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Attention Deficit Hyperactivity Disorder Medication Use Among Teens and Young Adults

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A B S T R A C T

Purpose: The purpose of this study was to determine rates of stimulant/atomoxetine use among teens (aged 12–17 years) and young adults (aged 18–23 years) and to investigate associations in medication use before and after the transition from teen to young adult.
Methods: Repeated cross-sectional analyses using the nationally representative Medical Expenditure Panel Survey. The sample included all teens and young adults between 2003 and 2012. Within this group, a staggered sample of individuals between 2006 and 2012 born during a 5-year range was used to minimize false positive findings due to temporal trends. The primary outcome was attention deficit hyperactivity disorder (ADHD) medication use (two or more prescriptions and ≥60 tablets). A multivariable logistic regression was utilized to determine associations between ADHD medication use and race/ethnicity and other sociodemographic factors.
Results: A total of 62,699 individuals were included between 2003 and 2012. Rates of ADHD medication use increased for both teens (4.2%–6.0%) and young adults (1.2%–2.6%) between 2003–2004 and 2011–2012. In adjusted analysis, blacks, Hispanics, and Asians had lower rates of use compared with whites. The decrease in use among young adults was more pronounced among blacks compared with whites. A usual source of care and health insurance were less common among young adults, and both were associated with ADHD medication use.
Conclusions: Although there has been an increase in the use of ADHD medications in both teens and young adults, we found a drop-off in levels of ADHD treatment among young adults when compared with teens. A portion of this decrease appears to be related to race/ethnicity, usual source of care, and health insurance status.

IMPLICATIONS AND CONTRIBUTION

Attention deficit hyperactivity disorder medication use has increased over the last decade. Of note, there has been a decrease in attention deficit hyperactivity disorder medication use during the transition to adulthood, which disproportionately affects blacks. Additional research is needed to evaluate the patient, provider, and/or systems factors that may be contributing to this disparity.

Attention deficit hyperactivity disorder (ADHD) is increasingly viewed as a disorder beyond childhood [1,2], but extension of the diagnosis to adults remains debated and controversial [3–5]. Some refute the diagnosis as marketing by pharmaceutical companies to a population with numerous psychiatric comorbidities that have not been shown in rigorous trials to benefit from treatment [4,5]. Others support the diagnosis based on longitudinal studies showing continued symptoms into adulthood [3], and there is a growing body of studies that have identified an association between a lack of ADHD treatment and higher levels of criminality [6], possibly more transportation accidents [7], and higher rates of suicidality [8].

The transition from adolescence to adult health care has received heightened attention [9–11]. This transitional period is

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associated with individuals gaining greater autonomy to direct their own health care. In addition, many individuals leave home and enter the workforce or start college. This transitional time also sees a decrease in physician appointments and lower levels of continuity of care [12,13]. One of the most commonly diagnosed and treated conditions for people within this age group is ADHD. Yet, as children transition to adulthood, lack of continuity of care, and increases in patient autonomy may contribute to declines in treatment and potential care gaps for those with ADHD.

A previous study showed a substantial decline in ADHD medication use among a longitudinal cohort during teen and young adult years in the United Kingdom between 1999 and 2006 [14]. To our knowledge, previous studies have not investigated changes in ADHD medication use over this transition utilizing a nationally representative sample of the U.S. population. We utilized a repeated cross-sectional analysis to determine how the rates of ADHD medication use changed between teens (aged 12–17 years) and young adults (aged 18–23 years). Furthermore, we aimed to investigate how patterns of ADHD medication use within these two populations changed during the transition.

Methods

Study design

We used a repeated cross-sectional study design utilizing data from the 2003–2012 Medical Expenditure Panel Survey (MEPS) [15] for this analysis. The survey is nationally representative of the civilian noninstitutionalized population of the United States and is comprised a subsample of individuals from the previous year's National Health Interview Survey. The Agency for Healthcare Research and Quality compiles the survey, which includes information about respondents' demographics, insurance coverage, health behaviors, and prescription drug use.

Each year of the survey includes around 15,000 households contacted across two overlapping groups. In participating households, five interviews are conducted more than two years with the family member who has the most knowledge regarding the family's medical problems. It utilizes a complex sampling frame and includes oversampling of blacks, Hispanics, and more recently Asians (starting in 2007).

Primary outcome

ADHD medications were identified by prescription name and classified into the following three categories: (1) amphetamines; (2) methylphenidates; and (3) atomoxetine. We opted to include all prescriptions given that 97.7% of prescriptions for individuals (aged 12–23 years) associated the medication with an ADHD diagnosis. In addition, we wanted to avoid an introduced bias related to the self-report of medical conditions. We opted not to include use of bupropion [16] or other medications that might be prescribed for ADHD as these are more frequently used for other conditions. In addition, users of antidepressants were identified based on prescriptions for individual selective serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors, bupropion, or mirtazapine. Antidepressants were utilized as a control group to allow a comparison to ADHD medications given they are used to treat mental health disorders that would likely have similar biases related to survey methodology.

Participants reported the prescription drug data. Pharmacies were then contacted to gather and confirm specifics regarding the prescription. An ADHD medication or antidepressant user was classified as someone who reported two or more prescriptions and more than 60 doses of the medications within the classes noted previously. Given lack of an accepted definition for a chronic medication user, this cutoff was selected to ensure a level of chronic use. Data about usage of chronic prescription medications have been found to be valid and not biased by sociodemographic variables [17].

Population

To determine the rates of use between 2003 and 2012, our sample included all individuals aged 12–23 years; we then classified individuals in this sample into 2-year age groups (aged 12–13 years, etc.) and by categorizing teens (aged 12–17 years) and young adults (aged 18–23 years). The sample for the next portion of our study included individuals who were either teens or young adults and were included in a stepwise manner between 2006 and 2012 (Supplementary Table 1). The main benefit of this study design was that it included multiple nationally representative cross-sectional groups of individuals born during the same years (1989–1994). We choose this study design to minimize the chances of a falsely large drop between the transition from child to adult related to higher rates of use in more recently born individuals. We felt this design was superior to the main alternative design, which would have included all individuals (aged 15–20 years) between 2007 and 2012 (Sensitivity Analysis 3; see below). In this design, a 15-year-old would be more likely to be an ADHD medication user than a 20-year-old in the same year simply because of increasing trends in ADHD medication use. We opted not to include ADHD or depression diagnoses given potential biases given the self-reported diagnoses.

Covariates

Sex, age, region (Northeast, Midwest, South, and West), insurance status (any private, public, or uninsured), race/-ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, Asian, or other), student status (only if $\geq$18 years old), metropolitan area, and a usual source of care (yes/no). Poverty category data (poor/near poor, low/middle, or high) were also collected and were based on the family's income in relation to the applicable poverty line.

Statistics

Adjusted Wald Test and χ^2 statistic were used to determine statistical significance in the bivariate analysis. A logistic regression comparing ADHD use among young adults and teens was created across sex, region, insurance status, race/ethnicity, metropolitan area, poverty category, and a usual source of care. An interaction term was included between race and teen/young adult. Given the significant interaction term, separate logistic regression models were utilized for teens and young adults. An identical logistic regression model with antidepressants replacing ADHD medications was created to compare results with the ADHD medication logistic regression. Postprediction average marginal effects were used to determine the probability