

MICRO REPORT

Relationship between autistic traits and social functioning in healthy individuals

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Abstract

Aim: Social functioning is influenced by various factors. Autistic traits could be one of the factors that affect social functioning.

Methods: In the present study, the relationship between autistic traits and social functioning among 755 healthy individuals was analyzed. Autistic traits were assessed with the autism-spectrum quotient. Social functioning was assessed by the social functioning scale and the social activity assessment.

Results: The Autism-Spectrum Quotient total score was significantly negatively correlated with the social functioning scale total and all subscales of the social functioning scale. All subscales of the Autism-Spectrum Quotient except attention to detail were significantly negatively correlated with the social functioning scale total score. However, the Autism-Spectrum Quotient was not correlated with the social activity assessment, which indicates labor functioning.

Conclusion: Autistic traits of healthy individuals had a negative impact on situations in real life through social functioning for daily life-sustaining. The effect was not enough to affect labor functioning as indicated by working hours in healthy individuals. These findings should also be examined in individuals with autism spectrum disorder in future studies.

KEYWORDS

adaptive behavior, autism spectrum disorder, childhood & adolescent disorders, interpersonal skill, social skill

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The main symptoms of autism spectrum disorder (ASD) are impaired social communication, impaired interpersonal reactions, and restricted repetitive behaviors.¹ Autistic traits lie on a spectrum from healthy individuals to individuals with ASD.¹ Social functions enable individuals to fulfill their social roles. These can be broadly divided into labor functions and other daily life-sustaining functions such as living skills and interpersonal communication skills. Various factors affect social functioning, and autistic traits could be one of those factors. Since healthy people do not have social or occupational disabilities, autistic traits would not correlate with work functioning in healthy individuals. On the other hand, autistic traits might have minor effects on daily life-sustaining functions among healthy individuals. There are no studies that have examined the effects of autistic traits on social functioning in healthy individuals.

In the present study, we investigated whether there was any relationship between autistic traits and social functioning among 755 healthy individuals (Table S1). They had already participated in our previous studies.² Healthy individuals were recruited from among local residents through advertisements at Osaka University. Those with current or previous psychiatric conditions, neurological conditions, intellectual disability, and other medical conditions that can affect the central nervous system were excluded. This study was approved by the ethics committees of Osaka University (approval number: 706-11) and the National Center of Neurology and Psychiatry (approval number: A2018-095) and complied with the provisions of the Declaration of Helsinki. All individuals provided written informed consent. Autistic traits were assessed with the autism-spectrum quotient (AQ).^{1,3} The AQ is a self-administered questionnaire that assesses autistic traits in adults without intellectual disability through five subscales^{1,3} and is used in studies of autistic traits.⁴ Social functioning was assessed by the social functioning scale (SFS)⁵⁻⁷ and the social activity assessment (SAA).^{8,9} The SFS is a self-administered questionnaire that assesses social functioning.^{5,7} The SFS was used excluding the item on employment since it was assessed by the SAA, as described below. The work hours were calculated using the SAA, in which psychologists or physicians interviewed the participants about their weekly work hours for which wages were paid, the time spent doing housework without wages for one or more family members, and the time spent on school-related study for students. Age was negatively correlated with the AQ and positively correlated with the SFS and the SAA, and there was a sex difference in the AQ (Table S1). Therefore, statistical analysis was performed using partial correlation analysis with age and sex as covariates. Statistical significance was defined as $P < 7.6 \times 10^{-4}$ (0.05/66, 66 is the sum of the 42 tests in Table 1 and 24 tests in Table S2) according to the Bonferroni correction. SPSS Ver. 26 (IBM) was used for statistical analysis.

The mean AQ score was 17.3 (SD = 7.0), which was below the cutoff value of 32 and within the normal range (Table S1). The SFS scores overlapped with the data of healthy subjects in the previous studies.^{6,10} The AQ total score and the SFS total score were significantly negatively correlated (Table 1: $r = -.31$, $P = 9.6 \times 10^{-18}$). Total SFS scores and all subscales of the AQ except the attention to detail showed a significant negative correlation (Table 1). The

TABLE 1 Results of partial correlation analyses between mean autism-spectrum quotient, subscale scores, and social functioning scale

	Autism-spectrum quotient											
	Total score		Social skill		Attention switching		Attention to detail		Communication		Imagination	
	r	P value	r	P value	r	P value	r	P value	r	P value	r	P value
Social Functioning Scale												
Total score	-.31	9.6×10^{-18}	-.31	1.2×10^{-18}	-.22	1.7×10^{-9}	.045	.22	-.22	1.6×10^{-9}	-.23	4.1×10^{-10}
Pro-social	-.26	6.6×10^{-13}	-.34	6.2×10^{-22}	-.15	3.0×10^{-5}	.060	.10	-.16	5.5×10^{-6}	-.17	3.0×10^{-6}
Interpersonal communication	-.40	3.6×10^{-30}	-.46	5.2×10^{-41}	-.26	2.1×10^{-13}	.084	.021	-.30	2.7×10^{-17}	-.28	5.7×10^{-15}
Independence-performance	-.15	2.8×10^{-5}	-.14	1.0×10^{-4}	-.11	2.1×10^{-3}	.055	.13	-.15	5.3×10^{-5}	-.11	2.3×10^{-3}
Independence-competence	-.13	3.9×10^{-4}	-.094	9.6×10^{-3}	-.096	8.5×10^{-3}	.018	.62	-.11	2.3×10^{-3}	-.11	2.2×10^{-3}
Recreation	-.19	3.0×10^{-7}	-.13	3.9×10^{-4}	-.18	6.0×10^{-7}	.032	.38	-.14	7.5×10^{-5}	-.16	1.3×10^{-5}
Social engagement	-.22	5.9×10^{-10}	-.28	9.0×10^{-15}	-.14	1.5×10^{-4}	.033	.36	-.13	3.2×10^{-4}	-.15	6.4×10^{-5}

Note: The total score of the social functioning scale is the sum of the subscales excluding employment. The bold font indicates statistical significance, which is defined as $P < 7.6 \times 10^{-4}$ (0.05/66, 66 is the sum of the 42 tests in Table 1 and 24 tests in Table S2) according to the Bonferroni correction.



AQ total score was negatively correlated with all subscales of the SFS (Table 1). Prosocial, interpersonal communication, recreation, and social engagement of the SFS were negatively correlated with social skill, attention switching, communication, and imagination of the AQ (Table 1). Independence-performance of the SFS showed a negative correlation with social skill and communication of the AQ (Table 1). The attention to detail of the AQ did not correlate with the SFS (Table 1). The total and subcategory AQ scores did not correlate with the SAA (Table S2).

In this study, we found that autistic traits were associated with daily life-sustaining social functions, but not with work hours. The subscale of social functioning that had relatively high correlations with the AQ (interpersonal communication, social engagement, prosocial) included many behaviors that require interaction with others. In contrast, the subscale with low correlations with the AQ (recreation, independence-performance, independence-competence) contains many behaviors that can be completed alone. Therefore, the autistic characteristics of healthy individuals had a negative impact on situations in real life, and the impact was probably according to the extent of interpersonal relationships. However, the effect was not enough to affect labor functioning in healthy individuals. With regard to individuals with ASD, it is expected to be correlated with labor functioning, as the employment rate is low in individuals with ASD.¹¹ In addition, social functioning was significantly negatively correlated with all of the AQ subtests except the attention to detail. The attention to detail would be different from other subscales of the AQ, since the AQ does not have high internal consistency.¹²

The moderate correlations between the subscales of the AQ and the subscales of the SFS were found for the social skill of the AQ and the interpersonal communication of the SFS ($r = -.46$), the social skill of the AQ and the prosocial of the SFS ($r = -.34$), and the communication of the AQ and the interpersonal communication of the SFS ($r = -.30$). The social skill of the AQ reflects the tendency to prefer to be alone, and the communication of the AQ reflects the lack of confidence in conversational skills. These traits seemed to correlate well with a negative impact on real life according to the extent of interpersonal relationships. Few studies have examined these points in both individuals with ASD and healthy individuals.

The results of the present study, which showed the relationship between autistic traits and social functioning in healthy individuals should also be investigated in individuals with ASD in future studies.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

YD contributed to conception, investigation, data curation, formal analysis, writing the original draft, and writing, review & editing. JM contributed to conception, investigation, data curation, formal analysis, visualization, writing, original draft, and writing review & editing. YY contributed to resources, investigation, methodology, data curation, and writing, review & editing. SI contributed to formal analysis, validation, and writing, review & editing. KM contributed to formal analysis, investigation, data curation, and writing, review & editing. HY contributed to resources, investigation, methodology, data curation, and writing, review & editing. MF contributed to resources, investigation, methodology, data curation, and writing, review & editing. NH contributed to validation and writing, review & editing. KI contributed to conception, investigation, and writing, review & editing. RH contributed to conceptualization, methodology, validation, investigation, resources, data curation, writing review & editing, supervision, project administration, and funding acquisition.

APPROVAL OF THE RESEARCH PROTOCOL BY AN INSTITUTIONAL REVIEWER BOARD

This study was approved by the ethics committees of Osaka University (Approval number: 706-11) and the National Center of Neurology and Psychiatry (Approval number: A2018-095).

INFORMED CONSENT

All participants provided written informed consent.

DATA AVAILABILITY STATEMENT

Raw data supporting this study cannot be shared, because we did not obtain consent to disclose raw data from the participants.

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SUPPORTING INFORMATION

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