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Toileting Resistance Among Preschool Age Children With and Without Autism Spectrum Disorder

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Abstract

Objective: Children with autism spectrum disorder (ASD) may achieve continence later than other children. Little is known about factors associated with toileting resistance in children with ASD and other developmental delays/disabilities (DD). We sought to describe toileting resistance in children with ASD, DD, and from the general population (POP) and identify factors associated with toileting resistance in children with ASD and DD.

Method: Families and children aged 24–68 months were enrolled in the Study to Explore Early Development, a multi-site case-control study on ASD. Children with ASD (N=743) and DD (N=766), and those from the POP (N=693) who were >=48 months were included in this study. Parents reported toileting resistance, gastrointestinal issues, behavior problems, and ASD symptoms in their child. Children completed an in-person evaluation to determine ASD status and developmental level.

Results: Toileting resistance was more common among children with ASD (49.1%) than children with DD (23.6%) and POP (8.0%). Diarrhea and deficits in social awareness were significantly associated with toileting resistance in children with ASD and DD. Constipation, expressive language delays, and low social motivation were significantly associated with toileting resistance only in children with ASD; very low visual reception skills and oppositional behaviors were significantly associated with toileting resistance in only children with DD (all p <=.05).

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Conclusion: Evaluating gastrointestinal issues, developmental delays, and social deficits prior to toileting training may help identify children with atypical development who are likely to present with toileting resistance. These evaluations can be incorporated into health supervision visits.

Keywords

autism; preschool; toileting

Mastery of toileting skills in the first few years of life is an important developmental milestone that facilitates child independence and prevents future problems with bladder and bowel health.[1-3] Most typically developing children begin toilet training between 18 and 30 months and most achieve daytime continence by 36 months.[4-8] The Diagnostic and Statistical Manual of Mental Disorders – 5th edition notes that incontinence is considered a problem >=4 years for encopresis and >=5 years for enuresis, based on developmental age. Delayed mastery of toileting skills is associated with anxious/depressed symptoms,[9] diminished self-esteem,[10] reduced quality of life in the child,[10] and significant parenting stress.[11] Almost half of school-aged children who experience persistent daytime enuresis present with learning or behavioral problems that interfere with school functioning.[12]

Autism spectrum disorder (ASD) is a developmental disability associated with social deficits and restricted interests and repetitive behaviors that manifest in early childhood. Some studies suggest that children with ASD achieve continence later than their typically developing peers and those with other developmental delays/disabilities (DD).[8, 12-13] Factors associated with toileting problems in the among typically developing children include anxious/depressed symptoms,[9] delayed motor skills,[14] family history of toileting problems,[15] gastrointestinal issues,[5,15-16] and male sex.[9,7,15] Although the data are limited, some of these same factors are associated with toileting problems in adolescents and adults with ASD, including anxious/depressed symptoms,[17] gastrointestinal issues,[17] and male sex,[12] in addition to intellectual disability and language delays.[17] While toileting problems tend to resolve with maturation in typically developing children, incontinence tends to persist across the lifespan if left untreated in individuals with DD.[13]

Much of the research on toileting problems among those with ASD has focused on school age children, adolescents, and adults. There is little literature on toileting problems in preschool age children with ASD,[12] and no identified study focused on factors associated with toileting resistance in preschool age children with ASD or other DD. Identifying factors associated with toileting resistance among children with atypical development in the preschool years could inform pediatric practice and help tailor interventions that may prevent chronic toileting issues later in life. Additionally, results from a large geographically diverse community-based sample could further advance our understanding of toileting resistance in children with ASD or other DD beyond findings obtained from small clinic-based samples.

To address these gaps, our objectives were to use data from children enrolled in a large multisite case-control study to (1) describe toileting resistance in preschool age children >=48 months with ASD compared to those with other DD and those from the general population (POP) and (2) identify factors associated with toileting resistance in children

>= 48 months with ASD and other DD. Based on the limited research available, we hypothesized that toileting resistance would be highest among children with ASD followed by children with DD then POP, and that factors associated with gastrointestinal issues and developmental delays would be associated with toileting resistance among children with ASD and DD. Although not explored in previous studies, we also hypothesized that ASD social deficits would be associated with toileting resistance among children with ASD.

METHOD

Participants were children and families who completed data collection for the Study to Explore Early Development Phase-2 (2012–2016) (SEED-2). SEED-2 is a multisite, case-control study of preschool age children designed to investigate risk factors and behavioral phenotypes associated with ASD. SEED-2 was conducted in communities in California, Colorado, Georgia, Maryland, North Carolina, and Pennsylvania. The SEED-2 protocol was approved by Institutional Review Boards at the Centers for Disease Control and Prevention and each SEED site. To be eligible for the study, a child had to be 24 through 68 months of age, have been born and reside in one of the study areas, and live with an English-speaking caregiver. Spanish-speaking caregivers were eligible in California and Colorado.

Enrollment focused on three groups of children: (1) those with known ASD, (2) those with known DD, and (3) those from the general population (POP). Children with known ASD and DD were identified from multiple educational and health providers by special education classification and diagnostic codes found in service records, or by family or physician referral. POP children were identified from state vital records. Families of potential participants were mailed information about the study, which included a response card to indicate interest in receiving more information. Schendel et al. (2012) provided a detailed description of eligibility criteria, ascertainment methods, enrollment methods, and data collection procedures in SEED.[18] Caregivers of enrolled children gave written consent to participate.

Data collection procedures

Parents completed the *Social Communication Questionnaire* (SCQ)[19] when first enrolled to determine child ASD risk and subsequent assessment procedures. Parents then completed self-administered forms to assess child behavior problems, gastrointestinal and other medical issues, and general ASD symptoms. Children were administered an early learning assessment during an in-person clinic visit. For the purposes of these analyses, only children who were >=48 months at the time of the clinic visit were included in the sample.

Data collection instruments

The *Child Behavior Checklist* (*CBCL*)[20] 1½–5-year-old version is a widely used standardized assessment of child behavior problems that contains 99 behaviors rated as “not true,” “somewhat or sometimes true,” or “very true or often true” within three months of CBCL completion. Individual items are rated separately by the parent/caregiver and then some are combined to derive five Diagnostic and Statistical Manual of Mental Disorders (DSM)-oriented subscales including anxiety, attention deficit hyperactivity, and oppositional

problems. CBCL t-scores of 65 or higher indicate borderline to clinically significant problems in the child; this cut-off was used to define the presence or absence of problems on each subscale. One item on the CBCL asks if the child "resists toilet training." This item was categorized as "no" if the parent answered as "not true" and "yes" if the parent answered as "somewhat or sometimes true" or "very true or often true." The CBCL toileting item is not included in the items used to derive DSM-oriented scales.

Responses to the *SEED-2 maternal interview* developed by SEED investigators was used to determined household income relative to federal poverty level (<=100%, 101%–200%, 201%–300%, 301%–399%, and >=400%), maternal education (less than high school diploma, high school diploma, associate degree/some college, college graduate, or advanced degree), and maternal race/ethnicity (Non-Hispanic White (NHW), Non-Hispanic Black (NHB), Non-Hispanic Other (NHOth), and Hispanic (HISP).) Mothers also reported child diagnoses given by a healthcare provider before study enrollment. These diagnoses were not mutually exclusive, so multiple diagnoses could be reported for the same child.

The *SEED-2 child health history form* was developed by SEED investigators to collect information on a variety of child conditions, including gastrointestinal issues. Mothers were asked to "Tell us how often your child has had the following problems within the past year." Problems included abdominal pain (general; not associated with diarrhea or constipation), abdominal pain (on stooling or having a bowel movement), abdominal distension or tummy bloating, constipation, diarrhea not associated with illness, gaseousness, gastroesophageal reflux, and vomiting not associated with illness. Gastrointestinal problems were considered endorsed if the mother reported that the child experienced the problem two or more times per month within the past year.

The *Social Responsiveness Scale (SRS)*[21] is a 65-item parent/caregiver questionnaire that assesses children's ASD symptoms and has five treatment subscales: autistic mannerisms (including "insistence on sameness" items), social awareness, social cognition (including an item on sensory over-reactivity), social communication, and social motivation. Higher SRS scores represent more ASD-related behaviors. SRS domain t-scores of 66 or higher indicate moderate to severe risk for ASD-related behaviors in the child; this cut-off was used to define the presence or absence of ASD risk on each subscale.

The *Mullen Scales of Early Learning (MSEL)*[22] is a standardized in-person evaluation of the early learning abilities of young children. The MSEL yields an early learning composite score (ELC) with a mean of 100 and standard deviation of 15 points. The MSEL ELC is based on performance in four domains: expressive language, receptive language, fine motor, and visual reception skills. MSEL domain scores have a mean of 50 and standard deviation of 10 points. MSEL domain scores less than 30 defined "very low developmental functioning" in this study.

Study classification

Families of children with a SCQ score >=11 points, who had a previous ASD diagnosis, or who demonstrated ASD behaviors during the MSEL were asked to complete the *Autism Diagnostic Interview — Revised* (a comprehensive parent interview) (*ADI-R*)[23]

and the *Autism Diagnostic Observation Schedule* (a standardized observation of the child) (*ADOS*).[24-25] The ADI-R and ADOS are gold-standard diagnostic instruments used to differentiate children with ASD from children with other DD. Children classified as ASD were those ascertained from any study recruitment source and met ASD criteria on both the ADI-R and ADOS, or who met ASD criteria on the ADOS and one of three alternate criteria on the ADI-R (i.e., met criteria on the social domain and was within two points on the communication domain, met criteria on the communication domain and was within two points on the social domain, or met criteria on the social domain and had two points noted on the behavioral domain).

Children with known DD were classified as DD if they were not referred for an ADI-R and ADOS or did not meet ASD case status upon completion of the ADI-R and ADOS. Similarly, children who were ascertained from state vital records were classified as POP if they were not referred for an ADI-R and ADOS or did not meet ASD case status upon completion of the ADI-R and ADOS. Details on the SEED final classification algorithm are provided in Wiggins et al. (2015).[26]

Statistical analyses

Statistical analyses were conducted using SPSS version 24.0. We first report sample characteristics noting omnibus chi-square differences between children classified as ASD, DD, and POP. We then similarly report discrete differences in the presence/absence of toileting resistance reported on the CBCL, parent-reported gastrointestinal issues, MSEL measures of very low developmental functioning, CBCL measures of behavior problems in the child (i.e., anxiety, attention deficits/hyperactivity, and oppositional defiant problems), and SRS measures of risk for ASD symptoms in the child (i.e., autistic mannerisms, social awareness, social cognition, social communication, and social motivation).

To account for false discovery in discrete chi square tests, we used the Benjamini Hochberg procedure with α=0.05. First, *p* values for these comparisons were ranked from lowest to highest within each study group. Second, critical values were calculated by dividing the rank of an individual *p* value by number of hypotheses tested, then multiplying by the false discovery rate. We did this correction for CBCL, GI, MSEL, and SRS variables (for example, the lowest significance threshold for a comparison of 20 variables = 0.05*1/20 = 0.002).

Two forward conditional logistic regression models — one for children with ASD and one for children with DD — examined associations between toileting resistance and the following: Block 1=gastrointestinal issues, Block 2=MSEL very low developmental functioning, Block 3=CBCL behavior problems, and Block 4=SRS risk for ASD symptoms. Forward conditional regression allows researchers to enter variables in a stepwise progression to achieve the most parsimonious model. The conditional approach retains variables in one block based on significance of the score statistics and removes variables based on the probability of a likelihood-ratio given conditional parameter estimates. Variables are retained and removed until all variables are considered in the model. The results of these analyses revealed independent associations with toileting resistance above those found in the previous block analysis.

MSEL, CBCL, and SRS independent variables were treated as categorical rather than continuous variables for ease of interpretation (e.g., the odds of toileting resistance in children with ASD who have diarrhea are XX times the odds of those without very low fine motor skills). Regression models were adjusted for child sex, child age, federal poverty level, maternal education, and maternal race/ethnicity. Adjusted odds ratios (aOR), 95% confidence intervals (95% CI), and p values are reported. As a reminder, an aOR can be interpreted as the number of children with an exposure (e.g., diarrhea) who experience toileting resistance divided by the number of children who do not, after adjusting for the aforementioned variables.

RESULTS

There were 2,899 participants in SEED-2. Of those, 2,202 children were >=48 months at the time of the SEED clinic visit and had the CBCL toileting question answered by their mother; 743 were classified as ASD, 766 were classified as DD, and 693 were classified as POP. The most common diagnoses given by a healthcare provider for DD children were speech/language delay (61.6%), unspecified developmental delay (35.0%), motor/movement delay (10.6%), hearing problems (8.7%), sensory integration problems (8.5%), learning disability (6.5%), and attention deficit hyperactivity disorder (5.9%). The mean age at the time of the SEED clinic visit was 55.8 months and did not differ between study groups. The mean MSEL ELC standard score was 65.4 for the ASD sample, 84.4 for the DD sample, and 103.6 for the POP sample (p<.01). Other sample characteristics are provided in Table 1.

Between-group comparisons of variables that represented toileting resistance within the last three months, gastrointestinal issues within the past year, very low developmental functioning, child behavior problems, and child risk for ASD symptoms are highlighted in Table 2. Of note, parents of children with ASD were significantly more likely to report toileting resistance than parents of children in the DD or POP groups (49.1% vs. 23.6% and 8.0%, respectively, p<.01). Parents of children with ASD were also significantly more likely than other parents to report each gastrointestinal issue noted on the child health history form (all p values <.01). Constipation was the most common gastrointestinal issue reported for all children (35.0% ASD, 22.8% DD, and 15.6% POP, p<.01).

Factors associated with toileting resistance in children with ASD are outlined in Table 3. In the most parsimonious model, constipation (aOR=1.64; 95% CI=1.10;2.45), diarrhea (aOR=1.54; 95% CI=1.01;2.45), very low expressive language skills (aOR=1.70; 95% CI=1.03;2.82), deficits in social awareness (aOR=1.97; 95% CI=1.31;3.00), and deficits in social motivation (aOR=1.50; 95% CI=1.02;2.21) were associated with parent-reported toileting resistance. Factors associated with toileting resistance in children with other DD are outlined in Table 4. In the most parsimonious model, diarrhea (aOR=2.56; 95% CI=1.37;4.76), very low visual reception skills (aOR=2.10; 95% CI=1.10;4.14), oppositional behaviors (aOR=2.87; 95% CI=1.54;5.34), and deficits in social awareness (aOR=2.19; 95% CI=1.23;3.91) were associated with parent-reported toileting resistance.

DISCUSSION

We found that preschool age children with ASD aged >=48 months in our study resisted toileting significantly more often than their DD or POP counterparts. In fact, almost half of the children with ASD in our sample had parent-reported toileting resistance within the past three months. The prevalence of toileting resistance in our POP group was in-range with estimates of toileting problems in the general population.[27] Factors associated with toileting resistance in children with ASD and other DD were diarrhea and deficits in social awareness. Factors associated with toileting resistance only in children with ASD were constipation, very low expressive language skills, and deficits in social motivation; factors associated with toileting resistance only in children with DD were very low visual reception skills and oppositional behaviors. These findings have important implications for pediatric practice and clinical intervention.

Diarrhea and constipation

Diarrhea was associated with toileting resistance among children with ASD and other DD in our sample, even though it was not the most common gastrointestinal symptom reported in either study group. Consequently, discussion of toileting readiness and toileting resistance should include screening for a range of gastrointestinal problems in additional to those most reported by parents.[6] Constipation was the most common gastrointestinal issue among children with ASD (35.7%), and children with ASD had significantly more parent-reported constipation than children with other DD or those in the POP group. In typically developing children, toileting resistance can be a presenting symptom of constipation and, if left untreated, acute constipation can lead to chronic constipation and child behavior problems.[6,16] Our findings extend upon those in typical populations and suggest that, although cause-and-effect cannot be determined from our analyses, children with ASD who resist toilet training may need to be evaluated, monitored, and treated for constipation. Eliciting concerns regarding diarrhea, constipation, and other gastrointestinal problems, especially when screening for ASD and DD at the 18– and 24– or 30– month health supervision visits (i.e., when families might be initiating toilet training), may help identify and circumvent problems that could interfere with the toilet training process.

In general, medical treatment for constipation and diarrhea in young children are the same regardless of presence of ASD or DD. Treatment for constipation includes increasing water and fiber intake and using osmotic laxatives, stimulant laxatives, and suppositories.[28-39] Behavioral interventions are also used in conjunction with medical treatment of constipation to support the development/maintenance of skills that facilitate healthy toileting routines, including to mitigate habits like stool withholding.[30-34] Treatment for diarrhea primarily involves dietary changes such as increasing fat in the diet and decreasing carbohydrates, fruit juice, and sorbitol.[35]

Delayed expressive language and visual reception skills

Very low expressive language skills were associated with toileting resistance in children with ASD in our sample, and very low visual reception skills were associated with toileting resistance in children with DD. Very low expressive language skills were significantly more

common among children with ASD than children from the DD or POP groups (60.0% vs. 19.3% and 3.2%). An association between lower verbal levels and age of toilet training among individuals with ASD has been reported in at least one previous study.[17] These findings coupled with our own could suggest that children with ASD may exhibit toileting resistance if they have limited means of communicating toileting problems. It is therefore imperative to teach children with ASD ways to communicate functionally, especially if expressive language is markedly delayed. Augmentative and alternative communication strategies for children with very low expressive language skills include sign language, picture exchange communication systems, and computerized communication devices.[36] Likewise, children with DD other than ASD may need additional evaluation and treatment of specific components of visual reception skills, such as integrating visual-motor input and understanding position in space, for successful toilet training.

ASD symptoms and oppositional behaviors

Deficits in social awareness was associated with toileting resistance in children with ASD and DD, and deficits in social motivation was associated with toileting resistance only in children with ASD. Deficits in both abilities can be addressed with social skill training techniques combined with behavior therapy. For instance, parents can use visual aids or video modeling, give concrete simple instructions, provide structure and predictability, sequence toileting training steps, reinforce positive behaviors, reduce interfering behaviors, and develop a fun and nurturing learning environment.[37-39] Other ways to increase social motivation are to foster self-awareness and self-esteem by giving feedback, using positive language, encouraging self-reflection, and helping children identify emotions related to toileting.[37,38] The association between toileting problems and oppositional behaviors in children with DD, which has also been noted in children in the general population, can also be addressed with behavioral supports that reinforce prosocial behaviors and reduce interfering behaviors.[40]

Limitations and strengths

There are limitations associated with this study. First, we used parent response to the single toileting resistance item on the CBCL for this study and did not assess progress in toilet training for child participants. Second, the POP group was comprised mainly of non-Hispanic white mothers with a college degree. However, reported toileting resistance in this group was similar to other general population samples. Third, we were underpowered to assess factors associated with toileting resistance in the POP groups due to low frequencies of problems defined by dependent variables. Regardless, the CBCL offered a uniform method for measuring parent-reported toileting resistance in a large sample of children in multiple geographic locations. Children enrolled in SEED were carefully evaluated to determine ASD status and developmental level, and additional data were collected from parents on the presence of ASD symptoms, behavior problems, and gastrointestinal issues in the child. Finally, our study is novel and provides clear recommendations that could help lessen the impact of toileting resistance in preschool age children with ASD and other DD.

Conclusions

Toileting resistance affects almost half of children with ASD and almost a quarter of children with other DD. Pediatricians are an important resource for families during the toilet training process. Evaluating gastrointestinal issues, developmental delays, and social deficits may help identify children who are likely to present with toileting resistance. These evaluations can be incorporated into health supervision visits, in conjunction with screening for ASD and other DD at 18– and 24– or 30– months of age when toileting training is most often initiated. Moreover, addressing concerns in each of these areas before the onset of toilet training may help prevent chronic toileting issues in children with atypical development.

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Table 1.

Omnibus comparisons of sample characteristics among preschool age children >=48 months classified as having autism spectrum disorder (ASD), other non-ASD developmental delay (DD), or population comparison (POP)

Child sex	**ASD=743 %**	**DD=766 %**	**POP=693 %**	**X^2 =145.3***
Female	18.7	33.0	48.3	
Male	81.3	67.0	51.7	
Income as % of Federal poverty level	**ASD=724 %**	**DD=741 %**	**POP=669 %**	**X^2 =104.5***
<=100%	9.3	16.3	7.8	
101%–200%	19.8	19.7	9.4	
201%–300%	19.3	19.2	14.1	
301%–399%	16.9	13.9	19.3	
>=400%	34.8	30.9	49.5	
Maternal education	**ASD=743 %**	**DD=763 %**	**POP=691 %**	**X^2 =100.2***
Less than high school	3.8	5.6	2.2	
High school graduate	9.4	13.1	7.7	
Some college	32.2	28.0	16.8	
College graduate	32.7	27.3	35.3	
Advanced degree	21.9	26.0	38.1	
Maternal race/ethnicity	**ASD=743 %**	**DD=763 %**	**POP=693 %**	**X^2 =86.4***
Non-Hispanic white	46.0	47.8	66.4	
Non-Hispanic black	26.1	26.0	16.2	
Non-Hispanic other	12.0	8.1	9.0	
Hispanic	15.9	18.1	8.4	

*Omnibus X^2 p values significant at p<.001

Table 2.

Discrete comparisons of toileting resistance and specific gastrointestinal issues and behavior problems among preschool age children >=48 months classified as having autism spectrum disorder (ASD), other non-ASD developmental delay (DD), or population comparison (POP)

Toileting resistance	**ASD=743 %**	**DD=766 %**	**POP=693 %**	**X^2 =**
Sometimes/often	49.1	23.6	8.0	312.2*
Often	28.1	11.2	2.7	197.9*
Gastrointestinal issues	**ASD=729 %**	**DD=760 %**	**POP=684 %**	**X^2 =**
Abdominal pain (general)	7.7	9.0	5.5	6.5*
Abdominal pain (on stooling)	19.5	14.5	8.9	33.1*
Bloating	13.5	9.1	3.6	43.8*
Constipation	35.0	22.8	15.6	76.8*
Diarrhea	15.9	10.1	4.9	47.3*
Gaseousness	23.3	17.1	10.7	41.0*
Reflux	7.8	7.3	2.3	23.8*
Vomiting	6.3	4.2	2.7	11.3*
Very low developmental level	**ASD=743 %**	**DD=766 %**	**POP=693 %**	**X^2 =**
Expressive language	60.0	19.3	3.2	618.8*
Receptive language	60.3	23.8	4.9	545.1*
Fine motor skills	62.9	21.7	4.5	620.4*
Visual reception skills	47.4	12.3	2.0	499.1*
Child behavior problems	**ASD=743 %**	**DD=766 %**	**POP=693 %**	**X^2 =**
Anxiety	21.0	14.6	3.8	93.8*
Attention deficits/hyperactivity	28.1	14.8	3.2	170.1*
Oppositional defiant problems	21.9	15.9	4.6	89.5*
ASD symptoms in the child	**A1SD=743 %**	**DD=766 %**	**POP=693 %**	**X^2 =**
Autistic mannerisms	68.5	19.6	2.9	793.7*
Social awareness	65.8	20.5	4.6	688.6*
Social cognition	68.0	20.1	2.6	782.1*
Social communication	70.9	18.0	2.5	878.6*
Social motivation	50.5	15.5	2.6	499.7*

*All X^2 p values <.001, which exceeded critical values after correcting for false discovery; significant differences found between children classified as ASD and DD on all variables except abdominal pain (general) and reflux; significant differences found between children classified as DD and POP on all variables

Table 3.

Factors associated with toileting resistance in preschool age children >=48 months classified as having autism spectrum disorder (ASD)[1]

Block 1=Gastrointestinal issues	**aOR**	**95% CI**	**p**
Constipation	1.85	1.26;2.70	<.01
Diarrhea	1.74	1.12;2.70	<.01
Block 2=Very low developmental level	**aOR**	**95% CI**	**p**
Constipation	1.71	1.16;2.51	=.01
Diarrhea	1.64	1.04;2.57	=.03
Very low expressive language skills	1.68	1.04;2.73	=.03
Block 3=Child behavior problems	**aOR**	**95% CI**	**p**
Constipation	1.64	1.11;2.43	=.01
Diarrhea	1.58	1.01;2.49	=.05
Very low expressive language skills	1.78	1.09;2.91	=.02
Attention deficits/hyperactivity	1.68	1.13;2.51	=.01
Block 4=ASD symptoms in the child	**aOR**	**95% CI**	**p**
Constipation	1.64	1.10;2.45	=.02
Diarrhea	1.54	1.01;2.45	=.05
Very low expressive language skills	1.70	1.03;2.82	=.04
Deficits in social awareness	1.97	1.31;3.00	<.01
Deficits in social motivation	1.50	1.02;2.21	=.04

[1]Forward conditional regression model adjusted for child sex, child age, federal poverty level, maternal education, and maternal race/ethnicity; variables significantly associated with toileting resistance "often" instead of "sometimes/often" were constipation (aOR=1.78, 95%CI=1.15,2.75), diarrhea (aOR=1.70, 95%CI=1.11,2.38), very low expressive language skills (aOR=1.78, 95%CI=1.02,3.72), and deficits in social awareness (aOR=2.01, 95%CI=1.40,3.56)

Table 4.

Factors associated with toileting resistance in preschool age children >=48 months classified as having developmental delay other than autism spectrum disorder[1]

Block 1=Gastrointestinal issues	**aOR**	**95% CI**	**p**
Diarrhea	2.75	1.57;4.85	<.01
Block 2=Very low developmental level	**aOR**	**95% CI**	**p**
Diarrhea	2.88	1.61;5.17	<.01
Very low fine motor skills	1.65	1.01;3.86	=.05
Very low visual reception skills	2.01	1.05;3.86	=.04
Block 3=Child behavior problems	**aOR**	**95% CI**	**p**
Diarrhea	2.65	1.45;4.84	<.01
Very low visual reception skills	2.24	1.15;4.36	=.02
Oppositional behaviors	3.02	1.65;5.54	<.01
Block 4=ASD symptoms in the child	**aOR**	**95% CI**	**p**
Diarrhea	2.56	1.37;4.76	<.01
Very low visual reception skills	2.10	1.10;4.14	=.03
Oppositional behaviors	2.87	1.54;5.34	<.01
Deficits in social awareness	2.19	1.23;3.91	<.01

[1]Forward conditional regression model adjusted for child sex, child age, federal poverty level, maternal education, and maternal race/ethnicity; variables significantly associated with toileting resistance “often” instead of “sometimes/often” were diarrhea (aOR=4.63, 95%CI=2.29,9.37), oppositional behaviors (aOR=2.70, 95%CI=1.26,5.76), and deficits in social awareness (aOR=2.29, 95%CI=1.10,4.78)