

The Effects of Mandated Health Insurance Benefits for Autism on Out-of-Pocket Costs and Access to Treatment

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Abstract

As of 2014, 37 states have passed mandates requiring many private health insurance policies to cover diagnostic and treatment services for autism spectrum disorders (ASDs). We explore whether ASD mandates are associated with out-of-pocket costs, financial burden, and cost or insurance-related problems with access to treatment among privately insured children with special health care needs (CSHCNs). We use difference-in-difference and difference-in-difference-in-difference approaches, comparing pre-post mandate changes in outcomes among CSHCN who have ASD versus CSHCN other than ASD. Data come from the 2005 to 2006 and the 2009 to 2010 waves of the National Survey of CSHCN. Based on the model used, our findings show no statistically significant association between state ASD mandates and caregivers' reports about financial burden, access to care, and unmet need for services. However, we do find some evidence that ASD mandates may have beneficial effects in states in which greater percentages of privately insured individuals are subject to the mandates. We caution that we do not study the characteristics of ASD mandates in detail, and most ASD mandates have gone into effect very recently during our study period. © 2015 by the Association for Public Policy Analysis and Management.

INTRODUCTION AND BACKGROUND

Autism spectrum disorders (ASDs) are a group of developmental disorders, typically apparent by age 3, that are characterized by impaired development in socialization, communication, and behavior (Autism and Developmental Disabilities Monitoring Network Surveillance Year 2006 Principal Investigators, 2009). Financing services for children with ASD is a growing concern among families, private and public insurers, and policymakers at the state and federal levels (Council for Affordable Health Insurance [CAHI], 2009; Holland, 2010; Sharpe & Baker, 2007; U.S. Government Accountability Office, 2005). This growing concern primarily stems from three issues. First, identification of ASD has increased dramatically in recent years. In 2011 to 2012, the prevalence of parent-reported diagnosed ASD among school-aged children was 2 percent, or 1 in 50 children, an increase from a prevalence rate of 1.2 percent in 2007 (Blumberg et al., 2013). ASD is now considered to be the second most common serious developmental disability (intellectual disability is first) affecting children in the United States (Newschaffer et al., 2007).

Second, depending on the severity of the disorder, treatment for ASD tends to be extensive, multifaceted, individualized, and, as a result, costly (Amendah et al.,

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2011; Sharpe & Baker, 2007).¹ Prior research based on data such as national surveys (Liptak, Stuart, & Auinger, 2006; Liptak et al., 2008), private health insurance claims (Leslie & Martin 2007; Shimaburkuro, Grosse, & Rice 2008), a managed care organization (Croen et al., 2006), and state Medicaid programs (Mandell et al. 2006, 2008) indicates that children with ASD have high utilization of health services, particularly psychiatric services and prescription drugs, even when compared to children with other types of developmental delays. Third, families affected by ASD report more difficulty in accessing services and less satisfaction with services compared to families of children with other special health care needs (Montes, Halterman, & Magyar, 2009).

Private insurance plans typically exclude coverage for some types of services for ASD, particularly behavioral treatments. Some plans exclude coverage of ASD altogether.² By federal law, public schools must provide early intervention and special education for children with ASD. It is often unclear, however, whether ASD services constitute educational, medical, or habilitative services. As a result, there is ongoing debate regarding the roles of health insurance and schools, and what services each should and should not cover for children with ASD (Holland, 2010). To ease the financial burden on affected families, as of 2014, 37 states have passed health insurance mandates specifically pertaining to ASD.³ These state mandates require many private health insurance policies to cover diagnostic and treatment services for ASD.

In this paper, we explore whether state ASD mandates are associated with three types of outcomes among privately insured children with special health care needs (CSHCNs) who have ASD: (1) out-of-pocket costs and financial burden related to children's treatment; (2) cost or insurance-related problems with access to treatment; (3) utilization of services that may not be covered extensively or covered at all in standard private health insurance plans, such as therapy and specialty providers. Economists have examined the effectiveness of health insurance mandates in expanding the use of a variety of health care services including mental health services (Frank, 1985; McGuire & Montgomery, 1982; Pacula & Sturm, 2000), substance abuse treatment (Dave & Mukerjee, 2011), and infertility treatments (Bundorf, Henne, & Baker, 2007; Schmidt, 2007). However, research on the effectiveness of ASD mandates in easing the financial burden and improving access to treatment is currently very limited. To our knowledge, only one study has examined this question. Parish et al. (2012) use data from the 2005 to 2006 National Survey of CSHCNs (NS-CSHCNs) to examine the effects of state insurance mandates relating to autism services on the probability of any out-of-pocket expenses associated with the child's medical care in the past 12 months, and on the probability of having high expenditures (>\$500) relative to low expenditures (<\$250). At the time of their study, nine states had some type of mandated benefit. Their results show a negative association between mandated autism benefits and their measures of out-of-pocket expenditures among families

¹ Early detection and engagement in treatment is considered critical for children with ASD (Bryson, Rodgers, & Frombonne, 2003; Liptak et al., 2008; Rogers, 1998). Treatment for ASD depends on the severity of the disorder and may include: (1) behavioral interventions, often based on applied behavioral analysis (ABA); (2) speech and language, occupational, and physical therapy; (3) neurosensory therapies; (4) biochemical interventions; and (5) complementary and alternative treatments (NICHD, 2005; Sharpe & Baker, 2007; Young, Ruble, & McGrew, 2009).

² Peele, Lave, and Kelleher (2002), for example, in an analysis of children's behavioral health coverage in 46 private, employment-based insurance plans, report that all of the plans exclude coverage for ASD services (Peele et al., 2002).

³ These states are: AK, AZ, AR, CA, CO, CT, DE, FL, IA, IL, IN, KS, KY, LA, ME, MD, MA, MI, MN, MO, MT, NE, NV, NH, NJ, NM, NY, OR, PA, RI, SC, TX, UT, VT, VA, WV, and WI. The District of Columbia and the U.S. Virgin Islands also have ASD mandates. *Source:* <http://www.autismspeaks.org/advocacy/states>.

with autistic children. However, these results can only be interpreted as descriptive, as the estimates are hindered by a lack of comparison to a control group, and there is no examination of outcomes within a state before and after the policy change.

We address these limitations by using difference-in-difference (DD) and difference-in-difference-in-difference (DDD) approaches. In the DD models, we compare pre- to postmandate changes in outcomes among privately insured CSHCN with ASD versus privately insured CSHCN other than ASD in states that passed mandates. In the DDD models, we compare pre- to postmandate changes in outcomes among privately insured CSHCN with ASD versus privately insured CSHCN other than ASD in states that passed mandates versus in states that did not pass mandates. Data come from the 2005 to 2006 and 2009 to 2010 waves of the NS-CSHCN.

Based on the model used, our findings show no statistically significant association between state ASD mandates and caregivers' reports about access to care, financial burden, and unmet need for services. There are no consistent effects of mandates on caregivers' reports of having adequate insurance coverage, or on needing but not being able to access services due to cost or insurance barriers. Moreover, we find no effects of mandates on out-of-pocket spending for CSHCN's health care. However, we do find some evidence that ASD mandates may have beneficial effects on some outcomes in states in which greater percentages of privately insured individuals are subject to the mandates. We caution that most ASD mandates have gone into effect very recently, and it may take time for these mandates to have measurable effects on families affected by ASD. Also, the characteristics of mandates are not analyzed in detail in this paper. The lack of effects of ASD mandates, however, is consistent with recent literature on mental health parity legislation and its effects on CSHCN, which shows limited effects on access to care and out-of-pocket burden.

METHODS

To estimate the effects of ASD health insurance mandates, we use a DD and a DDD approach. Conceptually, the treatment group is the group targeted by the mandates. The treatment group, therefore, is privately insured CSHCN with ASD. We compare pre- and postmandate changes in outcomes in this treatment group to a comparison group that includes privately insured CSHCN in the same state who do not have ASD. We use two alternative comparison groups: (1) privately insured CSHCN with psychiatric conditions other than ASD and (2) privately insured CSHCN with psychiatric conditions other than ASD, or with other chronic medical conditions, or with both.

We begin with a simple DD model as specified in equation (1):

$$Y_{ijt} = \alpha + \beta_1 \text{Mandate}_{jt} \times \text{ASD}_{ijt} + \beta_2 \text{ASD}_{ijt} + \beta_3 \text{SurveyYear}_t + \beta_4 X_{ijt} + \gamma_j + \varepsilon_{ijt}. \quad (1)$$

In equation (1), Y_{ijt} is an outcome variable for child i in state j at time t ; ASD_{ijt} is an indicator that the child is in the group targeted by the mandate (i.e., the child has ASD); Mandate_{jt} is an indicator that turns on when the state ASD mandate has been in effect for at least a year (the mandate variable is discussed in further detail below); and X_{ijt} represents child characteristics. Equation (1) also includes state fixed effects (γ_j) and survey year fixed effects. We estimate equation (1) using a sample limited to privately insured CSHCN in the treatment group or the comparison group who reside in states that have ever passed an ASD mandate during our study period (Mandate States). This way, we can make a clean comparison, examining pre- and postmandate changes in outcomes among CSHCN with ASD, netting out pre- and postmandate changes among CSHCN without ASD, in states that passed mandates.

Next, we move to a triple difference approach. This approach allows us to compare pre- and postmandate differences in outcomes between the treatment group and

the comparison group in states that passed mandates, while netting out this same difference in states that did not pass mandates.

The DDD econometric specification is:

$$Y_{ijt} = \alpha + \beta_1 \text{Mandate}_{jt} \times \text{ASD}_{ijt} + \beta_2 \text{ASD}_{ijt} + \beta_3 \text{SurveyYear}_t + \beta_4 \text{ASD}_{ijt} \times \text{SurveyYear}_t + \beta_5 X_{ijt} + \gamma_j + \beta_6 \text{ASD}_{ijt} \times \gamma_j + \beta_7 \text{SurveyYear}_t \times \gamma_j + \varepsilon_{ijt} \quad (2)$$

where Y_{ijt} is an outcome variable for child i in state j at time t ; ASD_{ijt} is an indicator that the child is in the group targeted by the mandate (e.g., the child has ASD); Mandate_{jt} is an indicator that turns on when the state has had an ASD mandate in effect for at least a year; and X_{ijt} represents child characteristics (e.g., age). In robustness checks, we also consider an indicator of whether a mandate is currently in place as an alternative to the one-year lag used in the main specifications. Equation (2) also includes state fixed effects (γ_j), interaction terms between the state fixed effects and the ASD indicator, interactions between the ASD indicator and the survey year fixed effects, and full interaction terms between the state fixed effects and the survey year fixed effects.

This empirical setup is a slight improvement to the standard DD and DDD setups, in which we would make “pre-post” comparisons between the second and first survey waves (2005 to 2006 and 2009 to 2010, respectively, data source discussed below), because we utilize information on the month and the year in which the interview was conducted within each survey wave. This information about the year and the month of interview is important for two reasons. First, it allows us to be more accurate about when a mandate was in effect. This is crucial to the analysis, since some of the mandates were becoming effective during the months in which the second wave of the survey was being conducted. That is, two survey respondents from the same state in the second wave of the survey may have been interviewed at different times, so one respondent may have had a mandate prior to the time of the interview while the other did not. We created the mandate variable based on the interview month and year to address this issue.

Second, because we have the year and month of the interview, in the triple difference models, we can include survey year fixed effects, interactions between survey year fixed effects and state fixed effects, and interactions between survey year fixed effects and treatment group status. The use of control groups plus the inclusion of these terms, which are year specific rather than specific to the second wave of the survey as a whole, allow us to better capture potentially confounding, unmeasured events occurring around the same time as the ASD mandates become effective.

We estimate these equations using a sample limited to privately insured CSHCN who meet criteria for inclusion in either the treatment group or in the comparison group. Details regarding the measures and the construction of the treatment and comparison groups are discussed below. Although all of our outcomes are binary, we estimate linear probability models to make interpretation of estimated coefficients on interaction terms straightforward. We use Huber–White corrected standard errors adjusted for clustering at the state level (Bertrand, Duflo, & Mullainathan, 2004).⁴ All models are estimated using survey sampling

⁴ Since the adoption of ASD mandates varies by state, analyses allowed for arbitrary correlation of standard errors within state cells rather than sampling design unit to avoid underestimating standard errors on our mandate variable (Donald & Lang, 2007; Moulton, 1990). Allowing clustering of errors only by sampling design unit (i.e., by household, state, and cell or landline status), results in very similar though usually somewhat lower standard errors since the design units are subsets of states, therefore allowing for a departure from an assumption of independent errors only for smaller units. For example,

weights. In the Appendix, we also present our main models estimated using probit models.⁵

The key independent variables in equations (1) and (2) are the interaction terms between mandate and ASD. The estimated coefficient on this interaction term in the DD model represents the effect of the mandate on outcomes of the targeted group (CSHCN with ASD) before and after a mandate becomes effective relative to the “pre-post” change in outcomes among CSHCN in the same state without ASD. In the DDD models, we further net out the analogous comparison in states that did not pass ASD mandates. The assumption underlying this model is that there is no unmeasured state-specific event that occurred in the same month as the ASD mandate becomes effective that affected “pre-post” differences in outcomes differentially for CSHCN with ASD versus the comparison group. As we discuss below, state ASD mandates are heterogeneous to some extent in terms of what age groups are covered, whether small firms are included, and dollar and service limitations. To address these issues, we also estimate specifications in which we replace the “any ASD mandate” variable with an indicator of whether or not the state has a “comprehensive ASD mandate” (which we define below).

Mandates were designed to improve access and increase use of services specifically for children with ASDs so we would expect to see that mandates are associated with improvements in access to and utilization of specialized services. We note, however, that the net effect of mandates on affected families’ out-of-pocket costs and financial burden may be positive or negative. That is, better insurance coverage reduces the proportion of uncovered costs, but it also induces greater utilization of services, making the net effect of mandates on out-of-pocket costs and financial burden ambiguous.

It is important to note that health plans offered by self-insured firms are exempt from state mandates because they are regulated under federal law according to the Employee Retirement and Income Security Act (ERISA). Research on other types of health insurance mandates suggests that ERISA does reduce their effectiveness. For example, previous research on postpartum discharge laws suggests that 40 to 55 percent of the privately insured U.S. population is not subject to these mandates, and ERISA reduces the effects of these mandates on outcomes (Dato et al., 1996; Jaggar, 1996; Liu, Dow, & Norton, 2004). Some self-funded plans may elect to provide coverage for ASD when a mandate is passed, but they are not subject to state regulations and thus not required to do so. Studies show that larger firms that self-insure often provide mandated benefits, and that this trend has been increasing since the 1980s (Acs et al., 1996; U.S. General Accounting Office, 1996; Jensen &

the mean percent of children with ASD or in comparison group 1 is 3.9 percent. The standard error of this estimate is 0.71, allowing for clustering of errors by state compared to 0.58 with the standard error only accounting for the design of the survey.

⁵ All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher’s Web site and use the search engine to locate the article at <http://www3.interscience.wiley.com/cgi-bin/jhome/34787>. We prefer to show the OLS findings in the main tables because when we ran the probit models there were: (1) convergence issues due to the large numbers of fixed effects; and (2) convergence problems due to incorporating the survey weights. We were able to estimate the DD models using probit models without the weights, and we show those results in Appendix Table A4. Some of the DDD models, however, would not converge, even without the weights included. Since the probit models in the Appendix are unweighted, they are not directly comparable to the OLS models in the main tables that are weighted, but the findings still offer a check as to whether using a probit model versus OLS changes our overall interpretation of the findings. Karaca-Mandic, Norton, and Dowd (2012) and Puhani (2008) show that in nonlinear models, the DD context is a special case in which one can test whether the treatment effect on the treated is different from zero by testing the estimated coefficient on the interaction term between treatment group and post (Tx × mandate in our case). This is generally not true in nonlinear models with interaction terms.

Morrissey, 1999). However, we lack systematic data on whether this is the case for ASD services in states that have passed ASD mandates. To address this issue, we estimate all of the DD and DDD models including a triple interaction term between ASD, mandate, and the percent of privately insured individuals in the respondent's state in the year prior to the interview not enrolled in self-insured plans (which is approximately the percent of privately insured individuals subject to state health insurance mandates).⁶

We estimate all of the DDD and DD models discussed above limiting the samples to CSHCN with private health insurance coverage, since only children with private, state-regulated health insurance plans should be directly affected by mandates. However, one may argue that insurance status is potentially endogenous. Insurance status may be affected if passage of a mandate induces families, for example, to move their children from public to private insurance plans. Furthermore, passage of a mandate may affect diagnosis of ASD or a caregiver's likelihood of reporting ASD, or both. It also may affect location decisions of families of children with ASD—for example, families may relocate to states with particularly favorable policy environments. We explore these ideas by testing whether ASD mandates are associated with the likelihood of a privately insured child currently having ASD, as shown in equation (3a), and whether mandates are associated with the likelihood that children with ASD are privately insured relative to children without ASD, as shown in equation (3b). The samples used to estimate all equations are limited to privately insured CSHCN in the treatment group and the comparison group. However, when estimating equation (3b), we do not limit the sample to privately insured children.

$$ASD_{ijt} = \alpha + \beta_1 Mandate_{jt} + \beta_2 SurveyYear_t + \beta_3 X_{ijt} + \gamma_j + \varepsilon_{ijt} \quad (3a)$$

$$PrivIns_{ijt} = \alpha + \beta_1 Mandate_{jt} \times ASD_{ijt} + \beta_2 ASD_{ijt} + \beta_3 SurveyYear_t + \beta_4 X_{ijt} + \gamma_j + \varepsilon_{ijt}. \quad (3b)$$

Note that these analyses represented by equations (3a) and (3b) are exploratory for several reasons. First, we do not know when the ASD diagnosis was made, or the timing of the private insurance coverage decision, so we cannot directly test whether the mandates induce new ASD diagnoses and changes in private insurance coverage. Second, in the case of equation (3a), we can only examine whether the mandates are associated with increased ASD diagnosis among children who have already been screened into the survey (described below) based on having special health care needs, although it is possible that the mandates could also be associated with an increase in the total number of CSHCN, if newly diagnosed children whose ASD diagnoses were induced by mandates come from outside the existing special health care needs population. This is a limitation of this analysis.

⁶ These data come from the Medical Expenditure Panel Survey Insurance Component, tabulated by the Agency for Health Care Quality and Research AHRQ, 2013. There appears to be sufficient variation in the percent of privately insured individuals not enrolled in self-insured plans across all states and across states that have passed ASD mandates. In our analysis sample, across all states, the mean of this variable is 0.45 with a standard deviation of 0.08, ranging from a minimum of 0.26 to a maximum of 0.75. Across states that have passed ASD mandates, the mean is 0.42 with a standard deviation of 0.06, ranging from a minimum of 0.27 to a maximum of 0.60.

DATA AND VARIABLE DEFINITIONS

The NS-CSHCN

The NS-CSHCN is a national, cross-sectional, random digit dial (RDD) telephone survey of caregivers (primarily mothers) of CSHCN. The survey was conducted in 2001, 2005 to 2006, and in 2009 to 2010, and was available in English, Spanish, Mandarin, Cantonese, Vietnamese, and Korean. The data are representative of CSHCN both at the national and state levels. The survey is sponsored by the Maternal and Child Health Bureau and conducted by the National Center for Health Statistics' State and Local Area Integrated Telephone Survey (SLAITS). In this paper, we use data from the 2005 to 2006 survey (collected between April 2005 and February 2007) and the 2009 to 2010 survey (collected between July 2009 and March 2011). The 2001 survey did not include questions about ASD and thus cannot be used in this analysis. More detailed information about the survey is available from Centers for Disease Control and Prevention (CDC; 2008, 2013a, 2013b).

The NS-CSHCN is a two-stage survey with a complex sampling design. The first stage of the survey is a screener for special health care needs. The CSHCN screener includes five stem questions about the child's general health care needs, such as need for therapy, need for prescription drugs, and use of more health services than what is typical among children of the same age. Each stem question is followed by additional questions regarding whether the child's health care needs are due to a chronic health condition. CSHCN whose caregivers indicate that the child has at least one general health care need that is due to a chronic condition meet the criteria for having a special health care need and are screened into the sample. About 400,000 households with children participate in the screener in order to identify about 40,000 CSHCN in each survey wave. Each wave includes about 750 CSHCN in each state and in the District of Columbia (CDC, 2013a, 2013b). The large sample size of CSHCN for each state is especially helpful for the present study.

There were some changes in the survey design between the 2005 to 2006 and the 2009 to 2010 waves. In 2005 and 2006, an RDD sample of households with landlines was used, and the sample was stratified by state, including the District of Columbia (CDC, 2008). In 2009 and 2010, the design was enhanced to include sampling of households with only cell phones, with stratification both by state and by landline versus cell phone (CDC, 2013a, 2013b). In each survey wave (2009 to 2010 and 2005 to 2006), there were more than 40,000 completed interviews of caregivers of children who were identified as having special health care needs. In each wave, all children in each participating household were screened for special health care needs. In households with more than one child with special health care needs, a single child was randomly selected to complete the interview.

The second stage of the NS-CSHCN includes detailed information about the nature of the focal child's special health care needs, health care utilization, access to services, and out-of-pocket spending on health care. Note that only CSHCN (children who met criteria for having a special health care need) were included in the second stage of the survey; thus, it is possible that some children with ASDs, especially milder forms of the disorders, are not included in the second stage data used for this analysis. In fact, analyses of the 2007 National Survey of Children's Health (which uses the same CSHCN screener and same questions about ASD, but includes all children not just CSHCN) show that about 5.5 percent of children with current

ASD are not CSHCN based on the CSHCN screener (Pringle et al., 2012).⁷ In short, the NS-CSHCN does not capture the whole population of children with ASD, and this is a limitation of the study.

In 2005 to 2006, the weighted, overall, national response rate for the special health care needs interview was 56.1 percent (Blumberg et al., 2008). In 2009 to 2010, this same response rate was 43.7 percent for the landline sample, 15.2 percent for the cell phone sample, and 25.5 percent for the combined sample CDC 2008, 2013a, 2013b. The differences in response rates by landline versus cell phone in the 2009 to 2010 survey are not considered to be the result of large differences in nonresponse bias because the response rates are sensitive to both assumed rates of eligibility among those whose eligibility is unobserved, as well as definitions of eligibility (CDC, 2013a, 2013b).⁸ In the end, however, nonresponse bias and changes in nonresponse bias cannot be ruled out.

CSHCN Treatment and Comparison Groups

In all of the analyses in this paper, aside from when we examine the effect of mandates on private insurance coverage, as in equation (3b) above, the treatment and comparison groups are limited to CSHCN who are privately insured at the time of the interview. In the 2009 to 2010 survey, CSHCN are included in the treatment group if the caregiver responded affirmatively to the question, “Has a doctor or health care professional ever told you that <<child’s name>> has autism, Asperger’s disorder, pervasive developmental disorder, or other autism spectrum disorder?” and the caregiver indicates that the child currently has autism or an ASD. In the 2005 to 2006 survey, CSHCN are included in the treatment group if the caregiver responded affirmatively to the question, “To the best of your knowledge, does <<child’s name>> currently have autism or autism spectrum disorder?”⁹ In the DDD sample, the treatment group includes a total of 3,312 CSHCN with ASD from the pooled 2005 to 2006 and 2009 to 2010 cross-sectional surveys (1,372 from the 2005 to 2006 survey, and 1,940 from the 2009 to 2010 survey).

We estimate the models using two alternative comparison groups of CSHCN: (1) CSHCN with developmental disabilities and psychiatric disorders other than ASD, including intellectual disability, Down syndrome, attention-deficit disorder (ADD/ADHD), depression, anxiety, or conduct disorder ($n = 17,743$ in the DDD sample); (2) CSHCN with psychiatric disorders other than ASD or other chronic medical conditions, such as asthma, diabetes, heart condition, blood disorder, cystic fibrosis, cerebral palsy, muscular dystrophy, seizure disorder ($n = 34,156$ in the

⁷ The National Survey of Children’s Health includes less-extensive information on insurance coverage and cost and insurance-related access problems compared to the NS-CSHCN, making it less suitable for this study.

⁸ Eligibility status was determined by residential status and whether a child aged 0 to 17 lived in the household; for the cell phone sample, respondents additionally had to meet the eligibility requirement of either not having a landline or not being likely to be reached through a landline. Next, children in eligible households were screened for special health care needs (CDC, 2013a, 2013b).

⁹ State autism insurance mandates typically require private insurers to cover diagnostic and treatment services for ASD. Ideally, then, our treatment group should include children with diagnosed and undiagnosed ASD because even children with undiagnosed ASD may benefit from mandates through increased health insurance coverage for screening and diagnostic services. However, it is difficult to identify undiagnosed children with ASD using a large secondary data set. Moreover, the focus of the mandates is treatment for children who have diagnosed ASDs. Thus, our treatment group is limited to children with diagnosed ASD.

DDD sample), or both.¹⁰ Information about health conditions comes from caregiver reports about whether the child currently has the condition (in the 2005 to 2006 survey) and caregiver reports of lifetime diagnosis and currently having the condition (in the 2009 to 2010 data). In the 2005 to 2006 survey, caregivers are asked if the child has “emotional problems” or ADD/ADHD, while in the 2009 to 2010 survey caregivers are asked specifically if the child has been diagnosed with and currently has depression, conduct disorder, ADD/ADHD, or anxiety. In this analysis, if a child has either emotional problems or any other specific psychiatric disorder mentioned (depression, anxiety, conduct, ADD/ADHD), he or she would meet the criteria for both comparison groups.¹¹

Both comparison groups exclude CSHCN with ASD. For example, if a child with special health care needs with ASD also has been diagnosed with intellectual disability, the child would be included in the treatment group but not in the comparison group. The treatment group and both comparison groups are limited to CSHCN ages 2 to 17 years old; CSHCN under 2 years old are excluded because ASD diagnosis is typically not possible for infants.

Outcome Variables

In the NS-CSHCN, caregivers are asked specifically about out-of-pocket spending related to the child’s health care needs. All respondents are asked, “During the past 12 months, would you say the family paid more than \$500, \$250-\$500, less than \$250, or nothing for <<child name>>’s medical care?” If respondents report spending more than \$500, they are asked, “During the past 12 months, would you say the family paid more than \$5000, \$1,000-\$5,000, or less than \$1000, for <<child name>>’s medical care?” From these questions, we construct two dichotomous measures of out-of-pocket spending: (1) whether the family had no out-of-pocket expenses in the past 12 months; and (2) whether the family had out-of-pocket expenses of \$750 or higher in the past 12 months.¹²

Caregivers are also asked a set of questions about the adequacy of their child’s health insurance coverage. Specifically, survey respondents answer “never,” “sometimes,” “usually,” and “always” to questions about whether health insurance coverage offers benefits and services that meet the child’s needs, whether the costs not covered by health insurance are reasonable, and whether the health insurance allows the child to see needed providers. From these questions, we created the following three dichotomous variables indicating problems with insurance coverage: (3) child’s health insurance benefits and coverage never or sometimes meet his or

¹⁰ We also considered a comparison group that included children with chronic medical conditions only (excluding those with mental health conditions). Results were very similar to those presented in the paper, and are available upon request.

¹¹ Between the two survey waves, there are some changes in the prevalence of psychiatric conditions and developmental disabilities among CSHCN in the sample composed of the treatment group and comparison group 1. The prevalence of ASD among CSHCN increases from 12 percent in 2005 and 2006 to 20 percent in 2009 and 2010, and the prevalence of intellectual disability falls from 19 percent in 2005 and 2006 to 11 percent in 2009 and 2010. The prevalence of ADHD among CSHCN stays fairly stable between waves (68 percent in 2005 and 2006 vs. 66 percent in 2009 and 2010), and the prevalence of emotional problems increases from 42 percent in 2005 and 2006 to 50 percent in 2009 and 2010 (although the way emotional problems are described also changes). Note that CSHCN may have multiple diagnoses. We explore whether ASD mandates are associated with ASD diagnosis later in the paper.

¹² We also estimated an ordered probit model of out-of-pocket spending in which the dependent variable was the midpoint of each of the six spending categories. Based on the DDD specification, the mandate was not associated with out-of-pocket spending. Results available upon request. The \$750 cutoff for the binary indicator of out-of-pocket expenses was chosen because this represents the 75th percentile of the distribution of out-of-pocket expenses in the pooled sample of the two NS-CSHCN surveys.

her needs; (4) costs not covered by child's health insurance never or sometimes are reasonable; (5) child's health insurance never or sometimes allows the child to see the health care providers he or she needs.

The NS-CSHCN includes questions about the impact of the child's health conditions on the family, and extensive questions about access to services and unmet needs. From the questions on family burden, we create a dichotomous indicator of (6) whether the child's health condition has caused financial problems for the family. This indicator is based on the question, "Have [the child's] health conditions caused financial problems for your family?" The access to care and unmet need questions starts with some questions about unmet need for all kinds of services. In the 2005 to 2006 survey, there is a general question about whether in the last 12 months the child has delayed or gone without any kind of needed health care (including therapy, special education services, and mental health care). Then, if the caregiver reports delaying or forgoing care, he or she selects from an extensive list of reasons why health care was delayed or foregone, including issues related to costs. In the 2009 to 2010 survey, the format of this question is slightly different; all survey respondents are asked if they have had "difficulties or delays" rather than "delays/forgoing care" in obtaining any kinds of health services because of issues related to costs. Thus, the 2009 to 2010 question wording is somewhat broader (since the word difficulty is included in addition to the word delay) and may be expected to apply to more children. From these questions, we create a dichotomous indicator of: (7) in the past 12 months, the child delayed or did not get any kind of needed health services because of costs.

Caregivers are also asked to provide information on whether the child received all the care he or she needed for different kinds of services. If a caregiver reports unmet need for a type of service, the caregiver then is asked to select from an extensive set of reasons why the child's needs were not met. From these questions, we created the following dichotomous indicators: (8) during the past 12 months, the child did not get all the prescription drugs that he or she needed due to costs or insurance issues; (9) during the past 12 months, the child did not get all the physical, occupational, or speech therapy that he or she needed due to costs or insurance issues; (10) during the past 12 months, the child did not get all the specialty physician services (not including psychiatrists and dentists) that he or she needed due to costs or insurance issues; and (11) during the past 12 months, the child did not get all the mental health care or counseling that he or she needed due to costs or insurance issues. The specific cost and insurance issues listed as reasons for unmet needs are: "cost too much," "no insurance," "health plan problem," and "can't find a provider who accepts child's insurance." When estimating models in which lack of access to a particular type of service due to cost or insurance is the outcome of interest, we limit the samples to families reporting having a need for drugs, therapy, specialty physician, and mental health services in the past 12 months. We also estimated these models without limiting the samples to families with need, since need may be endogenous to ASD mandates. These findings were similar to those presented in the paper, and are not shown here.

Autism Mandates and Other Covariates

Using the month and year of the NS-CSHCN interview, and the month and the year in which the mandate went into effect, each respondent in our sample is matched to information regarding whether the state had an autism mandate in effect 12 months prior to the month and year of the interview. It is critical to match mandates by month and year, and not just by year, because the 2009 to 2010 survey data were collected between July 2009 and March 2011 and many states were passing mandates

exactly during this time period. We also matched the mandate variable according to the age of the child, assigning a mandate value of zero to children who were outside the age range covered by an effective state mandate. This modification was minor since only a few states enacted mandates covering narrow age ranges (see below).

We use a one-year lagged measure of ASD mandates in our specifications shown in the paper because the outcome measures pertain to the past 12 months. However, we also estimate the models using an alternative mandate variable that captures whether the state had an ASD mandate in effect at the time of the interview. The advantage of using a current measure of ASD mandate instead of a lagged measure is when using the current measure we can draw on a larger set of natural experiments, and include some of the most recent ASD mandates in our analysis. The disadvantage of using the current measure is that the outcome measures pertain to the past 12 months, and past 12-month outcomes may not have been subject to an ASD mandate that just went into effect in the state. The main set of results do not differ qualitatively when we use current versus a one-year lag of ASD mandate; regardless of how the ASD mandate variable is constructed, we do not find effects of mandates on the outcomes we study in the main models. Appendix Table A1 shows the states that have mandates in effect requiring some level of coverage for ASD between 2005 and 2011, which is our study period,¹³ while Appendix Table A2 provides more detail about all autism mandates that have been passed as of July 2014.¹⁴ As seen in Appendix Table A2, several states passed autism mandates in 2010 and 2011, but these mandates did not go into effect until after our study period ended.¹⁵

We define an ASD mandate as a state law that requires some or all state-regulated insurance plans to cover particular types of screening, diagnosis, and treatment services for ASD.¹⁶ There is variation across states in the following important characteristics of ASD mandates: (1) whether the mandate applies to state employees only; (2) whether the mandate requires that insurers cover ASD services, or whether the ASD mandates that insurers just offer at least one plan that covers services; (3) the age range of the children covered; (4) whether the mandate includes firms of all sizes; (5) whether or not there are lifetime or annual limits on benefits, whether these limits apply to all ASD services or just some subcategories of services, and the dollar amounts of these limits; and (6) the specificity of the language of the ASD mandate, with more recent mandates generally worded in a more specific way than

¹³ Our tables rely on estimates with the mandate effective date lagged by one year, therefore relying on mandates in effect by 2010.

¹⁴ All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at <http://www3.interscience.wiley.com/cgi-bin/jhome/34787>.

¹⁵ All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at <http://www3.interscience.wiley.com/cgi-bin/jhome/34787>. Iowa and Kansas enacted mandates that apply to state employees only; we do not include those states as having passed a mandate in our study since these mandates were so narrow in scope. In our analysis, we consider the age of the survey respondent when merging the mandate variables to the individual records. For example, a 17-year-old child living in a state with a mandate that applies to children 16 years and younger would not be included in the treatment group.

¹⁶ We obtained basic information about the ASD mandates from three sources: Autism Speaks (<http://www.autismspeaks.org/advocacy/states>) the National Conference of State Legislatures (<http://www.ncsl.org>), and the American Speech Language Hearing Association (<http://www.asha.org/Advocacy/state/States-Specific-Autism-Mandates/>). We resolved any discrepancies across these sources by searching the LexisNexis database and looking at the exact wording of the legislation. The only basic information that varied across sources was the date of the Michigan ASD mandate; this discrepancy was resolved and this ASD mandate becomes effective outside our study period anyway. In general, of the three sources, Autism Speaks was the most complete and up-to-date source of information about the ASD mandates.

older mandates. In this study, we do not include ASD mandates that only apply to state employees (IA and KS), or mandates that only require insurance companies to offer a plan that provides certain ASD services (AL).¹⁷ We account for the differing age ranges of the ASD mandates by assigning children of nonapplicable ages living in states with mandates a “zero” for the mandate variable.

To further capture this heterogeneity in the ASD mandates, we estimate the main set of models with an indicator of “comprehensive ASD mandate” as an alternative to the “any ASD mandate” variable used in the main specifications. We define a comprehensive ASD mandate as an ASD mandate that covers children until age 18 (or does not specify an upper age limit), and that applies to firms of all sizes. By this definition, the following states had a comprehensive ASD mandate in effect during our study period: CO, IL, IN, KY, MA, MO, MT, NV, NH, NJ, NM, and WI (see Appendix Table A2).¹⁸ Ideally, we also would have liked to incorporate dollar benefit limits into our definition of “comprehensive ASD mandate” but there was inadequate variation to do so. Nearly all states had some sort of limit on either all services, or specifically behavioral treatment services, and many states had similar dollar limits.

Mental health parity laws require insurance plans to have the same cost sharing and limitations for mental health services as exist for medical services. These state laws were passed mainly in the late 1990s and early 2000s and thus would be captured by the state fixed effects. Some states have mental health parity laws that specifically include ASD (or have been amended to specifically include ASD), or imply coverage of ASD as a developmentally, neurologically, or biologically based disorder. Parity laws require greater equality between mental health and medical services, but they do not necessarily require that insurers cover particular ASD treatments, such as intensive behavioral therapies, the way ASD mandates do. Bilaver and Jordan (2013) classify states according to whether they have a strict mental health parity law, and whether the strict parity law includes ASD.¹⁹ During our study period, the following states had both an ASD mandate and a strict mental health parity law that includes ASD: CT, KY, ME, MO, MT, NH, and NJ.²⁰

In the main models, we only include dichotomous indicators for individual years of child age as child-level covariates because we do not expect individual child characteristics to be correlated with passage of ASD mandates. However, we also estimated extended models that included richer information on child characteristics such as household size, race/ethnicity (indicators for non-Hispanic black, Hispanic, and all other groups combined vs. non-Hispanic white), parental education (highest educated parent’s education is more than high school, high school, or less than high school), and dummy indicators for child health and functioning. These findings are based on smaller sample sizes than those presented here since there is some missing data on some of these covariates. These results were similar to the results presented here so we do not show the extended models; however, we briefly discuss the results

¹⁷ The AL mandate was passed too recently to be included in our study period.

¹⁸ All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher’s Web site and use the search engine to locate the article at <http://www3.interscience.wiley.com/cgi-bin/jhome/34787>.

¹⁹ Bilaver and Jordan (2013) report that of the 28 states with strict mental health parity laws, 17 states explicitly or implicitly include ASD. These authors define a strict mental health parity law as one that is different from federal legislation, is not limited to a special subpopulation, and does not exist such that insurance companies can impose limits on services.

²⁰ Ideally, we would like to test whether the effects of ASD mandates are different in states that have parity laws that include ASD versus states that do not have such laws. However, when we limit the sample to the 17 states with parity laws that include ASD, only three states (NJ, CT, and MT) have passed ASD mandates that become effective during our study period, based on the one-year lagged models.

below. There also may be unmeasured state-level trends that may be correlated with passage of a mandate and with outcomes. The use of comparison groups plus the use of state fixed effects and the interactions between the state and year fixed effects are expected to capture these potentially confounding variables.

RESULTS

Table 1 shows weighted descriptive statistics for the sample used to estimate the DDD models. This sample includes all states and is created using the treatment group (CSHCN with ASD) and comparison group 1 (CSHCN who have psychiatric disorders and developmental delays other than ASDs, including intellectual disability, Down syndrome, ADHD, depression, anxiety, or conduct disorder). Column 1 in Table 1 shows means for the whole sample while columns 2 and 3 show means by treatment group status. Columns 4 through 6 show means by treatment group and survey wave. Appendix Table A3 shows the same table for the sample created using the treatment group and comparison group 2.²¹

About 37 percent of the CSHCN with ASD or other psychiatric disorders and developmental disabilities had ASD, 9 percent lived in a state with an effective ASD mandate 12 months prior to the interview, and 36 percent lived in a state that passed a mandate during the study period, based on the lagged mandate measure, meaning that the study period essentially spans April 2004 to March 2010 even though the interviews were conducted between April 2005 and March 2011 (Table 1).²² Based on the lagged mandate measure, the percentage of CSHCN with ASD or another psychiatric disorder or developmental disability living in a state that had an effective mandate for at least a year rises from 2 to 3 percent in the 2005 to 2006 survey to 14 to 15 percent in the 2009 to 2010 survey (Table 1). The average age of the CSHCN with ASD or another psychiatric disorder was about 11.5 years old.

Access problems related to cost and insurance and financial burden were common in this sample of privately insured CSHCN with ASD and other psychiatric disorders with 26 percent reporting financial problems because of the child's health costs, 36 percent reporting that the costs covered by health insurance were never or sometimes reasonable, and 12 percent reporting delaying or forgoing the child's care due to costs in the past 12 months (Table 1, column 1). However, it is striking that the families of CSHCN with ASD fared worse than those of CSHCN with other psychiatric or developmental conditions. About 47 percent of families of CSHCN with ASD reported that the costs covered by health insurance are never or sometimes reasonable compared to 34 percent among families of CSHCN with psychiatric conditions other than ASD (Table 1, columns 2 and 3). In fact, compared to the comparison group, families of CSHCN with ASD reported worse access and higher financial burden in every area.

Table 1 does not show any consistent pattern over time in access to care and cost/insurance outcomes for the treatment group versus the comparison group. In general, financial burden of care and access to care appears to be stable or getting somewhat worse over time for both groups, with perhaps a more consistent

²¹ All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at <http://www3.interscience.wiley.com/cgi-bin/jhome/34787>.

²² Based on the current mandate measure, about 15 percent of the sample lived in a state with an effective mandate at the time of the interview, and 46 percent lived in a state that passed a mandate during the study period (results not shown). Based on the current mandate measure, the percentage of respondents living in a state with an effective mandate rises from 2 to 3 percent in the 2005 to 2006 survey to 27 to 29 percent in the 2009 to 2010 survey (results not shown).

Table 1. Weighted means for DDD sample includes privately insured CSHCN in treatment (Tx) group or comparison group 1 from all states.

	(1) Tx + comp 1	(2) Tx = 1	(3) Tx = 0	(4) Tx = 1 Wave = 1	(5) Tx = 1 Wave = 2	(6) Tx = 0 Wave = 1	(7) Tx = 0 Wave = 2
Treatment group (child has ASD)	0.37	1.00	0.00	1.00	1.00	0.00	0.00
State has ever passed an ASD mandate during study period	0.36	0.37	0.36	0.36	0.37	0.37	0.36
State ASD mandate is in effect 12 months prior to month and year of interview	0.09	0.09	0.09	0.02	0.14	0.03	0.15
Child's health problems caused financial problems for family	0.26	0.42**	0.23	0.38	0.44	0.22	0.24
Health insurance benefits and coverage never/ sometimes meet child's needs	0.17	0.30***	0.14	0.30	0.29	0.15	0.13
Costs covered by health insurance never/ sometimes reasonable	0.36	0.47**	0.34	0.48	0.46	0.34	0.34
Health insurance never/ sometimes covers needed providers	0.13	0.23***	0.11	0.25	0.23	0.11	0.11
Total out-of-pocket costs on child's medical care in past 12 months was \$750 or more	0.51	0.55***	0.50	0.56	0.55	0.47	0.52
No out-of-pocket costs on child's medical care in past 12 months	0.09	0.09	0.09	0.09	0.09	0.08	0.09
Delayed or foregone any kind of health services due to cost in past 12 months	0.12	0.20***	0.10	0.07	0.28	0.06	0.16
Child not get needed specialty doctor due to cost or insurance coverage issues in past 12 months (sample limited to those needing specialty doctor)	0.04	0.05**	0.03	0.05	0.04	0.02	0.04
Child did not get needed therapy due to cost or insurance coverage issues in past 12 months (sample limited to those needing therapy)	0.09	0.12***	0.07	0.09	0.14	0.06	0.08
Child did not get needed prescription drugs due to cost or insurance coverage issues in past 12 months (sample limited to those needing drugs)	0.01	0.02	0.01	0.01	0.03	0.01	0.01
Child did not get needed mental health care due to cost or insurance coverage issues in past 12 months (sample limited to those needing mental health care)	0.08	0.11**	0.08	0.09	0.12	0.06	0.09
Child age in years	11.5 (0.08)	9.9*** (0.09)	11.8 (0.09)	9.8 (0.17)	10.0 (0.15)	11.8 (0.10)	11.9 (0.13)

Notes: Statistics are weighted using survey weights. Child age shows robust standard error clustered on state in parentheses. The symbols ***, **, and * indicate statistically significant difference at the 1, 5, and 10 percent levels, respectively, for treatment versus control group based on a *t*-test. Wave = 1 indicates the 2005 to 2006 survey, while Wave = 2 indicates the 2009 to 2010 survey. Comparison group 1 includes CSHCN with psychiatric conditions other than ASD. All variables except child age are dichotomous. In the regression models, we used dichotomous indicators for each child age 2 to 17, leaving out one age as the baseline. CSHCN stands for children with special health care needs. DDD stands for difference-in-difference method.

Table 2. Effects of ASD mandates on ASD diagnosis and on private insurance status.

	(1) Tx group + comparison group 1 (CSHCN with other psychiatric disorders)	(2) Tx group + comparison group 2 (CSHCN with other psychiatric and/or chronic medical conditions)
Panel A: dependent variable: child has ASD		
Estimated coefficient on mandate	-0.04 (-4.05)	-0.01 (-0.65)
<i>n</i>	21,055	37,468
Panel B: dependent variable: child has private insurance		
Estimated coefficient on ASD × mandate	-0.01 (-0.13)	-0.002 (-0.04)
<i>n</i>	33,842	56,591

Notes: Table presents coefficients and *T*-statistics (in parentheses) from ordinary least squares models that use sample weights and robust standard errors clustered on state. Table only shows estimated coefficients on mandate (panel A) and ASD × mandate (panel B). All outcomes are binary. Other covariates included in models in panel A are: survey year fixed effects, state fixed effects, and dummy variables for each child age. Models in panel A estimated on sample of privately insured children. Other covariates used in models in panel B are: ASD × mandate, ASD, survey year fixed effects, state fixed effects, and dummy variables for each child age. Models estimated in panel B based on sample that includes CSHCN of any insurance status. Tx group is the treatment group. ASD stands for autism spectrum disorder.

worsening pattern for the treatment group. Between the 2005 to 2006 and the 2009 to 2010 waves of the survey, there is a large increase in caregivers' reports of delaying or forgoing services. However, this is true for both the treatment and the comparison groups (although more striking for the treatment group) and is probably at least partially due to the change in the wording of the question across the two waves.

In Table 2, we show findings from models that were estimated to gauge whether ASD mandates were associated with the likelihood of CSHCN being diagnosed with ASD, and models in which we examine whether ASD mandates were associated with the likelihood of CSHCN having private insurance. The dependent variables in these models are "Child currently diagnosed with ASD" (panel A, Table 2) and "Child has private insurance" (panel B, Table 2). In panel A of Table 2, the samples are limited to privately insured CSHCN, while in panel B of Table 2, the sample includes CSHCN of all insurance types.

In panel A of Table 2, the results suggest that ASD mandates were associated with a reduction in the likelihood of current ASD diagnosis among CSHCN. This association is statistically significant only when comparison group 1 is used (column 1 vs. column 2 in panel A, Table 2). Note that this model presumes that the denominator is fixed, or, in other words, that the mandate affected diagnosis of ASD among CSHCN who already had special health care needs, based on the screener administered during the survey. One possible interpretation of this finding is that ASD mandates improved access to diagnostic services among CSHCN (e.g., access to pediatricians specializing in CSHCN with developmental delays), which resulted in fewer CSHCN being diagnosed (perhaps incorrectly) with ASD. The negative correlation between mandates and ASD diagnosis also may result from states with lower rates of ASD having an easier time passing ASD mandates. That is, opposition to ASD mandates may be stronger in states in which the prevalence of ASD initially was high. This was the case for mental health parity laws; states with lower rates of mental health services usage to start with were more likely than higher utilization states to pass mental health parity laws (Pacula & Sturm, 2000; Sturm & Pacula, 1999).

To investigate this possibility, we reestimated the models shown in panel A of Table 2 replacing the mandate variable (which is measured in the past 12 months) with a 12-month lead of mandate. The lead mandate variable is an indicator of whether the respondent lives in a state in which a mandate is effective 12 months subsequent to the month and year of the interview. If the lead of mandate is associated with a reduction in ASD diagnosis, this finding would lend some support to the idea that states with preexisting lower levels of ASD diagnosis are more likely to pass mandates. However, the estimated coefficient on the lead of mandate was positive in sign and not statistically significant at the 0.05 level in these models (results not shown). These results make it less likely that policy endogeneity explains the finding that mandates are associated with reductions in the probability of ASD diagnosis.

It is important to emphasize that the diagnosis of ASD is measured at any time in the past, and is not timed well with the mandates, which are measured in the past year. To the extent that ASD diagnosis is made when children are young, it is less likely that ASD mandates could change diagnosis patterns among older CSHCN. Thus, if the association between ASD mandate and ASD diagnosis is causal, we would expect to see that this relationship is strongest among the youngest CSHCN, since these children are most likely to have been diagnosed in the past year when the mandates went into effect. To explore this idea, we estimated these models by age group (2 to 5, 6 to 12, and 13 to 17), and found that the association between ASD mandates and ASD diagnosis among CSHCN is statistically significant only for the 13 to 17 age group, not for the two younger age groups (results not shown). However, in the 2009 to 2010 wave, among CSHCN aged 13 to 17 years old who currently have ASD, about 8 percent were diagnosed in the past year and the majority (82 percent) was diagnosed four or more years prior to the survey. It seems unlikely, then, that the association between ASD mandates and ASD diagnosis that we find for this age group reflected a true causal relationship, since only a small percentage of these CSHCN were diagnosed in the past year.²³

In panel B of Table 2, we examine whether ASD mandates are associated with the probability of having private insurance among CSHCN with ASD versus CSHCN without ASD. In these models, the estimated coefficients on the interaction terms between mandate and ASD are not statistically different from zero. Based on these results, it seems unlikely that passage of ASD mandates has affected families' insurance coverage decisions. We thus proceed with the DD and DDD estimates, which are based on privately insured samples.

Table 3 summarizes findings from the DD and DDD regression models for outcomes related to financial burden and problems with health insurance. Each row shows results related to a different outcome. Only the estimated coefficients and *T*-statistics on the interaction between treatment group and mandate (reflecting that the policy is in effect 12 months prior to interview) are shown in the table. This estimate captures the effect of the mandate on CSHCN with ASD, netting out other possibly confounding "pre-post" changes. In each row, columns 1 and 2 come from a model estimated using a sample limited to the treatment group and comparison group 1, while columns 3 and 4 are estimated from a model based on the treatment group and comparison group 2.

The findings in Table 3 show no measurable impact of ASD mandates on outcomes related to financial burden and adequacy of health insurance coverage. In almost all of the models, the estimated interaction term between ASD and mandate is

²³ Ideally, one would like to examine the association between past year ASD mandate and new diagnosis of ASD in the past year. In the 2005 to 2006 wave, however, we do not know the age of ASD diagnosis. This information is only available in the 2009 to 2010 wave.

Table 3. Effects of ASD mandates on financial burden and health insurance outcomes.

	Tx group + comparison group 1 (CSHCN with other psychiatric disorders)		Tx group + comparison group 2 (CSHCN with other psychiatric and/or chronic medical conditions)	
	(1) DD Sample Mandate States only	(2) DDD Sample All states	(3) DD Sample Mandate States only	(4) DDD Sample All states
<i>In past 12 months</i>				
	Estimated coefficient on ASD × mandate			
Child health caused financial problems	0.04 (0.49)	0.003 (0.02)	0.03 (0.38)	0.01 (0.08)
No out-of-pocket costs for child's care	-0.03 (-1.16)	-0.01 (-0.47)	-0.02 (-0.87)	-0.01 (-0.34)
Out-of-pocket costs for child's care \$750+	0.03 (0.26)	0.02 (0.16)	0.002 (0.02)	0.01 (0.08)
Health insurance benefits and coverage never/sometimes meet child's needs	0.10 (3.90)	0.10 (2.88)	0.08 (3.18)	0.10 (3.10)
Costs covered by health insurance never/sometimes reasonable	0.03 (0.57)	0.07 (0.87)	-0.001 (-0.02)	0.06 (0.76)
Health insurance never/sometimes allows child to see needed providers	0.05 (0.75)	0.01 (0.21)	0.05 (0.85)	0.02 (0.27)
<i>n</i>	5,355	21,055	9,573	37,468

Notes: Table presents coefficients and *T*-statistics (in parentheses) from ordinary least squares models that use sample weights and robust standard errors clustered on state. Table only shows estimated coefficient on mandate (DD models) and estimated coefficient on interaction term between ASD and mandate (DDD models). Mandate States are states that passed an ASD mandate during our study period. All outcomes are binary. Other covariates included in DD models are: ASD indicator, survey year fixed effects, state fixed effects, and dummy variables for each child age. Other covariates included in DDD models are: ASD indicator, survey year fixed effects, state fixed effects, ASD × survey year fixed effects, ASD × state fixed effects, state fixed effects × year fixed effects, and dummy variables for each child age. Sample limited to CSHCN with private health insurance coverage. Tx group is the treatment group (CSHCN with ASD). DD indicates double difference model, while DDD indicates triple difference model. ASD stands for autism spectrum disorder.

not statistically different from zero. One exception is caregiver reports of health insurance never/sometimes meeting child's needs. In the DD and DDD models for this outcome, the findings suggest that ASD mandates are associated with an *increase* in this adverse outcome. It is possible that ASD mandates raised awareness of and dissatisfaction with private insurance coverage, even in the absence of any effects on out-of-pocket spending and financial burden. Also, it is possible that families of children diagnosed with ASD more recently have different expectations about access and service needs than families of children diagnosed in the earlier time period in some way that is related to passage of an ASD mandate. In any case, the general pattern of findings in Table 3 does not support the existence of any beneficial effects of ASD mandates, and in many cases the mandate was associated with worse health insurance and costs outcomes, although these effects are not statistically significant at conventional levels. In sum, then, Table 3 indicates that ASD mandates have not

Table 4. Effects of ASD mandates on cost and insurance-related access to care.

	Tx group + comparison group 1 (CSHCN with other psychiatric disorders)		Tx group + comparison group 2 (CSHCN with other psychiatric and/or chronic medical conditions)	
	(1) DD Sample Mandate States only	(2) DDD Sample All states	(3) DD Sample Mandate States only	(4) DDD Sample All states
<i>In past 12 months</i>				
	Estimated coefficient on ASD × mandate			
Difficulty/delay accessing services due to cost	0.12 (3.60)	0.07 (2.16)	0.12 (3.68)	0.05 (1.48)
<i>n</i>	5,355	21,055	9,573	37,468
<i>Among those needing services, child could not get all services needed due to cost or insurance</i>				
Specialty doctor	-0.03 (-2.30)	-0.03 (-1.52)	-0.03 (-1.82)	-0.03 (-1.86)
<i>n</i>	2,800	10,762	4,998	18,947
Prescription drugs	0.002 (0.19)	-0.003 (-0.26)	-0.01 (-0.43)	-0.01 (-0.59)
<i>n</i>	4,715	18,492	8,699	33,914
Therapy	0.02 (0.26)	0.03 (0.35)	0.02 (0.29)	0.02 (0.31)
<i>n</i>	1,540	5,948	2,004	7,707
Mental health	0.07 (0.76)	0.01 (0.10)	0.07 (0.70)	0.01 (0.12)
<i>n</i>	2,238	9,153	2,405	9,747

Notes: Table presents coefficients and *T*-statistics (in parentheses) from ordinary least squares models that use sample weights and robust standard errors clustered on state. Table only shows estimated coefficient on interaction term between ASD and mandate. Mandate States are states that passed an ASD mandate during our study period. All outcomes are binary. Other covariates included in DD models are: ASD indicator, survey year fixed effects, state fixed effects, and dummy variables for each child age. Other covariates included in DDD models are: ASD indicator, survey year fixed effects, state fixed effects, ASD × survey year fixed effects, ASD × state fixed effects, state fixed effects × year fixed effects, and dummy variables for each child age. Sample limited to CSHCN with private health insurance coverage. Tx group is the treatment group (CSHCN with ASD). DD indicates double difference model, while DDD indicates triple difference model. Tx group is the treatment group. ASD stands for autism spectrum disorder.

affected health insurance adequacy and financial burden among families of CSHCN with ASDs.

In Table 4, we show the same specifications as in Table 3, but with unmet need due to cost and insurance as the outcomes of interest. Again, as in Table 3, we note that overall there is generally no consistent pattern of findings. ASD mandates are associated with a statistically significant increase in reports of not being able to access services in general in the DD models, but this effect does not persist in both of the DDD models. The ASD mandates were associated with statistically significant, lower levels of unmet need for specialty doctor services. This effect persists regardless of which comparison group is used, but is marginally statistically significant in one of the models. The size of the effect is perhaps unreasonably large (3 percentage points compared to a mean of 5 percent in Table 1 for the treatment group in the first wave of data), but the direction of the effect makes sense, given that ASD mandates targeted types of treatment that may be provided by specialized doctors. However, we do not emphasize this finding since the general pattern of findings regarding the effects of ASD mandates on access to care is inconsistent. In the case of mental health services, for example, the ASD mandates were associated

with worse access to care, although these effects are not statistically significant at conventional levels.

We conducted several sensitivity checks of these findings. First, we reestimated the main DD models using probits instead of ordinary least squares (OLS). These findings are presented in Appendix Table A4.²⁴ The overall pattern of findings is consistent with the OLS results in that we observe mostly statistically insignificant results, with the exception of a few counterintuitive findings showing that ASD mandates are associated with greater dissatisfaction with insurance coverage and worse access to care. Second, we reestimated all models using an ASD measure indicating whether an ASD mandate was in effect in the month of the interview, instead of a one-year lagged measure. Using a current measure increases our power, since many ASD mandates are recent and, if we can include the most recent mandates, we can draw on more natural experiments in our analysis. The findings are very similar to those presented here (results not shown). We still see beneficial effects of the ASD mandates on access to specialty provider services, but no consistent effect on the other outcomes. Third, we considered a “comprehensive ASD mandate” variable, which only included mandates that apply to children of all ages and include small firms. These findings are shown in Appendix Tables A5 and A6.²⁵ Even when we consider only the ASD mandates with the broadest scope, we still see a generally statistically insignificant pattern of findings, with a few statistically significant, counterintuitive effects on satisfaction with insurance and overall access.

Finally, we also reestimated the models including more extensive controls for child and family characteristics. These results also showed no effects of ASD mandates on outcomes (results not shown), but they do offer some information on the correlates of access to care and out-of-pocket costs among privately insured CSHCN. In general, parents of CSHCN with more severe conditions and parents of CSHCN with ADHD were more likely to report insurance-related problems than other parents, controlling for other factors. Parental education, race/ethnicity, and the age of the child were not associated with insurance-related problems. Racial/ethnic minorities, lower educated parents, and parents living in larger households, however, were more likely than other parents to report having no out-of-pocket costs and less likely than other parents to report having out-of-pocket costs over \$750 in the past year. This finding is somewhat surprising since the sample is limited to privately insured CSHCN. It is unsurprising, however, that worse child severity is positively related to all adverse outcomes, including financial burden, overall access problems, and lack of access to specific services. In many cases, parents report worse access for female CSHCN compared to male CSHCN.

As described previously, the ASD mandates only apply to private insurance plans that are subject to state regulations. We therefore would expect stronger effects of mandates among respondents living in states in which higher shares of privately insured individuals are covered by state-regulated health insurance plans. To test whether this is the case, we follow the general approach used by Schmidt (2007), and reestimate the DD and DDD models with the inclusion of an additional triple interaction term between ASD, mandate, and the percent of privately insured enrollees in the state in the year prior to the interview year that are subject to state regulations. These findings are shown in Tables 5 and 6.

²⁴ All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at <http://www3.interscience.wiley.com/cgi-bin/jhome/34787>.

²⁵ All appendices are available at the end of this article as it appears in JPAM online. Go to the publisher's Web site and use the search engine to locate the article at <http://www3.interscience.wiley.com/cgi-bin/jhome/34787>.

Table 5. Effects of ASD mandates on financial burden and health insurance outcomes by percent of privately insured in state-regulated plans.

Sample Tx group + comparison group 1 (CSHCN with other psychiatric disorders)	(1) DD		(2) DDD	
	Sample Mandate States only		Sample All states	
	ASD × mandate	ASD × mandate × percent in state-regulated plans	ASD × mandate	ASD × mandate × percent in state-regulated plans
In past 12 months				
Child health caused financial problems	0.80 (5.79)	-1.91 (-4.93)	1.27 (3.10)	-3.07 (-2.68)
No out-of-pocket costs for child's care	-0.22 (-3.90)	0.50 (3.54)	-0.05 (-0.38)	0.09 (0.29)
Out-of-pocket costs for child's care \$750+	0.71 (3.63)	-1.73 (-3.99)	1.04 (1.68)	-2.45 (-1.60)
Health insurance benefits and coverage never/ sometimes meet child's needs	0.25 (2.45)	-0.39 (-1.54)	0.13 (1.02)	-0.07 (-0.27)
Costs covered by health insurance never/ sometimes reasonable	0.32 (1.79)	-0.73 (-1.37)	0.58 (1.23)	-1.25 (-1.08)
Health insurance never/ sometimes allows child to see needed providers	0.21 (0.72)	-0.40 (-0.65)	-0.14 (-0.39)	0.38 (0.52)
<i>n</i>	5,355	21,055		

Notes: Table presents coefficients and *T*-statistics (in parentheses) from ordinary least squares models that use sample weights and robust standard errors clustered on state. Table only shows estimated coefficients on interaction term between ASD and mandate and triple interaction between ASD, mandate, and percent in state insured in state-regulated plans. Mandate States are states that passed an ASD mandate during our study period. All outcomes are binary. Other covariates included in DD models are: ASD indicator, survey year fixed effects, state fixed effects, and dummy variables for each child age. Other covariates included in DDD models are: ASD indicator, survey year fixed effects, state fixed effects, ASD × survey year fixed effects, ASD × state fixed effects, state fixed effects × year fixed effects, and dummy variables for each child age. Sample limited to CSHCN with private health insurance coverage. Tx group is the treatment group (CSHCN with ASD). DD indicates double difference model, while DDD indicates triple difference model. ASD stands for autism spectrum disorder.

In Table 5, the estimated coefficients on the triple interaction terms generally support the idea of beneficial effects of ASD mandates in states with higher percentages of private insurance enrollees in state-regulated plans. For five of the six outcomes in Table 5, the estimated coefficients on the triple interaction term are intuitive in sign, and they are large and statistically significant in several cases. For example, ASD mandates do appear to reduce high out-of-pocket spending and reduce financial problems caused by children's health, as the percent of privately insured individuals in the state covered by state-regulated plans increases. In Table 6, we see that this is also true for the global outcome measure related to access problems due to cost; ASD mandates do appear to reduce caregivers' reports of difficulty and delays in accessing care due to the cost of care, as the percent of individuals privately insured and covered by state-regulated plans increases. There are no effects, however, on

Table 6. Effects of ASD mandates on cost and insurance-related access to care by percent of privately insured in state-regulated plans.

Sample Tx group + comparison group 1 (CSHCN with other psychiatric disorders)	(1) DD		(2) DDD	
	Sample Mandate States only		Sample All states	
	ASD × mandate	ASD × mandate × percent in state-regulated plans	ASD × mandate	ASD × mandate × percent in state-regulated plans
In past 12 months				
Difficulty/delay accessing services due to cost	0.43 (4.42)	-0.80 (-3.94)	0.22 (1.86)	-0.36 (-1.36)
<i>n</i>	5,355	21,055		
<i>Among those needing services, child could not get all services needed due to cost or insurance</i>				
Specialty doctor	0.01 (0.22)	-0.10 (-0.78)	-0.02 (-0.23)	-0.02 (-0.14)
<i>n</i>	2,800	10,762		
Prescription drugs	-0.07 (-1.37)	0.19 (1.27)	-0.03 (-0.46)	0.07 (0.36)
<i>n</i>	4,715	18,492		
Therapy	0.03 (0.14)	-0.03 (-0.06)	0.25 (0.58)	-0.53 (-0.51)
<i>n</i>	1,540	5,938		
Mental health	0.15 (0.46)	-0.19 (-0.24)	-0.48 (-0.87)	1.16 (0.91)
<i>n</i>	2,238	9,153		

Notes: Table presents coefficients and *T*-statistics (in parentheses) from ordinary least squares models that use sample weights and robust standard errors clustered on state. Table only shows estimated coefficients on interaction term between ASD and mandate and triple interaction between ASD, mandate, and percent in state insured in state-regulated plans. Mandate States are states that passed an ASD mandate during our study period. All outcomes are binary. Other covariates included in DD models are: ASD indicator, survey year fixed effects, state fixed effects, and dummy variables for each child age. Other covariates included in DDD models are: ASD indicator, survey year fixed effects, state fixed effects, ASD × survey year fixed effects, ASD × state fixed effects, state fixed effects × year fixed effects, and dummy variables for each child age. Sample limited to CSHCN with private health insurance coverage. Tx group is the treatment group (CSHCN with ASD). DD indicates double difference model, while DDD indicates triple difference model. ASD stands for autism spectrum disorder.

cost and insurance-related access to specific types of services (Table 6). We interpret these findings as suggestive, but not conclusive, evidence that ASD mandates may have beneficial effects in states in which greater percentages of privately insured individuals are subject to the mandates.

DISCUSSION AND CONCLUSIONS

Children with ASD typically require costly and extensive services beginning in early childhood, but many families lack adequate insurance coverage for and access to such care. State health insurance mandates for ASD have been viewed as a potential solution to this problem for children with private insurance coverage. That is, by mandating that private insurers provide coverage for specialized treatments, privately insured children are expected to have better access to services. The predicted direction of effects of mandates on out-of-pocket spending are conceptually ambiguous, however, since better insurance coverage both reduces the price of services and is likely to induce more utilization. This study provides some of the first empirical evidence about the effects of ASD mandates. Overall, based on the model used, the

findings do not support the idea that state autism mandates are associated with out-of-pocket spending or access to care among families of privately insured CSHCN with ASD. However, when we consider how the effects of ASD mandates may vary by the percentage of the working population subject to the mandates, the pattern of findings does suggest there may be some beneficial effects of the mandates; future research is needed using data sets with more detailed information about private health insurance plans and whether they are state regulated.

In many ways, the NS-CSHCN data are particularly well-suited for this study. The data include a large, national sample of CSHCN with ASD and conditions; the timing of the surveys is recent and corresponds to the period during which states were enacting mandates; and the questions in the surveys are relevant to the outcomes one would expect state mandates to affect. However, there are limitations as well. First, autism mandates are still very new, and, even though we use a one-year lag of the date the mandate is effective, it may take more time for this legislation to affect families' out-of-pocket spending and perceptions of access. Also, several large states, including California and New York, passed ASD mandates that became effective in 2012, but these changes are not captured by our study period, which ended in 2011.

Second, we may lack power to detect certain types of effects, such as access problems related to use of particular forms of specialized health services, and we lack data on whether children's insurance plans are through self-insured employers who are not subject to state mandates. Third, all data in the NS-CHSCN are reported by parents and not verified by providers, and there was a wording change in the autism question across the two waves. The data are based on sample surveys and as a result subject to potential nonresponse and coverage biases. Since this study draws on data from the 2005 to 2006 and the 2009 to 2010 surveys, there is differential coverage bias by survey year, since the later survey wave included both landlines and cell phones covering the population better than landlines only. Nevertheless, despite these issues, the general pattern of findings shows little support for the idea that ASD mandates alleviated insurance and access problems for families affected by ASD. There is some evidence that ASD mandates may have beneficial effects as more privately insured individuals are enrolled in state-regulated plans, but we treat this evidence as suggestive only. Further research on this topic is needed using data sets that include more detailed information on respondents' type of insurance plan. Also, we emphasize that this analysis focuses on privately insured children, and the findings cannot be generalized to CSHCN who have public insurance or are uninsured.

To our knowledge, no prior study has used a DDD-type approach to examine the effects of ASD mandates on utilization of and access to services. Some studies, however, have estimated effects of state mental health parity laws on access to care and financial burden among CSHCN. The evidence from the mental health parity literature focusing specifically on CSHCN is mixed. Barry and Busch (2007), using cross-sectional data from the 2000 CSHCN and an instrumental variables approach, report that state mental health parity laws are associated with lower out-of-pocket spending and less financial burden among families of children with mental health needs. Barry et al. (2013) report that parity in the Federal Employees Health Benefit Program led to lower out-of-pocket spending among families of children with high mental health or substance abuse expenditures, but the magnitudes of these effects were small. Using the 1997 to 2002 National Survey of America's Families and a DD approach, Barry and Busch (2008) find no association between mental health parity laws and use of mental health treatment among privately insured children. As others have documented, some reasons state parity laws may not improve access to mental health services and financial burden of care are because (1) these laws do not apply to workers in self-insured firms, (2) parity laws may increase management

of mental health care in a way that reduces access and offsets parity, and (3) there is limited availability of mental health providers in some communities RAND, 2008. In this sense, the findings of the present study are in line with the broader literature on mental health parity and CSHCN in that state-level legislation related to insurance coverage seems to have, at best, limited effects.

This study does not address supply-side factors, which may be important for privately insured families who need highly specialized mental health services for their children. Prior studies document socioeconomic status (SES)-related and racial disparities in access to ASD treatment (Magana et al., 2012; Shattuck & Grosse, 2007), but the role of provider availability in mediating such disparities is not known. It is possible that limited availability of appropriate providers in communities may be a more important barrier to access to care for children with ASDs than insurance coverage. If this is the case, ASD mandates may play a limited role in expanding access to services. However, states may need more experience with ASD mandates before we can draw firm policy conclusions regarding the effectiveness of mandates.

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The Effects of Mandated Health Insurance Benefits for Autism

APPENDIX

Table A1. States with effective ASD health insurance mandates during study period.

2005 to 2007	IN
2008	IL, IN, SC, TX
2009	AZ, FL, IL, IN, LA, NM, PA, SC, TX, WI
2010	AZ, CO, CT, FL, IL, IN, LA, MT, NJ, NM, PA, SC, TX, WI
2011	AZ, CO, CT, FL, IL, IN, KY, LA, MA, ME, MO, MT, NH, NJ, NM, NV, PA, SC, TX, WI

Notes: Table lists states with ASD health insurance mandates that were in effect in the year indicated during the time period April 2005 and March 2011. ASD stands for autism spectrum disorder. Arkansas had a mandate that went into effect in October 2011 and Vermont had a mandate that went into effect in July 2011—both are outside our study period, which ends in March 2011, so they are not listed in the table in the 2011 row. Note that when we use a one-year lag of the mandate variable, our study period effectively ends in March 2010, and the mandates passed in CO, KY, ME, MA, MO, NV, and NH are not included.

Source: <http://www.autismspeaks.org/advocacy/states>, Accessed 1/13.

Table A2. Health insurance mandates pertaining to ASD.

State	ASD mandate?	Details of legislation
AL	No	
AK*	Passed June 2012, effective January 2013	Includes diagnosis and treatment of ASD up to age 21 with no annual financial cap on benefits. ABA included. Plans with 20 or fewer employees not included.
AZ	Passed March 2008, effective July 2009	Under age 17; behavioral therapy limited to \$50,000 per year for ages 0 to 9, \$25,000 per year for ages 9 to 16; ABA included. Small group plans not included.
AR*	Passed March 2011, effective October 2011	Includes ABA with \$50,000 cap and only for those under 18. Small group plans included.
CA*	Passed October 2011, effective July 2012	Includes ABA with no age or dollar limits on coverage. Small group and individual plans included.
CO	Passed June 2009, effective July 2010	Under age 19, at least \$34,000 of ABA coverage until age 9, at least \$12,000 coverage from age 9 to 18. Small group plans included.
CT	Passed June 2009, effective January 2010	Under age 15, behavioral therapy capped at \$50,000 for ages 0 to 9, \$35,000 for ages 9 to 12, and \$25,000 for ages 13 to 14
DE*	Passed August 2012, effective December 2012	Includes diagnosis, testing, and treatment of ASD up to age 21. ABA subject to cap of \$36,000 per year. Small group plans included.
FL	Passed May 2008, effective April 2009	Maximum annual benefit of \$36,000 and lifetime limit of \$200,000. Applies to individuals under age 18. Small group plans not included.
GA	No	
HI	No	
ID	No	
IL	Passed and effective December 2008	Includes diagnostic and treatment services including ABA for those under age 21, up to \$36,000 per year. Includes small group plans.

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Table A2. Continued.

State	ASD mandate?	Details of legislation
IN	Passed and effective June 2001	Includes small group plans.
IA	No, applies to state employees only	
KS	No, applies to state employees only	Amended in 2014.
KY	Passed April 2010, effective January 2011	Includes ABA but coverage limited to \$50,000 for ages 1 to 6, max monthly benefit of \$1,000 for ages 7 to 21, and small group plans. Includes small group plans.
LA	Passed July 2008, effective January 2009	Covers ages 17 and under (expanded to 21 and under in 2012). Includes ABA. Limited at \$36,000 per year. Small group plans initially were not included—expanded to small group plans effective in 2014.
ME	Passed April 2010, effective January 2011	Only covers children 5 and under, ABA limited to \$36,000 per year. Includes small group plans.
MD*	Passed May 2014	Under age 19.
MA	Passed August 2010, effective January 2011	Includes ABA with no dollar limits on coverage. Small group plans included.
MI*	Passed April 2012, effective October 2012	ASD coverage mandates with \$50,000 annual limit for children under 7 years, \$40,000 for ages 7 to 12, and \$30,000 for ages 13 to 18. Includes small group plans.
MS	No	
MO	Passed June 2010, effective January 2011	Up to age 18, max \$40,000 of ABA coverage per year. Includes small group plans.
MN*	Passed May 2013, effective January 2014	Includes ABA. No dollar caps on benefits. Does not include small group plans.
MT	Passed May 2009, effective January 2010	Up to age 18, \$50,000 per year for a child 8 and younger, \$20,000 per year for child 9 to 18.
NE*	Passed April 2014, effective January 2015	Up to age 20, ABA included.
NV	Passed in May 2009, effective January 2011	Includes ABA up to \$36,000 per year, up to age 18 or 21 if in high school. Includes small group plans.
NH	Passed July 2010, effective January 2011	Includes ABA, \$36,000 cap on ABA for up to age 12, \$27,000 up to age 21. Includes small group plans.
NJ	Passed August 2009, effective February 2010	Up to age 21, ABA included with maximum benefit of \$36,000 per year. Includes small group plans.
NM	Passed April 2009, effective January 2010	ABA included, up to age 18 or age 22 if in high school, \$36,000 per year. Includes small group plans.
NY*	Passed November 2011, effective November 2012	ABA included up to \$45,000 per year. Includes small group plans.

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Table A2. Continued.

State	ASD mandate?	Details of legislation
NC	No	
ND	No	
OH	No	
OK	No	
OR*	Passed August 2013, effective January 2016	ABA covered with maximum of 25 hours per week. Small group plans included.
PA	Passed July 2008, effective July 2009	Under 21. ABA included. Maximum benefit of \$36,000 per year. Small group plans not included.
RI*	Passed June 2011, effective January 2012	ASD therapies covered up to age 15, ABA covered with \$32,000 maximum yearly benefit. Does not include small group plans.
SC	Passed June 2007, effective July 2008	Up to age 16. ABA covered with maximum benefit of \$50,000 per year. Small group plans not included.
SD	No	
TN	No	
TX	Passed in June 2007, effective January 2008	2007 Legislation covered only ages 2 to 6. Includes small group plans. ABA coverage has annual benefit limit of \$36,000 for individuals 10 and older. Expanded to older age groups with new legislation passed June 2009, effective January 2010. Expanded again in 2013. Includes ABA.
UT*	Passed April 2014	
VT*	Passed May 2010, effective July 2011	Initially limited to children under 6. Later expanded to children under 21 in 2012. Includes ABA. No annual or lifetime limits. Includes small group plans.
VA*	Passed May 2011, effective January 2012	May 2011 law applies to ages 2 to 6, more expansive law passed in 2012. Does not include small group plans.
WA	No	
WI	Passed June 2009, effective November 2009	Covers diagnosis and treatment up to \$50,000 per year for four years; after four years, covers at least \$25,000 annually. Includes small group plans.
WV*	Passed April 2011, effective January 2012	\$30,000 annual cap on ABA for three years, with maximum monthly benefit of \$2,000 for ABA after three years. Small group plans not included.
WY	No	

Notes: (1) OR previously passed a mandate that includes all pervasive developmental disorders, not just ASD, so we do not consider it an ASD mandate. (2) KS and IA passed mandates that did not apply to everyone, just state employees—we did not consider it a mandate. (3) Asterisk indicates that the legislation went into effect after our study period, which ends in March 2011. Note that when we examine a one-year lag of the mandate variable, our study period effectively ends in March 2010, and the mandates passed in CO, KY, ME, MA, MO, NV, and NH are not included. (4) ASD stands for autism spectrum disorder, and ABA stands for applied behavioral analysis. (5) States in bold have comprehensive ASD mandates effective during our study period. Comprehensive mandate is defined as the ASD mandate that covers children up to age 18 and includes small firms. (6) Of the states with ASD mandates in effect during our study period, CT, KY, ME, MO, MT, NH, and NJ also had strict mental health parity laws that include ASD Bilaver & Jordan, 2013.

Sources: Autism Speaks, <http://www.autismspeaks.org/advocacy/states>, Accessed 7/14; National Council of State Legislatures, <http://www.ncsl.org>, 8/12, Accessed 7/14; American Speech Language Hearing Association, <http://www.asha.org/Advocacy/state/States-Specific-Autism-Mandates>.

Table A3. Weighted means for DDD sample.

Sample includes privately insured CSHCN in treatment (Tx) group or comparison group 2 from all states						
	(1)	(2)	(3)	(4)	(5)	(7)
	Tx + comp 2	Tx = 1	Tx = 0	Tx = 1 Wave = 1	Tx = 1 Wave = 2	Tx = 0 Wave = 1 Wave = 2
Treatment group (child has ASD)	0.37	1.00	0.00	1.00	1.00	0.00
State has ever passed an ASD mandate during study period	0.36	0.37	0.36	0.36	0.37	0.36
State ASD mandate is in effect 12 months prior to month and year of interview	0.09	0.09	0.09	0.02	0.14	0.15
Child's health problems caused financial problems for family	0.21	0.42***	0.19	0.38	0.44	0.20
Health insurance benefits and coverage never/ sometimes meet child's needs	0.13	0.30***	0.11	0.30	0.29	0.11
Costs covered by health insurance never/ sometimes reasonable	0.33	0.47***	0.31	0.48	0.46	0.32
Health insurance never/ sometimes covers needed providers	0.09	0.24***	0.08	0.25	0.23	0.08
Total out-of-pocket costs on child's medical care in past 12 months was \$750 or more	0.46	0.55***	0.45	0.56	0.55	0.48
No out-of-pocket costs on child's medical care in past 12 months	0.08	0.09	0.08	0.09	0.09	0.08
Delayed or foregone any kind of health services due to cost in past 12 months	0.09	0.20***	0.08	0.07	0.28	0.12
Child did not get needed specialty doctor due to cost or insurance coverage issues in past 12 months (sample limited to those needing specialty doctor)	0.02	0.05***	0.02	0.05	0.04	0.03
Child did not get needed therapy due to cost or insurance coverage issues in past 12 months (sample limited to those needing therapy)	0.08	0.12***	0.06	0.09	0.14	0.07
Child did not get needed prescription drugs due to cost or insurance coverage issues in past 12 months (sample limited to those needing drugs)	0.01	0.02	0.01	0.01	0.03	0.01
Child did not get needed mental health care due to cost or insurance coverage issues in past 12 months (sample limited to those needing mental health care)	0.08	0.11***	0.07	0.09	0.12	0.08
Child age in years	10.7 (0.05)	9.9*** (0.09)	10.8 (0.06)	9.8 (0.17)	10.0 (0.15)	10.9 (0.08)

Notes: Statistics are weighted using survey weights. Child age shows robust standard error clustered on state in parentheses. The symbols ***, **, and * indicate statistically significant difference at the 1, 5, and 10 percent levels, respectively, for treatment versus control group. Wave = 1 indicates the 2005 to 2006 survey, while Wave = 2 indicates the 2009 to 2010 survey. Comparison group 2 includes CSHCN with psychiatric conditions other than ASD or other chronic medical conditions. All variables except child age are dichotomous. In the regression models, we used dichotomous indicators for each child age 2 to 17, leaving out one age as the baseline. CSHCN stands for children with special health care needs. DDD stands for difference-in-difference method.

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Table A4. DD estimates of ASD mandates on outcomes, unweighted probit model estimates.

	Sample Mandate States only	
	Tx group + comparison group 1 (CSHCN with other psychiatric disorders)	Tx group + comparison group 2 (CSHCN with other psychiatric and/or chronic medical conditions)
Child health caused financial problems	0.14 (0.80)	0.07 (0.43)
No out-of-pocket costs for child's care	-0.14 (-0.95)	-0.12 (-0.87)
Out-of-pocket costs for child's care \$750+	-0.03 (-0.16)	-0.09 (-0.46)
Health insurance benefits and coverage never/ sometimes meet child's needs	0.21 (2.93)	0.15 (2.23)
Costs covered by health insurance never/ sometimes reasonable	0.05 (0.56)	0.003 (0.03)
Health insurance never/ sometimes allows child to see needed providers	0.29 (2.21)	0.28 (2.2)
Difficulty/delay accessing services due to cost	0.29 (4.0)	0.25 (3.6)
<i>n</i>	<i>n</i> = 5,349 5,355	<i>n</i> = 9,563 9,573
<i>Among those needing services, child could not get all services needed due to cost or insurance</i>		
Specialty doctor	-0.09 (-0.29)	-0.11 (-0.38)
<i>n</i>	2,758	4,995
Prescription drugs	0.35 (0.98)	0.20 (0.65)
<i>n</i>	4,193	8,453
Therapy	-0.05 (-0.30)	-0.05 (-0.33)
<i>n</i>	1,539	2,002
Mental health	0.21 (0.97)	0.22 (0.96)
<i>n</i>	2,209	2,375

Notes: Table presents coefficients and *T*-statistics (in parentheses) from probit models. Table only shows estimated coefficient on mandate (DD models) and estimated coefficient on interaction term between ASD and mandate (DDD models). Mandate States are states that passed an ASD mandate during our study period. All outcomes are binary. Other covariates included in DD models are: ASD indicator, survey year fixed effects, state fixed effects, and dummy variables for each child age. Sample limited to CSHCN with private health insurance coverage. Tx group is the treatment group (CSHCN with ASD). DD indicates double difference model. ASD stands for autism spectrum disorder. Sample sizes vary because in some models survey years 2007 or 2011 were dropped. In the prescription drugs model, indicators for survey years 2007 and 2011 were dropped, one state was dropped, and age indicators for age 3 and age 4 were dropped.

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Table A5. Effects of comprehensive ASD mandates on financial burden and health insurance outcomes.

	Tx group + comparison group 1 (CSHCN with other psychiatric disorders)		Tx group + comparison group 2 (CSHCN with other psychiatric and/or chronic medical conditions)	
	(1) DD Sample Mandate States only	(2) DDD Sample All states	(3) DD Sample Mandate States only	(4) DDD Sample All states
<i>In past 12 months</i>				
	Estimated coefficient on ASD × mandate			
Child health caused financial problems	0.04 (0.49)	0.003 (0.02)	0.03 (0.38)	0.01 (0.08)
No out-of-pocket costs for child's care	-0.03 (-1.16)	-0.01 (-0.47)	-0.02 (-0.87)	-0.01 (-0.34)
Out-of-pocket costs for child's care \$750+	0.03 (0.26)	0.02 (0.16)	0.002 (0.02)	0.01 (0.08)
Health insurance benefits and coverage never/ sometimes meet child's needs	0.10 (3.90)	0.10 (2.88)	0.08 (3.18)	0.10 (3.10)
Costs covered by health insurance never/ sometimes reasonable	0.03 (0.57)	0.07 (0.87)	-0.001 (-0.02)	0.06 (0.76)
Health insurance never/ sometimes allows child to see needed providers	0.05 (0.75)	0.01 (0.21)	0.05 (0.85)	0.02 (0.27)
<i>n</i>	5,355	21,055	9,573	37,468

Notes: Table presents coefficients and *T*-statistics (in parentheses) from ordinary least squares models that use sample weights and robust standard errors clustered on state. Table only shows estimated coefficient on mandate (DD models) and estimated coefficient on interaction term between ASD and mandate (DDD models). Mandate States are states that passed an ASD mandate during our study period. All outcomes are binary. Other covariates included in DD models are: ASD indicator, survey year fixed effects, state fixed effects, and dummy variables for each child age. Other covariates included in DDD models are: ASD indicator, survey year fixed effects, state fixed effects, ASD × survey year fixed effects, ASD × state fixed effects, state fixed effects × year fixed effects, and dummy variables for each child age. Sample limited to CSHCN with private health insurance coverage. Tx group is the treatment group (CSHCN with ASD). DD indicates double difference model, while DDD indicates triple difference model. ASD stands for autism spectrum disorder.

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Table A6. Effects of comprehensive ASD mandates on cost and insurance-related access to care.

	Tx group + comparison group 1 (CSHCN with other psychiatric disorders)		Tx group + comparison group 2 (CSHCN with other psychiatric and/or chronic medical conditions)	
	(1) DD Sample Mandate States only	(2) DDD Sample All states	(3) DD Sample Mandate States only	(4) DDD Sample All states
<i>In past 12 months</i>				
	Estimated coefficient on ASD × mandate			
Difficulty/delay accessing services due to cost	0.12 (3.60)	0.07 (2.16)	0.12 (3.68)	0.05 (1.48)
<i>n</i>	5,355	21,055	9,573	37,468
<i>Among those needing services, child could not get all services needed due to cost or insurance</i>				
Specialty doctor	-0.03 (-2.30)	-0.03 (-1.52)	-0.03 (-1.82)	-0.03 (-1.86)
<i>n</i>	2,800	10,762	4,998	18,947
Prescription drugs	0.002 (0.19)	-0.003 (-0.26)	-0.01 (-0.43)	-0.01 (-0.59)
<i>n</i>	4,715	18,492	8,699	33,914
Therapy	0.02 (0.26)	0.03 (0.35)	0.02 (0.29)	0.02 (0.31)
<i>n</i>	1,540	5,948	2,004	7,707
Mental health	0.07 (0.76)	0.01 (0.10)	0.07 (0.70)	0.01 (0.12)
<i>n</i>	2,238	9,153	2,405	9,747

Notes: Table presents coefficients and *T*-statistics (in parentheses) from ordinary least squares models that use sample weights and robust standard errors clustered on state. Table only shows estimated coefficient on interaction term between ASD and mandate. Mandate States are states that passed an ASD mandate during our study period. All outcomes are binary. Other covariates included in DD models are: ASD indicator, survey year fixed effects, state fixed effects, and dummy variables for each child age. Other covariates included in DDD models are: ASD indicator, survey year fixed effects, state fixed effects, ASD × survey year fixed effects, ASD × state fixed effects, state fixed effects × year fixed effects, and dummy variables for each child age. Sample limited to CSHCN with private health insurance coverage. Tx group is the treatment group (CSHCN with ASD). DD indicates double difference model, while DDD indicates triple difference model. Tx group is the treatment group. ASD stands for autism spectrum disorder.