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Does broad autism phenotype traits effect mother-child interaction?: a cross-sectional study from Turkey

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ABSTRACT

Objectives: Broad Autism Phenotype (BAP) is defined as personality, social, and language features that parallel the defining behavioral characteristics of autism spectrum disorder, including social deficits, communication abnormalities, and stereotyped repetitive behavior. The objective of this study was to assess the impact of maternal BAP characteristics on the dynamic interaction between mothers and their children.

Methods: Children aged 12–60 months who were referred to the Infant Mental Health Unit of our outpatient clinic were analyzed. Forty-one children who were diagnosed with autism and 35 children who were diagnosed with global developmental delay (GDD) and their mothers were included in the study. The Parent–Infant Relationship Global Assessment Scale (PIR-GAS), Autism-Spectrum Quotient (ASQ), Parental Acceptance–Rejection Questionnaire, and Recognition of Emotional Maltreatment Scale (REMS) were used.

Results: The PIR-GAS score was significantly lower in the autism group than in the GDD group, and mothers of children with autistic children exhibited higher BAP scores.

Conclusions: Our study suggests a link between maternal BAP scores and the quality of mother-child relationships. Further studies are needed to examine and improve our ability to evaluate the effects of parental BAP in terms of parental intervention effectiveness.

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Autism spectrum disorder; broad autism phenotype; mother-child relationship

Introduction

The concept of the Broad Autism Phenotype (BAP) traces its origins to Leo Kanner's recognition of autism as a distinct developmental disorder in 1943 (Losh 2011). Kanner observed several characteristics, later termed BAP, that occasionally appear in close relatives of individuals diagnosed with autism spectrum disorder (ASD) (Roth et al. 2010).

Personality, social, and language features that comprise the BAP parallel the defining behavioral characteristics of autism, including social deficits, communication abnormalities, and stereotyped, repetitive behavior (Kiruthika and Tiwari 2022). Specifically, researchers have defined three primary components of the BAP: (1) aloofness, denoting a diminished inclination toward or enjoyment of social interaction; (2) rigidity in personality, indicative of challenges in adapting to environmental changes; and (3) pragmatic language deficits, signifying shortcomings in the socially contextualized use of language, thereby impeding effective communicative exchanges (Hurley et al. 2007). Numerous studies have shown that BAP characteristics are more common in parents of children with autism compared to other parents (Hasegawa et al. 2015; Wheelwright et al. 2010). Hartley et al. (2016) delineated parental manifestation of the BAP as a vulnerability determinant within families affected by autism (Hartley et al. 2016). The presence of parental BAP was correlated with heightened levels of negative affect during couple interactions. Furthermore, parental BAP levels moderated the influence of increasing autism symptoms and concurrent behavioral issues in children on subsequent assessments of negative problem-solving interactions among couples, both on the same day and the following day (Hartley et al. 2016). Collectively, these findings suggest a potential impact of BAP on parental dyadic interactions and interpersonal

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communication among adults (Carpita et al. 2020; Flippin and Watson 2018; Jobe and White 2007). BAP symptoms can also affect parents' perceptions and reactions to their children's behavior, and may also affect parent–child communication (Dissanayake et al. 2020). Numerous investigations have underscored the myriad challenges that autistic children encounter in initiating and sustaining meaningful relationships, particularly with their parents (Flippin and Watson 2018). In this context, attention to the mother–child relationship, which is recognized as the initial and ultimate bond in childhood, becomes imperative within both diagnostic evaluations and intervention frameworks.

Parents of autistic children experience significantly higher levels of stress, isolation, and psychological difficulty than parents of typically developing children and those of children with other disabilities (Hayes and Watson 2013). Parenting an autistic child could be linked to significant parental distress even when controlling for the core symptoms of autism (Martinez and Turnage 2022; Schwartzman, Hardan, and Gengoux 2021). This stress can cause a low sense of parenting efficacy and competence and may interrupt healthy parenting practices, leading to a higher likelihood of negative parenting practices and a lower likelihood of positive ones (Ekas, Lickenbrock, and Whitman 2010). In addition, many parent-related factors thought to be related to parental stress have also been studied in parents of autistic children, such as parental expressed emotion (Bader, Barry, and Hann 2015), alexithymia (Temelturk et al. 2021), optimism, social support (Ekas, Lickenbrock, and Whitman 2010), and parental perceptions (Lickenbrock, Ekas, and Whitman 2011).

Contemporary research underscores the significance of parental attunement during interactions between parents and children with autism (Chavira et al. 2000). Findings from a few studies in this field suggest an inverse relationship between mothers' aloofness and rigidity in personality traits and the frequency of child-initiated engagement, as well as the language proficiency of children (Hasegawa et al. 2015; Taylor et al. 2013). In this regard, parental personality traits, attitudes, and associated factors emerge as pivotal domains for investigation and intervention. However, the impact of these characteristics on the parent–child relationship remains an area that has not yet been sufficiently evaluated. Notably, the existence of effective interventions in autism to enhance children's outcomes, such as parent training (Liao et al. 2022; Ratliff-Black and Therrien 2021), makes it essential to investigate the characteristics of parents. The increase in our knowledge about parental personality traits and their influence on the relationship parents form with their children will provide important data for holistic intervention approaches in autism.

The objective of this study was to explore the impact of maternal BAP characteristics on the dynamic interaction between mothers and their children, alongside assessing maternal attitudes of acceptance or rejection toward their children, and the discernment of emotionally maltreating parental behaviors by mothers. To mitigate the likelihood of familial members exhibiting heightened BAP characteristics due to stressors associated with raising a child with special needs, children with developmental delays were included as a control group. Consequently, the study aims to comprehensively examine the reciprocal interplay between maternal BAP traits and child behaviors within the context of mother–child interactions, while also assessing the extent to which the findings are attributable to autism. Our first hypothesis is that mothers of autistic children exhibit more BAP traits compared to parents of children with GDD. Another hypothesis suggests that there are differences between mothers of children with autism and mothers of children with GDD in terms of their attitudes of acceptance or rejection towards their children and the perception of emotionally abusive parental behaviors. Our final hypothesis proposes that the BAP traits observed in mothers of children with autism have a negative impact on mother-child interaction.

Methods

Design

This study was planned as a cross-sectional study. Ethical approval was obtained from the Human Research Ethics Committee of Ankara University Faculty of Medicine (approval number: I3-69-19).

Participants

Children aged 12–60 months and their mothers referred to the Infant Mental Health Unit of our outpatient clinic between 1 January 2020 and 1 January 2023 were psychiatrically evaluated for eligibility for the study. Forty-one children who were diagnosed with ASD and 35 children who were diagnosed with global developmental delay (GDD) according to the Diagnostic Classification of Mental Health and

Developmental Disorders of Infancy and Early Childhood, revised edition (DC: 0–5) criteria and their mothers were included in the study.

Procedure

Within the cohort of young children and their parental caregivers seeking services at the Child and Adolescent Psychiatry Unit and diagnosed with autism and GDD, those consenting to participation were informed of the research protocols. Written and verbal consent was obtained from all parental guardians after thorough explanation of the study procedures. The study comprised two distinct sessions: (1) a clinical assessment phase and (2) a laboratory session. The clinical assessment entailed structured interviews conducted by a child psychiatrist and developmental level evaluations administered by a clinical psychologist. The development of infants and toddlers was evaluated using the Ankara Developmental Screening Inventory (ADSI), with maternal reports serving as the primary data source. In addition to ADSI, children's intellectual characteristics were also evaluated by the clinician (child and adolescent psychiatrist) through clinical examination.

Subsequently, Autism-Spectrum Quotient (ASQ), Parental Acceptance-Rejection Questionnaire (PARQ), and Recognition of Emotional Maltreatment Scale (REMS) were completed by the mothers. During the clinical assessment, the Childhood Autism Rating Scale (CARS) was administered to determine the severity of autism in the autism group. The first session lasted a maximum of 1 h.

Two weeks later, in the second part of the assessment, a laboratory session was arranged in our center, which had a playroom equipped with a range of toys and an observation room for the infant mental health team. The team consisted of three child psychiatrists, two clinical psychologists, and one nurse. Before the sessions, informed consent was obtained from each parent. Each parent–child dyad was then video recorded through a one-way mirror and included in three parent–child interaction episodes. Ten minutes of free play, a 5-min tidy up, a series of four tasks, and then a 2-min separation followed by a reunion. The parent and child were alone during the session. Instructions were given to the parent before the procedure, transitions between episodes were controlled with phone calls, and the ability of the parent to organize the session for their child was observed. After the reunion, one member of the infant mental health team joined the dyad.

The Crowell procedure typically lasted for half an hour. After observations, child psychiatrists and one of the clinical psychologists who made the first clinical assessments tried to classify the problem and relationship between parent and child using the criteria of Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood, Revised Edition (DC: 0–5), and Parent–Infant Relationship Global Assessment Scale (PIR-GAS) was calculated as a quantitative measure of the parent–infant relationship. Two coders, who were blinded to other data, independently rated the relationship quality using PIR-GAS. At the end of the laboratory session, parents were informed by the infant mental health team about the relationship and diagnosis, which lasted approximately half an hour. The whole process of collecting data including observational assessment session, coupled with the completion of psychiatric scales, took approximately 2 h.

Data collection—instruments

Sociodemographic questionnaire

A sociodemographic questionnaire, which examined the sociodemographic features of the children, perinatal and developmental histories, number of siblings, family types, and sociodemographic features of mothers and fathers, was created by the researchers and used in clinical interviews non-specifically. This form was completed by physicians by asking questions to the mothers and fathers at the initial interview.

Ankara Developmental Screening Inventory (ADSI)

The present tool is a parent-reported assessment administered by a physician to evaluate the developmental status of children within the age range of 0–6 years. Language-cognitive, fine and gross motor, social interaction skills, and self-care abilities are the subscales assessed. The inventory consists of 154 questions that are directed to mothers regarding the development of their child. There are separate questions for each age group. Mothers receive questions based on the age and month of their child; they are expected to respond to the questions with one of the following responses: 'Yes', 'No', or 'I do not know'. The child's scores are expected to be between his/her age line and the 20% line. However, if two or more development scores are between the 20 and 30% age lines or if each development score is below the 30% age line, it is concluded that the child has a developmental deficiency. The ADSI is a culturally appropriate, valid, and reliable developmental instrument The

validity scores of the inventory were 0.99 for 0–12 months, 0.98 for 13–44 months, and 0.88 for 45–72 months (Savasir, Sezgin, and Erol 1994).

Clinical problem-solving procedure (Crowell procedure)

The described methodology constitutes a semi-structured observational approach tailored for toddlers and preschool-aged children, as outlined by Crowell and Fleischmann (Crowell and Fleischmann 1993). This clinical paradigm comprises nine consecutive separate episodes: free play, tidy up, playing with bubbles, teaching tasks (four predesigned tasks), separation, and reunion. Initially, participants, comprising children and their parents, engaged in a 10-min observation session within a laboratory playroom furnished with a standardized array of toys. During this period, parents were directed to interact with their children in a manner typical of their home environment. After free play, parents facilitated a tidying session lasting ~5 min, followed by a 3-min period of bubble play. Following this, mothers were instructed to guide their children through four problem-solving tasks selected to span developmental levels, progressing from age-appropriate to more advanced challenges (e.g. puzzles, identifying and using specific toys). In the subsequent phase, mothers temporarily exited the playroom, leaving children unaccompanied for 3 min before re-entering and calling their children's names. At least three examiners observed the play from outside the room behind a one-way mirror (Zeanah et al. 1997).

Diagnostic classification of mental health and developmental disorders of infancy and early childhood, revised edition (DC: 0–5)

It is a diagnostic classification for mental health and developmental disorders in children aged 0–5 years. It is a developmentally based multi-axial system used for the psychiatric evaluation of children and assessment of the interaction between the child and caregiver. In the DC: 0–5 classification system, the Parent–Infant Relationship Global Assessment Scale (PIR-GAS) is used to evaluate the quality of parent–child relationships based on the intensity, frequency, and duration of maladaptive interactions. Scores range from grossly impaired (10) to well-adapted (90) indicating 'dangerously disorganized' and 'extremely well-functioning' relationships, respectively. A score below 40 indicates a disordered relationship (Zeanah et al. 2016).

Childhood Autism Rating Scale (CARS)

CARS, developed by Schopler et al. in 1971, is a behavioral rating scale that offers an objective and measurable assessment that is widely used in the diagnosis of autism and in differentiating children with autism from children with other developmental disorders (Schopler et al. 1980). Gassaloğlu et al. (2016) conducted a validity and reliability analysis of the scale, and the cut-off score for autism diagnosis was reported as 29.5 (Gassaloğlu et al. 2016). In the original study, Cronbach's alpha was 0.94, while in the Turkish version we used, it was determined as 0.95.

Autism-Spectrum Quotient (ASQ)

The ASQ, developed by Baron-Cohen et al. (2001), aims to determine the degree to which any adult with normal intelligence capacity exhibits autistic traits or has a broad phenotype (Baron-Cohen et al. 2001). The ASQ was originally a theoretically based, fifty-question self-report questionnaire consisting of five domains: social skills, attention switching, attention to detail, communication, and imagination. The validity and reliability of the Turkish adaptation of the scale were conducted (Köse et al. 2010). Cronbach's alpha value for the scale was 0.64 and test-retest reliability was 0.72.

Parental Acceptance-Rejection Questionnaire (PARQ)

PARQ was developed by Rohner, Saavedra, and Granum in 1980 to measure mothers' perceptions of child acceptance and rejection behaviors. The form was translated into Turkish by Polat and Sunar in 1988 and finalized by Anjel and Erkman in 1993 with an internal consistency of .90. The scale consists of 56 items in total and has four subtests (* Warmth and Affection (20 items) * Hostility and Aggression (16 items) * Indifference and Neglect, and * Undifferentiated Rejection (8 items). The scores obtained from the subtexts indicate total rejection. The higher the scores obtained for each sub-dimension and total, the higher the rejection (Anjel and Erkman 1993).

Recognition of Emotional Maltreatment Scale (REMS)

Developed in 2010 by Uslu et al. REMS comprises 26 small stories. In each story, the participant was asked to rate whether the parental behavior was appropriate for the child's psychological development. It is a four-point Likert-type scale. There are four subscales. These are: (1) inappropriate expectations, (2)

Insensitivity, (3) Terrorizing, and (4) Rejecting/Isolating subscales. As the score obtained from the scale increases, the ability to recognize emotional abuse decreases. The Cronbach's alpha coefficient of the scale was measured as 0.70 (Uslu et al. 2010).

Data analysis

According to the independent sample *t*-test, 30 patients for each group was enough to determine the differences between the groups at the level of 0.05 significance with 80% power (Faul et al. 2009).

In our study, we were able to assess the data of 41 children with autism and 35 children with global developmental delays. The Shapiro–Wilk test was used to analyze the homogeneity of the variables. The independent sample *t*-test was used to analyze group differences among demographic variables. The Mann–Whitney *U* test was used for non-homogenous variables. Chi-square or Fisher's exact analysis was used to analyze associations between categorical variables. For correlation analyses, Pearson or Spearman tests were used. Multiple regression analyses were conducted to examine the relationship between BAP traits, group, and PIR-GAS scores. Statistical analyses were performed using the SPSS statistical package, version 23.0, and differences were considered statistically significant at a level of 0.05.

Results

Sociodemographic characteristics of the groups

There was no statistical difference in terms of the age and sex distributions of the children, the age and education levels of the parents, family characteristics, and other sociodemographic factors among the groups (see Table 1). The age range of the entire sample was between 22 and 55 months (35.83 ± 7.32). All infants in the autism group were accompanied by intellectual disability and were similar to the other group in this respect. Based on ADSI and clinical examinations, both groups exhibited comparable developmental characteristics. There were no significant difference between ADSI subscales, including language-cognitive, fine and gross motor, social interaction skills, and

Table 1. Sociodemographic characteristics of the groups.

Sociodemographic variables	ASD ($n = 38$) Mean ± *SD*/Mdn (IQR)/*n* (%)	GDD ($n = 34$) Mean ± *SD*/Mdn (IQR)/*n* (%)	*p*
Gender, *n* (%)[a]			
Female	11 (26.8)	9 (26.5)	.972
Male	30 (73.2)	25 (73.5)	
Child age (months)[b]	34.39 ± 6.56	37.44 ± 7.88	.078
Mothers' age (years)[b]	32.10 ± 5.04	33.93 ± 6.54	.191
Fathers' age (years)[b]	35.73 ± 4.24	37.09 ± 6.09	.278
Mothers' education level, *n* (%)[a]			
Less than high school	6 (15.8)	9 (26.5)	
High school	12 (31.6)	13 (38.2)	.298
College degree or higher	20 (52.6)	12 (435.3)	
Mothers' occupation, *n* (%)[a]			
Housewife	24 (63.2)	25 (73.5)	.346
Working women	14 (36.8)	9 (26.5)	
Fathers' education level, *n* (%)[a]			
Less than high school	10 (26.3)	11 (32.4)	
High school	12 (31.6)	10 (29.4)	.853
College degree or higher	16 (42.1)	13 (38.2)	
Fathers' occupation, *n* (%)[a]			
Civil servant	7 (18.4)	10 (29.4)	
Laborer	26 (68.4)	15 (44.1)	.432
Tradesman	5 (13.2)	9 (26.5)	
Family type, *n* (%)[c]			
Intact family	37 (97.4)	34 (100)	1
Single parent family	1 (2.6)	0 (0)	
Number of siblings[d]	1 (0–1)	1 (0.75–2)	.09
Intellectual level, *n* (%)[a]			
Mild ID	31 (81.6)	27 (79.4)	.817
Moderate ID	7 (18.4)	7 (20.6)	
Parental psychopathology, *n* (%)[c]			
Present	3 (7.9)	2 (5.9)	1
Absent	35 (92.1)	32 (94.1)	

ASD: autism spectrum disorder; GDD: global developmental delay; *SD*: standard deviation; Mdn: median; IQR: interquartile range.
[a]Chi-squared test.
[b]Independent samples *t*-test.
[c]Fisher's exact test.
[d]Mann–Whitney *U* test.

Table 2. Comparison of scale scores between the groups.

Scales	ASD ($n = 38$) Mdn (IQR)/Min–Max	GDD ($n = 34$) Mdn (IQR)/Min–Max	*Z/U*	*p*
Autism-spectrum quotient				
Communication	3 (2–4)/1–8	2 (1–3)/0–8	−1.49/516.5	.135
Social skills	3 (2–4)/0–6	2 (1–3)/0–9	**−2.39/438.5**	**.017***
Imagination	3 (2–5)/1–7	2 (1–3)/0–8	**−3.23/364.5**	**<.001*****
Attention to detail	4 (3–6)/2–9	4 (3–6)/1–9	−0.34/616	.732
Attention switching	4 (3–4)/2–7	4 (3–5)/1–7	−0.69/586	.487
Total score	18 (14.75–20.5)/8–30	14.5 (13–17.25)/8–35	**−2.27/445**	**.023***
Parental acceptance-rejection questionnaire				
Warmth and affection	25.5 (23–29)/21–44	29 (24.75–32.25)/13–45	**−2.34/439**	**.019***
Hostility and aggression	19 (17–22)/16–37	21 (17.75–23)/16–35	−1.24/536	.212
Indifference and neglect	14 (13–15)/11–29	14.5 (12–17)/12–33	−0.28/621	.775
Undifferentiated rejection	11 (10–13)/8–16	10 (8–11.25)/5–17	**−2.34/440.5**	**.019***
Total score	71 (64.75–76)/56–114	73(68.75–88.25)/52–100	−1.24/535.5	.212
Recognition of emotional maltreatment scale				
Inappropriate expectations	8.5 (6–12)/4–16	11.5 (10–14)/8–18	**−3.59/329**	**<.001*****
Insensitivity	6 (4.75–7)/3–9	4 (3–5)/3–10	**−3.70/323.5**	**<.001*****
Terrorizing	10.5 (8–13)/5–19	13 (11.75–16)/9–23	**−3.25/359**	**.001****
Rejecting/isolating subscales	6 (5–7)/4–9	6 (5–7.25)/4–11	−0.09/638	.927
Total score	31 (27–35.5)/23–48	35 (31–39.25)/27–60	**−2.84/394**	**.004****
PIR-GAS	50 (40–50)/20–70	50 (50–62.5)/30–80	**−2.78/414.5**	**.005****

ASD: autism spectrum disorder; GDD: global developmental delay; Mdn: median; IQR: interquartile range; Min: minimum; Max: maximum.
Mann–Whitney *U* test.
*$p < 0.05$, **$p < 0.01$, ***$p < .001$.

self-care abilities ($p > 0.05$ for all). Parents did not have any history of developmental delay and current intellectual disability. When the parents were evaluated in terms of psychopathology, two mothers in the GDD group had depression, one mother and one father in the autism group had anxiety disorder, and one father had alcohol use disorder.

Comparison of scale scores and mother–child relationship

When the total and subscale scores of the mothers were analyzed, ASQ total scores, social skills, and imagination subscale scores were significantly higher in the autism group. In the analysis of PARQ scale scores, Warmth and Affection subscale scores were found to be higher in favor of the GDD group, while Undifferentiated Rejection subscale scores were found to be higher in the autism group. According to the analysis of REMS scale scores, total score, inappropriate expectations, and terrorizing subscale scores were higher in the GDD group, while insensitivity subscale scores were significantly higher in the autism group. When the groups were compared in terms of PIR-GAS scores, the score was significantly lower in the autism group [Median (IQR) in ASD: 50 (20–70), median (min–max) in GDD: 50 (30–80), $p = 0.005$] (Table 2).

Outcomes of the correlation analyses

Comparing the CARS scores in the autism group and scale scores of mothers, there were significant correlations between CARS scores and ASQ-attention to detail subscale scores, PARQ-Warmth and Affection subscale scores, and REMS-Inappropriate expectations, Insensitivity, Terrorizing subscale scores. Comparing the ASQ scores and other scales of mothers in the autism group, there were significant correlations between ASQ total scores and PARQ total scores, Warmth and Affection, Hostility and Aggression subscale scores, REMS total scores, and Rejecting/Isolating subscale scores.

Finally, the significant correlations of both ASQ score and group with PIR-GAS score ($r = -0.32$, $p = 0.006$, and $r = 0.33$, $p = 0.005$, respectively) suggested the eventual presence of a mediating effect of ASQ total score on the relationship between group and PIR-GAS score (Table 3). The mediation analysis showed a significant indirect effect of group on PIR-GAS score through ASQ total score, $b = -0.29$ (95% bootstrapped); group showed $b = -0.22$, $p = 0.04$ for ASQ total score. It is noteworthy that the mediation appears to be partial (Figure 1).

Discussion

The aim of the current work was to investigate the clinical and functional correlates of BAP characteristics and their relationship with their children in a sample of parents of autistic children. First, our findings show that the BAP scores of the parents of autistic children in our study sample were higher than those of other parents, in line with what has been emphasized in previous literature (Wheelwright et al.

Table 3. Correlations between the PIR-GAS scores and ASQ subscales in the whole sample.

	PIR-GAS	
ASQ subscales	*p*	*r*
ASQ-communication	.685	−0.049
ASQ-social skills	.055	−0.227
ASQ-imagination	.186	−0.158
ASQ-attention to detail	.068	−0.216
ASQ-attention switching	.073	−0.213
ASQ-total score	**.006****	**−0.320**

PIR-GAS: parent–infant relationship global assessment score; ASQ: autism spectrum quotient.
Spearman's correlation test.
Bold values indicate statistical significance. $^{**}p < 0.01$.

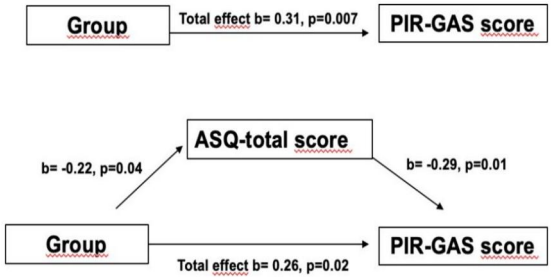


Figure 1. Mediation analysis results.

2010). Secondly, our findings suggest that the level of BAP characteristics of the parents we evaluated may be one of the factors related to the child-parent relationship. It was found that the mother's ASQ scores had a mediating effect on the difference between the groups in terms of PIR-GAS scores evaluating the mother's interaction with her baby. In this context, our findings improve our perspective on how parental BAP characteristics affect the child-parent relationship in early childhood.

Our first finding in the current study is that, as in the previous studies, parents in the autism group have more BAP characteristics. In a previous larger sample follow-up study, parents of autistic children reported greater impairments in all of ASQ subscales (Wheelwright et al. 2010). Similar results also have been shown in different studies from other countries (Hasegawa et al. 2015; Piana et al. 2007).

In the evaluations of parent scales, it was found that mothers in the GDD group had higher scores of negative parental attitudes toward their children and their ability to recognize emotional abuse was lower than that of mothers in the autism group. This finding is different from many studies in the literature. In a recent study, parents who have a formal diagnosis of autism themselves or a blood relative with a diagnosis of autism and who have at least one TD child under 18 years of age were assessed. Higher autism traits were associated with an increase in overall parenting difficulties (Dissanayake et al. 2020). In a recent Australian study, Lau et al. examined autism traits in mothers and fathers with and without an autism diagnosis by the ASQ. They found that while fathers with a diagnosis of autism feel less effective in their parenting, mothers who had a diagnosis did not differ in their parenting efficacy from mothers without a diagnosis (Lau et al. 2016). The first explanation for why we found the parent-child relationship worse in the GDD group on a scale basis that may be related to this finding is that parents in the autism group may have become more alert about the developmental status of their children after the diagnosis, and their efforts to show more positive parental attitudes may have increased. Hoffman et al. reported that mothers whose children were diagnosed with autism had similar emotional closeness to mothers of typically developing children and that mothers were more understanding of their children's negative behaviors after the diagnosis (Hoffman et al. 2009). In another study, van Steijn et al. examined the relationship between parenting styles and subthreshold traits of autism as determined by using the ASQ. Both mothers and fathers tended to use a more permissive parenting style, unlike an authoritative style, and mothers with high autism traits used a more permissive parenting style with their TD child compared with their autistic child (van Steijn et al. 2013). Possibly, evaluating the problematic behaviors of a child with autism as attributable to their child's disorder enables a mother to understand her child's feelings or needs accurately and to be more attuned to her child's needs with this closeness (Chavira et al. 2000). Another possible explanation for our findings is that mothers in the autism group showed more subthreshold autism characteristics and had lower awareness of their relationship with their children, which may have created a bias because the scales we used were self-reported. Although there are many differences between the findings of the studies, the common conclusion is that consistent with the current study, the BAP characteristics of the parents have a significant effect on parental attitudes not only in autism but also in GDD.

Our most important finding suggests that parent BAP scores are associated with parent–child relationships. In addition to scale correlations, maternal BAP scores were a factor mediating the statistical difference in PIR-GAS scores between the groups. It has been well shown that parenting practices and parenting style are closely related to the developmental and psychological outcomes of children (Belsky and De

Haan 2011). A good parent–child relationship is also important for parenting behaviors and children's outcomes (Dissanayake et al. 2020). Although there are many interventions where parents are involved in the treatment process (Hong et al. 2016; Liao et al. 2022; Wright and Kaiser 2017), little remains known about parenting behaviors in parents with autism traits and the needs of parents who present with either a diagnosis of autism or high autism traits, and whether these are different from those parents without such traits. It is well known that parent-implemented interventions could be cost-effective methods for autistic children (Hong et al. 2016; Liao et al. 2022; Wright and Kaiser 2017). Pre-treatment child-related variables have garnered attention for their potential influence on the efficacy of intervention programs designed for autistic children. However, scant attention has been devoted to investigating the potential influence of pre-treatment parent-related factors on the communication outcomes of autistic children (Dissanayake et al. 2020). Parents exhibiting the features of BAP may find tailored coaching models advantageous, addressing their distinctive social communication requisites, strengths, and individualities. Customizing parent coaching to align with parent pre-intervention characteristics in this manner holds promise for enhancing the fidelity and efficacy of parent-implemented interventions, thereby facilitating improved social communication outcomes for autistic children (Flippin and Watson 2018). Siller, Hutman, and Sigman (2013) observed that mothers initially demonstrating accepting insightfulness regarding their children's thoughts, emotions, and behaviors exhibited heightened synchronous responsiveness during interventions targeting responsive parenting strategies for young autistic children (Siller, Hutman, and Sigman 2013). Conversely, mothers lacking initial insightfulness did not exhibit changes in responsiveness when exposed to the same intervention. Consequently, understanding familial characteristics and developing appropriate interventions for these characteristics could be a significant utility for treatment efficacy.

Globally, our results, in line with other studies, seem to suggest an association between BAP and parent–child relationship, although further research in wider samples is needed to clarify this point. Further studies in wider samples and with a longitudinal design are warranted to clarify the relationship between parental BAP and parent–child relationship outcomes among parents of patients with autism. Furthermore, studies employing the criteria of BAP can enhance the capacity to identify potential genetic factors underlying autism expression, thereby informing future research endeavors in this domain.

Limitations

The current study has several limitations. First, the cross-sectional design prevented us from clarifying the causal relationship between BAP and the parent–child relationship. Moreover, BAP is a self-reported instrument, and parents may have overestimated or underestimated their own symptoms. To confirm this finding more comprehensively, it is thought that evaluating the neurodevelopmental characteristics of the parents in future studies will provide important data. The study population consisted of a clinical sample that was presented to the outpatient clinic; thus, the results may not be generalizable to the community population.

Conclusion

BAP is prevalent in parents of autistic children, and using BAP as an endophenotype may help us understand the etiology of child autism. However, in addition to the etiology, the parent–child relationship has an important aspect of autism, and early and effective intervention is important.

Our study findings emphasize that the attitudes of mothers of children with autism towards their children may have positive aspects compared to the attitudes of mothers of children with other neurodevelopmental disorders, as well as underlining that the mother's way of relating to her baby should be evaluated in the context of the mother's BAP characteristics and should be supported bidirectionally. Further studies are needed to examine and improve consistency between studies, improving our ability to evaluate the effects of parental BAP. Finally, we would also like to emphasize that this is an important issue in terms of investigating the effect of parental interventions on their effectiveness.

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Ethical approval

This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Written informed consent was obtained from all

participants before the initial assessment. Ethical approval was granted through the human research ethics committee of Ankara University Faculty of Medicine (Approval Number: I3-69-19).

Author contributions

Tuğba Menteşe Babayiğit: conceptualization, methodology, data curation, formal analysis, visualization, investigation, writing–original draft. Rahime Duygu Temelturk: data curation, formal analysis, visualization, investigation, writing–review, and editing. Merve Cıkılı Uytun: conceptualization, methodology, formal analysis, visualization, writing–original draft, writing–review and editing. Gokçe Yagmur Efendi: conceptualization, methodology, data curation, writing–review and editing. Esra Yurumez: conceptualization, methodology, writing–review and editing. Didem Behice Oztop: conceptualization, methodology, writing–review, and editing.

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Data availability statement

The data supporting this study's findings are available on request from the corresponding author. The data are not publicly available due to the privacy of research participants.

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