

Tobacco Use Behaviors and Perceptions of Parental Smokers in the Emergency Department Setting

Tobacco Use Insights
Volume 12: 1–7
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DOI: 10.1177/1179173X19841392



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ABSTRACT

BACKGROUND: More information is needed about modifiable child tobacco smoke exposure (TSE) patterns in racially diverse parental smokers to tailor interventions designed to help parents quit smoking and reduce their child's TSE. Our objectives were to determine whether there were differences in smoking and TSE patterns based on parental race and child age and whether these patterns differed based on child age within black and white parental smokers. Secondary objectives were to assess the relationship between parental perceptions about the effects of smoking and the benefits of quitting on their child based on child age, race, and reported TSE patterns and to examine biochemically verified TSE levels by child age, race, and parent-reported TSE patterns.

METHODS: Participants (N=415) were non-Hispanic black and non-Hispanic white parental smokers, mean age (standard deviation [SD])=31.2 (7.2) years, who visited the Pediatric Emergency Department (PED) or Urgent Care (UC) with their child, mean age (SD)=4.7 (4.6) years. Parents reported sociodemographics, smoking, and child TSE patterns. We conducted chi-square tests, independent t-tests, and general linear regression models to answer our primary objectives and linear regression models to answer our secondary objectives.

RESULTS: Parents were 56.1% non-Hispanic black; 87.5% women; mean (SD) number of cigarettes smoked/day was 10.5(6.8). A higher proportion of parents with younger children <3 years old reported smoking bans compared with parents with older children ≥3 to <18 years old (41.3% vs 19.7%, $P < .0001$). Subsequent analyses revealed this pattern for both black and white parents. A total of 212 (51%) of children had biochemical assessment of TSE; 89.6% had detectable TSE. Younger children had significantly higher cotinine levels than older children independent of their race ($P < .001$).

CONCLUSIONS: Children of parental smokers who visit the PED/UC were highly tobacco smoke exposed. Both black and white parental smokers with younger children were more likely to enforce smoking bans, but younger children had higher TSE levels than older children. Interventions that target this group of parental smokers with younger children may be more effective than interventions geared to all parental smokers.

KEYWORDS: tobacco smoke, children, emergency department, parents

RECEIVED: March 2, 2019. **ACCEPTED:** March 10, 2019.

TYPE: Original Research

FUNDING: The author(s) disclosed receipt of the following financial support for the research, authorship and/or publication of this article: Funding was provided by the National Institutes of Health R01HD083354 (EMMG) and K01DA044313 (ALM).

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Introduction

Parental tobacco cessation interventions have the potential to decrease morbidity in both adult smokers and children. When parents quit smoking, their children benefit because they are no longer exposed to their tobacco smoke, which may result in fewer illnesses, better overall health, and fewer health care visits.^{1,2} In addition, children of former smokers are also less likely to initiate smoking themselves.³ Parental smokers who bring their children to the Pediatric Emergency Department (PED) or Urgent Care (UC) have high rates of smoking and their children have high rates of tobacco smoke exposure (TSE).^{4,5} Most of these parental smokers are from low-income households and frequently use PED/UC settings for their children's nonacute and acute health care needs.^{6,7} Many of these parents are motivated to quit

smoking and are aware that smoking affects their child's health.^{5,8,9} Thus, the PED/UC visit may be an opportune time for parents to receive tobacco interventions that may improve their child's health. Unfortunately, parental interventions in the health care and other settings designed to decrease child TSE by helping parents quit smoking and implement smoking bans largely fail to achieve targeted quit rates or reductions in child TSE.^{10,11} Tailored cessation interventions that take into account racial differences in protective and harmful tobacco and TSE-related behaviors may improve outcomes.^{12–15}

Several studies have reported differences in patterns of smoking and cessation rates in black compared with white smokers.^{16,17} In addition, prior research has shown that parents of younger children are more concerned about the effects of TSE on their



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children compared with parents of older children.^{13,15,18,19} However, it is unknown whether there are differences in black and white parents' protective and harmful tobacco and TSE-related behaviors or concern about the effects of their smoking on their child's health and whether patterns differ by child age. Interventions specifically tailored to different parent populations that acknowledge and expand on their concerns for their children may be more effective than generic interventions. Thus, the primary objectives of this study were to determine whether there were differences in smoking and TSE patterns based on parental race and child age and whether these patterns differed based on child age within black and white parental smokers. Secondary objectives were to assess the relationship between parental perceptions about the effects of smoking and the benefits of quitting on their child based on child age, race, and reported TSE patterns and to examine biochemically verified TSE levels by child age, race, and parent-reported TSE patterns.

Methods

Design

This study used data from a randomized controlled trial (RCT) of a tobacco cessation intervention for parental smokers who presented to the PED or UC of a Midwestern Children's Hospital in the United States. Details are described elsewhere.²⁰ This study was approved by our hospital's Institutional Review Board. Parental consent and child assent on children 11 years of age or older was obtained. We analyzed data from baseline assessments obtained from parents and saliva samples obtained from children during the PED/UC visit for this study. As part of the RCT, approximately 50% of the child saliva samples were analyzed for cotinine, which is a biomarker of recent TSE;²¹ enzyme-linked immunosorbent assay (ELISA) techniques by Salimetrics LLC were used for analysis.²² Children with cotinine values >1.0 ng/mL were classified as being exposed to tobacco smoke.²²⁻²⁴

Participants

Trained clinical research coordinators approached and screened parents/legal guardians of children (age 0 to <18 years old) with a potentially TSE-related complaint (eg, cough) who presented to the PED or UC for a 23-month period beginning in April 2016. Parents were potentially eligible if they were daily smokers, English-speaking, had a permanent address and phone number, lived within a 50-mile radius of the hospital, and had no plans to move within 6 months. Parents were excluded if they were users of chewing tobacco or electronic cigarettes only or if they were taking cessation medications. There were 464 participants who enrolled during this time; 10 withdrew from the study. A total of 415 (91% of total enrolled) parents who self-identified as Non-Hispanic white or Non-Hispanic black were included in the current analysis.

Assessments

Parents completed electronic assessments that included measures of sociodemographics, financial strain (3 items, 1-5 range; items were added and means reported),²⁵ smoking behavior, nicotine dependence, prior quit attempts, and electronic cigarette use. Nicotine dependence was determined using the heavy smoking index (HSI), which is a validated, 2-item self-report measure (range: 0-6) derived from the Fagerstrom Test for Nicotine Dependence. A cut-off score of ≥ 4 was used to indicate heavy nicotine dependence.²⁶⁻²⁸ Readiness to quit was assessed using the Contemplation Ladder (range: 0-10).²⁹ To assess child TSE patterns, parents answered questions on the number of (1) cigarettes smoked per day by caregivers and (2) cigarettes smoked per day around the child by all smokers (eg, mother, father, caregiver's significant other, siblings, friends, visitors, relatives) in all locations including the home, car, and other locations during the past week. Categories were analyzed as 0 cigarettes/day compared with ≥ 1 cigarette/day. We defined parents who reported that their child was exposed to 0 cigarettes/day in any location as having implemented a total smoking ban. To assess parents' perception of their child's TSE-related health risks, we used measures adapted from Wagener et al,¹⁵ assessing perceived vulnerability (PV), which represents parents' perception of their child's health risk due to parental smoking (5 items; each range 5-20), and precaution effectiveness (PE), which represents parents' belief about their child's health benefit if they quit smoking (5 items; each range 5-20). Individual items were summed to calculate the total PV score and total PE score.

Statistical Analysis

Descriptive statistics were calculated for all variables including frequencies for categorical variables and means and standard deviations (SD) for continuous variables. Chi-square tests for categorical outcome variables and independent t-tests for continuous outcome variables were conducted to assess group differences in parental smoking patterns based on parental race (non-Hispanic black and non-Hispanic white) and child age. To evaluate potential group differences by age, we used age cutoffs of <3 years old (ie, children 0-35 months old) for younger children and ≥ 3 to <18 years (ie, children who were age 3 years to 17 years old) for older children. General linear regression models were used to assess the association between perceptions about the effects of smoking on children's health and the benefits of quitting (ie, total PV and PE scores) and parental race, child age, and total cigarettes smoked around the child by any smoker in any location as a dichotomous variable (0 cigarettes vs ≥ 1 cigarette). We examined models for possible interaction effects between race and age, age by cigarettes smoked around the child, and race by cigarettes smoked around the child. Least square means with 95% confidence

intervals (CIs) are reported. To answer our secondary objective, cotinine values were subjected to natural logarithmic transformations to stabilize residual variance as these data were not normally distributed. We conducted linear regression analyses to examine associations between log-transformed cotinine values and child age and cigarettes smoked around the child and present geometric means (GeoM) with 95% CIs. The alpha level of significance was set at 0.05. SAS version 9.4 (SAS Institute, Cary, NC, USA) was used to conduct analysis on smoking patterns and parental perceptions using survey data. R version 3.4.4 was used to conduct analyses on cotinine data.

Results

Of the 415 caregiver participants analyzed, 56.1% (n=233) of parents were non-Hispanic black and 43.9% (n=182) were non-Hispanic white; 87.5% were women; 86% of the parents were mothers, 12% fathers, and 2% were another caregiver. Most (65%) had an annual household income of \leq US\$15 000; the mean (SD) financial strain level was 2.3 (1.1; range: 1-5), and 88.2% had public insurance or were self-pay. Most of the participants had made a quit attempt in the past year (70.8%), and only 30% of parents reported smoking bans. Mean (SD) child age was 4.7 (4.6) years. The only significant differences between black and white parents were insurance type and income level (see Table 1 for a complete listing of sociodemographic characteristics).

Differences in smoking patterns by race and by child age group

Black parents smoked fewer cigarettes per day compared with white parents, and a smaller proportion of blacks had a HSI \geq 4 compared with whites. More blacks had made at least 1 quit attempt in the past year compared with whites. Blacks had lower rates of lifetime electronic cigarette use compared with whites (see Table 1 for a complete listing of smoking behavior characteristics).

Parents of younger children smoked more cigarettes per day, mean (SD) 11.2 (7.3), compared with parents of older children, mean (SD) 9.8 (6.2), $P=.04$. However, a higher proportion of parents with younger children had smoking bans (41.3% vs 19.7%, $P<.0001$; see Table 1).

Differences in smoking patterns by child age group within parental race

We examined within-group differences in the smoking patterns of black and white parents based on whether they had younger or older children. A significantly higher proportion of black parents with younger children (37.6%) reported smoking bans compared with parents of older children (21.0%, $P=.008$). Similarly, more white parents of younger children (44.8%) reported smoking bans compared with those with older children (17.6%, $P=.0002$; see Table 2).

Beliefs about effects of smoking and benefits of quitting on child's health

The overall mean (SD) score for parents' beliefs about the effects smoking has on their child's health (PV) was 12.0 (4.3). Parents who reported that \geq 1 cigarette was smoked around their child each day, compared with those reporting no cigarettes smoked around their child each day, felt more strongly that their child's health would be affected by smoking (ie, had higher PV scores): beta estimate (standard error [SE]) 2.24 (0.48), $P<.0001$. In addition, parents with younger children compared with parents with older children had higher PV scores: beta estimate (SE) 0.91 (0.44), $P=.04$. There were no significant differences in PV score by race nor were there any significant interaction effects (see Figure 1).

The overall mean (SD) score for parents' beliefs about the benefits of quitting (PE) was 13.3 (4.7). Similar to PV, parents who reported that \geq 1 cigarette was smoked around their child each day, compared with those reporting no cigarettes smoked around their child each day, felt more strongly about the benefits of quitting smoking (ie, had higher PE scores): beta estimate (SE) 1.19 (0.53), $P=.03$. Also, parents with younger children, compared with parents of older children, had higher PV scores as did black parents compared with white parents: beta estimate (SE) 1.01 (0.48), $P=.04$ (see Figure 1). There were no significant interaction effects.

Biochemical assessment of child TSE and TSE patterns

A total of 212 (51.1%) child saliva samples were analyzed for cotinine as part of the cessation trial.²⁰ Of these children, 190 (89.6%) had detectable cotinine levels of >1.0 ng/mL. The range of cotinine levels was 0 to 347.81 ng/mL (GeoM=5.78 ng/mL [95% CI: 4.87-6.83]). There was a negative bivariate correlation between log-transformed cotinine and child age ($r=-0.389$, $P<.001$). Children who were <3 years old (n=82; GeoM=10.36) had significantly higher cotinine levels than children who were ≥ 3 to <18 years old (n=130; GeoM=3.89, $P<.001$), independent of child race.

No differences were found based on cotinine levels between children who were reported to have 0 cigarettes smoked around them by any smoker in any location (n=47; GeoM=6.53) and children with ≥ 1 cigarette smoked around them (n=141; GeoM=5.64, $P=.45$) while controlling for child age and race.

Discussion

This study explored between- and within-group differences in smoking patterns and perceptions about the effects of smoking and the benefits of quitting among parental smokers based on parental race and child age. Our results show that both black and white parental smokers with younger children were more likely to report a smoking ban in which 0 cigarettes were

Table 1. Characteristics of the study population by race and by child age group.

	OVERALL (N=415)	BLACK, NON- HISPANIC (N=233) 56.1%	WHITE, NON- HISPANIC (N=182) 43.9%	P VALUE	CHILD'S AGE <3YEARS (N=210) 50.6%	CHILD'S AGE TO <18YEARS (N=205) 49.4%	P VALUE
Parent age, mean (SD)	31.2 (7.2)	31.3 (7.1)	31.0 (7.4)	.63	28.0 (5.1)	34.4 (7.6)	<.0001
Parent sex, n (%)				.26			.62
Female	363 (87.5)	200 (85.8)	163 (89.6)		182 (86.7)	181 (88.3)	
Insurance, n (%)				<.0001			.25
None or public	366 (88.2)	220 (94.4)	146 (80.2)		184 (87.6)	182 (88.8)	
Commercial	39 (9.4)	11 (4.7)	28 (15.4)		23 (10.9)	16 (7.8)	
Other	10 (2.4)	2 (0.86)	8 (4.4)		3 (1.4)	7 (3.4)	
Income, n (%) ^a				<.0001			.61
≤US\$15000	269 (65.0)	177 (76.3)	92 (50.6)		134 (63.8)	135 (66.2)	
Financial strain, mean (SD)	2.3 (1.1)	2.3 (1.0)	2.5 (1.2)	.09	2.3 (1.1)	2.4 (1.1)	.40
Employed (yes), n (%) ^a	232 (56.3)	130 (56.5)	102 (56.0)	.92	120 (57.4)	112 (55.2)	.65
Highest education level, n (%)				.63			.02
Less than high school/high school	238 (57.3)	136 (58.4)	102 (56.0)		132 (62.9)	106 (51.7)	
Some college and above	177 (42.7)	97 (41.6)	80 (44.0)		78 (37.1)	99 (48.3)	
Child age: mean, SD	4.7 (4.6)	5.1 (4.6)	4.1 (4.4)	.02	–	–	–
Number of cigarettes smoked per day by caregiver: mean, SD	10.5 (6.8)	8.2 (6.1)	13.4 (6.6)	<.0001	11.2 (7.3)	9.8 (6.2)	.04
Heavy smoking index (HSI) ≥4, n (%)	74 (17.8)	27 (11.6)	47 (25.8)	.0002	42 (20.0)	32 (15.6)	.24
High motivation to quit (≥8), n (%)	171 (41.2)	99 (42.5)	72 (39.6)	.55	88 (41.9)	83 (40.5)	.77
Any prior quit attempts in past year, n (%)	294 (70.8)	175 (75.1)	119 (65.4)	.03	153 (72.4)	142 (69.3)	.48
Number of cigarettes smoked per day around child by all smokers in all locations, n (%) ^b				.33			<.0001
Missing	33	21	12		21	12	
0	116 (30.4)	60 (28.3)	56 (32.9)		78 (41.3)	38 (19.7)	
≥1	266 (69.6)	152 (71.7)	114 (67.1)		111 (58.7)	155 (80.3)	
Electronic cigarettes: ever tried (yes), n (%)	169 (40.7)	71 (30.5)	98 (53.9)	<.0001	88 (41.9)	81 (39.5)	.62
Electronic cigarettes: current user (yes), n (%)	20 (4.8)	8 (3.4)	12 (6.6)	.14	10 (4.8)	10 (4.9)	.96

Abbreviation: SD, standard deviation.

^aMissing data: income (n=1) and employment status (n=3).^bAll locations include inside the home, car and other locations.

Bold values indicate statistical significance, P < .05.

Table 2. Comparisons of smoking behavior based on child age among black and white parental smokers.

	OVERALL (N=415)	BLACK, NON-HISPANIC		P VALUE	WHITE, NON-HISPANIC		P VALUE
	N (%)	CHILD AGE <3YEARS (N= 104)	CHILD AGE ≥3 TO <18YEARS (N= 129)		CHILD AGE <3YEARS (N= 107)	CHILD AGE ≥3 TO <18YEARS (N= 75)	
Number of cigarettes smoked per day by caregiver: mean (SD)	10.5 (6.8)	8.5 (6.8)	8.0 (5.4)	.53	13.8 (6.8)	12.9 (6.3)	.32
Heavy smoking index ≥4, n (%)	74 (17.8)	13 (12.5)	14 (10.8)	.70	29 (27.4)	18 (23.7)	.58
High motivation to quit (≥8), n (%)	99 (42.5)	46 (44.2)	53 (41.1)	.63	42 (39.6)	30 (39.5)	.98
Any prior quit attempts in past year, n (%)	294 (70.8)	82 (78.8)	93 (72.1)	.24	70 (66.0)	49 (64.5)	.83
Number of cigarettes smoked per day around child by all smokers in all locations, n (%) ^a				.008			.0002
Missing	33	11	10		10	2	
0	116 (30.4)	35 (37.6)	25 (21.0)		43 (44.8)	13 (17.6)	
≥1	266 (69.6)	58 (62.4)	94 (79.0)		53 (55.2)	61 (82.4)	
Electronic cigarettes: ever tried (yes), n (%)	169 (40.7)	32 (30.8)	39 (30.2)	.93	56 (52.8)	42 (55.3)	.74
Electronic cigarettes: current user (yes), n (%)	20 (4.8)	4 (3.8)	4 (3.1)	1.0 ^b	6 (5.7)	6 (7.9)	.55

^aAll locations include inside the home, car and other locations.

^bFisher exact test.

Bold values indicate statistical significance, $P < .05$.

smoked around their child compared with those who had older children. Other studies have also reported that parents with younger children are more likely to have smoking bans compared with parents of older children.^{18,30} These results are encouraging as a completely smoke-free environment is a first step in protecting children against tobacco-related morbidity. However, all children regardless of age should be protected against TSE. Furthermore, prior studies show that self-reported smoking bans may not accurately reflect children's exposure to tobacco smoke and that smoking bans do not protect children from thirdhand smoke.³¹⁻³⁴ Similar to these studies, our examination of a subpopulation of this study sample found that younger children had higher cotinine levels, most likely due to increased hand-to-mouth behaviors that can increase their exposure to secondhand and thirdhand smoke.^{35,36} We also found that even in the presence of self-reported smoking bans, 84.3% (n=54) of children still had cotinine levels that indicated that they were exposed to tobacco smoke. This could be due to a number of factors, including underreporting by parents especially in hospital settings where there is stigma associated with reporting child TSE.^{31-33,37,38} In addition, this lack of concordance with reported TSE and

cotinine could be due to parent's lack of awareness of all sources of TSE, which includes both secondhand smoke and thirdhand smoke,^{36,39} or improper implementation of or ineffective smoking bans.^{31-34,40} The results of our study underscore the importance of providing parents with education that the only way to fully protect their children from TSE is by quitting, but at minimum, they must enforce strict complete smoking bans to attempt to protect their children.

We assessed whether parent race, child age, or child TSE was associated with total PV or PE scores. We found that parents who endorsed that their child was exposed to ≥1 cigarette/day and parents of younger children had higher PV scores. We did not find any differences in PV scores by race. Our examination of factors associated with higher PE scores showed that in order of magnitude from greatest to least: younger child age, ≥1 cigarette/day smoked around the child, and black parental race were associated with higher PE scores. These findings are in parallel with other studies that have reported that parents of younger children recognize that smoking is harmful to their children and that quitting will benefit young children.^{13,15} In contrast to research conducted on children with asthma by Wagener et al,¹⁵ we found that parents' PV was associated with

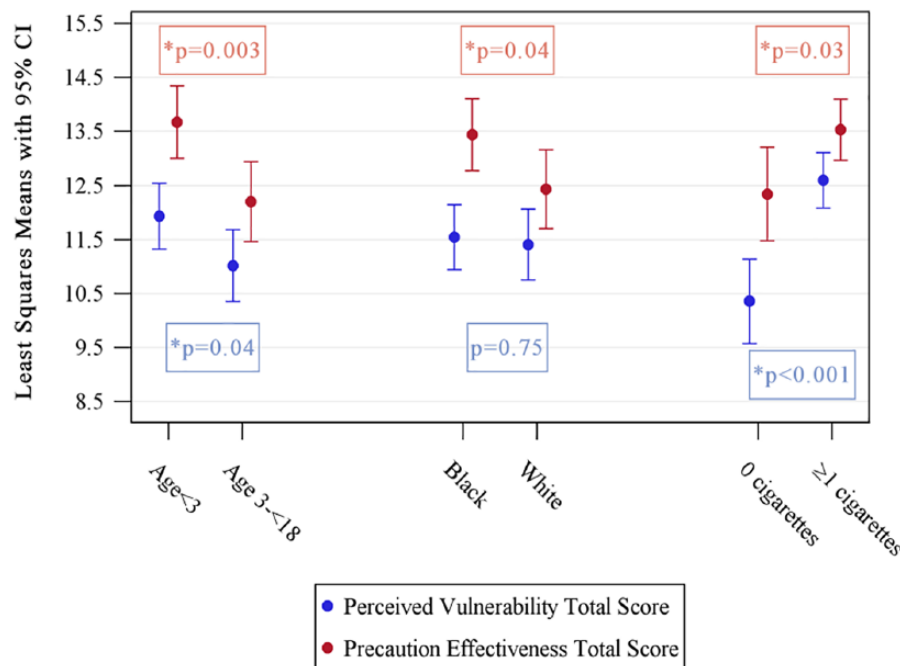


Figure 1. Perceived vulnerability and precaution effectiveness by child age, race and TSE patterns. CI indicates confidence interval; TSE, tobacco smoke exposure.

child TSE patterns. Other studies have found that parents of younger children are more likely to enforce smoking restrictions compared with parents of older children.^{18,19,30} Our findings suggest that parents of children with increased TSE and parents of younger children are aware of the effects of TSE. In addition, these parents are cognizant about the potential benefits of quitting on their children's health, irrespective of race. Thus, this diverse racial group of parental smokers may be a receptive group to target for future TSE reduction and cessation interventions. It may not be difficult to help these parents enforce smoking bans and motivate them to quit smoking as they already know these actions will decrease their child's TSE and improve their health. However, interventions should include information and education regarding secondhand smoke and thirdhand smoke and the best methods for implementing effective smoking bans. It is also important to consider the social stigma experienced by smokers and the potential for response bias in a hospital setting.^{40,41} Thus, we should assess for TSE and provide comprehensive information and education in a non-judgmental manner so that parents are less likely to underreport their child's TSE.

There are some limitations of this study. Our study population was a convenience sample taken from parents in an urban Midwestern PED/UC setting; thus, this sample is not representative of parental smokers in other types of settings. Parental reports of TSE were used to assess smoking practices, thus TSE may have been underreported or overreported. However, we did obtain biochemical validation of TSE on 51% of children.

Conclusion

Our results provide further evidence that children who visit the PED/UC setting are highly exposed to tobacco smoke and that black and white parental smokers are aware of the effects of TSE and the benefits of quitting on their child. As other studies have shown that parents who endorse these beliefs are motivated to quit and are more likely to successfully quit,^{13,42} parental smokers who visit the PED/UC should be routinely offered cessation counseling. Our findings suggest that parents of younger children, those without smoking bans, and black parents may be particularly receptive to receiving cessation interventions focusing on their child. In addition, all parental smokers need education about the importance of complete smoking bans and information about the harmful effects of TSE on their child's health. The PED/UC visit for a TSE-related illness may represent an ideal time to leverage parents' existing concerns about their child's current illness to assist them in creating a plan to make their children's environments smoke free by quitting smoking and enforcing bans.

Author Contributions

EMMG conceived the study, overall study aims, study design, and wrote the first draft of the paper. ALM, MET, and JCK conducted the statistical analyses and interpreted the data. LS supervised participant recruitment and data collection and created databases for analyses. JSG provided input on the overall study aims, analyses and interpretation of data. All authors made critical comments and revised drafts of the paper. All authors read and approved the final manuscript.

REFERENCES

- Merianos AL, Jandarov RA, Mahabee-Gittens EM. Adolescent tobacco smoke exposure, respiratory symptoms, and emergency department use. *Pediatrics*. 2018;142:e20180266.
- U.S. Department of Health and Human Services. The health consequences of smoking: 50 years of progress. A Report of the surgeon general. Website. <http://www.surgeongeneral.gov/library/reports/50-years-of-progress/full-report.pdf>
- Kandel DB, Griesler PC, Hu MC. Intergenerational patterns of smoking and nicotine dependence among US adolescents. *Am J Public Health*. 2015;105:e63–e72.
- Mahabee-Gittens EM, Gordon JS. Missed opportunities to intervene with caregivers of young children highly exposed to secondhand tobacco smoke. *Prev Med*. 2014;69:304–305.
- Kanis J, Byczkowski T, Mahabee-Gittens EM. Motivation to quit smoking in parental smokers in the pediatric emergency department. *Pediatr Emerg Care*. 2014;30:546–551.
- Morrison AK, Schapira MM, Gorelick MH, Hoffmann RG, Brousseau DC. Low caregiver health literacy is associated with higher pediatric emergency department use and nonurgent visits. *Acad Pediatr*. 2014;14:309–314.
- Kubicek K, Liu D, Beaudin C, et al. A profile of nonurgent emergency department use in an urban pediatric hospital. *Pediatr Emerg Care*. 2012;28:977–984.
- Mahabee-Gittens M. Smoking in parents of children with asthma and bronchiolitis in a pediatric emergency department. *Pediatr Emerg Care*. 2002;18:4–7.
- Mahabee-Gittens EM, Khoury JC, Ho M, Stone L, Gordon JS. A smoking cessation intervention for low-income smokers in the ED. *Am J Emerg Med*. 2015;33:1056–1061.
- Baxi R, Sharma M, Roseby R, et al. Family and carer smoking control programmes for reducing children's exposure to environmental tobacco smoke. *Cochrane Database Syst Rev*. 2014;1:CD001746.
- Rosen LJ, Noach MB, Winickoff JP, Hovell MF. Parental smoking cessation to protect young children: a systematic review and meta-analysis. *Pediatrics*. 2012;129:141–152.
- Lepore SJ, Winickoff JP, Moughan B, et al. Kids safe and smokefree (KiSS): a randomized controlled trial of a multilevel intervention to reduce secondhand tobacco smoke exposure in children. *BMC Public Health*. 2013;13:792.
- Mahabee-Gittens EM, Collins BN, Murphy S, et al. The parent-child dyad and risk perceptions among parents who quit smoking. *Am J Prev Med*. 2014;47:596–603.
- Webb Hooper M, Rodriguez de Ybarra D, Baker EA. The effect of placebo tailoring on smoking cessation: a randomized controlled trial. *J Consult Clin Psychol*. 2013;81:800–809.
- Wagener TL, Gregor KL, Busch AM, McQuaid EL, Borrelli B. Risk perception in smokers with children with asthma. *J Consult Clin Psychol*. 2010;78:980–985.
- Holford TR, Levy DT, Meza R. Comparison of smoking history patterns among African American and White cohorts in the United States born 1890 to 1990. *Nicotine Tob Res*. 2016;18:S16–S29.
- Kulak JA, Cornelius ME, Fong GT, Giovino GA. Differences in quit attempts and cigarette smoking abstinence between Whites and African Americans in the United States: literature review and results from the International Tobacco Control Us survey. *Nicotine Tob Res*. 2016;18:S79–S87.
- Hawkins SS, Berkman L. Parental home smoking policies: the protective effect of having a young child in the household. *Prev Med*. 2011;53:61–63.
- Hawkins SS, Berkman L. Increased tobacco exposure in older children and its effect on asthma and ear infections. *J Adolesc Health*. 2011;48:647–650.
- Mahabee-Gittens EM, Ammerman RT, Khoury JC, et al. Healthy families: Study protocol for a randomized controlled trial of a screening, brief intervention, and referral to treatment intervention for caregivers to reduce secondhand smoke exposure among pediatric emergency patients. *BMC Public Health*. 2017;17:374.
- Benowitz NL, Hukkanen J, Jacob P 3rd. Nicotine chemistry, metabolism, kinetics and biomarkers [published online ahead of print October 13, 2010]. *Handb Exp Pharmacol*. doi:10.1007/978-3-540-69248-5_2.
- High Sensitivity Salivary Cotinine Quantitative Enzyme Immunoassay Kit. State College, PA: Salimetrics, LLC; 2015. <https://salimetrics.com/wp-content/uploads/2018/03/cotinine-saliva-elisa-kit.pdf>. Accessed November 29, 2016.
- Butz AM, Halterman JS, Bellin M, et al. Factors associated with secondhand smoke exposure in young inner-city children with asthma. *J Asthma*. 2011;48:449–457.
- Kumar R, Curtis LM, Khiani S, et al. A community-based study of tobacco smoke exposure among inner-city children with asthma in Chicago. *J Allergy Clin Immunol*. 2008;122:754.e1–759.e1.
- Vinokur AD, Price RH, Caplan RD. Hard times and hurtful partners: how financial strain affects depression and relationship satisfaction of unemployed persons and their spouses. *J Pers Soc Psychol*. 1996;71:166–179.
- Piper ME, McCarthy DE, Baker TB. Assessing tobacco dependence: a guide to measure evaluation and selection. *Nicotine Tob Res*. 2006;8:339–351.
- Perez-Rios M, Santiago-Perez MI, Alonso B, Malvar A, Hervada X, de Leon J. Fagerstrom test for nicotine dependence vs heavy smoking index in a general population survey. *BMC Public Health*. 2009;9:493.
- Chabrol H, Niezborala M, Chastan E, de Leon J. Comparison of the heavy smoking index and of the Fagerstrom test for nicotine dependence in a sample of 749 cigarette smokers. *Addict Behav*. 2005;30:1474–1477.
- Biener L, Abrams DB. The contemplation ladder: validation of a measure of readiness to consider smoking cessation. *Health Psychol*. 1991;10:360–365.
- Zhang X, Martinez-Donate A, Rhoads N. Parental practices and attitudes related to smoke-free rules in homes, cars, and outdoor playgrounds in US households with underage children and smokers, 2010–2011. *Prev Chronic Dis*. 2015;12:E96.
- Wang MP, Suen YN, Wong BY, et al. Paternal smoking and maternal protective behaviors at home on infant's saliva cotinine levels. *Pediatr Res*. 2018;83:936–942.
- Ding D, Wahlgren DR, Liles S, et al. A second reporter matters: agreement between parents' and children's reports of smoking bans in families. *Am J Prev Med*. 2011;40:572–575.
- Wilson KM, Wesgate SC, Best D, Blumkin AK, Klein JD. Admission screening for secondhand tobacco smoke exposure. *Hosp Pediatr*. 2012;2:26–33.
- Mahabee-Gittens EM, Merianos AL, Hoh E, Quintana PJ, Matt GE. Nicotine on children's hands: limited protection of smoking bans and initial clinical findings [published online ahead of print January 16, 2019]. *Tob Use Insights*. doi:10.1177/1179173X18823493.
- Mahabee-Gittens EM, Merianos AL, Matt GE. Preliminary evidence that high levels of nicotine on children's hands may contribute to overall tobacco smoke exposure. *Tob Control*. 2018;27:217–219.
- Jacob P 3rd, Benowitz NL, Destailats H, et al. Thirdhand smoke: new evidence, challenges, and future directions. *Chem Res Toxicol*. 2017;30:270–294.
- Stuber J, Galea S. Who conceals their smoking status from their health care provider? *Nicotine Tob Res*. 2009;11:303–307.
- Stuber J, Galea S, Link BG. Smoking and the emergence of a stigmatized social status. *Soc Sci Med*. 2008;67:420–430.
- Matt GE, Quintana PJ, Destailats H, et al. Thirdhand tobacco smoke: emerging evidence and arguments for a multidisciplinary research agenda. *Environ Health Perspect*. 2011;119:1218–1226.
- Howrylak JA, Spanier AJ, Huang B, et al. Cotinine in children admitted for asthma and readmission. *Pediatrics*. 2014;133:e355–e362.
- Riley KE, Ulrich MR, Hamann HA, Ostroff JS. Decreasing smoking but increasing stigma? Anti-tobacco campaigns, public health, and cancer care. *AMA J Ethics*. 2017;19:475–485.
- Pineiro B, Lopez-Duran A, Del Rio EF, Martinez U, Brandon TH, Becona E. Motivation to quit as a predictor of smoking cessation and abstinence maintenance among treated Spanish smokers. *Addict Behav*. 2016;53:40–45.