RESEARCH ARTICLE

Falling Through the Cracks of Early Intervention and Prevention: Missed Smoking Cessation Referrals for Mothers in Early Head Start

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Smoking rates have decreased overall but smoking during pregnancy remains a challenge with impacts to mother, child, and family. Referrals are a critical component in accessing cessation, yet research identifies several barriers to access. Early Head Start (EHS) is one avenue for referrals, and we wanted to understand which characteristics describe those who have received prenatal smoking cessation referrals from EHS. Methods. This project utilized secondary data from the EHS Family and Child Experiences Study (N = 144). We conducted three hierarchical logistic regressions based on the following characteristics pulled from the literature—demographics (e.g., race, ethnicity, age, education, marital status, and partner at home), smoking behavior, and accessibility (e.g., language, location, siblings in EHS, length of time (LOT) in EHS, and program type)—removing nonsignificant variables at each stage of the hierarchy. Results. Results indicated no significant differences in referral rates across demographics (ps > .32). Results also showed smoking during pregnancy predictive of referral receipt (OR = 10.35, p < .05). Lastly, results showed longer LOTs with EHS (OR = 4.41, p < .01) and siblings in EHS (OR = 10.98, p < .05) significantly associated with referral receipt. Discussion. We found equity among referrals, consistent with EHS's anti-racist foundation. We found mothers only reporting smoking history were missed. Finally, we found when EHS knows about a pregnancy, either from early referral to EHS or from other children receiving services, the referral mechanism is most successful. Future work should include an emphasis on recruiting earlier in gestation.

Keywords: smoking cessation, pregnancy, Early Head Start, referrals

INTRODUCTION

Although smoking rates have decreased recently, smoking during pregnancy remains a challenging problem at roughly 9% (Azagba et al., 2020). Pregnant women are more likely to quit smoking during pregnancy than any other time in their life, yet still over half do not quit (2020). Difficulty

quitting during pregnancy is notable because nicotine can cross the placental barrier (Wickstrom, 2007). Prenatal smoking is associated with adverse maternal, child, and family outcomes (Chen et al., 2019; Wakschlag et al., 2006), but unlike genetic or biological risk factors, treating mothers who smoke is a uniquely valuable intervention target, as this behavior is relatively modifiable. Thus, it is important to improve cessation interventions. Referrals are a critical, understudied component in accessing substance use treatment, which typically occurs through prenatal visits, as well as wrap-around social services, such as Early Head Start (EHS)—a comprehensive program designed to support well-being for low-income families with children under 3 (Early Childhood Learning and Knowledge Center (ECLKC), 2018). EHS is in a unique position to provide a two-generation intervention; however, this intervention is only successful if mothers are provided referrals for services. This begs the question: Who is being missed and why might these programs not be meeting the needs of all the families they serve?

Barriers to Accessing Cessation Services

Several factors may explain why pregnant women are not referred for smoking cessation. Primary care regularly serves as a gatekeeper to these referrals. Yet, although obstetricians have widely available training for addressing prenatal smoking (5As; Fiore et al., 2000), few adequately assess for these behaviors or properly refer to cessation treatment (Chang et al., 2013). Given the barriers to accessing cessation referrals, it also makes sense to evaluate factors that may influence a mother's ability or comfort in seeking referrals in the first place.

A key mechanism in the referral process is needs identification, which relies on mothers reporting smoking behavior. However, there are discrepancies in comfort disclosing, with African American and Hispanic women displaying higher nondisclosure rates when reporting smoking to their obstetricians (Scherman et al., 2018). On the contrary, social support often enhances comfort disclosing, with social support associated with lower stigma among those in substance use treatment (Birtel et al., 2017). During pregnancy, supportive partners may be especially important for social support, as women who successfully quit smoking during pregnancy are more likely to live with a partner or be married (Riaz et al., 2018). With disclosure a key step in accessing cessation resources, having social support (e.g., those who live with a partner or are married) likely increases mothers' comfort disclosing and thus also their access.

It is unclear from the literature the racial and ethnic makeup of those who are provided referrals during pregnancy; however, we know women who smoke during pregnancy disproportionally come from economically disadvantaged backgrounds and adverse social circumstances (Maughan et al., 2004). Research also suggests these women are more likely to be younger and have less education (Azagba et al., 2020). It could be the demographics of those missed for referrals mirror those of women who smoke during pregnancy, but with this gap in the literature, these risk factors must be investigated.

Opportunities for Expanding Referrals

Unfortunately, primary care physicians and obstetricians are often unable to deliver cessation referrals due to time demands or other restrictions (Chang et al., 2013). In contrast, needs assessments and referrals for social services are regular practice for many other agencies coming into contact with pregnant women, including our nation's largest public early childhood education provider—Head Start (HS)—and its infant and toddler equivalent, EHS (ECLKC, 2018). EHS emerged out of the war on poverty as a two-generation intervention (Administration of Children and Families, 2021) and strives to form strong relationships with family units to promote child well-being. For these reasons, we would expect it to out-perform the regular medical system in terms of reducing disparities in accessing cessation services. EHS case managers gather information from families to establish needs, and then arrange and coordinate identified services to meet those needs (Miller, 2021). Although there are overarching structural similarities across EHS programs, variation in referral practices may be associated with programmatic differences, and the present study strives to understand how some aspects of EHS explains cessation referral practices.

Location is another factor that may relate to referral provision, especially given local differences in density of services, indicating that for areas with fewer cessation resources, there are also likely fewer referrals. Smoking is more prevalent in rural communities, but there is also less access to cessation resources in these areas (Horn et al., 2012). There may also be lower provision of referrals to minority populations, especially those which require linguistically appropriate treatment options. One study found Spanish language substance use treatment required patients to travel three times the distance of English language services (Guerrero et al., 2013). Guerrero's 2013 study, however, was conducted in an urban setting, and rural pregnant smokers who require Spanish language services may be even less likely to have cessation options for referral.

Additionally, EHS programs have varying program types: home visiting, center-based, and blended models. Center-based programs deliver early childhood services primarily in classroom settings; however, home visits still occur at least twice annually (ECLKC, 2018). For home-based programs, services occur through weekly visits to the child's home, focusing on fostering parents' skills in supporting their child's development (2018). Research into home visitor models indicates mothers with mental health concerns especially benefit, as their needs are addressed in parallel to other child and family needs. (Early Childhood Learning & Knowledge Center, 2021). EHS programs that utilize a home-visiting model may be better positioned to detect mother's smoking behaviors (e.g., through home observation). Home visiting may also allow for an enhanced relationship between mothers and case managers, potentially increasing disclosure and referrals more than center-based programs. Having more time to establish a trusting relationship is another program-level factor potentially impacting referrals. If a mother accessed services earlier in pregnancy or was already engaged with services via another child's enrollment, she would naturally have access to cessation resources earlier in gestation than new mothers or mothers faced with a waitlist. These program differences necessitate understanding not only which women are missing out on receiving referrals, but also why these referrals are not being consistently provided to those who need them.

The Present Study

This study seeks to understand characteristics of EHS mothers who reported smoking at some point during or before pregnancy and did not receive cessation referrals. The first set of variables we examine are demographic (e.g., race, ethnicity, age, education level, marital status, whether mothers have a partner living at home). As race, ethnicity, and social support are all related to comfort disclosing smoking behavior during pregnancy (Birtel et al., 2017; Canella, 2006; Riaz et al., 2018; Scherman et al., 2018; Thoits, 2011), these variables are included. Although there is no known literature describing demographic characteristics of pregnant women missed for referrals, we know women who smoke during pregnancy are more likely to be younger and have lower education (Azagba et al., 2020); therefore, these metrics were also selected. The second variable set evaluates timing of smoking behavior—whether mothers report only a history of smoking or whether she reported smoking during pregnancy. The third set of variables we examine relates to treatment access (e.g., language, location, whether mothers have other children enrolled in EHS, how long mothers spent using EHS services, program type). We know Spanish language cessation services are less prevalent (Guerrero et al., 2013), and rural areas have disproportionally more smokers and disproportionally fewer cessation resources (Horn et al., 2012). We also know intensity of services—whether because of program type (i.e., center-based, home-based, or mixed) or whether the family has been integrated into EHS longer or has other children enrolled—may also play a role in accessing referrals (Blair, 2013; Early Childhood Learning & Knowledge Center, 2021).

We expect those factors of smoking behavior and service intensity (e.g., program type, another child in EHS, longer time in EHS) to be predictive of referral receipt. We also expect factors related to comfort disclosing (e.g., marital status, partner living at home) may be predictive of referral receipt. To our knowledge, no specific literature cites demographic characteristics of those receiving smoking cessation referrals; thus, that was also an area of exploration in this study.

METHODS

This project evaluated secondary data from the EHS Family and Child Experiences Study (Baby FACES)—a longitudinal cohort study designed to maintain current, thorough information to support EHS (Vogel & Boller, 2014). The Baby FACES study (N = 976) enrolled a nationally representative sample of parents of one-year-old children (N = 782) across 89 EHS programs. This study used data from structured interviews with mothers and program administrators.

Participants

The Baby FACES dataset contains a larger sample of pregnant smokers than the general population (20% compared to 9%; Azagba et al., 2020). Predictor variables were selected from the literature review above and were grouped into three overarching categories: demographic characteristics, smoking behavior characteristics, and referral accessibility characteristics (see Table 1). Women in this sample were predominantly White and non-Hispanic. Additionally, most were never married and were not living with a partner. This sample ranged in age from 16 to 39 years old and

most had some high school, but not college, education. Smoking behavior in the present study was reported at two timepoints: before pregnancy only (N=73) and/or during pregnancy (N=71). 81.94% of this sample did not receive appropriate referrals based on their current or past smoking habits. No variable was available specifically measuring English-language comprehension; thus, the respondent's first language was selected as a proxy. This sample consists predominantly of speakers with English as their first language, living in mainly rural settings. Regarding intensity of services, 69.44% of mothers did not have other children receiving EHS services and were enrolled in EHS services ranging from 0 to 89 months (m=18.69mos, sd=19.92mos). Additionally, 18 mothers were enrolled in center-based, 31 mothers were enrolled in home-based, and 95 mothers were enrolled in blended programs.

TABLE 1
Sample Characteristics of main sample, one-year-old cohort, and current study

	Parent Study (N=782)		Present Study (N=144)	
D. V	Percentage	N	Percentage	N
Race*	40.720/	201	70.020/	102
White, non-Hispanic	48.72%	381	70.83%	102
Person of Color	48.08%	376	25.69%	37
Age (Mean (SD))	22.24 (12.28)		25.39 (5.04)	
Education level*				
Some HS/degree	61.76%	483	77.08%	111
Some college/degree or higher education	23.27%	182	22.22%	32
Marital Status*				
Married	26.21%	205	20.83%	30
Divorced/Separated	4.48%	35	6.94%	10
Never married	56.14%	439	71.53%	103
Partner living at home*				
Yes	40.15%	314	48.61%	70
No	47.06%	368	51.39%	74
First language*				
English	63.43%	496	93.75%	135
Spanish	22.12%	173	5.56%	8
Another child in EHS*				
Other child(ren) in EHS	26.47%	207	30.56%	44
No other child(ren) in EHS	60.74%	475	69.44%	100
Program location				
Urban	69.95%	547	61.81%	89
Rural	30.05%	235	38.19%	55
Program type				
Center based only	18.03%	141	12.50%	18
Home-visitor based only	13.81%	108	21.53%	31
Blended model	68.16%	533	65.97%	95
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Note. Participants were allowed to decline to answer any question with which they were not comfortable (missing data is denoted and will not be substituted).

Data Collection

Data collection was conducted by an external research group, and after representative EHS programs were scanned for eligibility, research coordinators worked with on-site EHS representatives to determine program administrators, teachers, and families who may also be potential study participants (Vogel & Boller, 2014). Data for this current study was collected over the phone. All participants gave written informed consent prior to interview, and research was conducted ethically according to local Institutional Review Boards.

Family interviews were conducted using computer-assisted telephone interviews, which allowed for standardized administration and skip logic (2014). This study uses a subset of data collected through Baby FACES family interviews including race, ethnicity, age, marital status, education level, whether there is a partner living at home, first language, and if there are other children enrolled in EHS. Interviewers also asked mothers about smoking behavior and cessation referral receipt during pregnancy. For this analysis, we also computed the length of a family's engagement with EHS using the date of first engagement with the program and the date of interview. Parents were compensated \$35 for participation (2014). For program-level data, researchers conducted telephone interviews with EHS administrators to collect information about program type and location (2014).

Data Analysis

As some families in this sample attended the same program, we ran an interclass correlations (ICC) to evaluate whether specific programs constituted a nest within our data. Results indicated program contributed no significant amount of variance in our outcome variable (ICC=0.00, 95% CI [-0.01, 0.04]). To answer our research question of who is/is not receiving referrals, we ran hierarchical, logistic regressions. Analyses were conducted in R version 3.6.3/R Studio version 1.4.1106 (R Core Team, 2020). Continuous variables (e.g., mother's age, months spent in EHS) were standardized and mean-centered. To test a fundamental assumption of regression, we evaluated a variance inflation factor (vif) testing for multicollinearity of predictors, and any values lower than 4 were deemed acceptable and assumed to contribute independent variance to the model. All vif scores were between 1.01 and 1.27. We conducted three hierarchical logistic regressions based on the categories described above—demographics, smoking behavior, referral accessibility—parsimoniously reducing the model by removing variables not statistically significant at each stage of the hierarchy. Lastly, we ran a best-fit model including only those variables significant after all three stages of the hierarchy.

RESULTS

Results from Model 1—demographic predictors—indicated no significant differences in referral rates across race, ethnicity, age, marital status, partner living at home, or education level (ps > .32; see Table 2 for all predictor z-scores). No predictors from Model 1 were carried into Model 2. In Model 2, however, timing of smoking behavior was significant, such that those who reported smoking during pregnancy were more likely to receive referrals (OR = 10.35, p < .05). The

smoking behavior variable consequently got carried into Model 3. Model 3, which included smoking behavior and treatment access metrics—location, language, program approach, length of time (LOT) spent in EHS, and siblings enrolled in EHS—yielded significant predictors. Although smoking behavior was no longer significant, both LOT with EHS (OR = 4.41, p < .01) and if mothers had other children enrolled in EHS (OR = 10.98, p < .05) were significantly, positively associated with referral receipt.

Model 4 was the most parsimonious, or best-fit, model and included solely significant predictors from Model 3 (LOT with EHS, siblings enrolled in EHS). These predictors remained significant. Model 4 established that one unit longer LOT with EHS services (e.g., 19.92 months) increased mother's odds of receiving a referral by 4, compared to mothers who spent less time in EHS (OR = 4.47, p < .01). Model 4 also found that having additional children in EHS increased odds of referral receipt by 16 (OR = 16.16, p < .05). To explore further, we tested the interaction between these two significant predictors in Model 4. This exploratory model did not yield a significant interaction between LOT with EHS and siblings in EHS (OR = 2.70, p = 0.3259), nor did it yield a significant first-order effect of LOT with EHS (OR = 2.78, p = 0.1345). This model, however, did yield a significant first-order effect of siblings in EHS, indicating that having other children enrolled in EHS resulted in a smoking cessation referral nearly 12x more frequently than those who did not have other children enrolled (OR = 11.95, p < .05).

TABLE 2

Hierarchical logistic regression z-scores of predictors for smoking cessation referrals

	Variable	Model 1	Model 2	Model 3	Model 4
	(constant)	-1.91	-5.59***	-2.91**	-6.37***
Variables					
	Person of color	-1.01			
	College and above	-0.24			
	Married				
	Partner at home	-0.06			
	Age	0.96			
	Smoking during pregnancy		2.19*	1.55	
	Spanish as first language			0.97	
	Urban location			-0.26	
	Home-based EHS vs. center			0.94	
	Mixed EHS vs. center			1.02	
	Siblings in EHS			2.06*	2.53*
	Months in EHS			3.01**	3.19**

Note. Significant at p < .05, ** significant at p < .01, *** significant at p < .001

Models 1-4 increase in complexity and parse out non-significant variables from prior models. Model 1 includes only demographic variables, Model 2 includes only the smoking behavior variable, and Model 3 includes the smoking behavior variable and cessation access predictors.

Model 4 is the best fit, or most parsimonious model, including only covariates and significant variables from Model 3.

DISCUSSION

This study examined demographic, smoking behavior, and treatment access metrics to predict which EHS mothers received smoking cessation referrals. This work was the first—to our knowledge—to examine referral receipt specifically, as much of the existing literature focuses on cessation. Three key findings are evident from these analyses. Firstly, mothers of color are being referred in equivalent ways to white, non-Hispanic women. Secondly, mothers who reported smoking at some point during pregnancy were more likely to receive cessation referrals than those who reported a history of smoking. Finally, we found that when context, namely characteristics of a families' relationship with EHS, was considered, prior significant predictors were no longer significant.

Cessation Referrals Criteria for Maternal and Child Health

Access to referral services and enrollment in EHS are associated with several child benefits, like higher kindergarten readiness, improved developmental milestones, and dental check-ups (National Head Start Association, n.d.). For families, EHS enrollment is associated with positive parenting practices, (National Head Start Association, n.d.) and assistance with food, housing, and income (Osgood-Roach & Wevers, 2020). Referrals are particularly important during pregnancy as there is service continuity postpartum, and many of EHS's peripartum services are delivered exclusively through referral, which includes nutritional counseling, oral, physical, and mental health care, substance abuse prevention and treatment, and housing stability (ECLKC, 2021b). All of this emphasizes the importance of evaluating who is left out of receiving these services.

Results from this study first highlight who is being provided referrals. We found equity among referral receipt, which is encouraging and consistent with EHS's foundation in anti-racist programming (ECLKC, 2021a). Compared to other facets of the healthcare system, this is a strength for EHS, especially considering racial differences in comfort disclosing to physicians during prenatal visits (Scherman et al., 2018).

While those with difficulty quitting are more acutely in need of getting connected to care, a history of smoking pre-pregnancy remains a significant risk factor as nearly 60% relapse within 6 months of delivery (Colman & Joyce, 2003). Moreover, those who are Medicaid recipients (e.g., many EHS families), have postpartum depression, or have increased stress are also at increased risk (Colman & Joyce, 2003; Notley et al., 2015; Solomon et al., 2007). This is notable as secondhand smoke (SHS) continues to pose risk to the child even after pregnancy and is similarly associated with adverse health concerns in early childhood (e.g., asthma, ear infections, sudden infant death syndrome (CDC, 2020)). This exposure, however, could come from any member of the household, and unfortunately, having more friends or family members who smoke is also a risk for postpartum relapse in mothers who quit during pregnancy (Solomon et al., 2007). Thus, having a history of smoking should not be overlooked during needs assessments, and automatically including this as

grounds for referral would be a simple adjustment to cessation referral programming that could have a multi-generational benefit for EHS families.

Identifying Contextual Factors Associated with Cessation Referral

Results from the best-fit model indicate that when a pregnancy is known to EHS, either because the mother was referred at some point early in pregnancy or because she has other children enrolled and is already receiving services, the smoking referral mechanism is most successful, regardless of present or historical smoking behavior. This is likely because programs are best able to provide wrap-around services to families who are already fully integrated into their system and who have established positive, trusting relationships with EHS.

Aligned with these findings, and given the extent to which SHS is detrimental to children and families, Head Start (HS) recently underwent a substantial initiative to revise their smoking cessation programming. With stakeholder involvement, HS integrated cessation strategies into already existing infrastructure (the Head Start Tobacco Cessation Initiative; Moody-Thomas et al., 2014) via additional focus on smoking cessation and SHS exposure during needs assessments. This initiative also included training workshops for HS staff centering around psychoeducation about nicotine addiction, cessation resources, and evidence-based counseling interventions (Moody-Thomas et al., 2014).

While it is encouraging to see the expansion of smoking cessation services in HS, findings from the present study indicate that such programs will primarily benefit families already well-integrated. What remains unclear is how best to increase the referrals made to women earlier in their connection to EHS. One method of delivering EHS services earlier in pregnancy is through referrals from obstetricians. A primary care study found that facilitating an initial connection to HS on behalf of families increased retention and attendance (Silverstein et al., 2004), which helps establish relationships with EHS. Other recommended referral sources may include local high schools, WIC, health departments, or state-run referral programs, such as IRIS (Integrated Referral and Intake System; IRIS, n.d.)). Overall, integrating new families into EHS sooner is most effective for early intervention, and future work should evaluate how an iterative process like the HS Tobacco Cessation Initiative could be revised to include an emphasis on recruiting and retaining this population earlier in gestation.

Limitations

There are notable limitations to this study. First, the Baby FACES dataset relied on retrospective reporting from EHS mothers—which could be prone to recall bias—and did not allow for referral or smoking disclosure confirmation. Consequently, we do not know whether mothers reported smoking during pregnancy and were not given a referral, whether mothers were not connected to EHS at the time of smoking behavior, or whether mothers were not comfortable disclosing smoking behavior. Predictors also did not all have equivalent group sizes, which may have led to underpowered testing of certain predictors, masking potential results. Lastly, there may be some selection bias. Although this data is nationally representative, all families selected are active

participants in EHS, meaning that families who have difficulty engaging with services may be disenrolled from EHS and ineligible for this study. It is also likely that these particular families are in even greater need of smoking cessation and other referral services. As such, results should be considered an undercount of those provided appropriate smoking cessation referrals.

Conclusion

Ultimately, smoking cessation during pregnancy remains a challenging health problem impacting both mother and child. The present study showed that EHS is in a favorable position to refer many women to access critical supports, and it does so without racial or ethnic bias. At the same time, over half of EHS families who reported a history of smoking or smoking during pregnancy did not receive a cessation referral, and most of these are new mothers or more recently enrolled in EHS. Findings from this study shed light on opportunities to expand early intervention and prevent relapse, benefitting both mother and child.

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