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The Parent–Child Dyad and Risk Perceptions Among Parents Who Quit Smoking

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Abstract

Background—Most parental smokers are deeply invested in their child's health, but it is unknown what factors influence parent risk perceptions of the effects of smoking on their child's health and benefits to the child of cessation.

Purpose—To explore differences in former versus current smokers' beliefs about harms of continuing to smoke, benefits of quitting, and how much smoking interferes with their parenting.

Methods—As part of a cluster RCT to increase tobacco control in the pediatric setting, we analyzed data collected at the ten control arm practices for 24 months starting in May 2010; a cross-sectional secondary data analysis was conducted in 2013. Parents were asked about smoking status and perceived harm, benefit, and well-being related to smoking behaviors.

Results—Of the 981 enrolled smoking parents, 710 (72.4%) were contacted at 12 months. The odds of having successfully quit at 12 months was 4.12 times more likely (95% CI=1.57, 10.8) for parents who believed that quitting will benefit their children, 1.68 times more likely (95% CI=1.13, 2.51) for parents with more than a high school education, and 1.74 times greater (95% CI=1.13, 2.68) for parents with children under age 3 years. Another factor associated with having successfully quit was a prior quit attempt.

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Conclusions—Providers' smoking-cessation advice and support should begin early and underscore how cessation will benefit the health and well-being of patients' children. Additionally, parents who have recently attempted to quit may be particularly primed for another attempt.

Introduction

Up to half of all smokers die prematurely, and each year, 443,000 deaths are attributable to smoking, accounting for one in five deaths in the U.S.^{1–5} In addition to the direct harmful effects of tobacco on smokers, tobacco smoke exposure (TSE) is a leading cause of preventable morbidity and mortality in children. Reducing children's TSE remains a public health priority¹ given the well-established associations between pediatric TSE and acute and chronic health conditions such as asthma, bronchiolitis, other respiratory tract infections, otitis media, behavioral and neurocognitive problems, cancers, and coronary heart disease.^{1–8}

Because of the numerous health risks associated with children's TSE, the American Academy of Pediatrics (AAP) strongly recommends that pediatric practitioners advise all parents and caregivers to quit smoking as a way of protecting children against the harms of TSE.⁵ Pediatric healthcare visits provide teachable moments for parents who smoke.^{9–11} However, many barriers exist (e.g., time, counseling resources, among others) in pediatric clinics that limit the opportunity for providers to implement interventions for smoking cessation that extend beyond brief advice.^{10–12} Brief advice alone may motivate parents to consider smoking behavior change and implementation of smoking restrictions to reduce TSE; however, brief advice may not be sufficient to promote long-term smoking behavior change.^{13–15}

In an effort to improve cessation outcomes of interventions in pediatric settings, researchers have proposed the inclusion of risk communication strategies designed to increase parents' perception of risks associated with their tobacco use and child TSE, as well as to increase parents' perceptions about the child and adult health risks associated with not quitting smoking.^{15,16} A recent meta-analysis¹⁵ reviewed the effects of such interventions and found that increased risk perceptions may improve the likelihood of smoking cessation. One of the intervention approaches that explored the influence of risk perceptions on TSE reduction was framed within the precaution adoption process model described by Weinstein and Sandman.¹⁷ This model is used to explain the stages in patterns of behavior, beliefs, and experiences that an individual goes through that leads to decisions to take action.¹⁸ This approach has been used successfully in achieving significant cessation rates in parental smokers,^{16,19} as well as in interventions promoting a variety of health behaviors including colorectal and mammography screening^{20,21} and encouraging healthy eating and sun protective behaviors in adolescents.^{22,23} The current study was conducted to advance the understanding of the potential influence of parent risk perceptions of their smoking on their smoking-cessation outcomes. A particular variable of interest was parents' perception of the degree to which their smoking interferes or conflicts with their role as a parent in maintaining their child's health and well-being. In a seminal study on parent risk perception and child TSE, Wagener and colleagues¹⁶ posited that parents' self-perception as a child

caretaker could be undermined if they viewed that their smoking contributed negatively to their own, or to their child's, health. In the present study, a cross-sectional secondary data analysis was conducted to explore the influence of smoking-related risk perceptions and parental role conflict on smoking outcomes among smokers versus ex-smokers in a usual-care control arm of an intervention trial. It was hypothesized that the following perceptions would be related to increased likelihood of cessation at 12-month follow-up (the end of the study): perceptions of personal and child harm in continuing to smoke, perceptions of personal and child benefits and overall well-being related to quitting smoking, confidence in staying quit, and perceptions that smoking interferes with one's role as a parent.

Methods

Overview

As part of the Clinical Effort Against Secondhand Smoke Exposure (CEASE), a cluster RCT that studied the implementation of a pediatric office-based intervention to address parental tobacco use, data collected at the ten control arm practices were analyzed; further details are described elsewhere.²⁴ IRB approval was obtained from the Massachusetts General Hospital (Boston MA), the AAP, and local IRBs when required by the practices. All data were collected from May 2010 through May 2012; cross-sectional data analysis was performed in 2013.

Pediatric Practices

Twenty practices were randomized to the intervention or usual-care control arms of the trial. This study analyzed data collected only from parents in the control arm practices. Each practice had at least three practitioners on staff, was not housed in a medical school or parent university, and was visited by at least 50 patients and at least ten smokers per day. To avoid contamination of the intervention effect, this analysis was limited to participants from the ten practices randomized to the control arm.

Study Participants

Any adult that was the primary caretaker of the child, older than age 18 years, English-speaking, and having reported they had "smoked a cigarette, even a puff, in the last 7 days" was eligible to be a study participant. Participants did not have to be interested in stopping smoking to participate.

Enrollment Procedures

At each practice, one or more research assistants were stationed near the exit to administer a screening questionnaire to all adults after their child's visit. If the parent was eligible, the research assistant obtained informed consent and administered an enrollment survey. All parents who enrolled received \$5 upon completing the survey. Screening continued until 100 parents had been enrolled at each practice.

Follow-up phone interviews were conducted at 12 months by the University of South Carolina using a computer-assisted telephone interviewing (CATI) system.

Measures

The screening questionnaire gathered demographic information: parent's age, race and ethnicity, and level of education; the age of the youngest child present at the visit; and child's insurance status (private insurance, Medicaid, self-pay, or other). Eligible parents completed baseline and 12-month follow-up assessments. At each time point, questionnaires assessed current smoking status, which was determined by the question: *Have you smoked a cigarette, even a puff, within the past 7 days?* Assessment measures related to smoking-related beliefs were obtained from the 12-month surveys (see Table 1 for questions and coding). These measures included: belief about thirdhand smoke, belief regarding impact of smoking on parental role (only this question was asked both at baseline and 12 months), confidence in staying quit, perceived effects of smoking on the well-being of the child and parent, harms of continued smoking on the child and parent, and benefits of quitting on the child and parent. The questionnaire also asked about strategies to help quit during the previous 12 months, including quit attempts, Quitline (QL) utilization, and use of nicotine replacement therapy (NRT) or prescription cessation medications.

Statistical Analysis

Univariate analyses were conducted to examine the relationship between factors and quit status. Logistic regression models with generalized estimating equations (GEE) were used to account for physician clustering. Candidates for the multivariable model included seven pre-determined predictors based on the literature^{25–27} (parent age, gender, race, education, number of cigarettes smoked per day, child's insurance, and other intervention) and those significant at the 0.1 level in the univariate analysis. Potential multicollinearity was examined by the variance inflation factor. The final model included the pre-determined predictors and variables remained significant at 0.05 level. AORs and 95% CIs were reported for each variable from the final model. All analyses were conducted using SAS, version 9.3 (SAS Institute Inc., Cary NC).

Results

Of the total 981 parental smokers who were enrolled in ten Pediatric in Office Settings (PROS) control practices, 710 were contacted at 12 months. Twelve patients were excluded from the analysis owing to missing data, thus the final sample size was 698. The majority (68%) of the parents were aged 25–44 years, 80% were women, mostly mothers, and 65% non-Hispanic white. Many parents (43%) had only a high school degree and 15% had completed college. Most of the children were under age 10 years (75%) and most (62%) were covered by Medicaid. Three hundred forty-four parents (55%) smoked at least ten cigarettes per day (Table 2). Attrition analysis revealed that those lost to follow-up were older (age [SD]: 30.9 [8.4] vs 28.9 [7.2] years), male (81% vs 72%), had children who were 1–4 years old (38% vs 34%), and did not have Medicaid coverage (65% vs 71%).

There were 111 (16%) former smokers at 12-month follow-up. The majority (88%) of former smokers believed that thirdhand smoke was harmful to their child and 53% believed that being a smoker interfered with their role as a parent. Only 58% of current smokers had made a quit attempt in the 3 months prior to the baseline survey, compared to 96% of former

smokers ($p<0.0001$). There were no statistically significant differences between current and former smokers in their use of any of the following cessation methods: QL, NRT, or prescription cessation medication (Table 3); however, data were not collected on frequency or amount of use of these cessation methods. In terms of their attitudes, former smokers were more likely to believe that: their continued smoking is harmful to their children, quitting would benefit their child and themselves, and quitting smoking would improve their child's and their own personal well-being. Both groups had similar beliefs about harms to self due to continuing smoking (92% vs 90%, $p=0.15$). Parental role conflict was not associated with smoking status.

Multivariable Analysis of Risk Perception and Quit Status

The final multivariable model of predicting quit status (Table 4) included seven pre-determined predictors (parental age, gender, race/ethnicity, education, child insurance status, cigarettes smoked/day, and any type of intervention) and three variables with potential associations with smoking status suggested following univariate analyses ($p<0.10$: child's age, quit attempt, and belief that quitting would benefit their child). The resulting multivariable model suggests five factors that significantly contributed to explaining the variance in predicting 12-month follow-up smoking status (likelihood of being quit). First, parents who reported a quit attempt during the 3-month baseline (pre-enrollment) period were nearly 20 times more likely to have quit at 12 months compared to parents who had not previously quit during baseline (OR=19.0, 95% CI=6.81, 52.8). Compared to parents who did not believe that quitting smoking would benefit their children, those who believed that quitting benefits their child were 4.12 times more likely (95% CI=1.57, 10.8) to have quit. Compared to parents of children older than age 3 years, parents of children 3 years old or younger were 1.74 times greater (95% CI=1.13, 2.68) to have quit. Compared to parents with less than a high school education, parents with at least high school education were 1.68 times more likely (95% CI=1.13, 2.51) to have quit. Finally, blacks were approximately 0.5 times less likely (95% CI=0.25, 0.96) to have quit smoking at 12 months compared to whites. Other variables were retained in the model but did not contribute significant variance in predicting quit status. The use of any cessation intervention was not significantly associated with quitting at 12 months in the univariate analysis; however, this may represent inconsistent or low frequency of cessation intervention use. There was no evidence of multicollinearity and the c statistic for the model was 0.79.

Discussion

This study explored risk perceptions among parents enrolled in a 12-month usual-care control arm of an RCT on 12-month smoking status. Secondary analysis examined the influence of risk perception on smoking status in the context of multiple factors shown in the extant literature or preliminary univariate analysis to be associated with smoking status. The results partially supported the hypotheses. Descriptive analyses showed that approximately half of parents believed that smoking interferes with their role as parents. However, this factor did not demonstrate a significant association with smoking status at 12 months. Similar to the study of Wagener et al.,¹⁶ no association was found between parents' perception of the harm of continued smoking on their own health and successfully quitting

smoking. However, unlike this prior work, the present study found that former smokers recognized that quitting would benefit both their children's and their personal health and well-being. This result may reflect more recent, successful public health and provider messaging around the dangers of smoking and TSE.

The multivariate model provides a unique contribution to the extant literature. As hypothesized, the importance of parents' perception that quitting smoking will benefit their child contributed to the likelihood of smoking abstinence at 12 months. This perception may contribute to motivation for smoking behavior change and (as the current data suggest) influence quit attempts in parents of young children. In the context of all other factors in the multivariate model, this result speaks to the importance of pediatric providers' efforts to review with parents the many benefits to the child that can be realized when they quit smoking. Indeed, such attention may benefit those primed for such messaging. However, previous research suggests that most parents are receptive to pediatric provider advice; thus, it is important for providers not to be deterred from offering additional "dosing" of cessation messaging to parents who may not understand how much their smoking impacts their children.¹⁰ Interestingly, the results also suggest that parents who recently attempted quitting smoking (prior to RCT enrollment) were far more likely to be abstinent from smoking at 12 months compared to parents who had not quit recently. This data may encourage providers to consider improving the quality of their follow-ups and record keeping for parents who have attempted quitting smoking. In fact, recent quitters may be most receptive to smoking cessation advice and encouragement. Finally, parents with children 3 years old and younger were more likely to quit than parents of older children. The authors surmise that this effect relates to established evidence that younger children are more vulnerable to the effects of TSE. Therefore, parents may be more aware of the vulnerability of younger children to their smoking, an observation supported by previous research.¹⁶ The present findings add to the literature showing that not only is younger child age associated with increased risk perceptions of parental smoking, but also that child age is associated with successful cessation outcomes. Finally, consistent with decades of studies in the tobacco intervention and control literature, two of the controlling variables (education and race) emerged as significant factors in the multivariate model.

Within the scope of this exploratory study, there are limitations. Although baseline surveys were administered in person and directly following clinic visits, the results are based on parental self-report and thus are subject to recall and response bias. Because the results are based on cross-sectional survey data, causality cannot be determined and differences were observed in those retained compared to those lost to follow-up. Although such differences may be seen in studies with a large sample size such as this one, this potential attrition bias suggests caution in generalizing study results to the broader, original baseline sample population. Furthermore, it is possible that parents who were able to quit may have more positive attitudes toward quitting because of their previous or current success compared to those who had not quit recently and were unable to quit at 12 months. In addition, the primary outcome of this study was self-reported cessation and not biochemically -confirmed quit rates at the 12-month follow-up. Despite these limitations, results from this exploratory research can guide future research on parental risk perceptions, behavioral health decision

making, and provider messaging that could improve the quality of care providers offer parental smokers in pediatric healthcare settings.

Conclusions

This exploratory study highlights important factors that may contribute to parental risk perceptions around smoking and child exposure to tobacco smoke, as well as how those perceptions may influence parents' actions toward smoking behavior change. Parents' perception of the benefits to their children of quitting smoking appears to be one key factor that could increase the likelihood of a successful quit attempt among parents who smoke. The ultimate goal of this line of research is to guide future studies that inform clinic-level intervention strategies and improve the impact of pediatric clinic-facilitated quit attempts among parents. Child TSE reduction remains a public health priority, and pediatric providers remain at the frontlines of this public health problem. Thus, practitioners should continue to expand their understanding of factors that can influence parents' adoption of provider advice to quit smoking. This study suggests that providers' smoking cessation advice and support should begin when parents' children are infants and preschoolers, and that parents who have recently attempted to quit may be particularly primed for another attempt. Finally, consistent with broader research in tobacco control, this study emphasizes that compared to whites and individuals with more than a high school education in the present sample, blacks and less-educated individuals may require more intensive messaging to promote smoking cessation.

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Table 1

Assessment questions and response options

Measures	Question	Response options ^a
Belief that third-hand smoke is harmful	"Breathing air in a room today where people smoked yesterday can harm the health of babies and children. Would you say that you..."	Strongly agree/Agree Disagree/Strongly disagree
Parental Role		
Parental Role and smoking (assessed at baseline and at 12 months)	"My being a smoker got in the way of my being a parent. Would you say that you..."	Strongly agree/Agree Disagree/Strongly disagree
Confidence in staying quit	"On a 1–10 scale with 1 being not at all confident and 10 being extremely confident, how confident are you that you can remain quit?"	Strongly agree/Agree Disagree/Strongly disagree
Smoking and Well-being		
Smoking and well-being of child	"From 1–10, how important is it for your children's overall well-being that you successfully quit smoking?"	1–8, 9–10
Smoking and well-being of parent	"On a 1–10 scale with 1 being not at all important and 10 being extremely important, how important is it for your overall well-being that you successfully quit smoking?"	1–8, 9–10
Harms of smoking		
Harm of continued smoking on child	"From 1–10, how likely is it that continuing to smoke would have harmed your children?"	1–8, 9–10
Harm of continued smoking on parent	"From 1–10, how likely is it that continuing to smoke would have harmed you?"	1–8, 9–10
Benefits of quitting		
Benefit of quitting on child	"From 1–10, how important is it for your children's overall well-being that you successfully quit smoking?"	1–8, 9–10
Benefit of quitting on parent	"On a 1–10 scale with 1 being not at all important and 10 being extremely important, how important is it for your overall well-being that you successfully quit smoking?"	1–8, 9–10

^aResponse categories were collapsed down for those questions with a Likert scale of 1–10 with options 9 and 10 being used. For example, on the confidence question we used 9 and 10 as being confident.

Table 2

Parent and child characteristics (N=698)

Variable	All N (%) ^a	Current smokers N (%)	Former smokers N (%)	p-value	OR ^b (CI)
N	698		111		
Parent Age (years)				0.38	
18–24	168 (24)	135 (23)	33 (30)		1.72 (0.59–5.00)
25–44	473 (68)	402 (68)	71 (64)		1.25 (0.43–3.59)
>45	56 (8)	49 (8)	7 (6)		Reference
Parent Gender				0.31	
Female	560 (80)	467 (80)	93 (84)		1.31 (0.77–2.24)
Parent Race and Ethnicity				0.45	
Hispanic (any race)	86 (12)	71 (12)	15 (14)		1.07 (0.66–1.73)
White	455 (65)	381 (65)	74 (67)		Reference
Black or African American	122 (17)	107 (18)	15 (14)		0.72 (0.40–1.28)
Other	35 (5)	28 (5)	7 (6)		1.56 (0.69–3.53)
Parent Education				0.11	
<High school	96 (14)	85 (14)	11 (10)		0.60 (0.28–1.33)
High school graduate	303 (43)	260 (44)	43 (39)		0.76 (0.47–1.21)
Some college	191 (27)	154 (26)	37 (33)		1.11 (0.65–1.89)
College graduate	106 (15)	87 (15)	19 (17)		Reference
Other smokers in home				0.17	
Yes	411 (59)	352 (60)	59 (53)		0.76 (0.47–1.21)
Youngest child's age (years)				0.021	
<3	235 (34)	186 (32)	49 (44)		Reference
4–10	286 (41)	248 (42)	38 (34)		0.58 (0.39–0.86)
11	167 (24)	146 (25)	21 (19)		0.54 (0.30–0.97)
Child's insurance coverage				0.89	
Medicaid	436 (62)	368 (63)	68 (61)		0.90 (0.59–1.38)
Private insurance/HMO	211 (30)	175 (30)	36 (32)		Reference
Other/self-pay	51 (7)	44 (7)	7 (6)		0.87 (0.37–2.08)
Number of cigarettes/day				0.004	

Variable	All N (%) ^a	Current smokers N (%)	Former smokers N (%)	p-value	OR ^b (CI)
10	378 (54)	338 (58)	40 (36)		0.42 (0.26–0.68)

Boldface indicates statistical significance (p<0.05).

^aSome categories do not add up to 100% due to missing data.

^bOdds ratio of being a former smoker.

HMO, Health Maintenance Organization

Table 3

Comparison of smoking behavior and parental attitudes in former smokers (N=111) and current smokers (N=587)

Variable	N (%)	Current smokers N (%)	Former smokers N (%)	p-value	OR ^b (CI)
Quit attempt					
Any Intervention ^a	445–64	338 (58)	107 (96)	<0.0001	19.24 (7.33–50.49)
	221(32)	187 (32)	34 (31)	0.80	0.94 (0.60–1.48)
Quitline (QL) Utilization					
Parent initiated call	46 (7)	38 (6)	8 (7)	0.78	1.12 (0.52–2.39)
QL initiated call	38 (5)	30 (5)	8 (7)	0.43	1.43 (0.64–3.17)
Spoke with a QL counselor	42 (6)	34 (6)	8 (7)	0.67	0.73 (0.19–2.83)
Received QL materials	47 (7)	39 (7)	8 (7)	0.87	1.08 (0.43–2.69)
Accessed an online QL site	40 (6)	36 (6)	4 (4)	0.21	0.57 (0.20–1.61)
Pharmacotherapy					
Use Nicotine Replacement Therapy	137(20)	115 (20)	22 (20)	0.97	1.01 (0.58–1.76)
Used prescription cessation medication	46 (7)	36 (6)	10 (9)	0.34	1.52 (0.71–3.27)
Harms					
Harm of continued smoking on child	487(70)	392 (67)	95 (86)	0.0001	3.05 (1.76–5.30)
Harm of continued smoking on parent	628 (90)	526 (90)	102 (92)	0.15	1.69 (0.76–3.73)
Benefits					
Benefit of quitting on child	572 (82)	469 (80)	103 (93)	<0.0001	5.14 (2.04–12.93)
Benefit of quitting on parent	549 (79)	449 (76)	100 (90)	0.0002	3.33 (1.73–6.40)
Well-Being					
Smoking and well-being of child	584 (84)	481 (82)	103 (93)	0.0008	3.21 (1.51–6.83)
Smoking and well-being of parent	589 (84)	485 (83)	104 (94)	0.001	3.53 (1.34–9.34)
Confidence in staying quit (former smokers)/quitting smoking (current smokers)	253 (36)	175 (30)	78 (70)	<0.0001	5.73 (3.59–9.14)
Parental Role					
Parental Role and smoking (baseline)	194 (28)	155 (26)	39 (35)	0.12	1.53 (0.93–2.52)

^aEither Quitline utilization, nicotine replacement therapy, or prescription cessation medication use.^bOdds ratio of being a former smoker.

Boldface indicates statistical significance (p<0.05)

QL, Quitline

Table 4

Multivariable logistic regression showing odds of being successfully quit at 12 months

Variable	Contrast	OR (95% CI)
Parent age	24 vs. 45	0.94 (0.30–2.93)
	25–44 vs. 45	0.78 (0.27–2.27)
Parent sex	Female vs. Male	1.03 (0.56–1.90)
Parent race and ethnicity	Black vs. White	0.49 (0.25–0.96)
	Hispanic vs. White	0.70 (0.37–1.35)
	Other race vs. White	0.96 (0.38–2.45)
Parent education level	>High School vs. High school	1.68 (1.13–2.51)
Child Insurance	Medicaid vs. Private	0.98 (0.60–1.61)
	Self pay/Other vs. Private	0.96 (0.40–2.30)
Utilized any cessation intervention	Yes vs. No	0.59 (0.34–1.02)
Age of child	3 vs. >3	1.74 (1.13–2.68)
Quit attempt	Yes vs. No	19.0 (6.81–52.8)
Benefit of quitting on child	Agree vs. Disagree	4.12 (1.57–10.8)
Number of cigarettes/day	> 10 vs. < 10	0.63 (0.35–1.12)

Boldface indicates statistical significance ($p < 0.05$).