

Self-Identified Tobacco Use and Harm Perceptions Among US Youth

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abstract

BACKGROUND: We investigated tobacco-related self-identity and risk perceptions among adolescent tobacco users.

METHODS: Data were analyzed for 20 675 US sixth- to 12th-graders from the 2016 National Youth Tobacco Survey. Students who reported past-30-day use of a specific tobacco product or ≥ 2 products but denied having used “any tobacco product” in the past 30 days were classified as not self-identifying as tobacco users. Tobacco product harm perceptions were further assessed across products. Descriptive and multivariable logistic regression analyses were performed.

RESULTS: Among past-30-day users of ≥ 1 specific tobacco product type, those denying having used any tobacco products in the past 30 days included single-product users of roll-your-own and/or pipe tobacco (82.2%), electronic cigarettes (e-cigarettes) (59.7%), cigars (56.6%), hookah (44.0%), smokeless tobacco (38.5%), and cigarettes (26.5%) as well as poly-tobacco users (12.7%). The odds of denying using any tobacco products were higher among those without symptoms of nicotine dependence than those with symptoms (adjusted odds ratio = 2.16); and those who access their tobacco products via social sources than those who bought them (adjusted odds ratio = 3.81; all $P < .05$). Among those believing “all tobacco products” were harmful, single-product users of the following believed their own product was not harmful: e-cigarettes (74.6%), hookah (56.0%), smokeless tobacco (41.8%), and cigarettes (15.5%).

CONCLUSIONS: Many of those who used certain tobacco products exclusively did not self-identify as tobacco users. Increasing the sensitivity of questions used to assess youth tobacco use in surveys and clinical settings can mitigate nondisclosure or underreporting of true tobacco use status.

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WHAT'S KNOWN ON THIS SUBJECT: The prevalence of self-reported smoking is underreported among youth when compared with biochemically validated prevalence using serum cotinine. “Social smokers” and those without symptoms of nicotine dependence are more likely to deny being tobacco users despite using tobacco products.

WHAT THIS STUDY ADDS: An inverse relationship existed between product-specific harm perception and denial of having used “any tobacco products.” Approximately 2 in 3 exclusive electronic cigarette and cigar users and 4 in 5 roll-your-own and/or pipe smokers did not self-identify as users of any tobacco product.

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Adolescence, which corresponds to the psychosocial stage of “identity versus confusion,” is a period during which youth experiment with different behaviors as they go through identity formation.¹ Most tobacco initiation begins during this critical developmental period, when youth are the most susceptible to social or peer influences to smoke even as they try to develop their own identities.^{2,3} Early initiation and continued tobacco use can cause premature disease and death.²⁻⁶ However, the internalization of tobacco use as a health threat may depend not only on the perceived seriousness of tobacco-attributable health risks in general but also on individuals’ subjective risk assessment of their own susceptibility,⁷ beginning with whether they even consider themselves as tobacco users if they use tobacco products.

Caraballo et al⁸ established that the prevalence of self-reported cigarette smoking was underreported among youth and young adults when compared with biochemically validated prevalence using serum cotinine. However, it is not clear how much of this underreporting results from intentional misrepresentation of tobacco use status because of the social unacceptability or stigma of using these products or because of a genuinely held self-identity as a nontobacco user despite actually consuming the tobacco products. Within clinical settings as well, researchers have shown that more youth smokers report being asked by a health professional about their smoking status than those who report the receipt of advice to quit smoking.⁹ Although recall errors as well as the actual failure of health professionals to follow-up with counseling after a patient has acknowledged being a smoker are possible explanations for this observation, underreporting could also result from youth smokers

denying being tobacco users when asked of their smoking status either intentionally or because they simply do not consider themselves as tobacco users. Youth tobacco product users who do not perceive themselves as tobacco users may conceivably have an altered perception of the risks of using these products or may think that mass media or clinical tobacco control messages do not apply to them.¹⁰

A better understanding of tobacco-related self-identity among youth can help inform clinical and public health practice, particularly in relation to tobacco screening, counseling, surveillance, and youth educational programs. Previous researchers studying a population of young adult smokers aged 18 to 30 years found that those without symptoms of nicotine dependence and those who identified themselves as “social smokers” were more likely to deny being tobacco users.¹¹ Relatively little research has been done on this subject among adolescents, particularly in relation to emerging tobacco products. In this article, we investigated whether adolescents who used only electronic cigarettes (e-cigarettes), hookah, cigars, cigarettes, smokeless tobacco products, roll-your-own (RYO) and/or pipe tobacco, as well as ≥ 2 tobacco products in the past 30 days identified themselves as recent tobacco users. We also measured risk beliefs about tobacco products as a whole and for individual products. Data were from a national sample of US middle and high school students who participated in the 2016 National Youth Tobacco Survey (NYTS).

METHODS

Data Source

The 2016 NYTS was used to survey US students attending public and private schools in grades 6 to 12.¹² A total of 20 675 students completed

the survey (overall response rate = 71.6%). Participants were selected by using a 3-stage cluster sampling design; survey questionnaires were administered in a paper-and-pencil format in students’ classrooms.

Study Population

Youth tobacco users’ perceptions of harm and identity could vary by product; furthermore, perceptions of harm may be different for users of multiple products compared with exclusive or single-product users.^{13,14} For these reasons, our analyses included both single-product users of cigarettes (including bidis; $n = 125$), hookah ($n = 159$), e-cigarettes ($n = 558$), cigars ($n = 233$), smokeless tobacco (including chewing tobacco, snuff, dip, snus, and dissolvable tobacco products; $n = 119$), and loose tobacco products (including RYO and pipe tobacco; $n = 68$) as well as poly-tobacco users (≥ 2 products; $n = 1088$). Single-product use of each specific product type was defined as past-30-day use of that product type but none of the others in the past 30 days. Poly-tobacco use was defined as past-30-day use of ≥ 2 tobacco product types. Cigarettes and bidis were combined as a product class because of their similarities in appearance and use and for sample size considerations. For similar reasons, RYO and pipe tobacco (ie, loose tobacco products) as well as chewing tobacco, snuff, dip, dissolvable tobacco products, and snus (ie, smokeless tobacco products) were aggregated.

Key Measures

Self-Identity as a User of “Any Tobacco Product”

For each of the tobacco product types assessed, all participants were asked product-specific questions regarding lifetime (ever) and past-30-day (current) use. These product-specific questions did not mention “tobacco” except when used as a qualifier (eg, “chewing tobacco” or “tobacco in a

hookah or waterpipe”). Considering that the nomenclature used by youth to describe specific tobacco products might differ from that in the survey, specific brand examples were provided for certain products to reduce confusion, cue recall, and increase the accuracy of responses to survey questions. These included questions used to assess lifetime usage of chewing tobacco, snuff, and/or dip products, “such as Redman, Levi Garrett, Beechnut, Skoal, Skoal Bandits, or Copenhagen,” as well as cigars, cigarillos, and/or little cigars, “such as Black and Mild, Swisher Sweets, Dutch Masters, White Owl, or Phillies Blunts.”

Product-specific questions used to assess current use were as follows: “During the past 30 days, on how many days did you [smoke cigarettes/smoke cigars, cigarillos, or little cigars/use e-cigarettes/smoke tobacco in a hookah or waterpipe/use chewing tobacco, snuff, or dip]?” Separate questions were also asked to determine past-30-day use of RYO cigarettes, bidis (small, brown cigarettes wrapped in a leaf), a pipe filled with tobacco (not a waterpipe), dissolvable tobacco products (such as Ariva, Stonewall, Camel orbs, Camel sticks, or Camel strips), and snus (such as Camel or Marlboro snus). These product-specific questions are thought to have a high degree of face and construct validity for correctly identifying current tobacco product users.^{3,4} For example, separate questions in the 2016 NYTS used to assess the number of days respondents smoked a cigarette in the past 30 days (question 13) and last time respondents smoked a cigarette, even 1 or 2 puffs in their lifetime (question 15), yielded almost identical estimates of past-30-day cigarette smoking prevalence among all students (5.5% and 5.6%, respectively).

After responding to the above product-specific questions, participants were asked “During the

past 30 days, on how many days did you use any tobacco product(s)?” Responses to this question were used to assess whether persons who reported use on the product-specific questions identified themselves as tobacco product users. Because the product-specific questions are thought to be valid, we assumed that respondents who answered in the affirmative to those questions but not to the question about any tobacco product use did not think of themselves as tobacco users and/or did not think of the product they reported using as a tobacco product.

Perceptions of Harm From Use

Product-specific and generic questions on perceived tobacco harm were posed to all participants. For each product (except cigars, RYO tobacco, and pipes, for which these questions were not assessed), respondents were asked, “How much do you think people harm themselves when they [smoke cigarettes/use chewing tobacco, snuff, dip, or snus/use e-cigarettes/smoke tobacco in a hookah or waterpipe] some days but not every day?” Response options for each of the 4 tobacco product types assessed were “no harm,” “little harm,” “some harm,” and “a lot of harm.” Within the main analyses, harm perception was dichotomized and presented as low harm (no harm or little harm) or high harm (some harm or a lot of harm). The 4-point Likert scale responses were also graphically represented for each product to visualize the gradation of responses.

The generic question on perceived tobacco use harm asked, “How strongly do you agree with the statement, ‘All tobacco products are dangerous?’” Response options were “strongly agree,” “agree,” “disagree,” and “strongly disagree.” Perceived harm was dichotomized as low harm (disagree or strongly disagree) or high harm (strongly agree or agree). Responses to the generic and

product-specific questions were used to evaluate cognitive dissonance between respondents’ perceptions of the harm of all tobacco products versus their specific products.

Other Indicators

Data were further collected on self-reported symptoms of nicotine dependence (ie, strong cravings) within the past 30 days, usual source of accessing the tobacco products used in the past 30 days (social sources [eg, family and friends] versus bought), and household member tobacco use (none, combustible-only use [cigarettes, bidis, cigars, pipes, or waterpipes], smokeless tobacco and/or e-cigarette-only use, and combined use of combustible, smokeless tobacco, and/or e-cigarettes). Sociodemographic characteristics were sex, race and/or ethnicity, and school level (middle school or high school).

Data Analyses

Among single-product and poly-tobacco users, we calculated the percentage who did not self-identify as current users of any tobacco product. Harm perception was analyzed as a dichotomous variable within the main analyses; graphical presentation of the polytomous responses (4 items) was also performed to depict the spectrum of harm perception within and across products. Differences in prevalence were assessed with χ^2 tests and logistic regression at $P < .05$. Prevalence estimates with relative SEs $\geq 30\%$ were suppressed.

Multivariable logistic regression analyses were performed to determine the correlates of denying being a user of any tobacco product among single-product and poly-tobacco users combined ($n = 2350$). Predictor variables were tobacco product used, tobacco access patterns, nicotine dependence, household member tobacco product

use, sex, race and/or ethnicity, and school level. All data were weighted and analyzed with R version 3.4.0.

RESULTS

Of all US middle and high school students, 50.6% were boys, 55.8% were in high school, and 52.3% were non-Hispanic white. Of all the participants who reported past-30-day use of ≥ 1 specific tobacco product type, 52.5% used only 1 tobacco product, whereas 47.5% used ≥ 2 tobacco products.

Self-Identity as a User of Any Tobacco Product

Among past-30-day users of ≥ 1 specific tobacco product type, those denying having used any tobacco products in the past 30 days included single-product users of RYO and/or pipe tobacco (82.2%), e-cigarettes (59.7%), cigars (56.6%), hookah (44.0%), smokeless tobacco (38.5%), and cigarettes (26.5%) as well as poly-tobacco users (12.7%). Within pooled analyses of single- and poly-tobacco users (Table 1), the odds of not self-identifying as a user of any tobacco product when compared with cigarette-only smokers were higher among users of RYO and/or pipe-only tobacco (adjusted odds ratio [aOR] = 6.38), e-cigarettes only (aOR = 2.81), and cigars only (aOR = 2.51) but lower among poly-tobacco users (aOR = 0.51). The odds of not self-identifying as a user of any tobacco product were higher among African American (aOR = 2.81) and Hispanic (aOR = 1.94) than white users, those without symptoms of nicotine dependence than those with symptoms (aOR = 2.16), those who accessed their tobacco products from social sources (eg, family and/or friends) than those who bought them (aOR = 3.81), and middle school than high school students (aOR = 1.84). Conversely, the odds of denying being a user of any tobacco product were lower among youth whose household member(s) used multiple

TABLE 1 Factors Associated With Denying Being a User of Any Tobacco Product Among Past-30-Day Users of Specific Tobacco Product Types ($N = 2350$), NYTS 2016

Characteristic	Category	aOR (95% CI) ^a
Tobacco product used in past 30 d	Cigarettes only ^b	Reference
	Hookah only	1.13 (0.58–2.20)
	E-cigarettes only	2.81 (1.63–4.84)*
	Cigars only	2.51 (1.35–4.67)*
	Smokeless tobacco only	1.46 (0.73–2.92)
	RYO and/or pipe tobacco only	6.38 (2.50–16.25)*
Usual source of tobacco products used in past 30 d	Purchased	Reference
	Social sources (eg, family and/or friends)	3.81 (2.80–5.17)*
Nicotine dependence ^d	Indeterminate	1.78 (0.79–3.98)
	Yes	Reference
	No	2.16 (1.56–3.00)*
Household member tobacco product use	Indeterminate	1.73 (0.67–4.48)
	None	Reference
	Combustible only ^e	0.96 (0.71–1.30)
	Smokeless tobacco or e-cigarettes only	1.15 (0.72–1.84)
Race and/or ethnicity	Combined tobacco products	0.55 (0.36–0.82)*
	Indeterminate	—
	White, non-Hispanic	Reference
	African American, non-Hispanic	2.81 (1.92–4.11)*
	Asian American, non-Hispanic	1.35 (0.34–5.40)
School level	Hispanic	1.94 (1.41–2.66)*
	Other race and/or ethnicity	1.24 (0.79–1.96)
	Indeterminate	2.77 (1.32–5.79)*
	High school	Reference
Sex	Middle school	1.84 (1.32–2.55)*
	Indeterminate	1.79 (0.36–8.84)
	Female	0.97 (0.74–1.26)
	Male	Reference
	Indeterminate	0.97 (0.19–5.04)

CI, confidence interval; —, not applicable.

^a Adjusted for all factors listed.

^b Includes 1 individual who smoked bidis exclusively, and 124 who smoked regular cigarettes exclusively.

^c Defined as the use of ≥ 2 products of those listed above.

^d “During the past 30 days, have you had a strong craving or felt like you really needed to use a tobacco product of any kind?”

^e Cigarettes, cigars, bidis, RYO tobacco, pipes, or waterpipes.

* $P < .05$.

tobacco product types than those with nontobacco-using household members (aOR = 0.55).

Perceptions of Harm Within and Across Tobacco Product Types

Analyses of the dichotomized harm perception variables revealed that although most exclusive users believed all tobacco products were harmful, fewer believed their own specific tobacco product was harmful (Table 2). Among hookah-only smokers, 34.8% believed hookah was harmful, 50.0% believed e-cigarettes were harmful, 84.3% believed cigarettes were harmful, 90.0% believed smokeless tobacco was harmful, and 79.5% believed

all tobacco products were harmful. Among e-cigarette-only users, 22.0% believed e-cigarettes were harmful, 70.5% believed hookah was harmful, 85.5% believed smokeless tobacco was harmful, 89.8% believed cigarettes were harmful, and 80.0% believed all tobacco products were harmful. Among smokeless tobacco-only users, 50.3% believed smokeless tobacco was harmful, 51.2% believed e-cigarettes were harmful, 70.9% believed hookah was harmful, 83.7% believed cigarettes were harmful, and 77.7% believed all tobacco products were harmful. Among cigarette-only smokers, 77.8% believed cigarette smoking was harmful, 37.0% believed e-cigarettes were harmful,

TABLE 2 Perception of Self and of Different Tobacco Products Among Past-30-Day Tobacco Product Users, NYTS 2016

Product Used in Past 30 d			Perception of Self		Perception of Products as Harmful ^a			
			Did Not Identify as a Tobacco Product User	Cigarettes ^b	Smokeless Tobacco ^b	Hookah ^b	E-cigarettes ^b	All Tobacco Products ^c
			% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
E-cigarettes only (N = 558)	Overall	Overall	59.7 (54.8–64.6)	89.8 (86.9–92.7)	85.5 (81.8–89.2)	70.5 (65.9–75.1)	22.0 (17.9–26.0) ^d	80.0 (76.0–83.9)
	Sex	Male	64.0 (57.8–70.2)	90.6 (87.0–94.3)	84.7 (79.7–89.6)	72.9 (67.1–78.8)	19.9 (14.8–25.0) ^d	77.8 (72.5–83.1)
		Female	53.8 (46.0–61.6)	88.6 (83.8–93.3)	86.3 (80.7–91.9)	66.8 (59.4–74.2)	24.4 (17.8–31.0) ^d	82.5 (76.6–88.3)
Cigars only ^a (N = 233)	Overall	Overall	56.6 (48.7–64.6)	82.7 (75.6–89.8)	82.2 (74.9–89.5)	61.8 (53.7–69.9)	45.2 (37.1–53.3)	81.9 (75.1–88.6)
	Sex	Male	48.1 (37.3–58.9)	78.0 (67.5–88.4)	79.2 (68.5–89.8)	62.6 (51.8–73.3)	37.2 (27.1–47.2)	79.3 (69.7–89.0)
		Female	69.7 (58.5–80.9)	89.8 (82.7–96.9)	86.7 (78.5–95.0)	60.6 (48.4–72.7)	57.1 (45.0–69.2)	85.8 (77.4–94.1)
Hookah only (N = 159)	Overall	Overall	44.0 (34.5–53.6)	84.3 (76.2–92.3)	90.0 (84.7–95.4)	34.8 (25.9–43.7) ^d	50.0 (40.4–59.6)	79.5 (71.8–87.1)
	Sex	Male	48.5 (30.5–66.5)	78.7 (63.0–94.4)	83.5 (69.5–97.4)	35.6 (20.1–51.2) ^d	44.7 (26.2–63.2)	80.8 (68.2–93.4)
		Female	42.2 (31.0–53.4)	86.5 (77.2–95.9)	92.7 (87.9–97.4)	34.5 (23.7–45.3) ^d	52.1 (40.8–63.5)	78.9 (69.5–88.3)
Smokeless tobacco only (N = 119)	Overall	Overall	54.2 (30.7–77.7)	74.7 (50.6–98.8)	86.8 (74.9–98.6)	25.6 (4.9–46.2) ^d	52.6 (28.0–77.1)	70.7 (49.3–92.1)
	Sex	Male	41.1 (31.0–51.2)	86.9 (79.4–94.4)	90.9 (84.9–97.0)	37.3 (27.6–47.0) ^d	49.3 (39.1–59.5)	81.9 (74.1–89.6)
		Female	58.9 (35.4–82.4)	82.1 (64.0–100.0)	60.2 (38.3–82.0) ^d	82.2 (63.5–100.0)	56.8 (34.7–78.9)	81.1 (62.3–100.0)
Cigarettes only ^f (N = 125)	Overall	Overall	29.9 (18.6–41.1)	84.2 (75.2–93.3)	46.8 (34.6–58.9) ^d	66.3 (54.8–77.9)	49.3 (37.1–61.6)	76.2 (66.3–86.1)
	Sex	Male	26.5 (17.6–35.4)	77.8 (69.2–86.4) ^d	83.9 (76.5–91.2)	73.4 (64.2–82.5)	37.0 (26.7–47.2)	86.8 (81.3–92.3)
		Female	28.1 (14.9–41.2)	68.6 (54.1–83.1) ^d	74.7 (61.0–88.4)	70.5 (55.8–85.2)	29.3 (16.7–41.9)	86.1 (77.1–95.0)
RYO and/or pipe tobacco only ^g (N = 68)	Overall	Overall	25.4 (13.4–37.5)	84.1 (74.8–93.5) ^d	90.2 (83.2–97.2)	75.3 (64.3–86.3)	42.3 (28.9–55.6)	87.3 (78.7–95.9)
	Sex	Male	42.3 (17.6–66.9)	69.2 (43.3–95.2) ^d	76.3 (61.0–91.7)	79.9 (58.3–100.0)	^e	75.9 (59.2–92.6)
		Female	24.2 (14.8–33.6)	79.1 (69.7–88.4) ^d	85.0 (76.9–93.1)	72.4 (63.0–81.9)	37.9 (27.3–48.6)	88.4 (82.0–94.8)
Poly-tobacco use (≥2 products; N = 1088)	Overall	Overall	82.2 (70.9–93.6)	56.8 (41.9–71.8)	54.2 (38.7–69.8)	47.7 (32.2–63.1)	37.6 (21.7–53.6)	58.9 (43.4–74.4)
	Sex	Male	83.5 (69.4–97.6)	51.4 (33.8–69.1)	54.3 (36.6–71.9)	52.4 (35.1–69.8)	36.3 (18.7–53.9)	63.1 (46.3–79.8)
		Female	77.0 (55.8–98.1)	77.4 (55.3–99.6)	59.5 (26.3–92.7)	^e	45.1 (10.3–79.9)	43.0 (12.4–73.6)
Cigarettes only ^f (N = 125)	Overall	Overall	77.4 (52.2–100.0)	62.3 (37.1–87.6)	57.6 (30.7–84.5)	59.8 (34.7–84.9)	^e	65.0 (40.2–89.8)
	Sex	Male	84.3 (73.8–94.7)	56.1 (37.8–74.4)	54.7 (35.6–73.7)	42.5 (24.0–61.1)	40.1 (20.6–59.6)	53.7 (34.4–72.9)
		Female	12.2 (8.7–15.6)	75.4 (70.2–80.5)	74.1 (68.6–79.5)	55.3 (49.5–61.2)	31.6 (26.2–37.0)	76.9 (72.3–81.5)
Poly-tobacco use (≥2 products; N = 1088)	Overall	Overall	16.4 (10.5–22.2)	56.7 (48.0–65.4)	64.9 (56.7–73.0)	44.0 (35.3–52.7) [*]	21.7 (15.1–28.2)	56.6 (47.7–65.6)
	Sex	Male	13.0 (9.9–16.0)	71.5 (67.1–76.0)	64.5 (59.8–69.2)	55.8 (50.8–60.8)	27.3 (22.9–31.7)	70.9 (66.5–75.4)
		Female	11.9 (9.4–14.3)	76.9 (73.3–80.4)	69.3 (65.3–73.3)	58.3 (54.1–62.5) [*]	30.5 (26.6–34.3)	77.2 (73.9–80.5)

Responses with *P* values vary significantly by the assessed sociodemographic characteristics (ie, between boys and girls or between middle school and high school students). Current (past-30-d) use was assessed for the following product types in the NYTS: cigarettes, bidis, cigars, pipes, RYO tobacco, hookah, e-cigarettes, and smokeless tobacco products (chewing tobacco, snuff, dip, snus, and dissolvable tobacco). Exclusive use of a specific product type was defined as using that product in the past 30 d but none of the remaining product types. CI, confidence interval.

^a No question was asked about perceived harm of cigars and pipe or RYO tobacco in the 2016 NYTS.

^b The 4 response options used to measure respondents' harm perception (no harm, little harm, some harm, and a lot of harm) were collapsed into either low harm (no harm or little harm) or high harm (some harm or a lot of harm).

^c The 4 response options used to measure the extent to which respondents agreed that "all tobacco products are dangerous" (strongly agree, agree, disagree, and strongly disagree) were collapsed into either perceived low harm (disagree or strongly disagree) or high harm (strongly agree or agree).

^d The tobacco product for which the perception of harm is being assessed corresponds to the specific tobacco product used exclusively by the respondent.

^e Estimates were suppressed because relative SEs were ≥30%.

^f Includes 1 individual who used bidis exclusively.

^{*} *P* < .05.

73.4% believed hookah was harmful, 83.9% believed smokeless tobacco was harmful, and 86.8% believed all tobacco products were harmful.

beliefs that their own products were not harmful: e-cigarettes (74.6%), hookah (60.8%), smokeless tobacco (41.8%), and cigarettes (15.5%).

products and cigarettes compared with every other tobacco user group (Table 2). RYO and/or pipe tobacco-only smokers also had lower harm perception in relation to smokeless tobacco products when compared with hookah-only, e-cigarette-only, cigar-only, and cigarette-only users but did

Among those who believed that all tobacco products were harmful, users of the following reported conflicting

RYO and/or pipe tobacco smokers had the lowest proportions reporting perceived harm of all tobacco

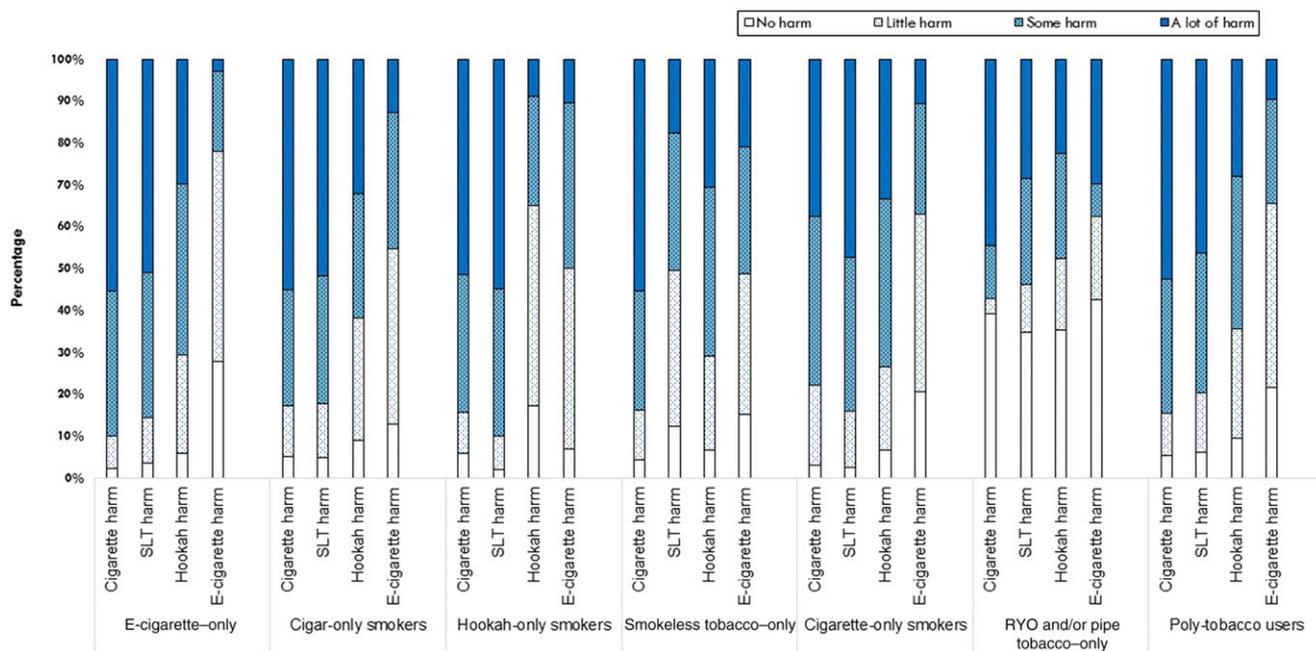


FIGURE 1

Harm perception across different tobacco products among single-product and poly-tobacco users, NYTS 2016. Questions used to assess product-specific harm perceptions were available for only cigarettes, smokeless tobacco products (chewing tobacco, snuff, dip, and snus), hookah, and e-cigarettes. Similar questions were not asked for RYO tobacco, pipe tobacco, or cigars. Single-product use of each specific product type was defined as past-30-day use of that product type but none of the others in the past 30 days. Poly-tobacco use was defined as past-30-day use of ≥ 2 tobacco product types. SLT includes chewing tobacco, snuff, dip, snus, and dissolvable tobacco products. SLT, smokeless tobacco.

not differ significantly from smokeless tobacco-only or poly-tobacco users. Hookah harm perceptions among RYO and/or pipe tobacco-only smokers did not differ significantly from hookah-only, cigar-only, and poly-tobacco users but were significantly lower compared with single-product users of cigarettes, e-cigarettes, and smokeless tobacco. E-cigarette harm perceptions among RYO and/or pipe tobacco-only smokers differed significantly only when compared with e-cigarette-only users (37.6% vs 22.0%, respectively); all other differences were nonsignificant.

In addition to the dichotomized harm perception variables presented above and in Table 2, participants' noncollapsed responses are shown in Fig 1 to highlight the within- and cross-product spectrum of harm perceptions.

DISCUSSION

We found an inverse relationship between product-specific perceived harm and nonidentification as a

tobacco product user. Most exclusive users of e-cigarettes or hookah thought that all tobacco products and any specific tobacco product they did not use were harmful; in contrast, the tobacco product they used was thought of by many as not being harmful. These findings reveal that these exclusive users may not consider their products to be part of the universe of all tobacco products. Recent Internet search patterns reveal that some of the top search queries in the United States in relation to e-cigarettes include "Are electronic cigarettes safe?" and "Are electronic cigarettes harmful?"¹⁵ Similarly, the top queries in relation to hookah include "Is hookah tobacco?" and "Is there tobacco in hookah?"¹⁵ These search patterns reveal that despite significant efforts by the public health community to educate people about the risks of tobacco products, particularly among youth, there is confusion about what constitutes a tobacco product. Studies have revealed that perceptions of harm and

addictiveness are lower for specific products, including hookah.^{13,14}

Another possible explanation for discordant reporting by respondents is that they do recognize that their products are tobacco yet do not see themselves as tobacco users. Youth ideation of a stereotypical tobacco user might be centered on certain imagery, such as a tobacco-related illness,¹⁶ daily tobacco use, or specific cues, such as the noxious smell of tobacco smoke. Youth tobacco product users may thus reject the identity of being a tobacco user if their tobacco use patterns do not conform to this conceived image.^{10,11} This is consistent with our findings that youth who obtained their tobacco from social sources, those who report no symptoms of nicotine dependence (which is suggestive of occasional use), and those who use certain products that are available in a wide variety of flavors were all more likely to deny being users of any tobacco product.

Exclusive smokers of RYO and/or pipe tobacco held the highest percentage

of those not self-identifying as tobacco product users. Smokers of hand-rolled cigarettes may falsely believe that they are not being exposed to certain harmful chemicals that are present in factory-manufactured cigarettes. However, the risk of several tobacco-attributable cancers has been shown to be similar or even higher among smokers of RYO tobacco than factory-manufactured cigarettes,^{17–19} possibly because of the absence of a filter on some RYO cigarettes, which potentially exposes users to high levels of toxins and carcinogens. Similarly, we found that although hookah smoking yields very high levels of toxicants,^{20,21} only one-third of exclusive hookah smokers (34.8%) believed hookah was harmful compared with those who believed that smokeless tobacco (90.0%), cigarettes (84.3%), or e-cigarettes (50.0%) were harmful. Several packaging elements on certain tobacco products implicitly convey perceptions of healthfulness, vitality, cleanliness, or reduced harm by referencing fruit (eg, “strawberry,” “mango,” and “apple”) or using other descriptors such as “cool,” “fresh,” “natural,” “clean,” “mellow,” or “smooth.”^{3,22}

Although noncombustible products, such as e-cigarettes, generally contain fewer toxicants than combustible tobacco products, no tobacco product is harmless.^{2,23} While moderation is encouraged for certain ingested substances that are potentially harmful in excess doses (eg, fat, salt, and sugar),²⁴ youth use of tobacco products in any amount is unsafe.^{2,25,26} Multifaceted interventions that address protobacco social and contextual factors (such as youth-oriented tobacco advertising

and marketing, product design, and packaging as well as social norms and access) can help reduce tobacco use.³ Several jurisdictions in the United States have restricted the sale of various flavored tobacco products,^{27,28} and multiple states and hundreds of communities have raised the legal age of purchasing tobacco products to 21 years.²⁹ A 2016 Food and Drug Administration deeming rule also extended certain regulatory requirements to e-cigarettes, including requirements for health warnings of nicotine addictiveness and the prohibition of sale to minors.³⁰ These requirements could help reinforce the fact that these products are indeed tobacco products.

The findings from this study can be useful to health professionals, especially within primary health care when screening adolescent patients for tobacco product use. Asking about the diversity of tobacco products, including occasional use, might better capture youth who may not otherwise identify as users of tobacco products.³¹ The American Academy of Pediatrics recommends that pediatric practitioners screen all patients for tobacco use, including e-cigarettes, and provide counseling. Efforts are warranted to educate youth about the risks of all forms of tobacco product use.

There are limitations in this study. First, the self-reported measures may be subject to misreporting. Second, product-specific past-30-day use status was used as a “gold standard” when respondents gave discordant answers to the question about 30-day any tobacco use status on the basis

of the cited previous evidence of consistent responses to questions about specific products. We assumed that discordant results reflected users not knowing their products were tobacco based or not identifying as tobacco users. However, it is possible that other reasons account for at least some of the discordance, such as respondents misunderstanding the questions or answering the specific product questions inaccurately. Finally, these findings may have limited generalizability to children who are institutionalized, have dropped out of school, or are homeschooled, who are not included in NYTS sampling frame.

CONCLUSIONS

Approximately 2 in 3 single-product users of e-cigarettes and cigars and 4 in 5 users of RYO and/or pipe tobacco did not consider themselves as tobacco product users. Health care providers are in a unique role to raise awareness among adolescents and their parents about the harms of all forms of tobacco use among youth. Additionally, questions used to assess youth tobacco use in population surveys and clinical visits could be made more sensitive by being used specifically to assess for different tobacco products, including occasional use by youth.

ABBREVIATIONS

aOR: adjusted odds ratio
e-cigarettes: electronic cigarettes
NYTS: National Youth Tobacco Survey
RYO: roll-your-own

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