Original article

Challenging Behaviors in Children with Down Syndrome: Prevalence and Associated Factors

Bilal Abid[1], Sultan Badar[1], Fareeha Latif Randhawa[1], Muneeba Malik[1], Fatima[1], Munawar Ghous[1]
[1]Development and Behavior Pediatrics, Children's Hospital, University of Child Health Sciences (CH&UCHS), Lahore, Pakistan
Correspondence to: Bilal Abid, Email: drbilalabid@gmail.com

ABSTRACT

Background: Children with Down syndrome often exhibit challenging behaviors that impact their daily functioning and social interactions. Identifying these behaviors and their associated factors is essential for developing targeted interventions to enhance their well-being and quality of life. The objective of this study was to identify and assess challenging behaviors in children with Down syndrome, determine their prevalence, and evaluate the influence of comorbidities, living environment, cognitive and communication abilities, mobility status, and socioeconomic status on behavioral functioning.

Methods: A cross-sectional study was conducted with a sample size of 42 children with Down syndrome age range of 5-12 years, selected using a purposive sampling technique. Data were collected through caregiver-reported questionnaires assessing behavioral challenges, including tantrums, aggravation, aggression, separation anxiety, stubbornness, and adaptability to routines. Statistical analyses included chi-square, independent t-tests and ANOVA.

Results: The findings revealed that tantrums and stubbornness were among the most prevalent challenging behaviors, reported by 48% and 59.52% of caregivers, respectively. Social interaction challenges, including aggravation, were noted in 42.86% of cases. A significant portion (80.95%) of caregivers felt confident managing challenging behaviors at home. Statistical analysis demonstrated that cognitive ability, communication ability, mobility status, and socioeconomic status significantly influenced behavioral functioning ($p < 0.001$). Higher adaptive behavior scores were associated with mild cognitive ability, verbal communication, independent mobility, and higher socioeconomic status.

Conclusion: The identification of behavioral challenges during early development requires specific interventions and empowered parents to create effective outcomes for children with Down syndrome and their families.

Keywords:
Down syndrome, challenging behaviors, cognitive ability, communication ability, mobility status

INTRODUCTION

Children with Down syndrome (DS) often exhibit a range of challenging behaviors (CB), which can persist throughout their developmental stages and significantly affect their functional and social outcomes[1]. Challenging behaviors are defined as actions that may be harmful to the individual or others, disruptive to their environment, or burdensome to caregivers, often resulting in impaired skill acquisition and developmental delays[2]. These behaviors commonly serve two main functions: seeking attention or attempting to escape from non-preferred tasks or environments[1].

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Several factors contribute to the emergence and persistence of challenging behaviors in children with DS. A major contributor is the typical behavioral phenotype associated with DS, characterized by specific developmental strengths and weaknesses. For example, many children with DS display relatively strong visual processing skills but experience delays in expressive language and social adaptability[1]. Additionally, sleep disturbances, particularly obstructive sleep apnea which affects approximately 52–69% of individuals with DS—can exacerbate irritability and behavioral dysregulation[3].

The presence of comorbid conditions, such as congenital heart disease (CHD), autism spectrum disorder (ASD), and attention deficit hyperactivity disorder (ADHD), further complicates the behavioral profile of children with DS[3]. These children frequently struggle with behaviors such as tantrums, aggression, resistance to routines, and difficulties with social interaction. These behavioral challenges not only impact their learning and adaptive functioning but also place emotional and practical strain on their caregivers[4,5].

Cognitive ability, verbal communication skills, mobility status, and socioeconomic background are closely linked to behavioral outcomes in children with DS[6].

For instance, limited verbal communication may increase frustration and lead to externalizing behaviors such as aggression or tantrums. Similarly, children with reduced mobility or intellectual functioning often exhibit higher levels of dependence, which may contribute to behavioral difficulties[7]. Socioeconomic constraints can also limit access to specialized services and supports, compounding behavioral issues[1].

Although some literature mentions the influence of parenting styleson child behavior, this study does not include parenting style as a variable under investigation and it has therefore been removed to maintain focus and relevance.

Previous research has primarily described the presence of behavioral challenges in DS; however, there is a lack of comprehensive analysis examining how specific demographic and clinical factors influence behavioral functioning in this population[1]. This study aims to address this gap by identifying the frequency of challenging behaviors in children with DS and evaluating their association with cognitive ability, communication skills, mobility status, comorbidities, living environment, and socioeconomic factors. Understanding these relationships is essential to designing targeted behavioral interventions and improving the quality of life for both children and their families[8].

PARTICIPANTS AND METHODS

A cross-sectional study was conducted over six months (January–June 2024) at the Developmental Pediatrics Department, The Children's Hospital, University of Child Health Sciences, Lahore. A purposive sample of 42 children aged 5–12 years with clinically diagnosed Down syndrome was recruited along with their primary caregivers.

Inclusion criteria required a confirmed diagnosis of Down syndrome and a caregiver involved in daily care for at least three months. Caregivers included parents, legal guardians, adult siblings, or trained institutional caregivers. Children with acute illness, profound sensory impairments, or without an available caregiver were excluded.

Data were collected using the Child's Challenging Behavior Scale Version 2 (CCBS-V2) through face-to-face interviews conducted in a quiet, designated area of the hospital. The questionnaire assessed disruptive behaviors (e.g., tantrums, aggression, noncompliance), as well as adaptive behavior, communication status (verbal, non-verbal, limited speech), cognitive ability (mild, moderate, severe), and mobility status (independent, assisted, wheelchair-bound). Demographic data such as age, gender, family structure, residence (urban/rural), and socioeconomic status (SES) were also recorded. SES was determined using income and parental education to classify families into low, middle, or high categories. Clinical comorbidities such as CHD, ASD, and ADHD were noted from caregiver reports and hospital records. Parenting style was excluded due to lack of standardized measurement.

Ethical approval was obtained from the Institutional Review Board of the University of Child Health Sciences. Written informed consent was taken from each participant, and all procedures followed the Declaration of Helsinki guidelines, ensuring confidentiality, voluntary participation, and the right to withdraw.

Data were analyzed using SPSS version 25. Descriptive statistics summarized demographic and clinical characteristics. Inferential analyses included independent t-tests (for comorbidities and residence) and one-way ANOVA (for cognitive ability, communication status, mobility, and SES). A p-value < 0.05 was considered statistically significant.

RESULTS

The caregiver responses offer detailed insight into the behavioral patterns of children with Down syndrome. When asked whether their child never has tantrums, 20 caregivers (47.62%) disagreed and 7 (16.67%) strongly disagreed, indicating that tantrums are commonly observed. Only 2 caregivers (4.76%) strongly agreed, suggesting that tantrums are present in most children. Regarding the behavior of aggravating others, 18 caregivers (42.86%) agreed with the statement, while another 18 (42.86%) disagreed, showing a near-even split and highlighting that this behavior is experienced by a considerable proportion of the sample. Aggressive or violent tendencies were also noted, with 18 caregivers (42.86%) disagreeing and 9 (21.43%) strongly disagreeing with the statement "My child is never aggressive and violent," indicating that 27 children (64.29%) were perceived to exhibit some form of aggression. None of the caregivers strongly agreed with this statement. In contrast, 24 caregivers (57.14%) agreed and 6 (14.29%) strongly agreed that their child does not mind being left at home with another adult, suggesting that 30 children (71.43%) tolerate separation well, while 12 (28.57%) disagreed. When asked about stubbornness, 25 caregivers (59.52%) agreed and 5 (11.90%) strongly agreed that their child can be stubborn and uncooperative, totaling 30 caregivers (71.42%). Only 1 caregiver (2.38%) strongly disagreed, indicating that this trait is widely recognized among the sample. In terms of behavioral management, 34 caregivers (80.95%) agreed and 4 (9.52%) strongly agreed that they can manage their child's challenging behaviors at home, demonstrating a high level of caregiver confidence and competence. Only 3 caregivers

(7.14%) disagreed and 1 (2.38%) strongly disagreed. Regarding emotional well-being, 23 caregivers (54.76%) agreed and 11 (26.19%) strongly agreed that their child is happy and content at home, totaling 34 caregivers (80.95%). Similarly, 28 caregivers (66.67%) agreed and 6 (14.29%) strongly agreed that their child follows the family routine easily, showing that 34 children (80.96%) adjust well to structured environments. However, when asked if their child copes well with disruptions in routine, only 20 caregivers (47.62%) agreed and 3 (7.14%) strongly agreed, while 19 caregivers (45.24%) disagreed, suggesting that nearly half of the children experience difficulty adapting to changes (Table 1).

The comparison of mean behavior scores across demographic and functional variables reveals several important associations in children with Down syndrome. Overall, children living in urban areas (Mean = 16.50, SD = 1.69) had significantly better behavioral scores than those in rural areas (Mean = 14.27, SD = 2.96), with a p-value of 0.047, suggesting that environmental factors may influence behavioral outcomes. Cognitive ability showed a strong association with behavioral functioning ($p < 0.001$); children with mild intellectual disability had the highest scores (Mean = 16.64, SD = 1.82), followed by those with moderate (Mean = 15.25, SD = 2.45) and severe (Mean = 12.56, SD = 2.61) disabilities, indicating that improved cognitive functioning correlates with fewer behavioral challenges. Similarly, communication ability played a significant role, as verbal children had the highest mean behavior scores (Mean = 17.05, SD = 1.28), while those with limited speech (Mean = 13.50, SD = 1.10) and non-verbal children (Mean = 10.00, SD = 2.28) had lower scores ($p < 0.001$), highlighting the importance of verbal skills in managing behavior. Mobility status was also significantly related to behavior ($p <0.001$); independently mobile children had higher scores (Mean = 17.41, SD = 1.00) compared to those needing assistance (Mean = 13.50, SD = 1.23) and wheelchair-bound children (Mean = 8.00, SD = 1.00), suggesting increased independence supports better behavior. Finally, socioeconomic status showed a marked influence, with children from high SES backgrounds scoring highest (Mean = 18.50, SD = 1.73), followed by middle (Mean = 16.42) and low SES groups (Mean = 12.16, SD = 2.06), with $p < 0.001$. These findings indicate that behavioral functioning in children with Down syndrome is positively influenced by higher cognitive and communication abilities, better mobility, urban residence, and stronger socioeconomic standing (Table 2).

The table 3 presents associations between behavioral functioning levels (classified as challenging behavior, borderline behavior, and adaptive behavior) and various demographic and clinical variables in children with Down syndrome. While the association between living environment and behavioral levels was not statistically significant ($p = 0.198$), the data show that children from rural areas were more likely to exhibit challenging (n = 10) or borderline behavior (n = 22), compared to urban children, of whom 7 showed borderline and only 1 showed adaptive behavior.

Cognitive ability showed a trend toward significance ($p = 0.058$). Children with severe cognitive impairments exhibited the highest number of challenging behaviors (n = 7), while those with mild cognitive ability demonstrated better behavioral outcomes, with no cases of challenging behavior and 2 cases of adaptive functioning. Communication ability had a statistically significant association with behavioral functioning ($p < 0.001$). All non-verbal children fell into the challenging behavior category (n = 6), whereas the majority of verbal children displayed borderline (n = 17) or adaptive behavior (n = 3), indicating that communication plays a vital role in behavior regulation.

Mobility status was also significantly associated with behavioral functioning ($p = 0.001$). Children with independent mobility mostly fell into the borderline (n = 14) or adaptive behavior groups (n = 3), while those requiring assistance or using a wheelchair predominantly exhibited challenging behaviors. Among wheelchair-bound children, all (n = 3) fell into the challenging behavior category.

Table 1: Parental perceptions of behavioral traits in children with Down syndrome

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
My child never has tantrums	2 (4.76%)	13 (30.95%)	20 (47.62%)	7 (16.67%)
My child aggravates others	1 (2.38%)	18 (42.86%)	18 (42.86%)	5 (11.90%)
My child is never aggressive and violent towards others	-	15 (35.71%)	18 (42.86%)	9 (21.43%)
My child does not mind when I leave them at home with another adult while I go out	6 (14.29%)	24 (57.14%)	12 (28.57%)	-
My child can be stubborn and uncooperative	5 (11.90%)	25 (59.52%)	11 (26.19%)	1 (2.38%)
I am able to manage the most challenging and difficult behaviors effectively on my own at home	4 (9.52%)	34 (80.95%)	3 (7.14%)	1 (2.38%)
My child is happy and content at home most of the time	11 (26.19%)	23 (54.76%)	8 (19.05%)	-
My child follows the family routine easily	6 (14.29%)	28 (66.67%)	8 (19.05%)	-
My child copes well with disruptions to the family routine	3 (7.14%)	20 (47.62%)	19 (45.24%)	-

Table 2: Comparison of mean behavior scores across demographic and functional variables

Variables	N	Mean	SD	p-value
Living Environment				
Rural	34	14.265	2.957	0.047
Urban	8	16.500	1.690	
Cognitive Ability Level				
Severe	16	12.563	2.607	< 0.001
Moderate	12	15.250	2.454	
Mild	14	16.643	1.823	
Communication Ability				
Limited speech	16	13.500	1.095	< 0.001
Non-verbal	6	10.000	2.280	
Verbal	20	17.050	1.276	
Mobility Status				
Independent	17	17.412	1.004	< 0.001
Needs assistance	22	13.500	1.225	
Wheelchair-bound	3	8.000	1.000	
Household Socioeconomic Status				
Low	19	12.158	2.062	< 0.001
Middle	19	16.421	SD	
High	4	18.500	1.732	

Table 3: Association behavioral functioning levels with demographic and clinical variables

Variables	Behavioral Functioning Level			p-value
	Challenging Behavior[a]	Borderline Behavior[b]	Adaptive Behavior[c]	
Living Environment				
Rural	10	22	2	0.198
Urban	0	7	1	
Cognitive Ability Level				
Severe	7	9	0	0.058
Moderate	3	8	1	
Mild	0	12	2	
Communication Ability				
Limited speech	4	12	0	< 0.001
Non-verbal	6	0	0	
Verbal	0	17	3	
Mobility Status				
Independent	0	14	3	0.001
Needs assistance	7	15	0	
Wheelchair-bound	3	0	0	
Household Socioeconomic Status				
Low	10	9	0	< 0.001
Middle	0	19	0	
High	0	1	3	

[1]Behavioral Functioning Level was categorized based on total scores from the Child's Challenging Behavior Scale (CCBS-V2):
[a]Challenging Behavior: Score < 13
[b]Borderline Behavior: Score 13–16
[c]Adaptive Behavior: Score > 16

Socioeconomic status showed a strong and statistically significant association ($p < 0.001$). All children from low socioeconomic backgrounds exhibited either challenging (n = 10) or borderline behavior (n = 9), with none in the adaptive category. In contrast, children from high SES backgrounds were predominantly in the adaptive category (n = 3), while those from middle SES mostly exhibited borderline behavior (n = 19). These results indicate that higher socioeconomic conditions, better mobility, verbal communication, and milder cognitive impairment are positively associated with better behavioral functioning in children with Down syndrome.

DISCUSSION

The behavioral problems of children with Down syndrome stem from multiple factors associated with their unique developmental trajectories. A significant 48% of caregivers disagreed with the statement *"My child never has tantrums,"* indicating frequent emotional outbursts. Studies suggest that children with Down syndrome often face challenges in speech development,

which may contribute to emotional dysregulation and subsequent tantrum behaviors[9,10]. Behavioral therapy combined with emotional regulation strategies serves as a necessary and proactive intervention for managing such difficulties[1].

Another notable issue is the tendency of children with Down syndrome to irritate others, as 42.86% of caregivers observed such behaviors. These actions manifest through peer interruptions and irritability, which disrupt interpersonal communication[1,11]. Consequently, social skills training that emphasizes patience-building and interpersonal understanding is recommended. Structured programs aimed at enhancing social competence have been shown to yield meaningful results in children with developmental delays, including those diagnosed with Down syndrome[1,11].

Regarding aggressive tendencies, caregiver responses were divided: 35.71% agreed while 21.43% strongly disagreed with the presence of aggressive behavior in their children. These mixed responses reflect inconsistent findings and highlight the need for further investigation into how such behavior was measured and interpreted[2]. Nevertheless, positive behavior support plans along with emotional control strategies are crucial to prevent or reduce aggressive outbursts[9].

In terms of anxiety-related behaviors, 28.57% of caregivers reported that their children experience distress when left with alternative caregivers. While some evidence suggests that gradual exposure to anxiety-inducing situations along with reinforcement of positive behaviors may reduce anxiety symptoms[12], this suggestion goes beyond the original objectives and should be presented as a recommendation rather than an observation.

Stubbornness and non-compliance were frequently reported, with 59.52% of caregivers indicating these behaviors. At the same time, 80.95% reported successful behavioral management at home, reflecting parental resilience and the potential effectiveness of individualized behavioral strategies[12]. The manuscript should clarify how this success rate was measured or derived from the data.

Emotional well-being was assessed using statements addressing children's general happiness and their ability to adapt to family routines. While 45.24% had difficulty with routine changes, 54.76% of caregivers affirmed that their children are generally content with life[12]. These figures highlight the importance of providing structure and predictability in a child's environment to facilitate smoother transitions and enhance emotional adjustment[11].

Although the text states that behavioral scores showed no significant difference between children with and without comorbidities, the types of comorbidities were not explicitly defined. Since no specific comorbidities were analyzed or described, this element should either be clarified or removed from both the objectives and the discussion section.

Environmental context also appears to influence behavioral outcomes; the study notes that urban children seem to adapt more effectively compared to their rural counterparts[1]. Additionally, findings emphasize that a child's behavioral profile is closely linked to their cognitive and communication abilities, with those demonstrating stronger abilities exhibiting more adaptive behaviors[13]. These insights underscore the necessity for intervention strategies that address both individual capacities and contextual factors when supporting children with Down syndrome.

CONCLUSION

Challenging behaviors are prevalent among children with Down syndrome and are significantly influenced by cognitive ability, communication status, mobility, and socioeconomic conditions. Children with milder cognitive impairments, verbal communication skills, independent mobility, and higher socioeconomic status demonstrated better behavioral functioning. Frequent tantrums, irritability, stubbornness, and non-compliance were commonly reported, while aggressive and anxiety-related behaviors showed mixed responses. Many caregivers reported successfully managing these behaviors at home, reflecting parental resilience and the potential effectiveness of individualized strategies. Emotional well-being was generally positive, with structured and predictable environments supporting better adjustment. Urban children appeared to adapt more effectively than rural counterparts, and stronger cognitive and communication abilities were linked to more adaptive behaviors. These findings underscore the importance of early identification of behavioral issues and tailored, multidisciplinary interventions that consider individual and contextual factors to improve outcomes for children and their families.

The small sample size (N=42) and purposive sampling limit generalizability of this study. The results acquired through caregivers might show bias and the study's cross-sectional structure hinders both causal relationships and temporal interpretations. Research should focus on following up participants over long periods using bigger and more inclusive groups in order to investigate behavior transformations with intervention performance measurement.

Author Contributions

Bilal Abid: Conception and design, analysis and interpretation of data, drafting the article, critical revision for important intellectual content, final approval.

Sultan Badar: Conception and design, analysis and interpretation of data.

Fareeha Latif Randhawa: Analysis and interpretation of data, drafting the article.

Muneeba Malik: Acquisition of data, conception and design, analysis and interpretation.

Fatima: Analysis and interpretation of data, proofreading.

Munawar Ghous: Conception and design, analysis and interpretation of data.

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