ORIGINAL INVESTIGATION

Children With Asthma Versus Healthy Children: Differences in Secondhand Smoke Exposure and Caregiver Perceived Risk

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Received January 28, 2013; accepted October 8, 2013

ABSTRACT

Introduction: Secondhand smoke (SHS) exposure remains a public health problem. Few, if any, studies include both children with and without asthma to assess differences in caregiver smoking behavior, risk perception, and SHS.

Methods: Participants were 738 daily U.S. smokers (443 caregivers of children with asthma [CG-AC] and 295 caregivers of healthy children [CG-HC]; 50.9% White, 25% Black, 15% Latino). Data are cross-sectional; SHS was measured through self-report and passive dosimetry.

Results: Compared with CG-HC, CG-AC had fewer risk factors for exposing children to SHS (lower nicotine dependence, higher motivation to quit, greater perceived benefits of cessation on child's health, and lower optimistic bias; all p values < .05). Specifically, 60.6% of CG-AC reported a household smoking ban versus 40.1% of CG-HC ($p < .05$), though >95% of both groups had detectable levels of SHS in their home. CG-AC self-reported lower SHS than CG-HC, but both groups had nearly equivalent SHS when measured objectively. CG-AC were almost twice as likely as CG-HC to report a home smoking ban when they had detectable levels of household SHS as measured by passive dosimetry ($OR = 1.71$; 95% CI = 1.2, 2.4; $p = .003$).

Conclusions: Caregivers of children with chronic health conditions, such as asthma, may be motivated to self-report lower levels of SHS. Child health status (e.g., asthma) may cue practitioners to inquire about SHS, but given the low proportion of household bans and high levels of actual exposure among both groups, SHS exposure assessment and reduction/elimination counseling should be prompted to occur for all children.

INTRODUCTION

Global estimates indicate that 40% of children are exposed to secondhand smoke (SHS; Oberg, Jaakkola, Woodward, Peruga, & Pruss-Ustun, 2011). In the United States, survey data from 2007 to 2008 indicate that 18.2% of children aged 3–11 and 17.1% of youths aged 12–19 live with someone who smokes inside the home, with approximately half having significant exposure as indicated by serum cotinine levels [Morbidity and Mortality Weekly Report (MMWR), 2010]. SHS exposure has numerous negative health effects for children, including increased risk of sudden infant death syndrome, upper and lower respiratory tract infections, cough, and development of asthma (Rushton, 2004). SHS is a particular problem for children with asthma (Akinbami, Moorman, Garbe, & Sondik, 2009), as it directly triggers asthma episodes and also increases airway responsiveness to irritants and allergens that affect asthma (Lodrup & Carlsen, 2001). SHS is associated with increases in school absence, emergency care, and hospitalization among children with asthma (Mannino, Homa, & Redd, 2002). Parents of children with asthma continue to smoke at levels comparable to the general population (Liem, Kozyrskyj, Benoit, & Becker, 2007), despite knowledge that SHS contributes to the development and exacerbation of asthma (Mahabee-Gittens, 2002). In one study, only one third of parents of children with asthma expressed motivation to quit smoking (Farber et al., 2008).

To our knowledge, caregivers of children with and without asthma have not been compared with each other, within the same study, on a variety of risk factors for SHS (e.g., risk

doi:10.1093/ntr/ntt180
Advance Access publication December 4, 2013
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perception and motivation to quit smoking) or differences in SHS exposure (objective and self-reported). In terms of risk perception, we examine the three integral constructs of the Precaution Adoption Process model (Weinstein, 1988), a theoretical framework, which describes how people process risks. Specifically, we examine between-group differences in perceived vulnerability (perceived risk of smoking to the child's health), optimistic bias (belief that risk to their child is less than that faced by other children), and precaution effectiveness (belief that risk could be reduced by elimination of smoking around child; Borrelli et al., 2002; Weinstein, Rothman, & Sutton, 1998). Enhanced understanding of SHS risk factors, like the perception of risks of SHS to their children and caregiver motivation to quit smoking, is crucial to design effective intervention approaches and public health messages. We hypothesized that caregivers of children with asthma (CG-AC) would have higher levels of motivation to quit smoking and report greater perceptions of the risks of their smoking to the child's health than caregivers of healthy children (CG-HC). We further hypothesized that CG-AC would be more likely than CG-HC to report a ban on smoking in the home. Finally, we hypothesized that CG-AC would demonstrate an increased level of social desirability to report reduced smoking in the home relative to CG-HC, as measured by a larger discrepancy between self-reported smoke exposure in the home versus objectively measured smoke exposure in the home. Findings could have important implications for health care providers, who rely on self-reported information regarding SHS and who may assume that parents of children with asthma are motivated to quit smoking and to reduce smoking around their child.

METHODS

Participants

Data for the current analyses are taken from baseline measures of participants in a smoking cessation induction trial (R01 HL062165-06, B. Borrelli, PI) conducted in the Northeastern United States (Rhode Island and Massachusetts). Participants were caregivers who smoked, but they were not required to have a desire to quit smoking to enroll. Prospective participants were told that, in order to be part of the program, they needed to accept health education visits in their home (either asthma education or child wellness if the child did not have asthma) and discuss their smoking. All participants signed informed consent, and the study received ethical approval from our institution's Human Subjects review Board. Data were collected during 2008–2012.

A total of 856 caregivers were eligible to participate. Of these, 86.2% were able to be contacted and decided to participate. Participants were 738 smokers (443 CG-AC and 295 CG-HC). CG-AC were recruited primarily from emergency departments and physician referrals. CG-HC were recruited from school fairs and community agencies. Participants were eligible for the study if they (a) were primary caregivers ≥18 years of age of a child between the ages of 3 and 17 (defined as the person who spends the most time with the child), (b) smoked at least 3 cigarettes/day for the past year and at least 100 cigarettes in their lifetime, (c) were not currently pregnant or planning to become pregnant, (d) spoke and understood English, (e) had a telephone, and (f) were not enrolled in a smoking cessation program or were using nicotine replacement or other medications to help them quit smoking. In addition, CG-AC were eligible only if they had a child who had an asthma exacerbation in the past 3 months necessitating an emergency room visit or hospitalization. Families who had children with other significant pulmonary disease (e.g., cystic fibrosis) were excluded.

CG-HC did not have children with diagnoses of asthma, reactive airway disease, cystic fibrosis, bronchopulmonary dysplasia, bronchiectasis, recurrent pneumonia, chronic lung disease, or congenital heart disease and were not hospitalized in the last year for a serious acute respiratory illness (ARI; e.g., acute pneumonia, respiratory distress or failure, heart failure, or any other acute severe pulmonary process). Children who were treated as outpatients for self-limited episodes of ARI in the last year (e.g., otitis media, sinusitis, rhinitis) were not excluded from the study. Children who had >4 episodes of ARI in the last year or had developed a chronic or persistent ARI (e.g., chronic allergic rhinosinusitis or chronic otitis media requiring tympanotomy or tympanostomy tubes) were excluded. Anyone with a child with asthma in the home (stepchild, foster child, extended family) was excluded from the CG-HC group.

Procedure

A research assistant traveled to participants' homes to obtain written informed consent and place two air samplers (passive dosimeters); one was placed in the room in which the child spent the most time and one was worn by the child. Participants were told that the samplers measured the "air quality" of their homes. Samplers were placed for 7 days, and then participants completed the baseline questionnaire. Participants received $20.00 for completing the baseline assessment and $5.00 for returning air monitors (passive dosimeters) in good condition.

Measures

Demographics and Smoking History

We assessed caregiver age, gender, marital status, ethnicity, employment, occupation, years of education, income, smoking rate, number of past year quit attempts >24 hr, number of smokers in the household, and prior use of nicotine replacement. The Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) measured nicotine dependence. This measure is internally consistent (α = .70; Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994) and correlated with several objective measures (Fagerstrom & Schneider, 1989).

Motivation to Quit Smoking

This was assessed with two measures. The Contemplation Ladder is an one-item, 11-point scale of motivation (0 = *no thought of quitting* and 10 = *taking action to quit*), which is reliable and valid (Biener & Abrams, 1991). Participants also self-reported their readiness to quit smoking according to the stage of change (Prochaska, DiClemente, & Norcross, 1992). The stages that were assessed were as follows: Precontemplation—not thinking about quitting within 6 months, Contemplation—planning to quit within 6 months, and Preparation—planning to quit within 30 days.

Asthma Functional Severity Scale

We assessed symptom frequency and activity limitations due to asthma. Significant associations have been found between the

Asthma Functional Severity Scale (AFSS) and school absences, medication use, and medical visits for asthma (Rosier et al., 1994). The scale has adequate internal consistency (α = .72; Koinis-Mitchell et al., 2007).

SHS Exposure

Objective Measure of SHS: The passive dosimeters use nicotine as a tracer for the amount of ambient SHS. Nicotine collected in the dosimeters was analyzed by gas chromatography. The limit of detection is 0.005 μg/sample or 0.02 $\mu g/m^3$ for a weekly sample. These dosimeters have been tested in an environmental chamber (Hammond & Leaderer, 1987) and in 96 homes (Leaderer & Hammond, 1991). This method has been validated in an intercomparison study (Caka et al., 1990) demonstrating accurate detection of nicotine.

Self-Reported Exposure to SHS: Self-reported SHS (Matt et al., 2000) was evaluated by a structured interview designed to elicit reliable memory-based reports of the participant's own smoking rate as well as their report of other's smoking rates while in the home. Specifically, we assessed six indices: Home exposure from caretaker, home and car exposure from the caretaker, exposure from the caretaker and other people from all places, exposure from all people in all places, exposure from caretaker and all others in the home only, and number of cigarettes smoked by caregiver around the child over the previous week. This measure has a high degree of reliability and validity (Hovell et al., 1994; Matt et al., 2000).

Perceived Risk Measures

Perceived vulnerability was assessed with five items assessing the smoker's degree of concern regarding whether smoking makes the child's asthma worse (1 = not concerned to 4 = very concerned). These items were adapted for the CG-HC group to assess the smoker's degree of concern whether smoking affects their child's health (1 = not concerned to 4 = very concerned). This scale had good internal consistency (Cronbach's α = .85). Precaution effectiveness was assessed with five items that focused on the caregiver's anticipated benefits of quitting smoking on the child's asthma symptoms (1= not at all to 5= complete elimination of symptoms). Parallel items that focused on child's general health were given to CG-HC. This scale had excellent internal consistency (Cronbach's α = .94). Optimistic bias was assessed by asking caregivers to rate whether their chances of a medical event were more or less likely compared with the chances of these events happening to children of nonsmokers. Four medical events were assessed: chances of having an asthma exacerbation, chances of having asthma attacks, need to see a doctor due to an asthma exacerbation, and need to go to the emergency room for asthma. Response options were much lower than average, lower than average, about average, higher than average, and much higher than average than the child of a nonsmoker. CG-HC were asked similar questions that were not asthma focused (e.g., chances of child getting sick, chances that they will have to go to the emergency room due to sickness, chances that they will have to visit a doctor due to illness, and chances that their health will get worse). This scale had excellent internal consistency (Cronbach's α = .92)

Data Analysis

We examined demographic differences between CG-AC and CG-HC, using *t* tests and chi-square tests. We then compared CG-AC with CG-HC, using linear regression for continuous outcome variables and logistic regression for categorical outcome variables, controlling for significant ($p < .05$) demographic group differences (i.e., caregiver and child age, child sex, caregiver employment status, and nicotine dependence). *M*, *SD*, adjusted odds ratios (*AOR*), interquartile ranges (*IQR*), and CI are provided for outcome variables of interest.

RESULTS

Demographics

The mean Fagerström score was 4.6 (*SD* = 2.3), indicating moderate nicotine dependence, and 80.5% of participants reported at least one 24-hr quit attempt in their lifetime (*M* = 3.8, *SD* = 8.7). In the previous year, 94.8% of the children with asthma had been to the emergency room and 60.1% had been hospitalized for asthma. The mean AFSS score for children with asthma was 1.45 (*SD* = 0.93), indicating mild-to-moderate functional impairment due to asthma symptoms. Compared with CG-HC, CG-AC were younger [$t(733) = 4.03$, $p < .001$], had younger children [$t(733) = 6.06$, $p < .001$], and were more likely to be employed [$\chi^2(1, N = 730) = 5.43$, $p = .02$]. There was a higher percentage of female children in the CG-HC group compared with the CG-AC group [$\chi^2(1, N = 734) = 9.97$, $p = .002$; Table 1].

Smoking Behavior and Motivation to Quit

CG-HC were less motivated to quit smoking (β = .14; 95% CI = 0.2, 0.5; $p < .001$) and more likely to be in the Precontemplation stage of change than CG-AC (7.5% CG-HC vs. 3.4% CG-AC; *OR* = 0.34; 95% CI = 0.2, 0.7; $p = .004$; Table 2).

Caregiver Risk Perception

CG-AC were more likely to believe that quitting smoking would have a positive impact on their child's health (β = .16; 95% CI = 0.8, 2.3; $p < .001$) and less optimistically biased regarding the effect of their smoking on their child's health (β = .13; 95% CI = 0.4, 1.7; $p = .001$) than CG-HC (Table 2).

SHS Exposure

When SHS was measured objectively by the passive dosimeters, both CG-AC and CG-HC had moderately high SHS levels, but there were no significant differences between the groups ($p > .05$). However, when SHS was measured by self-report, CG-AC reported significantly lower levels than CG-HC. Specifically, CG-AC reported less SHS to their child due to their own smoking in the home (β = –.10; 95% CI = –9.5, –1.6; $p = .01$), and less SHS when both the home and car exposure were taken into account (β = –.12; 95% CI = –12.0, –3.0; $p = .001$) versus CG-HC. CG-AC also reported less SHS when taking into account all possible places of exposure and all sources of exposure (β = –.09; 95% CI = –19.3, –1.9; $p = .02$) versus CG-HC. CG-AC also reported lower "in home" exposure from all sources including themselves (β = –.12; 95% CI = –16.8, –4.0; $p = .001$) than CG-HC. There were no significant differences between CG-AC and CG-HC in caregiver reported exposure from other people or in total number of cigarettes smoked over

Table 1. Differences Between Groups on Demographics

	n	Total sample, *M* (*SD*) or % (*n*)	CG-AC, *M* (*SD*) or % (*n*)	CG-HC, *M* (*SD*) or % (*n*)	*p* value CG-AC vs. CG-HC
Gender (% female)	735				
Caregiver		81% (594)	81% (358)	81% (236)	.88
Child		46% (336)	41% (181)	53% (155)	**.002**
Age (years)	735				
Caregiver		35.0 (10.1)	33.8 (9.8)	36.8 (10.3)	**<.001**
Child		6.1 (5.0)	5.3 (4.6)	7.5 (5.2)	**<.001**
Education	735				
>High school		36% (266)	37% (162)	36% (104)	.75
Income (per year)	696				
≤$25,000		75% (519)	74% (307)	75% (212)	.66
Employment status	730				
% Employed (full- or part-time)		38% (280)	42% (183)	33% (97)	**.020**
Ethnicity/race	738				
White/Caucasian		51% (376)	49% (218)	54% (158)	.25
Black/African American		24% (180)	25% (110)	24% (70)	.73
Hispanic/Latino(a)		15% (108)	16% (71)	13% (37)	.19
Other (Asian, American Indian, etc.)		10% (73)	10% (35)	10% (38)	.55
Nicotine dependence	714	4.6 (2.3)	4.3 (2.4)	5.1 (2.2)	**<.001**

Note. CG-AC = caregivers of children with asthma; CG-HC = caregivers of healthy children.
Bold *p* values indicate significance at $p < .05$.

the week. Pearson *r* correlations between objectively measured SHS and self-reported SHS were positive (*r*'s ranged from 0.16 to 0.33, $p < .001$; Table 3).

Home Smoking Bans

Specifically, 95.9% of CG-AC ($n = 375$ of 391) and 98.4% of CG-HC ($n = 253$ of 257) had detectable levels of SHS in the home as indicated by home dosimeters (CG-AC: $M = 1.96$, $SD = 3.95$, $IQR = 0.23–3.69$ vs. CG-HC: $M = 2.04$, $SD = 2.87$, $IQR = 0.18–5.56$). CG-AC were 1.5 times more likely to report having a smoking ban in their home than CG-HC (61% CG-AC vs. 40% CG-HC; $OR = 1.79$; 95% CI = 1.29, 2.48; $p < .001$). CG-AC were almost twice as likely as CG-HC caregivers to report a home ban when in fact they had detectable levels of SHS in the home as reported by home dosimeters (58.3% CG-AC vs. 38.7% CG-HC; $OR = 1.71$; 95% CI = 1.2, 2.4; $p = .003$). There were no significant differences on self-reported number of cigarettes that the child was exposed to between CG-AC and CG-HC who had a home ban but who also had detectable levels of SHS (Table 2).

DISCUSSION

The strengths of our study include a large sample, assessment of theory-based risk perception constructs, and assessment of SHS exposure by both self-report interview and objective measures. Our hypotheses were supported: compared with CG-HC, CG-AC reported greater motivation to quit smoking, and were more likely to report a household smoking ban, less likely to be optimistically biased regarding the effects of smoking on their child, and more likely to believe that quitting smoking could help their child's health. This suggests that CG-AC have fewer risk factors for smoking around their child. Although CG-AC self-reported lower levels of SHS than CG-HC, when SHS was measured objectively, CG-AC had moderately high levels of SHS and these levels were not significantly different from those found among the CG-HC. Furthermore, CG-AC were almost twice as likely as CG-HC to report a home ban when, in fact, they had detectable levels of SHS in the home. Specifically, 60.6% of CG-AC reported a household smoking ban versus 40.1% of CG-HC ($p < .05$), although >95% of both groups had detectable levels of SHS in their home.

Our results suggest that CG-AC may feel reticent to admit to smoking around their child and may be inclined to overreport positive health behaviors such as implementing a smoking ban. This finding is consistent with the broader literature regarding overreporting or overestimating positive health behaviors, such as parental estimates of controller medication use in asthma (Bender et al., 2000). Interestingly, although CG-AC and CG-HC differed in self-reports of exposure of their smoking to their child, they did not differ in their self-report of SHS from *other* sources. Thus, CG-AC might be inclined to present a more accurate picture of exposure when they are asked about exposure from other people.

One potential implication of these results is that health care providers may not receive accurate information from caregivers about the total amount of smoke exposure. Providing education about the risks of smoke exposure should be given regardless of whether the child has asthma and regardless of caregiver report of SHS exposure. Education about the risks of SHS should be provided in a neutral, nonjudgmental manner to increase the likelihood of accurate reporting and decrease the likelihood of defensive responding (McQuaid, Walders, & Borrelli, 2003). Aside from education, objective measures

Table 2. Differences Between Groups on Smoking History, Attitudes and Beliefs, and Psychosocial Variables

	n	Total sample, *M* (*SD*) or % (*n*)	CG-AC, *M* (*SD*) or % (*n*)	CG-HC, *M* (*SD*) or % (*n*)	*B*	β	*OR*	*95%* CI	*p* value
Caregiver smoking history									
Cigarettes per day	730	14.9 (9.4)	14.5 (10.4)	15.5 (7.8)	0.88	.05		−0.4, 2.1	.18
Number of quit attempts in last year	590	1.9 (6.3)	2.1 (7.9)	1.6 (2.9)	0.27	.02		−0.9, 1.4	.65
% used NRT in past	735	24% (172)	22% (95)	27% (77)			0.86	0.6, 1.2	.41
% live with another smoker	711	46% (330)	47% (197)	46% (133)			1.06	0.8, 1.4	.73
Stage of change									
% Precontemplators	738	5% (37)	3% (15)	8% (22)			0.34	0.2, 0.7	**.004**
% Contemplators	733	35% (257)	35% (153)	36% (104)			0.91	0.6, 1.3	.56
% In Preparation	738	60% (439)	61% (272)	57% (167)			1.38	1.0, 1.9	.054
Contemplation Ladder	733	6.6 (1.2)	6.7 (1.2)	6.4 (1.3)	0.36	.14		0.2, 0.5	**<.001**
Perceived risk									
Perceived vulnerability	732	14.7 (4.1)	14.8 (3.9)	14.5 (4.3)	0.41	.05		−0.2, 1.0	.20
Precaution effectiveness	730	14.6 (4.8)	15.2 (4.3)	13.7 (5.3)	1.6	.16		0.8, 2.3	**<.001**
Optimistic bias	726	11.9 (4.1)	12.3 (3.9)	11.3 (4.2)	1.1	.13		0.4, 1.7	**.001**

Note. *B* = unstandardized beta weight; β = standardized beta weight; CG-AC = caregivers of children with asthma; CG-HC = caregivers of healthy children; *OR* = odds ratio; CI = confidence interval; NRT, nicotine replacement therapy.
Models controlled for caregiver and child age, child sex, caregiver employment status, and nicotine dependence; bold *p* values indicate significance at $p < .05$.

Table 3. Differences Between Groups on Secondhand Smoke (SHS) Exposure and Home Smoking Bans

	n	Total sample, *M* (*SD*) or % (*n*)	CG-AC, *M* (*SD*) or % (*n*)	CG-HC, *M* (*SD*) or % (*n*)	*B*	β	*OR*	CI	*p* value
Home ban in place	734	53% (385)	61% (268)	40% (117)			1.79	1.3, 2.5	**<.001**
Home SHS (nicotine monitor)	648	1.9 (3.5)	1.9 (3.9)	2.0 (2.9)	0.36	.05		−0.2, 0.9	.21
Child SHS (nicotine monitor)	639	1.2 (2.4)	1.2 (2.7)	1.2 (1.9)	0.35	.07		−0.1, 0.8	.09
Self-reported SHS									
Home only (caregiver)	735	12.4 (26.7)	8.8 (23.4)	18.0 (30.3)	−5.6	−.10		−9.5, −1.6	**.01**
Home and car (caregiver)	735	16.4 (30.5)	11.9 (26.7)	23.3 (34.5)	−7.5	−.12		−12.0, −3.0	**.001**
Home only exposure from caregiver and others	735	18.1 (41.9)	12.6 (36.2)	26.5 (48.1)	−10.4	−.12		−16.8, −4.0	**.001**
All places (caregiver and others)	735	28.4 (57.4)	21.8 (56.2)	38.3 (57.8)	−10.6	−.09		−19.3, −1.9	**.02**
Exposure from other people (not caregiver)	735	11.9 (38.2)	9.9 (39.8)	15.0 (35.5)	−3.2	−.04		−9.2, 2.9	.30
Total cigarettes smoked over the entire week (caregiver)	735	101.3 (58.7)	96.0 (61.5)	109.4 (53.3)	−0.65	−.01		−8.1, 6.8	.86

Note. *B* = unstandardized beta-weight; β = standardized beta-weight; CG-AC = caregivers of children with asthma; CG-HC = caregivers of healthy children; *OR* = odds ratio; CI = confidence interval.
Models controlled for caregiver and child age, child sex, caregiver employment status, and nicotine dependence; bold *p* values indicate significance at $p < .05$.

of SHS could be given alongside other routine medical tests (e.g., lead exposure) during children's medical appointments to augment perception of risk and to show that SHS exposure is possible even if the caregiver perceives that they are taking risk reduction strategies (e.g., smoking in another room).

CG-HC reported less motivation to quit on two different measures. CG-HC more likely to be "Precontemplators" versus CG-AC, and CG-HC were less motivated to quit smoking than CG-AC as assessed by the Contemplation Ladder. CG-HC were also less likely to report a household ban than CG-AC. These differences could be a function of lower risk perception among CG-HC. CG-HC were less likely to perceive that quitting smoking would benefit their child's health and they were more likely to be optimistically biased regarding the effect of their smoking on their child's health. While intriguing, the cross-sectional nature of our study cannot determine if lower levels of risk perception are the reason why CG-HC had lower motivation to quit smoking and were more likely to have a household ban, or if these results represent biased responding. Nevertheless, these potential associations raise important considerations for future studies regarding possible mechanisms for interventions and designing public health messages.

Despite massive public health campaigns regarding the dangers of SHS, only half of the total sample reported having a household ban on smoking. It may be that our study participants felt that they did not have control over the other household member's smoking behavior, especially if it is not their home or if it is too cold to smoke outside. Interventions targeting the entire household are needed, though this is challenging because not everyone in the household may be willing to be counseled regarding SHS elimination/reduction, or there may be power imbalances in the household that could lead to potential volatility in the family. Alternatively, interventions and public health messages could provide guidance on how to ask others not to smoke in the presence of the child, so as not to elicit defensiveness in the smoker.

It is unclear if our results would apply to all children with asthma, as our sample was comprised of those with a recent asthma exacerbation. However, our sample has a disproportionate burden of asthma morbidity, some of which can be prevented by eliminating SHS. In sum, our results indicate that (a) CG-HC may have considerable risk factors for smoking around children (higher nicotine dependence, lower motivation to quit, lower perception of the benefits of quitting smoking to the child, higher levels of optimistic bias, and fewer household bans) and (b) CG-AC may underrepresent their smoking around their child. Accordingly, education regarding the effect of smoking on child health should be integrated into every medical encounter. Pediatric asthma may act as a cue for practitioners to discuss SHS, so caregivers of CG-HC may not receive such education, especially when practitioners are pressed for time. It will be important to make clear to caregivers the effects that smoking has on the child's current and future health, even in well children, and how these risks are mitigated upon quitting (i.e., precaution effectiveness). Health care practitioners could also discuss how changes in smoking behavior could directly and positively impact the caregivers life (e.g., child would have less sick days, have less visits to the doctor, and be less likely to take up smoking themselves; Farkas, Distefan, Choi, Gilpin, & Pierce, 1999).

Despite declines in smoking rates and initiatives to reduce smoking in public places, children's SHS exposure remains a critical health problem. Because young children have more frequent preventive and acute-care medical visits than adults, parents may interact with their child's health care providers more often than they do with their own primary care physicians. Some parents may not have access to health care themselves but may have frequent contacts with their child's health care provider. This presents opportunities to intervene with parents who smoke to aid in improving the health of both the child and the parent. Interventions provided to parents during their child's medical visit has been shown to increase interest in stopping smoking as well as quit attempts and quit rates (Curry et al., 2003; Severson, Andrews, Lichtenstein, Wall, & Akers, 1997; Winickoff, Buckley, Palfrey, Perrin, & Rigotti, 2003).

Our results help guide future intervention efforts and measurement considerations in this area. For researchers, multiple measures of SHS exposure are needed, with the caveat that there will likely still be error in measurement. Pediatricians, family physicians, and other health care practitioners who interact with families can play an instrumental role in guiding parents who smoke to understand the effects of smoke exposure on their children and to take the first steps to address this important issue and promote the health of all children.

FUNDING

This work was supported by the National Heart, Lung & Blood Institute at the National Institutes of Health (NIH; R01 HL062165) to BB, ELM, and SKH. TLW was supported by NIH T32 fellowship at the time of the writing of this manuscript but is now supported by the Oklahoma Tobacco Settlement Endowment Trust. ELM was supported by NIH/NICHD (The Eunice Kennedy Shriver National Institute of Child Health and Human Development; K24HD05879) during the writing of the manuscript.

DECLARATION OF INTERESTS

None declared.

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