Exploring Children's Secondhand Smoke Exposure with Early Child Care Providers

Jennifer R. Warren, PhD, Phyllis Sloan, MA, Michele Allen, MD, MS, Kolawole S. Okuyemi, MD, MPH

Background: Exposure to secondhand smoke (SHS) is a contributor to the increased morbidity and mortality experienced by inner-city African-American children. Limited evidence-based programming exists regarding how to address the negative effects of SHS in this community.

Purpose: A collaboration with an early child care center provided an opportunity to explore factors related to young children's SHS exposure as the first step in developing strategies to reduce exposure.

Methods: Survey data were obtained between 2008 and 2009 from 63 African-American parents of infants and children aged ≤5 years at two early child care centers located in an urban Minneapolis neighborhood. Forty-three of these children had salivary cotinine levels assessed.

Results: Parents living below the poverty level were more likely to report that their children were regularly exposed to SHS by family/friends ($p=0.01$). Sixty-eight percent of participants reported complete home smoking restrictions, which was significantly correlated with advice from the child's health provider ($p=0.001$). Nonsmokers and older parents were less likely to receive advice ($p=0.03$). Of the 43 children in whom cotinine levels were assessed, 39.5% had levels >0.64 ng/ml, which suggests high SHS exposure. Lower cotinine levels were significantly correlated with living in detached houses.

Conclusions: Exposure to SHS was common for children in this study. These findings, if supported by additional research, can be used to develop and disseminate targeted health messages about childhood SHS sources/negative effects and strategies to reduce exposure.

(Am J Prev Med 2010;39(6S1):S44–S47)

Background

Nine million children aged less than 5 years may be exposed to secondhand smoke (SHS) in the U.S.[1,2] SHS exposure is particularly high among lower-income African-American children, in whom serum cotinine levels have been measured at more than two times the level observed in white and Mexican-American children.[3] Among young children, exposure to SHS is associated with intellectual deficits, and diseases such as asthma[4,5] that result in large numbers of hospital visits.[6] Asthma disproportionately affects African-American children living in low-income households.[6–8] In inner-city Minneapolis, Minnesota, nearly one in five households report that children aged less than 6 years are exposed to SHS, and there is also a high concentration of children with asthma in this community.[9]

The implementation of smoking restrictions by parents has been shown to greatly reduce the negative effects of SHS exposure among young children.[3,10,11] Unfortunately, lower-income African-American households are less likely to establish home smoking restrictions.[3] One reason may be that these parents are less likely to be given advice from their physician to protect their children from SHS exposure, as is true for more than half of parents.[12,13] If parents do receive such advice, cultural factors, including mistrust, can affect African Americans' interaction with health providers,[14] causing parents to perceive advice on the negative effects of SHS as calling into question their parenting skills.

Because of the negative effects of SHS for young children and potential barriers to SHS reduction within lower-income and inner-city African-American communities,

From the Department of Communication (Warren), School of Communication and Information, Rutgers, The State University of New Jersey, New Brunswick, New Jersey; La Crèche Early Childhood Centers, Inc. (Sloan); and the Department of Family Medicine and Community Health (Allen, Okuyemi), University of Minnesota Medical School, Minneapolis, Minnesota

Address correspondence to: Jennifer R. Warren, PhD, Department of Communication, School of Communication and Information, Rutgers, The State University of New Jersey, 4 Huntington Street, Room 216, New Brunswick NJ 08901. E-mail: jrwarren@rutgers.edu.

0749-3797/$17.00
doi: 10.1016/j.amepre.2010.09.005

there is a need to develop new approaches to understand and address SHS exposure. One strategy is to provide community-based intervention through community assets, such as child care centers.[14] Studies have demonstrated that interventions in child care centers are highly effective in changing parental behavior,[15,16] resulting in long-term benefits among lower-income African-American families.[17] Moreover, partnering with local centers using community-based participatory research (CBPR) has been an effective strategy in dismantling mistrust-related barriers among lower-income communities of color.[18,19] Even though these centers have frequent contact with parents, the capacity of early child care centers to address children's SHS exposure in lower-income African-American communities remains unclear.

In the current study, a CBPR approach was used to conduct a tobacco-related survey, including cotinine testing in an inner-city child care center serving a predominately lower-income African-American population. This represented one aspect of a multi-component CBPR study. The community–academic partners were interested in gaining a baseline understanding of smoking restriction practices and children's SHS exposure at the partnering center. The goal of the research was to collaboratively plan communication strategies to address SHS exposure within the broader community by targeting the child care center.

Methods

Setting and Sample

This study represented a CBPR collaboration among the Program in Health Disparities Research at the University of Minnesota, a parent advisory board (PAB), and La Crèche Early Childhood Centers, Inc., in North Minneapolis MN. According to the Executive Director of La Crèche, 144 parents with 175 children utilized La Crèche services across two child care centers at the time of this study. Ninety-eight percent of the children were African-American, and 91% of the families were considered poor by federal income guidelines. The community–academic research team was closely involved throughout the entire project, including choice of research design and data collection methods. Survey data and salivary cotinine assays were collected from October 2008 to July 2009. Analyses were conducted from April to July 2009. This study was approved by the University of Minnesota IRB.

Eligibility/Procedures

Eligibility criteria for the parent survey included self-identifying as African American and having a child aged 6 weeks to 5 years attending La Crèche. Center administrators were certified in human subjects training through the University of Minnesota and identified eligible parents from their official database. Of the 144 parents utilizing La Crèche services, 64 were found to be eligible and were mailed the baseline survey (one survey per household) with consent information and an anonymous self-addressed stamped return envelope. Parents were provided with a $25 gift card for completing the survey.

Survey measures. A paper survey (107 items) was developed by the research team and administered to parents whose children attended La Crèche. The survey items were adapted from previous studies (see references for detail regarding question and response options) and included: *demographic characteristics*[20]; *home smoking restrictions*[20]; *general smoking restrictions*[14]; *exposure to secondhand smoke*[13]; *child's health provider advice*[13]; and *social environment*.[13]

For a child to be eligible for salivary cotinine testing, the child must have been aged 6 weeks to 5 years, currently enrolled at La Crèche, identified as African American, and have a parent who completed and returned the baseline survey. Parents who had multiple eligible children could choose only one child for testing. Sixty-three children were eligible. Salivary assays were collected on-site at one of the La Crèche centers during the school day by inserting two sorbettes (cotton-swab device) into the child's mouth, which were held under the tongue and moved around the mouth to enable total saturation. Once saturated, the sorbettes were immediately placed in conical tubes for storage, refrigerated, and then shipped to Salimetrics, LLC, in State College PA for testing. Parents were provided a $25 savings bond for the participating child.

Analysis

Surveys were double-data entered in Access and exported into SPSS version 13. Descriptive statistics were used to summarize participant demographic and tobacco-related characteristics. Categoric variables were analyzed using frequencies and percentages, and continuous variables were summarized using means and SDs. Correlational analyses were also conducted to assess the relationships among the scales. Cronbach's alpha for the scales ranged from 0.48 to 0.89. Drawing on precedents set in the literature, cotinine data were treated categorically.[21] Results for all analyses were considered significant at $p<0.05$.

Results

Survey

Sixty-three parents returned surveys for a 98% response (63/64). Demographic characteristics are outlined in Table 1. Sixty-eight percent maintain complete home smoking restrictions, with 28.6% allowing smoking in some places or at some times in their home, and 3.2% reporting no restrictions anywhere in the home. Parents with incomes below the poverty level[22] (49%) were less likely to have smoking restrictions in their homes (Table 2) and more likely to report their children were regularly exposed to SHS by family/friends ($p=0.01$). Current smokers (29%) were more likely to report that their child had been exposed to SHS in a greater number of private or public places in the past week ($p<0.001$). The likelihood of having complete home smoking restrictions was correlated with parents' reports of the child's healthcare provider advising a smokefree environment for their children in the past 12 months ($p=0.001$). Parents who were employed full-time, who were older, and those who were

Table 1. Demographic characteristics

Characteristic (N=63)	%
Gender	
Female	84
Age (years)	
M (range)	31 (20–47)
Poverty level	
Below	47
Employment	
Less than full time	40
Education	
High school or less	32
Housing type	
Detached home	41
Attached home	59
Marital status	
Single	64
Number of children	
More than one child aged <5 years in home	26

nonsmokers (p=0.03) were less likely to have been asked about SHS exposure by their child's healthcare provider in the last 12 months.

Children's Cotinine Levels

Of the 63 children eligible for testing, 43 were tested, a response of 68% (43/63). Cotinine cut-off levels were: nondetectable=0.0≤0.5; low=0.06<0.12; intermediate=0.12<0.64; and high≥0.64.[21] Of the 43 children (M age: 3 years; range: 1–5 years) whose cotinine levels were assessed (M=1.07; median=0.27; SD=1.88; range=0.00–8.42), 27.9% (n=12) had nondetectable levels of cotinine,

Table 2. Relationships between secondhand smoke restrictions and poverty status, M (SD)

Restrictions	Below poverty level	Above poverty level	p-value
Home smoking restrictions	5.66 (1.28)	6.45 (1.03)	**0.01***
Smoking restrictions in other public or private places	4.75 (1.62)	5.56 (1.41)	**0.01***

*Significant p-values are bolded.
Source: Reference 22

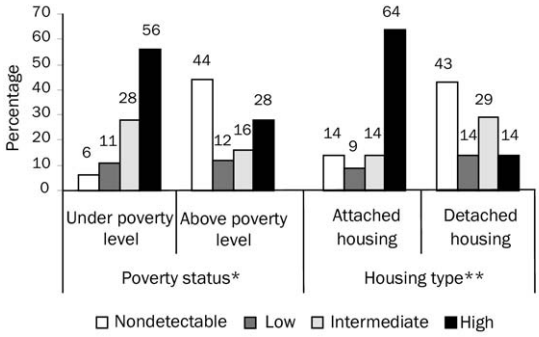

Figure 1. Cotinine levels based on poverty status and housing type
*Fisher's exact test: 8.632 (p=0.029)
**Fisher's exact test: 11.349 (p=0.007)

11.6% (n=5) had low levels of cotinine, 20.9% (n=9) had intermediate levels of cotinine, and 39.5% (n=17) had high levels of cotinine. Children living in attached housing were more likely to have high levels of cotinine (63.6%; Figure 1).

Discussion

Consistent with previous studies, this investigation found a positive association between poverty status and exposure to SHS among African-American children[1] as well as between complete home smoking restrictions and advice from the child's healthcare provider to have a smokefree environment.[5,23] In the current study, utilizing a CBPR approach to collaborate with an early child care provider, resulted in high levels of response for both the research survey (98%) and biochemical testing (68%). This contrasts with prior findings that have shown African Americans as less willing to participate in biomedical research.[24] Additionally, as prior studies have shown, child health providers may not be advising all parents regarding SHS exposure.[12,13] The current study found that parents who are full-time workers, nonsmokers, or older, may not be consistently receiving this advice.

Interestingly, smoking prevalence was lower than previously measured within similar populations,[1] and the prevalence of complete home smoking restrictions was higher compared to other studies.[3] There was, however, a high prevalence of biochemically confirmed exposure among the children tested, which supports prior studies.[3] It is possible that intermittent SHS exposure may occur because reported implementation of home smoking restrictions may be less comprehensive than realized and/or the impact of thirdhand smoke in this population may not be fully understood.[25] Lastly, children may also be exposed to SHS from someone other than their parent(s), including tobacco smoke contamination in housing developments that infiltrates neighboring units.[26]

Cotinine measures in the current study indicated SHS is a common exposure for the children living in attached housing (e.g., apartments).

This study has limitations. It represents a small sample from two child care centers and thus the results may not be generalizable. Because this is a cross-sectional study, it is not possible to infer causality. Despite these limitations, the results provide relevant and novel local data from which to develop intervention strategies.

Conclusion

The current research may represent the first published study that has utilized CBPR approach with child care centers to explore young children's SHS exposure. Such an approach has the potential to overcome barriers that may limit the involvement of lower-income African-American communities in biomedical research. Additionally, child health providers should seek to identify parents living in multi-unit dwellings to address these causes of exposure, as well as including nonsmokers, older parents, and those with full-time employment in advice given regarding SHS. With further study, these findings have the potential to enhance efforts to reduce young children's exposure to SHS and reduce tobacco-related childhood illness and disease.

This work was supported by grant RC-2007-0028 from ClearWay Minnesota[SM]. The contents of this manuscript are solely the responsibility of the authors and do not necessarily reflect the official views of ClearWay Minnesota.

No financial disclosures were reported by the authors of this paper.

This paper was supported by ClearWay Minnesota[SM] as part of a supplement entitled ClearWay Minnesota[SM]: Advancing Tobacco Control Through Applied Research (Am J Prev Med 2010;39[6S1]).

References

1. Feinson J. Knowledge and attitudes about smoking among children with lung and allergic disorders and their parents. Pediatric Asthma, Allergy & Immunology 2004;17(4):251–61.
2. Miller T, Rauh VA, Glied SA, et al. The economic impact of early life environmental tobacco smoke exposure: early intervention for developmental delay. Environ Health Perspect 2006;114(10):1585–8.
3. USDHHS. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General. Atlanta GA: USDHHS, CDC, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.
4. Yolton K, Dietrich K, Auinger P, et al. Exposure to environmental tobacco smoke and cognitive abilities among U.S. children and adolescents. Environ Health Perspect 2005;113(1):98–103.
5. Gehrman CA, Hovell MF. Protecting children from environmental tobacco smoke (ETS) exposure: a critical review. Nicotine Tob Res 2003;5(3):289–301.
6. Vargas PA, Simpson PM, Gary Wheeler J, et al. Characteristics of children with asthma who are enrolled in a Head Start program. J Allergy Clin Immunol 2004;114(3):499–504.
7. Berman BA, Wong GC, Bastani R, et al. Household smoking behavior and ETS exposure among children with asthma in low-income, minority households. Addict Behav 2003; 28(1):111–28.
8. Teach SJ, Crain EF, Quint DM, et al. Indoor environmental exposures among children with asthma seen in an urban emergency department. Pediatrics 2006;117(4 Pt 2):S152–158.
9. Landreman U, Swaney S, Zimmerman T, et al. Geographic data book: survey of the health of adults, the population, and the environment [SHAPE]. Hennepin County Community Health Dept.; Bloomington Division of Public Health 2002:3-154.
10. Gonzales M, Malcoe LH, Kegler MC, et al. Prevalence and predictors of home and automobile smoking bans and child environmental tobacco smoke exposure: a cross-sectional study of U.S.- and Mexico-born Hispanic women with young children. BMC Public Health 2006;6:265.
11. Levy DT, Romano E, Mumford EA. Recent trends in home and work smoking bans. Tob Control 2004;13(3):258–63.
12. Hymowitz N, Schwab J, Haddock C, et al. The pediatric resident training on tobacco project: baseline findings from the Parent/Guardian Tobacco Survey. Prev Med 2005;41(1):334–1.
13. Winickoff JP, McMillen RC, Carroll BC, et al. Addressing parental smoking in pediatrics and family practice: a national survey of parents. Pediatrics 2003;112(5):1146–51.
14. Huang H. Examining issues affecting African American participation in research studies. J Black Studies 2008;40(4):619–36.
15. Guralnick M. Effectiveness of early intervention for vulnerable children: a developmental perspective. American Journal on Mental Retardation 1998;102(4):319–45.
16. Ramey CT, Ramey SL. Early intervention and early experience. Am Psychol 1998;53(2):109–20.
17. Nelson G, Westhues A, MacLeod J. A meta-analysis of longitudinal research on preschool prevention programs for children. Prevention and Treatment 2003;6(December):Art. 31.
18. Israel B, Eng E, Schulz A, et al. Methods in community-based participatory research for health. San Francisco CA: Jossey-Bass, 2005.
19. McAllister CL, Green BL, Terry MA, et al. Parents, practitioners, and researchers: community-based participatory research with early head start. Am J Public Health 2003;93(10):1672–9.
20. Ahluwalia JS, Okuyemi K, Nollen N, et al. The effects of nicotine gum and counseling among African American light smokers: a 2 × 2 factorial design. Addiction 2006;101(6):883–91.
21. Mannino DM, Homa DM, Redd SC. Involuntary smoking and asthma severity in children: data from the Third National Health and Nutrition Examination Survey. Chest 2002;122(2):409–415.
22. Poverty income guidelines. Fed Regist 2009;74(14):4199–201.
23. Hymowitz N, Pyle SA, Haddock CK, et al. The pediatric residency training on tobacco project: four-year parent outcome findings. Prev Med 2008;47(2):221–4.
24. Graham S. "Most of the subjects were white and middle class": Trends in published research on African Americans in selected APA journals, 1970–1989. American Psychologist 1992;47(5):629–39.
25. Winickoff JP, Friebely J, Tanski SE, et al. Beliefs about the health effects of "thirdhand" smoke and home smoking bans. Pediatrics 2009; 123(1):e74–e79.
26. Kraev TA, Adamkiewicz G, Hammond SK, et al. Indoor concentrations of nicotine in low-income, multi-unit housing: associations with smoking behaviors and housing characteristics. Tob Control 2009; 18(6):438–44.