ORIGINAL INVESTIGATION

Individual, Social, and Environmental Factors Associated With Support for Smoke-Free Housing Policies Among Subsidized Multiunit Housing Tenants

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Received June 27, 2012; accepted October 6, 2012

ABSTRACT

Introduction: Mandatory smoke-free policies in subsidized, multiunit housing (MUH) may decrease secondhand smoke exposure in households with the highest rates of exposure. Ideally, policies should be based on a strong understanding of factors affecting support for smoke-free policies in the target population to maximize effectiveness.

Methods: A face-to-face survey was conducted from August to October 2011 using a stratified random sample of private subsidized housing units in Columbus, OH, without an existing smoke-free policy ($n = 301$, 64% response rate). Lease holders were asked to report individual, social, and environmental factors hypothesized to be related to support for smoke-free policies. Multiple logistic regression models were used to identify factors independently associated with policy support.

Results: Most tenants supported smoke-free policies in common areas (82.7%), half supported policies inside units (54.5%), and one third supported a ban outside the building (36.3%). Support for smoke-free policies in units and outdoors was more common among nonsmokers than smokers (71.5% vs. 35.7%, $p < .001$ and 46.2% vs. 25.4%, $p < .001$, respectively). Several individual and social, but no environmental, factors were independently associated with policy support. Smokers who intended to quit within 6 months or less were more likely than other smokers to support in-unit policies (45.3% vs. 21.1%; $p = .003$).

Conclusions: More than half of subsidized MUH tenants supported smoke-free policies inside their units. Strategies to address individual- and social-level barriers to behavior change should be implemented in parallel with smoke-free policies. Policies should be evaluated with objective measures to determine their effectiveness.

INTRODUCTION

Despite substantial decreases in secondhand smoke (SHS) exposure due to smoke-free policies in workplaces and public places, 88 million nonsmokers in the United States are still exposed to SHS annually (Centers for Disease Control and Prevention, 2010). Children, Black non-Hispanics, and low socioeconomic status (SES) populations are most likely to be exposed. Compared to all other settings, the largest proportion of SHS exposure occurs in residential settings among both children and adults (Klepeis, Nelson, Ott, Robinson, Tsang, Switzer, et al., 2001). Up to one fifth of children and adolescents live with someone who smokes inside the home (Centers for Disease Control and Prevention, 2010; Singh, Siahpush, & Kogan, 2010). In-home exposure rates are 2–3 times higher for nonsmoking children and adults in low-SES households (Centers for Disease Control and Prevention, 2008; Singh, Siahpush, & Kogan, 2010).

Until recently, most public health efforts to decrease residential SHS exposure focused on promoting voluntary home smoking restrictions (HSRs), in which households ideally eliminate all smoking in the home. However, a growing body of evidence shows that tenants in multiunit housing (MUH)—including duplexes, double or other multifamily homes, apartment buildings, condominiums, or townhouses—may be exposed to nontrivial SHS incursions, that is, tobacco smoke that seeps from other indoor areas. Evidence of SHS seepage has been verified in MUH through studies using self-report, biomarker measurement, and direct measurement of air transfer between units (Bohac, Hewett, Hammond, & Grimsrud, 2011; King, Cummings, Mahoney, Juster, & Hyland, 2010; King, Travers, Cummings, Mahoney, & Hyland, 2010; Kraev, Adamkiewicz, Hammond, & Spengler, 2009; Wilson, Klein, Blumkin, Gottlieb, & Winickoff, 2011). This research has justified shifting from voluntary to mandatory policies to limit smoking in MUH (Winickoff, Gottlieb, & Mello, 2010).

doi:10.1093/ntr/nts246

Advance Access publication November 7, 2012

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Recent efforts by researchers and practitioners have focused specifically on publicly subsidized MUH because subpopulations that are disproportionately affected by SHS exposure (i.e., children, low-SES, Black) are over-represented in this type of housing (Turner & Kingsley, 2008). Because most subsidized MUH tenants have fewer housing alternatives than market-rate tenants, their ability to avoid units where SHS exposure occurs is limited.

Since 2009, the U.S. Department of Housing and Urban Development has strongly encouraged subsidized housing providers to adopt mandatory smoke-free policies (Winickoff et al., 2010). If implemented and enforced appropriately, such policies are legal and constitutional. Nearly 250 subsidized housing providers in 27 states have implemented smoke-free policies (J. Bergman, personal communication, March 18, 2011). According to several surveys, a majority of MUH residents support smoke-free policies but only about one fourth of smokers support them (Henrikus, Pentel, & Sandell, 2003; Hewett, Sandell, Anderson, & Niebuhr, 2007; King et al., 2010). Although these studies did not explicitly exclude subsidized MUH tenants, their sampling frames (e.g., commercial list of renters; largest suburban apartment complexes) or data collection methods (e.g., landline telephone survey) likely limited the number of very low-SES tenants and results were not reported separately for subsidized MUH tenants. In the only published evaluation of a smoke-free policy in subsidized MUH, smokers reported decreased indoor smoking and cigarette consumption, and increased cessation in the 17 months after policy implementation (Pizacani, Maher, Rohde, Drach, & Stark, 2012). Although these results seem promising, baseline measurements were retrospective self-report and objective measures of smoking or in-home smoking were not collected. Empirical evidence about behaviors and attitudes of subsidized housing tenants prior to policy changes is needed to design policies and associated strategies to maximize effectiveness.

In the current study, identified gaps in the literature were addressed by assessing the prevalence of support for mandatory smoke-free policies among a population of subsidized housing tenants without an existing smoke-free policy. Additionally, the extent to which individual, social, and environmental/community factors were associated with policy support was examined, including smoking-related characteristics among smokers.

Theoretical Framework: Social Ecological Model

Using a social ecological framework (Kok, Gottlieb, Commers, & Smerecnik, 2008), factors at multiple levels of influence (i.e., individual, social, environmental/community) were identified that may be associated with supporting smoke-free policies. Previous studies have focused primarily on individual or household factors. Social factors are particularly important for the current population because lease holders are accountable for actions of other household members or visitors. Environmental and community factors have long been considered as influences on outdoor health-related behaviors such as physical activity (Bennett et al., 2007) but have not been examined for in-home smoking behaviors. These factors were expected to affect support for smoke-free policies by influencing the desirability of going outside to smoke.

METHODS

Sample

The study population was tenants in subsidized MUH units located in 184 buildings across five urban neighborhoods and managed by a private company in Columbus, OH. No buildings or units were covered by a smoke-free housing policy. Using units that were occupied as of July 2011 ($n = 914$), a stratified random sample ($n = 475$) was selected and the primary lease holder in each unit was eligible to participate in the study. Administrative data provided by the property management company were used to stratify units by the age of the youngest child (less than 5 years; 5–17 years; or no children <18 years); this variable has been associated with having voluntary HSRs in previous studies (Borland et al., 2006; King et al., 2010), which was expected to be associated with support for smoke-free policies.

Data Collection

An interviewer-administered, face-to-face survey was conducted at tenants' homes from August to October 2011. A personalized letter was sent to lease holders in selected units 1 week prior to the first in-person visit. Teams of two interviewers (one community resident and one graduate student) made at least five in-person attempts to contact each lease holder at different days and times. Visits took an average of 27.0 min to complete and participants were given a \$5 grocery store gift card. The study was approved by the university's institutional review board and participants provided informed consent.

Measurement

Support for Mandatory Smoke-Free Policies

Respondents were asked whether they would support a policy that says no one can smoke inside their unit ("in-unit" policies), in common indoor areas, or on porches/steps outside their building ("outdoor" policies). Responses for each area were dichotomized into "support" (yes, definitely/yes, probably) and "do not support" (no, probably not/no, definitely not).

Individual/Household Variables

Several demographic and household characteristics were collected: age (in years); race/ethnicity (African American or other); sex (male or female); age of youngest child under 18 years living in household (<5 years, 5–17 years, no children <18 years); educational attainment (high school degree or not); and employment status (part-/full-time or not employed). Respondents' self-reported move-in dates were used to calculate length of stay (months).

Smoking Status

All participants were asked whether they had smoked at least 100 cigarettes in their lifetime and how many days per week they smoke now. Smoking status was defined as follows: (a) never-smokers: never smoked 100 cigarettes and smoked 0 days per week now; (b) former smokers: smoked 100 cigarettes in their lifetime but smoked 0 days now; and (c) current smokers: smoked 1–7 days per week now regardless of whether they had smoked 100 cigarettes in their lifetime. Current smokers reported how many cigarettes they usually smoke on days

they smoke. Never- and former smokers were grouped as “non-smokers” for some analyses.

Knowledge

Respondents were asked whether SHS causes the following health problems: asthma symptoms or ear infections in children, sudden infant death syndrome, and heart disease or lung cancer in adults who do not smoke. The 4-level response options ranging from “yes, definitely” to “no, definitely not” were averaged across items; a higher score indicated more accurate knowledge. Respondents were also asked the following item from an existing survey (www.socialclimate.org): “If children are not present but will be later, it is ok to smoke inside the home” (strongly disagree/disagree vs. agree/strongly agree).

Voluntary HSRs

Respondents were asked, “Which of the following best describes smoking inside your home? Do not include decks or porches.” Those who reported smoking was not allowed anywhere were asked if there are ever any exceptions to the rule ([Wakefield et al., 2000](#)). Complete HSRs were defined as no smoking allowed anywhere in the home with no exceptions. Partial HSRs allowed smoking in some places or at some times, including having exceptions to complete restrictions. Those with no HSRs allowed smoking anywhere inside the home.

Nicotine Dependence

Categorical responses for time to first cigarette (TTF) ([Baker et al., 2007](#)) were dichotomized into ≤ 30 and > 30 min. Cigarette consumption was measured as daily versus nondaily and usual number of cigarettes per day (CPD) was classified as very light (1–5 CPD), light (6–10 CPD), or moderate/heavy (11+ CPD). Current smokers were asked to rate urges to smoke during normal days by reporting how much of the time they felt the urge to smoke in the past 24 hr (not at all/a little of the time/some of the time/a lot of the time) and how strong the urges to smoke have been in general (slight/moderate/strong/very strong) ([Fidler, Shahab, & West, 2011](#)). Responses to both items were summed to create a scale ranging from 1 to 8 (Cronbach’s $\alpha = .69$); higher scores indicated more frequent/strong urges.

Intentions to Quit Smoking

All current smokers were asked, “Are you seriously considering quitting smoking within the next 6 months?” Affirmative or “don’t know” responses were followed by, “Are you planning to quit within the next 30 days?” A dichotomous indicator variable was created to identify those who intended to quit in 6 months or less versus those who did not.

Child With Asthma

Respondents were asked whether a health care provider ever told them any children who lived with them had asthma (yes/no). Respondents without children were coded as “no.”

Social Variables

Dichotomous indicators were created for having anyone else in the household who smokes cigarettes and having visitors smoke inside at least 1 day per week. Based on previous work ([Borland et al., 2006](#)), respondents were asked how many of

the five adults they spend the most time with on a regular basis: (a) smoke cigarettes or (b) do not allow smoking in their own homes. Responses were dichotomized into a majority (≥ 3) versus fewer. All respondents were also asked, “If your lease said no smoking was allowed in your unit, how hard would it be to keep other household members from smoking in your unit? Visitors?” ([Henrikus et al., 2003](#)). Those who reported “somewhat” or “very” hard to either question (versus “not at all” hard) were classified as “hard to ask.”

Environmental/Community Variables

Data collectors recorded (yes/no) whether each unit had a covered front porch and if it was on the ground floor. A dichotomous indicator (yes/no) for smelling cigarette smoke that came from other apartments or the hallway at least once a year (SHS incursions) was created to be comparable to other studies ([Henrikus et al., 2003](#); [Hewett et al., 2007](#); [King et al., 2010](#)). Perceptions of safety were assessed by asking respondents how safe they would feel (4-point Likert-type scale) being out alone in the daytime/nighttime near their building ([Robinson, Lawton, Taylor, & Perkins, 2003](#)). Neighborhood cohesion was measured using an existing 5-item Likert scale (e.g., people around here are willing to help their neighbors) ([Sampson, Raudenbush, & Earls, 1997](#)). The composite scale of averaged items ranged from 1 to 5 with higher scores indicating better cohesion (Cronbach’s $\alpha = .81$). Respondents who identified one or fewer neighborhood issues (4-item scale; e.g., people who do not keep up their property or yards) ([Robinson, Lawton, Taylor, & Perkins, 2003](#)) as “somewhat of a problem” and none as a “big problem” were assigned “better” neighborhood condition; all others were assigned “worse” condition.

Data Analysis

The prevalence of each individual, social, and environmental/community factor was compared between smokers and non-smokers. Smoking status and demographic characteristics were also compared between respondents who supported smoke-free policies and those who did not. Chi-square tests of association with Rao–Scott adjustment were used for categorical variables and Kruskal–Wallis tests or analysis of variance for continuous variables. Length of stay was natural log-transformed to improve normality; geometric means and 95% confidence intervals are reported for this variable.

Associations between independent variables (i.e., demographic, individual, social, and environmental/community factors) and each dependent variable were tested using multiple logistic regression analyses. “Support” for smoke-free policies was modeled separately for in-unit and outdoor policies; support for policies in common areas was not modeled because most tenants supported these policies. A separate subanalysis was conducted among smokers to examine associations between smoking-related characteristics (nicotine dependence and intentions to quit) and support for smoke-free policies, controlling for significant demographic factors. Standard model building procedures with purposeful forward selection were used with Hosmer–Lemeshow goodness-of-fit tests to determine adequacy of model fit ([Hosmer & Lemeshow, 2000](#)). Analyses were conducted using SAS 9.2 (SAS Institute Inc.) and STATA 10.1 (StataCorp) with adjustments for the stratified sampling design when possible.

RESULTS

Sample Characteristics

Completed surveys were obtained from lease holders in 301 units (63.8% response rate); of those successfully contacted, 74.1% participated (i.e., cooperation rate). Based on administrative data, nonrespondents did not differ from respondents in lease holder age ($p = .29$), age of youngest child ($p = .82$), or neighborhood of residence ($p = .50$).

Overall, 47.5% ($n = 143$) of respondents were current smokers and 12.3% ($n = 37$) were former smokers. The sample was predominantly young (median age = 24.8 years), female (86.4%), and African American (83.7%). More than half (55.5%) had a child less than 5 years in the household and 17.3% had a child 5–17 years. Almost one third (29.2%) had less than a high school education and 33.2% were employed. The geometric mean length of stay was 24.3 (95% *CI*: 21.3–27.9) months. Among smokers, 79.7% smoked daily and most were very light (55.2%) or light (30.1%) smokers. Less than half (41.6%) smoked within 30 min of waking and 60.1% intended to quit in 6 months or less. Mean urge strength was 4.6 ($SE = 0.17$).

Prevalence of Individual, Social, and Environmental Factors by Smoking Status

Many individual and social factors differed by smoking status. At the individual level, smokers were less likely than nonsmokers to have complete HSRs (6.3% vs. 50.0%; $p < .001$) or to disagree that smoking when children are not present is acceptable (54.5% vs. 78.7%, $p < .001$). At the social level, smokers were more likely than nonsmokers to have visitors who smoke inside (54.5% vs. 26.6%, $p < .001$) or other household members/visitors who smoke outdoors (60.6% vs. 46.8%, $p = .02$). A higher proportion of current smokers expected difficulties enforcing a smoke-free policy with

others than did nonsmokers (31.5% vs. 15.8%, $p = .001$). Not surprisingly, smokers were also more likely to have a majority of friends who smoke (58.7% vs. 26.6%, $p < .001$) and less likely to have a majority with HSRs (14.7% vs. 33.5%, $p < .001$). Environmental/community factors did not differ between smokers and nonsmokers, including having SHS incursions in the past year (26.2% vs. 31.8%, $p = .29$).

Support for Smoke-Free Policies

Most tenants (82.7%) supported smoke-free policies in common indoor areas with differences between smokers and nonsmokers borderline significant (78.2% vs. 86.7%; $p = .05$). About half of all respondents (54.5%) supported a smoke-free policy in units and about one third (36.3%) supported a policy outside the building. Support for smoke-free policies in units and outdoors was more common among nonsmokers than smokers (71.5% vs. 35.7%, $p < .001$, and 46.2% vs. 25.4%, $p < .001$, respectively). Females and respondents with young children or a high school degree were more likely to support in-unit policies than males, respondents with older or no children, and those with less than high school education, respectively (Table 1). Also, in-unit policy supporters had lived in their units for significantly less time than nonsupporters. No demographic characteristics differed by support for outdoor policies.

Many individual and social factors differed by support for in-unit or outdoor policies in bivariate analyses (Tables 2 and 3). After controlling for smoking status, however, many of these associations became nonsignificant. In the final models, being a never-smoker, not believing that it is OK to smoke when children will be present later, and SHS incursions were associated with higher odds of supporting policies both in units and outdoors (Tables 2 and 3). Having partial or complete HSRs or having a child with asthma were also associated with higher odds of supporting in-unit policies (Table 2). More knowledge about SHS health effects and lack of difficulty asking others

Table 1. Demographic Characteristics by Support for Smoke-Free Policies Among All Respondents ($N = 301$)

Variables		Support in-unit policy				Support outdoor policy			
		Yes		No		Yes		No	
		No.	Est.	No.	Est.	No.	Est.	No.	Est.
Age, median, years		—	23.8	—	27.2	—	24.9	—	24.8
Sex (%)	Male	16	39.0	25	61.0*	14	35.0	26	65.0
	Female	148	56.9	112	43.1	95	36.5	165	63.5
Race/ethnicity (%)	African American	137	54.6	114	45.4	90	36.0	160	64.0
	Other	27	55.1	22	44.9	19	38.8	30	61.2
Age of youngest child (%)	No children	37	45.1	45	54.9*	32	39.5	49	60.5
	<5 years	103	61.7	64	38.3	55	32.9	112	67.1
	5–17 years	24	46.2	28	53.8	22	42.3	30	57.7
Education (%)	Less than high school	40	45.5	48	54.5*	29	33.3	58	66.7
	High school or more	124	58.2	89	41.8	80	37.6	133	62.4
Employment (%)	Full-/part-time	62	62.0	38	38.0	37	37.0	63	63.0
	Not employed	102	50.7	99	49.3	72	36.0	128	64.0
Length of stay, geometric mean, months		—	21.1	—	28.9*	—	23.6	—	24.5
(95% <i>CI</i>)		(17.7–25.0)		(23.3–35.9)		(19.1–29.2)		(20.5–29.1)	

Note. *CI* = confidence interval.

* $p < .05$ for comparison of demographic variable by policy support status (no comparisons were significant for outdoor policies).

Table 2. Individual, Social, and Environmental Factors Associated With Support for In-Unit Smoke-Free Policies Among All Respondents

		Support policy (<i>n</i> = 301)		Bivariate (<i>n</i> = 301)	Final model ^a (<i>n</i> = 295)
		No.	%	OR (95% CI)	AOR ^b (95% CI)
Individual factors					
Smoking status	Never	90	74.4	5.2 (3.1–9.0)	3.3 (1.7–6.2)
	Former	23	62.2	3.0 (1.4–6.3)	1.9 (0.8–4.4)
	Current	51	35.7	1.0	1.0
Home smoking restrictions	Complete	71	80.7	11.5 (4.9–27.0)	3.9 (1.4–10.9)
	Partial	81	48.2	2.6 (1.2–5.3)	2.3 (1.0–5.3)
	None	12	26.7	1.0	1.0
Child with asthma in home	Yes	47	67.1	2.0 (1.1–3.5)	2.1 (1.1–4.2)
	No	117	50.6	1.0	1.0
SHS knowledge, continuous ^c		–	–	1.3 (0.8–2.0)	–
OK to smoke when children not present	Strongly disagree/disagree	129	64.5	3.7 (2.2–6.3)	2.6 (1.4–4.8)
	Strongly agree/agree	32	32.7	1.0	1.0
Social factors					
Other HH member smokes	Yes	18	40.0	1.0	–
	No	145	57.1	2.0 (1.0–3.8)	–
Visitors smoke inside	Yes	52	43.3	1.0	–
	No	112	61.9	2.1 (1.3–3.4)	–
Other household members or visitors smoke outside	Yes	91	56.9	1.0	–
	No	73	52.1	0.8 (0.5–1.3)	–
Hard to ask others not to smoke in home	Yes	27	38.6	1.0	–
	No	137	59.3	2.3 (1.3–4.0)	–
Friends who smoke	0–2	105	60.0	1.7 (1.1–2.7)	–
	3–5	59	46.8	1.0	–
Friends with complete HSRs	0–2	113	49.8	1.0	–
	3–5	51	68.9	2.2 (1.3–3.9)	–
Environmental/community factors					
SHS incursions at least once a year	Yes	58	66.7	2.1 (1.2–3.5)	2.3 (1.2–4.3)
	No	103	48.8	1.0	1.0
Safety near building	Very safe/safe	88	51.5	0.8 (0.5–1.2)	–
	Unsafe/very unsafe	76	58.5	1.0	–
Neighborhood cohesion, continuous ^c		–	–	1.1 (0.8–1.5)	–
Neighborhood conditions	Better	45	53.6	1.0 (0.6–1.6)	–
	Worse	119	54.8	1.0	–
Unit location	Ground floor	132	55.5	1.2 (0.7–2.0)	–
	Upper floor	32	51.6	1.0	–
Covered front porch	Yes	39	52.7	0.9 (0.5–1.5)	–
	No	125	55.1	1.0	–

Note. OR = odds ratio; AOR = adjusted odds ratio; HH = household; SHS = secondhand smoke.

^aModel only includes variables with $p < .05$ after controlling for other variables in the model.

^bAdjusted for other variables in the table plus length of stay; no other demographic variables were significant.

^cHigher score indicates more knowledge or cohesion.

not to smoke in the home were also associated with supporting outdoor policies (Table 3). Length of stay was the only demographic characteristic associated with support; support for in-unit policies was less likely as logged length of stay increased ($AOR = 0.8$, 95% CI : 0.6–1.0).

Among smokers, several smoking-related characteristics were associated with support for in-unit policies but not for outdoor policies (Table 4). In the final model, only those who intended to quit smoking in 6 months or less were more likely to support in-unit policies ($OR = 3.1$, 95% $CI = 1.5$ –6.7). No other smoking-related or demographic characteristics were

associated with support for in-unit policies after controlling for intentions to quit or with outdoor policies.

DISCUSSION

This is the first study of support for mandatory smoke-free policies among subsidized housing tenants without an existing smoke-free policy. Tenant support for in-unit smoke-free policies (55%) was slightly lower than in previous studies not limited to subsidized MUH tenants (Henrikus et al., 2003;

Support for smoke-free subsidized housing policies

Table 3. Individual, Social, and Environmental Factors Associated With Support for Outdoor Smoke-Free Policies Among All Respondents

			Support policy (<i>n</i> = 301)		Bivariate (<i>n</i> = 301)	Final model ^a (<i>n</i> = 293)
			No.	%	OR (95% CI)	AOR ^b (95% CI)
Individual factors						
Smoking status	Never		58	47.9	2.7 (1.6–4.6)	2.1 (1.2–3.8)
	Former		15	40.5	2.0 (0.9–4.3)	1.7 (0.7–4.0)
	Current		36	25.4	1.0	1.0
Home smoking restrictions	Complete		45	51.1	1.8 (0.9–3.9)	
	Partial		48	28.6	0.7 (0.3–1.4)	
	None		16	36.4	1.0	
Child with asthma in home	Yes		32	45.7	1.7 (1.0–2.9)	
	No		77	33.5	1.0	
SHS knowledge, continuous ^c OK to smoke when children not present					2.0 (1.2–3.1)	2.0 (1.2–3.3)
	Strongly disagree/ disagree		87	43.7	3.0 (1.7–5.4)	2.0 (1.1–3.7)
	Strongly agree/agree		20	20.4	1.0	1.0
Social factors						
Other HH member smokes	Yes		11	24.4	1.0	
	No		98	38.7	2.0 (0.9–4.1)	
Visitors smoke inside	Yes		31	26.1	1.0	
	No		78	43.1	2.2 (1.3–3.6)	
Other household members or visitors smoke outside	Yes		55	34.6	1.0	
	No		54	38.6	1.2 (0.7–1.9)	
Hard to ask others not to smoke in home	Yes		14	20.0	1.0	1.0
	No		95	41.3	2.8 (1.5–5.4)	2.5 (1.2–5.0)
Friends who smoke	0–2		68	39.1	1.3 (0.8–2.2)	
	3–5		41	32.5	1.0	
Friends with complete HSRs	0–2		83	36.7	1.0	
	3–5		26	35.1	0.9 (0.5–1.6)	
Environmental/community factors						
SHS incursions at least once a year	Yes		40	46.0	1.9 (1.1–3.1)	2.0 (1.1–3.4)
	No		66	31.4	1.0	1.0
Safety near building	Very safe/safe		57	33.5	0.8 (0.5–1.2)	
	Unsafe/very unsafe		52	40.0	1.0	
Neighborhood cohesion, continuous ^c Neighborhood conditions			–		1.0 (0.7–1.3)	
	Better		27	32.1	0.8 (0.5–1.3)	
Unit location	Worse		82	38.0	1.0	
	Ground floor		89	37.6	1.3 (0.7–2.3)	
Covered front porch	Upper floor		20	32.3	1.0	
	Yes		26	35.1	0.9 (0.5–1.6)	
	No		83	36.7	1.0	

Note. OR = odds ratio; AOR = adjusted odds ratio; HH = household; SHS = secondhand smoke.

^aModel only includes variables with *p* < .05 after controlling for other variables in the model.

^bAdjusted for other variables in the table; no demographic variables were significant.

^cHigher score indicates more knowledge or cohesion.

Hewett et al., 2007; King et al., 2010). Constituent support is a suggested prerequisite for using legislative interventions to modify health-related behaviors, but there is no predetermined level of support needed to ensure effectiveness (Pawson, Wong, & Owen, 2011). Although support was much lower among smokers than nonsmokers, several quasiexperimental and longitudinal studies found that support increased among smokers after implementation of smoke-free policies in other settings (e.g., worksites, hospitality venues) (Fong et al., 2006). These studies could not determine if increases were due to the policies themselves or associated media and educational strategies (Hyland et al., 2009). Therefore, complementary strategies to

address knowledge, attitudes, and social norms that could be barriers to behavior change should be implemented prior to or in concert with smoke-free housing policies.

Primarily qualitative research has suggested that low-SES populations face unique multilevel barriers to restricting in-home smoking such as having sole responsibility for young children, managing other smokers in the home, and having neighborhood safety concerns (Greaves & Hemsing, 2009). The current study is one of the first to explore these barriers quantitatively. Having children or young children were not associated with higher or lower support for smoke-free policies, and tenants with children with asthma were actually

Table 4. Smoking-Related Characteristics Associated With Support for In-Unit and Outdoor Policies Among Smokers (*n* = 143)

Variables		Support in-unit policy				Support outdoor policy			
		Yes		No		Yes		No	
		No.	Est.	No.	Est.	No.	Est.	No.	Est.
Smoking frequency (%)	Nondaily	13	44.8	16	55.2	9	31.0	20	69.0
	Daily	38	33.3	76	66.7	27	23.9	86	76.1
Cigarette consumption (%)	Very light (1–5 CPD)	31	39.2	48	60.8*	19	24.1	60	75.9
	Light (6–10 CPD)	18	41.9	25	58.1	12	27.9	31	72.1
	Moderate/heavy (11+ CPD)	2	9.5	19	90.5	5	25.0	15	75.0
Time to first cigarette (%)	≤30 min	19	32.2	40	67.8	18	31.0	40	69.0
	>30 min	32	38.6	51	61.4	18	21.7	65	78.3
Intentions to quit (%)	Within 6 months or less	39	45.3	47	54.7*	25	29.1	61	70.9
	Not within 6 months	12	21.1	45	78.9	11	19.6	45	80.4
Urge to smoke, ^a mean (<i>SE</i>)		–	4.1 (0.3)	–	4.8 (0.2)	–	4.5 (0.3)	–	4.5 (0.2)

Note. CPD = cigarettes per day; *SE* = standard error.

^aA higher score indicates stronger urges (range 1–8).

**p* < .05 for comparison of each variable by policy support status (no comparisons were significant for outdoor policies).

more likely to support smoke-free policies. Similarly, no environmental or community factors such as safety or neighborhood conditions were associated with support, even in bivariate analyses. The only barrier supported by study results was managing other smokers in the home. This is a concern because if the housing provider strictly enforces a smoke-free policy, the lease holder would be held responsible for violations by other household members or guests. Future research could examine the effectiveness of assertiveness or conflict resolution training in addressing this issue. Also, future studies should measure neighborhood-level variables in more heterogeneous populations before concluding that these factors are not barriers to limiting in-home smoking for very low-SES populations.

This is also the first study to examine associations between smoking-related characteristics and support for smoke-free housing policies among smokers. Previous studies have shown that smokers with higher nicotine dependence were less likely to have voluntary HSRs (Borland et al., 2006; King, Hyland, Borland, McNeill, & Cummings, 2011; Pizacani et al., 2008). However, in the current study, dependence (e.g., TTF) was not associated with support for smoke-free policies. Smokers who intended to quit smoking within the next 6 months or less were more likely to support smoke-free policies in units. Thus, some smokers may perceive smoke-free policies as a cessation aid. It is necessary to understand more about tenants who want to quit smoking in order to tailor cessation treatments to their needs.

More knowledge of specific SHS health effects and disagreement that it is acceptable to smoke when children are not present but will be later were consistent predictors of supporting smoke-free policies. These findings are also consistent with a recent nationally representative parent survey in which the level of agreement that breathing air in a room today where people smoked yesterday can harm the health of children was associated with having complete HSRs and more nuanced knowledge of SHS health effects was more salient than general knowledge (Winickoff et al., 2009). Together, these findings suggest a need to increase awareness of specific harmful effects of SHS

exposure and effective strategies for protecting nonsmokers—especially children—from being exposed.

Fewer than one third of tenants reported SHS incursions in the past year compared to about half in other studies of MUH residents (Hennrikus et al., 2003; King et al., 2010; Pizacani et al., 2012). However, tenants with incursions were more likely to support smoke-free policies. The lower incursion rate was not surprising because most buildings contained relatively few units with most on the ground floor, and SHS is more likely to seep from lower to upper floors (Bohac et al., 2011). No previous studies have assessed whether tenants who experienced SHS incursions were more likely to support smoke-free policies. This finding could potentially be used to promote the need for smoke-free policies among tenants.

As a whole, study findings also have implications for the effectiveness of smoke-free policies in subsidized MUH. Poland et al. proposed that enforcement of bans in public places is likely to be as much or more driven by social norms about appropriate public behavior than by officials (Poland, 2000). This is likely to be more true for regulation of behaviors in private settings (Blankenship, Bray, & Merson, 2000). Social norms for smoking and in-home smoking (e.g., number of friends who smoke) were not significant predictors of support for smoke-free policies after controlling for smoking status. However, more than half of smokers had a majority of friends who smoke and visitors who smoke inside. Therefore, social norms among smokers largely did not support limiting in-home smoking. Because smokers were also less likely to support smoke-free policies, it is unclear whether existing social norms will support compliance with these policies.

To date, public health professionals have equated a lack of evictions and tenant complaints about smoke-free policies with compliance. However, the same outcomes would be observed if compliance was low and few enforcement activities were occurring. Although one evaluation found positive changes in self-reported smoking and in-home smoking behaviors (Pizacani, Maher, Rohde, Drach, & Stark, 2012), the effectiveness of

smoke-free policies must be evaluated using objective measures of in-home smoking and smoking. This type of evaluation is comparable to the indoor air quality studies that proliferated after clean indoor air policies were implemented (Callinan, Clarke, Doherty, & Kelleher, 2010), and is even more critical for evaluating policies governing private behaviors. The extent to which explicit behavior change strategies to address knowledge, attitudes, and social norms contribute to the effectiveness of smoke-free policies should also be evaluated.

This study had several limitations. Self-reported smoking status was not objectively confirmed, but the high rate of smoking makes underreporting unlikely. The relatively small sample size precluded statistical comparisons of predictors of between smokers and nonsmokers. Although they were randomly selected, all units were managed by the same company. Characteristics of the company, buildings, units, or tenants themselves may make this population uniquely different from other subsidized housing tenants. Subsidized housing is a decentralized network, which limits alternatives for selecting representative samples at the state or national level. However, one third of all private subsidized housing recipients in the United States are African American and one third have children (Turner & Kingsley, 2008), making them comparable to the current study population.

CONCLUSIONS

Most subsidized MUH tenants supported smoke-free policies in common indoors areas, more than half supported policies inside their units, and one third supported outdoor policies. There was no evidence that environmental/community factors such as safety were barriers to supporting smoke-free policies. Attitudes and experiences of tenants who support smoke-free policies—such as having children with asthma or experiencing SHS incursions—could be used to promote policies among other tenants. In addition, strategies to address knowledge, attitudes, and social norms should be carefully designed to complement smoke-free policies. Future studies should evaluate changes in in-home smoking behavior after policy implementation using objective measures.

FUNDING

Prepared under Grant Number H-21629SG from the Department of Housing and Urban Development, Office of University Partnerships. Points of view or opinions in this document are those of the author and do not necessarily represent the official position or policies of the Department of Housing and Urban Development. NEH was supported in part by the Behavioral Cooperative Oncology Group of the Mary Margaret Walther Program of Cancer Care Research, an affiliate of the Walther Cancer Institute. One student data collector (K. Meeker) was supported through a grant from the National Cancer Institute (P50CA105632). This work was also supported by Community Properties of Ohio.

DECLARATION OF INTERESTS

None declared.

ACKNOWLEDGMENTS

The authors would like to acknowledge Community Properties of Ohio staff for partnering on this study and tenants for graciously sharing their time and opinions. We also sincerely thank Anna Borsick, Amber Broadus, Danyelle Heard, Katy Meeker, and Meaghan Novi for their commitment to and enthusiasm for collecting data.

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