The Relationship of Cigars, Marijuana, and Blunts to Adolescent Bidi Use

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SYNOPSIS

Objective. Previous research suggests that bidi, cigar, and marijuana use may be interrelated, but to date, this hypothesis has not been empirically tested.

Methods. We explored the relationships among use of these products using data from 17,429 youths who completed the 2001 National Household Survey on Drug Abuse. Variables of interest included demographics, tobacco use (i.e., cigarettes, cigars), marijuana use, and blunting (i.e., cigars filled with marijuana). Adjusted odds ratios (AOR) for past-month bidi use were generated for each variable; regression models were also generated separately by race/ethnicity.

Results. Overall, 1.1% of the youths surveyed reported past month bidi use; higher prevalence was noted for those who were past-month users of cigarettes (4.6%), cigars (7.0%), marijuana (5.8%), and blunts (7.3%). Logistic regression yielded significant odds ratios for all tobacco products, marijuana, and blunts, with the greatest odds associated with past-month cigarette use. Interestingly, the pattern varied notably by race. Among white youth, the greatest odds for past-month bidi use were associated with cigarette use (AOR=3.9), while among black youth the greatest odds were associated with blunting (AOR=9.5).

Conclusion. The findings demonstrate that the use of cigars and blunts is highly associated with bidi use among youths and these patterns differ by race/ethnicity. Tobacco control efforts that target youths must address other tobacco products and marijuana and should be tailored appropriately and effectively, with consideration of racial, ethnic, and cultural variations.

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Bidi cigarettes have been available overseas and in the U.S. for years, but during the late 1990s, public health researchers observed growing appeal for this product among young people in the U.S.[1] Manufactured primarily in India and other Southeast Asian countries, bidis are small brown hand-rolled cigarettes, consisting of tobacco flakes rolled in a tendu leaf tied with a small string. They are similar in appearance to marijuana joints. Bidis are flavored exclusively for the U.S. market in a wide variety of flavors such as vanilla, strawberry, orange, and lime. These popular flavored cigarettes are often perceived by young people as more safe or natural than regular cigarettes.[1]

Despite its allure, the bidi is not a safer alternative to conventional cigarettes. Much of the available toxicological and epidemiological data on bidis are derived from researchers in India, where bidis are referred to as the "poor man's cigarette." Bidis must be puffed more often than regular cigarettes to keep the product lit. In addition, bidis contain three to five times the amount of nicotine and tar than a regular cigarette.[2–6] A high concentration of nicotine puts bidi smokers at risk for nicotine dependence.[4] In comparison to non-smokers, bidi smokers also have increased risks for cancers of the throat, oral cavity, pharynx, larynx, lungs, esophagus, stomach, and liver.[7,8]

Previous research has documented a higher likelihood of bidi use among current cigarette smokers, males, minorities, and youths who perceive bidis as safer than conventional cigarettes.[9–13] In an earlier study, we also found a particularly strong relationship between current use of cigars and current use of bidis.[10] Prior research by Stoltz and colleagues has suggested a relationship between cigar and marijuana use among youths,[14] likely because cigars are sometimes used for smoking marijuana by replacing some or all of the cigar's filler with marijuana (aka, "blunts").[15] Moreover, bidis are similar in appearance to marijuana joints and in a study of bidi users, half of the participants held the bidi like a marijuana joint with the index finger and thumb.[3] Previous research has suggested the use of these three products—bidis, cigars, and marijuana—may be interrelated to some degree.[9,10] However, the hypothesis that bidi, cigar, and marijuana use are interrelated has not been empirically tested. The goal of this study was to understand more fully the relationship between bidis, other tobacco products such as cigars, and marijuana among youths using data from the 2001 National Household Survey on Drug Abuse (NHSDA).

METHODS

We utilized data from the 2001 National Household Survey on Drug Abuse (NHSDA), an annual survey that provides national drug and alcohol use estimates for the U.S. civilian population aged 12 and older. The NHSDA is conducted in-person via computer-assisted interviewing methods and employs a multistage probability sample to yield nationally representative findings. A detailed description of the survey design and sampling procedures are provided elsewhere.[16]

The 2001 NHSDA public access dataset contains a sample of 54,079 individual records. However, questions on our variables of interest (e.g., bidis) were only asked of youth participants. Thus, our analyses were limited to 17,429 youths, ages 12 to 17, who completed the 2001 NHSDA.

Our analysis focused on exploring the relationship between bidis, cigars, and marijuana use among youths. The NHSDA contains questions on all three of these products, as well as blunts (i.e., cigars with marijuana). Our main variables of interest included past-month use of bidis, cigars, marijuana, and blunts. During interviewing, all products were defined or described for the participants. Bidis were described as "small brown cigarettes from India consisting of tobacco wrapped in a leaf and tied with a thread." Cigars were described as any kind of cigars, "including big cigars, cigarillos, and even little cigars that look like cigarettes." Marijuana was defined as marijuana, hashish, pot, or grass and described as "usually smoked, either in cigarettes, called joints, or in a pipe." Last, blunts were described as "taking some tobacco out of a cigar and replacing it with marijuana." Past-month use for these products was defined as any use in the 30 days preceding the survey. Demographic variables included gender, race/ethnicity, and age. We also included past-month cigarette use in our analyses because the likelihood of other substance use (e.g., marijuana) is greater for those youth who smoke cigarettes.[17]

The dataset was weighted for the varying probability of selection and statistical analyses were performed using SUDAAN, which corrects for the complex sample design.[18] Prevalence estimates with 95% confidence intervals were utilized for descriptive analyses. Differences between prevalence estimates were considered statistically significant ($p<0.05$) if the 95% confidence intervals did not overlap. Adjusted odds ratios (AOR) for past-month bidi use were generated for each variable. We also tested for the presence of interaction effects based on race/ethnicity, which were significant. Thus, regression models were also generated separately by race/ethnicity.

RESULTS

Table 1 summarizes past-month use of cigarettes, cigars, marijuana, blunts, and bidis by demographic characteristics. For all products, age was positively associated with past-month prevalence. However, patterns of use by gender and race/ethnicity varied by products. Overall, cigarettes were the most commonly used product (13.0%). White youths (15.1%) reported the highest rate of past-month cigarette use, while black youths had significantly lower rates of past-month cigarette use (6.2%) than both their white and Hispanic counterparts (10.6%). Males (6.1%) were significantly more likely to report past-month cigar use than females (2.7%) and white youths (5.2%) reported the highest rate of past-month cigar use. The overall prevalence of past-month marijuana use (8.0%) was significantly higher than past-month use of cigars, blunts, or bidis. Black youths reported significantly lower rates of past-month marijuana use (5.8%) than white youths (8.6%). Blunt use was significantly higher for males (5.2%) than females (3.8%), and was higher for black youths (5.8%) compared to white and Hispanic youths. The overall prevalence of past-month bidi use was low (1.0%), with little variation by demographic characteristics.

Because the past-month prevalence of bidi use was low, we reported on lifetime (i.e., ever) and past-year use (Table 2) to further explore use by demographic characteristics. Overall, 4.4% of youths reported ever trying bidis and 1.8% reported use in the past year. Lifetime, past-year, and past-month use of bidis were higher for males than females. Not surprisingly, 16- to 17-year-olds reported the highest rate of ever and past-year bidi use but they did not differ from 14- to 15-year-olds with respect to past-month use.

As shown in Table 3, the prevalence of bidi use is considerably higher for those youths reporting use of other products in the past month compared to youths who do not use cigarettes, cigars, marijuana, or blunts. A strong association was noted for two specific products: past-month users of marijuana and blunts had 10.5 and 11.5 times, respectively, greater odds of reporting past-month bidi use relative to non-users of these products.

Table 4 shows the adjusted odd ratios for past-month bidi use by past-month cigarette, cigar, marijuana, and blunt use, controlling for gender, age, and race/ethnicity. Overall, significantly higher odds were noted for cigarettes, cigars, marijuana use, blunt use, and male gender. The greatest odds for past-month bidi use was cigarette use (AOR=4.4). However, the strength of the associations varied based on race/ethnicity. Among white youths, the greatest odds for past-month bidi use were associated with cigarette use (AOR=3.9); other significant associations included marijuana use and gender. Among black youths, the greatest odds for past-month bidi use were associated with blunting (AOR=9.5); other significant associations were cigarette use and male gender. In fact, the association

Table 1. Past-month use of cigarettes, cigars, marijuana, blunts, and bidis by gender, age, and race/ethnicity, 2001 NHSDA

	Cigarette			*Cigar*			*Marijuana*			*Blunts*			*Bidi*		
	Percent		*95% CI*	*Percent*		*95% CI*	*Percent*		*95% CI*	*Percent*		*95% CI*	*Percent*		*95% CI*
Gender															
Male	12.3	±	0.8	6.1	±	0.6	8.9	±	0.7	5.2	±	0.6	1.2	±	0.3
Female	13.7	±	0.8	2.7	±	0.4	7.1	±	0.6	3.8	±	0.5	0.8	±	0.2
Age (years)															
12–13	3.1	±	0.5	1	±	0.3	1.5	±	0.4	0.9	±	0.3	0.5	±	0.2
14–15	11.5	±	0.9	3.8	±	0.6	7.6	±	0.8	4	±	0.6	1.2	±	0.4
16–17	24.1	±	1.3	8.4	±	0.8	14.8	±	1.1	8.7	±	0.9	1.3	±	0.3
Race/ethnicity															
White	15.1	±	0.7	5.2	±	0.5	8.6	±	0.6	4.3	±	0.4	1.1	±	0.2
Black	6.2	±	1.2	2.8	±	0.7	5.8	±	1.1	5.8	±	1.1	0.9	±	0.4
Hispanic	10.6	±	1.6	2.9	±	0.8	7.6	±	1.4	4.4	±	1.1	1.0	±	0.5
Other	11.9	±	2.5	3.4	±	1.6	8.1	±	2.1	4.4	±	1.7	0.7	±	0.5
Total	13	±	0.6	4.4	±	0.4	8.0	±	0.5	4.5	±	0.4	1.0	±	0.2

NHSDA = National Household Survey on Drug Abuse

CI = confidence interval

Table 2. Prevalence of lifetime, past-year, and past-month bidi use by gender, age, and race/ethnicity, 2001 NHSDA

	Bidi use					
	Ever		*Past year*		*Past month*	
	Percent	*95% CI*	*Percent*	*95% CI*	*Percent*	*95% CI*
Gender						
Male	5.3%	± 0.6	2.2%	± 0.4	1.2%	± 0.3
Female	3.4%	± 0.4	1.4%	± 0.3	0.8%	± 0.2
Age (years)						
12–13	1.4%	± 0.3	0.6%	± 0.2	0.5%	± 0.2
14–15	3.7%	± 0.6	1.9%	± 0.4	1.2%	± 0.4
16–17	7.9%	± 0.9	2.9%	± 0.5	1.3%	± 0.3
Race/ethnicity						
White	4.3%	± 0.4	1.9%	± 0.3	1.1%	± 0.2
Black	5.3%	± 1.1	1.7%	± 0.6	0.9%	± 0.4
Hispanic	4.4%	± 1.0	2.0%	± 0.7	1.0%	± 0.5
Other	2.9%	± 1.3	1.5%	± 0.9	0.7%	± 0.5
Total	4.4%	± 0.4	1.8%	± 0.2	1.0%	± 0.2

NHSDA = National Household Survey on Drug Abuse

CI = confidence interval

of male gender and bidi use is greatest among black youths (AOR=3.1). Among Hispanic youths, the only significant association with past-month bidi use was cigar use (AOR=4.0). Also, in contrast to white and black youths, gender was not significantly associated with bidi use among Hispanic youths.

DISCUSSION

To our knowledge, this is the first paper exploring the association of bidis, cigars, blunts, and marijuana use among adolescents. The findings demonstrate that cigar and blunt use (i.e., marijuana in a cigar) are highly associated with bidi use among youths and these patterns differ by race/ethnicity. Indeed, past-month blunt use was the strongest predictor for bidi use among black youths, but not among white or Hispanic youths, and marijuana use was a significant predictor of bidi use among white youths only.

Bidis, cigars, and blunts are all associated, directly or indirectly, with marijuana use. Bidis are visually similar to marijuana and a study of bidi users found half held the bidi like a marijuana joint.[2] In a recent study examining youth attitudes and beliefs toward alternative tobacco products, Soldz and colleagues[19] found that beliefs regarding the perceived similarity between bidis and marijuana joints predicted bidi use. Cigars are sometimes hollowed out and filled with marijuana and thus are used as a marijuana delivery device (blunts).[20] Also, further analysis of data from the 2001 NHSDA suggests that blunts are an increasingly common way to smoke marijuana; approximately 40% of past-month marijuana use was attributed to blunts.

The concurrent use of tobacco (i.e., bidis, cigarettes, or cigars) and marijuana is concerning. Like tobacco smoke, marijuana smoke contains carcinogens.[21] Additionally, it is worth noting that the smoking behavior of marijuana users differs from that of cigarette users in that marijuana users inhale more deeply and hold their breath longer.[22] This raises questions about whether ever marijuana users who continue to use, or initiate,

Table 3. Prevalence and odds of past-month bidi use by product among youths, 2001 NHSDA

	Past month use (percent)	*No past month use (percent)*	*Odds ratio (95% CI)*
Cigarette	4.6%	0.5%	9.9 (6.8, 14.4)
Cigar	7.0%	0.7%	10.2 (7.0, 14.9)
Marijuana	5.8%	0.6%	10.5 (7.3, 15.0)
Blunt	7.3%	0.7%	11.5 (7.9, 16.8)

NHSDA = National Household Survey on Drug Abuse

CI = confidence interval

Table 4. Prevalence and adjusted odds ratio of past-month bidi use among youths by use of other products and demographic characteristics, 2001 NHSDA

	All youth (n=17,429)			*White youth (n=11,626)*			*Black youth (n=2,329)*			*Hispanic youth (n=2,319)*		
	Percent	*AOR*	*(95% CI)*	*Percent*	*AOR*	*(95% CI)*	*Percent*	*AOR*	*(95% CI)*	*Percent*	*AOR*	*(95% CI)*
Past-month cigarette use												
Yes	4.6%	4.4	(2.5, 7.8)	4.1%	3.9	(1.9, 7.9)	5.6%	3.6	(1.2, 10.7)	6.0%	3.8	(0.9, 16.3)
No	0.5%	1.0	referent	0.5%	1.0	referent	0.6%	1.0	referent	0.4%	1.0	referent
Past-month cigar use												
Yes	7.0%	1.9	(1.1, 3.1)	6.1%	1.7	(0.9, 3.1)	7.5%	1.9	(0.6, 6.1)	13.8%	4.0	(1.0, 15.7)
No	0.7%	1.0	referent	0.8%	1.0	referent	0.7%	1.0	referent	0.6%	1.0	referent
Past-month marijuana use												
Yes	5.8%	2.2	(1.0, 4.5)	5.6%	2.5	(1.0, 5.9)	5.3%	0.9	(0.3, 2.7)	8.0%	3.8	(0.5, 28.9)
No	0.6%	1.0	referent	0.6%	1.0	referent	0.6%	1.0	referent	0.4%	1.0	referent
Past-month blunt use												
Yes	7.3%	2.4	(1.3, 4.4)	6.5%	1.7	(0.8, 3.5)	7.4%	9.5	(2.8, 32.2)	10.0%	2.9	(0.6, 15.1)
No	0.7%	1.0	referent	0.8%	1.0	referent	0.5%	1.0	referent	0.6%	1.0	referent
Gender												
Male	1.2%	1.6	(1.1, 2.3)	1.3%	1.7	(1.1, 2.7)	1.3%	3.1	(1.1, 8.6)	0.9%	0.7	(0.3, 1.7)
Female	0.8%	1.0	referent	0.8%	1.0	referent	0.5%	1.0	referent	1.1%	1.0	referent
Age (years)												
12–13	0.5%	1.0	referent	0.5%	1.0	referent	0.5%	1.0	referent	0.6%	1.0	referent
14–15	1.2%	1.5	(0.9, 2.6)	1.2%	1.4	(0.7, 2.7)	1.3%	2.1	(0.4, 10.5)	1.5%	1.5	(0.4, 5.1)
16–17	1.3%	0.9	(0.5, 1.6)	1.5%	1.1	(0.5, 2.2)	1.0%	0.8	(0.2, 4.6)	0.9%	0.5	(0.1, 1.8)
Race/ethnicity												
White	1.1%	1.0	referent									
Black	0.9%	1.2	(0.7, 2.0)									
Hispanic	1.0%	1.2	(0.7, 2.0)									
Other	0.7%	0.7	(0.3, 1.5)									
Total	1.0%			1.1%			0.9%			1.0%		

NHSDA = National Household Survey on Drug Abuse

AOR = adjusted odds ratio

CI = confidence interval

tobacco are at greater risk for tobacco-caused morbidity and mortality because of their smoking behavior (i.e., deeper inhalation). In addition, marijuana use may impede or undermine tobacco cessation attempts in adults and youth.[23,24]

The findings of this study are subject to a few limitations that must be considered in the interpretation of its results. First, data on bidi, cigar, cigarette, marijuana, and blunt use are based on self-report, which may be subject to under- or over-reporting. Second, the NHSDA is cross-sectional, and thus we cannot determine the temporality of use among the products examined. Bidis may act as a form of entry to the use of other products, or conversely, the use of other products may lead to bidi use and the temporal association may differ by race/ethnicity and gender. Minimally, the bidi provides another choice and a new way for youth to experiment with tobacco. Third, the NHSDA is administered via computer-assisted interviewing methods, which has been found to produce lower prevalence estimates than school-based surveys (e.g., National Youth Tobacco Survey), especially with regards to sensitive behaviors such as marijuana use.[25,26] Finally, it is possible that participants may not distinguish between bidi and traditional cigarette use since bidis are legally categorized as cigarettes.

While the prevalence of youth bidi use in the 2001 NHSDA was low, it should not be discounted as a public health problem. Indeed, during a period where there was no significant change in current use of any tobacco products among youth, data from the National Youth Tobacco Survey pointed to a significant increase in the use of bidis and cigars among Hispanic middle and high school students between 2002 and 2004.[27]

Tobacco control efforts that target minority youth must address other tobacco products as well as other substances, like marijuana. Such efforts must dispel the dangerous myth that products such as bidis, cigars, and marijuana are safer than conventional cigarettes. The findings of this study raise the importance of having two public health fields, tobacco control and substance abuse, work together[20] to address youth's use of these harmful products and tailor efforts appropriately and effectively, with consideration of racial, ethnic, and cultural variations.

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REFERENCES

1. Centers for Disease Control and Prevention (US). Bidi use among urban youth—Massachusetts, March-April 1999. MMWR Morb Mortal Wkly Rep 1999;48(36):796-9.
2. Malson JL, Lee EM, Moolchan ET, Pickworth WB. Nicotine delivery from smoking bidis and an additive-free cigarette. Nicotine Tob Res 2002;4:485-90.
3. Malson JL, Pickworth WB. Bidis-hand-rolled, Indian cigarettes: effects on physiological, biochemical and subjective measures. Pharmacol Biochem Behav 2002;72:443-7.
4. Malson JL, Sims K, Murty R, Pickworth WB. Comparison of the nicotine content of tobacco used in bidis and conventional cigarettes. Tob Control 2001;10:181-3.
5. Pakhale SS, Maru GB. Distribution of major and minor alkaloids in tobacco, mainstream and sidestream smoke of popular Indian smoking products. Food Chem Toxicol 1998;36:1131-8.
6. Rickert WS. Determination of yields of 'tar,' nicotine and carbon monoxide from bidi cigarettes: final report. Kitchener (ON): Labstat International, Inc.; 1999.
7. Gupta PC, Hamner JE, Murti PR. Control of tobacco-related cancers and other diseases. Proceedings of an international symposium, Tata Institute of Fundamental Research; 1990 Jan 15–19; Mumbai (India). Bombay: Oxford University Press; 1992.
8. Rahman M, Sakamoto J, Fukui T. Bidi smoking and oral cancer: a meta-analysis. Int J Cancer 2003;106:600-4.
9. Delnevo CD, Pevzner ES, Hrywna M, Lewis MJ. Bidi cigarette use among young adults in 15 states. Prev Med 2004;39:207-11.
10. Hrywna M, Delnevo CD, Pevzner ES, Abatemarco DJ. Correlates of bidi use among youth. Am J Health Behavior 2004;28:173-9.
11. Soldz S, Huyser DJ, Dorsey E. Characteristics of users of cigars, bidis, and kreteks and the relationship to cigarette use. Prev Med 2003;37:250-8.
12. Taylor TM, Biener L. Bidi smoking among Massachusetts teenagers. Prev Med 2001;32:89-92.
13. Tercyak KP, Audrain J. Psychosocial correlates of alternate tobacco product use during early adolescence. Prev Med 2002;35:193-8.
14. Stoltz AD, Sanders BD. Cigar and marijuana use: their relationship in teens. J Sch Nurs 2000;16:28-35.
15. Department of Health and Human Services (US). Youth use of cigars: patterns of use and perceptions of risk. OEI-06-98-00030. Washington: DHHS, Office of the Inspector General; 1999. p 9-11.
16. Substance Abuse and Mental Health Services Administration (US). National Household Survey on Drug Use, 2001 Computer file. ICPSR version. Rockville (MD): Department of Health and Human Services (US), SAMHSA; 2004. Ann Arbor (MI): Inter-university Consortium for Political and Social Research; 2004.
17. Everett SA, Giovino GA, Warren CW, Crossett L, Kann L. Other substance use among high school students who use tobacco. J Adolesc Health 1998;23:289-96.
18. Research Triangle Institute. SUDAAN Language Manual, Release 9.0. Research Triangle Park (NC): Research Triangle Institute; 2001.
19. Soldz S, Dorsey E. Youth attitudes and beliefs toward alternative tobacco products: cigars, bidis, and kreteks. Health Educ Behav Aug 2005;32:549-66.
20. Soldz S, Huyser DJ, Dorsey E. The cigar as a drug delivery device: youth use of blunts. Addiction 2003;98:1379-86.
21. Hoffman D, Brunnemann KD, Gori GB, Wynder EL. On the carcinogenicity of marijuana smoke. In: Runeckles, VC, editor. Recent advances in phytochemistry. New York: Plenum, 1975.
22. Wu TC, Tashkin DP, Djahed B, Rose JE. Pulmonary hazards of smoking marijuana as compared with tobacco. N Engl J Med 1988;318:347-51.
23. Ford DE, Vu HT, Anthony JC. Marijuana use and cessation of tobacco smoking in adults from a community sample. Drug Alcohol Depend 2002;67:243-8.
24. Moolchan ET, Zimmerman D, Sehnert SS, Zimmerman D, Huestis MA, Epstein DH. Recent marijuana blunt smoking impacts carbon monoxide as a measure of adolescent tobacco abstinence. Subst Use Misuse 2005;40:231-40.
25. Gfroerer J, Wright D, Kopstein A. Prevalence of youth substance use: the impact of methodological differences between two national surveys. Drug Alcohol Depend 1997;47:19-30.
26. Kann L, Brener ND, Warren CW, Collins JL, Giovino GA. An assessment of the effect of data collection setting on the prevalence of health risk behaviors among adolescents. J Adolesc Health 2002; 31:327-35.
27. Centers for Disease Control and Prevention (US). Tobacco use, access, and exposure to tobacco in media among middle and high school students—United States, 2004. MMWR Morb Mortal Wkly Rep 2005;54:297-301.