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Smokers who have children with asthma: Perceptions about child secondhand smoke exposure and tobacco use initiation and parental willingness to participate in child-focused tobacco interventions

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Abstract

Objective: This study examined, among parents who smoke and have children with asthma, perceptions about child secondhand smoke exposure (SHSe), child tobacco use initiation, and parent willingness to participate in child-focused tobacco interventions.

Methods: Participants were 300 caregivers who smoked and had a child with asthma (ages 10–14). Parents completed an online survey and self-reported perceptions about child SHSe elimination, child tobacco use prevention, and willingness to participate in three types of interventions with and without their child (SHSe reduction intervention, tobacco prevention intervention, and the combination of the two). Correlates of perceptions and willingness were examined.

Results: Parents who were ready to quit smoking and who reported home smoking bans (HSBs) were more motivated to eliminate SHSe (p 's < .05). Being white, younger, ready to quit, and having HSBs were associated with greater confidence to eliminate SHSe (p 's < .05). Parents with HSBs reported higher perceived importance about preventing child tobacco use (p 's < .05). Parents were less confident about preventing male children from using tobacco ($p = 0.001$). Parents were highly willing to participate in all of the described intervention approaches, with or without their child.

Conclusions: Parents were willing to participate in child-focused tobacco interventions, with or without their child with asthma, including interventions that address *both* child SHSe and tobacco

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use prevention. This research demonstrates the acceptability of child-focused tobacco interventions among a high-risk population and may be a foundational step for intervention development.

Keywords

tobacco abuse; prevention; pediatrics

Introduction

Secondhand smoke exposure (SHSe) increases the risk of asthma development, severity, exacerbations, and morbidity and decreases asthma medication effectiveness among youth [1–6]. National survey data indicate that no significant reductions in SHSe among children with asthma have occurred since 1999 [7]. Rates of SHSe are higher (58.8%) among children aged 6–11 with asthma relative to same-aged children without asthma (44.7%) [7].

Active smoking is associated with increased risk for asthma severity, exacerbations, and mortality [8]. The intergenerational transmission of smoking is especially problematic among families with a child with asthma: youth with asthma are more likely to have parents who smoke [9] and parental smoking is a stronger predictor of smoking initiation among youth with asthma vs. without asthma [10]. Youth with asthma smoke at comparable or higher rates than youth without asthma: 17% of adolescents with asthma use tobacco [8,11]. Youth with asthma report higher nicotine dependence and are less likely to quit smoking than youth without asthma [12]. To break the cycle of tobacco exposure among families with children with asthma, more information is needed about parental perceptions about child SHSe and smoking initiation, and parental willingness to participate in interventions focused on eliminating child SHSe and preventing child smoking initiation.

Perceptions of Parents who Smoke about Child Tobacco Exposure

While previous research has explored parental perceptions about child SHSe [13–17], there is a paucity of research on parental perceptions about offspring smoking. Qualitative studies indicate that parents who smoke do not want their children to smoke [18–20] and attempt to reduce their child's exposure to their smoking and prevent them from smoking [18,19]. Parents describe guilt about smoking,[18] uncertainty about how their smoking impacts child smoking risk [20], and feel that social stigma will be sufficient to prevent offspring smoking [18]. Quantitative data suggest that approximately 90% of parents who smoke believe they should attempt to prevent their children from starting to smoke [21]; however, only 50–63% know that parental smoking is a risk factor for child smoking [14,21] and only 45% believe they can prevent their child from smoking [21]. This study will extend the literature by identifying parental perceptions about SHSe and tobacco use (TU) regarding their child with asthma.

Tobacco Interventions for Parents who Smoke

This paper explores parental willingness to participate in child-focused tobacco interventions aimed at preventing smoking initiation and eliminating SHSe. This section summarizes the

interventions available for families with a parent who smokes, regardless of the child's disease status.

SHSe Interventions.—There is mixed evidence for the efficacy of SHSe reduction interventions [22]. Interventions that use Motivational Interviewing and biomarker feedback on smoke exposure have been shown to motivate parental smoking cessation and reduce child SHSe, including among children with asthma [23,24]. Coaching children on how to avoid SHS has also been shown to reduce SHSe [25]; therefore, interventions that capitalize on both parent and child involvement may maximize SHSe reduction.

Tobacco Prevention Interventions.—Few child smoking prevention interventions have targeted families with a parent who smokes. One study enrolled only parents and aimed to promote parental cessation and thereby decrease child smoking initiation; parental cessation was not associated with reduced child smoking initiation, suggesting that child involvement is critical [26]. Another program engaged the parent-child dyad and aimed to decrease child smoking initiation by increasing antismoking socialization and home smoking bans; it effectively reduced child smoking initiation, but did not increase home smoking bans [27,28]. To date, there are no tobacco prevention interventions focused on youth with asthma, despite their high rates of smoking, high prevalence of SHSe, and particular vulnerability to the health effects of smoking. It is not known if parents who smoke and have a child with asthma would be willing to participate in tobacco prevention or combined SHSe and tobacco prevention interventions, and whether willingness to participate is associated with sociodemographic, asthma, and smoking correlates.

Current Study

Overall, the literature suggests that 1) children with asthma who have parents who smoke are disproportionately affected by SHSe and are more likely to initiate smoking, 2) interventions that address both child SHSe and smoking prevention have shown potential, 3) child involvement in interventions may be beneficial, and 4) there is a lack of information about parental perceptions about child SHSe and smoking initiation and willingness to participate in child-focused tobacco interventions among parents who smoke and have children with asthma.

The current study included parents who smoke and have a child with asthma and had the following aims:

- Aim 1: Identify key variables (i.e., sociodemographic, asthma, and smoking variables [29]) associated with parental perceptions about eliminating child SHSe and preventing child TU.
- Aim 2: Determine if there are mean differences in parental willingness to participate in three different child-focused tobacco interventions (SHSe elimination, TU prevention, or the combination of the two interventions).
- Exploratory Aim: Determine if there are mean differences in which intervention type (SHSe, tobacco prevention, or combined intervention) parents are willing to

participate in *with their child with asthma* (Part A) and identify key variables associated with participation in each intervention type (Part B).

Methods

Procedure

Participants were recruited from the United States using representative sampling strategies through an online survey company, Toluna™. Panel members were recruited through websites, social media, and affiliate partnerships. Informed consent was obtained from all study participants. Procedures were utilized to prevent participants from taking the survey multiple times. Participants earned points for survey completion that can be redeemed for vouchers or gifts. Toluna's security protocols to protect personal identifiable information exceed research industry standards set forth by the Council of American Survey Research Organizations and the European Society for Opinion and Market Research. Data were collected from December 2015 through January 2016.

Participants

Participants were 300 caregivers who smoked and had a child with asthma. Parents completed a cross-sectional, observational online study of parental smoking. Caregivers of children with asthma were eligible for study participation if they smoked 3 cigarettes per day and had smoked at least 100 cigarettes in their lifetime, were 18 years old, and self-reported that they were the caregiver of a 10–14 year old child with physician-diagnosed asthma and that the child was not a tobacco user. This study was approved by the Institutional Review Board where the study was conducted.

Of the 4736 who completed the above screening questions, 4091 (86.4%) did not meet study criteria. Cases indicative of the participants taking the survey too quickly (i.e., survey completion in less than six minutes) and engaging in patterned responding (e.g., straight-liners) were identified. No patterned responders were detected. Of the 645 who were eligible to participate, 331 (51.3 %) were removed because they completed the survey too quickly. Thirteen people (2.0 %) were eligible but terminated the survey prematurely. The final sample was comprised of 300 parents.

Measures

Parents reported on their sex, race/ethnicity (Black, Hispanic, White), education level, and age, their child's sex and age, and parent and child lifetime cigarette use and cigarettes smoked per day). Parent stage of change was also assessed, i.e., readiness to quit smoking in the next 30 days, in the next 6 months, or not at all [30].

Secondhand Smoke Exposure (SHSe).—Children's SHSe was assessed by asking on how many days during the past week their child with asthma was exposed to others' cigarette smoke [31]. Caregivers also reported on the presence of home and car smoking bans (no smoking allowed, partial ban, or no ban) and the number of other smokers in the home.

Asthma.—Caregivers self-reported whether or not their child currently had physician-diagnosed asthma; parents had to answer “yes” be included in the study. Asthma symptoms were assessed via two questions from the Asthma Control Test [32]. Children with >2 days of shortness of breath per week and/or >2 nighttime awakenings per month due to asthma symptoms were characterized as having poorly controlled asthma [33].

Parental Perceptions about Child Tobacco Exposure.—Parents were administered two questions about child SHSe: 1) “How much do you want to eliminate your child’s exposure to SHS (including smoke from your tobacco)?” and 2) “How confident are you that you can eliminate your child’s exposure to SHS (including smoke from your tobacco)?”; each of which was rated on a 1–5 Likert scale (1= Not at All; 5=Very).

Parents were asked three questions about child smoking initiation: 1) “How important is it to you to prevent your child with asthma from starting to smoke cigarettes or use other forms of tobacco?”; 2) “How confident are you that you can prevent your child with asthma from starting to smoke cigarettes or use other forms of tobacco?”; and 3) “To what degree would it be important for you to know if your child with asthma was at risk for starting to smoke cigarettes or use other forms of tobacco?”. Each of which were rated on a 1–5 Likert scale (1= Not at All; 5=Very).

Parental Willingness to Participate in Tobacco Interventions.—Parents rated how willing they would be to participate in three different interventions focused on their child with asthma; first they rated their willingness to participate in each intervention together with their child and then they rated their willingness to participate without their child (1= Not at All Willing; 5 = Very Willing). The three types of interventions were the following: 1) SHSe elimination (“How willing would you be to participate in a program together with your child with asthma that focused on eliminating your child’s exposure to secondhand smoke?”), 2) preventing child tobacco initiation (“How willing would you be to participate in a program together with your child with asthma that focused on preventing your child with asthma from starting to smoke cigarettes or use other forms of tobacco?”), or an intervention that focused on both topics (“How willing would you be to participate in a program together with your child with asthma that focused on **both** eliminating your child’s exposure to secondhand smoke **and** preventing your child from starting to smoke cigarettes or use other forms of tobacco **in a combined program?**”).

Data Analysis

Descriptive statistics examined parents’ perceptions about child SHSe and tobacco initiation and willingness to participate in different types of tobacco interventions (SHSe reduction, child tobacco prevention, or combined SHSe and child tobacco prevention intervention). Conditional models (i.e., models with covariates) included the following covariates: parent minority status, education, sex, age, cigarettes per day, and stage of change, child age, sex, SHSe, and asthma control (well vs. poorly controlled), number of smokers in the home, home smoking ban status, and car smoking ban status. A model building approach was used; covariates with $p < 0.1$ in individual analyses were included in multivariate models [34]. Partial eta squared (η_p^2) were presented as effect sizes; η_p^2 values of .0099 were considered

small effects, values of .0588 were considered medium, and values of .1379 were considered large [35].

Aim 1: Multivariate ANOVAs examined the relationship between covariates and parental perceptions about child tobacco exposure. One model examined the two perceptions about child SHSe (importance of preventing child TU, confidence about eliminating child SHSe); another examined the three perceptions about child TU (importance of preventing child TU, confidence about doing so, and importance of knowing their child's risk for starting to use tobacco).

Aim 2: Repeated measures general linear models (GLMs) were run to compare willingness to participate in each intervention type with or without their child. Covariate by child intervention involvement (with vs. without child) interactions were evaluated. Three separate GLMs were run to evaluate parental willingness to participate in each intervention type (i.e., SHSe, tobacco prevention, or combined intervention).

Exploratory Aim: Given the literature suggesting that child involvement in interventions is beneficial, GLMs were completed to examine which intervention type (SHSe, child tobacco prevention, or combined intervention) parents were willing to participate in *with their child with asthma*. Covariate by intervention type interactions were evaluated (Exploratory Aim A). Lastly, additional ANOVAs examined the relationships between covariates and willingness to participate with their child for each intervention type (Exploratory Aim B). Along with the previously mentioned covariates, parental perceptions about child tobacco exposure were also examined as covariates.

Results

The sample was predominately White (83.5%) and married (85.3%). Males and females were relatively equally represented. The mean age was 35.4 years old and the mean number of cigarettes smoked per day was 13.3. Parents reported that their children with asthma were on average 12.2 years old, on average exposed to SHS 3.4 days during the past week, and had asthma symptoms 3 days/week during the past month (68.7%; Table 1).

Overall, parents believed it was important to eliminate their child with asthma's SHSe and prevent them from using tobacco; parents reported high willingness to participate in all intervention types, with and without their child (Table 2). Descriptions of the tested models are listed in Table 3.

Aim 1: Identify key variables associated with parental perceptions about child tobacco exposure.

Perceptions about Eliminating Child SHSe.—White parents were more confident than Black parents that they could eliminate their child's SHSe ($p = 0.048$; see Table 4 for omnibus test results). Parents who were ready to quit smoking in the next month reported greater motivation and confidence about eliminating their child's SHSe compared to parents who were not ready to quit in the next month, $p's < 0.05$. Parents with no home smoking bans (HSB) reported less motivation to eliminate child SHSe compared to those with partial

($p = 0.01$) or complete HSBs ($p = 0.006$). As parent age increased, confidence about eliminating child SHSe decreased ($B = -0.02$, $t = -2.72$, $p = 0.007$).

Perceptions about Child Tobacco Use.—Parents were less confident that they could prevent their male (vs. female) children from using tobacco, $p = 0.001$ (Table 4). Parents with complete HSBs reported higher perceived importance of preventing TU in their child compared to parents with no ($p = 0.001$) or partial bans ($p = 0.01$). Parents with complete HSBs reported higher perceived importance of knowing if their child was at risk for TU initiation compared to those with no HSBs ($p = 0.02$).

Aim 2: Determine if there are mean differences in parental willingness to participate in different child-focused tobacco interventions.

When asked about participating in SHSe interventions with vs. without their child, the omnibus test examining differences in willingness based on child involvement was significant (Table 5); however, follow-up tests found that parents were similarly willing to participate in a SHSe intervention with or without their child ($p = 0.65$). An interaction between parent age and child intervention involvement was detected (Table 5), but follow-up tests revealed no associations between parent age and willingness.

When examining willingness to participate in tobacco prevention interventions, an interaction between car smoking ban status and child intervention involvement (involved vs. not involved) emerged (Table 5). Follow-up tests found that parents with complete car smoking bans were more willing to participate in a tobacco prevention intervention without their child compared to parents with a partial ban ($p = 0.02$). Parents reported no preference for participating in a tobacco prevention program with vs. without their child ($p > .05$).

Further, parental willingness to participate in a combined SHSe/prevention intervention with vs. without their child was examined. No covariates were significant in the individual analyses; thus, an unconditional model was presented. Parents were more willing to participate in a combined program without their child vs. with their child, $p = 0.001$.

Exploratory Aim:

A: Determine if there are mean differences in which intervention type (SHSe, tobacco prevention, or combined intervention) parents are willing to participate in *with their child with asthma*.—When asked about participating in interventions *with* their child with asthma, no intervention type by covariate interactions were significant (observed power ranged from 0.18 to 0.57) and parents were similarly willing to participate in SHSe, prevention, or combined programs with their child ($F(2, 588) = 2.78$, $p = 0.06$, $\eta_p^2 = 0.01$, observed power = 0.51).

B: Identify key variables associated with participation in each intervention type.—ANOVAs were used to examine the relationship between covariates and willingness to participate in each intervention type *with their child* with asthma. See Table 6 for the omnibus test statistics.

Willingness to Participate in a SHSe Intervention with Child with Asthma.—

Parents who were ready to quit smoking in the next month were more willing to participate in a SHSe intervention with their child compared to parents who planned on quitting during the next six months ($p = 0.003$). Parents with children with poorly controlled asthma were more willing to participate in a SHSe intervention compared to parents of children with well-controlled asthma, $p = 0.009$. Higher parental motivation ($B = 0.17$, $t = 2.05$, $p = 0.04$) and confidence about preventing their child from using tobacco ($B = 0.17$, $t = 3.35$, $p = 0.001$) were related to more willingness to participate in interventions targeting this issue.

Willingness to Participate in a Tobacco Prevention Intervention with Child with Asthma.—

Higher motivation to eliminate SHSe ($B = 0.13$, $t = 2.13$, $p = 0.03$), confidence about preventing child TU ($B = 0.11$, $t = 2.15$, $p = 0.03$), and importance of knowing child risk for TU ($B = 0.23$, $t = 3.07$, $p = 0.002$) were associated with more willingness to participate in a prevention intervention with their child.

Willingness to Participate in a Combined SHSe and Tobacco Prevention Intervention with Child with Asthma.—

Higher motivation to eliminate SHSe was associated with greater willingness to participate in a combined intervention ($B = 0.24$, $t = 3.81$, $p < 0.001$).

Discussion

This study identified key variables associated with parental perceptions about reducing child SHSe and future TU, compared parental willingness to participate in child-focused tobacco interventions, and identified variables that were associated with parental willingness to participate in different intervention types among families with a parent who smokes and a child with asthma. Specifically, parent race, parent stage of change, and home smoking ban status were associated with parental perceptions about reducing child SHSe; child sex and home smoke ban status were associated with perceptions about reducing future child TU. Our study provided some evidence that parents were similarly willing to participate in SHSe and tobacco prevention interventions whether their child was involved in the intervention or not, but were more willing to participate in combined SHSe/tobacco prevention interventions if their child was not involved. Additionally, our study found that parents were equally willing to participate in SHSe, TU prevention, and combined interventions with their child with asthma. Parental perceptions about changing their child's tobacco exposure were consistently associated with parental willingness to participate in all three intervention types with their child with asthma (other significant correlates were also identified). Taken together, this provides some preliminary evidence that some parents who smoke are willing to participate in interventions to reduce their children with asthma's SHSe and future TU.

Previous research has shown that some child smoking prevention interventions (i.e., Smoke-free Kids) [27] and SHSe reduction interventions [22] are effective for families with a parent who smokes; however, there are limited data about families with a parent who smokes and has a child with asthma. Our results provide preliminary data that smokers with children with asthma want to reduce their child's SHSe and future TU, and are willing to participate in interventions that address both sources of exposure. To date, there are no tailored

prevention interventions for children with asthma, and no combined SHSe/prevention interventions have successfully modified both SHSe and future TU among children [26,27]. The Smoke-free Kids intervention was not effective when implemented with children with nonsmoking parents [37] but was effective with children with smoking parents [27], suggesting a benefit for targeted interventions with parents who smoke. This intervention had no differential effect for children with asthma (14% of sample), suggesting a need for tailored interventions for children with asthma. More research is needed to identify the critical components for interventions that address both SHSe and future child TU and to target children with asthma.

Aim 1: Parental Perceptions about Child Tobacco Exposure

Black parents reported similar levels of perceived importance about eliminating their children's SHSe as White parents, but were less confident than White parents about being successful in eliminating SHSe. This lower confidence may be due in part to their higher rates of smoking, SHSe, and asthma [6,29,38], lower quit rates [39], and sociocultural factors among Black families (e.g., higher stress, exposure to tobacco advertising, lower income) [40–42]. Black parents reported higher levels of concern about preventing child TU, though non-significantly, than White parents. This is consistent with previous research that found that Black parents are *less* likely to have home smoking bans but *more* likely to disapprove of child smoking and want to be involved in smoking prevention efforts [43]. Black parents may benefit from interventions that help reduce barriers and capitalize on their heightened disapproval of child smoking and discuss how parental smoking is a risk factor for child smoking.

Parents who had smoking bans reported more motivation for reducing child SHSe and future TU and more willingness to participate in interventions, suggesting parents with smoking bans may be ready take further steps to reduce their child's tobacco exposure. Parents did not want their female or male children to use tobacco, but were less confident that they could prevent their male children from initiating use; this may result in less parental efforts to deter TU initiation among male offspring. Other research has found that parents utilize different parenting practices for male and female children (e.g., less parental monitoring reported for male youth); importantly, positive parenting practices (e.g., parental monitoring) are protective against youth substance use for males *and* females [44]. All parents, including parents who smoke, should be encouraged to utilize protective parenting practices for both male and female children. Alternatively, novel strategies to support parents in preventing smoking among male children may be necessary.

Parents reported lower confidence about reducing tobacco exposure relative to the perceived importance about doing so. Parents of children with asthma have additional childcare responsibilities, e.g., symptom monitoring and medication management, and this may dampen their self-efficacy for taking on additional difficult tasks. Additionally, a meta-analysis found that parents of children with asthma experience increased difficulties in the parent-child relationship, possibly due to increased stress, compared to families without a child with a chronic medical condition; though small, these differences may indicate that these parents may benefit from increased parenting support [45].

Aim 2 and Exploratory Aim: Parental Willingness to Participate in Tobacco Interventions

Aim 2: Overall, parents reported high levels of willingness to participate in all child-focused tobacco interventions, with and without their child. Some differences in willingness were detected. When asked about participating in each intervention type with and without their child, parents were more willing to participate in combined SHSe/tobacco prevention interventions without their child, though parents were highly willing to participate either way.

Exploratory Aim (A): When examining willingness to participate in interventions *with their children*, parents reported high, and similar, levels of willingness to participate in all types of tobacco interventions. These data suggest that 1) discussing child smoking may be a “foot in the door” approach [23] for addressing both child SHSe elimination and TU prevention and 2) parents were open to participating in interventions with their children with asthma. This is important given the potential benefit (e.g., current and future tobacco exposure reductions, improved asthma health, increased efficacy of interventions that include the parent and child) and cost-effectiveness of a combined intervention that involves the parent-child dyad.

Exploratory Aim (B): Research suggests that child involvement may increase intervention efficacy [25–27]. As such, the associations between covariates and parental willingness to participate in each intervention type *with their child* with asthma were examined. Parents who were ready to quit smoking and parents who had a child with poorly controlled asthma were more willing to participate in SHSe interventions with their child. Borrelli et al. have capitalized on how children’s poor asthma control promotes smoking cessation induction [23,24].

Across all intervention types, parental perceptions about youth tobacco exposure were associated with willingness to participate in interventions with their children, suggesting parent cognitions may be important intervention targets. Only motivation to eliminate SHSe, and not perceptions about child TU, was associated with willingness to participate in combined SHSe/ prevention interventions, highlighting that low motivation to change SHSe may preclude intervention involvement. Motivational Interviewing incorporates perceived importance, confidence, and readiness to change into intervention strategies and has been effective at promoting behavior change [46], including smoking cessation among parents of children with asthma [23,24,47,48].

Limitations and Future Directions

The current study demonstrates the acceptability of child-focused tobacco interventions among a high-risk population and may be a foundational step for intervention development. While these results are encouraging, these preliminary results they should be interpreted with caution. This study assessed willingness to participate in hypothetical interventions; actual participation rates may vary or be impacted by similar constructs examined in this study and/or novel factors. For example, our study found that parental motivation was associated with willingness to participate in hypothetical interventions; correspondingly, other research has identified low parental motivation as a key barrier to participation in

family focused prevention programs.[49] Jointly, these data suggest that addressing parental motivation may increase parental participation in tobacco interventions; as such, motivational interventions may hold promise for these high risk families given their explicit focus on increasing intervention participation, engagement, and effectiveness at addressing SHSe [23,24] and smoking prevention.[50,51]

Utilizing an online platform capitalized on our ability to assess caregivers who smoke and minimize social desirability by providing anonymity and reducing interviewer effects [52,53]; however, social desirability may have still influenced our results. Notably, internet-based smoking assessments have good validity and reliability when compared to other self-report smoking measures [54,55] and data obtained via online panels is comparable to data collected via other online or laboratory methods [56]. Another limitation is our reliance on parental reports about child asthma status; future research should utilize a clinical evaluation, the gold standard for asthma assessment [33]. Our sample was primarily highly educated and White, limiting the generalizability of the results. Notably, our sample did have relatively equal numbers of mothers and fathers. Due to our sample and study design, our study may not be representative of all parents who smoke and have a child with asthma, but provides preliminary data about high-risk families' willingness to participate in tobacco interventions.

Conclusion

Our results are the first to indicate that parents who smoke and have a child with asthma believe that reducing their children with asthma's SHSe and chance of starting to use tobacco in the future is important, and are willing to engage in associated interventions. Key correlates of parental tobacco perceptions were identified. Specifically, parent race, parent stage of change, and home smoking ban status were associated with parental perceptions about reducing child SHSe; child sex and home smoke ban status were associated with parental perceptions about reducing child future TU. Second, our study identified that parents were equally willing to participate in SHSe and tobacco prevention interventions whether their child was involved in the intervention or not, however, parents were more willing to participate in combined SHSe/tobacco prevention interventions if their child was not involved. Lastly, parents were equally willing to participate in the three types of interventions with their child with asthma; parental perceptions about changing their child's tobacco exposure were consistently associated with parental willingness to participate in all intervention types with their child. Our research demonstrates the acceptability of child-focused tobacco interventions among a high-risk population and may be a foundational step for intervention development.

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Table 1.

Description of Participant Characteristics.

Caregiver Characteristics	<i>n</i> (%)	<i>M</i> (<i>SD</i>)
Age		35.41 (5.71)
Female	149 (49.7%)	
Race/Ethnicity		
White, Non-Hispanic	243 (83.5%)	
Black, Non-Hispanic	24 (8.2%)	
Hispanic	24 (8.2%)	
Education		
Less than high school education	4 (1.3%)	
High school graduate/GED	20 (6.7%)	
Technical school/ Some college	83 (27.7%)	
College graduate	133 (44.3%)	
Graduate school	30 (20.0%)	
Marital Status		
Never married	21 (7.0%)	
Married	256 (85.3%)	
Divorced	10 (3.3%)	
Engaged/Living together	13 (4.3%)	
Cigarettes smoked per day		13.32 (10.29)
Stage of change		
Plan on quitting within the next 30 days	172 (57.3%)	
Plan on quitting within the next 6 months	102 (34.0%)	
Not thinking about quitting smoking	26 (8.7%)	
Number of smokers living in the home		2.48 (1.63)
Home smoking ban status		
No smoking ban	99 (33.03%)	
Partial smoking ban	133 (44.3%)	
Full smoking ban	68 (22.7%)	
Car smoking ban		
No smoking ban	76 (25.3%)	
Partial smoking ban	153 (51.0%)	
Full smoking ban	71 (23.7%)	
Child Characteristics		
Age		12.21 (1.28)
Female	132 (44.0%)	
Asthma symptom days in the past month		
Not at all	9 (3.0%)	
Once or twice a week	84 (28.0%)	
3–6 times a week	107 (35.7%)	
Once a day	48 (16.0%)	

Caregiver Characteristics	<i>n</i> (%)	<i>M</i> (<i>SD</i>)
More than once a day	51 (17.0%)	
Parent did not know	1 (0.3%)	
Nighttime asthma symptom days in the past month		
Not at all	16 (5.3%)	
Once or twice	55 (18.3%)	
Once a week	80 (26.7%)	
2–3 nights a week	106 (35.3%)	
4 or more nights a week	43 (14.3)	
Poorly controlled asthma	243 (81.0%)	
Days exposed to secondhand smoke during the past week		3.40 (2.19)

Table 2.

Descriptives of parental tobacco perceptions and willingness to participate in tobacco interventions.

Parental Perceptions about Tobacco Exposure	<i>M (SD)</i>	<i>n (%) who endorsed 4 or 5</i>
Child SHSe		
Motivation to eliminate child with asthma's SHSe	4.46 (0.71)	279 (93.0%)
Confidence in ability to eliminate child with asthma's SHSe	4.34 (0.81)	252 (84.0%)
Child Smoking		
Importance of preventing child with asthma from using tobacco	4.70 (0.50)	294 (98.0%)
Confidence about preventing child from asthma from using tobacco	4.48 (0.72)	264 (88.0%)
Importance of knowing if child with asthma is at risk for starting to use tobacco	4.59 (0.59)	284 (94.7%)
Willingness to Participate in Tobacco Interventions		
Willingness to participate in an intervention without their child focused on....		
Reducing child with asthma's SHSe	4.52 (0.63)	280 (93.3%)
Preventing child with asthma from starting to use tobacco	4.57 (0.66)	278 (92.7%)
Both reducing child SHSe and preventing child tobacco use	4.60 (0.61)	281 (93.7%)
Willingness to participate in an intervention <i>together with child with asthma</i> that focused on...		
Reducing child with asthma's SHSe	4.57 (0.64)	281 (93.7%)
Preventing child with asthma from starting to use tobacco	4.55 (0.67)	276 (92%)
Both reducing child SHSe and preventing child tobacco use	4.48 (0.68)	270(90%)

Table 3.

Outline of different models and covariates included in multivariate models.

Aim 1: Parental Perceptions about Tobacco Exposure		Covariates included in multivariate model
Child SHSe		
Dependent Variables in Multivariate ANOVA:		
1. Motivation to eliminate child with asthma’s SHSe	Parent minority status*, stage of change*, age*, and CPD; child asthma control and SHSe; home* and car smoking ban statuses, and number of other smokers in the home	
2. Confidence in ability to eliminate child with asthma’s SHSe		
Child Smoking		
Dependent Variables in Multivariate ANOVA:		
1. Importance of preventing child with asthma from using tobacco	Parent minority status, sex, and age; child sex*, asthma control, and SHSe; and home* and car smoking bans statuses	
2. Confidence about preventing child from asthma from using tobacco		
3. Importance of knowing if child with asthma is at risk for starting to use tobacco		
Aim 2: Comparing Parental Willingness to Participate in Interventions with and without their Child		
Within-subject measures in GLMs (child involvement):		Model for SHSe intervention: parent age*, CPD, and stage of change
1. Willingness to participate <i>without</i> child with asthma		Model for tobacco prevention: Car smoking ban status*
2. Willingness to participate <i>with</i> child with asthma		
		Model for combined intervention: none
Exploratory Aim: Examining Parental Willingness to Participate in Interventions with their Child		
A: Willingness to participate in an intervention <i>together with child with asthma</i>		
Within-subject measures in GLM (intervention type):		
1. Child SHSe reduction intervention		Parental stage of change and child asthma control status
2. Child tobacco prevention intervention		
3. Combined child SHSe and tobacco prevention intervention		
B: Associations between Covariates and Parental Willingness to Participate in Interventions with Child with Asthma		
Dependent Variable in ANOVA:		
Willingness to Participate in a SHSe Intervention with Child	Parent sex and stage of change*; child sex and asthma control*; and all variables about parental perceptions about child tobacco exposure*	
Dependent Variable in ANOVA:		
Willingness to Participate in a Tobacco Prevention Intervention with Child	Parent sex, home smoking status, and all parental perception variables*	
Dependent Variable in ANOVA:		
Willingness to Participate in a Combined SHSe and Tobacco Prevention Intervention with Child	Parent sex and stage of change, child sex, home smoking ban status, and all perception variables*	

Notes: A model building approach was used; covariates with an alpha of .01 in individual analyses were included multivariate models. Asterisks denote covariates that remained significant at an alpha of < 0.05 in the multivariate models. CPD: cigarettes smoked per day. SHSe: secondhand smoke exposure.

Table 4.

Results of multivariate ANOVA for Aim 1: Examining parental perceptions about child tobacco exposure.

Correlates of Parental Perceptions about Child SHSe^a				
	F (df, df)	p	η^2	Observed Power
Multivariate Tests				
Parent minority status	3.19 (4, 554)	0.01	0.02	0.83
Parent stage of change	6.35 (4, 554)	<0.001	0.04	0.99
Parent age	5.35 (2, 276)	0.005	0.04	0.84
Parent CPD	1.84 (2, 276)	0.16	0.01	0.38
Child asthma control	1.23 (2, 276)	0.29	0.009	0.27
Child SHSe	0.53 (2, 276)	0.59	0.004	0.14
Home smoking ban	3.99 (4, 554)	0.003	0.03	0.91
Car smoking ban	2.35 (4, 554)	0.05	0.02	0.68
Number of other smokers in home	1.33 (2, 276)	0.27	0.01	0.29
Univariate Tests				
Parent minority status				
Motivation to eliminate SHSe	0.61 (2, 277)	0.55	0.004	0.15
Confidence in ability to eliminate SHSe	3.84 (2, 277)	0.02	0.03	0.69
Parent stage of change				
Motivation to eliminate SHSe	3.13 (2, 277)	0.045	0.02	0.60
Confidence in ability to eliminate SHSe	12.06 (2, 277)	<0.001	0.08	0.99
Parent age				
Motivation to eliminate SHSe	0.46 (1, 277)	0.50	0.002	0.10
Confidence in ability to eliminate SHSe	7.39 (1, 277)	0.007	0.03	0.77
Home smoking ban				
Motivation to eliminate SHSe	6.25 (2, 277)	0.002	0.04	0.89
Confidence in ability to eliminate SHSe	0.20 (2, 277)	0.82	0.001	0.08
Correlates of Parental Perceptions about Preventing their Child from Using Tobacco^b				
Multivariate Tests				
Parent minority status	1.50 (6, 556)	0.18	0.02	0.58
Parent sex	1.16 (3, 277)	0.33	0.01	0.31
Parent age	1.22 (3, 277)	0.30	.01	0.33
Child sex	4.33 (3, 277)	0.005	.05	0.87
Child asthma control	0.84 (3, 277)	0.48	0.009	0.23
Child SHSe	0.35 (3, 277)	0.79	0.004	0.12
Home smoking ban status	3.05 (6, 556)	0.006	0.03	0.91
Car smoking ban status	0.68 (6, 556)	0.67	0.007	0.27
Univariate Tests				
Child Sex				
Importance of preventing child from using tobacco	0.76 (1, 279)	0.38	0.003	0.14
Confidence about preventing child from using tobacco	11.11 (1, 279)	0.001	.04	0.91

Correlates of Parental Perceptions about Child SHSe^a				
	F (df, df)	p	η_p^2	Observed Power
Importance of knowing if child is at risk for using tobacco	3.83 (1, 279)	0.05	0.01	0.50
Home smoking ban				
Importance of preventing child from using tobacco	6.37 (2, 279)	0.002	0.04	0.90
Confidence about preventing child from using tobacco	1.68 (2, 279)	0.19	0.01	0.35
Importance of knowing if child is at risk for using tobacco	4.08	0.02	0.03	0.72

Notes: A model building approach was used; covariates with an alpha of 0.1 in individual analyses were included multivariate models. Pillai's Trace statistic was utilized in the multivariate models; if multivariate tests were significant, univariate tests were reported. If the univariate tests were significant above, follow-up analyses were reported in the text. CPD: cigarettes smoked per day. SHSe: secondhand smoke exposure.

^aThe dependent variables included in this model were 1) motivation to eliminate child with asthma's SHSe and 2) confidence in ability to eliminate child with asthma's SHSe.

^bThe dependent variables included in this model were 1) importance of preventing child with asthma from using tobacco, 2) confidence about preventing child with asthma from using tobacco, and 3) importance of knowing if child with asthma is at risk for starting to use tobacco.

Table 5.

Results of multivariate repeated measures general linear models for Aim 2: Comparing Parental Willingness to Participate in Interventions with and without their Child.

Comparing Parental Willingness to Participate in SHSe Interventions with and without Child				
	F (df, df)	p	η^2	Observed Power
Child involvement in intervention (with vs. without child)	6.57 (1, 295)	0.01	0.02	0.72
Child involvement*Parent stage of change	2.53 (2, 295)	0.08	0.02	0.51
Child involvement*Parent age	4.75 (1, 295)	0.03	0.02	0.58
Child involvement*Parent CPD	3.33 (1, 295)	0.07	0.01	0.44
Comparing Parental Willingness to Participate in Tobacco Prevention Interventions with and without Child				
Child involvement in intervention (with vs. without child)	1.99 (1, 297)	0.16	0.007	0.29
Child involvement*Car smoking ban status	3.08 (2, 297)	0.047	0.02	0.59
Comparing Parental Willingness to Participate in Combined SHSe/Prevention Interventions with and without Child				
Child involvement in intervention (with vs. without child)	10.34 (1, 299)	0.001	0.03	0.89

Notes: A model building approach was used; covariates with an alpha of .01 in individual analyses were included in multivariate models. The within-subject measure is child involvement in the intervention, i.e., willingness to participate with or without child. If the omnibus tests were significant above, follow-up analyses were reported in the text. CPD: cigarettes smoked per day.

Table 6.

Results of ANOVAs for Exploratory Aim B: Associations between Covariates and Parental Willingness to Participate in Interventions with Child with Asthma.

Associations between Covariates and Parental Willingness to Participate in SHSe Interventions with Child with Asthma				
	F (df, df)	p	η^2	Observed Power
Parent sex	2.34 (1, 289)	0.13	0.008	0.33
Parent stage of change	6.07 (2, 289)	0.003	0.04	0.88
Child sex	0.59 (1, 289)	0.44	0.002	0.12
Child asthma control	7.01 (1, 289)	0.009	0.02	0.75
Parent motivation to eliminate SHSe	2.96 (1, 289)	0.09	0.01	0.40
Parent confidence in ability to eliminate SHSe	3.39 (1, 289)	0.07	0.01	0.45
Parent perceived importance of preventing child from using tobacco	4.21 (1, 289)	0.04	0.01	0.53
Parent confidence about preventing child from using tobacco	11.19 (1, 289)	0.001	0.04	0.92
Parent perceived importance of knowing if child is at risk for using tobacco	0.85 (1, 289)	0.36	0.003	0.15
Associations between Covariates and Parental Willingness to Participate in Tobacco Prevention Interventions with Child with Asthma				
Parent sex	0.80 (1, 291)	0.37	0.003	0.14
Home smoking ban status	2.57 (2, 291)	0.08	0.02	0.51
Parent motivation to eliminate SHSe	4.55 (1, 291)	0.03	0.02	0.57
Parent confidence in ability to eliminate SHSe	2.41 (1, 291)	0.12	0.008	0.34
Parent perceived importance of preventing child from using tobacco	2.10 (1, 291)	0.15	0.007	0.30
Parent confidence about preventing child from using tobacco	4.61 (1, 291)	0.03	0.02	0.57
Parent perceived importance of knowing if child is at risk for using tobacco	9.44 (1, 291)	0.002	0.03	0.87
Associations between Covariates and Parental Willingness to Participate in Combined SHSe/ Tobacco Prevention Interventions with Child with Asthma				
Parent sex	3.69 (1, 288)	0.06	0.01	0.48
Parent stage of change	2.11 (2, 288)	0.12	0.01	0.43
Child sex	0.34 (1, 288)	0.56	0.001	0.09
Home smoking ban status	1.31 (2, 288)	0.27	0.009	0.28
Parent motivation to eliminate SHSe	14.53 (1, 288)	<0.001	0.05	0.97
Parent confidence in ability to eliminate SHSe	0.95 (1, 288)	0.33	0.003	0.16
Parent perceived importance of preventing child from using tobacco	0.88 (1, 288)	0.35	0.003	0.15
Parent confidence about preventing child from using tobacco	2.91 (1, 288)	0.09	0.01	0.40
Parent perceived importance of knowing if child is at risk for using tobacco	3.11 (1, 288)	0.08	0.01	0.42

Notes: A model building approach was used; covariates with an alpha of .01 in individual analyses were included multivariate models. If the omnibus tests were significant above, follow-up analyses were reported in the text. CPD: cigarettes smoked per day. SHSe: secondhand smoke exposure.