Complexity of Measuring "Cigar Use" in Adolescents: Results From a Split Sample Experiment

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Abstract

Introduction—Inclusion of brand-specific examples (BE) in health surveys assessing lifetime and current cigar use has been shown to impact response rates. A split sample experimental design was used to investigate whether these rates are consistent by race, gender, and geographic locale.

Methods—The 2009 Cuyahoga County Youth Risk Behavior Survey was conducted among 20 randomly selected high schools. Two versions of the survey were created; the first included items assessing lifetime and current cigar use with no brand-specific examples (NBE) while the second included BE in the items assessing cigar use. Both survey versions were distributed randomly within selected classrooms in participating schools.

Results—Within the City, both White and Black BE respondents reported higher lifetime cigar product use prevalence and current cigar product use compared to the NBE group; however, the difference was only significant among Black respondents (odds ratio [*OR*] = 1.45, 95% *CI* 1.02–2.06). In the Outer Ring, White BE respondents were significantly less likely to report lifetime cigar use (*OR* = 0.73, 95% *CI*: 0.54 – 0.98) and current cigar use (*OR* = 0.66, 95% *CI*: 0.44–0.99) when compared with White NBE respondents.

Conclusions—Inclusion of BE in current measures of cigar product use may improve product use estimates in at-risk groups. However, better estimation of cigar product use may be accomplished by creating additional items to assess the use of subtypes of cigars.

Introduction

While current cigarette use among adolescents in the United States has declined since 1997 reaching 19.5% in 2009, current cigar product use has stagnated at around 14% since 2005 (Centers for Disease Control and Prevention [CDC], 2010). Like cigarettes, cigars are known to cause coronary heart disease and cancers of the mouth, esophagus, larynx, and lungs (Baker et al., 2000). Cigars also have significantly higher nicotine levels compared to cigarettes (Boffetta et al. 1999). Hence, cigars may lead to a lifetime of nicotine addiction and a multiplied risk of certain cancers (Shapiro, Jacobs, & Thun, 2001), especially since these products may be inhaled like cigarettes. Despite these health concerns, cigar use remains a poorly understood public health problem (Symm, Morgan, Blackshear, & Tinsley, 2005), in part because cigar product use is not consistently measured at the national level (Delnevo, 2006). While the lack of consistent measurement is problematic, operationalization of cigar product use may further exacerbate the problem. Several studies suggest current items may underestimate "cigar use" in adolescent populations (Page & Evans, 2003; Terchek, Larkin, Male, & Frank, 2009; Yerger, Pearson, & Malone, 2001).

Terchek et al. (2009) speculated that prevalence rates for cigar use were underestimated due to the absence of brand examples. Using methods similar to the Youth Risk Behavior Surveillance System (YRBSS) (CDC, 2009), they included brand specific examples following the standard YRBSS cigar items. This modification resulted in significantly higher reported rates when compared to national, state, and local estimates, especially among Black and female adolescents. While this study was informative in suggesting a more valid measure of cigar use, it had several limitations, most importantly the study design, which compared data from two different cohorts. Additionally, the study sample was drawn from schools in inner-ring suburbs, which are distinctive from center cities and surrounding suburbs (Puentes & Warren, 2006) and have been shown to have unique risk profiles (Larkin, Frank, Knight, & Frank, 2006).

The current study expands on the work of Terchek et al. (2009), utilizing a split sample experimental design to further investigate the impact of adding brand-specific examples (BE) to two standard items used to measure lifetime and current cigar use. Specifically, we were interested in testing whether the addition of the BE had an impact on lifetime and current use of cigars and little cigars and if this effect was consistent by race, gender, and geographic location.

Methods

Design, Setting, and Procedures

Data for this study were drawn from the 2009 Cuyahoga County YRBSS (CC-YRBSS); sampling methodology for the overall 2009 CC-YRBSS can be found elsewhere (Center for Health Promotion Research, 2009). Of the 30 Cuyahoga County high schools randomly selected for the CC-YRBSS sample, 20 (67%) agreed to participate. A total of 6,597 students were eligible to complete the survey; 4,980 completed the survey. Student non-participation was due to student refusal or absence on the day of survey administration

(24.0%) or parent refusal (0.6%). Questionnaires that failed quality control standards (6.8%) were removed from the data set. The overall response rate was 46%.

In 2009, a split sample experimental design was used during administration of the CC-YRBSS and two versions of the survey were created (i.e., brand examples and no brand examples). The wording for these questions was based on expert feedback from community stakeholders and previous literature (Soldz, 2003a; Terchek et al., 2009). Both surveys were distributed randomly to students within each of the selected classrooms.

The current analyses were restricted to those students self-identifying as non-Hispanic Black or non-Hispanic White due to the small numbers of Hispanic and other race/ethnicity students surveyed, resulting in a final sample of 3,643 respondents. The study was approved by the Institutional Review Board at Case Western Reserve University.

Measures

Lifetime Cigar Use—The first survey utilized the standard YRBSS item with no brand-specific examples (NBE): "Have you ever tried smoking cigars, cigarillos, or little cigars, even one or two puffs?" The second survey included the standard item with the addition of specific brand examples (BE): "Have you ever tried smoking cigars, cigarillos, or little cigars, such as Black & Milds, Swisher Sweets, or Phillies, even one or two puffs?" Respondents were considered lifetimes users if they responded "yes."

Current Cigar Use—The first survey utilized the standard YRBSS item with NBE: "During the past 30 days, on how many days did you smoke cigars, cigarillos, or little cigars?" The second survey included the standard item with the addition of specific brand examples (BE): "During the past 30 days, on how many days did you smoke cigars, cigarillos, or little cigars, such as Black & Milds, Swisher Sweets, or Phillies?" Respondents were considered current users if they reported use on 1 or more days. For the remainder of this paper, we use the term "cigar products" to be inclusive of cigars, cigarillos, and little cigars.

Demographic Data—Participant report of grade, gender, and race was assessed as demographic factors. Geographic location was designated by location of the participating school, defined as City (within the metropolitan city limits), Inner Ring (share a border with city), or Outer Ring (do not share a border with city).

Statistical Analyses—The SAS software package (version 9.2 for Windows; SAS Institute Inc., Cary NC, 2008) was used for data analysis. Univariate analyses were conducted to examine the demographic characteristics. Pearson chi-square statistics were used to determine demographic differences between those students who received version BE and those who received version NBE of the survey.

Hierarchical logistic regression models were fit using the glimmix procedure to adjust for any potential design effect of clustering at the classroom level. The relationship between lifetime or current cigar product use and survey version was examined after adjusting for race, gender, and geographic location. Interactions between race, gender, or geographic

location and survey version were fit in separate interaction models, with the interaction between survey version and race as well as between survey version and geographic location found to be statistically significant. Based on these results, we stratified the sample by race and geographic location and re-ran the hierarchical logistic regression models, including gender as a covariate. A two-tailed alpha of 0.05 was used to determine statistical significance.

Results

Demographic characteristics for the study population are shown in Table 1. Of the 3,643 students, 52.9% were female and 60.0% were non-Hispanic White. Students were nearly evenly split between the two versions of the survey. The two survey groups were similar in gender, race, grade, and geographic distribution.

Results from stratified, hierarchical logistic regressions, both unadjusted and after adjusting for gender, are shown in Table 2. In the City, Black students who received survey version BE were 1.45 times more likely to report lifetime cigar use (95% *CI*: 1.02–2.06) and 1.59 times more likely to report current cigar use (95% *CI*: 1.07–2.37) than Black NBE respondents after adjusting for gender. Similarly, Black BE respondents in the Inner Ring were two times as likely to report lifetime cigar use (odds ration [*OR*] = 2.12, 95% *CI*: 1.55–2.89) and current cigar use (*OR* = 1.96, 95% *CI*: 1.36–2.81) than Black NBE respondents. Among Outer Ring White respondents, those completing the BE survey were significantly less likely to report lifetime cigar use (*OR* = 0.73, 95% *CI*: 0.54–0.98) and current cigar use (*OR* = 0.66, 95% *CI*: 0.44 – 0.99) when compared with White NBE respondents.

Discussion

Addition of BEs in the CC-YRBSS resulted in the discovery of unique patterns of cigar product use reporting in our sample. Black youth in the city and Inner Ring who responded to the BE surveys reported significantly higher rates ($p < 0.05$) of cigar product use compared with their NBE counterparts. Our findings are consistent with previous research demonstrating significant increase of cigar product use among this subpopulation with the use of a brand example (Terchek et al., 2009; Yerger et al., 2001). We believe the use of BE increases the validity of items measuring cigar product use in Black adolescents through the inclusion of wording that reflects the everyday language of this group. Our study shows that current measures of cigar product use utilized in the YRBSS appear to underestimate cigar product use in Black adolescents.

Conversely, White adolescents in outer-ring suburbs who responded to the BE surveys reported lower rates of both lifetime and current cigar product use than White NBE respondents. This is counter-intuitive given the expectation that a BE will assist youths in better recognition of cigar products (Yerger et al., 2001). The reasons for the lower rate of cigar product use reported by White adolescents in the Outer Ring with the addition of brand examples are unclear and require further investigation. We speculate that White students in the Inner and Outer Rings may identify with different brands than those listed in the BE item such as Garcia y Vega, Dutch Masters, White Owl, or other popular brands (Soldz, 2003).

However, this explanation would more likely have resulted in no difference in reporting among the groups as opposed to lower rates among the BE respondents. Alternatively, the brands included in the BE item may have impacted prevalence rates in White students due to their association with other risk behaviors (e.g., drug use) (Soldz, Huyser, & Dorse, 2003) or other sociocultural factors.

Despite the use of a split sample experimental design, this study has some limitations. Examination of the sample by race only included Whites and Blacks, in part due to the demographic profile of Cuyahoga County. Further, the communities represented in each ring have additional variability that is not captured by identification of the Ring itself, including variations in socioeconomic status, proportion of minority residents, and population density. It is likely that our use of Rings served as a proxy for socioeconomic status and a more valid measure of socioeconomic status for each respondent may have yielded additional insight into our findings. Lastly, the sample did not include adolescents from rural areas, who may not identify with the brand examples used.

This study indicates that current items designed to estimate prevalence of both lifetime and current "cigar use" in adolescent populations are inadequate. While we had hoped that the inclusion of BE to current measures would result in better estimates of cigar product use in all groups, the lower rates of reported cigar product use in White Outer Ring adolescents suggests that the measurement of cigar use in adolescent populations is more nuanced than previously thought.

Underestimation and nonroutine measurement of cigar product use among youth is of particular concern considering our findings that show significantly different rates of reporting, especially among Blacks, with the inclusion of brand examples. Blacks are a heavily targeted group for cigar advertising (Kwate & Lee, 2007; Malone, Yerger, & Pearson, 2001; Singer et al., 2007), and our findings indicate they are also the group most affected by underestimation. In our sample, the odds of both current and lifetime cigar use were at least 45% greater among city and Inner Ring Black BE respondents than among NBE respondents. Further investigation of cigar use among adolescents and young adults may help reveal similarities and differences between cigarette and cigar products, potentially allowing us to begin to identify intervention strategies to reduce cigar use and impact the current health disparity experienced by Blacks.

Our results suggest that a single question assessing cigar product use, without including examples of cigar brands, cannot be used to accurately reflect the rate of current or lifetime cigar product use among a diverse adolescent population. At a minimum, the inclusion of BE to standard wording on current cigar items would improve estimates of lifetime and current cigar product use in those most at risk. However, better estimation of cigar product use may be accomplished by separating the cigar measure into separate items designed to estimate prevalence of subtypes of cigars (cigars, cigarillos, and little cigars) and/or by further refining item wording to reflect a broader range of brands in the item.

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Table 1

Demographic Characteristics of Sample by Version of Survey

	Overall (*n* = 3,643)		No Brand Examples (NBE) (*n* = 1,775)		Brand Examples (BE) (*n* = 1868)		*p*
	N	*%*	*N*	*%*	*N*	*%*	
Gender							.08
Male	1,714	47.13	904	48.52	810	45.66	
Female	1,923	52.87	959	51.48	964	54.34	
Race							.10
Black	1,456	39.97	722	38.65	734	41.35	
White	2,187	60.03	1,146	61.35	1,041	58.65	
Grade							.18
9th grade	1,034	28.46	552	29.66	482	27.20	
10th grade	978	26.92	499	26.81	479	27.03	
11th grade	791	21.77	409	21.98	382	21.56	
12th grade	830	22.85	401	21.55	429	24.21	
Ring							.61
City	704	19.32	372	19.91	332	18.70	
Inner Ring	1,833	50.32	928	49.68	905	50.99	
Outer Ring	1,106	30.36	568	30.41	538	30.31	

Table 2

Odds Ratios (95% CIs) of Lifetime and Current Cigar/Little Cigar Use by Race/Ethnicity and Ring

	Lifetime cigar/little cigar use		Current cigar/little cigar use	
	Unadjusted	Adjusted[a]	Unadjusted	Adjusted[a]
City White				
No examples	1.00	1.00	1.00	1.00
Brand examples	1.32 (0.69, 2.51)	1.28 (0.67, 2.44)	2.09 (0.97, 4.48)	2.06 (0.96, 4.43)
City Black				
No examples	1.00	1.00	1.00	1.00
Brand examples	1.47 (1.04, 2.08)*	1.45 (1.02, 2.06)*	1.57 (1.05, 2.33)*	1.59 (1.07, 2.37)*
Inner ring White				
No examples	1.00	1.00	1.00	1.00
Brand examples	0.92 (0.68, 1.24)	0.93 (0.69, 1.25)	1.01 (0.68, 1.50)	1.02 (0.69, 1.52)
Inner ring Black				
No examples	1.00	1.00	1.00	1.00
Brand examples	2.10 (1.54, 2.86)*	2.12 (1.55, 2.89)*	1.97 (1.38, 2.83)*	1.96 (1.36, 2.81)*
Outer Ring White				
No examples	1.00	1.00	1.00	1.00
Brand examples	0.73 (0.54, 0.99)*	0.73 (0.54, 0.98)*	0.65 (0.43, 0.98)*	0.66 (0.44, 0.99)*
Outer Ring Black				
No examples	1.00	1.00	1.00	1.00
Brand examples	1.26 (0.47, 3.42)	1.13 (0.40, 3.20)	0.88 (0.26, 3.07)	0.77 (0.21, 2.79)

Note.

[a] Adjusted for gender.

* Significant at $p < .05$