Research Square

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Deprescribing psychiatric medications in youth: A feasibility study

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Abstract

Background and objective: Rates of psychiatric medication use among U.S. youth have increased substantially and stakeholders are increasingly concerned. We tested the feasibility of a novel intervention that combines shared decision making and a structured deprescribing protocol during routine outpatient care with youth.

Methods: Five clinicians delivered the intervention to youth 6 to 17 years old receiving three or more psychiatric medications or an off-label antipsychotic. Families completed assessments at baseline, 18- and 30-weeks. We collected data via surveys, medical records, and qualitative interviews.

Results: We enrolled 31 youth, 29 received the intervention, and 13 of the 29 (45%) chose to deprescribe. Eleven of those 13 reduced their dose or stopped completely; 2 returned to their original dose. Of the 13, the mean dose-weighted medication use reduced from 3.9 (SD=1.38) to 2.9 (SD=1.41), and the mean number of medication reactions reduced from 1.3 (SD=2.21) to 0.3 (SD=0.48). In the 16 participants who chose not to deprescribe, the mean dose-weighted medication use and medication reactions reduced from 3.4 (SD=0.89) to 3.2 (SD=1.32) and 0.6 (SD=0.89) to 0.0 (SD=0.0), respectively. Youth functioning remained similar across groups. There were no study-related serious adverse events. Clinicians and caregivers considered the intervention feasible, valuable, and effective.

Conclusions: Our intervention and procedures were feasible in real-world community settings. The intervention shows promising findings related to safety and effectiveness.

Trial registration: Our study was retrospectively registered with ClinicalTrials.gov. NCT # pending.

Introduction

The use of off-label antipsychotics and psychiatric polypharmacy, defined here as three or more psychiatric medications, has increased internationally and among US children and adolescents, henceforth referred to as youth, over the past 20 years.(Chiang et al., 2024; Davis et al., 2021; Winterstein et al., 2017; J. M. Zito et al., 2021) An estimated 1.3 million youth in the US receive psychiatric polypharmacy or off-label antipsychotics.(Olfson et al., 2015; J. M. Zito et al., 2021) Youth also remain on these medications far longer than the clinical durations studied.(Crystal et al., 2016; J. M. Zito et al., 2013) Youth with social and developmental vulnerabilities, including those receiving Medicaid and those in foster care, have the highest rates of off-label antipsychotic use and polypharmacy.(Allen et al., 2018; Barnett et al., 2019; Crystal et al., 2016; Dosreis et al., 2011; Simmel et al., 2021; Zuddas et al., 2011)

Side effects reported for antipsychotics can include weight gain, metabolic abnormalities, neurocognitive impairments, sedation, tremor, somnolence, and restlessness.(Caccia, 2013; Cohen et al., 2012; Pillay et al., 2017; Zuddas et al., 2011) Long-term antipsychotic use in adults has given rise to obesity, diabetes, heart disease, cortical thinning, and impaired social functioning.(Andreasen et al., 2013) The recommended monitoring in youth occurs inconsistently.(AACAP, n.d.; Sanyal et al., 2024; Walkup & Work Group on Quality Issues, 2009) No studies have assessed the safety of psychiatric polypharmacy in youth. Moreover, caregivers are often unaware of the risks of psychiatric medications in youth, although side effects are their most frequent concern.(Barnett et al., 2019; Brinkman et al., 2011; McLaren et al., 2022)

Calls, both professional and societal, to reduce the off-label use of antipsychotics and polypharmacy in youth are increasing(M. Boland et al., 2024; Keeshin et al., 2020; Kutz, 2012; Morgan & Baker, 2024; World Health Organization, n.d.; J. A. Zito, 2019), public concern is growing (Assistant Secretary for Public Affairs (ASPA), 2025; Richtel & Flanagan, 2022), and caregivers and prescribing clinicians are increasingly willing to consider reducing these medications. (Barnett et al., 2020; McLaren et al., 2022)

The term deprescribing describes the process of prescribing clinicians (henceforth referred to as clinicians) and patients working together to reduce or remove medications based on effectiveness, side effects, and patient preferences.(Goldberg et al., 2025; Gupta et al., 2019) Deprescribing has been primarily described and studied in the elderly, with results demonstrating reduced side effects, fewer drug interactions, and improved health, mental health, and quality of life (Davies et al., 2020; Mohamed et al., 2020; Nieder et al., 2017)Within child psychiatry, studies of children in residential settings have demonstrated safe deprescribing of antipsychotics and polypharmacy, leading to less aggression, less use of restraints, and lower costs.(Bellonci et al., 2013; Connor & McLaughlin, 2005; Huefner et al., 2014; van Wattum et al., 2013) A body of literature has also emerged around deprescribing antidepressants in youth, with attention to individualized approaches.(Stimpfl et al., 2025)

Shared decision making (SDM) is an approach where clinicians and patients collaborate to tailor treatment based on both clinical evidence and the patient's preferences.(Barnett et al., 2018; L. Boland et al., 2019; *Making Shared Decision-Making A Reality*, n.d., *Patients' Preferences Matter*, n.d.; Wyatt et al., 2015) For youth, SDM requires a triadic process between the youth, caregivers, and clinicians. Although very few studies have examined shared decision making (SDM) in child psychiatry, there is evidence that youth and their caregivers want their voices heard.(Barnett et al., 2019; Brinkman et al., 2013; Pillen et al., 2024)

Despite the need to engage youth and their caregivers in decisions about high-risk psychiatric medication and provide structured guidance to clinicians, there are no published structured deprescribing protocols available to support clinicians caring for outpatient youth. To address this gap, we aimed to develop and test the feasibility of an intervention that facilitates SDM between youth, caregivers, and clinicians and provides structured deprescribing guidance to clinicians caring for youth in outpatient settings.

Methods

Procedures

Our evaluation adopted a mixed-methods approach, collecting data from online surveys, electronic health records (EHR), a smartphone app, and by interviewing clinicians and caregivers. We recruited clinicians and youth/caregiver dyads from two urban outpatient community mental health centers in New York between December 2023 and April 2024. Both clinics served Medicaid populations and accepted private insurance, offering a range of psychiatric, counseling, and case management services. Prescribing clinicians and clinic administrators identified all potentially eligible caregivers and youth from their client lists using electronic health record data. At the next clinic visit for each of the identified youth, clinicians briefly explained the study and obtained permission for the research team to talk with them. Prospective caregivers and youth participants were then contacted by a research assistant who provided copies of the informed consent and assent documents and conducted the consent discussion. Caregivers were compensated $30 for taking part in the consent discussion and $50 for each of the three research assessments completed. Those who completed an interview received an additional $75. This study was overseen by a single IRB, the Biomedical Research Alliance of New York (BRANY), and conducted in accordance with the Declaration of Helsinki as revised in 2024. Caregivers and youth provided written informed consent and written (ages 12–17 years) or verbal (ages 6–11 years) assent prior to engaging in any study activities. Clinicians provided written informed consent in advance of the qualitative interviews.

Participants

Inclusion criteria

Eligible youth were: (a) aged 6–17 years, (b) prescribed psychiatric polypharmacy (3 or more concurrent medications) or an antipsychotic off-label for at least 3 months, and (c) had no hospitalizations, emergency room visits, or major life events (i.e., moving, changing schools) in the previous 3 months. Eligible caregivers (parents or guardians) were: (a) 18 years or older, (b) capable of providing informed consent, and (c) fluent in English. Eligible clinicians: (a) provided care to youth at one of the clinics and (b) were fully licensed to prescribe medications.

Exclusion criteria

Youth were considered ineligible if they: (a) had an acute crisis, (b) had a diagnosed substance use disorder, (c) were pregnant, or (d) were prescribed an antipsychotic for a condition approved by the FDA, such as a psychotic disorder, bipolar disorder, autism spectrum disorder with irritability/aggression, or Tourette's disorder.

Intervention

The clinical research team developed a preliminary version of the intervention and accompanying tools and manual. Prior to study launch, the tools and manual were revised in partnership with our Advisory Group, comprising two child clinical prescribers and two parents of youth who had received psychiatric polypharmacy and off-label antipsychotics in the past.

Phase 1. Shared decision making treatment review phase (~ 4 weeks)

The intervention began with a collaborative treatment review during which the triad (clinician, caregiver, and youth) discussed the youth's medications and made a shared decision regarding whether to try deprescribing a medication. This was completed in 1 or 2 sessions over the course of about 4 weeks. The triad considered whether each medication was improving symptoms, causing side effects, and still necessary. The research team did not impose any standards for which medication the triad might choose to try to deprescribe; decisions were individualized through the SDM process. SDM was supported by two tools: 1) a caregiver-facing Option Grid conversation aid (see Appendix S1), and 2) a smartphone-based chatbot app for caregivers (with a web portal for clinicians). The Option Grid supported SDM by describing five options, behavioral therapy plus four classes of medications, comparing the likely risks and benefits of each and providing plain language answers to frequently asked questions.(Barnett et al., 2018) The chatbot app contained the Option Grid content, other resource materials, and a treatment plan section that allowed caregivers to review various options, record their preferences, and leave comments that were viewable by clinicians in the web portal. The app also enabled caregivers to complete weekly health check-ins and an assessment of SDM.(Elwyn et al., 2013) Phase 1 ended with a shared decision whether or not to try deprescribing.

Phase 2. Deprescribing and monitoring medications phase (~ 14 weeks)

This phase was supported by a clinician-facing deprescribing protocol that facilitated tapering schedules and monitoring (see Appendix S2 and S3). Families who elected not to try deprescribing continued with their psychiatric care as usual. We modeled the protocol on existing structured guidance for deprescribing medications in the elderly (Bjerre et al., 2018) and on broad recommendations made by expert clinicians for children (Bellonci & Carlson, 2016; de Kuijper et al., 2014; Lohr, n.d.; Reeve et al., 2017; Scott et al., 2015). Protocol development involved multiple iterations, including consultation with 14 residents and fellows in psychiatry, tests of clinical utility by colleagues, and multiple changes as a result of feedback. When 9 pediatric clinicians confirmed that the protocol was practical, feasible, and usable, we completed a pilot test with 4 youth (age 6–17 years) taking atypical antipsychotics. Their medications were reduced or eliminated over a few months without adverse events. We then expanded the protocol to support deprescribing for polypharmacy, again based on existing guidance (Bellonci et al., 2013; Bellonci & Carlson, 2016; Connor & McLaughlin, 2005; Huefner et al., 2014; Lohr, 2019; Reeve et al., 2017; Scott et al., 2015), using feedback from 10 child psychiatry prescribers.

As a research team, we provided 3 hours of training to participating clinicians, including didactic, discussion, and role plays. After describing the study, we discussed the challenges of providing psychiatric care to youth, described SDM, simulated the use of the Option Grid conversation aid, and reviewed the

deprescribing protocol. We reinforced fidelity to the intervention through monthly consultation with the research team child psychiatrist/co-principal investigator (JM).

Measures

We conducted online caregiver assessments at baseline, 18, and 30 weeks after the first study visit. We collected medication reaction checklists and safety events from clinicians during clinic visits. We also obtained data from medical records, the smartphone app, and qualitative interviews with participants (see Table 1).

Table 1
Measures, Sources & Assessment Schedule

Measure	Source	Number of Items	Response Scale	Established Psychometrics	Baseline	Intervention *Weeks 1–18*	Post-Intervention *Week 18*	Follow-up *Week 30*
Online Assessments								
Demographics	Caregiver	8	n/a	n/a	✓			
Demographics	Youth	5	n/a	n/a	✓			
Youth impairment (CIS-P)	Caregiver	13	0–4	✓	✓		✓	✓
Youth aggression (MOAS)	Caregiver	4	0–4	✓	✓		✓	✓
Involvement in decisions (M-PICS)	Caregiver	20	1–5	✓	✓		✓	✓
Demographics	Clinician	7	n/a	n/a	✓			
Illness severity & improvement (CGI-S & CGI-I)	Clinician	2	0–7	✓	✓		✓	✓
Youth impairment (CIS-Y)	Youth[a]	13	0–4	✓	✓		✓	✓
Medication reactions (MRC)	Clinician	60[b]	Yes / No	no		✓ (each visit)		
Safety (adverse events)	Clinician	n/a	n/a	n/a		✓ (each visit)		
Electronic Health Record								
Diagnoses, date of birth, insurance payor	Clinic Staff	n/a	n/a	n/a	✓			
Medications & dosages	Clinic Staff	n/a	n/a	n/a	✓	✓ (each visit)	✓	✓
Clinic visit type & date	Clinic Staff	n/a	n/a	n/a		✓ (each visit)	✓	✓
Smartphone App								
Quality of SDM (collaboRATE)	Caregiver	3	0–9	✓		✓ (wks 4, 8, & 12)		
Key areas of youth functioning	Caregiver	6	0–5	no		✓ (weekly)		
Qualitative Interviews								
Intervention feasibility, acceptability, benefits, & ways to improve; opinions about medications, shared decision making, deprescribing & conversation aid	Caregiver	10	Narrative	n/a	Caregivers were interviewed between weeks 18 and 30 (with one exception, one interview was 14 days after week 30)			
Intervention feasibility, acceptability, benefits, & ways to improve; effectiveness of training & support; opinions about medications, shared decision making, deprescribing & structured deprescribing protocol	Clinician	10	Narrative	n/a	Clinicians were interviewed after all their participants had completed the study			

Note. n/a = not applicable;CIS-P = Columbia Impairment Scale, parent version; MOAS = Modified Overt Aggression Scale; M-PICS = Modified Perceived Involvement in Care Scale; CGI-S = Clinical Global Impression - Severity; CGI-I = Clinical Global Impression - Improvement; CIS-Y = Columbia Impairment Scale, youth version; SDM = shared decision making; wks = weeks.

[a]Youth ages 12 and older were invited to complete the CIS-Y at each assessment point.

[b]60 possible medication reactions across 11 body systems based on the Psychotropic Medications Monitoring Checklist (PMMC)

Online assessments

Caregivers and clinicians completed online surveys through a HIPAA-compliant REDCap system. We used the Columbia Impairment Scale for caregivers and youth aged 12 and older(Attell et al., 2020; Cleverley et al., 2020; Singer et al., 2011) and the Clinical Global Impression severity (CGI-S) and improvement (CGI-I) clinician rating scales(Attell et al., 2020; Busner & Targum, 2007) to assess youth functioning. We measured youth aggression using the Modified

Overt Aggression Scale (MOAS)(Kay et al., 1988) and the extent to which caregivers felt involved in clinical decisions using the Modified Perceived Involvement in Care Scale (M-PICS)((Smith et al., 2006) These online assessments were collected at baseline and 18 and 30 week follow up.

We created a simple checklist, the Medication Reactions Checklist (MRC), with 60 negative medication reactions organized by 11 body systems (included as Appendix S4). These 60 reactions were taken from the Psychotropic Medication Monitoring Checklist (PMMC),(Ninan et al., 2014) which is widely used in clinical trials, but often considered too long and complicated for use in routine settings. We chose the terminology of "medication reactions" over the more widely used "side effects" because medication-related issues can encompass not only side effects but also withdrawal effects, medication interactions, or relapse in symptoms. Clinicians completed the MRC with caregivers and youth at each study visit, and probed for adverse events (e.g., hospitalizations, behavioral escalations). After the visit, clinicians then indicated whether the identified medication reactions were likely related to the study using their clinical judgment and knowledge of the youth's history and current life experiences. Clinicians also reported any adverse events, including suicidality, to the research team.

[insert Table 1 **here]**

Medical records

Site staff extracted the following data from the medical record: psychiatric diagnoses, date of birth, medications and dosages (used to calculate dose-weighted medication count), clinic visit types and dates, insurance coverage, and decision made after the SDM treatment review.

Smartphone app data

We collected data about the caregivers' use of the app, including account activation, page visits, activities completed and dates of app usage. Caregivers were asked to complete two brief measures in the app: 1) a caregiver-reported level of perceived shared decision making (collaboRATE),(Barr et al., 2014; Elwyn et al., 2013; *Scoring collaboRATE*, n.d.) and 2) health/functioning in six key areas (called health check-ins). We created the health check-ins rating scale to track general functioning during the study; caregivers were prompted weekly to rate how much their youth had been affected in the areas of mood, behavior, sleep, ability to wake up/stay awake in the morning, ability to stay alert throughout the day, and appetite.

Qualitative interviews

We purposely invited 21 caregivers who had agreed to be interviewed and who differed in their clinician, clinic, decisions to deprescribe, app use, and caregiver and youth sex. We invited all 5 participating clinicians for interviews. Our interview guide covered the following topics: reactions to the interventions, the use of SDM, the Option Grid, the deprescribing protocol, smartphone app and web portal, and whether they would recommend changes to be made in future studies. We asked a researcher who was not part of the core study team (RB) to conduct the interviews. We followed the COnsolidated criteria for REporting Qualitative research standards of reporting qualitative research (COREQ) (Tong et al., 2007).

Analyses

Because of our small sample size, we did not have power to conduct any statistical tests of significance. Given the primary objective of the study was to understand the feasibility of the intervention and study procedures, we conducted descriptive statistics and examined patterns over time in our quantitative data, and thematic analyses on our qualitative data. Our results are reported as frequencies and percentages for categorical data, means and standard deviations for continuous data, and most common themes from our qualitative interviews.

We calculated dose-weighted medications instead of a simple medication count to reflect reductions in dose. The number of dose-weighted medications at each follow-up point was calculated as a sum of the proportion of the current dose of each medication compared to the sum of the baseline doses of those medications. For example, if a participant was taking 100 mgs of trazodone and 25 mgs of zoloft daily at baseline and 50 mgs of trazodone and 25 mgs of zoloft daily at 18-week follow-up, the dose-weighted number of medications at follow-up would be 1.5 (whereas a straight count of medications at follow-up would be 2).

Participants had varying numbers of visits during the study, based on clinical need, which resulted in differing numbers of clinician-rated medication reaction checklists (MRCs). To eliminate the problem of unequal numbers of completed MRCs across participants and to reflect changes in negative medication reactions from study initiation to final follow-up assessment, we compared each participant's first completed MRC to their last MRC.

We adopted the Practical Thematic Analysis approach to qualitative interviews.(Saunders et al., 2023) EB and RB read all transcripts, created a code book, conducted double-coding on 8 transcripts before individually coding the rest, and independently drafted a set of themes based on the coding. A third researcher (HL) facilitated a collaborative theming process to finalize the themes and these were reviewed by all authors for approval.

Results

Feasibility

We identified 39 eligible youth/caregiver dyads, enrolled 31, and provided the intervention to 29. Of those 29, 20 (69%) completed the 18-week follow-up assessment and 15 (52%) completed the 30-week follow-up assessment. See Fig. 1 for details. For qualitative interviews, we approached 21 caregivers and all 5 clinicians; 10 caregivers (48%; 2 declined, 9 could not be reached) and 4 clinicians agreed to participate (80%; 1 declined).

As shown in Table 2, most of the participants were White, non-Hispanic, and covered by public insurance; 85% of caregivers were female and 63% of youth were male. Mean caregiver and youth ages were 40 and 12 years, respectively. Youth received a mean of 3.6 concurrent medications and the most common diagnosis was attention deficit hyperactivity disorder (ADHD); 66% of youth were taking an antipsychotic medication (either alone or as part of

polypharmacy). The majority of clinicians were female, White, and non-Hispanic, providing care to both youth and adults. Demographics of caregivers, youth, and clinicians who were interviewed were representative of the full sample.

Table 2
Characteristics of Caregivers, Youth and Clinicians

Characteristic	N	%	Mean	SD
Caregivers *(n = 31)*[a]				
Sex (female), *n = 27*	23	85%	-	-
Race (White), *n = 27*	25	93%	-	-
Ethnicity (not Hispanic), *n = 26*	20	77%	-	-
Marital status (married), *n = 27*	15	56%	-	-
Education level, *n = 26*				
High school or less	8	31%	-	-
Some college or 2-year degree	9	35%	-	-
4-year college or graduate degree	9	35%	-	-
Relationship to child (mother/step-mother), *n = 27*	19	70%	-	-
Age (in years), *n = 25*	-	-	40.0	10.1
Children *(n = 31)*[b]				
Sex (male), *n = 27*	17	63%	-	-
Race (White), *n = 27*	23	85%	-	-
Ethnicity (not Hispanic), *n = 27*	21	85%	-	-
Age (in years), *n = 23*	-	-	12	3.7
Primary insurance (public/Medicaid) *(n = 29)*	27	93%		
Psychiatric medications *(n = 29)*				
Total number	-	-	3.6	1.1
Polypharmacy[c] (no antipsychotic)	10	34%	-	-
Polypharmacy[c] with an antipsychotic or antipsychotic only	19	66%	-	-
Most common diagnoses[b,d] *(n = 29)*				
Attention deficit hyperactivity disorder (ADHD)	24	83%	-	-
Disruptive, Impulse Control & Conduct Disorder	14	48%	-	-
Anxiety Disorders	12	41%	-	-
Other	12	41%	-	-
Clinicians *(n = 5)*				
Sex (female)	3	60%	-	-
Race (White)	4	80%	-	-
Ethnicity (not Hispanic)	5	100%	-	-
Patient population (pediatric & adult)	4	80%	-	-
Age (in years)	-	-	49.5	10.99
Years in practice	-	-	15.8	12.52

[a]Four caregiver participants did not complete the baseline survey with caregiver demographics.

[b]Four caregiver participants did not complete the baseline survey with youth demographics; an additional 4 caregivers did not complete youth age. In addition, EMR data from the 2 participants who dropped out before the intervention were not available.

[c]Polypharmacy is defined as 3 or more concurrent medications.

[d]Totals exceed 100% because most participants had more than one diagnosis.

[insert Table 2 **here]**

All caregivers were invited to use the smartphone chatbot application and associated resources. Of the 29 who received the intervention, 22 (76%) activated their app account. Caregivers most commonly used the treatment section, where options, preferences, and plans could be reviewed and comments made (62%, n = 18 of 29), while only 21% (n = 6 of 29) accessed the resources section. The collaboRATE survey was also embedded within the app. Response rates were too low to run analyses; only 10 of 29 (34%) caregivers completed at least one survey.

Figure 1 demonstrates the total number of participants eligible, recruited, consented/assented, and engaged in SDM treatment review during our study. This diagram also shows the number of participants who chose to deprescribe, remained undecided, or chose to not deprescribe, as well as the number of participants who completed each survey

Process outcomes

Choice to deprescribe

Thirteen (45%) of the 29 participants chose to try deprescribing a medication; 12 (41%) did not choose to deprescribe, and 4 (14%) remained undecided. These 4 were included with the 12 who did not choose to deprescribe for the comparisons described below. Of the 13 who began deprescribing, 7 discontinued the medication entirely, 4 reduced dose (3 by 50% or more) and remained on the lower dose, and 5 chose to deprescribe a second medication. Two of the 13 stopped deprescribing and returned to their original dose. The following medications were chosen for deprescribing: risperidone, buspirone HCl, guanfacine, prazosin, fluoxetine, clonidine, aripiprazole, citalopram, amphetamine/dextroamphetamine, lurasidone, trazodone, and cyproheptadine. Five youth then chose to deprescribe a second medication, which included: amphetamine/ dextroamphetamine, clonidine, risperidone, hydroxyzine, and guanfacine. The two youth who stopped deprescribing and returned to their original dose were receiving cyproheptadine and trazodone. For the former, cyproheptadine was being taken to stimulate appetite due to stimulant use, and the youth's appetite reduced when they stopped the periactin. For the latter, trazodone was being taken to help with sleep, and the youth's sleeping difficulties returned.

Caregiver involvement in decisions

Caregivers reported moderate levels of perceived involvement in decisions related to their child's psychiatric care, and these reports were relatively stable across time points. Patterns in these perceptions were similar for the full sample and by group (chose vs. did not choose to deprescribe).

Outcomes

Dose-weighted number of medications

For the full sample (N = 29), the average number of dose-weighted medications reduced from 3.6 (SD = 1.09) at baseline to 3.1 (SD = 1.35) at 30-week follow-up. In group comparisons, there was a greater reduction in dose-weighted medications for those who chose to deprescribe (3.9 at baseline to 2.9 at 30-week follow-up) than for those who did not choose to deprescribe (from 3.4 at baseline to 3.2 at 30-week follow-up). See Table 3 and Fig. 2.

Table 3
Youth Outcomes by Group

	Total Sample						Chose to Deprescribe						Did Not Choose to Deprescribe				
	(N = 29)						(n = 13)						(n = 16)				
	T0		T1		T2		T0		T1		T2		T0		T1		T2
Measure	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**
Dose-Weighted Medications	3.59	*1.09*	3.09	*1.30*	3.05	*1.35*	3.85	*1.28*	3.01	*1.29*	2.87	*1.41*	3.38	*0.89*	3.15	*1.35*	3.19
Negative Medication Reactions[a]	0.93	*1.62*	0.17	*0.38*	-	-	1.31	*2.21*	0.31	*0.48*	-	-	0.63	*0.89*	0.00	*0.00*	-
Functioning																	
Youth impairment (CIS-P)	24.3	*9.8*	24.3	*11.5*	23.8	*11.4*	20.6	*10.79*	23.4	*12.89*	23.8	*12.27*	27.7	*7.70*	25.2	*10.64*	23.7
Youth aggression (MOAS)	10.1	*7.63*	13.1	*10.25*	12.3	*10.14*	11.8	*7.32*	13.7	*10.58*	10.2	*7.81*	8.5	*7.86*	12.4	*10.43*	14.9
Youth impairment (CIS-Y)[b]	34.6	*12.54*	34.1	*11.93*	34.5	*12.11*	-	-	-	-	-	-	-	-	-	-	-
Illness severity (CGI-S)	4.1	*0.8*	3.6	*0.8*	3.4	*1.2*	4.0	*0.71*	3.5	*0.78*	3.7	*0.85*	4.2	*0.83*	3.6	*0.91*	3.2
Illness improvement[c] (CGI-I)	-	-	3.4	*0.83*	2.5	*1.07*	-	-	3.3	*0.95*	2.8	*1.01*	-	-	3.4	*0.74*	2.3

Note. T0 = baseline; T1 = 18 weeks post first study visit; T2 = 30 weeks post first study visit; M = mean; SD = standard deviation; CIS-P = Columbia Impairmen parent version; MOAS = Modified Overt Aggression Scale; CIS-Y = Columbia Impairment Scale, youth version; CGI-S = Clinical Global Impression - Severity; CG Clinical Global Impression - Improvement. For all functioning measures, higher scores are worse (e.g., higher impairment, aggression, illness severity, and le improvement).

[a] Negative medication reactions checklists were completed by the clinician at each clinic visit during the intervention period. Participants had a varying num visits during the study, so we compared the first checklist completed to the last checklist completed. T0 = first medication checklist completed, T1 = last che completed, T2 = not applicable.

[b] Only 17 youth completed the CIS-Y at baseline, 12 at 18 weeks, and 8 at 30 weeks. Sample sizes when split into decision groups are too small to display.

[c] There is no improvement rating at T0 because there is no previous rating with which to compare.

Negative medication reactions

For the full sample, the average number of negative medication reactions reduced from 0.9 (SD = 1.69) on the initial checklist to 0.2 (SD = 0.38) on the final checklist. Those who chose to deprescribe showed a greater reduction in negative medication reactions (from 1.3 to 0.3) compared to those who did not choose to deprescribe (0.6 and 0.0, respectively).

[insert Table 3 **here]**

Figure 2. **Dose Weighted Number of Medications**

Figure 2a. Dose-weighted medication count by group over time showing mean medication counts at baseline, 18 weeks, and 30 weeks for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating a decrease in medication count over time with a slightly greater reduction among participants who chose to deprescribe

Figure 2b. Number of negative medication reactions by group over time showing mean number of reactions at first visit and last visit for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating a decrease in negative medication reactions across all groups over time

Safety

There were no study-related serious adverse events or behavioral escalations reported by participants or clinicians. As reported above, the number of negative medication reactions reduced for all participants. The study clinicians judged that for seven participants, the identified negative medication reactions may have been related to study deprescribing. The reactions were minor and included: feeling depressed, trouble sleeping, decreased appetite, agitation/irritability, hyperactivity/impulsivity, problems focusing, and feeling jittery. Five participants tolerated the reactions well and continued to deprescribe; two decided to stop deprescribing due to trouble sleeping (trazadone) and decreased appetite (cyproheptadine) and return to their original dose.

Functioning

For the full sample (N = 29), outcome measures related to youth functional impairment, illness severity and improvement appeared similar across time points. These patterns were also true when comparing those who chose to deprescribe (n = 13) with those who did not choose to deprescribe (n = 16). Aggression ratings remained fairly stable for the full sample and those choosing to deprescribe, but trended towards getting worse for those choosing *not* to deprescribe. See Table 3 and Fig. 3.

[insert Table 3 **here]**

Figure 3. **Clinician and Caregiver Functioning Results**

Figure 3a Clinician-rated illness severity by group over time showing mean severity ratings at baseline, 18 weeks, and 30 weeks for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating a decrease in severity across time points with slightly greater reductions in the non-deprescribing group by 30 weeks

Figure 3b. Clinician-rated improvement by group over time showing mean improvement ratings at 18 weeks and 30 weeks for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating modest declines in improvement ratings over time with similar trajectories across groups

Figure 3c. Caregiver-rated youth impairment Fig. 3d. Caregiver-rated youth aggression

Figure 3d. Caregiver-rated youth aggression by group over time showing mean aggression ratings at baseline, 18 weeks, and 30 weeks for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating increasing aggression over time in the non-deprescribing group and a decrease by 30 weeks in the deprescribing group

Qualitative outcomes

We identified six caregiver and five clinician themes. Several themes converged between groups, including fit between the intervention and prior beliefs; the need for strong relationships between youth, caregivers, and clinicians; the importance of a triadic SDM process; increased caregiver knowledge about medications due to the intervention; and a positive research process. See Table 4 for exemplar quotes from caregivers and clinicians.

Table 4
Caregiver Themes and Illustrative Quotes

Theme	Supporting Quotes
Caregivers' views aligned with the goals of SDM and treatment optimization	"I think it just made me a little bit more aware of looking at other possible medications and trying to be more of an advocate for her…trying to make sure that she realizes this is not something we're doing to her. It's something we're doing with her." Caregiver 6 "At first, I was really nervous…after we did it, and we ran into a hitch with the first time, so we lowered a different medication. Now she's lowered [a medication] down to a lot, and she's even off some medications." Caregiver 2 "Just the open line of communication is huge. Paying attention to the signs and symptoms that the kids are having, concerns that you might be having, reasons as to why you would want to change or lower. I mean, there's a lot that goes into that kind of decision-making." Caregiver 5
Existing positive relationships with clinicians influenced decisions	"We have considered, and we've been working with our provider to lower [medications] a little bit. We will take a medicine and say, 'Is this the time to start lowering it?' You seem to be doing a good job..." So that's something our prescriber has been doing all along. She's really been working hard at that." Caregiver 4 "We've built a good relationship with her [clinician]. My daughter trusts her. I trust her, and it's been a really good experience with her." Caregiver 3 "I felt pretty involved. I mean, not so much as choosing the med because she [clinician] made the recommendations… but she involved us in educating us on the medication and the side effects and everything else." Caregiver 9
The collaborative team-based approach, inclusive of the youth, was valued	"We've kind of always, in the past, kind of always been blindly doing what the doctor said. Partly because, in the past, we didn't really have a say. Some of these kids were foster kids, and it's like, 'Well, you do what we tell you to, whether you like it or not.' So being able to have this conversation with the doctor is just very freeing and liberating. I love being able to be a part of that discussion." Caregiver 6 "I think that they have to look at everything…to come to a team decision with the provider and the child and the parent all together… the provider has some insight of seeing things sometimes that we don't see… but the parent can be there to tell the provider what's going on…because the provider's not in the home." Caregiver 9
Caregivers reported increased knowledge and empowerment	"I'm actually very grateful for the study because had we not gotten involved, I would not have known that about the risperidone [side effects]." Caregiver 6 "I do feel like I learned a lot more about my daughter's medications than anything else and different options that are out there to help proceed with certain situations." Caregiver 1 "I definitely learned a lot more details in depth with the medications and how they function and work together. And also that open line of communication more– I spoke up before, my concerns, but I definitely opened up more to say, 'Hey, this was working, but I don't think this is working anymore, and I want to try something else.'" Caregiver 7 "I found that [Option Grid]incredibly helpful. There were a couple of things I didn't know. I mean, we've been a therapeutic foster home for 15 years, so we have experience with a lot of medications, but some of that I didn't know, so I found it incredibly helpful." Caregiver 6
Caregivers reported positive outcomes	"I think it's a really great project that's very beneficial and helpful overall…it's more of a team effort all the way around to benefit the child and the care so a parent and provider can work together." Caregiver 7 "When she first started trying to come off the Abilify, she got very aggressive. So he [clinician] put it back up, and then he stopped the Buspirone. So that helped, and then she was off Doxepine next, and then we just cut the Abilify, and she's doing very well with it." Caregiver 2
Caregivers were positive about the research processes	"People were very attentive to our time schedule, and they were very– explained everything about the process of the survey and the questioning and very upfront. And I never felt like we were forced into doing anything. And my daughter felt very comfortable when she talked to everyone." Caregiver 9

Caregivers

Caregivers' views aligned with the goals of SDM and treatment optimization. All of the caregivers interviewed felt the study's approach to medications aligned with their beliefs about how decisions should be made and about the use of psychotropic medication for their youth. They preferred a "less is more" approach: "*I don't want him to take all these medications. I want a root cause as to what's actually wrong with him*" (Caregiver 3). Many reported having anxiety about the initiation of medication: "*My biggest concern with any medication, really, is the side effects…*" (Caregiver 7). However, caregivers had mixed reactions when clinicians suggested deprescribing. Some had already considered it; for others, the idea was new: "*No, I never considered it. I thought she would always be on all the meds the rest of her life*" (Caregiver 2). Some admitted anxiety about the possibility. Many were pleased because it addressed their concerns about the side effects or allowed for more individualized care.

Existing positive relationships with clinicians influenced decisions. Collaborative and trusting relationships fostered confidence in medication decisions and helped families feel supported: "*We've had a good relationship with the prescriber all along, and she gives us all the options and makes sure that we are very well aware of the possibilities of what may happen or may not happen, and she talks about everything very well*" (Caregiver 3).

The collaborative team-based approach, inclusive of the youth, was valued. Caregivers valued the team-based SDM process. *"I felt that the process itself, working together as a team, felt like he [youth] knows that he has support of all these people" (*Caregiver 4*).* Nearly all caregivers valued the youth's preferences and appreciated that the intervention reinforced youth autonomy: "*At the end of the day, she's the one that has to take the meds. It's her body. I want her to make her own decisions for her own body…*" (Caregiver 1).

Caregivers reported increased knowledge and empowerment. The intervention increased caregivers' understanding of medications and encouraged more active involvement, leading to informed and empowered decisions. Caregivers especially liked the Option Grid decision aid in helping them make decisions.

I found it [Option Grid] useful because then I knew what kind of medications he would be taking…Then I could see if there was any side effects, what other medications he would be going on, or the classifications to just know in general. So I had a better understanding of how they're going to help them or work together. (Caregiver 7)

If the caregivers used the app, they appreciated the weekly symptom tracking feature, which reminded them to pay attention to their youth's functioning and side effects.

Caregivers reported positive outcomes. Those who chose to deprescribe typically saw reductions in negative medication reactions and behaviors:

So the one big thing that we noticed, believe or not, we noticed a huge change in less aggression. We also noticed, according to his endocrinologist, less gynecomastia, his gynecomastia stopped growing. So that was huge for Michael. We also noticed for him, he stopped putting on weight. He actually started losing weight. (Caregiver 6)

Those who did not deprescribe still felt successful; caregivers felt more empowered and equipped to have these discussions about deprescribing in the future.

Caregivers were positive about the research processes. Caregivers were overwhelmingly positive about the research process. They appreciated the clear consent process, brief surveys, and the respectful, accommodating research staff.

[insert Table 4 **here]**

Clinicians

Clinicians' (and their clinics') views aligned with SDM and treatment optimization. Clinicians found it easy to integrate the intervention because it aligned with their own and their clinic's philosophies related to SDM and a "less is more" approach. As stated by one clinician: "*I've always considered myself a collaborator…I'm a collaborator with the parent, with the family, with the teacher, with the kid, with the patient. Like a journey. Walking together*" (Clinician 2). Clinicians also highlighted shared values across their agency: "*…We try to do it [deprescribe] all the time. That's our goal is to try to have them on the least amount of medication or no medication*" (Clinician 3). Similarly:

I think the other practitioners we have at this site, it's just kind of something that we all naturally do. It doesn't feel good for families, and it doesn't feel good for the providers to have polypharmacy or using medications that are off-label. It just doesn't feel good. (Clinician 1)

Clinicians appreciated the structured framework and intervention tools. Clinicians valued how the intervention structured collaboration and deprescribing. As one stated:

I like that it [the intervention] ensures that caregivers, particularly, maybe some teenagers, are aware that that [deprescribing] is a priority, that that is encouraged, and it's on paper. It [the intervention] sort of puts it to the forefront. (Clinician 3)

Similar to caregivers, clinicians valued the triadic SDM process between youth, caregivers, and clinicians, noting how the intervention enhanced this triadic process. Clinicians, like caregivers, also appreciated the Option Grid tool, in particular.

I liked the Option Grid because I think it's nice to have had all the information in one place to be able to hand it to them and let them take with them. I think it's a lot of stuff that we go over with people…But to have it on paper and to really be able to see it. (Clinician 1)

There were mixed thoughts about whether they would use the other study tools (e.g. web-based portal that accompanied caregiver mobile phone app) in the future.

Clinicians provided considerations for implementation. Clinicians emphasized the importance of timing when deprescribing based on the youth's stability in symptoms and life events. Some reported maintaining doses between reduction increments longer than the protocol's recommended schedule: *I think sometimes there's fear around changing that or rocking the boat. And so going slower, I think a lot of them did. I still have a couple that, after the 18 weeks, were still in process because some sort of went down on a medication and then wanted to wait a little while and then consider the next one.* (Clinician 1)

Clinicians discussed the importance of acknowledging the success of dose reductions, not just removals. Clinicians also prioritized caregiver engagement and comfort with the treatment decision. It was important for caregivers to not have to commit to deprescribing to be part of the study. Similar to caregivers, clinicians agreed that although caregivers had mixed initial reactions, caregivers frequently felt relieved from their discomfort with the medications in the first place. Still, in some cases, caregiver fears about their youth's decompensation led to maintaining the youth's medication regimen. Finally, some clinicians suggested that the intervention be supplemented by additional education or non-pharmacological interventions.

Clinicians recommended expanding the concept and practice of deprescribing. Clinicians perceived deprescribing as an ethical imperative: "*It's a moral and ethical issue to not be continuing people on medications without good, documented reasons*" (Clinician 2). They described a need for these concepts and practices to permeate the field, including incorporation into medical training and continuing medical education:

So I think we need a cultural change. We're always pushing to prescribe, … But you don't really hear, "Okay. Once your person is better, when do you think about starting to take them off that medication?" And so when you bring that up, kind of are on your own. (Clinician 2)

Clinicians felt prepared and supported by the research team. The prescribers felt well prepared and supported through training resources and monthly consultations with the research team's child and adolescent psychiatrist. Clinicians found the research process to add very little to their workload. In

addition, their internal clinic administrative support further reinforced the adoption of the intervention.

Differing perspectives between caregivers and clinicians

Clinicians reported that the structured deprescribing guidance may need to consider slower tapering. Clinicians also recommended adding extra supports or non-pharmacological interventions when deprescribing. However, caregivers did not mention these needs. In addition, whereas clinicians were mostly motivated to deprescribe based on the youth's stability in symptoms, caregivers were mostly motivated by the potential to reduce negative medication reactions.

[insert Table 5 **here]**

Table 5
Clinician Themes and illustrative Quotes

Theme	Supporting Quotes
Clinicians' and clinics' views aligned with SDM and treatment optimization	"I usually always talk to the patients and family right off the bat. That, "Just because we're starting this medication now doesn't mean it's something that's going to be forever, and that our ultimate goal would be to try to see if we can get you off the medication," and encouraging them to participate in their therapy…And then once their symptoms are stable, the goal is to try to bring down those medications." Clinician 4 "I try to have patients more so be aware that we ramp up and we also ramp down ahead of time…that this is not just something we're going to slap them on, as we say, and leave it alone. It's an actively managed process even when we find the right doses and such because things change over time…." Clinician 3
Clinicians appreciated the structured framework and intervention tools	I think sometimes it's just hard to keep track of a lot of the stuff that you hear in appointments like that - and just making sure everything gets talked about and the questions that they have get answered. So I think it helped structure that a little bit in a nice way." - Clinician 1
Clinicians provided considerations for implementation	"I think a lot of times, caregivers of kids on medicine, they're just waiting to get the kid off…caregivers of kids are usually reluctant, and they're sort of last resort to prescribe. And so then when you're talking about deprescribing, it was very well received." Clinician 2
Clinicians recommended expanding the concept and practice of deprescribing	"So I'd like to see it [deprescribing] expanded into training, into nursing, into social working, so when everyone's sitting down, just like we look out for child abuse, we look out for these things." Clinician 2
Clinicians felt prepared and supported by the research team	"I don't think there was anything burdensome about it. There were a couple of things that were just a little different in terms of the way that we were documenting but still all stuff that we would have done in the course of an appointment, like the medication reaction checklist." Clinician 1 "Folks seem very passionate. And I just thought it was helpful to really be presented with well-thought-out, well-researched points of view that made sense about deprescribing." Clinician 2

Discussion

We demonstrated the feasibility of our study procedures and intervention. Caregivers and clinicians were positive about the intervention and study processes. About half of the triads chose to try deprescribing; no study-related serious adverse events occurred. The intervention seemed to reduce the number of medications and medication reactions, although the small sample and low baseline rates of medication reactions preclude firm conclusions. Qualitative themes suggested that the "less is more" approach aligned with the beliefs of our participating clinics and clinicians, and the intervention provided a structure to make SDM and deprescribing a reality.

The strengths of our study include its mixed methods approach and real world context. To our knowledge, this is the first study of a structured, deprescribing protocol within child psychiatry. However, we have several limitations. This is a small feasibility study limited to two motivated, innovative clinics with values that align with deprescribing. The findings may not be generalizable to all settings. We were unable to distinguish between potential side effects, withdrawal symptoms, and relapse symptoms within our negative medication reactions checklist. Our medication review checklist was modified from the original version and not validated, and the brief caregiver-rated youth health check-ins within the phone application was not validated. We also had high rates of missing data on the caregiver-rated collaboRATE and youth health check-ins, which were collected via the app.

Deprescribing interventions include patient education, clinician audits, pharmacy reviews, and the use of structured protocols. In large reviews targeting the reduction of polypharmacy in various populations, deprescribing has led to efficacy for physical health outcomes in certain groups(Adams et al., 2023), but not all.(Keller et al., 2024) The use of structured tapering protocols and interventions used during the clinical encounter may be important in psychiatry. (Christensen et al., 2025; Jerjes et al., 2024; Mølgaard et al., 2024) To our knowledge, only one study has specifically investigated a structured deprescribing intervention in child psychiatry among youth seeking outpatient care. No patient-provider interaction or structured tapering protocol was used, and the authors reported no effects on medication (i.e., antipsychotic) use.(Penfold et al., 2025) More recently, deprescribing interventions with a very slow approach that use smaller and smaller incremental dose reductions over time are being promoted by the scientific and lived-experience communities.(Campbell et al., 2024; Horowitz & Taylor, 2024; Ramsdale et al., 2024)

In future studies, it will be important to improve measurement of relapse vs. withdrawal, follow participants longer, and test various deprescribing approaches and paces that may reduce withdrawal symptoms or relapse,(Stimpfl et al., 2025) including the hyperbolic approach to tapering medications. (Horowitz & Taylor, 2024; Stimpfl et al., 2025) Finally, the intervention needs to be tested in other settings and in larger studies, ideally through randomized controlled trials, to test its effectiveness and safety.

Conclusions

Caregivers, youth, and clinicians were highly motivated to deprescribe through a SDM process in outpatient settings. Our intervention demonstrated feasibility and, although conclusions are limited by our small sample, our intervention was associated with a reduction in the number of medications and negative medication reactions. We plan to test our intervention in a larger and more rigorous trial. Meanwhile, child psychiatry leaders and researchers can incorporate our findings into their clinical practice, advocacy, and policy efforts.

Declarations

Ethics approval and consent to participate

The study was approved by the BRANY Institutional Review Board (Protocol #32704, Master File #23-10-216). Clinicians, caregivers, and youth provided informed consent / assent prior to the initiation of study activities.

Consent for publication

Not applicable

Competing Interests

Glyn Elwyn's academic interests are focused on shared decision making and coproduction. He is the editor of the 4th edition of the Textbook of Shared Decision Making (Oxford University Press, 2025). He is the Founder and Director of &think LLC, which owns the registered trademark for Option Grid.TM He owns copyright in measures of shared decision making and care integration, namely collaboRATE, integRATE, Observer OPTION-5, and Observer OPTION-12. These measures are freely available. Ben Fehnert and James King are co-founders of Fora Health, the company responsible for developing and providing the app utilized in this study. All other authors report no disclosures.

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Author Contribution

ERB- Funding acquisition, conceptualization, data curation, formal analysis, supervision, writing (original draft), methodology. JLM- Funding acquisition, conceptualization, data curation, formal analysis, supervision, writing original draft, methodology. GE- Funding acquisition, conceptualization, supervision, writing (original draft), methodology. SCA- Funding acquisition, conceptualization, data curation, formal analysis, writing (original draft), project administration, methodology. HBL-, data curation, formal analysis, writing (original draft), project administration, methodology. SB- implementation, writing (review and editing), methodology . AG- implementation, writing (review and editing), methodology. RB- data curation, formal analysis (qualitative), writing (review and editing). JK- Technology development, writing (review and editing), methodology. BF- Technology development, writing (review and editing), methodology.

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Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Figures

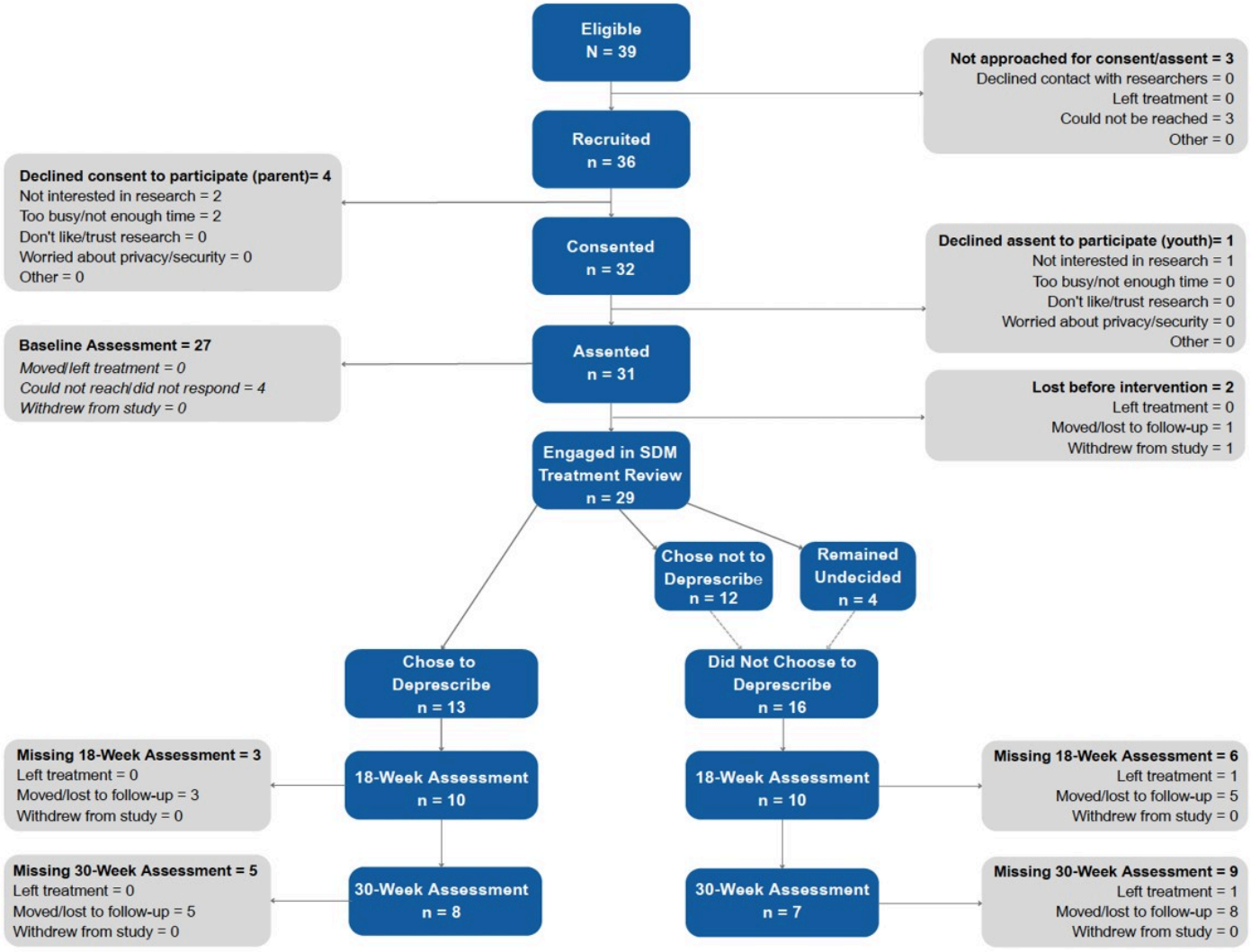

Figure 1

CONSORT Diagram

demonstrates the total number of participants eligible, recruited, consented/assented, and engaged in SDM treatment review during our study. This diagram also shows the number of participants who chose to deprescribe, remained undecided, or chose to not deprescribe, as well as the number of participants who completed each survey

Fig 2a. Dose-weighted medication count

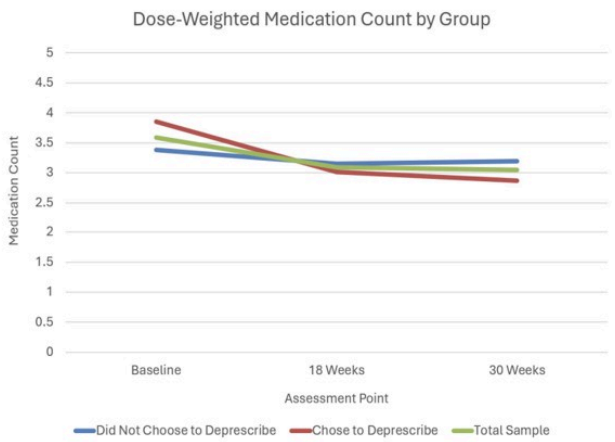

Fig 2b. Number of negative medication reactions

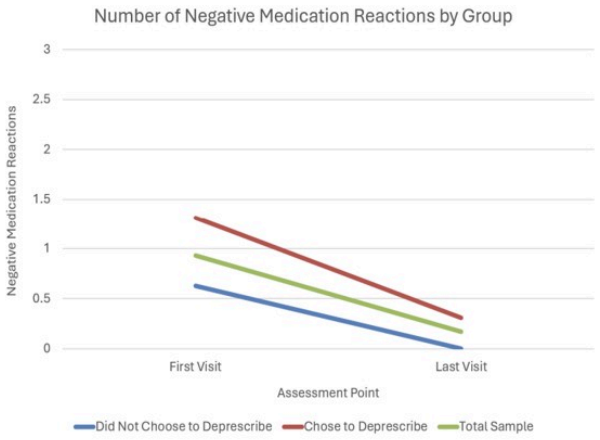

Figure 2

Dose Weighted Number of Medications

Fig. 2a. Dose-weighted medication count by group over time showing mean medication counts at baseline, 18 weeks, and 30 weeks for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating a decrease in medication count over time with a slightly greater reduction among participants who chose to deprescribe

Fig. 2b. Number of negative medication reactions by group over time showing mean number of reactions at first visit and last visit for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating a decrease in negative medication reactions across all groups over time

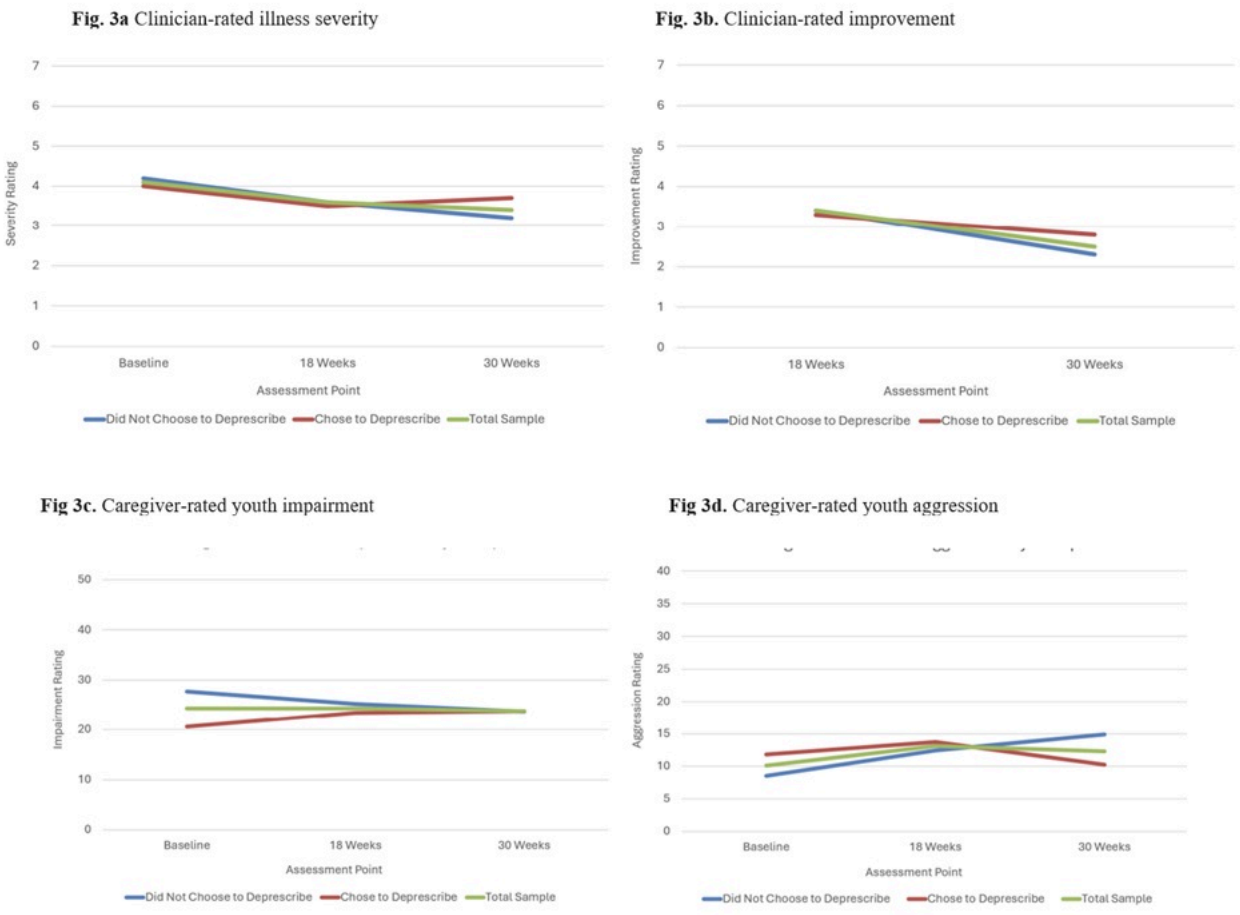

Figure 3

Clinician and Caregiver Functioning Results

Fig 3c. Caregiver-rated youth impairment by group over time showing mean impairment ratings at baseline, 18 weeks, and 30 weeks for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating reductions in impairment over time with convergence of group scores by 30 weeks

Fig 3d. Caregiver-rated youth aggression by group over time showing mean aggression ratings at baseline, 18 weeks, and 30 weeks for participants who did not choose to deprescribe (blue line), participants who chose to deprescribe (red line), and the total sample (green line), demonstrating increasing aggression over time in the non-deprescribing group and a decrease by 30 weeks in the deprescribing group

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- AppendixS1.OptionGrid.pdf
- AppendixS2.AntipsychoticDeprescribingProtocol.pdf
- AppendixS3.PolypharmacyDeprescribingProtocol.pdf
- AppendixS4.MedicationReactionsChecklist.pdf