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Self-Reported Secondhand Marijuana Smoke (SHMS) Exposure in Two New York City (NYC) Subsidized Housing Settings, 2018: NYC Housing Authority and Lower-Income Private Sector Buildings

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Abstract

Introduction: The percentage of adults in the United States reporting current marijuana use has more than doubled, from 4% to 9% between 2002 and 2018, suggesting that exposure to secondhand marijuana smoke (SHMS) has probably increased. Few studies have characterized the extent to which residents experience SHMS, particularly those living in multi-unit housing. It remains unknown how recently implemented smoke-free housing policies (SFH) targeting cigarette smoke in public housing authorities (PHAs) will affect SHMS exposure.

Objective: To characterize prevalence of self-reported SHMS exposure among residents living in two different subsidized housing settings prior to SFH policy implementation in PHAs: New York City Housing Authority (NYCHA) buildings and private sector buildings where most residents receive Section 8 subsidy vouchers (herein ‘Section 8’ buildings).

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Author Contribution

EA, SC and LT made substantial contributions to the conception, design, drafts and revision of this manuscript up until its submission. LT and DS are the Co-Principal Investigators of this study and conceptualized the initial project protocol, guided overall study design and implementation, and engaged substantially in the revising of this manuscript. LT and KW reviewed the data analysis plan for clarity and accuracy. KW led the drafting and revision of the data analysis sections. All authors read and approved the final manuscript.

Competing Financial Interests:

The authors declare they have no actual or potential competing financial interests.

Ethics Approval and Consent to Participate

The study protocol and procedures were approved by the Institutional Review Board at the New York University School of Medicine on July 20, 2017; IRB number: i17-00968. Written informed consent is obtained from study participants by trained field staff and Memorandums of Understanding were signed by all institutions involved for the appropriate exchange of data following good clinical practice and HIPAA compliance. The study provides participants’ households with information on the aggregate results of the air monitoring in their respective buildings.

Methods: Residents were recruited from 21 purposefully-selected buildings: 10 NYCHA and 11 Section 8 buildings (>15 floors). Survey responses were collected during April-July 2018 for NYCHA residents (n=559) and August-November 2018 for Section 8 residents (n=471). Of 4,628 eligible residents, 1,030 participated (response rates, 35% NYCHA, 32% Section 8).

Results: Overall, two-thirds of residents reported smelling marijuana smoke (67%) in their home over the past year, higher than reports of smelling cigarette smoke (60%). Smoking status and smelling SHS were both strong predictors of smelling SHMS ($p<0.05$). Nearly two thirds of residents perceived smoking marijuana (68%) and smelling SHMS (69%) as harmful to health.

Conclusion: Immediately prior to SFH rule implementation in PHAs, SHMS was pervasive in low-income multi-unit housing, suggesting SFH policies should expand to cover marijuana use.

Keywords

smoke-free housing; secondhand marijuana smoke; secondhand smoke; public housing authority

Introduction:

In the United States (U.S.), marijuana is currently the second-most used substance after tobacco and the most commonly used illicit substance.^{1–3} Results from a nationwide survey in 2018 suggest that one in seven people aged 12 and older have used marijuana in the past year, more than twice the number reporting current use since 2001–2002.^{1, 4} As of mid-2019, marijuana has been legalized in 33 states and the District of Columbia for medicinal purposes and in eight states for recreational use.⁵ Although not as well-enumerated, lax enforcement has likely increased marijuana use, and as a result exposure to secondhand marijuana smoke (SHMS). Such exposure is anticipated to increase following further legalization and decriminalization of marijuana in other states in the U.S.⁶

Marijuana can be used in various forms (smoked, vaporized or edible), but smoking remains the most common route of administration.⁷ Studies have found SHMS to contain many chemicals found in tobacco smoke, including known carcinogens and other hazardous substances.⁸ Yet little is known about the health effects of SHMS.^{9, 10} Previous studies examining health effects of chronic use among marijuana smokers have found plausible positive associations with cardiovascular disease, cognitive impairment and addiction.^{11, 12} One cross-sectional study found that children living in the homes of marijuana smokers had 83% greater odds of experiencing five different smoking-related adverse health outcomes compared to children in homes with no marijuana smoking, after controlling for cigarette smoke exposure and other covariates.¹⁰ Another study that measured endothelial function in rats found that SHMS causes similar vascular endothelial impairment as cigarette secondhand smoke (SHS) but for significantly longer periods of time.⁹

Marijuana smoking most frequently transpires indoors, often in homes,^{13, 14} putting nonsmokers at risk for SHMS inhalation in residential settings, particularly in multi-unit housing (MUH). Previous studies have demonstrated tobacco smoke's high propensity to diffuse into adjacent apartments and common areas,¹⁵ as well as high rates of SHS exposure among low-income residents of large apartment buildings.^{16, 17} Smoke-free housing (SFH)

policies targeting cigarette smoke are newly being implemented in public housing authorities (PHAs), nationwide.¹⁸ Descriptions of SHMS exposures in MUH are lacking, making it difficult to assess how marijuana will detract from the SFH policy intended effects. The aim of this study was to characterize self-reported SHMS exposure among residents living in two different subsidized housing settings in New York City (NYC) pre-SFH policy implementation in PHAs (effective July 30th, 2018).

Methods:

Study Population

We selected a purposeful sample of 21 high-rise buildings (>15 floors) located in Manhattan and the Bronx—10 public housing developments operated by NYC Housing Authority (NYCHA) and 11 developments operated by private building managers, where most residents receive Section 8 housing subsidy vouchers (herein ‘Section 8 buildings’). The study population and procedures have been described elsewhere.¹⁹ Study protocol and procedures were approved by the Institutional Review Board at the New York University School of Medicine on July 20, 2017; IRB number: i17–00968. Written informed consent was obtained from study participants by trained field staff and Memorandums of Understanding were signed by all institutions involved for the appropriate exchange of data following good clinical practice and HIPAA compliance.

Resident Survey

Using building resident rosters as sampling frames, surveys were administered to NYCHA residents between April- July 2018 (pre-SFH policy implementation) and to Section 8 building residents between August -November 2018.¹⁹ Of 4,628 eligible residents, 1,030 participated (response rates, 35% NYCHA, 32% Section 8).

Measures of Self-Reported Secondhand Marijuana Smoke Exposure

Self-reported measures included socio-demographics, cigarette smoking behavior, SHS and SHMS exposure, and knowledge of SHS and SHMS health impacts. SHMS incursions were obtained by asking: “During the past 12 months, have you smelled marijuana smoke in your home that comes from another apartment or from outside? [yes/no]”. Perceptions of harm of SHMS exposure were obtained by asking: “Do you agree or disagree that smoking marijuana is harmful to your health? [Strongly agree/agree/disagree/strongly disagree]” and “Do you agree or disagree that smoke from other people smoking marijuana is harmful to you? [Strongly agree/agree/disagree/strongly disagree]”. Responses were collapsed into strongly agree/agree and strongly disagree/disagree categories.

Data Analysis

We used descriptive statistics to characterize participant socio-demographic characteristics (number of children in the home, education level and language spoken), as well as self-reported smoking status, SHS and SHMS exposure, and perceptions of harm associated with smoking marijuana as well as smelling SHMS. We compared differences in responses between NYCHA and Section 8 residents using bivariate χ^2 tests. We also examined the association between self-reported SHS and SHMS, and self-reported smoking status and

SHMS. All estimates were considered statistically significant at $\alpha=0.05$, two-tailed. Analyses were conducted using SAS 9.4.

Results:

The demographic composition and prevalence of cigarette smoking among NYCHA and Section 8 residents were highly comparable ($p>0.05$) (Table 1).¹⁹ More than half of residents reported smelling cigarette smoke (60%) and two-thirds report smelling marijuana smoke (67%) in their home over the past year. Cigarette smoking status and smelling SHS were both strong predictors of smelling SHMS. For example, 87% of non-cigarette smokers reported smelling marijuana smoke compared to only 13% of current cigarette smokers ($p=0.007$). Similarly, residents who reported smelling cigarette smoke also reported smelling marijuana smoke with greater frequency (77% vs 23%, $p<0.001$). Lastly, nearly two thirds of residents described smoking marijuana (68%) and smelling SHMS (69%) as harmful to health.

Across our 21 building sample, the proportion of residents smelling SHMS within the past year ranged from 54% to 80%. There were no significant differences between NYCHA and Section-8 in the proportion of residents reporting smelling SHMS within the past year ($p=0.123$).

Discussion:

To our knowledge, this is the first descriptive study quantifying residential exposure to SHMS among low-income residents living in urban MUH. Previous studies have examined the likelihood of allowing marijuana use in homes and cars among young adults.^{20, 21} Nearly two thirds of the residents in our sample reported smelling marijuana smoke in their home over the past year. Our findings substantiate published qualitative findings from focus groups where public housing residents reported pervasive marijuana use in their building's common areas.²² Current non-smoking residents in our sample were also more sensitive to noticing, or at least reporting, pervasive marijuana use in their buildings. Overall, the widespread prevalence of SHMS exposure in MUH is especially concerning given an emerging body of evidence associating SHMS with poor health outcomes.^{9, 10}

The national and local move towards legalization of marijuana may increase already high levels of exposure and undermine cigarette SFH policies by creating confusion about differential policies for these two products. In states that have legalized marijuana for both recreational and medical use, it is therefore important that SFH policies be expanded to also address marijuana smoke. In areas of the U.S. where marijuana is still an illegal substance, differential enforcement approaches create challenges. SFH policies are enforced by local PHAs while marijuana, in these locations, is enforced by law enforcement agencies.

A particular strength of this study was our ability to recruit a large and diverse sample of low-income residents living in high-rise developments. Our survey was conducted immediately prior to implementation of nationwide SFH policies, providing a robust baseline assessment of both self-reported cigarette and marijuana SHS exposure across settings implementing and not implementing SFH policies. Our study was subject to

limitations. The purposeful selection of buildings limits our ability to generalize results to other multi-unit housing settings. Finally, self-reported SMHS exposure may be inaccurate and influenced by attitudes, social norms and behaviors, creating a potential information bias.

Conclusion:

Immediately prior to SFH rule implementation in PHAs, SHMS was pervasive in low-income multi-unit housing, suggesting SFH policies should expand to cover marijuana use.

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Table 1.

Characterization of Self-Reported Secondhand Marijuana Smoke Exposure in Two NYC Subsidized Housing Settings

	Overall (n=1030)	NYCHA Residents (n=559)	'Section 8' Residents (n=471)	
	%	%	%	<i>P</i> -value
Demographic Variables				
Children in home (under the age of 18)	37.8	37.4	38.3	<i>0.768</i>
Education Level (< High School)	22.7	24.3	20.7	<i>0.031</i>
Spanish Language	28.4	28.5	28.3	<i>0.852</i>
Self-Reported Smoking Status				
Current Smoker	15.5	15.7	15.2	<i>0.829</i>
Self-Reported Secondhand Smoke Incursions				
Smelling Cigarette Smoke, past year	60.0	62.3	57.2	<i>0.095</i>
Smelling Marijuana Smoke, past year	66.7	68.8	64.2	<i>0.123</i>
Knowledge and Attitudes Towards Smoking				
Smoking Marijuana is Harmful to Health	67.6	68.3	66.7	<i>0.612</i>
Smelling SHMS is Harmful to Health	68.9	69.4	68.2	<i>0.703</i>
Smelling Marijuana Smoke, Past Year (n=1030)				
	Yes (%)	No (%)		<i>P</i> -value
Self-Reported Smoking Status				
Current Smoker	12.9	21.1		<i>0.0007</i>
Non-Smoker	87.1	78.9		
Smelled Cigarette Smoke, past year				
Yes	77.0	25.1		<i><0.0001</i>
No	23.0	74.9		