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Authors

Caplan, Barbara
Chlebowski, Colby
May, Gina
et al.

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Psychotropic Medication Use by Children with Autism Served in Publicly-Funded Mental Health Settings

Barbara Caplan, Ph.D,
University of California San Diego, Department of Psychiatry, Child and Adolescent Services Research Center, 9500 Gilman Drive #0812, La Jolla, CA 92093-0603

Colby Chlebowski, Ph.D.,
University of California San Diego, Department of Psychiatry, Child and Adolescent Services Research Center

Gina May, B.A.,
University of Nebraska-Lincoln, Department of Psychology

Mary J. Baker-Ericzén, Ph.D.,
San Diego State University, Department of Administration, Rehabilitation and Post-Secondary Education, Child and Adolescent Services Research Center

Willard Connor, M.D.,
University of California San Diego, Department of Psychiatry, Rady Children's Hospital- San Diego

Lauren Brookman-Frazee, Ph.D.
University of California San Diego, Department of Psychiatry, Child and Adolescent Services Research Center, Autism Discovery Institute at Rady Children's Hospital-San Diego

Abstract

Objective: To characterize patterns of and factors associated with psychotropic medication use in children with autism spectrum disorder (ASD) receiving publicly-funded mental health services.

Method: Data were extracted from 202 children with ASD participating in a cluster randomized trial of *An Individualized Mental Health Intervention for ASD* (AIM HI) conducted in 29 publicly-funded mental health programs. Children with ASD were ages 5 to 13 years (M=9.1 years, SD=2.4), 84.2% Male, and 59.9% Latinx. Child ASD and cognitive functioning was determined via standardized assessment. Caregivers reported child psychotropic medication use, behavior problems, ASD symptom severity, and mental health symptoms, family demographics, and caregiver strain at the baseline.

Results: Nearly half (49.5%) of participants used psychotropic medication(s) within the past six months, with stimulants being most commonly reported. Child co-occurring ADHD (*B* =

Corresponding author: Barbara Caplan, Ph.D., 9500 Gilman Drive #0812, La Jolla, CA 92093-0603, Phone: 858-966-7703 ext. 242699, bcaplan@health.ucsd.edu.
Address for reprints: Barbara Caplan, PhD, 3020 Children's Way MC 5033, San Diego, CA 92123

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1.55, p< .01; 95% CI: 0.53 to 2.57), lower cognitive functioning (*B* = - 0.03, *p* = .02; 95% CI: −0.05 to <0.00), and Non-Hispanic White ethnicity (versus Hispanic/Latinx; *B* = 1.02, *p* = 02; 95% CI: −1.89 to −0.14) were associated with a greater likelihood of using any type of medication. Factors associated with medication use varied by class: Stimulants - ADHD, lower ASD symptom severity, and more intensive behavior problems; SSRIs - higher ASD symptom severity; Alpha-2 agonists - ADHD, higher ASD symptom severity, lower cognitive functioning, and higher caregiver strain; and Antipsychotics - none.

Conclusion: Findings highlight factors associated with psychotropic medication use for a clinically complex population, which may inform community care improvement efforts.

Keywords

Psychotropic Medications; Autism; Community-Based Research; Health Services Research

An estimated 1 in 54 school-age children meet criteria for autism spectrum disorder (ASD)[1], reflecting a steady increase in ASD prevalence over several decades. Community service systems are challenged with meeting the complex needs of this population. Publicly-funded mental health (MH) services play an important role in caring for children with ASD given documented high rates (> 70%) of co-occurring psychiatric conditions[2,3]. Although there are no FDA-approved medications to treat the core symptoms of ASD, several psychotropic medications are commonly prescribed to treat the co-occurring behavioral and MH conditions of children with ASD, even in children as young as 0–2 years[4]. Of these medications, only two (risperidone and aripiprazole) have FDA approval for use in children with ASD, and specifically to target co-occurring irritability[5]. Physicians report commonly prescribing medications using a “trial and error” approach to help manage symptoms in children with or without ASD when evidence-based treatments are not available[6]. Given the complex clinical presentations of children with ASD, there is a need to systematically assess medication practices in community services as a means of informing care improvement efforts.

Rates of psychotropic medication use in children with ASD vary but tend to be high, with a median prevalence of 41.9% (range: 2.7 – 80.0%) assessed across healthcare databases, national autism organization registries, and web-based surveys[7]. There are also relatively high rates of psychotropic polypharmacy reported (e.g., 35.0% as assessed through private insurance claims[8]). Rates of psychotropic medication use is higher for children with ASD than those without ASD, even when matched for other psychiatric diagnoses and private health insurance[9]. Globally and within the U.S., the most commonly prescribed classes of psychotropic medications for children with ASD are antipsychotics, stimulants, and selective serotonin reuptake inhibitors (SSRIs)[7]. The existing prevalence research is largely based in private insurance claims and registry/survey data, and suggests prominent use of various psychotropic medications alone or in combination in children with ASD. There is a need to better understand patterns of and factors associated with psychotropic medication use in publicly-funded MH settings where rates of medication use tend to be high across child populations[10].

In regard to factors, older child age and Non-Hispanic White ethnicity are associated with more psychotropic medication use in children with ASD across studies of national registries and publicly-funded healthcare claims[4,11]. Findings regarding gender[4,12] and cognitive functioning[11] are mixed. While some registry-based studies report higher medication use with increased severity of co-occurring intellectual disability[13], others find no differences by cognitive functioning[11]. Child clinical characteristics, including higher rates of behavior problems and co-occurring MH diagnoses are also associated with medication use in ASD across claims- and registry-based samples[7,11]. Extant studies primarily utilize insurance claims or registry data, and are limited by a lack of independent and standardized assessment of child clinical characteristics (ASD severity, cognitive functioning, co-occurring MH diagnosis). Moreover, very few studies examine factors associated with use of specific medication classes (see Coury et al.[11] for an exception), though this level of analysis may shed light on prescription practices in community MH settings. Finally, caregivers play a significant role in accessing mental health services for their children, including psychotropic medications. Caregiver characteristics, including caregiver strain and education level, have been found to be significantly associated with psychotropic medication use in broader child populations of children receiving MH services (e.g. children with disruptive behavior disorders)[12]. Caregivers of children with ADHD have also reported reduced caregiver strain and improved family relationships as a key benefit of psychotropic medication treatment[14]. There is a need to further examine caregiver factors in relation to psychotropic medications use in ASD, particularly in regard to caregiver strain, which is disproportionally high in this population[15], and may contribute to caregivers seeking or responding to recommendations for psychotropic medications.

The present study extends existing research on psychotropic medication use in ASD by depicting patterns of use, as well as assessing child- and family-level factors associated with any medication use, polypharmacy and medication class in a well-characterized sample of children with ASD receiving publicly-funded MH services. The study aims to: (a) characterize rates of psychotropic medication use in children with ASD receiving outpatient or school-based publicly-funded MH services, (b) examine child- and family-level factors associated with *any* medication use and the number of medications used, and (c) examine these factors in relation to the use of specific medication classes (e.g. stimulants, antipsychotics, SSRIs). We anticipate relatively high rates of medication use in this population, with specific child (co-occurring MH diagnoses, greater ASD severity and behavior problems) and family (higher caregiver strain, less education) characteristics positively associating with any medication use. Factors associated with medication use will likely vary by class (e.g. ADHD for stimulants).

METHODS

Data were drawn from the baseline assessments of participants from a community effectiveness trial of An Individualized Mental Health Intervention for Autism (AIM HI)[1], a parent-mediated behavioral intervention for children with ASD, conducted in publicly-funded outpatient and school-based MH programs across California. All research procedures were reviewed and approved by the regulatory board of the sponsor institution. Participants were enrolled in the trial between 2012 and 2015. Specifically, community therapists from

participating MH programs were enrolled and children/families were then recruited from the caseloads of participating therapists. Prior to participation in the trial, all child/caregiver participants participated in a baseline assessment to determine trial eligibility and assess baseline functioning and characteristics. See Brookman-Frazee et al. (2019)[1] for further trial details, including sampling and recruitment methods.

Participants

See Table 1 for child, family and service characteristics. Child-caregiver dyads were eligible for the trial if the: 1) child age was 5 to 13 years during the recruitment period, 2) caregiver spoke English or Spanish as their primary language, 3) child had an existing ASD diagnosis on record (either medical or special education diagnosis), and (4) child exhibited clinically significant ASD symptoms on a standardized ASD diagnostic measure performed by research team (the Autism Diagnostic Observation Schedule, second edition; ADOS-2[16], or the Social Responsiveness Scale, second edition; SRS-2)[17]. All children were administered the ADOS-2, and 96% of children were classified of “ASD” or “Autism” on the ADOS-2. Those that did not meet the clinical cutoff (n =12) were clinically reviewed, and determined to meet study criteria based on: (a) scoring in the clinical range on all scales of the SRS-2, and (b) having an existing ASD diagnosis provided by a community provider with specialization in ASD and developmental disabilities (e.g. psychologist from the state Regional Center). A total of 202 children and their primary caregivers (93.6% mothers) were included in the current study. The average age of the child participants was 9.1 years (SD = 2.4) and 170 (84.2%) were male. Caregiver-reported child race and ethnicity is as follows: Hispanic/Latinx (59.9%), followed by Non-Hispanic White (25.2%), Black (5.4%), Multiracial (4.5%), Asian (4.0%), and American Indian/Alaska Native (1.0%). A substantial minority of caregivers (29.7%) identified Spanish as their preferred language.

Procedure

Caregivers and children participated in a baseline assessment that included standardized assessment of child ASD symptoms, co-occurring MH conditions, and cognitive functioning. During the assessment, caregivers were interviewed regarding child psychotropic medication use. Caregivers also completed questionnaires, including a demographic survey, and measures of child behavior problems and caregiver strain. Participants received a $40 gift card honorarium for participating in this baseline assessment.

Measures

Medication Use.—The baseline assessment included a service use assessment collected via interview with the caregiver. The service assessment included medication use within the past six months. We applied the methods employed in the Garland et al (2012) study conducted in similar service contexts characterizing medication use via parent report. Specifically, caregivers were asked, “In the past six months, has (your child) used any medications for a developmental, behavioral, emotional, or drug/alcohol problem?” If the caregiver reported yes, the caregiver was asked, “Please tell me the name of the medication that the child has used in the past 6 months.” The question was repeated until all medications were listed. Interviewers were trained to provide assistance to caregivers during

the interview to assist with accurate reporting. For example, interviewers were provided with a list of common psychotropic medications by treatment targets along with a crosswalk of medication brand and generic names that they could reference during the interview to help clarify the parents' responses. Interviewers recorded parent responses verbatim. Caregiver responses were later classified into the specific medication classes by mechanism of action consistent with Neuroscience Based Nomenclature guidelines and prior studies[12,18] (see Supplemental Table 1). Although previous research suggests that parental report may not be accurate for precise assessment of dose and timing[19], it has been shown to be a reliable general indicator or children's medication treatment[20].

Child and Family Characteristics.

Child and caregiver demographics.: Data on child age, gender, and race/ethnicity and caregiver marital status, education level and household income were collected using a baseline questionnaire completed by the caregiver. Race/ethnicity variables were classified as a three group variable broken down by Non-Hispanic White, Hispanic/Latinx, and Other Minority/Multiracial. Responses for caregiver education level were coded into three groups: (1) some high school or less; (2) completed high school, (3) any college/trade school. Responses for annual household income were coded into three groups: (1) <$25,000; (2) $25,000–75,000 (3) >$75,000.

Child behavior problems.: Child behavior problems were assessed using the Eyberg Child Behavior Inventory (ECBI). The ECBI is a caregiver-report measure assessing behavior problems in children aged 2–16 years. The ECBI includes 36 items, rated on a dichotomous Problem scale and a 7-point Likert Intensity scale. Higher scores indicate more frequent (Intensity scale) or more problematic (Problem scale) behavior problems. The ECBI demonstrates strong psychometric properties, including test-retest reliability (r = .80) and convergent and divergent validity[21]. While designed to assess disruptive behavior in children broadly, the ECBI has also been used to assess behavior problems and monitor treatment progress in studies of children with ASD, demonstrating excellent internal consistency (ECBI Intensity scale $\alpha = 0.92$) in samples of children with ASD[22]. The ECBI Intensity Scale t-score was used for the present analyses.

Child autism severity.: Information about autism severity was collected using the Social Responsiveness Scale, Second Edition (SRS-2[17]), a 65-item rating scale that assesses the presence and severity of social impairments associated with ASD. The SRS-2 has strong internal consistency, inter-rater reliability and diagnostic discrimination in school-aged children[17]. The SRS-2 was completed by caregivers at baseline and the SRS-2 Total T-score (M= 50, SD = 10) was used to measure child autism severity in the current analyses. Higher scores indicate higher severity.

Child co-occurring mental health diagnoses.: The Mini-International Neuropsychiatric Interview, parent version (MINI-KID-P)[23] is a structured diagnostic interview that assessed the presence of Axis I clinical disorders (in line with DSM-IV/ICD-10 criteria). An adapted MINI-KID-P was administered to the caregiver by a trained member of the research team at the baseline assessment. The MINI-KID-P was adapted for use in this ASD

sample by adding follow-up probes to aid in the differentiation between ASD symptoms and symptoms of other psychiatric disorders. All interviewers were trained to criterion prior to administering the MINI-KID-P by a study investigator who is a licensed clinical psychologist with clinical expertise in child mental health and ASD diagnostic assessment. Diagnostic criteria were assessed for the following categories: (1) Attention Deficit Hyperactivity Disorder (ADHD) diagnoses, (2) Anxiety diagnoses, (3) Mood diagnoses and coded as meeting diagnostic criteria or not.

Child cognitive functioning.: Child cognitive functioning was assessed with either the Wechsler Abbreviated Scale of Intelligence-II (WASI-II) or the Differential Ability Scale-II (DAS-II) based on the child's age (the DAS-II was administered to children younger than six years old) . The WASI-II[24] is a standardized assessment of cognitive ability that includes 4 subtests that yields a FSIQ represented as a standard score (M = 100; SD = 15). The DAS-II[25] is a comprehensive assessment of cognitive ability that produces a General Conceptual Ability (GCA) score comprised of three composites (Nonverbal Reasoning Ability, Verbal Ability, and Spatial Ability) and represented as a standard score. All measures was administered by a trained member of the research team.

Caregiver strain.: Caregivers reported their experience of caregiving-related strain using the Cargeiver Strain Questionnaire (CGSQ)[26]. The CGSQ is a 21-item scale that measures the impact of caring for a child with emotional and behavioral problems in six areas: economic burden, impact on family relations, disruption of family activities, psychological adjustment of family members, stigma/anger, and worry/guilt; higher scores indicate higher caregiver strain. The CGSQ total score demonstrates strong internal consistency (α= 0.93) and convergent and discriminant validity[26].

Statistical Analyses

Patterns of psychotropic medication use were determined with descriptive statistics in SPSS Version 26. Associations between child and family factors and any medication use and specific medication classes were analyzed using logistic regression in STATA Version 16. Only medication classes with more than 10% endorsement were analyzed as dependent variables. Negative binomial regression was used to analyze the number of medications given the positively skewed nature of the data. Only the subset of children taking psychotropic medications (n = 100) were assessed in analyses examining characteristics associated with the number of medications used to provide more accurate understanding of relations to use. Factors assessed in relation to medication use (any use, number of medications, medication class) were selected based on previous literature and include: child age, gender, race/ethnicity, cognitive functioning, autism severity, behavior problem intensity, co-occurring MH diagnosis, caregiver strain and caregiver level of education.

RESULTS

Rates of any medication use

Nearly half (49.5%) of the full sample of children were reported to use *any* type of psychotropic medication (see Table 2). The most commonly endorsed medication class

was stimulants (methylphenidate- and amphetamine-based) followed by antipsychotics (dopamine antagonists/partial agonists), alpha-2 agonists, and SSRIs. Other classes of psychotropic medications (e.g. antiepileptics, anxiolytics, norepinephrine reuptake inhibitors), were endorsed at relatively low rates (<4%). Of those children taking any psychotropic medications, the average number of medications was 1.78 (range: 1–6). Seventeen children (17.0%) were reported to use three or more medications (see Supplemental Table 2 for a list of medication combinations reported).

Factors associated with medication use

Results revealed that *any* psychotropic medication use was more likely for Non-Hispanic White children (relative to Hispanic/Latinx children), children with lower cognitive functioning, and children who met criteria for an ADHD (see Table 3). Age, gender, autism severity, behavior problems, anxiety or mood diagnoses, caregiver strain and caregiver education were not significantly associated with any psychotropic medication use. For children taking at least one medication, *none* of the child/family characteristics assessed were significantly associated with using multiple medications.

Next, factors associated with use of specific medication classes (stimulants, antipsychotics, SSRIs, and alpha-2 agonists) were assessed (See Table 4). Results revealed different factors associated with medication use by medication class. Stimulant use was significantly more likely for children with lower autism severity, greater intensity of behavior problems, and meeting criteria for an ADHD diagnosis. There were no factors significantly associated with antipsychotic medication use. Higher autism severity was the only significant factors associated with SSRI use. Alpha-2 agonist use was significantly more likely for children with lower cognitive functioning, lower autism severity, ADHD diagnosis, and those whose caregivers reported higher levels of caregiver strain.

DISCUSSION

Mental health services play an important role in caring for children with ASD, but guidelines for psychotropic medication practices for this population are only emerging. The present study sought to characterize patterns of and factors associated with medication use in a well-characterized sample of clinically referred children with ASD aged 5 to 13 receiving publicly-funded MH services to inform care improvement efforts. Consistent with previous research conducted in different settings (e.g., private insurance claims, national registries, web-based surveys), this study found relatively high rates of psychotropic medication use in this population, with nearly half of children reported to use one or more psychotropic medications, and about one in five children reported to use multiple psychotropic medications. These rates appear to be comparable yet slightly lower than rates reported in large public and private insurance claims-based studies of children with ASD[4,8], yet higher than those reported through web-based registries[11,13]. This variability may be explained by differences in samples (e.g., clinically referred samples, participant age range). Interestingly, some studies find lower rates of medication use (and particularly stimulant use) in Western versus Midwest and Southern states in the U.S.[27], which may play a role in the prevalence rates found in the present study.

There is a lack of consensus in the field over psychotropic medication use for children with ASD, in part due to debate over over-medication and polypharmacy[28], and lack of FDA-approved medications to treat the core symptoms of ASD[5]. The high medication rates found in the present sample may be attributable to the high rates of co-occurring MH conditions in children with ASD receiving MH services[2]. Indeed, the most frequently endorsed medication class in the current study (stimulants) is an evidence-based treatment for the most prevalent co-occurring psychiatric disorder in children with ASD, ADHD[2]. Yet, the rates of medication use and stimulant medication use found were somewhat lower than those reported for a community sample of similar-aged children with disruptive behavior disorders receiving publicly-funded MH services[12], suggesting that decisions about medication use may be weighed differently for children with ASD. Assessments of factors associated with psychotropic medication use and class provide a lens for further characterizing community care of this clinically complex population.

Non-Hispanic White Ethnicity (compared to Hispanic), ADHD diagnosis, higher autism severity, and lower cognitive functioning were all significantly associated with higher likelihood of psychotropic medical use. The finding related to ethnicity is consistent with studies of children with ASD[4,8,11] and without ASD[12], demonstrating lower rates of medication use in children from racial and ethnic minoritized backgrounds compared to Non-Hispanic White children and lower rates of receiving ASD services[29]. It is notable that these rates differ after controlling for other clinical factors and suggest that there may be other factors associated with medication use such as access to prescribing providers, access to information about psychotropic medications, provider decision-making regarding referrals to physicians, or caregiver decision-making regarding medications. Future inquiry into these factors is warranted.

Evidence further suggests that child ADHD diagnosis may influence decisions regarding psychotropic medication use (e.g. stimulant, alpha-2 agonist). Results from medication class analyses support the increased likelihood of a child taking a stimulant medication if the child has less severe autism symptoms and meets criteria for ADHD. These medications have been found to be effective and well-tolerated for youth with ADHD[30] but less effective and tolerated for those with ADHD *and* co-occurring ASD[31] . Future study should investigate clinician decision-making in co-occurring cases to understand if providers weigh ADHD symptomatology differently in those children with mild comorbid ASD symptoms. Finally, current findings corroborate prior findings of higher rates of medication use in children with ASD and comorbid intellectual disability[13]. It is unclear why children with ASD and lower cognitive functioning are more likely to receive medication, as lower cognitive functioning is not typically associated with greater intensity of behavior problems in youth with ASD as is the case for youth without ASD[32], and current multiple regression analyses controlled for behavior problems and co-occurring psychiatric conditions. Further research is needed to investigate whether this finding is related to caregiver and/or provider perceptions that these children may be more likely to benefit from psychotropic medications to address concerns, or perceptions of barriers to traditional behavioral intervention approaches (e.g. due to limited child verbal ability).

Compared to stimulant medications, SSRI use was reported in a smaller proportion of the sample (13.9%). This finding may be related to the limited and mixed evidence to support SSRI efficacy in this population[5]. Only greater autism severity was associated with SSRI use in the current study, suggesting that SSRIs may be selected to manage autism-related symptoms (e.g. rigidity, repetitive behaviors) in community settings. While some small trials provide evidence for the effectiveness of SSRIs in treating anxiety and aggression in adults with ASD, there is limited evidence of SSRI effectiveness in children[5]. A recent meta-analysis suggests no effect of SSRIs in the treatment of repetitive behaviors in children with ASD[33]. Evidence for the treatment of anxiety and depression is limited and mixed[34]. Further study of the tolerability and effectiveness of SSRIs across treatment targets for children with ASD is warranted to inform care guidelines, though the paucity of evidence to support the treatment of repetitive behaviors may be an important consideration for community providers.

Alpha-2 agonists use was also endorsed in 13.9% of the sample, in the context of emerging research on their effectiveness in children with ASD. Alpha-2 agonists are FDA-approved for the treatment of ADHD, and were shown to be safe and effective in clinical trials of children with ADHD and no ASD[35]. Alpha-2 agonists research in ASD is limited, but suggests a potential link to ADHD symptom reduction[36], with consideration of potential side effects including sedation and headaches[37]. ADHD diagnosis, lower cognitive functioning , and higher caregiver strain were all uniquely associated with alpha-2 agonists use, suggesting that alpha-2 agonists may be used to manage co-occurring ADHD, particularly when caregivers are strained or when children have lower cognitive ability.

Importantly, the current study revealed no factors significantly associated with the number of medications used and antipsychotic medication use. These findings suggest that there is no clear pattern in community practice for polypharmacy nor the prescription of antipsychotics for this population, and may be a reflection of the growing concern in the field over the varied and at times non-evidence-based use of these medications[7,8]. While antipsychotic medications are FDA-approved and shown to be effective at treating irritability and aggression in children with ASD, studies indicated that these medications have been used off-label in the ASD population to target other symptoms such hyperactivity and repetitive behaviors for which there is less evidence for effectiveness[37]. Lack of identifiable child and family characteristics associated with antipsychotic use may relate to the broad assessment of behavioral problem intensity in the current study, rather than specific assessments of aggression and irritability, as well as the examination of a clinically referred population of children with ASD. Alternatively, it may suggest lack of consensus in community practice about indications for antipsychotic use. Future research should examine caregiver and provider beliefs and practices regarding antipsychotic use and polypharmacy with this population, which in turn may inform community care improvement efforts.

The present findings should be interpreted within the context of study limitations. First, the present sample included children that were already connected to publicly-funded MH services; findings may not generalize to those with private insurance or those who do not access mental health services. The present sample was assessed within the context of a community effectiveness trial, which has the advantage of a large, representative

and community-based sample; however, certain sample characteristics (limited geographic region, family consent to participate in a community research trial of a MH intervention) may limit generalizability. Of note, a few studies suggest that medication use may be somewhat lower in [state] relative to other states in the U.S..[27] The present study was limited to assessing child and family factors associated with medication use. Future research examining provider factors, including provider decision-marking and continuity of providers over time, will further our understanding of provider-level correlates of child medication use. Finally, the sample size did not allow for the detection of factors associated with smaller differences in medication use.. Importantly, the study demonstrated many methodological strengths that enhance the conclusions that may be drawn, including the use of a well-characterized sample of children with ASD, use of standardized clinical assessments delivered by the research team, and concurrent consideration of child and family factors associated with medication use.

Taken together, results support that psychotropic medication use and polypharmacy are common in school-age children with ASD served in publicly-funded mental health settings. Findings suggest that providers may weigh child clinical characteristics related to ASD and/or co-occurring conditions in making decisions regarding psychotropic medications. These community practices demonstrate varying degrees of alignment with the evidence-base by medication class, and suggest important areas for future research and intervention. Given the tremendous burden of MH problems in ASD, and lack of FDA-approved medications for core ASD symptoms, further research into additional pharmacological targets is important and ongoing[37]. Similarly, postmarketing and community effectiveness trials of FDA-approved medications are also needed to inform care guidelines. Particularly, given the high rates of use of polypharmacy in this population, additional research is needed to assess the effectiveness and safety of the combinations of the various medications commonly used. Clarification of psychotropic medication recommendations specific to children with ASD may be especially important for prescribing providers whom are less familiar with the evidence in ASD, as these providers may be likely to follow guidelines for children without ASD, which may or may not be contraindicated. Community providers will likely benefit from additional supports in caring for this clinically complex child population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Child and service characteristics by medication use (N = 202)

	Yes, Medication Use (*n* = 100)	No Medication Use (*n* = 102)	
Child demographic and clinical characteristics	**Mean (SD) or *n* (%)**	**Mean (SD) or *n* (%)**	***t* or Chi-square (X^2)**
Age (years)	9.3 (2.1)	9.0 (2.7)	$t = -0.99$
Sex (male), %	83 (83.0%)	87 (85.3%)	$X^2(1) = 0.20$
Race and ethnicity, %			$X^2(2) = 12.41^{**}$
Hispanic/Latinx	50 (50.0%)	71 (69.6%)	
Non-Hispanic White	36 (36.0%)	15 (14.7%)	
Multiracial and Other Race	14 (14.0%)	16 (15.7%)	
Cognitive standard score (IQ)[a]	86.2 (16.5)	91.3 (16.1)	$t = 2.10^{*}$
SRS-2 Total T-score	80.0 (11.1)	80.0 (11.6)	$t = -0.21$
ECBI Intensity T-score	65.8 (9.3)	60.8 (10.9)	$t = -3.43^{**}$
Diagnosis Group[c]			
ADHD	89 (89.9%)	67 (66.3%)	$X^2(1) = 16.18^{***}$
Anxiety	59 (59.6%)	54 (52.9%)	$X^2(1) = 0.90$
Mood	37 (37.4%)	23 (22.8%)	$X^2(1) = 5.08^{*}$
Caregiver/family characteristics			
Marital status (married) % (*n* = 201)	49 (49.5%)	56 (54.9%)	$X^2(5) = 5.00$
Annual household income ($), %			$X^2(2) = 2.65$
< 25,000	40 (40.0%)	51 (50.0%)	
25,000 – 75,000	43 (43.0%)	33 (32.4%)	
>75,000	17 (17.0%)	18 (17.6%)	
Caregiver highest level of education % (*n* = 200)			$X^2(2) = 4.11$
Less than high school diploma	13 (13.3%)	25 (24.5%)	
Completed high school	40 (40.8%)	36 (35.3%)	
Any college or trade school	45 (45.9%)	41 (40.2%)	
Caregiver Strain Questionnaire Total score[d]	2.9 (0.9)	2.5 (0.8)	$t = -3.61^{***}$
Service characteristics			
Mental health service setting			$X^2(2) = 2.14$
Mental health outpatient clinic	63 (63.0%)	54 (52.9%)	
School-based setting	20 (20.0%)	27 (26.5%)	
Other (including home or multiple settings)[e]	17 (17.0%)	21 (20.6%)	
Prescribing provider for psychotropic medication (*n* = 99)			---
Psychiatrist	84 (84.8%)	---	
Pediatrician/Family Medicine	8 (8.1%)	---	
Other provider/Multiple providers[f]	7 (7.1%)	---	

Note:

[a]Standard score obtained from the Wechsler Abbreviated Scale of Intelligence-II or the Differential Ability Scale-II

[b]ADOS-2 comparison scores range from 1–10

[c]Diagnostic group classifications based on Mini-International Neuropsychiatric Interview, parent version. Diagnostic data missing for 2 participants; Yes Medication Use: $n = 99$; No Medication Use: $n = 101$.

[d]Caregiver Strain total scores range from 1 to 5 (high)

[e]Multiple settings refers to services being provided across multiple service settings (home, school, clinic).

[f]Other provider refers to neurologist or other specialist. Four families reported that psychotropic medications were prescribed by multiple providers.

*p<.05,

**p<.01,

***p<.001

Abbreviations: ADOS-2: Autism Diagnostic Observation Schedule, 2nd edition; SRS-2: Social Responsiveness Scale, 2nd edition; ECBI: Eyberg Child Behavior Inventory; CGSQ: Caregiver Strain Questionnaire; ADHD: Attention Deficit Hyperactivity Disorder

Table 2

Patterns of psychotropic medication use.

Full sample (*N* = 202)	***n* (%)**
Any Psychotropic Medication	100 (49.5%)
Polypharmacy (2 or more medications)	48 (23.8%)
Children with any psychotropic medication use (*n* = 100)	***n* (%)**
Number of Medications	
1	52 (52.0%)
2	31 (31.0%)
3	8 (8.0%)
4 or more	9 (9.0%)
Medication Class *(not mutually exclusive)*	
Stimulants[a]	58 (58.0%)
Antipsychotics[b]	33 (33.0%)
Alpha-2 agonists	28 (28.0%)
Selective serotonin reuptake inhibitors	28 (28.0%)
Anti-epileptics	7 (7.0%)
Anxiolytics	5 (5.0%)
Norepinephrine reuptake inhibitors	5 (5.0%)
Serotonin agonist and reuptake inhibitors	2 (2.0%)
Norepinephrine/serotonin receptor antagonist	2 (2.0%)
Alkali metal	1 (1.0%)
Beta blocker	1 (1.0%)

Note:

[a]Methylphenidate- and amphetamine-based.

[b]Dopamine antagonist/partial agonists.

Table 3

Predictors of any medication use and number of medications

	Any Medication (*N* = 202)			**Number of Medications (*n* = 100)**		
	***B* (SE)**	**95% C.I.(*B*)**	***OR***	***B* (SE)**	**95% C.I.(*B*)**	**Beta**
Child Factors						
Age	0.12 (0.86)	−0.05, 0.29	1.13	0.00 (0.04)	−0.08, 0.08	0.06
Sex[a]	−0.82 (0.53)	−1.85, 0.21	2.28	0.04 (0.23)	−0.40, 0.48	0.09
Race/ethnicity[b]						
Hispanic	**−1.02 * (0.44)**	**−1.89, −0.14**	**0.36**	−0.15 (0.18)	−0.50, 0.20	−0.22
Multiple and Other	−0.85 (0.57)	−1.97, 0.28	0.43	−0.38 (0.26)	−0.89, 0.13	−0.20
Cognitive Functioning	**−0.03 * (0.01)**	**−0.05, 0.00**	**0.97**	−0.01 (0.01)	−0.18, 0.00	−0.20
SRS Total	−0.03 (0.02)	−0.07, 0.01	0.97	0.00 (0.01)	−0.02,0.02	−0.09
ECBI Intensity	0.02 (0.02)	−0.03, 0.07	1.02	0.01 (0.01)	−0.01, 0.04	0.14
ADHD diagnosis	**1.55 * (0.52)**	**0.53, 2.57**	**4.73**	0.04 (0.29)	−0.53, 0.61	0.16
Anxiety diagnosis	−0.13 (0.38)	−0.88, 0.63	0.88	0.11 (0.19)	−0.26, 0.48	0.02
Mood diagnosis	0.41 (0.39)	−0.35, 1.18	1.51	0.00 (0.17)	−0.34, 0.33	0.06
Caregiver Factors						
Caregiver strain[c]	0.44 (0.44)	−0.11, 1.00	1.56	0.01 (0.11)	−0.41, 0.64	0.11
Caregiver education[d]						
Completed HS	0.73 (0.50)	−0.25, 1.70	2.07	0.11 (0.27)	−0.33, 0.73	0.15
Any college/ trade school	0.62 (0.50)	−0.36, 1.61	1.87	0.20 (0.27)	−1.67, 2.32	0.14

Note. Significant predictors are bolded for emphasis.

[a]Reference group = male.

[b]Reference group = Non-Hispanic White.

[c]Caregiver Strain Questionnaire – Total score.

[d]Reference group = No high school degree. Caregiver ed.: caregiver level of education. HS: high school. HS = high school.

*p< .05.

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Table 4

Predictors of medication use by medication class (N = 202)

	Stimulants			***Antipsychotics***			***SSRIs***			***Alpha 2 Agonists***		
	B **(SE)**	**95% C.I. (*B*)**	***OR***	***B*** **(SE)**	**95% C.I. (*B*)**	***OR***	***B*** **(SE)**	**95% C.I. (*B*)**	***OR***	***B*** **(SE)**	**95% C.I. (*B*)**	***OR***
Child												
Age	0.14 (0.09)	−0.03, 0.31	1.15	−0.09 (0.11)	−0.31. 0.13	0.91	0.03 (0.11)	−0.20, 0.26	1.03	0.01 (0.12)	−0.22, 0.24	1.00
Sex[a]	0.63 (0.54)	−0.43, 1.68	1.87	0.63 (0.64)	−0.63, 1.89	1.87	0.74 (0.62)	−0.48, 1.97	2.10	1.05 (0.75)	−0.41, 2.51	2.85
Race/ethnicity[b]												
Hispanic	−0.65 (0.43)	−1.48, 0.20	0.52	−1.02 (0.53)	−2.06, 0.03	0.36	−0.32 (0.58)	−1.45, 0.83	0.73	−0.55 (0.55)	−1.65, 0.56	0.58
Other/multiple	−0.48 (0.58)	−1.62, 0.67	0.62	−0.55 (0.68)	−1.89, 0.79	0.58	−0.89 (0.84)	−2.54, 0.75	0.41	−0.94 (0.81)	−2.53, 0.64	0.39
Cognitive Functioning	−0.01 (0.01)	−0.03, 0.02	0.99	−0.22 (0.01)	−0.05, 0.01	0.98	−0.03 (0.01)	−0.05. 0.00	0.97	**−0.05** (0.02)**	**−0.09, −0.02**	**0.95**
SRS Total	**−0.07 * (0.02)**	**−0.11, −0.02**	**0.94**	−0.03 (0.03)	−0.08, 0.02	0.97	**0.11 *** (0.03)**	**0.05. 0.18**	**1.12**	**−0.75 * (0.03)**	**−0.13, −0.17**	**0.93**
ECBI Intensity	**0.07 * (0.03)**	**0.02, 0.12**	**1.07**	−0.01 (0.03)	−0.07, 0.06	1.00	−0.03 (0.04)	−0.10. 0.04	0.97	0.04 (0.04)	−0.04, 0.11	1.04
ADHD	**1.58 * (0.64)**	**0.34, 2.83**	**4.88**	0.98 (0.79)	−0.56, 2.52	2.66	1.21 (0.78)	−0.31, 2.73	3.36	**2.78 * (1.37)**	**0.07, 5.45**	**15.80**
Anxiety	0.13 (0.41)	−0.67, 0.93	1.14	−0.04 (0.52)	−1.01, 0.98	0.96	0.12 (0.55)	−0.95, 1.20	1.13	0.06 (0.58)	−1.08, 1.20	1.07
Mood	0.09 (0.40)	−0.70, 0.88	1.09	0.59 (0.48)	−0.35, 1.52	1.80	0.46 (0.50)	−0.51, 1.43	1.58	0.64 (0.53)	−0.41, 1.68	1.89
Caregiver												
Caregiver strain[c]	−0.33 (0.28)	−0.88, 0.23	0.72	0.50 (0.33)	−0.15, 1.16	1.65	−0.16 (0.35)	−0.86, 0.54	0.85	**0.88 * (0.37)**	**0.14, 1.61**	**2.40**
Caregiver ed.[d]												
Completed HS	0.36 (0.56)	−0.73, 1.46	1.43	0.87 (0.72)	−0.55, 2.29	2.38	0.00 (0.74)	−1.43, 1.44	1.00	1.11 (0.87)	−0.60, 2.83	3.04
Any college/ trade school	0.81 (0.56)	−0.27, 1.90	2.25	−0.16 (0.78)	−1.69, 1.38	0.86	0.76 (0.70)	−0.60, 2.12	2.14	1.00 (0.89)	−0.74, 2.75	2.72

Note. Significant predictors are bolded for emphasis.

[a]Reference group = male.

[b]Reference group = Non-Hispanic White.

[c]Caregiver Strain Questionnaire – Total score.

[d]Reference group = No high school degree. Caregiver ed.: caregiver level of education. HS: high school. HS = high school.

* p< .05,

*** p<.001