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Wandering Among Preschool Children with and Without Autism Spectrum Disorder

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Abstract

Objectives: (1) Report the occurrence of wandering, or leaving a supervised space, among children with confirmed autism spectrum disorder (ASD), other developmental delay (DD) with a previous but unconfirmed ASD diagnosis (DDprevASD), DD without a previous ASD diagnosis, and a population comparison group (POP) at an age when wandering is no longer expected and (2) explore whether ASD status is associated with wandering independent of behavioral, developmental, and maternal factors.

Method: Parents and children aged 4 to 5 years enrolled in the Study to Explore Early Development Phase-1+2. All children were screened for ASD symptoms upon enrollment. Those with ASD symptoms and/or a previous ASD diagnosis received the *Mullen Scales of Early Learning* (MSEL) to determine their developmental level and 2 ASD diagnostic tests to determine their ASD status. All other children were evaluated with the MSEL alone. Mothers completed the *Child Behavior Checklist/11/2–5*, which includes an item on whether the child wanders away (categorized as at least sometimes true vs not true) and items assessing behavior problems.

Results: Children with ASD (N = 1195) were significantly more likely to wander than children classified as DDprevASD (N = 230), DD (N = 1199), or POP (N = 1272) (60.4%, 41.3%, 22.3%, and 12.4%, respectively, p < 0.01). ASD status, very low developmental level, and affective, anxiety, attention, and oppositional problems were each independently associated with wandering behavior.

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Conclusion: Wandering is significantly more common among children with ASD and those with behavioral and developmental problems compared with other children. These findings can be used to increase the awareness of wandering among children with atypical development.

Keywords

autism; autism spectrum disorder; elopement; wandering; Study to Explore Early Development

Autism spectrum disorder (ASD) is a developmental disorder characterized by deficits in social interaction and communication and the presence of restricted interests and repetitive behaviors.¹ Typically recognized in early childhood, ASD can last throughout life, although the presentation and severity of symptoms may change with age.¹ ASD is associated with many co-occurring behaviors and conditions that affect health outcomes and quality of life for those living with ASD.^{2–4} One of those co-occurring behaviors is wandering, that is, leaving a supervised space and/or care of a responsible person.^{5–10}

Wandering is reported to be common among toddlers who are exploring their environment and learning to assert independence.¹¹ Wandering becomes much less common after 4 years of age.^{5,10} The limited available literature suggests that wandering after 4 years of age is more common among children with ASD than children with other developmental disorders. ^{5–10} In one online survey, 49% of respondents said that their child with ASD had attempted to elope, which is often used interchangeably with wandering, at least once after 4 years of age.⁵ Elopement attempts in children with ASD peaked at 5 years of age.⁵ Wandering among children with ASD has tended to increase as the severity of ASD symptoms increased and developmental level decreased.^{5,10} Wandering among children with ASD is also higher among males and children who have co-occurring attention deficit hyperactivity disorder, anxiety, depression, or oppositional behaviors.^{5,10}

Of most concern is the potential impact of wandering on child safety and family functioning. Among parents of children with ASD who went missing, 65% endorsed that their child was in danger of traffic injury, and 24% endorsed that their child was in danger of drowning.⁵ Moreover, worries about elopement had a negative effect on families. Sixty-two percent reported that they did not attend or enjoy activities outside the home, and 56% said that elopement was one of the most stressful parenting challenges. Unfortunately, parents receive little guidance regarding elopement in that only 33% of parents of children with ASD who previously wandered reported that they ever received counseling about wandering.⁹ These findings highlight the importance of identifying measures to prevent wandering and implementing them into treatment programs.

Many studies on wandering in ASD have relied on samples that did not verify ASD classification or developmental level of the child.^{5–10} ASD symptom severity has been associated with wandering,^{5,10} but no study has examined whether children with a previous diagnosis that is unconfirmed on examination are also more likely to wander than other children. Additionally, only one study compared wandering among children with ASD to unaffected siblings,⁵ and no identified study used a general population comparison group (POP).^{5–10} The main objective of this study is to add to a growing body of literature on the occurrence of wandering among children with and without ASD at an age when wandering

is not expected in typically developing children (i.e., 4–5 years). Specifically, we sought to compare the occurrence of wandering among children with confirmed ASD, other developmental delay with previous but unconfirmed ASD diagnosis (DDprevASD), children with other developmental delay without a previous ASD diagnosis (DD), and those from a POP. A secondary objective was to explore whether ASD status is associated with wandering independent of behavioral, developmental, and maternal factors.

METHODS

Participants were children and families who completed data collection for the Study to Explore Early Development (SEED) Phase-1 (2007–2011) and Phase-2 (2012–2016). SEED1+2 is a multisite, community-based study of preschool children designed to investigate the development and risk factors of autism spectrum disorder (ASD). SEED1+2 was conducted in communities in California, Colorado, Georgia, Maryland, North Carolina, and Pennsylvania. The SEED1+2 protocols were approved by the Institutional Review Boards at each site. To be eligible for the study, a child had to be between 2 and 5 years of age, have been born and reside in one of the study areas, and live with a knowledgeable caregiver who was competent to communicate in English. Knowledgeable caregivers who were competent to communicate in Spanish were also eligible for the study in 2 sites: California and Colorado.

Enrollment focused on 3 groups of children: (1) those with known ASD, (2) those with known other developmental delay (DD), and (3) those from the general population. Children with known ASD and DD were identified from multiple educational and health providers or family or physician referral by diagnostic codes found in service records. Those from the general population 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.¹² (2012) provided a detailed description of eligibility criteria, ascertainment methods, enrollment methods, and data collection procedures in SEED. Caregivers of enrolled children gave written consent to participate.

Data Collection Procedures

Parents completed the *Social Communication Questionnaire* (SCQ) when first enrolled to determine child ASD risk and subsequent assessment procedures.¹³ All study children then completed the *Mullen Scales of Early Learning* (MSEL) within 6 months of enrollment.¹⁴ Families of children with a an SCQ score of 11 or higher, 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) and had their child participate in the *Autism Diagnostic Observation Schedule* (a standardized observation of the child) (ADOS).^{15–17} The ADOS and ADI-R are gold-standard diagnostic instruments used to differentiate children with ASD from children with other DD.¹⁸ For the purpose of these analyses, only children who were 4 years and older at the time of the clinic visit were included in the sample.

Data Collection Instruments

The Mullen Scales of Early Learning—The MSEL is a standardized in-person evaluation of the early learning abilities of young children that assesses development in 4 areas of functioning: expressive language, receptive language, fine motor, and visual reception skills. The MSEL yields an early learning composite (MSEL ELC) score based on the performance in the aforementioned domains. The MSEL ELC has a mean of 100 and SD of 15. Children with an MSEL ELC score of 70 or below are classified as having "very low developmental level" (VLDL) by the MSEL manual and in the SEED1+2 sample.

The Child Behavior Checklist/1½–5 Years—Parents completed the Child Behavior Checklist (CBCL) to assess behavior problems in the child.¹⁹ The CBCL is a widely used standardized instrument that contains 99 behaviors rated as "not true," "somewhat or sometimes true," or "very true or often true" within 3 months of the CBCL completion date. Individual items are rated separately by the caregiver, and then some are combined to derive 5 Diagnostic and Statistical Manual of Mental Disorders (DSM)-oriented scales: affective, anxiety, pervasive developmental, attention deficit hyperactivity disorder (ADHD), and oppositional problems. CBCL *t*-scores of 65 or higher indicate borderline to clinically significant problems in the child; this cutoff was used to define the presence or absence of problems on each scale. One item on the CBCL asks whether the child "wanders away." 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 wandering item is not included in the items used to derive DSM-oriented scales.

The Study to Explore Early Development Maternal Interview—Responses on a comprehensive caregiver interview determined maternal age, education, and race/ethnicity. Maternal age at the time of study enrollment (years) was categorized as below 20, 20 to 29, 30 to 34, 35 to 39, and 40 years or older. Maternal education was categorized as less than high school diploma, high school diploma, associate degree/some college, and college or advanced degree. Maternal race/ethnicity was categorized as non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic other, and non-Hispanic multi-race.

Study Classification

Study to Explore Early Development is a research study that classified children into study groups based on ascertainment source, results of an ASD screen, and in-person developmental assessment. Thus, children were not diagnosed with developmental conditions based on study measures. Families were encouraged to contact their health care providers if results of any of the measures indicated developmental concerns or delay.

Children who were ascertained from state vital records were classified as population comparison group (POP) if they did not meet ASD case status, regardless of their developmental functioning on the MSEL (i.e., even if they had VLDL). Children with known DD were classified as DD if they did not meet ASD case status, regardless of having a previous ASD diagnosis. The most common conditions reported by parents of children with DD were language delay, motor delay, ADHD, and sensory integration disorder.

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Children classified as ASD were those who met ASD criteria on both the ADI-R and ADOS or who met ASD criteria on the ADOS and 1 of 3 alternate criteria on the ADI-R (i.e., met criteria on the social domain and was within 2 points on the communication domain, met criteria on the communication domain and was within 2 points on the social domain, or met criteria on the social domain and had 2 points noted on the behavioral domain). Previous analyses found that SEED final classification criteria had a good balance of sensitivity (0.86) and specificity (0.74) when compared with clinical judgment of whether the child had ASD or another DD, which was higher than that of any one diagnostic instrument used alone.²⁰ Details on the SEED final classification algorithm are provided by Wiggins et al.²⁰

Statistical Analyses

Statistical analyses were conducted using SPSS version 24.0.²¹ We first report maternal demographic characteristics, noting omnibus χ^2 differences between children classified as ASD, DDprevASD, DD, and POP, and group differences comparing ASD with POP, ASD with DD, ASD with DDprevASD, DDprevASD with POP, DDprevASD with DD, and DD with POP. We then similarly report differences in child sex, presence of problems noted on CBCL DSM-oriented scales, presence of wandering, and MSEL VLDL.

A multiple logistic regression model examined independent associations between wandering (as defined above) and the following variables: study classification, CBCL affective problems, CBCL anxiety problems, CBCL ADHD problems, CBCL oppositional problems, MSEL VLDL, child sex, maternal age, maternal education, and maternal race/ethnicity. The results of this analysis revealed the expected change in the odds of wandering for a change in a specific predictor variable holding other predictor variables constant.

RESULTS

There were 4999 children who completed a developmental assessment in Study to Explore Early Development Phase-1+2, and 3896 (77.9%) were between 4 and 5 years of age and included in this analysis. Of these, 1195 (30.7%) met the study criteria for autism spectrum disorder (ASD), 230 (5.9%) for DDprevASD, 1199 (30.8%) for other developmental delay (DD), and 1272 (32.6%) for population comparison group (POP). The mean age of the sample was 5.3 years and did not differ by study classification. Mothers of children with ASD were older than mothers of children from the POP comparison group (p < 0.05). In general, mothers of children classified as POP were more educated and more likely to be non-Hispanic white than mothers of children in other study groups (p < 0.01). Details on maternal demographics by study classification are provided in Table 1.

There were significant differences in child sex, behavior problems, very low developmental level (VLDL), and wandering based on study classification (Table 2). Children with ASD (81.8%) and DDprevASD (77.0%) were more likely to be male than children with DD (65%), and those with DD were more likely to be male than POP (52.5%) (p < 0.01). For wandering, children with ASD were more likely to wander than children classified as

DDprevASD, DD, and POP (60.4%, 41.3%, 22.3%, and 12.4%, respectively, p < 0.01). Children with ASD were also classified as having VLDL more than children in other study groups (p < 0.01). There were no differences between children with ASD and those with DDprevASD for affective problems, anxiety, attention deficit hyperactivity disorder (ADHD), or oppositional problems.

Table 3 shows the factors associated with wandering independent of other predictor variables. Children with ASD had 3.83 higher odds of wandering than POP children (95% confidence interval [CI] 2.99, 4.94). Children with DDprevASD and DD had 2.06 (95% CI 1.44, 2.94) and 1.31 (95% CI 1.03, 1.65) higher odds of wandering than POP children, respectively. Other child factors independently associated with wandering were affective problems (adjusted odds ratio [aOR] = 2.00; 95% CI 1.59, 2.52), anxiety problems (aOR = 1.63; 95% CI 1.24, 2.13), ADHD problems (aOR = 3.00; 95% CI 2.30, 3.90), and oppositional problems (aOR = 2.05; 95% CI 1.57, 2.68). Child sex was not associated with wandering in our sample. Mothers who were 19 years or younger had 1.98 higher odds (95% CI 1.23, 3.18) of having a child who wandered than mothers who were 40 years or older. Similarly, mothers who had less than a high school education had 1.46 higher odds (95% CI 1.19, 1.70) of having a child who wandered than mothers with a college or advanced degree. Hispanic mothers (aOR = 0.73; 95% CI 0.58, 0.91) and those listed as "other" (aOR = 0.63; 95% CI 0.48, 0.83) or "multi" (aOR = 0.64; 95% CI 0.45, 0.89) race had fewer odds of having a child who wandered than white mothers.

DISCUSSION

Consistent with previous studies, we found that wandering is very common among children with autism spectrum disorder (ASD). More than half of children with confirmed ASD were reported to wander away in this study (60.4%), compared with 41.3% of children with DDprevASD, 22.3% of children with other developmental delay (DD), and 12.4% of population comparison group (POP) children. To our knowledge, this is the first study that compares wandering among children who primarily have typical development and those who have atypical development. Moreover, to our knowledge, this is the only identified study that assessed the influence of previous but unconfirmed ASD diagnosis on wandering behavior and the independent associations between wandering and developmental, behavioral, and maternal factors. These results provide important information for parents and providers on the occurrence of wandering among children at increased risk for leaving safe environments.

The occurrence of wandering was higher in our sample than previously reported.^{5,10} Discrepancies between our and other findings may be due to the definition of wandering used, age of the sample, and data collection methods. Anderson et al.⁵ developed an elopement questionnaire for families of children with ASD and found that 49% of respondents reported that their child, aged 4 to 17, had left a safe environment. Rice et al.¹⁰ analyzed data from a telephone questionnaire and found that 33% of children with ASD without very low developmental level, aged 6 to 17, had wandered off from home or a public

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place. In the current study, we measured wandering using one Child Behavior Checklist (CBCL) item that asks whether the child "wanders away" never, sometimes, or often. The imprecision of this CBCL question may have inflated parent response patterns because of the lack of specificity. Nonetheless, our results show striking differences in wandering among children classified as ASD, DDprevASD, DD, and POP and highlight the importance of developing appropriate screens and interventions for those who wander.

Children who had a previous ASD diagnosis but did not meet study criteria for ASD (DDprevASD) were more likely to wander than those classified as DD without a previous ASD diagnosis. Those classified as DDprevASD may have a subthreshold ASD presentation with overlapping symptoms that places them at increased risk for leaving a safe environment. In our sample, children with ASD and DDprevASD had similar occurrences of affective, anxiety, attention deficit hyperactivity disorder, and oppositional problems, which highlights a complex array of co-occurring behaviors among those with an early ASD diagnosis. Items that assessed affective problems on the CBCL include "looks unhappy" and "sad." Items that assessed anxiety problems are "fearful," "nervous," and "worries." Items that assessed attention problems include "can't sit still," "gets into everything," and "can't concentrate," and those that assessed oppositional problems include "defiant," "disobedient," and "uncooperative." Parents and providers who notice these behaviors in young children regardless of ASD confirmation may want to develop individualized response, prevention, and treatment plans to keep their children safe.

Very young and less educated mothers of children with ASD were more likely to report having a child wander, and Hispanic mothers less often reported that their child wandered than did non-Hispanic white mothers. Future research studies should replicate these findings in other child samples to determine consistency of results and potential confounding with other social and environmental factors.

Children with ASD and DD may wander for a variety of reasons. Functional behavior analyses find that obtaining preferred objects, engaging in preferred activities, escaping from task demands, and getting attention are some reasons children with ASD and DD may leave a safe environment.^{25–31} Appropriate interventions can be developed once the antecedents of wandering are identified for an individual child. For instance, interventions that involve attention and tangible rewards decrease wandering in classroom settings.^{28,31} Functional communication training helps give children strategies to communicate their wants and needs.²⁶ Finally, frequent breaks during high-demand activities may reduce frustration and the desire to flee a situation.²⁹

Discussing safety issues, helping caregivers develop prevention and response plans, and documenting the occurrence of wandering are important roles for healthcare professionals. Resources to help prevent and respond to wandering are available from Autism Speaks, the Autism Wandering Awareness Alerts Response Collaboration, and the American Academy of Pediatrics.^{29–31} The International Classification of Disease billing code Z91.83 (wandering in diseases classified elsewhere) helps document wandering in the pediatric medical record.³² This documentation can facilitate discussions about safety, prevention, and response that may improve the lives of those who wander and their families.

Study Limitations and Strengths

One limitation of this study was that our assessment of wandering was based on a single CBCL checklist item asking about a broadly defined behavior (i.e., "wanders away"). Nonetheless, results produced significant between group differences and showed that wandering was associated with ASD when considering a variety of other factors. There are no standardized assessments of wandering among preschool children available. Using the CBCL item to assess wandering offers the advantage of uniform assessment of the behavior with a validated tool appropriate for preschool children. Another limitation was that our sample was restricted to children 4 to 5 years of age, although previous analyses suggested that this age range may represent the peak age when atypical wandering occurs.⁵ A final limitation was that, we did not measure the impact on families of child wandering in Study to Explore Early Development Phase-1+2.

Despite these limitations, ours is the largest assessment of wandering among preschool children to date. Study strengths include large sample size, geographic variability, developmental assessment with gold-standard diagnostic instruments, and presence of children from a DD and POP comparison group. We were also able to assess the influence of confirmed versus unconfirmed ASD diagnosis reported by the parent.

Study Conclusions

Our results highlight wandering as significantly more common among children with ASD compared with other children. These findings can be used to increase awareness of wandering as a common behavior among children with ASD symptoms and encourage efforts to develop prevention and response plans for children who wander.

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	ASD N = 1195	DD with Previous but Unconfirmed ASD Diagnosis N = 230	DD Without Previous ASD Diagnosis N = 1199	POP N = 1272			
	N (%)	N (%)	N (%)	N (%)	X ³	d	Group Differences ^a
Maternal age					25.5	<0.05	1
40 yrs or older	84 (7.0)	11 (4.8)	70 (5.8)	58 (4.6)			
35–39 yrs	253 (21.2)	51 (22.2)	274 (22.9)	317 (24.9)			
30–34 yrs	404 (33.8)	73 (31.7)	416 (34.7)	476 (37.4)			
20–29 yrs	424 (35.5)	83 (36.1)	398 (33.2)	381 (30.0)			
19 yrs or younger	30 (2.5)	12 (5.2)	41 (3.4)	40 (3.1)			
Maternal education					111.2	<0.01	1, 2, 3, 4, 6
College or advanced degree	622 (52.1)	104 (45.2)	630 (52.5)	857 (67.4)			
Associate degree/some college	347 (29.1)	68 (29.6)	293 (24.4)	256 (20.1)			
High school diploma	163 (13.6)	40 (17.4)	177 (14.8)	117 (9.2)			
Less than high school	62 (5.2)	18 (7.8)	99 (8.3)	42 (3.3)			
Maternal race/ethnicity					120.9	<0.01	1, 2, 4, 6
MHN	586 (49.0)	105 (45.7)	647 (54.1)	850 (66.8)			
NHB	284 (23.8)	62 (27.0)	273 (22.8)	192 (15.1)			
HISP	171 (14.3)	40 (17.4)	175 (14.6)	112 (8.9)			
NHOth	114 (9.5)	11 (4.8)	62 (5.2)	78 (6.1)			
NHMulti	40 (3.4)	12 (5.2)	39 (3.3)	40 (3.1)			

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 a^{2} = ASD vs POP p < 0.05; 2 = ASD vs DD p < 0.05; 3 = ASD vs DD p < 0.05; 4 = DD/ASD vs POP p < 0.05; 5 = DJ/ASD vs DD p < 0.05; and 6 = DD vs POP p < 0.05. ASD, autism spectrum disorder; DD, other developmental delay; HISP, Hispanic; NHB, non-Hispanic black; NHMulti, non-Hispanic Multi-Race; NHOth, non-Hispanic Other; NHW, non-Hispanic white; POP, population comparison group.

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Table 1.

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	ASD N = 1195	DD with Previous but Unconfirmed ASD Diagnosis N = 230	DD Without Previous ASD Diagnosis N = 1199	POP N = 1272			
	N (%)	N (%)	N (%)	N (%)	X ⁷	d	Group Differences ^a
Child sex					251.0	<0.01	
Male	977 (81.8)	177 (77.0)	779 (65.0)	668 (52.5)			1, 2, 4, 5, 6
Female	217 (18.2)	53 (23.0)	420 (35.0)	604 (47.5)			
CBCL affective problems					468.9	$<\!0.01$	1, 2, 4, 5, 6
No	752 (62.9)	158 (68.7)	1046 (87.2)	1205 (94.8)			
Yes	443 (37.1)	72 (31.3)	153 (12.8)	66 (5.2)			
CBCL anxiety problems					191.5	$<\!0.01$	1, 2, 4, 5, 6
No	944 (79.0)	175 (76.1)	1072 (89.4)	1217 (95.7)			
Yes	251 (21.0)	55 (23.9)	127 (10.6)	54 (4.3)			
CBCL ADHD problems					419.5	<0.01	1, 2, 4, 5, 6
No	850 (71.1)	167 (72.6)	1081 (90.2)	1245 (97.9)			
Yes	345 (28.9)	63 (27.4)	118 (9.8)	26 (2.1)			
CBCL oppositional problet	ms				197.06	$<\!0.01$	1, 2, 4, 5, 6
No	915 (76.6)	180 (78.3)	1065 (88.8)	1216 (95.7)			
Yes	280 (23.4)	50 (21.7)	134 (11.2)	55 (4.3)			
VLDL on MSEL					1111.64	$<\!0.01$	1, 2, 3, 4, 5, 6
No	427 (36.1)	155 (67.7)	917 (76.6)	1225 (96.5)			
Yes	756 (63.9)	74 (32.3)	280 (23.4)	45 (3.5)			
CBCL wandering					730.36	$<\!0.01$	1, 2, 3, 4, 5, 6
No	473 (39.6)	135 (58.7)	932 (77.7)	1114 (87.6)			
Yes	722 (60.4)	95 (41.3)	267 (22.3)	158 (12.4)			
Sometimes	427 (35.7)	66 (28.7)	191 (15.9)	128 (10.1)			
Often	295 (24.7)	29 (12.6)	76 (6.4)	30 (2.3)			

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Table 2.

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 a 1 = ASD vs POP p < 0.05; 2 = ASD vs DD p < 0.05; 3 = ASD to DD/ASD p < 0.05; 4 = DD/ASD vs POP p < 0.05; 5 = DD/ASD vs DD p < 0.05; and 6 = DD vs POP p < 0.05. ADHD, attention deficit hyperactivity disorder; ASD, autism spectrum disorder; CBCL, Child Behavior Checklist; DD, other developmental delay; MSEL, Mullen Scales of Early Learning; POP, population comparison group; VLDL, very low developmental level.

Table 3.

Factors Associated with Wandering in Children 4–5 Years of Age Enrolled in the Study to Explore Early Development

	OR	95% CI	р
Study classification			
Population comparison (referent)			
Developmental delay without a previous autism spectrum diagnosis (DD)	1.31	1.03, 1.65	< 0.01
DD with previous but unconfirmed autism spectrum diagnosis	2.06	1.44, 2.94	< 0.01
Confirmed ASD	3.83	2.99, 4.94	< 0.01
CBCL affective problems			
No (referent)			
Yes	2.00	1.59, 2.52	< 0.01
CBCL anxiety problems			
No (referent)			
Yes	1.63	1.24, 2.13	< 0.01
CBCL attention deficit/hyperactivity problems			
No (referent)			
Yes	3.00	2.30, 3.90	< 0.01
CBCL oppositional problems			
No (referent)			
Yes	2.05	1.57, 2.68	< 0.01
VLDL on MSEL			
No (referent)			
Yes	2.50	2.05, 3.03	< 0.01
Child sex			
Female (referent)			
Male	1.12	0.93, 1.35	0.22
Maternal age			
40 yrs or older (referent)			
35–39 yrs	1.07	0.74, 1.54	0.74
30–34 yrs	1.16	0.92, 1.46	0.20
20–29 yrs	0.99	0.80, 1.22	0.93
19 yrs or younger	1.46	1.19, 1.70	< 0.01
Maternal education			
College or advanced degree (referent)			
Associate degree/some college	0.92	0.62, 1.38	0.70
High school diploma	0.98	0.74, 1.30	0.90
Less than high school	1.46	1.19, 1.70	< 0.01
Maternal race/ethnicity			
NHW (referent)			
NHB	1.23	0.78, 1.91	0.35
HISP	0.73	0.58, 0.91	0.01

	OR	95% CI	р
NHOth	0.63	0.48, 0.83	< 0.01
NHMulti	0.64	0.45, 0.89	0.01

ASD, autism spectrum disorder; CBCL, Child Behavior Checklist; CI, confidence interval; DD, other developmental delay; HISP, Hispanic; MSEL, Mullen Scales of Early Learning; NHB, non-Hispanic black; NHMulti, non-Hispanic Multi-Race; NHOth, non-Hispanic Other; NHW, non-Hispanic white; OR, odds ratio; and VLDL, very low developmental level.