Journal of Pediatric Nursing (2015) **30**, 227–235

Secondhand Smoke Exposure, Parental Depressive Symptoms and Preschool Behavioral Outcomes

Nerissa S. Bauer MD, MPH[a,b,*], Vibha Anand PhD[c], Aaron E. Carroll MD, MS[a,b], Stephen M. Downs MD, MS[a,b]

[a]*Department of General & Community Pediatrics, Section of Children's Health Services Research, Indiana University School of Medicine, Indianapolis, IN*
[b]*Regenstrief Institute for Healthcare, Indianapolis, IN*
[c]*Pediatric Institute, Cleveland Clinic, Cleveland, OH*

Received 19 January 2014; revised 12 June 2014; accepted 17 June 2014

Key words:
Child preschool;
Mental health;
Primary health care;
Screening;
Secondhand smoke

Little is known about the association of secondhand smoke (SHS) exposure and behavioral conditions among preschoolers. A cross-sectional analysis was used to examine billing and pharmacy claims from November 2004 to June 2012 linked to medical encounter-level data for 2,441 children from four pediatric community health clinics. Exposure to SHS was associated with attention deficit-hyperactivity disorder/ADHD and disruptive behavior disorder/DBD after adjusting for potential confounding factors. Assessment of exposure to SHS and parental depressive symptoms in early childhood may increase providers' ability to identify children at higher risk of behavioral issues and provide intervention at the earliest stages.

THE PREVALENCE OF behavioral conditions among preschool aged children has been increasing steadily (Egger & Angold, 2006). There also is a nationwide shortage of child psychiatrists and other community mental health providers with expertise in working with young children. Therefore, there is a critical need to examine efficient strategies to support pediatric health care providers who are asked to identify at-risk children as early as possible (Thomas & Holzer, 2006). Shifting the focus towards screening for psychosocial risk factors associated with pediatric behavioral issues may help identify at-risk children such that behavioral issues can be prevented or identified as they are emerging. This is important as pediatric providers can then feasibly manage these issues in the primary care setting. This understanding may aid in prioritizing screening and intervention efforts by pediatric healthcare providers and public health officials for at-risk children. SHS exposure can be screened effectively in primary care settings and is amendable to brief counseling (Anand, Carroll, & Downs, 2012; Bandiera, Richardson, Lee, He, & Merikangas, 2011; Downs, Zhu, Anand, Biondich, & Carroll, 2008; Hamer, Ford, Stamatakis, Dockray, & Batty, 2011; Rosen, Noach, Winickoff, & Hovell, 2012; Twardella, Bolte, Fromme, Wildner, & von Kries, 2010). In a 2007 national survey, 5.5 million children resided in households with a smoker (Singh, Siahpush, & Kogan, 2010). Despite successful US public health efforts aimed at reducing SHS exposure among non-smokers, children of non-Hispanic Whites and Blacks continue to be at highest risk (Pirkle, Bernert, Caudill,

* Corresponding author: Nerissa S. Bauer.
E-mail address: nsbauer@iu.edu.

http://dx.doi.org/10.1016/j.pedn.2014.06.004
0882-5963/

Sosnoff, & Pechacek, 2006; Sexton et al., 2004; Wilson, Kahn, Khoury, & Lanphear, 2005). Additionally, SHS exposure in the prenatal and postnatal periods has been associated with increased rates of childhood behavior problems (Herrmann, King, & Weitzman, 2008).

Despite the growing attention to the science on early brain and child development (Garner & Shonkoff, 2012), relatively little research has focused on secondhand smoke and its association with preschool behavioral outcomes. The majority of studies examining the negative effects of secondhand smoke and behavioral outcomes have relied upon samples of school-age children. One example of this is attention-deficit hyperactivity disorder (ADHD) (Banerjee, Middleton, & Faraone, 2007; Faraone, Sergeant, Gillberg, & Biederman, 2003; Froehlich et al., 2007; Langley, Rice, van den Bree, & Thapar, 2005; Yoshimasu et al., 2009). However, ADHD is increasingly being diagnosed among preschoolers such that clinical care guidelines have been revised to encourage providers to consider this diagnosis among this age group (Kollins et al., 2006; Wolraich et al., 2011). Moreover, identification rates of other common psychiatric disorders among preschoolers have been increasing as well (Carter et al., 2010; Egger & Angold, 2006; Wilens et al., 2002b). Pediatric providers routinely screen for various psychosocial risk factors during frequent well-child visits in the first 5 years of life. Yet, no studies were found in our review of the literature that have utilized data collected in community clinics to understand what risk factors are associated with earlier behavioral outcomes.

Prior work also has not accounted for important risk factors such as parental mental health conditions. For instance, parental depression has been correlated with poor childhood behavioral outcomes and is being increasingly screened for by pediatric healthcare providers (Earls, 2010; Field, 2011; Murray et al., 2011). Yet, past studies have not always controlled for this important confounder, i.e. depressive symptoms among parents of young children (Bandiera et al., 2011; Hamer et al., 2011; Twardella et al., 2010). Our findings add to existing literature by showing that secondhand smoke is associated with behavioral outcomes as early as preschool age. It also focuses on a community-based sample using data collected in primary care and adjusts for exposure to parental depressive symptoms.

Methods

Study Design

This is a cross-sectional study of children between the ages of 0 and 6 years seen at 4 community pediatric clinics between November 2004 and June 2012. Data for this study were derived from a computerized decision support system used in conjunction with our electronic health record. Children were included in the study sample if complete visit level data for exposure to SHS and parental depressive symptoms were available.

Data Sources

We used data collected through the pre-screener form generated by the Child Health Improvement through Computer Automation (CHICA) system, which has been described elsewhere (Anand, Biondich, Liu, Rosenman, & Downs, 2004; Anand et al., 2012). Briefly, CHICA provides clinical decision support for both pediatric preventive care and disease management services (Anand et al., 2004, 2012; Downs et al., 2008). When a parent brings a child to a clinic that uses CHICA, a pre-screener form is generated for the parent to complete in the waiting room. The pre-screener form contains 20 questions based on information contained in the child's health record and the age of the child at the visit as displayed in Figure 1 (Downs, Biondich, Anand, Zore, & Carroll, 2006). Once completed by the parent, the pre-screener form is scanned back into the system, and the data are incorporated immediately into the child's health record. CHICA then generates a separate physician worksheet with 6 selected prompts, based on information the parent provided on the pre-screener form and information in the health record. These prompts are designed to call the pediatric provider's attention to specific health risks during the face-to-face encounter as displayed on a sample physician worksheet in Figure 2. At the end of the visit, the physician worksheet is scanned back into CHICA. Data for this study were extracted from the electronic medical record. We linked data from the parent-completed pre-screener form containing information about individual child and family health risks to administrative data of mental health diagnoses and prescriptions data from our statewide clinical network, the Indiana Network for Patient Care, which houses billing data, physician orders, filled prescriptions, and laboratory reports (McDonald et al., 2005).

Measures

SHS Exposure

SHS exposure was defined by any positive response to CHICA's pre-screener question asking families whether any household member smoked. Parents of children 0–11 years of age were asked about SHS exposure if no previous information regarding the child's exposure to SHS existed in CHICA during the last 18 months or if the question had not been asked before. A positive response during any visit resulted in the child being classified as having had SHS exposure. Likewise, if no affirmative responses were captured for any visits, the child was categorized as not having had SHS exposure.

Socio-Demographic Characteristics

Child gender, race/ethnicity and insurance category were obtained from CHICA's database. Insurance category served as a proxy for socio-economic status.