



Short Communication

Smoke-free homes among single-parent families: Differences associated with parental race/ethnicity and smoking behaviors

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ABSTRACT

We assessed differences in the rates of smoke-free homes among single-parent households with regard to parental race/ethnicity and smoking status. We identified two cohorts representative of the U.S. single-parent households with underage children (children under the age of 18) based on the Tobacco Use Supplement to the Current Population Survey: 2010–11 ($n = 6474$) and 2014–15 ($n = 6114$). The interviews were conducted by phone and in-person. Statistical analysis was performed in 2017. The overall rate of smoke-free homes was 82% in 2010–11 and 86% in 2014–15. The rate of a smoke-free home was highest for Non-Hispanic (NH) Asian (94%) and Hispanic (92%) parents and lowest for NH Multiracial (77% in 2010–11 and 82% in 2014–15) in both survey periods. However, 2014–15 model-based comparisons relative to NH Whites indicated only one significant difference: the rate was lower for NH Blacks (OR = 0.46, 99% CI = 0.32:0.66). The smoke-free homes were least prevalent among daily smokers, followed by occasional smokers, followed by former smokers, and most prevalent among never smokers in each survey period. The 2010–11 and 2014–15 rates were 45% and 54% for daily, 64% and 72% for occasional, 89% and 91% for former, and 93% and 94% for never smokers. The gap in the rates of smoke-free homes for diverse parental racial/ethnic groups observed in 2010–11 decreased by 2014–15. While smoke-free homes became more prevalent in 2014–15, the rates remain drastically different among families with different parental smoking behaviors. Exposure to secondhand smoke at home remains common among single-parent households where the parent smokes.

1. Introduction

Exposure to secondhand smoke (SHS) during infancy and childhood can lead to reduced lung function (Tager 2008), respiratory infections (Öberg et al. 2011), invasive meningococcal disease (Murray et al. 2012), and other health problems (King et al. 2016). Because the exposure to SHS for children occurs primarily in homes, a smoke-free home environment is vital for eliminating and reducing the exposure to SHS (U.S. Department of Health and Human Services 2014).

In the U.S., the prevalence of smoke-free homes among households with underage children (younger than 18 years old) had increased from 45% in 1992–93 to 89% in 2010–11 (King et al. 2016). However, exposure to SHS at home is not uniform among diverse populations (Homa et al. 2015; King et al. 2016; U.S. Department of Health and Human Services 2014). For example, smoke-free homes are less prevalent in non-Hispanic (NH) Black households than they are in NH White, Hispanic, and NH Asian households (Binns et al., 2009; Hawkins and Berkman 2011; King et al. 2013; Mills et al. 2011; Zhang et al. 2011). Specifically, in 2006–07, among households with adult smokers,

the smoke-free homes were 50% as likely among NH Blacks than among NH Whites (Hawkins and Berkman 2011) and the increase in the rate of smoke-free homes for NH Blacks was 25% less than those for NH Whites from 1992–93 to 2006–07 (Mills et al. 2011). In addition, smoke-free homes are less prevalent among households with adult smokers than among households with no adult smokers (Binns et al., 2009; Hawkins and Berkman 2011; Zhang et al. 2011). In the U.S., among the single-parent households where the parent never smoked, the rate of smoke-free homes was 67% in 1995–96 and 89% in 2006–07; while among the households where the parent was a current smoker, the rate of smoke-free homes was only 13% in 1995–96 and 40% in 2006–07 (Zhang et al. 2011).

The smoking rules at home also differ between single-parent and two-parent households. In 1995–96, the rate of smoke-free homes was 46% among the single-parent households and 63% among the two-parent households (Zhang et al. 2011). In 2006–07, the rate of smoke-free homes was 75% among the single-parent households and 88% among the two-parent households (Zhang et al. 2011). Thus, children in single-parent households were more likely to be exposed to SHS than

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children in two-parent households. Among the single-parent households, the lower rate of smoke-free homes corresponded to NH Black and NH White parents relative to Hispanic parents, parents who did not complete the high school relative to those who completed the high school, and parents who were current or former smokers relative to never smokers (Zhang et al. 2011). The rates of smoke-free homes were similar among female- and male-parent households, as well as households with diverse parental age groups (Zhang et al. 2011). Single-parent households became more prevalent in the past decades in the U.S.: the rate was 9% in 1996 and 27% in 2016 (U.S. Department of Commerce, Census Bureau 2016a). However, the most recent studies addressing smoking rules at home used 2006–07 data. Thus, there is a lack of research addressing recent prevalence of smoke-free homes.

We examined whether the rates of smoke-free homes differ among seven parental racial/ethnic groups and evaluated disparities in the rates of smoke-free homes associated with parental smoking behaviors. In addition, we estimated the 2010–11 and 2014–15 rates of smoke-free homes for U.S. single-parent households with diverse characteristics.

2. Methods

2.1. Data

We used data from the Tobacco Use Supplement (TUS) to the Current Population Survey, administered by the U.S. Census Bureau for the National Cancer Institute (U.S. Department of Commerce, Census Bureau 2016b). These data are de-identified and available for public use. We identified two cohorts of single-parent households and analyzed the cohorts separately. The 2010–11 cohort consisted of 6474 households and the 2014–15 cohort consisted of 6114 households. Single-parent households were identified using the following criteria: 1) there is only one adult (18+ years old) in the household, 2) there is at least one underage child (i.e., under 18 years old) in the household, and 3) the parent self-responded to the survey, i.e., reports from proxy-respondents were not included in the study. We note that the parents are not necessarily the biological parents of the co-resident children. The Appendix below presents parental sociodemographic characteristics and parental smoking status for each cohort. The interviews were conducted by phone (59% in 2010–11 and 57% in 2014–15) or personal interviews (41% in 2010–11 and 43% in 2014–15). About 17% of the single-parent households resided in the Northeastern U.S. region; 22% in the Midwestern region; 41% in the Southern region; and 20% in the Western region; about 85% in a metropolitan area; and 15% in a non-metropolitan area.

2.2. Measures

The primary (binary) measure “smoke-free home” is differentiated between smoke-free and not smoke-free homes. The measure was based on parental responses to the survey question: “Which statement best describes the rules about smoking inside your home?” The parent could choose one of the following response options: option 1) no one is allowed to smoke anywhere, option 2) smoking is allowed in some places or at some times, and option 3) smoking is allowed anywhere. Response option 1 corresponds to “a smoke-free home”, while options 2 and 3 correspond to “not a smoke-free home”. The secondary measures were the parental race/ethnicity (Hispanic and several NH groups including White, Black, Asian, American Indian/Alaska Native, Hawaiian/Pacific Islander, and Multiracial) and smoking status (daily smoker, occasional smoker, former smoker, and never smoker). These and additional considered characteristics are depicted in the Appendix. U.S. regions and metropolitan status are defined accordingly to the U.S. Census Bureau (U.S. Department of Commerce, Census Bureau 2017).

2.3. Statistical analyses

First, we analyzed two-way contingency tables between the parental race/ethnicity and smoke-free home measure using the Rao-Scott chi-square tests (Rao and Scott 1984). Similarly, we analyzed two-way contingency tables between parental smoking status and smoke-free home measure. If an overall association was significant (at the 5% level), we performed multiple comparisons among diverse parental racial/ethnic groups (reference group was NH White) and diverse parental smoking behaviors (reference group was “never smoker”). We used Bonferroni adjustments for multiplicity. Specifically, when each of the five racial/ethnic groups were compared to NH Whites, the adjusted p -value was 5 times the original p -values and when former, daily, and occasional smokers were compared to never smokers, the adjusted p -value was 3 times the original p -value. The adjusted p -values are presented in Results section. We also used the Bonferroni method for calculating simultaneous 95% confidence intervals.

Next, for each cohort we fitted a logistic regression model to evaluate the relationship between the logit of probability of a smoke-free home and parental race/ethnicity and smoking status while controlling for other important covariates (parental age, sex, marital status, education level, employment status, metropolitan status, U.S. region of residency, and survey mode). The 2010–11 model fit statistics were: Likelihood Ratio $\chi^2 = 2,192,373$, $df = 22$, $p < 0.001$. The 2014–15 model fit statistics were Likelihood Ratio $\chi^2 = 1,756,557$, $df = 22$, $p < 0.001$. Significant factors are depicted in Table 2. Parental age, sex, and marital status were not significantly associated with the odds of a smoke-free home in each model. In addition, the metropolitan status was not significant in the 2014–15 model. Because the sample size for cross-groups for NH Hawaiian/Pacific Islanders was insufficient, this group was not included in tests and models.

In all analyses, we incorporated the main and 160 replicate weights, and used Balanced Repeated Replications for variance estimation (Wolter 2007). This approach allowed adjusting for the complex design of the Survey (U.S. Department of Commerce, Census Bureau 2016b). All analyses were performed using SAS®9.4 software (SAS Institute Inc, 2013).

3. Results

3.1. Disparities in the rates of smoke-free homes associated with parental race/ethnicity

Table 1 depicts prevalence of smoke-free homes for diverse parental populations and significance of comparisons relative to NH Whites and never smokers. The overall rates of a smoke-free home differed significantly among the parental racial/ethnic groups in both 2010–11 and 2014–15 (both p 's < 0.001). In 2010–11 and 2014–15, smoke-free homes were consistently more prevalent among Hispanic parents than among NH White parents. In addition, smoke-free homes were more prevalent among NH Asian parents than among NH White parents in 2010–11, but the difference became nonsignificant in 2014–15.

Table 2 presents the model-based results. Race/ethnicity was a significant predictor in both models. In 2010–11, the smoke-free homes were significantly more prevalent among Hispanic and less prevalent among NH Black parents than among NH White parents. The difference was not significant for NH Asian parents. In 2014–15, the rate of a smoke-free home was significantly lower for NH Black parents than for NH White parents; other differences were not significant.

3.2. Disparities in the rates of smoke-free homes associated with parental smoking status

The overall rates of a smoke-free home differed among parents who were never smokers, former smokers, occasional, or daily smokers; the differences were significant in both 2010–11 and 2014–15 (both

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