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Examining psychotropic medication use among youth in the U.S. by race/ethnicity and psychological impairment

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ABSTRACT

Objective: Clinical practice guidelines underscore the need for careful evaluation of the risk-benefit ratio of psychotropic medications treating mental health disorders among youth. While it is well known that racial/ethnic disparities exist in psychotropic medication use, little is known about whether these differences are driven by over-prescribing among white youth, under-prescribing among minority youth, or both. To build evidence in this area, this study examined racial/ethnic differences in the prescription of psychotropic medications among youth with and without psychological impairment.

Methods: Secondary data on two-year medication use from the 2004–2011 Medical Expenditure Panel Surveys were analyzed. We capitalized on two-year panel data, creating variables that allow for differential sequencing of psychological impairment and medication prescription (e.g., impairment in year 1 or year 2, and a psychotropic medication fill in year 2). Statistical differences were determined using unadjusted rate comparisons and logistic regression models, after adjustment for socio-contextual and health status characteristics.

Results: Compared to Black and Latino youth with psychological impairment, White youth were more likely to be prescribed psychotropic medications when impaired. Among youth never having psychological impairment, White youth were also more likely to be prescribed medications compared to their racial/ethnic minority counterparts.

Conclusions: Differences in rates of medication use among youth with and without impairment suggest poor medication targeting across racial/ethnic groups. These results, combined with recent psychotropic medication risk warnings and concerns over increases in psychotropic medication use among youth, suggest that a continued emphasis on accurate targeting of prescribing patterns is needed across racial/ethnic groups.

1. Introduction

U.S. data from the 2001–2004 National Comorbidity Survey-Adolescent Supplement (NCS-A) demonstrate that just 14.2% of adolescents meeting DSM-IV criteria for a mental health disorder received treatment with at least one psychotropic medication prescription, suggesting high rates of unmet need among youth with disorders, for which specific medication treatments exist. Low rates of inappropriate use were also reported: <2.5% of adolescents in the sample were prescribed a psychotropic medication without a 12-month mental health disorder [1]. These data were collected before a period of dramatic increases in youth antipsychotic medication [2,3] and stimulant use [4,5]. Analyses of this kind contend with popular media reports [6,7] that raise concerns about overuse of psychotropic medications in youth.

Subsequent to the time of the NCS-A, notable declines in antidepressant use were identified after an FDA black box warning in the U.S. raised concerns about increased rates of suicidal ideation among youth using antidepressant medications [8,9]. Recent evidence shows increases in the rate of suicide attempts among youth in the years following the FDA warnings, which may be related to significant reductions in the diagnosis and treatment of depression [10]. These

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dramatic changes in the use of psychotropic medications among youth in the past decade show a need for updated research to inform the field's knowledge of appropriate targeting of medication use among youth.

In the U.S., racial/ethnic differences in psychotropic medication use are an important public health issue because it suggests the need to improve access to medications for certain groups, curb overuse among other groups, or both. Evidence from community samples and insurance claims data shows that White youth are significantly more likely to fill psychotropic medication prescriptions than racial/ethnic minority youth. At the same time, the extent of racial/ethnic differences in medication use varies across categories of psychotropic medications. For example, White youth are twice as likely to fill prescriptions for antipsychotics [11,2], approximately two to nine times more likely to fill stimulant prescriptions [4,12], and approximately four times as likely to fill antidepressant prescriptions compared to Black and Latino youth [13].

An important limitation of previous research is the failure to determine if medication use is appropriate given the diagnosis or level of impairment. One exception found that Black, Latino, and Asian adolescents with major depression in the last year were less likely than Whites to receive antidepressants [14]. Another older study of Medicaid claims reported Black-White disparities and Latino-White disparities in access and adherence to antidepressants (for depression) and antipsychotics (for schizophrenia) [15].

The presence of both risks and benefits of psychotropic medication use suggests that researchers should use caution in identifying racial/ethnic differences in psychotropic medication utilization. While a robust body of evidence demonstrates their effectiveness in the treatment of mood, psychotic, anxiety, developmental, and behavioral disorders, psychotropic medications can cause severe side effects in youth [16,11,17,18,1]. Atypical antipsychotic side effects may include weight gain, hyperglycemia, cardiovascular morbidity, and endocrine abnormalities [19,13,1,20], while SSRIs may be associated with increased suicidal ideation [21]. For youth with a clinical need for psychotropic medications, the benefits often outweigh the risks [22]. For those without a clinical need, however, their use may represent an unnecessary risk to patients and an inefficient use of health system resources.

Disparities studies, in the context of FDA risk warnings, further highlight the complexity of defining "disparity" in psychotropic medication use. For example, Depetris and Cook [23] identified that disparities in youth antidepressant use were considerably diminished after the FDA issued a black box warning of suicidal ideation. In this case, a reduction in disparities after the medication warning reflected increased use by racial/ethnic minorities of a psychotropic medication but also increased relative exposure to risk. Similarly, Dusetzina et al. [24] found that the rates of olanzapine use declined more slowly among Latinos compared to Whites after the FDA issued an advisory of the metabolic risks of atypical antipsychotics. These differing trends in olanzapine use identified a greater risk among Latinos compared to Whites in the presence of lower risk alternative medications.

In this study, we used 2-year panel data to identify youth with psychological impairment in the year prior to and/or concurrent with the period of medication use studied. Recent health services research has demonstrated that level of psychological impairment, as measured by the Columbia Impairment Scale [25], is a valid and useful approach to studying psychotropic use among youth, even when specific diagnostic information is not available in national surveys [5]. We build on this research by examining the match between psychotropic medication use and psychological impairment among non-Latino white, Black, and Latino youth using a recent, nationally representative U.S. community sample. We assessed differences in psychotropic medication fills using three groups: 1) all youth with mental health impairment, allowing us to estimate differences in indicated medication use; 2) all youth that filled a psychotropic medication prescription, allowing us to measure the racial/ethnic variation in indicated and non-indicated use; and 3) all youth, to generate estimates of national differences in psychotropic medication use.

2. Methods

2.1. Data

Data used in this study come from Panels 9–15 (corresponding to years 2004–2011) of the Household Component of the Medical Expenditure Panel Surveys (MEPS) for children and adolescents age 5–17 (referred to as "youth" from here forward). The MEPS is a nationally representative sample of noninstitutionalized U.S. civilians that is administered in both English and Spanish. We assessed rates of any psychotropic medication use for non-Latino White, non-Latino Black, and Latino youth. Institutional Review Board approval was obtained for this study.

2.2. Dependent variables

Psychotropic medication use in these data was defined as a fill of any medication classified as a psychotropic drug according to the Multum classification system [26]. This method of identification of psychotropic medication use requires not only that a prescription be written by a clinician, but also that the youth or a caregiver fills the prescription. However, a limitation remains that this is not a measure of whether the youth actually took the medication. We capitalized on the two-year panel data to generate dependent variables of "non-indicated use" (a variable describing *overuse* where an individual had no mental health impairment in year 1 and year 2 but had medication use in year 2), "indicated use" (an individual had mental health impairment in year 1 or year 2 and medication use in year 2), and "non-use" (a variable describing unmet need, where an individual had mental health impairment in year 2 but no medication use in year 2) (Table 1). In sensitivity analyses, we use a more restrictive definition of "non-indicated use" as *overuse* when an individual had no mental health impairment in year 1 or year 2, no medication use in year 1, and initiation of medication use in year 2. This more restrictive definition recognizes that it is possible that a youth may have no measured health impairment for two years due to successful treatment with medication. We acknowledge that evidence-based guidelines for psychotropic medication use are more specific in defining appropriate use of specific medications for specific disorders, as determined by FDA approval. However, our categorization provides useful information, particularly given the dearth of research on differences in overall psychotropic medication use among those with and without impairment and the absence of more specific diagnostic information in recent nationally representative datasets. Further, we note that such guidelines often recommend psychotherapy as a treatment for pediatric mental disorders alone or in combination with medications. Thus, we measure disparities using the above definitions, with the goal of comparing medication use, as opposed to assessing national quality metrics that require greater specificity of diagnosis and treatment type.

To provide more descriptive information of the types of psychotropic drugs that are typically used by the youth population, we assessed the percentage of whites, Blacks, and Latino youth with any use of antidepressants, antipsychotics, and stimulants (see Table 2). We defined these psychotropic drug categories using Multum classification codes available in the MEPS.

Table 1
Definitions for three dependent variables.

Variable name	Psychological impairment	Filled medication in year 2
Indicated use	Yes (either year 1 or 2)	Yes
Non-indicated use	No (years 1 and 2)	Yes
Non-use	Yes (year 2)	No

Table 2
Comparisons of medication use variables and socio-demographic characteristics of MEPS sample age 5–17.

	White ($n = 8953$)	Black ($n = 5093$)	Latino ($n = 8478$)
	%	%	%
Medication variables			
Any psychotropic drugs[a]	8.1	5.0[b]	3.4[b]
Antidepressants	2.4	1.0[b]	0.9[b]
Atypical antipsychotics	1.2	0.8[b]	0.6[b]
Stimulants	6.2	4.1[b]	2.5[b]
Health status characteristics			
Parent-reported Mental Health Status			
Excellent	55.0	53.8	47.7[b]
Very good	28.4	23.4[b]	29.9
Good	13.7	19.0[b]	19.7[b]
Fair	2.3	3.1[b]	2.3
Poor	0.6	0.7	0.5
Parent-reported Physical Health Status			
Excellent	54.2	49.2[b]	42.4
Very good	30.2	27.1[b]	32.1[b]
Good	13.8	20.1[b]	22.1
Fair	1.5	3.3[b]	3.1[b]
Poor	0.3	0.4	0.3
Psychological impairment (measured as CIS > = 16)	10.8	10.8	6.8[b]
Socio-demographic characteristics			
Female	48.8	49.8	48.3
Age			
5–9 years	34.1	32.0	38.4[b]
10–12 years	28.2	29.3	27.2
13–17 years	37.7	38.7	34.4[b]
Income			
<100% FPL	11.2	31.9[b]	31.2[b]
100–125% FPL	3.9	8.5[b]	10.1[b]
125–200% FPL	13.8	19.1[b]	22.9[b]
200–400% FPL	36.6	26.2[b]	25.6[b]
400% + FPL	34.5	14.3[b]	10.3[b]
Insurance Status			
Private insurance	75.8	47.1[b]	35.6[b]
Medicare	18.1	46.8[b]	49.4[b]
Medicaid	6.1	6.1	14.9[b]
Region			
Northeast	19.4	16.8	12.6[b]
Midwest	27.4	18.6[b]	9.0[b]
South	34.1	56.0[b]	34.5
West	19.1	8.7[b]	43.9[b]
Urban residence	79.7	88.4[b]	92.8[b]

CIS: Columbia Impairment Scale.
All variables reported here are from year one of the two-year panel for each respondent.
[a] Rates of antidepressants, antipsychotics, and stimulants add up to more than rate of any psychotropic medication because some youth filled greater than one psychotropic medication.
[b] Difference from whites is significant at $p < 0.05$ level.

Psychological impairment was defined as a Columbia Impairment Scale (CIS) score ≥ 16 [25]. The CIS is a parent-report measure of functioning across four areas (interpersonal relations, broad psychopathology domains, functioning in job or schoolwork, and use of leisure time). The CIS has excellent psychometric properties, correlates well with the Children's Global Assessment Scale, referral for mental health services, academic performance and school difficulties [27,25], and has been shown to have reliability and validity among diverse racial, ethnic and socioeconomic populations [28]. We utilized a cutoff score of 16 in this pediatric sample, which has shown moderate agreement with DSM diagnoses (kappa, 0.48; sensitivity, 0.44; specificity, 0.96; positive predictive value, 0.79) [29]. To assess disparities under conditions of greater sensitivity, we conducted sensitivity analyses lowering the cutoff score to 12+. At this threshold, the CIS has been shown to have a sensitivity of 0.64, specificity of 0.86, and positive predictive value of 0.59 [29]. The direction and significance of the results were unchanged (see Appendix Table 1).

2.3. Independent variables

Individuals of any race identifying as Latino or Latino origin were defined as Latino. Other respondents were classified as Black or White by their responses to the question about race.

When measuring racial/ethnic differences in psychotropic medication use, we adjust for four categories of variables: proxies of underlying illness prevalence; socioeconomic status (SES); insurance status; and geographic location. More specifically, in the absence of valid population-based measures of mental disorders in the MEPS, we adjust for the following covariates representing *underlying illness prevalence*: parent-assessed mental health and physical health scores (rated in four categories as excellent, very good, good, fair/poor), gender, CIS score, and age (5–9, 10–12, 13–17). Prior studies have shown that Black adolescents have increased rates of lifetime anxiety disorders, and Latino adolescents have higher rates of lifetime mood disorders compared with non-Latino White adolescents [30]. As a proxy for *socioeconomic status* (SES), we adjust for family income (<100% Federal Poverty Level [FPL], 100–125% FPL, 125–200% FPL, 200–400% FPL, 400+ FPL). Blacks and Latinos have lower average SES than Whites [17,31], and there is a positive correlation between family socioeconomic status and antidepressant use [35], stimulant use [31,17,35], and overall psychotropic medication use [37]. We additionally adjust for *insurance status* (private, Medicare, Medicaid/SCHIP, other public insurance, uninsured). White adolescents are three times more likely than Black and Latino adolescents to be insured, and more likely to be privately insured [17,31], both significant predictors for psychotropic medication use [32–34,17,35,31,36]. Finally, we adjust for *geographic location* using indicators of urban location (living in a metropolitan statistical area with population >250.000) and region of the country (Northeast, Midwest, South, and West). Compared to White youth, Blacks and Latinos are more likely to live in urban areas, which has been shown to be a positive predictor of access to psychotropic medications [36,21,17,32].

2.4. Statistical analysis

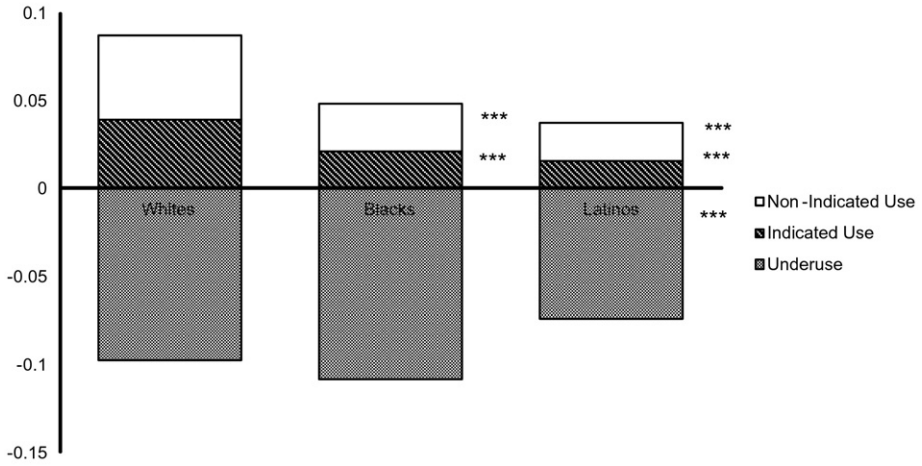
We first compared rates of dependent and independent variables by race/ethnicity using chi-square tests for categorical variables and *t*-tests for continuous variables. Next, we decomposed racial/ethnic unadjusted differences in psychotropic medication use into differences in non-indicated use and differences in indicated use (Fig. 1). In the same figure, we compared racial/ethnic differences in "underuse", that is, non-use of psychotropic medications among those with impairment.

Next, we estimated multivariate logit models [38] to assess racial/ethnic disparities in these same three dependent variables (non-indicated use, non-use, and indicated use of any psychotropic medication), after adjustment for the above described covariates shown to influence racial/ethnic mental health care disparities [13,39].

2.5. Survey weighting, variance estimation, and missing data

Survey weights account for both the complex sampling design and non-response (i.e., due to attrition and refusal to respond) so that the MEPS remains nationally representative. Variance estimates account for the complex sample design. Stratum and primary sampling unit variables were standardized across pooled years [40] using publicly available strata and psu variables that specify a common variance structure for MEPS respondents across multiple years of data.

Our initial sample was 22,524 non-Latino White, Black, and Latino individuals ages 5–17. Missing values were present in <1% of the population for all variables except the Columbia Impairment Scale, in which 4673 individuals (or 20.7% of the youth respondents) were missing data. To impute missing data, we used the multiple imputation technique described by Rubin [41]. Using the *mi* command in STATA software [42], we created five complete datasets, imputing missing values



**Significantly different from Whites at the α<.01 level
***Significantly different from Whites at the α<.001 level
Non-indicated use defined as the use of the drug without the CIS<16, for the second year panel data.
Indicated use defined as the use of the drug with CIS≥16, for the second year panel data.
Non-use defined as not using with CIS≥16, for the second year panel data.

Fig. 1. Decomposition of disparities in youth psychotropic drug use by indicated use, non-indicated use, and underuse.

using a chained equations approach, analyzed each dataset, and used standard rules to combine the estimates and adjust standard errors for the uncertainty due to imputation.

3. Results

Blacks and Latinos were significantly less likely to fill prescriptions for any psychotropic medication (Table 2); respectively, 5.0% and 3.4% of Black and Latino youth filled at least one prescription for any psychotropic medication in the last year, compared to 8.1% of Whites. These racial/ethnic differences persisted when assessing three sub-classes of psychotropic medication use, with Whites more likely than blacks and Latinos to have any prescription fill for an antidepressant (2.4%, 1.0%, and 0.9%, respectively), atypical antipsychotic (1.2%, 0.8%, and 0.6%) and stimulant (6.2%, 4.1%, and 2.5%). Compared to White youth, Black youth had poorer parent-reported mental health and physical health, lower income, lower rates of private insurance, higher rates of public insurance and uninsurance, and greater likelihood to live in the South. Compared to White youth, Latino youth were younger in age, less likely to be have mental health impairment, and more likely to be publicly insured or uninsured.

3.1. Indicated and non-indicated use among those that filled a psychotropic medication prescription

In Fig. 1, we decompose the racial/ethnic differences in psychotropic medication use into non-indicated use and indicated use. Youth with any psychotropic medication use are represented above the zero percentage line. Black-white and Latino-white disparities were identified in rates of non-indicated use and indicated use. The overall percentages of White, Black, and Latino youth reporting any psychotropic medication use are 8.6%, 4.6%, and 3.7%, respectively. Over 50% of this use across racial/ethnic groups was non-indicated (4.8% out of 8.6% or 56% for Whites, 2.8% out of 4.6% or 57% for Blacks, and 2.2% out of 3.7% or 58% for Latino youth).

3.2. Psychotropic medication use among those with need for treatment

Comparing the darkly shaded area above the zero percentage line with the shaded area below the zero percentage line in Fig. 1, one can see that the majority of youth with psychological impairment had no psychotropic medication use. 9.8% out of the 14.6% of white youth that had impairment never filled a psychotropic medication, 10.9% out of the 13.7% of black youth that had impairment never filled a psychotropic medication, and 7.4% out of the 9.6% of Latino youth never filled a psychotropic medication.

3.3. Racial/ethnic differences in multivariate regression models

After adjustment for family parent-assessed mental health and physical health, gender, CIS, age, family income, insurance coverage, urbanicity, and region of the country, white youth *without* ever having reported impairment were also significantly more likely than Black and Latino youth *without* impairment to report any psychotropic medication (Non-Indicated Use in Table 3). Using a second more strict definition of non-indicated use limited to those that initiated use in year 2 without impairment in years 1 and 2 or medication use in year 1, the results are the same in direction and significance for Blacks and the same in direction but not significance for Latinos (see Appendix Table 1). Black youth were significantly more likely to not use psychotropic medications despite having psychological impairment (Non-use in Table 3). Black and Latino youth with impairment in years 1 or 2 were significantly less likely than their White counterparts to report any psychotropic medication use ("Indicated use" column in Table 3).

4. Discussion

This study provides recent national estimates of psychotropic medication use by youth with and without psychological impairment in the United States. Our results reveal racial/ethnic differences in how psychotropic medication use matches mental health need among youth. Among youth filling a psychotropic medication, Blacks and Latinos were less likely than Whites to have both indicated use and non-indicated use, although the ratio of indicated to non-indicated use was remarkably similar across racial/ethnic groups. These findings support other work demonstrating that psychotropic medication use is lower among racial/ethnic minorities [43]. The finding that overall racial/ethnic differences are due to lower rates of indicated and non-indicated use motivates further research into the reasons that minority youth are not offered, or do not accept, medication recommendations despite having severe psychological impairment.

Table 3
Logistic regressions assessing the use of psychotropic drugs in youth age 5–17.

	Non-indicated use of psychotropic drugs		Non-use of psychotropic drugs		Indicated use of psychotropic drugs	
	Coefficient	CI	Coefficient	CI	Coefficient	SE
Race/ethnicity						
Blacks	−0.69[c]	[−1.01–0.38]	0.40[b]	[0.12–0.68]	−1.08[b]	0.187
Latinos	−0.64[c]	[−0.97–0.31]	−0.24	[−0.61–0.13]	−0.75[b]	0.197
Self-reported MH status						
Excellent (reference)						
Very good	0.34	[−0.08–0.75]	0.51[b]	[0.13–0.88]	0.71[b]	0.229
Good	0.83[b]	[0.31–1.33]	0.15	[−0.35–0.64]	1.52[b]	0.245
Fair	1.40[b]	[0.62–2.18]	−0.98[b]	[−1.72–0.25]	2.20[b]	0.314
Poor	−0.56	[−2.84–1.72]	−2.59[c]	[−3.82–1.38]	2.38[b]	0.444
Self-reported PH status						
Excellent (reference)						
Very good	0.17	[−0.25–0.58]	0.04	[−0.38–0.46]	−0.03	0.233
Good	−0.08	[−0.63–0.47]	0.47	[−0.01–0.93]	−0.49[b]	0.231
Fair	0.00	[−0.8–0.79]	0.58	[−0.13–1.29]	−0.45	0.373
Poor	−0.24	[−1.92–1.43]	0.74	[−0.32–1.79]	−1.87[b]	0.948
Female	−0.79[c]	[−1.02–0.56]	0.20	[−0.06–0.46]	−0.65[b]	0.143
CIS year 1	−0.02[a]	[−0.04–0.01]	0.14[c]	[0.12–0.15]	0.04[b]	0.009
CIS year 2	−0.02[a]	[−0.04–0.01]	0.12[c]	[0.1–0.14]	0.13[b]	0.007
Age						
5–9 years (reference)						
10–12 years	0.29[a]	[0.02–0.55]	−0.01	[−0.36–0.33]	0.17	0.165
13–17 years	0.28[a]	[0.01–0.54]	0.00	[−0.3–0.3]	−0.58[b]	0.194
Income						
<100% FPL (reference)						
100–125% FPL	0.22	[−0.24–0.68]	−0.38	[−0.96–0.2]	0.41[b]	0.224
125–200% FPL	0.07	[−0.31–0.44]	−0.10	[−0.53–0.33]	0.14	0.248
200–400% FPL	0.32	[−0.04–0.66]	−0.30	[−0.71–0.1]	0.47[b]	0.219
400% + FPL	0.69[b]	[0.27–1.09]	−0.46	[−0.96–0.03]	0.56[b]	0.260
Insurance status						
Private (reference)						
Medicare	0.23	[−0.06–0.52]	−0.25	[−0.58–0.07]	0.66[b]	0.184
Medicaid	−0.85[a]	[−1.56–0.15]	0.03	[−0.53–0.58]	−0.86[b]	0.452
Region						
Northeast (reference)						
Midwest	0.20	[−0.19–0.58]	0.40	[−0.06–0.85]	0.05	0.231
South	0.43[a]	[0.07–0.78]	−0.08	[−0.53–0.37]	0.07	0.248
West	−0.28	[−0.69–0.11]	0.66[b]	[0.21–1.11]	−0.68[b]	0.278
Urban residence	0.21	[−0.12–0.52]	−0.01	[−0.34–0.31]	0.06	0.223
Constant	−3.96[c]	[−4.55–3.37]	−7.04[c]	[−7.8–6.29]	−6.28[c]	0.359

Data: MEPS Panel 9–15 (2004–2011) youth respondents age 5–17.
Non-indicated use defined as having no illness in year 1 or year 2 but use in year 2.
Non-use defined as having illness in year 2 but no use in year 2.
Indicated use defined as having illness in year 1 or year 2 and use in year 2.
[a] Significantly different at the $\alpha < 0.05$ level.
[b] Significantly different at the $\alpha < 0.01$ level.
[c] Significantly different at the $\alpha < 0.001$ level.

Our identification of racial/ethnic disparities in indicated use among Black and Latino youth and greater non-use among Black youth adds information to the known prior studies demonstrating the existence of disparities in access to youth outpatient mental health visits and psychotropic medication use [43], and appropriate care management [44]. Family and patient preferences are a likely underlying mechanism of these disparities [43]. Greater stigma among certain groups toward mental illness and mental health treatment [45] may partially explain disparities in psychotropic medication use. Such attitudes may underlie racial/ethnic differences in family preferences for psychotropic medication use [46,47]. Latino and Black parents have lower levels of confidence in the medical system, are more reluctant to seek mental health care compared to white parents, and are more skeptical of providers' suggestions and prescriptions [37,31]. Latinos are also more likely than whites to view mental illness as an issue that should be treated with spiritual and interpersonal healing, rather than with medications [48]. Contrary to these prevailing concerns about racial/ethnic differences in parent skepticism over medication use, using hypothetical medication scenarios, Cohen et al. [49] found no significant difference between minority (Black and Latino) and white parents' willingness to medicate children with psychotropic medications. Further research examining differences in parental attitudes toward the use of psychotropic medications is needed.

Geographic area-level factors may also influence differences in psychotropic medication use by race/ethnicity. In areas characterized by greater economic deprivation, unmet need for services is often exacerbated by lack of community-based services [50]. County-level density of mental health specialists was found to be a positive and significant predictor of mental health care access and particularly instrumental in increasing access for Blacks [51]. Monitoring trends in access to specialty care is important as primary care providers assume greater responsibilities for psychotropic medication management by under health care reform and with the emergence of integrated primary and mental health care practices [52].

Between 55% and 58% of youth with a psychotropic medication fill did not have an identified need for psychotropic medications using the criteria in this study. This percentage is well above the 2.5% of individuals who received a psychotropic medication fill without a confirmed DSM-IV mental disorder in NCS-A data [1]. Our study differs from the NCS-A in several important ways that shed light on directions for future research and clinical and policy implications. First, MEPS data offer a less precise definition of psychological impairment based on CIS score or parent-reported mental health, which may be a poor proxy for rigorously assessed DSM-IV diagnoses. Recurrent nationally representative medical care surveys such as the MEPS should expand their ability to measure mental illness more precisely (e.g. use all five digits in diagnostic codes, or through adoption of ICD-10 codes), or resources should be made available to duplicate other comprehensive, nationally representative psychiatric epidemiology studies like the NCS-A. Second, this study includes youth ages 5–17, whereas the NCS-A survey is limited to 13 to 18 year olds. Non-indicated use is likely to be higher among children given the lower prevalence of mood and psychotic disorders in the 5–12 age range. Third, the period of the current study (2004–2011) was a time of profound increases in the rates of any psychotropic medication use [2–4], and much of the difference in non-indicated use between the two surveys may be attributable to an increase in non-indicated use in recent years. Fourth, the impairment measures were based on parent-report, and not provider report. There is evidence to suggest that compared to whites, Latino and Black parents may place greater emphasis on somatic complaints than mental health complaints in children [53], and therefore may have underreported psychological impairment and problems with mental health. Had the MEPS relied on provider assessments of mental illness, our analysis might have identified more racial/ethnic minority youth with mental illness and yielded lower rates of non-indicated use.

Our definitions of non-indicated use, indicated use, and non-use are limited, because, in the category of "any psychotropic medication", they rely upon a measure of psychological impairment rather than detailed clinical information about each respondent. However, this study is the only available preliminary research to provide evidence of quality of prescribing in the absence of nationally representative surveys with detailed psychiatric diagnostic and prescription information. Recognizing the lack of quality information linking mental illness and medication, the National Commission of Quality Assurance has proposed a new HEDIS measure of quality antipsychotic medication use [54] based on limited diagnosis information from claims data. This study has developed measures of psychotropic medication use in that same spirit.

A second limitation is that there is a small percentage of the population receiving sustained and successful psychotropic medication treatment across the panel that may be misclassified as having non-indicated use. That is, the lack of measured impairment is a result of successful treatment. We determine the extent of this scenario by removing from the sample youth with no year 1 or 2 impairment with continuous fills (at least one psychotropic medication fill every three months) across years 1 and 2 and found that the disparity results were the same in magnitude and direction for Blacks and Latinos. As reported above, we also conducted a secondary analysis examining initiation of psychotropic medication in year 2 among youth with no impairment and found that results were the same in direction and significance for Blacks and the same in direction but not significance for Latinos.

A third limitation is that 17.3% of the MEPS youth sample were missing data on the CIS. Missingness was differential by age, insurance status, and self-reported physical and mental health status. However, these biases due to missingness did not differ by race/ethnicity. Moreover, no significant overall racial/ethnic differences were found in missingness on the CIS. We have further attempted to address differential missingness using multiple imputation methods that impute missing data conditional on observed characteristics.

Despite these limitations, we were able to identify important variations in racial/ethnic disparities in psychotropic medication use. Blacks were more likely than whites to have non-use despite severe impairment, and Black and Latino youth were less likely to report indicated use for any psychotropic medications. In general, the results demonstrate poor targeting across racial/ethnic groups for any psychotropic medication.

Conflict of interest and disclosures

All authors have completed the ICMJE uniform disclosure form and declare no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, and no other relationships or activities that could appear to have influenced the submitted work.

This research has been approved by the Cambridge Health Alliance Institutional Review Board.

I, Benjamin Cook, hereby affirm that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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Appendix A

Appendix Table 1
Logistic regressions assessing the use of psychotropic drugs in youth age 5–17 (cutoff = CIS≥12).

	Non-indicated use of psychotropic drugs				Non-use of psychotropic drugs				Indicated use of psychotropic drugs				Non-indicated "initiation" of psychotropic drugs (cut-off = CIS > = 16)			
	Coefficient	CI			Coefficient	CI			Coefficient	CI						
Race/ethnicity																
Blacks	−0.66	−0.98	−0.33	c	0.36	0.21	0.52	b	−0.95	−1.36	−0.53	b	−0.86	−1.49	−0.23	b
Latinos	−0.60	−0.93	−0.27	c	0.10	−0.06	0.26		−0.91	−1.33	−0.49	b	−0.26	−0.86	0.34	
Self-reported MH status																
Excellent (reference)																
Very good	0.17	−0.26	0.59	b	0.08	−0.13	0.29		1.35	0.83	1.87		−0.41	−1.16	0.33	
Good	0.81	0.30	1.31	b	−0.50	−0.78	−0.22	b	1.92	1.40	2.44	b	−0.28	−1.37	0.80	
Fair	1.85	1.12	2.58	b	−2.71	−3.53	−1.89	b	2.79	2.13	3.44	b	0.53	−0.84	1.91	
Poor	1.51	0.23	2.79	b	−5.53	−7.35	−3.71	c	2.87	2.06	3.67	b	−0.99	−3.10	1.12	
Self-reported PH status																
Excellent (reference)																

(continued on next page)

Appendix Table 1 (*continued*)

	Non-indicated use of psychotropic drugs				Non-use of psychotropic drugs				Indicated use of psychotropic drugs				Non-indicated "initiation" of psychotropic drugs (cut-off = CIS > = 16)			
	Coefficient	CI			Coefficient	CI			Coefficient	CI						
Very good	0.21	−0.20	0.61		−0.01	−0.24	0.22		−0.29	−0.75	0.18		0.55	−0.21	1.31	
Good	−0.08	−0.60	0.44		0.41	0.14	0.68	b	−0.77	−1.22	−0.32	b	0.79	−0.37	1.96	
Fair	−0.02	−0.87	0.83		0.39	−0.17	0.96		−0.34	−1.08	0.39		−0.61	−2.41	1.19	
Poor	−1.33	−2.67	0.00		1.23	−0.13	2.59		−2.13	−3.74	−0.52	b	−0.25	−2.37	1.86	
Female	−0.75	−1.00	−0.50	c	0.27	0.13	0.41	b	−0.77	−1.07	−0.47	b	−0.41	−0.86	0.04	
CIS year 1	0.04	0.02	0.06	a	−0.01	−0.02	0.01	c	0.07	0.05	0.09	b	−0.03	−0.07	0.00	a
CIS year 2	−0.09	−0.11	−0.07	a	0.31	0.29	0.34	c	0.08	0.07	0.10	b	0.01	−0.02	0.03	
Age																
5–9 years (reference)																
10–12 years	0.36	0.08	0.64	a	−0.18	−0.35	−0.01	b	0.41	0.07	0.75		−0.59	−1.08	−0.10	b
13–17 years	0.41	0.13	0.68	a	−0.03	−0.22	0.16		−0.42	−0.80	−0.04	b	0.05	−0.42	0.52	
Income																
<100% FPL (reference)																
100–125% FPL	0.05	−0.45	0.55		−0.13	−0.42	0.17		0.15	−0.39	0.69		−0.05	−1.17	1.06	
125–200% FPL	−0.07	−0.44	0.30		0.01	−0.21	0.23	b	0.35	−0.14	0.85		0.25	−0.41	0.90	
200–400% FPL	0.19	−0.13	0.52	b	−0.13	−0.35	0.09	b	0.70	0.26	1.14	b	−0.17	−0.84	0.50	
400% + FPL	0.46	0.05	0.86	b	−0.31	−0.55	−0.07	b	0.97	0.42	1.53	b	0.40	−0.34	1.15	
Insurance status																
Private (reference)																
Medicare	0.11	−0.20	0.43		−0.40	−0.60	−0.20		0.77	0.35	1.19	b	−0.29	−0.83	0.25	
Medicaid	−0.81	−1.52	−0.10	a	0.19	−0.05	0.44		−0.66	−1.60	0.27		−1.32	−2.72	0.08	
Region																
Northeast (reference)																
Midwest	0.28	−0.10	0.66		0.10	−0.13	0.33		−0.14	−0.63	0.36		−0.06	−0.65	0.52	
South	0.51	0.17	0.86	a	−0.17	−0.40	0.06		0.03	−0.45	0.51		0.52	−0.01	1.04	
West	−0.17	−0.58	0.23		0.21	−0.01	0.44	b	−0.64	−1.23	−0.05		−0.34	−1.01	0.32	
Urban residence	0.27	−0.04	0.58		0.02	−0.19	0.24		−0.17	−0.56	0.23		0.10	−0.49	0.69	
Constant	−3.99	−4.56	−3.43	c	−4.56	−4.96	−4.16	c	−6.61	−7.28	−5.95	c	−4.55	−5.56	−3.54	c

Data: MEPS Panel 9–15 (2004–2011) youth respondents age 5–17.
Non-indicated use defined as having no illness in year 1 or year 2 but use in year 2.
Non-use defined as having illness in year 2 but no use in year 2.
Indicated use defined as having illness in year 1 or year 2 and use in year 2.
Non-indicated "initiation" defined as having no illness in year 1 or year 2 but use in year 2.
[a] Significantly different at the $\alpha < 0.05$ level.
[b] Significantly different at the $\alpha < 0.01$ level.
[c] Significantly different at the $\alpha < 0.001$ level.

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