in German language was somewhat better than in the control group. In either group, however, school grades and reading competencies did not correlate as grades would encompass various teacher assessments such as marking homework. For adolescents with autism, one could assume that the lower school grades in German language were mainly due to communication difficulties in the classroom. The autism spectrum is characterized by a lack of communication and self-expression (Wing, 1989).

This gap between school grades and competencies did not emerge in mathematics where no significant differences were found between the two groups. However, in the school subject of mathematics, there was a significant and clear correlation between grades and competencies in the group of adolescents with autism, which did not reach significance in the comparison group. Recent research also found that on the one hand, the subject of mathematics is more difficult to teach (Betthäuser et al., 2023; LangeKüttner, 2024b), on the other hand it appears to be taught in a more objective fashion than a language subject (Bittmann, & Mantwill, 2020; Lange-Küttner, 2024a).

With regards to the concept of independent learning (academic self-concept), in the first factor there were more similarities than differences between adolescents with autism and the comparison group. However, there were some interesting divergences in the second factor. For adolescents with autism their self-concept involved thinking critically about topics and identifying one's own strengths and weaknesses but not necessarily problem-solving. In contrast, in the comparison group, the academic selfconcept involved taking decisions independently and speaking up, but not necessarily realizing one's own goals. Thus, it seems that for adolescents with autism, independent learning involves intellectual evaluations, while for the comparison group reaching some degree of autonomy appears to be their main aim. Previous research showed that there was no difference between academic self-concepts of adolescents with a high or low AQ (van der Cruijsen et al., 2024), so while this current result in general confirms this study, there is a fine line between reaching intellectual brilliance or personal independence. Both aims are within the scope of the institution school although for sociological educators, especially adolescence is a time where a feeling of individual responsibility should develop (Edelstein, 1995, 1997).

The social self-concept likewise revealed some similarities and differences between the two groups. The first factor revealed positive self-esteem in both groups. On the one hand, in adolescents with autism, compassion with peers appears as an issue while this was not the case in the comparison group. On the other hand, for the comparison group, issues of self-control were part of this factor while this was not the case in adolescents with autism. Instead, in adolescents with autism, all three items about selfcontrol loaded highly on a separate second factor with no other items. Their third factor revealed again positive self-esteem but also a negative perception of being able to mediate other pupils' emotion in situations of distress. Thus we find three clearly distinctive factors of the social self-concept in adolescents with autism, namely positive esteem of self and others, self-control, and compassion.

In contrast, the second factor of the comparison group was the negative to the first factor, as all of the first five items had a negative sign. There was particularly low self-esteem, low confidence in the own competence to succeed, and being in trouble due to low self-control. The theme of the third and fourth factor were peer relationships. In the third factor, items loaded that described a positive influence on peers in distress, while the fourth factor was again negative as peers would deny that the pupil is being helpful when they are in distress. Thus, in all four factors the social context is present, for better or for worse. It appears that the comparison group indeed always considers the self in a social context (Edelstein, 1995, 1997). Also recent research found that fewer autism traits were associated with less distinction resp. more overlap between their own and the assumed peer perception of their prosocial self than in pupils with high autistic traits (van der Cruijsen et al., 2024).

The questionnaire about inclusion revealed a happy school life factor in adolescents with autism, as they endorsed learning quickly, liking to be in school and having fun except that apparently their peers would not work in a group. The second factor was a positive peer factor with many high loading items, not feeling lonely and working in a group with peers. The loneliness item loaded highly on the third factor despite being a good pupil and peers being sympathetic. The fourth factor was also a problem factor as the only high loading item was a general statement that school is difficult. All in all, positive statements about school and peer relationships explain more than twice as much variance (55.3%) than the problem factors (21.4%). This needs to be remembered when studies focus on the problems that adolescents with autism experience. It is also a good outcome for such pupils in inclusive education.

For the comparison group, the first factor had similar high loading items as in adolescents with autism but also included items about positive peer relationships. The second factor showed items of not being a good pupil and not liking to go to school but still having many sympathetic friends in class. The third factor included high loading items showing that learning is slow and being unable to solve difficult tasks yet still having fun, but this time peer relationships were not mentioned. The fourth factor described that school is difficult, while the fifth factor was about the importance of group work when there is not much of positive appreciation of school in general. Thus, here we find a number of dimensions that increasingly describe problems with oneself learning in school, but no mention of loneliness or pronounced difficulties with peer relationships.

One could conclude that perhaps the balance between spending time with friends and academic learning is the juvenile equivalent of the adult work-life balance dilemma (Crompton, & Lyonette, 2006). If learning is at the center, issues of loneliness and alienation can become an issue, but if the social context absorbs too much energy, learning and achievements may fall behind.

A limitation is that only a relatively small sample of adolescents with autism was identified. However, it needs to be considered that the incidence rate in the current study is very similar to the general prevalence rate in Germany, so this limitation is a quasi-naturally occurring one. A strength of the current study, though, is that when autism is diagnosed, often parents are questioned about symptoms and problems rather than the children and adolescents themselves. From this perspective, the study makes an important contribution to reliably assessed academic performance and first-hand information about the academic and social self-concepts as well as inclusion in school from adolescents with and without autism.

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