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Research Article

FAMILY CAREGIVER'S KNOWLEDGE AND ATTITUDE CONCERNING THE BEHAVIORAL AND SOCIAL PUBERTAL CHANGES IN AUTISTIC CHILDREN AT SUDANESE EGYPTIAN CENTER IN ALHARAM, GIZA GOVERNORATE, CAIRO EGYPT

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Abstract

Background: This study examines family caregivers' knowledge of the social and behavioral changes autistic children face during puberty, focusing on challenges and support gaps at the Sudanese Egyptian Center in Alharam, Giza Governorate, Cairo Egypt. **Aim:** The study aims to assess family caregivers' knowledge of behavioral and social changes in autistic children during puberty, assess the family caregivers' attitude towards these changes, and assess their satisfaction with services provided affects their support. **Methods:** A mixed research design was used, combining both quantitative and qualitative approaches. The data were collected using questionnaires, which included both Likert-scale questions and an open-ended question to capture family Caregivers' opinions. The sample consisted of 40 family Caregivers from the Sudanese Egyptian Center, selected through purposive sampling. The quantitative data were analyzed using descriptive statistics (mean scores, frequencies, and percentages) to assess family Caregivers' awareness, confidence, and perceptions. For the open-ended responses, content analysis was applied to identify common themes, which were then coded and quantified to integrate them with the quantitative findings. To examine potential relationships between family Caregivers' demographics and their awareness, inferential analysis was carried out using the chi-square test, with a significance level set at $p < 0.05$. **Results:** The results showed that family Caregivers had limited knowledge, especially of behavioral changes during puberty, and low confidence in handling both changes. Misconceptions were common, and a significant link was found between family Caregivers' gender and awareness of behavioral changes ($p = 0.023$). **Conclusion:** This study emphasizes the importance of increasing family Caregivers' knowledge and training to better support their children through puberty, ultimately improving their developmental outcomes during this crucial phase.

Keywords: Autistic children, Family caregivers, Puberty.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a complex and heterogeneous neurodevelopmental condition that typically manifests during infancy or early childhood. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), ASD encompasses a spectrum of developmental disorders previously classified separately, including Autistic Disorder, Asperger's Disorder, and Pervasive Developmental Disorder–Not Otherwise Specified (PDD-NOS) [1]. The onset of puberty represents a critical developmental stage characterized by significant behavioral and social transformations. For individuals with (ASD), this period can be particularly challenging, impacting both the individuals themselves and their families. Given the essential role that family caregivers play in supporting their children's adaptation to these developmental transitions, it is crucial to understand these changes from the caregivers' perspectives [2]. Adolescents diagnosed with Asperger's Syndrome often face heightened challenges during puberty, including impairments in self-regulation, communication, social functioning, and increased sensory sensitivities. The hormonal changes characteristic of this developmental stage can further exacerbate behavioral and emotional difficulties. Providing appropriate support to individuals on the autism spectrum during puberty requires a thorough understanding of these multifaceted issues. Moreover, it is essential to address the physical aspects of puberty, such as hormonal alterations, body image development, and the establishment of personal hygiene routines [3]. Due to uncertainty about potential behavioral and social changes, family caregivers of autistic children frequently report feeling more anxious and stressed as their child enters adolescence [4]. Parental conduct can also improve development in children with ASD, and parents are involved in many interventions, just like with children who develop normally [5]. In sub-Saharan Africa, there is a gap in health services for children and adolescents with mental health disorders [6]. Limited evidence exists regarding the transition of children with ASD into adolescence within low-income countries, despite most children with ASD residing in these regions [7]. Puberty poses distinct challenges for children with ASD and their families, yet little research focuses on parental perspectives. In Pakistan, managing ASD is particularly difficult due to lack of awareness and support. This study aims to examine family caregivers' understanding of pubertal changes in autistic children. Additionally, it looks for knowledge gaps and their implications for offering the right kind of support [8]. Tadesse and colleagues (2024) conducted an exploratory qualitative study to examine the challenges experienced by children with (ASD) during their transition to adolescence in Ethiopia, where such issues had not been previously researched [9]. The study involved focus group discussions with 11 parents and semi-structured interviews with six head teachers. Thematic analysis revealed that children with ASD face various challenges during puberty,

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including behavioral problems, inappropriate sexual behaviors relative to their sociocultural context, and difficulty in understanding and regulating sexual urges. Girls with ASD, in particular, experienced difficulties in managing hygiene and cleanliness. The study highlights the significant gap in research and support services for adolescents with ASD in low-income countries.

Okwara and Donald (2024) conducted a cross-sectional study to explore caregiver perspectives, service satisfaction, and health service utilization among families of children with developmental disorders in a resource-limited tertiary care setting. The study included 240 children aged 3–8 years (116 with ASD and 124 with Global Developmental Delay) and utilized pre-validated caregiver questionnaires alongside medical record reviews. Results indicated that caregivers often had limited understanding of their child's condition and generally viewed available treatments as ineffective. Both groups reported moderate family distress (mean score: 3.3 out of 10) and service satisfaction (68.3%). Children with Global Developmental Delay had slightly more annual healthcare visits (13.3) compared to children with ASD (11.5). Caregivers who believed in the effectiveness of therapy accessed healthcare services more frequently. Among families of children with ASD, lower distress and higher satisfaction (though not statistically significant) were associated with increased service utilization. The study recommends empowering caregivers, decentralizing early intervention services, and adopting family-centered care to improve service use [10].

Hamdan (2022) conducted a qualitative study to explore the changes and challenges experienced during puberty by adolescents withASD. The study employed semi-structured in-depth interviews with 12 parents (8 fathers and 4 mothers) whose adolescent children, aged 13–18 years, had been diagnosed with ASD through government or private clinics. The analysis revealed that many parents observed early onset of puberty, particularly among female adolescents. Some parents also reported a reduction or cessation of stereotypical and repetitive behaviors during this developmental stage. However, adolescents with ASD also encountered significant behavioral difficulties during puberty, including increased anger, social withdrawal, inappropriate sexual behaviors, challenges with daily living skills, menstruation management, and eating-related issues.The study concluded that puberty introduces distinct challenges for adolescents with ASD, exacerbated by impairments in communication and behavioral regulation, which may increase vulnerability during this period. Consequently, the author recommends the implementation of counseling and training programs for both adolescents with ASD and their parents to support them through these developmental transitions [11].

Al-Dulbhi (2023) conducted a study to examine the relationship between the challenges experienced by parents of children with ASD and their coping strategies in the Riyadh region [12]. The study sample consisted of 110 parents (55 fathers and 55 mothers) aged between 30 and 50 years, all of whom had children diagnosed with ASD and residing in Riyadh. The researcher developed two instruments for data collection: a scale measuring the challenges faced by parents of children with ASD, and a scale assessing their coping strategies.The findings revealed a statistically significant correlation between the challenges parents face and the coping methods they employ. Additionally, significant gender differences were identified: mothers reported a higher level of experienced challenges, while fathers demonstrated more effective coping strategies. The study further found that the extent of issues faced by parents could be predicted based on their coping style. These results highlight the importance of supporting both mothers and fathers differently, according to their unique experiences and coping capacities.

Wang *et al.* (2018) investigated the knowledge, attitudes, and behaviors of Chinese parents of children with ASD. The study involved 394 parents whose children met DSM-5 diagnostic criteria for ASD. Data were gathered using a 20-item knowledge questionnaire (PKQA) and a 17-item survey on demographics, attitudes, and behaviors. The results showed that parental knowledge varied significantly based on several factors. Lower knowledge scores were linked to advanced paternal age and delays in joining training programs, while higher knowledge was associated with maternal education, family income, early intervention, and unified family understanding of the diagnosis. Additionally, reading autism-related materials and attending professional lectures positively influenced knowledge levels. The study highlighted the importance of targeted educational programs to enhance parental understanding and caregiving practices for children with ASD [13].

Manohar *et al.* (2024) studied the experiences of parents raising autistic teenagers in India. Using interviews with twelve parents, the researchers found three main themes: parents learning to accept their child while still feeling grief, growing stronger through their experiences, and worrying about who will care for their child in the future. Even with few support services, parents showed strength and adjusted to their child's needs. The study shows the need for better long-term support for families, especially in low-resource settings [14].

Burnett *et al.* (2011) explored how puberty influences the understanding of complex emotions, particularly social emotions like embarrassment and guilt. In a study of 83 girls aged 9–16, those in later stages of puberty reported more "mixed" emotions experiencing more than one emotion at once when responding to social situations. This increase was linked to puberty stage rather than age. No similar change was found for basic emotions such as fear or anger. The study suggests that puberty plays a key role in developing emotional complexity related to social understanding, which may have important implications for education [15].

MATERIALS AND METHODS

Quantitative Qualitative Method (mixed method) was applied. Using mixed methods can help facilitate deeper understanding because quantitative research method enabled the researcher to quantify data and generalize results from the sample to the population of interest, to measure the incidence of various views and opinions, as for qualitative research method used to explore some findings further; gain an understanding of underlying reasons and motivations, provide insights into the setting of the problem, generate ideas and/or hypotheses for later quantitative research, and finally uncover common trend in thought and opinion [16]. The questionnaire designed for the study comprises 19 items, organized into four sections to evaluate family caregivers' awareness, misconceptions, and support concerning autistic children during puberty. It includes demographic data, awareness of behavioral and social changes, knowledge gaps, and caregiver confidence in managing puberty-related challenges. Utilizing yes/no, Likert scale, and an open-ended question, the tool aims to identify areas where additional resources or education may be beneficial for caregivers. The data collected from the questionnaires were analyzed using descriptive statistics, inferential statistics, and content analysis.

Research Sample

A total population sampling technique was applied, where all units meeting specific criteria were selected for inclusion in the study (40 samples). This method is typically used when the target population is small or unique, and it is necessary to analyze every individual or unit to obtain accurate and comprehensive results.

Table 1. Gender of child with autism

Gender of Child with Autism	Frequency (n = 40)	Percentage
Male	26	65%
Female	14	35%

The above table shows that 65% of children with autism were males and 35% were females, reflecting a higher prevalence among males.

Table 2. Age of autistic child

Age Range of Child with Autism	Frequency (n = 40)	Percentage
5 Years and less	11	28%
6 -10 Years	14	35%
11 -15 Years	10	25%
16 -20 Years	3	8%
More than 20 Years	2	5%

Table (2) illustrates that the majority ofthe sample (35%) fall within the 6–10 years age range, followed by 28% who are 5 years old or younger. Children aged 11–15 years account for 25% of the sample, while only 8% are aged 16–20 years, and a small proportion (5%) are over 20 years old.

Table 3. Relation to child

Relation to Child	Frequency (n = 40)	Percentage
Parent (father/mother)	13	33%
Brother/Sister	8	20%
Uncle/Aunt	12	30%
Guardian/Legal Representative	7	18%

The above table presents that parents (either father or mother) constitute the largest group at 33%, uncles and aunts represent 30%, and siblings account for 20% of respondents, while guardians or legal representatives make up the remaining 18%.

RESULTS AND DISCUSSION

Table 4. Family caregivers' awareness of behavioral changes

Family Caregivers' Awareness of Behavioral Changes	Mean Response (n = 40)
Knowledge of behavioral changes	1.075
Ability to notice major behavioral changes	1.4
Confidence in handling behavioral challenges	1.325

Knowledge of Behavioral Changes (Mean = 1.075): Family Caregivers reported low to moderate awareness of behavioral changes, suggesting a gap in understanding.

Ability to Notice Major Behavioral Changes (Mean = 1.4): Respondents indicated moderate ability to notice changes, showing room for improvement.

Confidence in Handling Behavioral Challenges (Mean = 1.325): Confidence in managing behavioral issues during puberty was moderate but slightly higher than knowledge levels.

Interpretation: These scores indicate that while family caregivers are somewhat able to notice behavioral changes, their understanding and confidence in handling these changes are relatively low, suggesting a need for additional support and education.

Table 5. Family caregivers' awareness of social changes

Family Caregivers' Awareness of Social Changes	Mean Response (n = 40)
Knowledge of social changes	1.75
Ability to notice social changes	1.475
Confidence in handling social challenges	0.95

Knowledge of Social Changes (Mean = 1.75): Family Caregivers exhibited a higher level of awareness regarding social changes during puberty.

Ability to Notice Social Changes (Mean = 1.475): Respondents showed moderate ability to identify significant social changes.

Confidence in Handling Social Challenges (Mean = 0.95): Confidence was quite low in managing social challenges, suggesting a critical area for intervention.

Interpretation: Although family Caregivers are more aware of social changes compared to behavioral changes, their confidence in managing these challenges is noticeably low, underlining the need for training programs focused on social aspects of puberty in children with autism.

Table 6. Misconceptions and knowledge gaps

Misconceptions and Knowledge Gaps	Mean Response (n = 40)
Incorrect information about puberty	1.3
Desire for more information or training	1.925
Awareness of autism and puberty differences	1.425

Incorrect Information About Puberty (Mean = 1.3): A moderate number of family Caregivers acknowledged having had incorrect information about puberty and autism.

Desire for More Information or Training (Mean = 1.925): Nearly all family Caregivers expressed a strong desire for more information and training, with a very high mean score.

Awareness of Autism and Puberty Differences (Mean = 1.425): Awareness that autism impacts puberty differently from non-autistic children was moderate.

Interpretation: The results strongly suggest that family Caregivers are eager for more education, particularly in correcting misconceptions and understanding how autism affects puberty differently. There is a clear demand for training programs.

Table 7. Family caregivers' support and management of needs

Family Caregivers' Support and Management of Needs	Mean Response (n = 40)
Awareness helps provide appropriate support	1.7
Support has improved the child's behavior	1.625

Awareness Helps Provide Appropriate Support (Mean = 1.7): Family Caregivers felt that their awareness of behavioral and social changes during puberty helps them support their children effectively.

Support has Improved the Child's Behavior (Mean = 1.625): A relatively high percentage of family Caregivers believe that their knowledge and support have positively impacted their child's behavior.

Interpretation: Family Caregivers who are more knowledgeable believe they can provide better support, which in turn helps improve the behavior of their children. This further emphasizes the need for increased awareness and training.

Table 8. Biggest concern during puberty

Biggest Concern During Puberty (Frequency)	Frequency (n = 40)	Percentage
Behavioral Changes	9	23%
Social Changes	4	10%
Anxiety and Stress	27	68%

Behavioral Changes (Frequency = 9): 22.5% of family Caregivers were most concerned about behavioral changes.

Social Changes (Frequency = 4): 10% of family Caregivers expressed concerns about social changes.

Anxiety and Stress (Frequency = 27): 67.5% of family Caregivers were most worried about managing their child's anxiety and stress during puberty.

Interpretation: The majority of family Caregivers expressed significant concerns about anxiety and stress in children with autism during puberty. This suggests that future interventions and training should focus on equipping family Caregivers with strategies to manage these emotional challenges.

Inferential Analysis Results:

Table 9. Comparison of Means by Gender:

Mean Scores by Gender

Variable	Male	Female
Knowledge of Behavioral Changes	1.25	1
Ability to Notice Major Behavioral Changes	1.583	1.321
Confidence in Handling Behavioral Changes	1.75	1.142
Knowledge of Social Changes	1.75	1.75
Ability to Notice Major Social Changes	1.67	1.39
Confidence in Handling Social Changes	1.25	0.821

Interpretation of Results:

Knowledge of Behavioral Changes: The mean score for males (1.25) is higher than that of females (1.00). This suggests that male family Caregivers might feel more knowledgeable about behavioral changes in children with autism during puberty. However, further statistical testing (ttest) is needed to confirm if this difference is statistically significant.

Ability to Notice Major Behavioral Changes: Males reported a higher mean (1.583) compared to females (1.321), indicating that male family Caregivers may be more confident in noticing significant behavioral changes. Again, statistical tests will determine significance.

Confidence in Handling Behavioral Changes: Males (mean = 1.75) show significantly higher confidence than females (mean = 1.142). This result may indicate that male family Caregivers feel better equipped to handle behavioral challenges. The significance of this difference will need to be assessed through appropriate testing.

Knowledge of Social Changes: The mean scores are equal (1.75 for both genders), suggesting no difference in perceived knowledge of social changes.

Ability to Notice Major Social Changes: Male family Caregivers (mean = 1.67) outperformed female family Caregivers (mean = 1.39). This could suggest that males may be more observant of social changes, but statistical validation is required.

Confidence in Handling Social Changes: The disparity is evident, with males scoring 1.25 and females at 0.821. This indicates that male family Caregivers may feel more competent in managing social challenges faced by children during puberty. The statistical significance should be verified through testing.

Table 10. Chi-square Test for Family Caregivers' Awareness of Behavioral Changes:

Observed Family Caregivers' Awareness of Behavioral Changes	Male	Female	Total
No	1	16	17
Some what	15	39	54
Yes	20	29	49
Total	36	84	120

Expected Family Caregivers' Awareness of Behavioral Changes	Male	Female	Total
No	5.1	11.9	17
Some what	16.2	37.8	54
Yes	14.7	34.3	49
Total	36	84	120

Calculate Chi-square Statistic (χ^2):	
For: No	4.71
For: Some what	0.13
For: Yes	2.73
Total Chi-square Value (χ^2):	7.57
Degree of freedom (df) = (number of rows−1) × (number of columns−1)	2
Using a significance level of 0.05 and df = 2, the critical value from the chi-square distribution table is	5.991
P Value	0.023

Interpretation: Significant association: The p value (0.023) is less than the significance level (0.05), indicating a significant association between gender and family Caregivers' awareness of behavioral changes.

Table 11. Chi-square test for family caregivers' awareness of social changes:

Observed Family Caregivers' Awareness of Social Changes	Male	Female	Total
No	3	15	18
Some what	10	27	37
Yes	23	42	65
Total	36	84	120
Expected Family Caregivers' Awareness of Social Changes	Male	Female	Total
No	5.4	12.6	18
Some what	11.1	25.9	37
Yes	19.5	45.5	65
Total	36	84	120

Calculate Chi-square Statistic (χ^2):	
For: No	1.52
For: Some what	0.16
For: Yes	0.90
Total Chi-square Value (χ^2):	2.58
df=(number of rows−1)×(number of columns−1)	2
Using a significance level of 0.05 and df = 2, the critical value from the chi-square distribution table is	5.991
P Value	0.276

Interpretation: Non-Significant Result: Since the value (0.276) is greater than the commonly used significance level of 0.05. This means there is no significant association between gender and family Caregivers' awareness of social changes.

Table 12. Chi-square test for family caregivers' misconceptions and knowledge gaps:

Observed Misconceptions and Knowledge Gaps	Male	Female	Total
No	3	11	14
Some what	7	19	26
Yes	26	54	80
Total	36	84	120
Expected Misconceptions and Knowledge Gaps	Male	Female	Total
No	4.2	9.8	14
Some what	7.8	18.2	26
Yes	24	56	80
Total	36	84	120

Calculate Chi-square Statistic (χ^2):	
For: No	0.49
For: Some what	0.12
For: Yes	0.24
Total Chi-square Value (χ^2):	0.85
df=(number of rows−1)×(number of columns−1)	2
Using a significance level of 0.05 and df = 2, the critical value from the chi-square distribution table is	5.991
P Value	0.655

Interpretation: Non-Significant Result: Since the p value (0.655) is greater than the commonly used significance level of 0.05, there is no significant association between gender and family Caregivers' awareness of social changes.

Table 13. Chi-square test for family caregivers' family caregivers' support and management of needs:

Observed Family Caregivers' Support and Management of Needs	Male	Female	Total
No	1	2	3
Some what	9	12	21
Yes	14	42	56
Behavioral changes (such as: mood swings, aggression)	4	5	9
Social changes (for example: interaction with the Quran, friendships)	1	3	4
Difficulty managing your child's anxiety and stress (for example: inability to calm the child, frequent anxiety attacks, or increased stress due to physical and psychological changes).	7	20	27
Total	36	84	120
Expected Family Caregivers' Support and Management of Needs	Male	Female	Total
No	0.9	2.1	3
Some what	6.3	14.7	21
Yes	16.8	39.2	56
Behavioral changes (such as: mood swings, aggression)	2.7	6.3	9
Social changes (for example: interaction with the Quran, friendships)	1.2	2.8	4
Difficulty managing your child's anxiety and stress (for example: inability to calm the child, frequent anxiety attacks, or increased stress due to physical and psychological changes).	8.1	18.9	27
Total	36	84	120

Calculate Chi-square Statistic (χ^2):	
For: No	0.02
For: Some what	1.65
For: Yes	0.67
Behavioral changes (such as: mood swings, aggression)	0.89
Social changes (for example: interaction with the Quran, friendships)	0.05
Difficulty managing your child's anxiety and stress (for example: inability to calm the child, frequent anxiety attacks, or increased stress due to physical and psychological changes).	0.21
Total Chi-square Value (χ^2):	3.49
df=(number of rows−1)×(number of columns−1)	5
Using a significance level of 0.05 and df = 2, the critical value from the chi- square distribution table is	11.07
P Value	0.625

Interpretation: Non-Significant Result: The p value (0.625) is greater than the commonly accepted significance level of 0.05, indicating that there is no significant association between gender and family Caregivers' support and management of their children's needs during puberty.

DISCUSSION

Hypothesis (1): Postulates that "There is a statistically significant level of awareness among family caregivers regarding the behavioral and social changes experienced by children with autism during puberty"

The mean score for caregiver knowledge of behavioral changes during puberty was low (M = 1.075), and while the ability to recognize these changes (M = 1.4) and confidence in managing them (M=1.325) were moderate, these values remain insufficient to conclude a high level of awareness or preparedness. One respondent expressed the need for more information, stating, "I would like more information on behavioral and social changes, considering physiological changes." This reflects a recognition of the complexity of puberty and an admission of inadequate preparedness. This aligns with findings by Hamdan (2022), who reported that adolescents with ASD experience increased behavioral difficulties during puberty, such as aggression, withdrawal, and inappropriate sexual behavior, which often overwhelm unprepared caregivers [11]. These results are further supported by Tadesse *et al.* (2024), who also noted significant behavioral challenges in autistic adolescents in low-resource settings like Ethiopia, emphasizing the lack of prior research and caregiver readiness [9]. The data show a slightly higher mean score for caregiver knowledge of social changes (M = 1.75), suggesting better awareness compared to behavioral changes. However, the critically low confidence in managing social challenges (M = 0.95) indicates a serious gap in practical preparedness. This mirrors the findings of Burnett *et al.* (2011), who demonstrated that puberty brings about complex emotional and social transformations, which can be particularly difficult for individuals with ASD and their caregivers to navigate [15]. Furthermore, Wang *et al.* (2018) found that caregiver knowledge varies greatly based on educational and socioeconomic factors, implying that awareness does not necessarily translate to confidence or competence in caregiving [13]. The gender-based analysis revealed that male caregivers reported slightly higher levels of knowledge and confidence regarding behavioral changes. The statistically significant association between gender and awareness (p = 0.023) indicates that gender may influence caregiving roles and perceptions. Al-Dulbhi (2023) found similar results, where fathers demonstrated more effective coping strategies despite mothers reporting more frequent challenges [12]. However, the absence of significant gender differences regarding social changes suggests that both male and female caregivers face similar limitations in this domain, which is consistent with the general trends identified in both Manohar *et al.* (2024) and Okwara and Donald (2024), studies that highlighted uniform caregiver struggles across genders in low-resource settings [10] [14]. In conclusion, family caregivers have a basic understanding of autism-related changes during puberty but lack deep knowledge and confidence in addressing these issues. This partially supports Hypothesis (1). The findings stress the need for educational programs and caregiver support, particularly in under-resourced areas, as noted by Tadesse *et al.* (2024), Hamdan (2022), and Wang *et al.* (2018).

Hypothesis 2: Postulates that "Family caregivers hold identifiable misconceptions or demonstrate gaps in knowledge concerning the behavioral and social changes associated with puberty in autistic children"

Numerous studies highlight that caregivers frequently feel inadequately prepared to handle the complex developmental changes that occur during puberty in children with ASD. Okwara and Donald (2024) indicated that caregivers often possess limited understanding of their children's developmental conditions and view existing treatments as largely ineffective, coupled with moderate levels of family distress. Similarly, Wang *et al.* (2018) demonstrated that parental knowledge about ASD is significantly affected by factors such as maternal education, family income, and participation in training programs. Several respondents echoed this need. One said, "I would like additional information on managing behavioral and social changes and where to find reliable resources," and another stated, "I want to understand the general changes that may occur, the most difficult challenges, and the best ways to handle them." These statements clearly reflect uncertainty and a desire for reliable guidance. A third respondent noted, "I struggle to distinguish whether new behaviors are due to typical puberty or autism-related changes," highlighting the confusion between developmental and condition-specific behaviors.These findings illustrate that disparities in knowledge are not only prevalent but also influenced by socio-demographic factors, further intensifying the challenges faced by caregivers.Quantitative findings presented in Table 6 highlight the prevalence of misconceptions among caregivers. Caregivers reported possessing incorrect or incomplete information concerning puberty in autistic children (mean = 1.3), coupled with a significant interest in obtaining additional training and resources (mean = 1.925). These results substantiate caregivers' recognition of their knowledge deficits and underscore the need for educational interventions. Furthermore, the average score of 1.425 related to understanding how autism specifically impacts puberty indicates that, while there is some level of awareness, it remains moderate and insufficient for effectively supporting children through this developmental stage.The qualitative insights gathered from various studies provide further validation. Tadesse *et al.* (2024) found that Ethiopian parents identified significant behavioral and sexual development challenges in their autistic children during puberty yet lacked the tools to respond appropriately within their sociocultural context. Similarly, Hamdan (2022) reported that caregivers observed early-onset puberty and the emergence of inappropriate behaviors but struggled with managing these due to poor understanding and inadequate resources. These narratives align closely with the hypothesis by showing both knowledge gaps and the consequences of misinformation or lack of awareness. Interestingly, gender differences in misconceptions and knowledge gaps were found to be statistically insignificant (p = 0.655), according to Table 12. This suggests that both mothers and fathers experience similar challenges in understanding the impact of puberty on autistic children, reinforcing the need for inclusive and universally targeted educational programs. Nonetheless, Al-Dulbhi (2023) observed that while mothers reported higher levels of stress, fathers demonstrated more effective coping mechanisms, implying that gender-based support approaches may still be beneficial.Moreover, Burnett *et al.* (2011) provided insight into how puberty influences emotional complexity in typically developing adolescents, underscoring the unique challenges faced by autistic youth who may not process these social emotions in typical ways. Understanding this divergence is crucial for caregivers, yet it appears to be underrepresented in their current knowledge base.In short, family caregivers of autistic children often lack knowledge about the social and behavioral changes during puberty. This highlights the need for targeted training, culturally sensitive education, and systemic support to help both caregivers and children.

Hypothesis 3: Postulates that "Higher levels of understanding among family caregivers are positively associated with more effective support and management of their autistic children's needs during puberty"

Data from Table 13 shows that increased caregiver awareness correlates with better support provision (mean = 1.7) and improvements in child behavior (mean = 1.625). This supports the assumption that informed caregivers are more capable of addressing their children's unique needs during puberty. One respondent stated, "I need scientifically based support to rely on for handling my child," which indicates a direct link between increased knowledge and improved caregiving. Another added, "I want guidance on how to manage behavioral evolution as my child ages, especially with mood swings and social withdrawal," illustrating the importance of informed, ongoing support. This is consistent with Wang *et al.* (2018), who found that higher parental knowledge shaped by maternal education, income, and participation in training was significantly associated with improved caregiving practices in China (Wang et al., 2018). Table 14 highlights that anxiety and stress (67.5%) are the most pressing concerns for caregivers, with behavioral (23%) and social changes (10%) also reported. These findings reflect the emotional and psychological complexities of puberty, which were similarly noted by Burnett *et al.* (2011). Their study linked later pubertal stages with increased emotional complexity, such as experiencing multiple emotions simultaneously, indicating the need for caregiver guidance during this time (Burnett et al., 2011).The absence of a significant association between caregiver gender and support effectiveness (p = 0.625, Table 19) aligns with Al-Dulbhi's (2023) findings. While Al-Dulbhi found differences in coping styles with mothers experiencing more challenges and fathers showing stronger coping mechanisms, both parents' contributions were essential. This indicates that training and support must be inclusive and tailored to different parental experiences (Al-Dulbhi, 2023).The study also resonates with qualitative data from Ethiopia (Tadesse et al., 2024), where caregivers faced challenges like managing inappropriate sexual behaviors and poor hygiene but identified awareness as critical in navigating puberty. Similarly, Manohar *et al.* (2024) emphasized how parents in low-resource settings in India relied on personal resilience and gradual knowledge acquisition to manage their children's needs, affirming that education plays a vital role in support effectiveness.

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