



Psychotropic Medication Use and Perceptions of Medication Effects Among Transition-Age Foster Youth

Keunhye Park¹ · Nathanael J. Okpych² · Mark E. Courtney¹

© Springer Science+Business Media, LLC, part of Springer Nature 2019

Abstract

The prevalence of psychotropic medication use among children and adolescents in foster care has received increasing attention from policymakers and scholars and led to responses from government. Most research has focused on school-age foster children; less is known about psychotropic medication use among foster youth transitioning to adulthood from care. Using data from a longitudinal study of transition-age foster youth ($n=611$), this study examines the prevalence of psychotropic medication use over time, evaluates youths' perceptions of the benefits of medication, and assesses associations between medication use and behavioral health problems. The overall rate of psychotropic medication use dropped from age 17 to age 19. Among youth with at least one behavioral health problem, rates of psychotropic medication use also declined over time. Decreases in psychotropic medication use between age 17 and 19 were found among youth with the following disorders: mania, an alcohol use disorder, and a non-alcohol drug use disorder. Behavioral health status and youths' living arrangements were associated with the likelihood of psychotropic medication use at age 17, whereas only behavioral health status was associated with the likelihood of psychotropic medication use at age 19. Most youth reported either a positive or neutral view of the relative benefits of using medications. Among youths who had used medications, those in relative foster homes were less likely than those in non-relative foster homes to report negative views of their medications. The findings have implications for child welfare and health care professionals and policymakers.

Keywords Psychotropic medication · Transition-age foster youth · Mental health · Extended foster care

Psychotropic medications have played an increasing role in the treatment of emotional and behavioral health problems of young people in the United States and abroad (Steinhausen, 2015). Since the 1990s, psychotropic medications prescribed to children and adolescents have increased two to threefold in the U.S. (Brenner, Southerland, Burns, Wagner, & Farmer, 2014; Olfson, Blanco, Liu, Moreno, & Laje,

2006; Raghavan & McMillen, 2008; Safer, Zito, & dosReis, 2003; Zito et al., 2003). Studies report even more widespread use of psychotropic medications among children and adolescents in foster care (Landsverk, Garland, & Leslie, 2002; Raghavan et al., 2005), a group with high rates of mental health problems and exposure to traumatic experiences (Kutz, 2011; Leslie et al., 2010; McMillen et al., 2004; Miglani & Scrivener, 2017; Miller, 2009).

The prevalence of psychotropic medication use by children and adolescents in foster care has received increasing attention from practitioners, policymakers, and researchers, and has led the federal government to respond (Mackie, Hyde, Palinkas, Niemi, & Leslie, 2017; Sheldon, Berwick, & Hyde, 2011; U.S. Government Accountability Office [GAO], 2017). The Department of Health and Human Services provides states with guidance about the provisions of psychotropic treatment, and requires child welfare jurisdictions to submit annual reports on their treatment oversight practices (Congressional Research Service, 2017).

Disclaimer The findings reported herein were performed with the permission of the California Department of Social Services. The opinions and conclusions expressed herein are solely those of the authors and should not be considered as representing the policy of the collaborating agency or any agency of the California government.

✉ Keunhye Park
kunepark@uchicago.edu

¹ School of Social Service Administration, University of Chicago, 969 E. 60th Street, Chicago, IL 60637, USA

² School of Social Work, University of Connecticut, 38 Prospect Street, Hartford, CT 06103, USA

In California—the state with the largest foster care population in the nation—a recent state audit reported that child welfare agencies failed to provide appropriate monitoring of medication prescriptions to young people in foster care (California State Auditor, 2016). Following the state audit, several state senate bills were passed to improve oversight of psychotropic medication use in foster care. Provisions of these laws require child welfare agencies to train professionals on the authorization and monitoring of psychotropic medications (SB 238), order psychotropic medications in group home facilities to be recommended by a physician and ordered by a juvenile court officer (SB 484), and mandate prescribing physicians to share data with the Medical Board of California about their prescription patterns when treating foster youth covered by Medicaid (SB 1174).

Most of the existing research on psychotropic drug use in foster care has focused on school-age children. However, less is known about psychotropic medication use among youths transitioning to adulthood from care. The study reported here examines the prevalence of psychotropic medication use, predictors of psychotropic medication use, and experiences with psychotropic medications for a population of youth transitioning to adulthood from foster care in California. We find that the prevalence of psychotropic medication use declines over time for the overall population and among youth with self-reported behavioral health problems, with behavioral health problems and youths' living arrangements being predictive of medication use. We also find that the youths have generally positive views of the medications they use, particularly youths in relative foster care, but a significant proportion of the youths held negative views of the medications they used.

Foster Youth and Mental Health Services

Of the nearly 440,000 young people in foster care on September 30, 2016, more than 64,000 were between the ages of 16 and 20 (AFCARS, 2015). Given their histories of trauma and removal from their family, a sizable proportion of foster youth experience behavioral health problems during late adolescence and early adulthood (Havlicek, Garcia, & Smith, 2013). Studies using structured behavioral health assessments have found that transition-age foster youth are more likely than their non-foster peers to experience problems such as depression and PTSD (Courtney, Terao, & Bost, 2004; McMillen et al., 2005; Shin, 2005).

The relatively high prevalence rate of behavioral health problems among foster youth suggests that many will need or may benefit from behavioral health interventions, including the use of psychotropic medications (Kutz, 2011). Recently enacted federal legislation has increased the role that government agencies play in providing behavioral health

services to transition-age foster youth. The Fostering Connections to Success and Increasing Adoptions Act of 2010 provides states with an option to extend the age limit of foster care services from 18 to 21. In addition, a provision of the Affordable Care Act that became effective in 2014 provides young people who are in foster care on their 18th birthday with Medicaid coverage up to their 26th birthday.

Prevalence of Psychotropic Medication Use

Reported rates of psychotropic medication use in foster care vary substantially by jurisdiction level (county vs. state vs. nationwide) and data source (self-reported interviews vs. administrative claims data), as well as by age range of study participants, making it challenging to accurately summarize medication use among foster youth (Zito et al., 2008). Despite these challenges, extant evidence suggests that children and adolescents in foster care receive psychotropic medications at disproportionately higher rates than those in the general population. Estimates from the National Comorbidity Survey-Adolescent Supplement (2002–2004) revealed that 7% of U.S. adolescents between 13 and 18 years old had used psychotropic medications in the past year (Olfson, He, & Merikangas, 2013). Other studies have shown that 4–10% of Medicaid-enrolled children used psychotropic medications (Zito et al., 1998; 2005). In contrast, studies of children and adolescents in foster care find that 30–52% used psychotropic medications (Barnett et al., 2016; DosReis, Zito, Safer, & Soeken, 2001; Ferguson, Glesener, & Raschick, 2006; Kutz, 2011; Kansas Health Policy Authority, 2009; Raghavan et al., 2005; Texas Health and Human Services Commission, 2006; Zito et al., 2008).

Older children in foster care are particularly likely to use psychotropic medications (Raghavan & McMillen, 2008; Sheldon et al., 2011; Zima, Bussing, Creclius, Kaufman, & Belin, 1999), but few studies have investigated trends in psychotropic medication use over time as foster youth transition to adulthood. The Midwest Evaluation of the Adult Functioning of Former Foster Youth followed a sample of 732 youth in three states over the course of several years (Courtney et al., 2004). Findings showed a gradual decline over time in the rates of self-reported psychotropic medication use as youth entered adulthood: 23% at age 17 (Courtney et al., 2004), 15% at age 19 (Courtney et al., 2005), and 13% at age 21 (Courtney et al., 2007). A pattern of a decline in psychotropic medication use was also observed among participants in the VOYAGES study, which included 406 17-year-olds in Missouri foster care (35% at age 17, 13% at age 19) (McMillen et al., 2005). Declining use of psychotropic medications appears to be part of a more general trend of decreasing behavioral healthcare services use (i.e., psychological counseling, psychotropic medication, substance

use treatment) among transition-age foster youth (Brown, Courtney, & McMillen, 2015; Havlicek, Garcia, & Smith, 2013).

Concerns About Psychotropic Medication Practices with Children and Adolescents

Findings from studies have raised concerns on a number of fronts about high rates of psychotropic medication use among children and adolescents.

Concern About the Safety and Effectiveness of Psychotropic Treatment of Young People with Behavioral Health Problems

From a developmental perspective, a growing body of research has pointed to medical risks and adverse side-effects of psychoactive medications used during childhood and adolescence, when critical brain development is taking place (Boyer & Shannon, 2005; Correll, 2008; Jerrell, 2010; Malone, Sheikh, & Zito, 1999; Morrato et al., 2010; Safer et al., 2003). Concerns include the potentially negative consequences of medication for brain activity and metabolic functioning as well as increased risk of obesity and diabetes (Crystal, Olfson, Huang, Pincus, & Gerhard, 2009; DeHert, Dobbelaere, Sheridan, Cohen, & Correll, 2011; Medicaid Medical Directors Learning Network and Rutgers Center for Education and Research on Mental Health Therapeutics, 2010; Yoon, Rubin, Riddle, Noll, & Rothbard, 2011).

Moreover, evidence-based medication regimens and practice standards (e.g., maximum doses level, polypharmacy, balancing risk and benefits) for children and adolescents have not been firmly established (Barnett et al., 2016; Brenner et al., 2014). Sheldon et al. (2011) note that “most psychotropic medications [prescribed to children and adolescents] are approved based on clinical trial data from studies of adults” (p. 3). The absence of scientifically-validated practice standards is particularly risky for young people in foster care given evidence that they may be over-medicated and be prescribed multiple prescriptions within and between drug classes (i.e., co-pharmacy or polypharmacy) (Breland-Noble et al., 2004; Substance Abuse and Mental Health Services Administration [SAMHSA] & The TA Network, 2015; Kimbo & Pataki, 2017; Kutz, 2011; Raghavan & McMillen, 2008; Yoon et al., 2011; Zito et al., 2008).

In short, while the knowledge base about potential developmental and physiological risks and effectiveness of psychotropic medications for developing bodies is limited (Comer, Olfson, & Mojtabai, 2010; Nevels, Dehon, Alexander, & Gontkovsky, 2010), these medications have been widely used with foster children and youth with behavioral health conditions (Bentley & Collins, 2013). Psychotropic

medication prescription often occurs in the context of limited empirical evidence, inadequate assessment, lack of access to alternative psychosocial interventions, and sparse monitoring mechanisms—a practice pattern that can yield serious consequences for the long-term health of young people (Burns et al., 2004; Camp, 2011; SAMHSA & The TA Network, 2015).

High Reliance on Psychotropic Treatment in Congregate Care Placements

Concerns have been raised about excessive use of psychotropic drugs to treat behavioral health problems in certain foster care placement types, particularly congregate care settings. Studies report that rates of medication use are especially high in group or residential homes, where rates have been found to range from 59 to 79% (Breland-Noble et al., 2004; Brenner et al., 2014; Connor, Ozbayrak, Harrison, & Melloni Jr., 1998; Huefner, Griffith, Smith, Vollmer, & Leslie, 2014; Ryan, Reid, Gallagher, & Ellis, 2008; Yoon et al., 2011).

Public policy has moved to address the expanded use of psychotropic medications in congregate care settings. For example, in California, Senate Bill 484 was enacted to address concerns that group homes excessively and inappropriately use psychotropic medications as the primary intervention for behavioral issues (John Burton Foundation, 2015). Under this bill, the state is required to undertake annual inspection of group home facilities that exceed the average rate of medication authorization, and to help those facilities develop a corrective action plan.

It is also important to note that because these care settings have been increasingly used to place children with severe behavioral health problems, the need for interventions to address mental health and behavior problems is especially high in these settings (Okpych & Courtney, 2014). While a few studies note that foster youth in congregate care settings have an elevated likelihood of psychotropic medication use (Breland-Noble et al., 2004; Brenner et al., 2014; Zima et al., 1999), little research has examined to what extent medication use is related to residential options, after adjusting for their behavioral health problems.

Lack of Knowledge About Foster Youths' Perceptions of Medication Benefits

Qualitative studies investigating adolescents' experiences with psychotropic treatment find that adolescents report more negative experiences (e.g., side effects, worries about dependency) than positive experiences (e.g., improvements in interpersonal relationships, emotional stability) (Floersch et al., 2009; Longhofer, Floersch, & Jenkins, 2004). Stigma around psychotropic medication use is also a commonly

reported experience among adolescents, leading to secrecy and shame (Kranke, Floersch, Townsend, & Munson, 2010). If adolescents perceive more negative effects than positive effects from using medication, how does this influence their continued use of medications? This might be explained, in part, by the tendency for adolescents to negotiate between experienced/actual effects (e.g., side effects) and desired/hoped effects (e.g., aggression reduction) of medication based on their social relationships (Longhofer et al., 2004). A study by Moses (2011) included 50 adolescents who received wraparound services and psychotropic treatment, and found that 44% felt forced or pushed to take medication and 62% reported a desire to discontinue treatment if there were no outside influence or pressure.

Among the foster care population, scant research has investigated youths' perceptions of the costs and benefits of their medications, and which factors might influence their perceptions. One qualitative study conducted by Narendorf, Munson, and Floresch (2015) included a sample of 52 young adults (ages 18–25) who had been involved with public systems of care (e.g., child welfare, juvenile justice, special education) during adolescence and who had ever used psychotropic medications. They found that as youth become young adults and take control over their medication, their experience with medication become more individual and internalized; youths' perceived effects of medication contribute to their decisions about continuation or discontinuation of medication. Another study by Foltz and Huefner (2014) of a sample of 74 adolescents (ages 13–18) currently placed in residential treatment centers due to significant emotional or behavioral problems investigated youths' reactions to medication effectiveness. The study provides a descriptive analysis that 40% of youth reported favorably about taking psychotropic medications, and less than one-half reported benefits from medications across symptoms they were asked about. While these investigations suggest that youths' experience might matter in their service engagement and help to understand the overall effectiveness of care, there is a further need to understand what factors impact youths' perception of their medications using a larger representative sample of foster youth transitioning to adulthood.

These are important areas of research to address especially for transition-age foster youth because of system, social, and developmental changes that occur as they enter adulthood. First, monitoring policies and oversight practices often change as youth transition from child mental health services to adult mental health services. Young adults in foster care typically move to the adult behavioral healthcare system with more independence, where the system's supervision of clients and supports for accessing and navigating services might decline (Brown et al., 2015; Sakai et al., 2014). Second, changes also occur in the constellation of people who could influence youths' feelings and views about

medications during the transition to adulthood. Children in foster care may have more professionals or adults surrounding them (e.g., foster parents, child welfare workers, mental health providers) who could encourage children to benefit from behavioral health services, while young adults in foster care often move to independent living settings (Okpych, Feng, Park, Torres-García, Courtney, 2018) that may offer less contact with professionals. Lastly, since transition-age foster youth may exert increased autonomy and take more responsibility in making their own treatment decisions than younger children, their views about medication side effects or their desire to seek nondrug treatments may factor into their decision about psychotropic medication use.

Given these changes occurring during the transition to adulthood, youths' perceptions about their medication may influence their use of medication, and will also be critical data sources for quality assurance and treatment satisfaction. Nonetheless, while public attention and legislative reforms have primarily focused on curbing inappropriate prescription and overuse of medications in foster care, consumers' own perspectives about medication effects remain understudied. Including youths' concerns and voices about their healthcare services is important for a number of reasons. Young people in care are "too often excluded from decision making processes that concern them the most" (Havlicek, Lin, & Braun, 2016, p. 1). Creating opportunities for youth to actively participate in decisions that affect their wellbeing acknowledges the value of their input and importance of their agency. Additionally, attending to youth perceptions of healthcare services may mitigate barriers to service participation by youth with mental health problems, enhance clinical engagement with professionals, and ultimately improve mental health functioning.

The Current Study

While most existing research has focused on school-age children (ages 6–16), little research has followed how prevalence of psychotropic medication use changes over time as foster youth move from late adolescence into early adulthood. This information is particularly important since about half of U.S. states now allow foster youth to remain in care until age 21. As extended foster care can change youths' living settings, social networks, and access to professional assistance, it may also influence their medication use. Thus, it is critical to examine how medication use changes over time as youth enter adulthood, as well as how it differs for young people who remained in foster care past age 18 and for young people who exited foster care.

Second, while psychotropic medications have been widely used by foster youth to treat their behavioral health

problems, there is limited information about how medication use differs for youth who have different types of behavioral health problems. For youth with a specific behavioral health problem, what proportion receives psychotropic medication and how do these prevalence rates differ over time?

Finally, few studies have evaluated youths' perceptions of the benefits and downsides of their medications. Among older foster youth who are prescribed medications, how many perceive that the advantages of their medications outweigh the disadvantages? How do their perceptions vary by demographic characteristics, behavioral health status, living arrangements, and extended foster care status?

In the interest of filling gaps in the extant literature, this study has four aims:

- 1) compare the prevalence rates of psychotropic medication use of foster youth at age 17 and age 19;
- 2) at age 19, compare prevalence rates of psychotropic medication use between youth who are in foster care and youth who exited care;
- 3) investigate how psychotropic medication use rates differ by behavioral health disorders, both at age 17 and age 19; and
- 4) examine predictors of two outcomes at both age 17 and age 19: (a) psychotropic medication use and (b) youths' perceptions of the net benefits of medications.

Methods

Data and Sample

Data for the current study come from the California Youth Transitions to Adulthood Study (CalYOUTH) (Courtney et al., 2014; Courtney et al., 2016), a panel study of a cohort of transition-age foster youth in California. Youth were eligible for the study if they were between ages of 16.75 and 17.75 at the time of the sample draw in 2012 and had been in foster care for six months or longer. Using state administrative child welfare data, the stratified random sample was drawn from the population of foster youth meeting the eligibility criteria ($N=2583$). Counties were grouped into six strata, based on the number of eligible youth within each county. Within each stratum, youth were randomly selected into the study. Counties in stratum with relatively few eligible foster youths were oversampled to ensure that youth from small counties were included the sample. Of the 880 youth originally selected into the study, 117 were eventually excluded because they had run away from care for at least 2 months, returned home, were physically or mentally unable/incompetent to participate, were incarcerated, or had moved out of state. Of the final sample of 763 youth, over 95% ($n=727$) completed the Wave 1 interviews conducted

in 2013. The majority of youth were 17 years old at the time of the interview. Eighty-four percent ($n=611$) of the Wave 1 respondents participated in the Wave 2 interviews conducted in 2015 when most participants were at 19 years old. The analytic sample for the current study includes 611 youths who participated in both interview waves.

We evaluated whether differences were present between participants who completed both interview waves ($n=611$) and youth who only completed Wave 1 interview ($n=116$). For all variables measured at Wave 1 that were included in the present analyses, no statistically-significant differences ($p>.05$) were found between the two groups, except for the prevalence of psychotropic medication use at age 17 (39% among the 116 youth who only completed Wave 1 vs. 27% among the 611 youth who completed both waves, $p=.03$).

Measures

Dependent Variables

Psychotropic Medication Use During both interview waves, participants were asked, "In the past year, did you receive medication for your emotions?" A binary measure for medication use was created at age 17 and age 19.

Perception of Net Benefits of Psychotropic Medications At both age 17 and age 19, youth who had used psychotropic medications were asked the following question: "For me, good things about the medication outweigh the bad." The original response options ranged from 1 to 5 (1=strongly agree, 2=agree, 3=neither agree nor disagree, 4=disagree, 5=strongly disagree). The original categories were recoded into three categories capturing an affirmative response (1="agreed" or "strongly agreed"), a neutral response (2="neither agreed nor disagreed"), and a negative response (3="disagreed" or "strongly disagreed"). Thus, a higher score on this measure indicates a greater perception that the negative consequences of medications outweigh the positive ones.

Covariates

Demographic Characteristics Covariates include several Wave 1 characteristics: *gender*, *race/ethnicity* (white, African American, Hispanic, mixed race, and Other [Asian, Pacific Islander, American Indian, Alaskan Native]), and *sexual minority status* (100% heterosexual vs. another sexual orientation). The other sexual orientations included mostly heterosexual, bisexual, mostly homosexual, 100% homosexual, and not sexually attracted to either males or females.

Behavioral Health Status The CalYOUTH Study screened for current behavioral health disorders at Waves 1 and 2. The Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID) was used at Wave 1 (Sheehan et al., 1998; 2010), and the adult version of the MINI was used at Wave 2 (Sheehan et al., 1998). The MINI is a brief structured diagnostic interview used to identify the presence of several mental health disorders and substance use disorders. Several dichotomous variables were created to assess whether the respondents screened positive for each of the following seven behavioral health disorders: major depressive episode, manic or hypomanic episode, social phobia, post-traumatic stress disorder [PTSD], psychotic thinking, alcohol abuse or dependence, and drug abuse or dependence. Symptoms of a psychotic disorder were assessed using different instruments at each interview wave; the MINI-KID (Sheehan et al., 1998; 2010) was used at Wave 1 (age 17) and the Psychoticism Dimension of the Symptoms Checklist-90-Revised (SCL-90-R) (Derogatis, 1996; Derogatis & Unger, 2010) was used at Wave 2 (age 19). A separate dichotomous variable was created to capture whether or not respondents had a positive screen for at least one of the seven behavioral health problems. A conservative approach was used to code youth who reported “don’t know” or “refused” on one or more of the questions needed to reach a positive screen. Youth who reported “don’t know/refused” to an item needed for a positive diagnosis, and who did not meet the screening criteria for a positive diagnosis from other questions they answered, received a negative diagnosis.

Placement Type The current placement where youth were residing during their Wave 1 interview included five categories: non-relative foster home, relative foster home, congregate care, independent living settings, and other placement (e.g., legal guardianship, adoptive home).

Extended Foster Care Status at Age 19 For the analyses of outcomes at age 19, a binary variable was created to measure whether youth were or were not in foster care at the time of the Wave 2 interview.

Analytic Approach

We first describe sample characteristics at both ages 17 and 19 for the measures included in the analysis. Second, we examine the prevalence of psychotropic medication use and the perceived net benefits of medications (among medication users), both at age 17 and age 19. Third, the prevalence of medication use at age 19 is compared by care status at age 19. Fourth, we examine prevalence rates of medication use among youth with specific behavioral health problems, both at ages 17 and 19. We test whether rates change significantly between ages 17 and 19 using McNemar’s tests of matched

pairs (McNemar, 1947). Finally, we use regression analyses to examine predictors of psychotropic medication use and perceptions of net benefits of medication use (among medication users). These two outcomes are examined at both age 17 and age 19. Binary logistic regression is used to evaluate the likelihood of psychotropic medication use, and ordinal logistic regression is used to evaluate the incremental changes in perceptions of net benefits.

For the outcomes measured at age 17 (Wave 1), predictors include demographic characteristics, behavioral health status, and living arrangements. For outcomes measured at age 19 (Wave 2), we investigate care status instead of living arrangements, and controlled for Wave 1 psychotropic medication use and experiences. As a predictor, a four-category variable was created based on whether or not youth used medications at age 17 and their level of agreement with the statement that the good things outweighed the bad things (among medication users). Those four categories included: 1 = no medication use, 2 = medication use and agreed about net benefits, 3 = medication use and neutral about net benefits, and 4 = medication use and disagreed about net benefits.

All analyses apply survey weights to account for the sampling design and nonresponse. In each analysis, we report findings using unweighted frequencies, weighted percentages, and weighted odds ratios. None of the variables in this analysis had more than 10% missing data.

Results

Sample Description

As displayed in Table 1, most participants were female, nearly half identified as Hispanic, and about three-quarters identified as being 100% heterosexual. At age 17, nearly half of the participants screened positive for at least one of the seven behavioral health disorders that were assessed. The prevalence rate was lower at age 19, with a little more than one-quarter of youth screening positive for a behavioral health disorder. Youth were most commonly living in a non-relative foster home at age 17, and over one-quarter were placed in a congregate care setting. Over three-quarters of youth remained in foster care at the time of their Wave 2 interview, when nearly all youth were 19 years old. At age 17, more than a quarter of youth reported using medications for their emotions, and most of these youth agreed or were neutral about the positive aspects outweighing the negative aspects. At age 19, less than one-sixth of youth used medications for their emotions.

Table 1 Descriptive statistics for independent and dependent variables

	Age 17		Age 19	
	<i>n</i>	%	<i>n</i>	%
Demographic characteristics				
Gender				
Female	368	60.0	–	–
Male	243	40.0		
Race/ethnicity				
White	139	17.6		
Black	90	17.3		
Hispanic	270	47.4	–	–
Mixed race	90	15.2		
Other	21	2.4		
Sexual orientation				
100% heterosexual	448	76.6	–	–
Non-100% heterosexual	139	23.4		
Covariates				
Behavioral health disorder (current symptoms)				
Major depressive episode	134	21.5	71	9.6
Mania	84	13.6	17	2.3
Psychotic thinking	48	8.0	61	9.0
PTSD	48	7.2	22	3.0
Social phobia	33	5.1	42	4.8
Alcohol abuse/dependence	89	12.7	59	8.5
Drug abuse/dependence	144	22.7	66	9.4
Any behavioral health diagnoses from above	301	48.0	176	27.3
Current placement type				
Non-relative foster home	283	43.9		
Kinship foster home	108	19.0		
Group care or residential treatment center	131	23.5	–	–
Independent living arrangements	24	2.8		
Other	64	10.8		
Care status at age 19				
In care	–	–	467	76.3
Not in care			136	23.7
Outcome variables				
Received psychotropic medications in the past year	177	27.2	106	15.4
Good things about medication outweighed the bad things				
Agree	72	38.0	44	44.5
Neutral	51	32.2	35	29.9
Disagree	51	29.9	26	25.6

Unweighted frequencies

Weighted percentages

Changes Over Time in Psychotropic Medication Use and Net Benefits of Medication

Figure 1 depicts the proportion of respondents who reported taking psychotropic medications in the past year at each interview wave, as well as the proportion of respondents who reported net benefits of their medications (among medication users). The proportion of youth

using psychotropic medications dropped by almost one-half from age 17 to age 19 ($p < .001$). With respect to the net benefits of psychotropic medications, at both ages the majority of youth who had used medications reported a positive or neutral view of the relative advantages and disadvantages of using medications (70% at age 17; 74% at age 19).

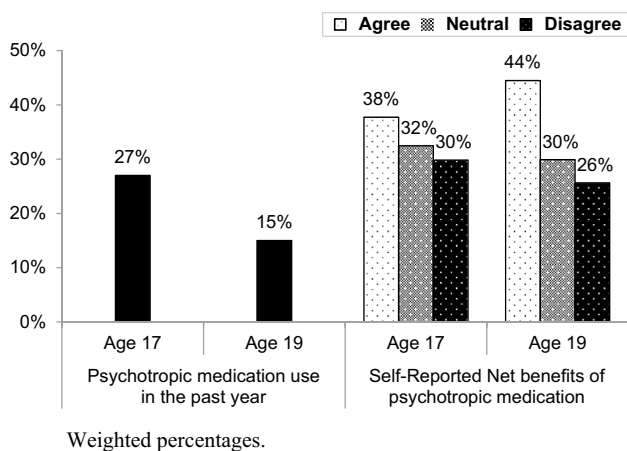


Fig. 1 Proportion of youth using psychotropic medications in the past year ($n = 611$) and youths' perceptions of the net benefits of their psychotropic medications ($n = 177$ at age 17, $n = 106$ at age 19)

Prevalence of Psychotropic Medication Use at Age 19 by Extended Foster Care Status

Table 2 show rates of psychotropic medication use at age 19 by extended foster care status. There was no statistically-significant difference in the use of psychotropic medications between youths in care and those out of care.

Prevalence of Psychotropic Medication Use by Behavioral Health Disorders

Table 3 shows the prevalence rates of specific behavioral health diagnoses and rates of psychotropic medication use associated with each diagnosis. The left columns of Table 3 present the proportion of respondents who screened positive for specific behavioral health problems at age 17 and age 19 among all participants in each interview wave. The right columns present the proportion of respondents who used psychotropic medications, among the youth who screened positive for the corresponding behavioral health problem.

Table 2 Psychotropic medication use at age 19, by extended foster care status ($n = 611$)

Foster care status at age 19	% receiving psychotropic medications at age 19 (%)			Degree of freedom	F statistic	p
	No	Yes	Total			
In care	85.8	14.2	100	597	$F(1, 597) = 1.87$	0.172
Out of care	80.5	19.5	100			

Weighted percentages

Table 3 Prevalence of specific behavioral health problems ($n = 611$) and psychotropic medication use among youths with behavioral health problems ($n = 177$ at age 17, $n = 106$ at age 19)

Behavioral health disorders (current symptoms)	% screened positive for behavioral health disorder		Between ages p	% receiving psychotropic medications, among those who screened positive for disorder		Between ages p
	Age 17	Age 19		Age 17	Age 19	
Major depression episode	21.5	9.6	***	45.7	40.1	
Mania (manic episode or hypomanic episode)	13.5	2.3	***	45.5	19.5	*
Psychotic thinking	7.9	9.0		38.9	35.1	
PTSD	7.2	3.0	**	62.6	39.3	
Social phobia	5.0	4.8		46.3	38.9	
Alcohol abuse or dependence	12.7	8.5	*	44.4	19.8	**
Drug abuse or dependence	22.7	9.4	***	44.8	26.5	*
Any mental health disorder (excludes substance use disorder)	21.2	11.6	***	32.2	28.8	
Any substance use disorder (excludes mental health disorder)	14.6	8.1	**	32.8	19.3	
Any behavioral health disorder	48.0	27.3	***	37.8	25.7	*

Weighted percentages
 * $p < .05$, ** $p < .01$, *** $p < .001$

At age 17, less than one-half of youth screened positive for either a mental health or substance use disorder. The most prevalent behavioral health disorders were a non-alcohol drug use disorder and depression. At age 19, more than one-quarter screened positive for either a mental health or substance use disorder. The most prevalent behavioral health disorders were also depression and non-alcohol drug use problems, as well as symptoms of psychotic thinking. Prevalence rates of behavioral health problems were generally lower at age 19 than at age 17, with significant declines found for most disorders, except for psychoticism and social phobia.

As seen in the right columns of Table 3, the point estimate of psychotropic medication use among youth with at least one behavioral health problem was significantly lower at age 19 than at age 17; the number of youth taking psychotropic medications dropped by 12% points over that period for youth with any behavioral health problem ($p < .05$). This change over time appears to be driven primarily by declines in psychotropic medication use among youths who reported symptoms consistent with alcohol or drug use disorders and declines in the rate of mental health and substance use comorbidity over time. Declines in use of these medications varied across types

of behavioral health problems. Among the mental health disorders (excluding substance use disorders) we screened for, a statistically-significant decline in the rate of psychotropic medication use was observed for only mania, and the difference over time in psychotropic medication use by youths with any self-reported mental health disorder was small and did not approach statistical significance (32% at 17 vs. 29% at 19). In contrast, statistically-significant decreases were observed for the rate of psychotropic medication use among youths who screened positive for an alcohol use disorder ($p < .01$) and those who screened positive for a drug use disorder ($p < .05$).

However, additional analyses indicated that the decline in psychotropic medication use among youth with a substance use disorder was explained, at least in part, by an accompanying decline in the prevalence of co-occurring mental health disorders from age 17 to age 19. Specifically, among youth that screened positive for any substance use disorder, the percentage that also screened positive for a mental health disorder declined from 58% at age 17 to 42% at age 19 ($p > .1$). Moreover, as shown in Table 3, when we restrict the analysis of trends over time in the use of psychotropic medications to youths who only screened positive for any substance use disorder, we do not

Table 4 Estimates of psychotropic medication use and perceived net benefits from regression models at age 17

	Binary logistic regression: psychotropic medication use ($n = 583$)			Ordinal logistic regression: net benefits of medication ($n = 160$) ^a		
	B	OR	SE	B	OR	SE
Demographic characteristics						
Gender (ref: female)						
Male	0.04	1.04	0.25	-0.01	0.99	0.41
Race/ethnicity (ref: white)						
Black	-0.06	0.94	0.37	0.62	1.85	0.53
Hispanic	-0.21	0.81	0.28	0.20	1.22	0.51
Mixed race	-0.68	0.51	0.36	0.03	1.03	0.59
Other	-0.02	0.98	0.62	1.45	4.25	0.89
Sexuality (ref: 100% heterosexual)						
Non-100% heterosexual	0.48	1.61	0.27	0.20	1.23	0.44
Behavioral health disorder (ref: no diagnosis)						
Any mental health or substance use diagnosis	1.04	2.82***	0.23	0.35	1.42	0.42
Current placement type (ref: non-relative foster homes)						
Kinship foster home	0.02	1.02	0.32	-1.86	0.16**	0.53
Congregate care	1.32	3.73***	0.28	0.15	1.16	0.45
Independent living placements	1.25	3.47*	0.50	1.07	2.90	1.02
Other	0.61	1.84	0.39	0.44	1.56	0.66
/cut1				-0.03		0.52
/cut2				1.48		0.53

Weighted log odds and weight odds ratios

* $p < .05$, ** $p < .01$, *** $p < .001$

^aThe sample for this analysis includes only youth who used psychotropic medications

Table 5 Estimates of psychotropic medication use and perceived net benefits from regression models at age 19

	Binary logistic regression: psychotropic medication use ($n = 541$)			Ordinal logistic regression: net benefits of medication ($n = 92$) ^a		
	B	OR	SE	B	OR	SE
Demographic characteristics						
Gender (ref: female)						
Male	-0.08	0.92	0.34	-0.69	0.50	0.72
Race/ethnicity (ref: white)						
Black	-0.75	0.47	0.50	-0.27	0.76	0.78
Hispanic	-0.20	0.82	0.36	0.39	1.47	0.79
Mixed race	-0.32	0.73	0.43	-0.33	0.72	0.80
Other	0.01	1.00	0.76	-1.62	0.20	1.35
Sexuality (ref: 100% heterosexual)						
Non-100% heterosexual	0.16	1.18	0.34	0.02	1.02	0.56
Behavioral health disorder (ref: no diagnosis)						
Any mental health or substance use diagnoses	0.63	1.87*	0.29	-0.48	0.62	0.46
Care status (ref: remained in care)						
Left care after age 18	0.48	1.62	0.31	0.31	1.37	0.59
Psychotropic medication history at age 17 (ref: no meds)						
Used medication, agree that the good things outweigh the bad things	2.24	9.41***	0.39	0.03	1.04	0.69
Used medication, neutral that the good things outweigh the bad things	2.31	10.06***	0.43	0.50	1.64	0.79
Used medication, disagree that the good things outweigh the bad things	2.13	8.40***	0.43	-0.10	1.11	0.69
/cut1				-0.53		0.84
/cut2				0.87		0.87

Weighted log odds and weight odds ratios

* $p < .05$, *** $p < .001$

^aThe sample for this analysis includes only youth who used psychotropic medications

find a statistically-significant decline over time in the use of such medications.

Predictors of Psychotropic Medication Use and Perceived Net Benefits

We now examine predictors of psychotropic medication use and net benefits of psychotropic medications. Table 4 displays results from the outcomes measured at age 17, and Table 5 displays results from the outcomes measured at age 19. In both Tables 4 and 5, the model on the left presents results from binary logistic regression analyses investigating predictors of psychotropic medication use, while the model on the right presents results from ordinal logistic regression analyses investigating predictors of perceived net benefits.

In addition to log odds, odds ratios are presented for ease of interpretation. In the ordinal logistic regression models, the odds ratio is interpreted as the expected changes in odds associated with moving to a higher net benefit category (i.e., from agree to neutral/disagree, or from agree/neutral to disagree). A main assumption of ordinal logistic regression models is that the relationship between the covariates

and the outcome is proportional across changes in the outcome categories. Results from tests of the proportional odds assumption suggests that the assumption was not violated for both age 17 [$\chi^2(5) = 2.38, p = .79$] and age 19 [$\chi^2(6) = 4.49, p = .61$].

At age 17 (Table 4), two predictors are significantly associated with the odds of psychotropic medication use after controlling for other covariates: behavioral health disorders and living arrangements. Self-reported symptoms consistent with a behavioral health disorder increased the estimated odds of taking psychotropic medications by a factor of about 2.8. Compared to youth living in non-relative foster homes, youth in congregate care and in independent living settings each had significantly greater odds of receiving psychotropic medications. No significant associations were found between youths' demographic characteristics and psychotropic medication use. At age 19 (Table 5), having a behavioral health problem was still associated with a greater odds of psychotropic medication use, although the relationship was weaker than at age 17. Prior medication use was a predictor of future medication use; youth who used medications at baseline were much more likely than those who did not use

them at baseline to use medications at age 19, regardless of their perceptions of the net benefits of medications at age 17. Moreover, among youth who had used medications at baseline, differences in their baseline perceptions of the net benefits of psychotropic medications did not predict medication use at age 19. That is, youth who had favorable, neutral, or unfavorable views of their medications at age 17 did not significantly differ in their odds of using medication later on when they were 19 years old.

The second set of analyses in the right columns of Tables 4 and 5 investigates perceptions of net benefits among youth taking psychotropic medications at each interview. At age 17, youth living in relative foster homes had lower odds of experiencing negative medication effects than did youth living in non-relative foster homes. At age 19, no statistically-significant associations were found between the predictors and the expected changes in perceived net benefits.

Limitations

Several study limitations should be considered when interpreting the results of this study. First, our self-report measure of the use of psychotropic medications relies on a question that may not reliably capture all use of psychotropic medications. The question asked to participants about “medications for emotions” may not have captured the total array of psychotropic medications used to treat different kinds of behavioral health problems. However, this concern is tempered somewhat by the fact that our point estimate of youth who reported using psychotropic medications at age 17 (27.2%) is very close to the estimate provided by state child welfare system administrative data on the percentage of 16–17-year-old youths in care in the spring of 2013, when baseline interviews for our study took place, who had been authorized to receive such medications (28.2%) (Webster et al., 2018). Second, due to time constraints in conducting the survey, study data do not provide detailed information about youths’ use of psychotropic medications, including the specific types of medication youths were taking, how many they were prescribed and in what combinations, and which behavioral health problem(s) a medication was intended to treat. Future research that obtains specific prescription information can help address some of these limitations and expand our understanding of psychotropic medication use among transition-age foster youth. Third, the study did not collect detailed information on the types of side effects youths experienced. Fourth, sample sizes limited the statistical power of our analyses, particularly our analyses of differences in the rates of psychotropic medication use between subgroups and our analyses of predictors of youths’ perceptions of the effects of their medications. Lastly, the study findings may not represent the experiences of youth in other

jurisdictions, due to differences in youth characteristics and policies and practices of child welfare and behavioral health services systems.

Discussion

This study confirms findings of earlier research that documents the frequent use of psychotropic medications by older youth in foster care (Landsverk et al., 2002; Raghavan et al., 2005). Study findings are also consistent with prior research showing a decline in use over time of mental health services (Brown et al., 2015; McMillen & Raghavan, 2009), in this case psychotropic medications, by youth transitioning to adulthood from foster care; the self-reported prevalence of psychotropic medication use by the young people in this study declined by nearly half over the study period, from 27% at age 17 to 15% at age 19. These findings suggest that this decline may be, in part, a function of the decreasing prevalence of behavioral health disorders, particularly mental health disorders, among this population.

The downward trends in medication use could also reflect youths’ development and changes in their developmental context. For example, youth may desire increased autonomy and control over their medication use as they become older, seek nonpharmacological approaches to addressing their health, and discontinue treatment when there is no external influence. Changes in their living situations might involve transitions from child welfare placements that provide relatively easy access to professionals and service providers to independent adult living settings that have less supervision by and support from professionals or other adults who are in a position to advise youth about their behavioral health service choices. Lastly, potential structural barriers to medication use include discontinuity in services and supports provided by the child welfare system after youth leave foster care, lack of coordination between the child behavioral healthcare system and the adult behavioral healthcare system, and inadequate access to transportation. Future research should further explore the declines in behavioral health service use, including psychotropic medication, found in this study and previous research (e.g., Brown et al., 2015). Qualitative studies may be particularly well suited to improving understanding of why behavioral health service use changes for foster youth when they reach the age of majority.

We find only limited evidence of a decline in the rate of psychotropic medication use *among youth who screened positive for the disorders we assessed*, and the observed decline among youth with substance use disorders may be largely a function of the declining co-occurrence of mental health and substance use disorders. Indeed, the apparent decline in the use of psychotropic medications

among youth who only report substance use problems may be a positive development given the lack of evidence of their effectiveness in treating substance use disorders (Foulds, Rouch, Spence, Mulder, & Sellman, 2016) and limited understanding of the interactions between psychotropic medications and substances of abuse among youth (Kaminer, Goldberg, & Connor, 2010).

Our data do not speak directly to whether the psychotropic medication use reported here is consistent with evidence-based medical practice, but the results of our analysis of predictors of medication use are generally encouraging. We find strong positive associations between the presence of a behavioral health disorder and self-reported use of psychotropic medications at ages 17 and 19. Controlling for the presence of those disorders, we find no relationship between the gender, race/ethnicity, or sexual minority status of the youths and their use of psychotropic medications. It is also encouraging that youths' extended foster care status was not associated with their likelihood of medication use; this finding suggests that, at least in California, foster youth need not remain in care past their 18th birthday to access an important form of psychiatric service. However, the association between placement type and the use of medications by minors in care is worthy of further investigation. It may be the case that placement in group care or in an independent living arrangement served as a proxy for severity of the behavioral health problems experienced by our study subjects, but continuing scrutiny of group care settings to better understand the use of psychotropic medications there seems warranted.

Our findings regarding the perceptions of youth in foster care about the effects of their medications are new and provide food for thought for child welfare and behavioral health services professionals. The news is generally positive, with most youth reporting that they had favorable or neutral views regarding whether the good things about their medications outweighed the bad. However, the fact that over one-quarter of the youths were more negatively disposed regarding the effects of their medications calls for active engagement with youth about their experiences with psychotropic medications. The knowledge gained from such engagement can help behavioral health professionals better tailor treatment programs to the needs of the youth in their care. Moreover, youth who have generally negative experiences with their medications may be less likely than those with positive experiences to comply with protocols for effective medication use, though our study found no relationship between youths' reports of the effects of their psychotropic medications at baseline and the likelihood that they would be using medications 2 years later. Lastly, the finding that young people living with their kin at age 17 were less likely than their peers living in non-relative foster homes to report generally negative experiences with psychotropic medications calls for

further research on the relationship between the care settings of youth in foster care and their experiences with psychotropic medications.

Funding Funding was provided by William T. Grant Foundation, Conrad N. Hilton Foundation, Stuart Foundation, Walter S. Johnson Foundation, Zellerbach Family Foundation, and Annie E. Casey Foundation.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

- Barnett, E. R., Butcher, R. L., Neubacher, K., Jankowski, M. K., Daviss, W. B., Carluzzo, K. L., ... Yackley, C. R. (2016). Psychotropic medications in child welfare: From federal mandate to direct care. *Children and Youth Services Review*, *66*, 9–17.
- Bentley, K. J., & Collins, K. S. (2013). Psychopharmacological treatment for child and adolescent mental disorders. In C. Franklin, M. S. Harris & P. A. Mears (Eds.), *The school services sourcebook: A guide for school-based professionals (Vol. 2, pp. 53–72)*. New York: Oxford.
- Boyer, E. W., & Shannon, M. (2005). The serotonin syndrome. *New England Journal of Medicine*, *352*(11), 1112–1120.
- Breland-Noble, A. M., Elbogen, E. B., Farmer, E. M., Dubs, M. S., Wagner, H. R., & Burns, B. J. (2004). Use of psychotropic medications by youths in therapeutic foster care and group homes. *Psychiatric Services*, *55*(6), 706–708.
- Brenner, S. L., Southerland, D. G., Burns, B. J., Wagner, H. R., & Farmer, E. M. (2014). Use of psychotropic medications among youth in treatment foster care. *Journal of Child and Family Studies*, *23*(4), 666–674.
- Brown, A., Courtney, M. E., & McMillen, J. C. (2015). Behavioral health needs and service use among those who've aged-out of foster care. *Children and Youth Services Review*, *58*, 163–169.
- Burns, B. J., Phillips, S. D., Wagner, H. R., Barth, R. P., Kolko, D. J., Campbell, Y., & Landsverk, J. (2004). Mental health need and access to mental health services by youths involved with child welfare: A national survey. *Journal of the American Academy of Child and Adolescent Psychiatry*, *43*(8), 960–970.
- California State Auditor. (2016). *California's foster care system: The state and counties have failed to adequately oversee the prescription of psychotropic medications to children in foster care*. Sacramento, CA: California State Auditor. Retrieved from <https://www.auditor.ca.gov/pdfs/reports/2015-131.pdf>.
- Camp, R. (2011). A mistreated epidemic: State and federal failure to adequately regulate psychotropic medications prescribed to children in foster care. *Temple Law Review*, *83*, 369–404.

- Comer, J. S., Olfson, M., & Mojtabai, R. (2010). National trends in child and adolescent psychotropic polypharmacy in office-based practice, 1996–2007. *Journal of the American Academy of Child & Adolescent Psychiatry*, 49(10), 1001–1010.
- Congressional Research Service. (2017). *Child welfare: Oversight of psychotropic medication for children in foster care*. Retrieved from <https://www.everycrsreport.com/reports/R43466.html>.
- Connor, D. F., Ozbayrak, K. R., Harrison, R. J., & Melloni, R. H. Jr. (1998). Prevalence and patterns of psychotropic and anticonvulsant medication use in children and adolescents referred to residential treatment. *Journal of Child and Adolescent Psychopharmacology*, 8(1), 27–38.
- Correll, C. U. (2008). Monitoring and management of antipsychotic-related metabolic and endocrine adverse events in pediatric patients. *International Review of Psychiatry*, 20(2), 195–201.
- Courtney, M. E., Charles, P., Okpych, N. J., Napolitano, L., & Halsted, K. (2014). *Findings from the California youth transitions to adulthood study (CalYOUTH): Conditions of foster youth at age 17*. Chicago, IL: Chapin Hall at the University of Chicago. Retrieved from: http://fosteringsuccessmichigan.com/uploads/misc/CalYOUTH_Conditions_of_Foster_Youth_at_Age_17_report.pdf.
- Courtney, M. E., Dworsky, A., Brown, A., Cary, C., Love, K., & Vorhies, V. (2011). *Midwest evaluation of the adult functioning of former foster youth: outcomes at ages 26*. Chicago, IL: Chapin Hall at the University of Chicago. Retrieved from: http://www.chapinhall.org/sites/default/files/Midwest%20Evaluation_Report_4_10_12.pdf.
- Courtney, M. E., Dworsky, A., Cusick, G. R., Havlicek, J., Perez, A., & Keller, T. (2007). *Midwest evaluation of the adult functioning of former foster youth: Outcomes at age 21*. Chicago, IL: Chapin Hall Center for Children at the University of Chicago. Retrieved from: http://www.chapinhall.org/sites/default/files/ChapinHall_Document_2.pdf.
- Courtney, M. E., Dworsky, A., Lee, J. A., & Raap, M. (2010). *Midwest evaluation of the adult functioning of former foster youth: outcomes at ages 23 and 24*. Chicago, IL: Chapin Hall at the University of Chicago. Retrieved from: http://www.chapinhall.org/sites/default/files/Midwest_Study_Age_23_24.pdf.
- Courtney, M. E., Dworsky, A., Ruth, G., Keller, T., Havlicek, J., & Bost, N. (2005). *Midwest evaluation of the adult functioning of former foster youth: Outcomes at age 19*. Chicago, IL: Chapin Hall Center for Children at the University of Chicago. Retrieved from: http://www.chapinhall.org/sites/default/files/ChapinHall_Document_4.pdf.
- Courtney, M. E., Okpych, N. J., Mikell, D., Stevenson, B., Park, K., Harty, J., ... Kindle, B. (2016). *CalYOUTH survey of young adults' child welfare workers*. Chicago, IL: Chapin Hall at the University of Chicago. Retrieved from: http://www.chapinhall.org/sites/default/files/CY_YT_RE0516_4.pdf.
- Courtney, M. E., Terao, S., & Bost, N. (2004). *Midwest evaluation of the adult functioning of former foster youth: Conditions of youth preparing to leave state care*. Chicago, IL: Chapin Hall Center for Children at the University of Chicago. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.599.150&rep=rep1&type=pdf>.
- Crystal, S., Olfson, M., Huang, C., Pincus, H., & Gerhard, T. (2009). Broadened use of atypical antipsychotics: Safety, effectiveness, and policy challenges. *Health Affairs*, 28(5), w770–w781.
- DeHert, M., Dobbelaere, M., Sheridan, E. M., Cohen, D., & Correll, C. U. (2011). Metabolic and endocrine adverse effects of second-generation antipsychotics in children and adolescents: A systematic review of randomized, placebo controlled trials and guidelines for clinical practice. *European Psychiatry*, 26(3), 144–158.
- Derogatis, L. R. (1996). *SCL-90-R: Symptom checklist-90-R: Administration, scoring, and procedures manual*. New York: Pearson.
- Derogatis, L. R., & Unger, R. (2010). Symptom Checklist-90-Revised. *Corsini Encyclopedia of Psychology*, 4th edition (pp. 1–2). Hoboken, NJ: John Wiley and Sons.
- DosReis, S., Zito, J. M., Safer, D. J., & Soeken, K. L. (2001). Mental health services for youths in foster care and disabled youths. *American Journal of Public Health*, 91(7), 1094–1099.
- Ferguson, D. G., Glesener, D. C., & Raschick, M. (2006). Psychotropic drug use with European American and American Indian children in foster care. *Journal of Child & Adolescent Psychopharmacology*, 16(4), 474–481.
- Floersch, J., Townsend, L., Longhofer, J., Munson, M., Winbush, V., Kranke, D., ... Findling, R. L. (2009). Adolescent experience of psychotropic treatment. *Transcultural psychiatry*, 46(1), 157–179.
- Foltz, R., & Huefner, J. C. (2014). The subjective experience of being medicated in troubled youth: A sample from residential treatment. *Journal of Child and Family Studies*, 23(4), 752–763.
- Foulds, J. A., Rouch, S., Spence, J., Mulder, R. T., & Sellman, J. D. (2016). Prescribed psychotropic medication use in patients receiving residential addiction treatment. *Alcohol and Alcoholism*, 51(5), 622–623.
- Havlicek, J., Lin, C., & Braun, M. T. (2016). Cultivating youth voice through participation in a foster youth advisory board: Perspectives of facilitators. *Children and Youth Services Review*, 69, 1–10.
- Havlicek, J. R., Garcia, A. R., & Smith, D. C. (2013). Mental health and substance use disorders among foster youth transitioning to adulthood: Past research and future directions. *Children and Youth Services Review*, 35(1), 194–203.
- Huefner, J. C., Griffith, A. K., Smith, G. L., Vollmer, D. G., & Leslie, L. K. (2014). Reducing psychotropic medications in an intensive residential treatment center. *Journal of Child and Family Studies*, 23(4), 675–685.
- Jerrell, J. M. (2010). Neurological and cardiovascular adverse events associated with antimanic treatment in children and adolescents. *CNS Neuroscience & Therapeutics*, 16(1), 25–31.
- John Burton Foundation. (2015, November 3). New laws passed to reduce psychotropic use for foster youth. *John Burton Foundation Updates*. Retrieved from: <https://www.jbaforyouth.org/newsletter-archive/>.
- Kaminer, Y., Goldberg, P., & Connor, D. F. (2010). Psychotropic medications and substances of abuse interactions in youth. *Substance Abuse*, 31(1), 53–57.
- Kimbo, F. V., & Pataki, C. (2017). Psychotropic polypharmacy: A serious concern among children and adolescents in the United States of America foster care system. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(10), S124–S125.
- Kranke, D., Floersch, J., Townsend, L., & Munson, M. (2010). Stigma experience among adolescents taking psychiatric medication. *Children and Youth Services Review*, 32(4), 496–505.
- Kutz, G. (2011). *Foster children: HHS guidance could help states improve oversight of psychotropic prescriptions* (GAO-12-270T). Washington, DC: Government Accountability Office. Retrieved from: <https://www.gao.gov/assets/590/586570.pdf>.
- Landsverk, J., Garland, A. F., & Leslie, L. K. (2002). Mental health services for children reported to child protective services. *APSAC Handbook on Child Maltreatment*, 2, 487–507.
- Leslie, L. K., Mackie, T., Dawson, E. H., Bellonci, C., Schoonover, D. R., Rodday, A. M., ... Hyde, J. (2010). *Multi-state study on psychotropic medication oversight in foster care*. Boston: Tufts Clinical and Translational Science Institute.
- Longhofer, J., Floersch, J., & Jenkins, J. H. (2004). Medication effect interpretation and the social grid of management. *Social Work in Mental Health*, 1(4), 71–89.
- Mackie, T. I., Hyde, J., Palinkas, L. A., Niemi, E., & Leslie, L. K. (2017). Fostering psychotropic medication oversight for children in foster care: A national examination of states' monitoring

- mechanisms. *Administration and Policy in Mental Health and Mental Health Services Research*, 44(2), 243–257.
- Malone, R. P., Sheikh, R., & Zito, J. M. (1999). Psychopharmacology: Novel antipsychotic medications in the treatment of children and adolescents. *Psychiatric Services*, 50(2), 171–174.
- McMillen, J. C., Scott, L. D., Zima, B. T., Ollie, M. T., Munson, M. R., & Spitznagel, E. (2004). Use of mental health services among older youths in foster care. *Psychiatric Services*, 55(7), 811–817.
- McMillen, J. C., Zima, B. T., Scott, L. D. Jr., Auslander, W. F., Munson, M. R., Ollie, M. T., & Spitznagel, E. L. (2005). Prevalence of psychiatric disorders among older youths in the foster care system. *Journal of the American Academy of Child and Adolescent Psychiatry*, 44(1), 88–95.
- McNemar, Q. (1947). Note on the sampling error of the difference between correlated proportions or percentages. *Psychometrika*, 12, 153–157.
- Medicaid Medical Directors Learning Network (MMDLN) and Rutgers Center for Education and Research on Mental Health Therapeutics (CERTs). (2010). *Antipsychotic medication use in Medicaid children and adolescents: Report and resource guide from a 16-state study* (MMDLN/Rutgers CERTs Publication #1). Retrieved from: http://rci.rutgers.edu/~cseap/MMDLNAPKIDS/Antipsychotic_Use_in_Medicaid_Children_Report_and_Resource_Guide_Final.pdf.
- Miglani, J. B., & Scrivener, J. (2017). are we overdiagnosing and overmedicating children and adolescents being raised in non-parental households and foster care? Diagnostic and demographic considerations in children raised in parental household vs. other placement settings. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(10), S184–S185.
- Miller, L. (2009). Adoption and foster family care. In W. B. Carey, A. C. Crocker, E. R. Elias, H. M. Feldman & W. L. Coleman (Eds.), *Developmental-behavioral pediatrics e-book* (pp. 134–143). Philadelphia: Elsevier Health Sciences.
- Morrato, E. H., Nicol, G. E., Maahs, D., Druss, B. G., Hartung, D. M., Valuck, R. J., et al. (2010). Metabolic screening in children receiving antipsychotic drug treatment. *Archives of Pediatrics and Adolescent Medicine*, 164, 344–351.
- Moses, T. (2011). Adolescents' commitment to continuing psychotropic medication: A preliminary investigation of considerations, contradictions, and correlates. *Child Psychiatry & Human Development*, 42(1), 93–117.
- Narendorf, S. C., Munson, M. R., & Floersch, J. (2015). Perspectives on psychotropic medication treatment among young adults formerly served in public systems of care: A thematic and narrative analysis. *Journal of the Society for Social Work and Research*, 6(1), 121–143.
- Nevels, R. M., Dehon, E. E., Alexander, K., & Gontkovsky, S. T. (2010). Psychopharmacology of aggression in children and adolescents with primary neuropsychiatric disorders: A review of current and potentially promising treatment options. *Experimental and Clinical Psychopharmacology*, 18(2), 184–201.
- Okpych, N. J., & Courtney, M. E. (2014). Relationship between adult outcomes of young people making the transition to adulthood from out-of-home care and prior residential care. In J. W. Whitaker, J. F. del Valle & L. Holmes (Eds.), *Therapeutic residential care with children and youth: Developing evidence-based international practice* (pp. 49–62). London: Jessica Kingsley Publishers.
- Okpych, N. J., Feng, H., Park, K., Torres-García, A., & Courtney, M. (2018). Living situations and social support in the era of extended foster care: A view from the US. *Longitudinal and Life Course Studies*, 9(1), 6–29.
- Olfson, M., Blanco, C., Liu, L., Moreno, C., & Laje, G. (2006). National trends in the outpatient treatment of children and adolescents with antipsychotic drugs. *Archives of general psychiatry*, 63(6), 679–685.
- Olfson, M., He, J. P., & Merikangas, K. R. (2013). Psychotropic medication treatment of adolescents: Results from the National Comorbidity Survey–Adolescent Supplement. *Journal of the American Academy of Child & Adolescent Psychiatry*, 52(4), 378–388.
- Olfson, M., Marcus, S. C., Weissman, M. M., & Jensen, P. S. (2002). National trends in the use of psychotropic medications by children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 41(5), 514–521.
- Raghavan, R., & McMillen, J. C. (2008). Use of multiple psychotropic medications among adolescents aging out of foster care. *Psychiatric Services*, 59(9), 1052–1055.
- Raghavan, R., Zima, B. T., Andersen, R. M., Leibowitz, A. A., Schuster, M. A., & Landsverk, J. (2005). Psychotropic medication use in a national probability sample of children in the child welfare system. *Journal of Child & Adolescent Psychopharmacology*, 15(1), 97–106.
- Ryan, J. B., Reid, R., Gallagher, K., & Ellis, C. (2008). Prevalence rates of psychotropic medications for students placed in residential facilities. *Behavioral Disorders*, 33(2), 99–107.
- Safer, D. J., Zito, J. M., & dosReis, S. (2003). Concomitant psychotropic medication for youths. *American Journal of Psychiatry*, 160, 438–449.
- Sakai, C., Mackie, T. I., Shetgiri, R., Franzen, S., Partap, A., Flores, G., & Leslie, L. K. (2014). Mental health beliefs and barriers to accessing mental health services in youth aging out of foster care. *Academic Pediatrics*, 14(6), 565–573.
- Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., ... Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (MINI): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry*, 59, 22–33.
- Sheehan, D. V., Sheehan, K. H., Shytle, R. D., Janavs, J., Bannon, Y., Rogers, J. E., ... Wilkinson, B. (2010). Reliability and validity of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). *The Journal of Clinical Psychiatry*, 71(3), 313–326.
- Sheldon, G., Berwick, D., & Hyde, P. (2011). *Joint letter to state child welfare, Medicaid, and mental health authorities on the use of psychotropic medication for children in foster care & substance abuse and mental health services administration*. Washington DC. Retrieved from <https://www.medicaid.gov/Federal-Policy-Guidance/Downloads/SMD11-23-11.pdf>.
- Shin, S. H. (2005). Need for and actual use of mental health service by adolescents in the child welfare system. *Children and Youth Services Review*, 27(10), 1071–1083.
- Steinhausen, H. C. (2015). Recent international trends in psychotropic medication prescriptions for children and adolescents. *European Child & Adolescent Psychiatry*, 24(6), 635–640.
- Substance Abuse and Mental Health Services Administration & The TA Network. (2015). *Improving the oversight and monitoring of psychotropic medication use among children in Medicaid* [Webinar]. Retrieved from http://csgjusticecenter.org/mental-health/webinars/improving-the-oversight-and-monitoring-of-psychotropic-medication-use-among-children-in-medicaid/?mc_cid=867888c539&mc_eid=69de5cd14b.
- Texas Health and Human Services Commission. (2006). *Use of psychotropic medication in Texas foster children state fiscal year 2005*. Retrieved from https://www.dfps.state.tx.us/Child_Protection/Medical_Services/documents/reports/2006-06_Use_of_Psychotropic_Medications_in_Foster_Child.pdf.
- The Adoption and Foster Care Analysis and Reporting System (2015). *The AFCARS report: Preliminary FY 2014 estimates*. Washington DC: U.S. Department of Health and Human Services. Retrieved from <https://www.acf.hhs.gov/sites/default/files/cb/afcarsreport23.pdf>.

- The Kansas Health Policy Authority. (2009). *2008 Medicaid transformation*. Retrieved from <http://www.khpa.ks.gov/>.
- U. S. Government Accountability Office. (2017). *Foster care: HHS has taken steps to support states' oversight of psychotropic medications, but additional assistance could further collaboration* (GAO-12-201), Washington, D.C. Retrieved from <https://www.gao.gov/assets/690/681916.pdf>.
- Webster, D., Lee, S., Dawson, W., Magruder, J., Exel, M., & Cuccaro-Alamin, ... Lee, H. (2018). *CCWIP reports*. Retrieved from University of California at Berkeley California Child Welfare Indicators Project website: http://cssr.berkeley.edu/ucb_childwelfare.
- Yoon, Y., Rubin, D. M., Riddle, M. A., Noll, E., & Rothbard, A. (2011). Antipsychotic treatment among youth in foster care. *Pediatrics*, *peds-2010*.
- Zima, B. T., Bussing, R., Crecelius, G. M., Kaufman, A., & Belin, T. R. (1999). Psychotropic medication treatment patterns among school-aged children in foster care. *Journal of Child and Adolescent Psychopharmacology*, *9*(3), 135–147.
- Zito, J. M., Safer, D. J., DosReis, S., & Riddle, M. A. (1998). Racial disparity in psychotropic medications prescribed for youths with Medicaid insurance in Maryland. *Journal of the American Academy of Child & Adolescent Psychiatry*, *37*(2), 179–184.
- Zito, J. M., Safer, D. J., Gardner, J. F., Magder, L., Soeken, K., Boles, M., ... Riddle, M. A. (2003). Psychotropic practice patterns for youth: A 10-year perspective. *Archives of Pediatrics & Adolescent Medicine*, *157*(1), 17–25.
- Zito, J. M., Safer, D. J., Sai, D., Gardner, J. F., Thomas, D., Coombes, P., ... Mendez-Lewis, M. (2008). Psychotropic medication patterns among youth in foster care. *Pediatrics*, *121*(1), e157–e163.
- Zito, J. M., Safer, D. J., Zuckerman, I. H., Gardner, J. F., & Soeken, K. (2005). Effect of Medicaid eligibility category on racial disparities in the use of psychotropic medications among youths. *Psychiatric Services*, *56*(2), 157–163.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.