Title

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Journal

Nicotine & Tobacco Research, 18(12)

ISSN

1462-2203

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Publication Date

2016-12-01

DOI

10.1093/ntr/ntw203

Peer reviewed

Nicotine & Tobacco Research, 2016, 2225–2233
doi:10.1093/ntr/ntw203
Original investigation
Advance Access publication August 4, 2016

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Changes in Smoking Intensity Over Time by Birth Cohort and by Latino National Background, 1997–2014

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Abstract

Introduction: The purpose of the study was to describe changes in smoking intensity among US Latinos and non-Latinos from 1997 to 2014.

Methods: National Health Interview Survey data between 1997 and 2014 were used to determine the number of cigarettes smoked per day (CPD) among Latino and non-Latino adults who had smoked at least 100 cigarettes in their lifetime and were currently smoking every day or some days (ie, current smokers).

Results: CPD declined steadily throughout the observation period and were consistently lower for Latino than for non-Latino smokers. However, decreases were not equal across birth cohorts, genders, or among Latino national background groups. CPD declined most among Mexican men and least among younger generations, Cuban women, and acculturated Latina women. Additionally, declines in smoking intensity seemed to slow over time among low CPD consumers.

Conclusions: Although smoking intensity has decreased substantially since the late 1990s, CPD data suggest that declines are slowing among younger generations and certain Latina women. Effective tobacco control strategies should be developed to discourage even very light and non-daily smoking.

Implications: Few studies have been conducted on how smoking intensity has changed since the late 1990s. Between 2004 and 2011, when the decline in smoking prevalence slowed, it is unknown how smoking intensity (ie, CPD) changed by age. Additionally, no research has assessed differences and changes in smoking intensity over time among Latinos. From this study we learned that smoking intensity declined significantly since the late 1990s, but this decline slowed among younger generations of smokers and certain Latina women. Findings suggest that future patterns of smoking intensity may only marginally decline in the near future.

Introduction

Although the proportion of adults in the United States who smoke decreased by more than 50% from its peak in 1965,[1,2] the decline in yearly smoking prevalence was gradual and inconsistent. For example, between 1997 and 2004 the annual decline averaged −0.54% (range −0.2% to 0.8%). It slowed somewhat between 2004 and 2011, averaging −0.27% annually (range −1.2% to 0%),[2–6] and then accelerated between 2011 to the most recently available estimate (March 2015), at an annual rate of −0.9%.[4] While these broad annual prevalence figures are instructive, examining other secular trends can provide hints for targeted tobacco control efforts. For example, within the population of smokers there may be changes in smoking intensity, as measured by the number of cigarettes smoked per day (CPD) by adult smokers. This is an important area to study because reductions in smoking intensity correspond with a decreased risk for tobacco-related illness such as lung cancer, sometimes slightly better quit rates, and less exposure to secondhand smoke.

In addition, strategies addressing the largest growing proportion of the US population, Latinos,[7,8] need to take into account the fact that the Latino category masks a wide variety of national groups with different smoking cultures.[2,9,10] As a general group, Latinos have a lower smoking prevalence, averaging 17.3% for men, compared to 21.2% for non-Latino White men, and 7.0% for women, compared to 17.8% for non-Latino White women.[11] In addition, large differences in smoking prevalence exist among Latinos according to levels of acculturation (more acculturation leads to higher smoking rates among women)[12–21] and national backgrounds (Puerto Ricans have the highest rates [33.8%] and Dominicans the lowest [11.4%]).[22]

The daily intensity of smoking in the United States had decreased since the early 1980s, when it averaged 21 CPD among smokers.[23] Among Latino smokers, average CPD was lower (10 CPD),[14,24] with recent data showing smoking intensity of Latino smokers at 6.7 CPD compared to 14.9 CPD for non-Latino White smokers.[25] Furthermore, the gradual declines in overall smoking prevalence may have masked other important trends, such as changes in CPD, especially among Latino national background groups.

We hypothesized that (1) CPD levels decreased among both women and men in the general and Latino population despite an inconsistent rate of decline in smoking prevalence nationally, (2) CPD levels decreased more among older generation adults than younger generation adults because of increasing tobacco control efforts over time, and (3) CPD levels decreased more among Latino national background groups with higher smoking rates. We analyzed data from National Health Interview Survey (NHIS) to test these hypotheses, in order to inform better subsequent smoking prevention and cessation strategies aimed at Latinos, the nation's second largest racial/ethnic group.

Methods

National Health Interview Survey

Public use data from adult participants (aged ≥18 years) of the NHIS[26] between 1997 and 2014 were analyzed in 2015. The NHIS is administered by the US Centers for Disease Control and Prevention (CDC) and is a nationally representative survey that uses a complex, multistage sampling methodology to assess health status, health care access, and progress toward national health objectives. The number of adults surveyed each year from 1997 to 2014 ranged between 24 279 and 36 697. NHIS public use data, as analyzed in our study, are not considered to involve human subjects; therefore, our analysis did not necessitate review by the Institutional Review Board.

Demographic and Acculturation-Related Characteristics

Participants' year of birth, gender, ethnicity and Latino national background, marital status, educational attainment, nativity, and interview language were assessed in all survey years. Race/ethnicity and Latino national background were self-reported by participants. Latino national background groups included: Central or South American, Cuban, Mexican, Puerto Rican, and Other Latino. Latino national background groups with fewer than 50 observations (eg, Dominican) were grouped into the Other Latino category. Educational attainment was categorized as less than a high school degree, high school degree or equivalent, some college, or a college degree or higher. Acculturation-related variables included country of birth and interview language, categorized into English only versus any other language (ie, 93.7% Spanish).

Cigarette Smoking and Intensity

Participants who reported having smoked at least 100 cigarettes in their lifetime and were currently smoking every day or some days were defined as current smokers. Smoking intensity was assessed by self-reported CPD. Smokers who reported only smoking on some days were asked, "On the average, when you smoked during the PAST 30 DAYS, about how many cigarettes did you smoke a day?" This analysis used a recoded variable, created by the CDC, to convert CPD for every day and some-day smokers to a uniform, estimated CPD equivalent for monthly consumption. We did not manipulate any smoking-related variable. Because data on electronic cigarette use were available for only one survey year (ie, 2014), we provide only cursory descriptive analyses.

Statistical Analyses

One-way analysis of variance *F*-tests and chi-square tests evaluated statistical significance by gender and Latino national background. Trend analyses were conducted using multivariable linear regression by modeling cigarette intensity against survey year, stratified by gender and ethnicity, and adjusted for birth year and, when applicable, Latino national background. Assumptions were assessed with diagnostic testing, and CPD was normalized using a square-root transformation.

Survey data analysis procedures for means, percentages, and linear regression modeling accounted for the complex stratified sampling and weighting procedures in the NHIS.[27] Adjacent years were combined to increase the precision of estimates. Variance estimates were subsequently adjusted using sampling weights as described. To remain consistent with CDC protocol, estimates based on sample sizes fewer than 50 respondents or with more than 30% relative standard error were excluded. All analyses were conducted using SAS v. 9.4 (SAS Institute, Inc, Cary, NC).

Results

Demographic Characteristics

A total of 124 160 current smokers were included in the analysis (Table 1). Thirteen percent of these were Latino, who tended to be younger than their non-Latino counterparts (38.3 years compared to 42.1 years; $p < .001$). Compared to non-Latino smokers, more Latino smokers were men (53% compared to 67%; $p < .001$), less educated (16% with less than a high school education compared to 37%; $p < .001$), born outside of the United States (6% compared to 50%; $p < .001$), and not interviewed in English (1% compared to 29%; $p < .001$).

The national background of Latinos was represented primarily by Mexicans (59%) followed by Puerto Ricans (14%), Central or South Americans (11%), Other Latinos (10%), and Cubans (5%) (Table 1). Categories of smoking intensity were more evenly distributed between very light (≤5 CPD) and moderate (11–20 CPD) intensity for Cubans and Puerto Ricans than for other Latino national backgrounds.

The distribution of smokers by birth cohort differed significantly between Latinos and non-Latinos (Table 2). While most non-Latino smokers were born between 1910 and 1959 ($p < .001$), the majority of Latino smokers were born between 1960 and 1999 ($p < .001$).

Description of Cigarette Smoking Intensity

Smoking intensity was significantly lower among Latinos compared to non-Latinos across all birth cohorts (Table 2; $p < .001$). The highest CPD was observed among Latinos born between 1930 and 1939 and non-Latinos born between 1940 and 1949, while all-time CPD lows

Table 1. Demographic Characteristics of Latino and Non-Latino Current[a] Smokers From the 1997–2014 National Health Interview Surveys

Characteristics	Total (n = 124 160), No. (weighted %) or weighted mean (SE)	Latino (n = 16 131), No. (weighted %) or weighted mean (SE)	Non-Latino (n = 108 029), No. (weighted %) or weighted mean (SE)
Mean age, years	41.7 (0.07)	38.3 (0.17)*	42.1 (0.08)*
18–24	13 910 (14)	2301 (17)*	11 609 (14)*
25–34	26 622 (21)	4384 (27)*	22 238 (21)*
35–44	28 097 (22)	4067 (25)*	24 030 (22)*
45–54	26 244 (22)	2922 (18)*	23 322 (22)*
55–64	17 513 (13)	1516 (8)*	15 997 (13)*
≥65	11 774 (7)	941 (4)*	10 833 (8)*
Men	62 332 (54)	9525 (67)*	52 807 (53)*
Married/living with partner	44 954 (45)	6274 (46)	38 680 (45)
Educational attainment			
Less than high school	24 789 (18)	6431 (37)*	18 358 (16)*
At least high school	46 496 (39)	9009 (33)*	41 487 (40)*
Some college	37 649 (30)	3544 (23)*	34 105 (31)*
At least bachelor's	14 900 (12)	1064 (7)*	13 836 (12)*
Born in the United States	110 139 (90)	8154 (50)*	101 985 (94)*
English only interviewed	115 438 (96)	11 052 (71)*	104 386 (99)*
Cigarette smoking intensity			
Very light (≤5 CPD)	33 162 (25)	8350 (53)*	24 812 (22)*
Light (6–10 CPD)	32 183 (26)	4118 (25)*	28 065 (26)*
Moderate (11–20 CPD)	44 823 (37)	3125 (19)*	41 698 (39)*
Heavy (>20 CPD)	13 992 (12)	538 (3)*	13 454 (13)*
Latino national background			
Central or South American	—	1606 (11)	—
Very light (≤5 CPD)		969 (59)	
Light (6–10 CPD)		365 (25)	
Moderate (11–20 CPD)		232 (14)	
Heavy (>20 CPD)		40 (2)	
Cuban	—	923 (5)	—
Very light (≤5 CPD)		279 (29)	
Light (6–10 CPD)		232 (27)	
Moderate (11–20 CPD)		338 (37)	
Heavy (>20 CPD)		74 (7)	
Mexican	—	9178 (59)	—
Very light (≤5 CPD)		5329 (60)	
Light (6–10 CPD)		2169 (23)	
Moderate (11–20 CPD)		1454 (15)	
Heavy (>20 CPD)		226 (2)	
Puerto Rican	—	2444 (14)	—
Very light (≤5 CPD)		883 (36)	
Light (6–10 CPD)		806 (34)	
Moderate (11–20 CPD)		634 (26)	
Heavy (>20 CPD)		121 (4)	
Other Latino[b]	—	1961 (11)	—
Very light (≤5 CPD)		881 (45)	
Light (6–10 CPD)		542 (29)	
Moderate (11–20 CPD)		461 (23)	
Heavy (>20 CPD)		77 (4)	

CPD = cigarettes per day; SE = standard error.

[a]Current smokers were identified as having ever smoked at least 100 cigarettes in their lifetime and currently smoking every day or some days.

[b]Other Latino includes Dominicans, Other Latin American, and Other Spanish.

*$p < .001$, statistical significance between Latinos and non-Latinos.

Table 2. Smoking Intensity by Birth Cohort for Current[a] Smokers From the 1997–2014 National Health Interview Surveys

	Latinos							
	Total Latino sample (n = 16 113)		Foreign born (n = 7959)		US born (n = 8154)		Non-Latinos (n = 108 029)	
Birth cohort	No. (weighted %)	Cigarettes per day	No. (weighted %)	Cigarettes per day	No. (weighted %)	Cigarettes per day	No. (weighted %)	Cigarettes per day
1910–1929	278 (1)	9.6	135 (1)	9.7	143 (1)	9.4	3522 (2)*	14.8*
1930–1939	674 (3)	11.3	383 (3)	11.4	291 (3)	11.1	6765 (5)*	16.5*
1940–1949	1472 (8)	10.5	804 (9)	9.8	668 (7)	11.4	15 132 (12)*	17.6*
1950–1959	2906 (17)	9.8	1535 (19)	8.9	1371 (15)	11.0	24 390 (22)*	16.9*
1960–1969	4149 (25)	8.1	2336 (29)	7.1	1813 (21)	9.6	24 117 (23)*	15.7*
1970–1979	4006 (25)	7.6	1901 (25)	6.8	2105 (26)	8.4	20 262 (20)*	13.2*
1980–1999	2628 (21)	6.6	865 (14)	5.5	1763 (29)	7.1	13 841 (16)*	10.7*

[a]Current smokers were identified as having ever smoked at least 100 cigarettes in their lifetime and currently smoking every day or some days.
*p < .001, statistical significance between Latinos (combined foreign born and US born) and non-Latinos.

were observed among Latinos and non-Latinos born between 1980 and 1999. CPD data were not determined for ethnicities, genders, and Latino national backgrounds where sample sizes were small.

Smoking Intensity Over Time Among Latino and Non-Latino Women and Men

In Figure 1, smoking intensity data from the 18-year observation period between 1997 and 2014 were stratified and analyzed by gender and birth cohort. We observed that smoking intensity declined throughout the period, particularly between 2004 and 2011, among both Latino and non-Latino smokers. Trend analysis results revealed significant declines in CPD for Latino men (p < .001), non-Latino men (p < .001), and non-Latina women (p < .001). Of note, Latino smokers in all birth cohorts were smoking fewer than 10 CPD by 2007–2008. Among non-Latinos, only the youngest generation of women declined to this intensity by 2009–2010.

Smoking Intensity Over Time by Birth Cohort

Older birth cohorts of men experienced moderate to large declines in CPD over time, while declines in CPD for younger birth cohorts of men were small (Figure 1). For Latino men born between 1910 and 1959, declines were in a moderate range (–2.2 to –5.0 CPD). Surprisingly, Latino men born between 1960 and 1969 experienced an increase of 0.1 CPD. For non-Latino men born between 1910 and 1969, declines were in a relatively large range (–5.2 to –9.2 CPD).

In comparison to the declines observed among older birth cohorts of men, decreases in CPD among younger birth cohorts of men were small (Figure 1). For Latino men born between 1970 and 1999, these small decreases ranged from –1.1 to –0.8 CPD. For non-Latino men, a similar small decline was observed among the youngest birth cohort (–1.6 CPD for 1980–1999 birth cohort). Interestingly, the birth cohort of men with the smallest decreases in CPD (ie, 1980–1999) was also the birth cohort that consumed the fewest CPD at each timepoint.

For women, unlike for men, declines in smoking intensity over time were not observed to have such a clear distinction between older and younger generations (Figure 1). Across all birth cohorts, declines in CPD for Latina women ranged from –2.1 to 0.7 CPD, while those of non-Latina women ranged between –5.2 and –1.7 CPD. Of note, from 2003 to 2014 the declines in CPD among the youngest birth cohort of Latina (–0.2 CPD) and non-Latina (–1.3 CPD) women were small. Similar to men, this birth cohort (ie, 1980–1999) also tended to be the birth cohort that consumed the fewest CPD at most points in time.

Smoking Intensity Over Time Among Latino National Backgrounds

Analyses among Latino participants by national background and acculturation-related characteristics revealed unequal decreases over time (Table 3). Mexican (–3.0 CPD) had the largest declines, Puerto Rican men (–2.7 CPD) and women (–2.2 CPD) had moderate declines, and Cuban women (0.8 CPD) experienced a slight increase. We found that CPD for women across national backgrounds matched the trends observed among men, although CPD among women tended to be slightly attenuated. With respect to nativity and interview language, US born men (–3.4 CPD) and men interviewed in English only (–3.8 CPD) experienced larger decreases over time than foreign-born men (–2.9 CPD) and men interviewed in Spanish (–2.8 CPD). However, the opposite was true among women. US born women (–1.5 CPD) and women interviewed in English only (–1.8 CPD) experienced smaller decreases than their foreign-born (–2.2 CPD) and Spanish interviewed (–2.1 CPD) counterparts.

Electronic Cigarette Use

Electronic cigarettes have become increasingly popular but questions about their usage were covered only in the most recent NHIS (ie, 2014). In our study, 15.9% and 3.4% of current smokers reported regular (defined as at least some days) and daily electronic cigarette use, respectively. Regular electronic cigarette use was 16.4% among non-Latinos versus 11.3% among Latinos. Daily usage was also more prevalent among non-Latinos (3.6%) than among Latinos (2.1%). Observations by specific Latino national background groups were too few to provide reliable estimates for either regular or daily electronic cigarette use.

Discussion

In our study of data from the NHIS, we found that smoking intensity, defined by CPD, among both Latino and non-Latino adults declined steadily. This finding confirmed our hypothesis that the inconsistent rate of decline in smoking prevalence nationally[2,3] masked modest decreases in smoking intensity. We also hypothesized that CPD level decreased more among older generation adults than younger generation adults and among Latino subgroups with higher smoker rates. Our findings demonstrated that more declines in smoking intensity were experienced by some, but not all, older birth cohorts and Latino subgroups with higher smoker rates. Of note, decreases

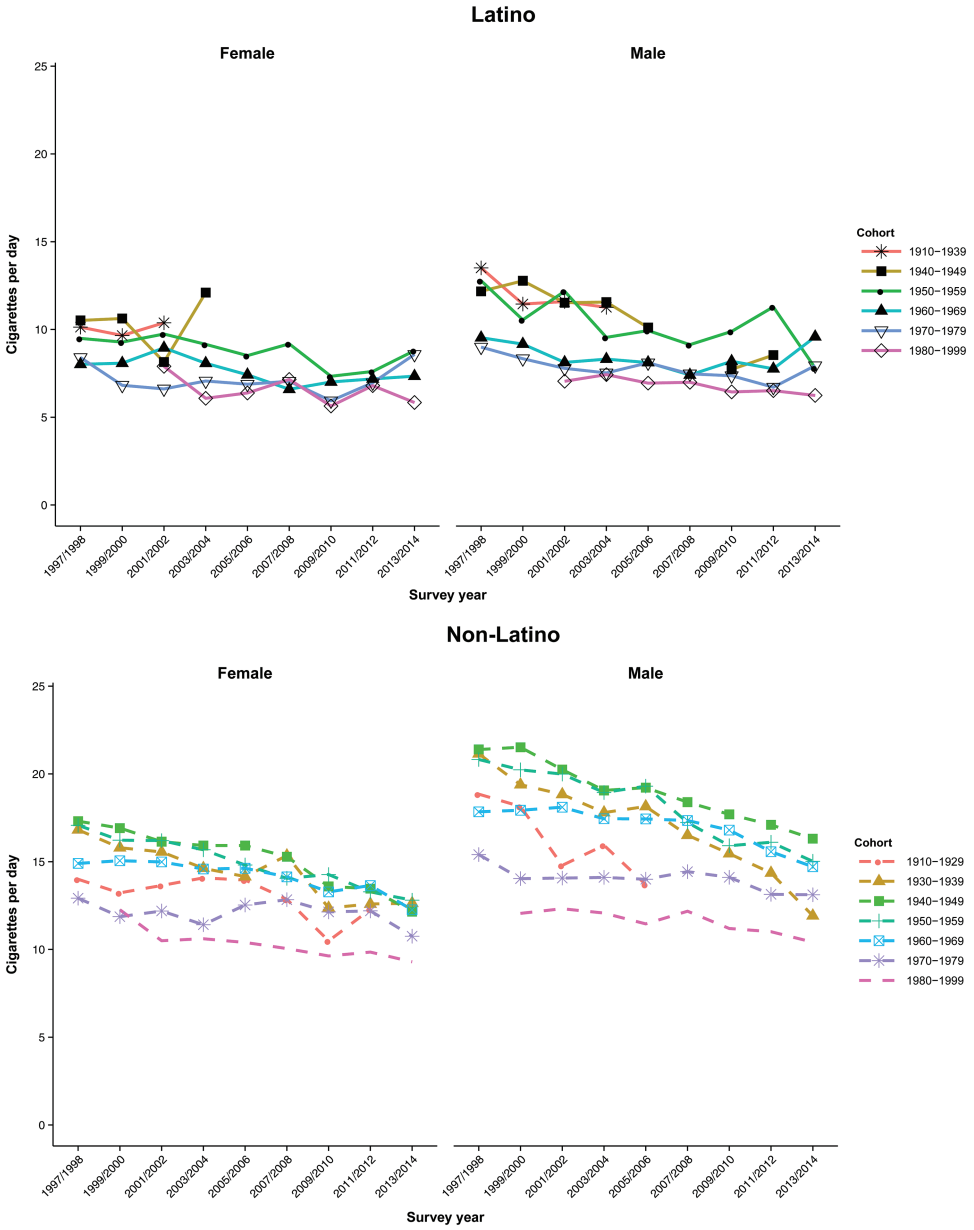

Figure 1. Changes in cigarettes smoked per day by birth cohort among Latino and non-Latino women and men, 1997–2014 National Health Interview Surveys.

in CPD seemed to slow among smokers who are consuming fewer CPD, such as younger generations.

Two significant patterns of smoking seem to be occurring simultaneously. First, while the prevalence of smoking among Americans continues to decrease, the decline has not remained steady over time, leaving over 40 million active smokers in the United States.[6] Second, there is an overall sustained downward movement of smoking intensity between 1997 and 2014. This decline is an extension of decreasing intensity rates that began in the 1980s and continued through the 1990s.[23] Although those who smoke fewer CPD are at a decreased risk for tobacco-related illness such as lung cancer, the risk of cardiovascular disease is nearly the same as that of higher intensity smokers[28] and quit rates among lower intensity smokers are only slightly better than higher intensity smokers.[29]

Our results show that non-Latinos smoked more CPD than Latinos overall and that smoking intensity by birth cohort was consistently higher among non-Latinos. This is not surprising given that greater smoking intensity seems to be related to higher smoking prevalence. More interestingly, Latinos and non-Latinos born between 1970 and 1999 smoked the fewest CPD. This finding may be related to the implementation of tobacco control policies and taxation[30] as well as education about the detrimental health effects of smoking[1] during adolescence and young adulthood, when smoking behaviors are more likely to initiate.[31] Also of note, declines in CPD appeared to occur around similar points in time across some birth cohorts. It is difficult to know what tobacco control events contributed to a decrease in CPD at any given time. However, our observational time period coincides with the implementation of the terms and conditions of the Tobacco Master Settlement Agreement, the

Table 3. Smoking Intensity in Cigarettes per Day by Survey Year for Current[a] Smokers From the 1997–2014 National Health Interview Surveys (n = 16 113)

Men (n = 9513)					
Year of survey	Central/South American (n = 1096)	Cuban (n = 513)	Mexican (n = 5873)	Puerto Rican (n = 1107)	Other Latino[b] (n = 787)
1997–1998	—	15.0	9.6	14.2	10.2
1999–2000	8.7	15.1	8.4	13.0	13.7
2001–2002	7.4	16.2	7.8	12.4	—
2003–2004	7.0	14.2	7.7	10.8	10.1
2005–2006	7.2	13.7	7.5	11.5	10.2
2007–2008	7.5	—	7.1	9.1	—
2009–2010	6.9	—	6.9	10.1	—
2011–2012	7.2	14.0	6.7	9.3	—
2013–2014	6.7	13.3	6.5	11.5	5.9
Year of survey	US born (n = 4173)	Foreign born (n = 5340)	English only (n = 6090)	Spanish (n = 3205)	Non-Latino (n = 52 956)
1997–1998	11.7	9.8	12.0	8.9	19.0
1999–2000	11.1	8.7	10.4	8.5	18.1
2001–2002	10.6	8.0	9.8	7.6	17.4
2003–2004	9.5	7.8	9.1	7.5	16.7
2005–2006	8.8	7.9	9.0	6.9	16.3
2007–2008	8.9	6.7	8.2	6.7	15.7
2009–2010	8.0	7.4	8.2	6.5	14.7
2011–2012	8.2	6.7	7.8	6.8	13.9
2013–2014	8.4	6.9	8.2	6.2	13.2
Women (n = 6600)					
Year of survey	Central/South American (n = 510)	Cuban (n = 410)	Mexican (n = 3305)	Puerto Rican (n = 1337)	Other Latinob (n = 881)
1997–1998	—	—	7.5	11.2	9.5
1999–2000	6.4	12.6	7.0	11.3	8.3
2001–2002	5.9	11.6	7.3	11.0	9.5
2003–2004	9.2	11.2	7.3	9.7	10.4
2005–2006	6.9	—	6.6	8.5	9.1
2007–2008	—	—	6.6	9.0	—
2009–2010	6.3	—	6.1	7.8	6.9
2011–2012	6.8	—	5.6	10.5	—
2013–2014	5.2	—	6.7	9.0	8.4
Year of survey	US born (n = 3981)	Foreign born (n = 2619)	English only (n = 4962)	Spanish (n = 1505)	Non-Latino (n = 55 385)
1997–1998	9.6	8.3	9.4	8.2	15.5
1999–2000	9.0	7.3	8.6	7.9	14.8
2001–2002	9.1	7.6	9.0	6.9	14.5
2003–2004	8.6	8.4	8.7	7.9	13.9
2005–2006	7.7	7.0	7.7	6.6	13.7
2007–2008	8.3	6.2	7.7	6.5	13.2
2009–2010	7.2	6.2	7.0	6.3	12.4
2011–2012	7.4	7.0	7.5	6.3	12.2
2013–2014	8.1	6.1	7.6	6.1	11.2

— = Value suppressed due to less than 50 participants per cell.

[a]Current smokers were identified as having ever smoked at least 100 cigarettes in their lifetime and currently smoking every day or some days.

[b]Other Latino including Dominicans, Other Latin American, and Other Spanish.

truth campaign of the American Legacy Foundation, seven Reports of the Surgeon General on smoking or tobacco use, and the Family Smoking Prevention and Tobacco Control Act.

Over the 18-year observation period, the smallest declines in smoking intensity were among men born between 1960 and 1999. Surprisingly, younger generations of non-Latino men did not experience declines similar to those from older birth cohorts. Instead, their smoking intensity either decreased only slightly or even increased from 1997 to 2014. For non-Latina women, declines were moderate for birth cohorts between 1960 and 1999 and relatively large for those born between 1930 and 1959. Analyses by Burns et al.[23] of 1965–1998 NHIS data found roughly equal decreases in mean CPD between men and women from their peak in 1980. They also reported that the proportion of men born between 1960 and 1969 who smoked at least 25 CPD was relatively stable, while CPD among their female counterparts decreased approximately 8 percentage points before flattening.[23] By investigating CPD among more recent birth cohorts, our study extends the work of Burns et al. We have identified a divergence between the smaller declines in smoking intensity among younger generation men and larger declines among their female counterparts. Additionally, the generally larger declines in CPD among older generations, compared to younger generations, during our observation period may reflect the time after age 40 when many smokers quit. Also, a survival bias may exist among older generations who have not died of tobacco-related conditions but have reduced their smoking intensity, as well as prevalence, as they face age-related health conditions in later life.

We also found unequal declines in smoking intensity among Latino national background groups and acculturation-related characteristics. Most studies on smoking behavior that include Latinos aggregate them into one group. Consequently, Latinos overall are observed to have a low smoking prevalence. When disaggregated, smoking prevalence among Latinos differs by national background.[22] However, there is scant research on other smoking-related behaviors such as smoking intensity among Latinos by national background[14,24] or acculturation-related characteristics.[24,32] We observed that Mexican men experienced larger decreases in CPD compared to any other national background. These decreases may have been influenced by acculturation level. Although past research[21,24] has generally found mixed results between acculturation level and smoking among Latino men, studies among Asian men have found associations between higher acculturation level and lower smoking intensity, lower smoking prevalence, and higher quit rates.[33–37]

One study[13] found that similar relationships may exist among Latino men. The most acculturated of Latino men (ie, born in the United States and speak English only) may be more strongly influenced by changing pressures in the United States to not smoke. Given that 50%–71% of Latinos in our study were either US born or interviewed in English only, our chances of observing large declines in CPD among more acculturated smokers were moderately high.

Among groups other than Mexican men, smoking intensity and its decline varied by national background and gender. The moderate and small declines in CPD among Central or South American men and Mexican women, respectively, resulted in similar amounts of CPD by the end of the study period. For Mexican women, acculturation may have been a contributing factor. Unlike for Latino men, higher levels of acculturation are known to be associated with increased smoking prevalence among Latina women.[12–22,24] Furthermore, higher smoking prevalence seems to be related to higher smoking intensity among Latinos.[24] This may explain why we observed no more than a small decline over time in CPD among Mexican women. Additionally, large to moderate declines were found among Puerto Rican men and women. This contrasts with research from the early 1980s and 1990s, in the years leading up to the beginning of our observational period, which showed that Puerto Ricans of either gender were more likely to smoke more CPD.[14,24] Taken together, these findings reflect the heterogeneity of US Latinos and suggest that assessing smoking behavior among Latinos as a whole may not represent the full spectrum of the problem.

To investigate any potential differences in smoking intensity by acculturation level, we used the proxies of country of birth and language of interview to assess the extent to which Latinos overall have changed values, attitudes, and behaviors due to continuous interaction with the majority White population. We observed that Latino smokers who were born in the United States or interviewed only in English had consistently higher smoking intensity than did foreign-born and Spanish-speaking respondents. Although not unexpected, this finding adds to our knowledge of the relationship between acculturation and smoking prevalence among Latinos overall. Previous research[38–40] among Spanish speakers has not assessed acculturation level and changes in smoking intensity over time. Furthermore, the tobacco industry used acculturation level to better target Latinos with pro-tobacco marketing.[41] Our finding suggests that higher smoking intensity, in addition to greater smoking prevalence, may be related to such targeted marketing.

We also observed that declines in CPD among Latinos overall differed by gender. CPD decreased more among US born and English-speaking Latino men than among foreign-born and Spanish-speaking Latino men. However, US born and English-speaking Latina women experienced smaller decreases in CPD than those who were more acculturated. Receptivity to tobacco control messages and social norms may have driven the greater declines among more acculturated Latino men and less acculturated Latina women, respectively. Higher acculturated Latino men may be discouraged from smoking by US-based tobacco control strategies, while lower acculturated Latina women may be influenced by social pressure from family and friends to not smoke.

Electronic cigarettes are an emerging market and present important challenges and opportunities for tobacco control and cessation of combustible tobacco. Introduced to the market in 2007,[42] electronic cigarette use grew during the last 8 years of our study period.[43,44] However, our analyses of only 1 year of available data did not allow us to draw any conclusions regarding their role in the decline in smoking intensity. Electronic cigarettes and other non-cigarette forms of nicotine (eg, little cigars and cigarillos, hookahs, snus) are important sources of exposure to tobacco that merit expanded and continued surveillance.

Lastly, rates of decline in smoking intensity slowed as smokers consume fewer cigarettes per day. This observation can be seen across ethnicities and genders. Rates of daily smoking intensity fell in the United States from a peak of 21 CPD in the early 1980s to 13 CPD in the early 2000s.[23] Between 2005 and 2011, there was a relative increase of approximately 30% in the proportion of US daily smokers who smoked less than 10 CPD.[2,23] Findings from our analysis suggest that the slow rate at which smoking intensity is declining may continue under the existing tobacco control environment. Expanded tobacco control efforts, such as tobacco-free policies, taxation, and smoking cessation, may need to be made in order to further drive down smoking intensity. These efforts are particularly relevant as lower smoking intensity smokers may be easier targets for smoking cessation.[29,45,46]

Some limitations of this research arise from its use of NHIS data. Smoking behavior in the NHIS is assessed by self-report, which

may not capture individuals who often do not perceive themselves as smokers because they consume cigarettes at a very low smoking intensity. Also, smoking intensity could only be assessed from the average number of CPD on the days participants smoked. For current smokers who did not report smoking every day, this measure may not have reflected their patterns of nondaily cigarette intensity. Another limitation of the NHIS is that it is a cross-sectional survey that does not follow participants over time. Therefore, we could not assess individual-level changes in smoking behavior. Additionally, this study assessed trends in cigarette use only and no other forms of tobacco. Electronic cigarette use was also assessed, but trends could not be analyzed because only 1 year of data was available. Future research in this area can fill these gaps by analyzing biochemical measures of tobacco use and self-reported measures of non-cigarette forms of tobacco use from longitudinal studies.

The prevalence of current smoking in the United States has declined to the lowest levels on record. Smoking intensity among smokers has also decreased substantially since the late 1990s. However, the slowing decline of smoking intensity among younger generations of smokers and certain Latina women suggests that future patterns of smoking intensity may only marginally decline under existing tobacco control efforts. Few federally funded projects on cigarette smoking involve light or nondaily smokers specifically.[47] To further discourage cigarette use and encourage smoking cessation, tobacco control strategies such as tobacco-free policies in outdoor areas, higher taxes on tobacco products, gradual decrease in the nicotine content of commercial tobacco products, and smoking cessation research among very light (≤5 CPD) and nondaily smokers should be developed now to test their effectiveness and efficacy on the low intensity smokers of the future.

Funding

This study was funded in part by grants from the Clinical and Translational Science Institute at the University of California, San Francisco (Strategic Opportunities Support, K19683L); Resource Centers for Minority Aging Research of the National Institute on Aging, National Institutes of Health (Center for Aging in Diverse Communities, P30 AG15272); Cancer Education and Control Development Program in Tobacco Control of the National Cancer Institute, National Institutes of Health (Center for Tobacco Control Research and Education, R25 CA113710); and the National Latino Cancer Research Network of the National Cancer Institute, National Institutes of Health (Redes En Acción, U01 CA86117 and U54 CA153511). The study sponsors played no role in the design of the study, writing of the manuscript, or decision to submit the manuscript for publication.

Declaration of Interests

None declared.

Acknowledgments

We are grateful for the feedback and advice we have received from members of the Center for Tobacco Control Research and Education and Center for Aging in Diverse Communities. The contents and views in this manuscript are those of the authors and should not be construed to represent the views of the National Institutes of Health or any of the sponsoring organizations and agencies of the US government. EJR and SSO contributed equally to this manuscript and share first authorship.

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