



Mood and Emotional Changes After PEERS® Program in Parents of Young Adults With Autism Spectrum Disorder

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Objectives: This study examined the changes in anxiety and depressive symptoms in the parents of Korean adults with autism spectrum disorder (ASD) after participating in the Korean version of the Program for the Education and Enrichment of Relational Skills for Young Adults (PEERS®-YA-K).

Methods: Forty-six parents were enrolled (mean age 54.7 years; 22 fathers and 24 mothers), of whom 27 participated in the PEERS®-YA-K as social coaches. Participants completed self-report scales, including the Test of Young Adult Social Skills Knowledge (TYASSK), Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and Symptom Check-List-90-R (SCL-90-R). The scales were administered three times: before and after the 16-week program and 4 months after the program ended. Differences between participant variables at pretreatment, post-treatment, and follow-up were analyzed using paired-sample t-tests.

Results: Participants showed a significant improvement in their social skills knowledge (TYASSK) ($p < 0.01$). There was a significant improvement in the BAI and BDI scores of parents with severe depressive and anxiety symptoms at the baseline ($p < 0.05$). Paternal paranoia and maternal hostility results also significantly improved on the SCL-90-R.

Conclusion: This study suggests that PEERS®-YA-K can reduce parental anxiety and depressive symptoms. To the best of our knowledge, this is the first to compare the degree of depression and anxiety after PEERS®-YA-K in parents of adults with ASD.

Keywords: ASD; PEERS®-YA-K; Anxiety; Depression; Parents; Social skills training.

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INTRODUCTION

Autism spectrum disorder (ASD) is characterized by the lack of sociality and limited repetitive behaviors. In particular, a lack of sociality is an integral symptom of ASD, causing complications in daily interpersonal relationships across one's lifespan. Individuals with ASD have difficulty navigating complex social rules and report limited participation in peer relationships and social activities [1].

Social skills training (SST) is an evidence-based program designed to improve communication and interpersonal skills of individuals with ASD. SST benefits individuals with ASD who express an interest in obtaining social relationships, but struggle when interacting or conversing with others [2]. Despite these beneficial effects, few SSTs are available and fewer still are applicable to adults with ASD. The Program for the Education and Enrichment of Relational Skills (PEERS®), de-

veloped by the University of California, Los Angeles, is a manualized SST for individuals with ASD. PEERS® Young Adults (PEERS®-YA) was developed in 2017 for adults with ASD [3]. Individuals with ASD and their social skills coaches (e.g., parents, mentors, brothers, and sisters) participated in the program for 90 min each week for 12–16 weeks. Several studies have verified that this program helps individuals with ASD improve their overall social skills. In Korea, two randomized controlled trials (RCTs) have verified the program's effects [4,5].

Mental health problems are widely known to be more prominent in the parents of individuals with ASD than in the general population [6]. Individuals with ASD lack social interaction and exhibit repetitive behaviors, thereby increasing childcare burdens and caregiving challenges, which can influence parental depression and anxiety [7]. To relieve parental anxiety and depression, interventions such as behavioral parent training and parent-child interaction therapy have been explored. However, these methods are limited to pediatric settings [8]. According to Ekas et al. [9], raising a child with ASD affects the well-being of parents and families re-

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ardless of the severity of the child's symptoms. Thus, families of individuals with ASD can be negatively affected, regardless of their functioning. Although behavioral problems caused by ASD abate to some extent over time, mothers of adolescents and adults with ASD are three times more likely to experience stress than mothers of children without disabilities [10]. Since most post-adolescent individuals with ASD remain socially isolated, they often require extensive social and economic family support. One is to become a social skills coach during SST sessions. When parents participate as coaches, behavioral rigidity and social communication of individuals with ASD has been found to improve [11]. Moreover, when parents participate as social coaches in the PEERS[®] RCT for adolescents, parental depression and anxiety have been found to partially improve [4].

Currently, few studies have been conducted on the parents of children with ASD. Furthermore, the few studies on adults with ASD and their parents are insufficient. In a study conducted on the parents of individuals with ASD, Karst et al. [12] hypothesized that participating in PEERS[®] could provide positive results for parents by improving their ability to implement support strategies for their children. This study reported decreased family chaos and increased parental self-efficacy after participating in the program. However, few studies have compared emotional changes before and after SST in parents of individuals with ASD [13]. In the present study, it was hypothesized that the PEERS[®]-YA-K would help decrease comorbid psychosocial distress, such as anxiety and depressive symptoms, in parents of adults with ASD.

METHODS

Participants

This study analyzed the data of parents who participated in an RCT of the PEERS[®]-YA-K [5]. Among the 64 participants, 23 mothers and 4 fathers participated as social coaches. Furthermore, 24 mothers with a mean age of 53.5 years ($SD \pm 4.41$ years) and 22 fathers with a mean age of 56.1 years ($SD \pm 4.78$ years) completed the self-report scales, including the Test of Young Adult Social Skills Knowledge (TYASSK), Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and Symptom Check-List-90-R (SCL-90-R). The scales were administered before the program and 16 weeks and 4 months after the program ended (refer to the RCT for the overall process of PEERS[®]-YA-K and the study protocol [5]). The study procedure, including informed consent, recruitment, and participation procedures, was approved by the Institutional Review Board of the Seoul National University Bundang Hospital (IRB no. B-2207-769-302).

Measures

TYASSK [3]

TYASSK evaluates modified knowledge of specific social skills acquired during the program. Scores range from 0 to 30, with higher scores reflecting greater understanding of social skills. The English version of the TYASSK was translated into Korean with the original author's permission and then translated back into English by a bilingual translator not associated with the study for validation. The Korean PEERS[®]-YA-K research team reviewed the translation ($\alpha = 0.403$).

BDI [14]

The BDI is a self-report questionnaire that measures the intensity of 21 depressive symptoms on a scale ranging from 0 to 3, with a maximum score of 63 points: the higher the score, the greater the symptom severity. In the non-clinical population, scores >20 indicated probable depression. A total score between 0 and 13 was considered minimal, 14 to 19 as mild, 20 to 28 as moderate, and 29 to 63 as severe. The participants were divided into the mild and above groups and the minimal group at baseline. We investigated changes in parental BDI scores compared with parents' and their children's scores at baseline.

BAI [15]

The BAI is a self-report questionnaire that measures common symptoms of anxiety, such as fear of the worst. Each question was scored in a range between 0 and 3, with a maximum score of 63 points; the higher the score, the greater the symptom severity. A total score of 0–7 was considered minimal, 8–15 was mild, 16–25 was moderate, and 26–63 was severe. The participants were divided into groups according to their baseline severe and non-severe BAI scores. We investigated the changes in parental BAI scores compared with the parents' and their children's scores at baseline.

SCL-90-R [16]

The SCL-90-R is a self-report scale with nine symptomatic dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. It includes 90 items with a five-point scale measuring severity. The scale provides a general understanding of a respondent's mental health status. The SCL-90-R is represented by a T-score with a mean of 50 and standard deviation of 10. The higher the T-score, the more severe were the self-reported symptoms.

Statistical analyses

The differences between participant variables in the pre-

Table 1. Parental knowledge of social skills

TYASSK	Pre-treatment	Post-treatment	Follow-up	Pre-post			Pre-f/u		
				t	df	p	t	df	p
Father	15.2±3.6	17.5±4.7	17.1±4.7	-3.24	20	<0.01**	-2.51	20	0.02*
Mother	18.2±2.7	22.4±3.7	22.0±3.9	-4.27	20	<0.01**	-3.22	20	<0.01**
Parents	16.7±3.5	19.9±4.9	19.6±5.0	-5.27	41	<0.01**	-4.02	41	<0.01**

Values are presented as mean ± standard deviation. *p<0.05; **p<0.01. TYASSK, Test of Young Adult Social Skills Knowledge; Pre-post, pre-treatment vs. post treatment; pre-f/u, post-treatment vs. f/u treatment; df, degree of freedom

Table 2. Parental depression and anxiety

	Pre-treatment	Post-treatment	Follow-up	Pre-post			Pre-f/u		
				t	df	p	t	df	p
BDI									
Father	5.2±6.3	4.3±4.9	3.8±5.5	0.63	20	0.53	1.71	20	0.10
Mother	9.3±9.2	9.1±9.1	8.6±7.0	0.11	23	0.90	0.37	23	0.71
BAI									
Father	23.2±4.7	22.4±2.0	22.1±2.1	0.81	20	0.42	1.03	20	0.32
Mother	26.8±6.3	26.5±7.4	27.7±6.3	0.14	23	0.88	-0.47	23	0.63

Values are presented as mean ± standard deviation. BDI, Beck Depression Inventory; BAI, Beck Anxiety Inventory; Pre-post, pre-treatment vs. post treatment; pre-f/u, post-treatment vs. f/u treatment; df, degree of freedom

treatment and post-treatment, as well as pretreatment and follow-up periods, were analyzed using paired-sample t-tests. In addition, separate analyses were performed based on the baseline severity of psychiatric symptoms in the parents and individuals with ASD. All statistical analyses were performed using the IBM SPSS version 22.0 (IBM Corp., Armonk, NY, USA). Statistical significance was defined as p-values of <0.05.

RESULTS

Parental knowledge of social skills

The TYASSK scores improved significantly in both fathers and mothers. Compared with the baseline scores for both parents, the scores immediately after the program (pre-post comparison, p<0.01) and at follow-up (pre-f/u comparison, p<0.01) increased significantly (Table 1).

Parental depression, anxiety, and overall psychiatric symptoms

The BDI and BAI scores showed no significant changes for either the mothers or fathers. Fathers' baseline BAI scores were moderate, whereas mothers' scores were severe (Table 2). On the SCL-90-R, fathers showed improved paranoia symptoms at follow-up (p<0.05) compared with pretreatment symptoms. For mothers, hostility improved immediately after the program (p<0.05) (Table 3).

Parents' depression and anxiety by baseline differences

A baseline BDI score of ≥8 points was selected as the severe group, and a baseline BAI score of ≥26 points was de-

finied as the severe group.

The severe baseline BDI parental group showed an improvement in depressive symptoms (n=7; pre-post, p<0.05; pre-f/u, p<0.05). Furthermore, improvement was observed in the severe baseline BAI parental group (n=30; pre-post, p<0.05; pre-f/u, p<0.05) (Table 4). Parental anxiety in those with children in the severe baseline BAI group improved (n=14; pre-pest, p<0.05; pre-f/u, p<0.05); however, no differences were observed for the parents in the non-severe baseline group (Table 5).

DISCUSSION

This study investigated changes in depressive and anxiety symptoms in parents of adults with ASD after implementing PEERS®-YA-K, a social skills program for individuals with ASD. Following the program, the results showed a significant increase in parental social skills knowledge. Depressive symptoms improved in parents who reported high depressive symptoms at baseline. The high baseline anxiety in adults with ASD and their parents improved after the PEERS®-YA-K. Furthermore, the paranoia dimension for fathers and hostility dimension for mothers significantly improved.

Both fathers and mothers showed significant improvement in social skills knowledge, suggesting that understanding general behavioral management is necessary to cope with real-world situations and provide proper advice and guidance to children who lack social skills [17]. A lack of insight into ASD can contribute to parenting stress. Through the PEERS®-YA-K, parents learn which social skills their children lack,

and based on this knowledge, they can guide their children, thereby relieving parenting stress. The violent behavior of children with ASD, loss of parental control, and lack of social support tend to affect depression in the parents of children with ASD [18].

The parental baseline BAI scores were moderate for fathers and severe for mothers. These findings are similar to those of previous studies on parents of adults with ASD [6]. Anxiety in the parents of adolescent patients in Korea was also comparable, and our study showed statistically insignif-

Table 3. Overall parental psychiatric symptoms

SCL-90-R	Pre-treatment	Post-treatment	Follow-up	Pre-post	Pre-f/u
				p	p
Father					
Global severity index	38.9±9.4	39.3±10.8	34.8±9.5	0.76	0.14
Positive symptom test	39.3±9.3	39.7±10.9	35.2±9.9	0.71	0.14
Positive symptom distress index	40.3±7.5	41.6±8.1	37.9±6.5	0.46	0.80
Somatization	39.2±7.1	39.9±7.4	37.4±6.2	0.52	0.55
Obsessive compulsive	40.9±9.1	42.1±9.2	39.0±7.5	0.34	0.75
Interpersonal sensitivity	43.1±8.3	42.6±7.9	39.0±8.4	0.66	0.09
Depression	40.5±8.4	42.0±9.3	38.0±7.8	0.15	0.19
Anxiety	40.7±6.5	41.6±7.4	39.0±5.7	0.55	0.80
Hostility	42.4±8.4	42.4±7.2	39.9±5.4	0.86	0.45
Phobic anxiety	42.5±3.4	43.7±4.4	42.5±3.7	0.10	0.95
Paranoid ideation	42.8±6.3	43.4±6.6	39.6±5.6	0.76	0.01*
Psychoticism	41.0±6.4	41.4±7.1	40.0±5.1	0.79	0.83
Others	41.4±7.2	43.3±8.5	40.2±6.4	0.20	0.79
Mother					
Global severity index	43.0±11.4	41.2±12.9	41.7±12.4	0.27	0.20
Positive symptom test	43.0±10.6	41.8±13.0	42.0±12.5	0.45	0.39
Positive symptom distress index	44.3±9.1	43.6±10.1	46.0±15.9	0.59	0.68
Somatization	44.8±10.9	45.1±10.6	44.4±10.0	0.91	0.45
Obsessive compulsive	44.0±8.9	42.7±9.6	43.7±10.2	0.22	0.77
Interpersonal sensitivity	44.2±10.5	43.5±10.4	42.7±10.7	0.59	0.12
Depression	44.3±10.1	43.2±10.6	44.8±11.3	0.40	>0.99
Anxiety	43.4±9.2	43.0±10.4	43.2±9.4	0.64	0.51
Hostility	46.0±8.9	43.3±8.8	44.8±9.1	0.01*	0.29
Phobic anxiety	45.6±7.0	45.0±6.2	44.2±5.5	0.45	0.15
Paranoid ideation	43.9±7.8	45.0±8.2	45.5±7.9	0.19	0.22
Psychoticism	44.7±8.7	44.2±8.4	44.7±8.5	0.46	0.68
Others	45.6±9.7	44.4±10.9	44.1±10.8	0.28	0.13

Values are presented as mean±standard deviation. *p<0.05. SCL-90-R, The Symptom Checklist-90-R; Pre-post, pre-treatment vs. post treatment; pre-f/u, post-treatment vs. f/u treatment

Table 4. Changes in parental depression and anxiety with severe baseline scores

	Pre-treatment	Post-treatment	Follow-up	Pre-post			Pre-f/u		
				t	df.	p	t	df.	p
BDI									
Non-severe	4.42±3.59	5.89±6.5	5.02±5.75	-1.27	37	0.20	-0.59	37	0.55
Severe	23.8±6.5	12.2±7	13.7±7.4	3.19	6	0.01*	3.52	6	0.01*
BAI									
Non-severe	21.8±1.1	23.5±5.8	24.3±5.8	-1.69	29	0.10	-2.57	29	0.01*
Severe	31.8±5.7	26.8±5.7	26.6±4.8	2.54	14	0.02*	2.48	14	0.02*

Values are presented as mean±standard deviation. *p<0.05. BDI, Beck Depression Inventory; BAI, Beck Anxiety Inventory; Pre-post, pre-treatment vs. post treatment; pre-f/u, post-treatment vs. f/u treatment; SD, standard deviation; df, degree of freedom

Table 5. Changes in parental depression and anxiety with a severe patient baseline score

	Pre-treatment	Post-treatment	Follow-up	Pre-post			Pre-f/u		
				t	df.	p	t	df.	p
BDI									
Non-severe	8.08±8.28	7.80±8.09	6.12±7.00	0.22	24	0.82	1.48	24	0.15
Severe	5.85±6.86	5.75±7.51	6.70±6.57	0.04	19	0.96	-0.43	19	0.62
BAI									
Non-severe	21.9±1.1	23.5±5.7	24.1±5.6	-1.62	30	0.11	-2.27	30	0.03*
Severe	33.0±5.9	27.0±5.9	27.2±4.7	2.84	13	0.01*	2.65	13	0.02*

Values are presented as mean ± standard deviation. *p < 0.05. BDI, Beck Depression Inventory; BAI, Beck Anxiety Inventory; Pre-post, pre-treatment vs. post treatment; pre-f/u, post-treatment vs. f/u treatment; SD, standard deviation; df, degree of freedom

icant changes in the parents of adults with ASD even after PEERS®-YA-K. Based on previous studies reporting improved mental health symptoms after SST, improvements in depression and anxiety were expected [19]. However, no significant improvements were observed in depression or anxiety. When individuals with ASD transition to adulthood, they and their parents experience increased anxiety and fear related to lack of available services and unmet needs. A previous study [20] showed that parental anxiety regarding individuals with ASD affects their school lives, occupations, and future management skills. According to Taylor and Seltzer [21], adults with ASD who drop out of school early are impeded in the development of behavioral functioning. Thus, parents in the present study may not have shown much improvement in mental health symptoms because they felt that their children did not have sufficient development compared with attending school.

Parents with severe depressive and anxiety symptoms at baseline showed improved mental health symptoms, as the interaction skills of adults with ASD improved after the PEERS®-YA-K. Low self-efficacy can also contribute to baseline parental depressive and anxiety symptoms [22]. Bandura [23] reported that individuals show confidence if they think they can cope with certain situations, yet lack confidence if they feel they cannot. Parents who struggle with psychiatric symptoms can master behavioral patterns, achieve self-efficacy, and show remarkable improvement through PEERS®-YA-K. In addition, a previous study [24] showed that the less severe the social impairment and the higher the cognitive function are, the more severe the depressive symptoms in individuals with ASD. According to another study [25], a disorder that affects social function can exacerbate depression and anxiety. Therefore, individuals with ASD who are more aware of their problems may experience severe mental health symptoms. Studies applying PEERS® to individuals with ASD and high levels of functioning have confirmed improved social function and mental health symptoms [4,5,26].

Most parents of individuals with ASD, primarily mothers,

play active and essential roles in their children's lives. Because they are more actively involved in their children's lives, mothers are more likely to feel isolated, as they often do not have time for friends and family and cannot engage in their own social interests and hobbies. Social isolation may in turn affect caregivers' well-being, which may also significantly impact family life [27]. Maternal hostility, as assessed by the SCL-90-R, improved during participation in the PEERS®-YA-K as a coach, partly because, as the social function of their children with ASD improves, mothers can overcome their sense of helplessness. According to a study using the SCL-90-R [28] with parents of children with disorders, such as oppositional defiant disorder and generalized anxiety disorder, parental anxiety and hostility were higher than in parents of children without these disorders. Thus, children's mental health problems and continuous negative environmental feedback result in parental fear and emotional problems related to helplessness.

Paranoia symptoms improved in the fathers. Unlike mothers, fathers rarely participated in the PEERS®-YA-K as social coaches. Fathers of individuals with ASD may be more aware of their children's development and more involved in their daily parenting routines than fathers of children without ASD [29]. Fathers of individuals with ASD who are more involved in their children's lives have shown modifications in paranoia by simply observing improvements in their children's mental health symptoms during the PEERS®-YA-K. Further, couples raising children with ASD are more likely to experience frequent, severe, and unresolved conflict. Thus, improvement in children's symptoms can lead to decreased marital conflict and concomitant improvement in mental health symptoms [30].

Despite these positive findings, this study had some limitations. First, anxiety and depressive symptoms were assessed using self-reporting questionnaires. No medical staff objectively evaluated mental health symptoms; therefore, the results have a limited interpretation. Second, the PEERS®-YA-K was not used to determine whether psychiatric treat-

ment was provided for the parents' depression and anxiety. Therefore, the parents' improved mental health symptoms may not be entirely related to PEERS®-YA-K. Third, the follow-up period after PEERS®-YA-K was 16 weeks. An extended follow-up period is required to determine the validity of PEERS®-YA-K in improving social relationships. Further studies on PEERS®-YA-K and its effects on parents should consider these limitations.

CONCLUSION

This study examined how the emotional state of the parents of individuals with ASD in Korea changed after participating in the PEERS®-YA-K. Overall, depressive and anxiety symptoms were alleviated, and this improvement was more noticeable in parents with moderate or higher symptoms at baseline. In addition, paternal paranoia and maternal hostility improved significantly, and parental knowledge of social skills was enhanced. In the future, more studies will be needed to extensively examine the effects of PEERS®-YA-K with longer follow-up periods and larger sample sizes.

Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

Conflicts of Interest

Hee Jeong Yoo and Miae Oh, a contributing editor of the *Journal of the Korean Academy of Child and Adolescent Psychiatry*, was not involved in the editorial evaluation or decision to publish this article. All remaining authors have declared no conflicts of interest.

Author Contributions

Conceptualization: Miae Oh, Hee Jeong Yoo. Data curation: Chansoo Son, Miae Oh. Formal analysis: Chansoo Son, Miae Oh. Investigation: Miae Oh, Joo-Hyun Kim. Methodology: Miae Oh, Joo-Hyun Kim, Hee Jeong Yoo. Project administration: Miae Oh, Joo-Hyun Kim, Hee Jeong Yoo. Supervision: Miae Oh, Hee Jeong Yoo. Validation: Chansoo Son. Writing—original draft: Chansoo Son, Miae Oh. Writing—review & editing: all authors.

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