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Original Article

Mediating Role of Social Problem-Solving on the Relationship between Autistic Traits and Depression in a Non-Clinical Iranian Sample

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Abstract

Background: Research on the role of social problem-solving in the relationship between autistic traits and depression is still in its nascent stage and more detailed research is required.

Methods: We aimed to investigate the mediating role of problem-solving in the relationship between autistic traits and depression. A sample of 376 university students were assessed on depression, problem-solving and autism-spectrum quotient in 2019 at Shahed University, Tehran, Iran.

Results: Social problem-solving played the role of a partial mediator in the relationship between autistic traits and depression. Positive problem orientation and negative problem-solving style fully mediated the effects of autistic traits on depression.

Conclusion: Since people with autistic traits have deficits in problem-solving strategies, they may be vulnerable to symptoms of depression. Increasing the ability of positive problem-solving and decreasing negative problem orientation may serve as a buffer against depression in people with autistic traits.

Keywords: Social problem-solving; Autistic traits; Depression

Introduction

Autism Spectrum Disorder (ASD) is defined by impairments, including repetitive and restricted interests, activities, and deficits in social interaction and social communication (1). High-Functioning Autism Spectrum Disorder (HFASD) is applied to people with ASD that have average or above-average levels of intelligence. The quantitative approach to autistic traits resulted in the development of a questionnaire called the Autism-spectrum Quotient (AQ) (2) to quantify autistic traits in people that have normal intelligence (3). AQ is a sensitive measure of autistic traits in the general population (2), suggesting that traits reaching a clinical level in autism can be seen to a lesser degree in nonclinical sample (2). The mean AQ score was 16.94 for the nonclinical sample (4). People with more autistic traits tend to be susceptible to milder versions of many psychiatric difficulties (5).

Depression and autistic traits

People with autistic traits have deficits in social skills. This deficit plays a significant role in depression, so it is not surprising that depression is one of the most common disorders among people with autistic traits (6). Depression is common in this population (7). Depression is the most common disorder that occurs in individuals with ASD (6,8). The average or even higher IQ level increases the likelihood of depression (6). People with HFASD have higher levels of IQ, leading to increased awareness of their problems in social interactions that is the predictor of the depression (9, 10).

The role of social problem solving in the relationship between Depression and autistic traits

Increasingly, researchers suggest a significant relationship between autistic traits and deficiency in social problem-solving (11, 12). Problem-solving refers to a cognitive-behavioral process through which the individual finds appropriate and useful solutions for a specific problem. Not only does the cognitive-behavioral process provide access to appropriate potential solutions, but also it increases the possibility of choosing the most appropriate solution among all solutions (13). The social problem-solving is a mediator in the relationship between life events and psychological compatibility (14). A significant relationship between the psychological well-being and the problem-solving skill is reported (15). On the other hand, impairment in social problem-solving was associated with depressive symptoms (16).

Only two studies addressed the mediating role of social problem-solving in the relationship between depression and autistic traits (11, 12), and they were conducted in Western cultures, while cultural differences can affect social problem solving (17) and manifestation of autistic phenotypes (18). Rosbrook and Whittingham (12) did not examine the mediating role of social problem-solving components in the relationship between depression and autistic traits.

A previous research highlighted the importance of two problem-solving styles, including positive problem-solving and negative problem orientation. Positive problem-solving appraisal is related to less depression (19). Participants that adopt a positive approach to problems had less depression. Individuals with a negative problem orientation tend to doubt their capability of problem-solving, consider a problem as a danger and threat to well-being, feel distressed when faced with a problem (20). Negative problem-solving orientation is also correlated with depression (12, 21, 22). Surprisingly, *researchers* did not found the moderating role of a negative problem orientation in the relationship between depression and life events (23). While previous studies show the importance of problem orientation in depression (6, 7, 8, 11, 12), no study has examined the role of positive problem orientation in the relationship between autistic traits and depression.

It is not clear to what extent deficits in social problem-solving skills can explain increased vulnerability to depression in people with autistic traits in Eastern cultures. We tried to investigate which components of social problem-solving have a mediating role in the relationship between autistic traits and depression.

Materials and Methods

Study design

We conducted a descriptive research.

Setting and sample

A cluster sampling approach was used. Data were collected in the academic year 2019. Participants were selected from faculties of Humanities, Basic Science, Engineering, and Agriculture in Shahed University, Tehran, Iran. Several classes were selected from these faculties. Then, the sample was selected from the classes.

This study was approved by Ethics Committee, Behavioral Sciences Research Center, Shahid Beheshti University od Medical Sciecnes, Tehran, Iran (1399.785). Students provided written information about the research and asked if they wished to participate. Participants were informed

about the result of the study. Anonymity and privacy of respondents were guaranteed.

The inclusion criteria were as follows: (a) participants were aged between 18-30; (b)**;** bachelor and master students were participated in this study**;** (c) residency in Tehran. The exclusion criteria were as follows: (a) those who did not want to participate in this study; (b) PhD students**.**

Overall, 350 participants were selected. Therefore, 450 questionnaires were distributed, and 74 incomplete questionnaires were deleted from final analysis. The sample included 172 female and 204 male students with a mean age of 22.23 (SD = 2.70) year. Overall, 142 students from Engineering, 101 students from Humanities, 109 students from Agriculture, and 24 students from Basic Sciences faculties participated in this research.

Measurements

Beck Depression Inventory-II (BDI-II): BDI-II was developed by Beck, Steer, and Brown (24). The items are rated on a four-point scale, ranging from 0 to 3. The retest reliability of BDI-II ranged from 0.73 to 0.96 (۲۵). Internal consistency was approximately 0.9. In terms of validity there was a quite high overlap with different measures of depression and anxiety, ranging from 0.66 to 0.86 (۲۵). Studies showed a retest reliability of .74, and good Cronbach's alpha coefficients, ranging from .87 to .91 in Iran (26, 27). Content validity of BDI-II was also confirmed in these studies (26, 27). In current study, the BDI-II demonstrated good internal consistency (a= .89).

The Autism-Spectrum Quotient (AQ): AQ was developed and it is a 50-item self-report questionnaire that measures the degree to which an adult with normal intelligence has the autistic traits (2). The AQ has five dimensions, including social skills, attention switch, communication, attention to detail, as well as imagination. Respondents are offered a four-point response scale from Strongly Disagree to Strongly Agree. Researchers divided the four-point scale into a dichotomous 0 versus 1 scoring scheme. Definitely agree or slightly agree responses to some questions score 1 point, and definitely disagree or slightly disagree responses to some questions score 1 point. 'Clinical' threshold of ⩾32 was reported (2). Researchers reported adequate internal consistency only in one domains of AQ. An adequate alpha coefficient (higher than .70) was reported for the social domain (۰.77). The marginal alpha coefficients were reported for other domains (2). Another study using factor analysis showed the AQ consists of five dimensions (28), and has inadequate alpha coefficient. In Iran, the test-retest reliability of this questionnaire was .82 and Cronbach's alpha for the internal consistency was ۰.76 (۲۹). Coefficient alpha of AQ was ۰.65 in current study.

Social Problem Solving Inventory-revised long form (SPSI-R): SPSI-R has 52 items and five factors, including positive problem orientation, rational problem solving, negative problem orientation, impulsive/careless, and avoidance styles (30). It assesses ability to solve problems in everyday life. The coefficient alphas for these subscales ranged from ۰.68 to ۰.91 (31). The construct validity was assessed and confirmed by using the Scale of Life Satisfaction. A study confirmed psychometric properties of SPSI-R in Iran (33). The SPSI-R demonstrated good internal consistency, with coefficient alpha ranging from ۰.71 to ۰.91. Similarly, factor analysis showed five factors (32). In current study, the SPSI-R demonstrated good internal consistency (α=۰ .85).

Statistical analysis

Statistical analyses were performed via SPSS-23 (IBM Corp., Armonk, NY, USA). Path model analysis was assessed using SEM in AMOS-24. The model was evaluated with these criteria: Chi-square (χ^2); χ^2/df with χ^2 being greater than 0.05 and with χ^2/df being less than 2; Goodness-of-fit index (GFI) being greater than ۰.90; adjusted goodness of fit index (AGFI) being greater than ۰.90; standardized root mean square residual (SRMR); Bollen's Incremental Fit index (IFI) being greater than ۰.90; Tucker-Lewis Index (TLI) being greater than ۰.90; Bentler-Bonett Normed Fit Index (NFI) being greater than ۰.90; Parsimonious Fit Indices: Root Mean Square Error of Approximation (RMSEA) and PCLOSE. To test the

significance of indirect effects we used Process macro in SPSS (SPSS, Inc., Chicago, IL, USA) and The Process macro computes the indirect effect by calculating the product of coefficients. The significance of social problem-solving's mediation role was examined with PROCESS and bootstrapping methods.

Results

Descriptive statistics and correlation among variables

Table 1 shows descriptive statistics, and Table 2 shows the Pearson correlation coefficients between the variables.

Table 1: Descriptive Statistics and Pearson Correlations

Variable	*Mean*	*SD*
Autism-Spectrum Quotient	20.305	5.216
Rational	58.725	13.396
Avoidance	22.808	6.425
Negative	19.273	6.221
Positive	21.091	4.976
Impulsive	11.082	3.768
Problem-Solving	178.595	27.78
Depression	12.301	9.646

Table 2: Matrix of Correlation among Autism-Spectrum traits, problem-solving, and depression

Variables	*Autism-Spectrum Quotient*	*Rational*	*Avoidance*	*Negative*	*Positive*	*Impulsive*	*Problem-Solving*
1. Autism-Spectrum Quotient							
2. Rational	-.216***						
3. Avoidance	.323***	-.271***					
4. Negative	.338***	-.337***	.694***				
5. Positive	-.295***	.718***	-.358***	-.402***			
6. Impulsive	.262***	-.361***	.582***	.533***	-.383***		
7. Problem-Solving	-.357***	.831***	-.670***	-.671***	.765***	-.649***	
8. depression	.318***	-.324***	.437***	.714***	-.396***	.372***	-.439***

Note: N=376
*: 0.05>α> 0.01
**0.01>α> 0.01
**α< 0.001

The mediating effect of problem solving in the relationship between autistic traits and depression

The total effect of autistic traits on depression was .18 (Fig. 1).

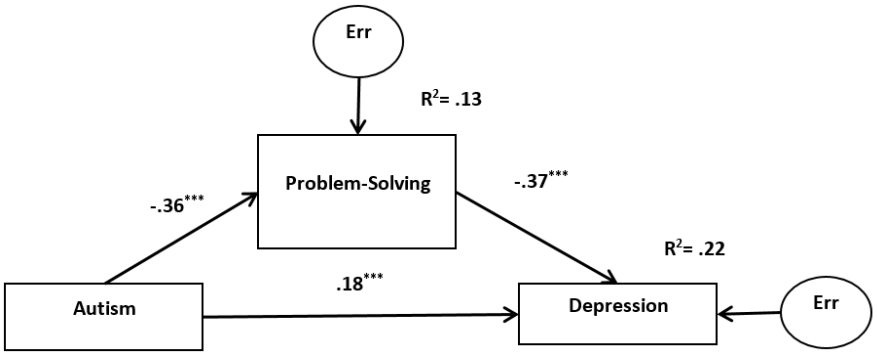

Fig. 1: The mediating effect of problem solving in the relationship between autistic traits and depression

When indirect effects through the shared relationship among autistic traits, depression, and social problem-solving were controlled for, the amount of effect was ٠.13. The relationship between autistic traits and depression was not reduced to zero after controlling for social problem solving, indicating a partial mediation. Hence, the significance of social problem-solving's mediation role in the relationship between autistic traits and depression was measured with the PROCESS in SPSS-23 and bootstrapping in AMOS-24. In the both methods standardized indirect effect (b = 0.134) supports the significance of this partial mediation beyond the 0.05 level (Table 3).

Table 3: The significance of the standardized indirect effect of social problem-solving's mediation role

Variable	*b*	*SE*	*LBound*	*UBound*	*P*
SEM	.134	.022	.093	.175	.002
PROCESS	.134	.023	.093	.182	<.05

The mediating effect of problem solving styles

The tested path model included intercorrelations among the autistic traits and the two social problem-solving components (positive problem orientation and negative problem orientation). Direct paths were included from autistic traits to two social problem-solving components (as autistic traits such as deficit in social skills and communication will influence individuals' confidence in their capability to solve the social problems, and the orientations with which they react to that problems; 11) and depression. Therefore, direct paths were included from autistic traits to both Negative problem orientation, positive problem orientation. Finally, direct paths were included from these two social problem-solving components to depression (since the social outcomes, which are caused by these problem-solving strategies, are theoretically able to lead to distress). Negative problem solving orientation mediated the relationship between autistic traits and depression (95% CI [0.162, 0.289]). Positive problem solving orientation mediated the relationship between autistic traits and depression (95% CI [0.069, 0.015]). The relationship between autistic traits and depression was not significant after controlling for positive and negative social problem solving orientations, suggesting a full mediation (Fig. 2).

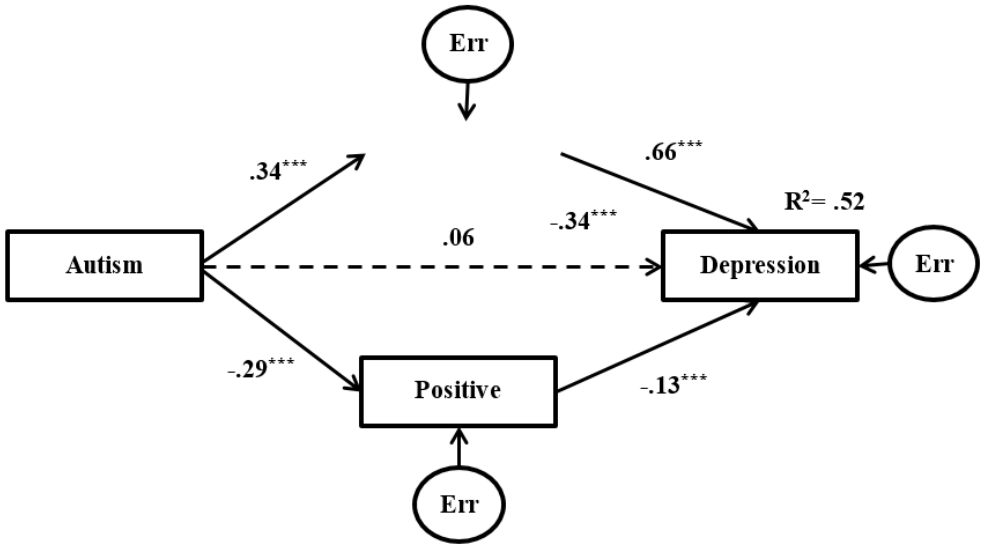

Fig. 2: The mediating effect of positive problem solving style and negative problem solving style in the relationship between autistic traits and depression

Discussion

This study showed a significant relationship between autistic traits and depression in general population. This finding is consistent with previous results (6, 7, 8, 11, 12). The deficits in social skills in people with autistic traits may lead to negative consequences, such as social dysfunction and low self-efficacy (33-36). Increased awareness of the deficit in interaction and communication leads to depression in people with HFASD (37), and autistic traits (11). Since people with autistic traits have socially unskilled behaviors and unusual behaviors and interests, they may be at increased risk for isolation, loneliness, victimization, rejection, hostile aggression, mood problems, academic failure, and anxiety (38).

This study showed social problem-solving mediates the relationship between autistic traits and depression. This finding is consistent with previous researches in western cultures (11, 12). The deficits in problem-solving skills are considered as a crucial vulnerability factor for depression (39). In highly stressful situations, these deficits result in coping attempts that are ineffective, increasing the possibility of depression. Depressed people have difficulties in problem-solving skills, leading to stressful consequences (39). Subjects were shown with autistic traits solved their problem slower, and they showed more irrelevant behaviors (40). In highly stressed situations, people with effective social problem strategies had experienced lower depressive symptoms (41). Additionally, the effectiveness of problem-solving therapy was shown in depression (42).

The current study significantly expanded the boundaries of knowledge on the role of problem-solving styles in the relationship between autistic traits and depression. This research showed that negative problem-solving style and positive problem-solving style mediated the relationship between autistic traits and depression. Some studies show that negative problem-solving style has the strongest correlation with depression (16). Negative problem-solving style was predictive of more depression 3 months later (22). Negative problem orientation is a mediating variable between depression and everyday problems (43). Problem solving accounts to a significant degree for the relationship between depression and everyday problems. Although all of problem-solving dimensions were related to depression, negative problem solving contributed most to the mediating effect (43). Negative problem solving is considered as a dysfunctional cognitive-emotional tendency, including a lower level of tolerance for frustration,

doubting one's own problem-solving abilities, interpreting a problem as a threat, as well as anticipating negative problem-solving outcomes. Negative problem orientation mediated the link between autistic traits and depression in general population (11). Since a negative problem orientation means that problems have a threatening psychological significance, it is thought to have a direct effect on psychological well-being (43).

Positive problem-solving style mediated the relationship between autistic traits and depression. Positive problem-solving appraisal is related to less depression (٤٤), and assesses useful tendencies to deal with a problem with a positive attitude, to consider it as a challenge rather than a burden, and to solve problems in a logical and consistent way which uses the generation of other solutions and means–ends thinking (23). Alternative solutions and positive problem orientation moderate the relationship between depression and life events (23). Participants that adopt an active and positive approach to problems have less depression. They are protected from depression by perceiving the problems as an opportunity, leading to persistence in seeking a solution. This can result in a sense of perceived control over the situation or self-efficacy, serving as a buffer against depression (23). Appraisals, negative life events, and their interactions accounted for 87% of the variance in depression scores (41). Lower levels of positive problem-solving orientation and higher levels of negative problem-solving orientation accounted for the variance in depression scores in participants with autistic traits. Their cognitive ability provides them with understanding of their social difficulties and challenges and their inability to fit in with others (٤٥).This leads to ongoing failures, resulting in a sense of hopelessness and loneliness (٤٦). Not only hopelessness is related to depression, but also higher levels of effective problem solving are correlated with lower levels of hopelessness (٤٧). A negative problem orientation is the most highly related to hopelessness and depression, followed by a positive problem-solving style (15).

Limitations and future directions

This research had some limitations. First, only students participated in this study. This limits the generalizability of the results. In AQ, 'clinical' threshold of ⩾32 was reported (2), and a study showed mean AQ score was 16.94 for the nonclinical sample (4), and the mean score of AQ in this study was 20.305 (5.21). The mean score of depression in this study was 12.30 (9.64), and scores between 0 and 13 fall in the range of minimal depression. Second, researchers have pointed out that the AQ as compared to other questionnaires measuring autistic traits has lower validity and weaker function (٤٨). The criterion validity of AQ is also lower than the other questionnaires. Therefore, it is suggested that future researches investigate the role of social problem-solving skills in depression in clinical population.

Conclusion

After entering positive and negative social problem solving, the relationship between autistic traits and depression was not significant. Participants that adopt a positive approach to problems had less depression. Individuals with a negative problem orientation tend to doubt their capability of problem-solving, consider a problem as a danger and threat to well-being, and feel distressed when faced with a problem.

Journalism Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflicts of Interest

The authors declare that there is no conflict of interest.

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