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Sociodemographic differences in beliefs in harm reduction tobacco products as cigarette cessation aids among United States adults in 2024: Results from the health information National Trends Survey (HINTS) 7

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ABSTRACT

Objective: There is increasing interest in harm-reduction tobacco products as potential cigarette cessation aids. This study examined sociodemographic differences in the belief that harm-reduction nicotine and tobacco products could aid in cigarette cessation.

Methods: We analyzed data from the Health Information National Trends Survey 7. We conducted four multivariable binomial logistic regressions on the belief that people can quit cigarette smoking using each harm reduction tobacco product by a priori predictors. The data were collected March to September 2024 in the United States.

Results: E-cigarettes were more likely to be endorsed by adults who reported current e-cigarette use (aOR = 6.45, 95%CI = 3.84,10.81; vs. no-use). Nicotine pouches were endorsed by higher-income individuals (aOR = 1.82, 95%CI = 1.37,2.40; vs. lower-income individuals), and adults with depression or anxiety disorders (aOR = 1.58, 95%CI = 1.19,2.10; vs. without depression or anxiety disorders). Heated tobacco products were endorsed by males (aOR = 3.07, 95%CI = 1.78,5.32; vs. females). Other modified-risk tobacco products were endorsed by adults aged 18–34 (aOR = 2.69, 95%CI = 1.42,5.12; vs. aged ≥35).

Conclusions: To our knowledge, this is the first US population-level study to identify factors associated with endorsement of beliefs related to whether harm-reduction tobacco products could help with cigarette cessation, including younger age, male gender, higher income, mental health symptoms, and use of harm-reduction products.

1. Introduction

Commercial combustible cigarette smoking is a major cause of preventable mortality and morbidities; however, cigarette smoking cessation remains challenging (U.S. Department of Health and Human Services, 2020; US Department of Health and Human Services, 2014). There has been increasing interest in harm-reduction approaches in cigarette smoking for "*minimizing harms and decreasing total mortality and morbidity, without completely eliminating tobacco and nicotine use*." (Hatsukami and Carroll, 2020) Tobacco harm reduction considers reduced levels of nicotine and tobacco use and exposure to nicotine and other chemicals as an alternative and complementary smoking cessation strategy (Hatsukami and Carroll, 2020). Such approaches are still controversial since they could be easily influenced by the tobacco industry, and the risks versus benefits remain debatable (Bhatnagar et al., 2019; Samet and Barrington-Trimis, 2021; Koh and Fiore, 2022).

Although no safe tobacco products exist, the relative risk of harm reduction products is lower than combustible cigarette smoking when considering risk in a risk-continuum manner. Examples of harm reduction products are electronic nicotine delivery systems (ENDS) such as e-cigarettes and vapes (US Food and Drug Administration, 2026a; Gottlieb and McClellan, 2024), nicotine pouches such as Zyn (Centers for Disease Control and Prevention, 2025; US Food and Drug Administration, 2026b), heated tobacco products ("heat-not-burn" products) such as

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IQOS (Center for disease control and prevention, 2025a; US Food and Drug Administration, 2025), and modified-risk cigarette products such as the VLN King and VLN Menthol King (US Food and Drug Administration, 2026c). The United States' (US) 2009 Family Smoking Prevention Tobacco Control Act referred to "modified-risk nicotine products" as legally designated tobacco products to reduce tobacco-related harm, with risks lower than combustible cigarette smoking (Center for Disease Control and Prevention, 2025b; US Food and Drug Administration, 2026d).

Limited data exists on the cigarette cessation effects (i.e., complete cessation of cigarette smoking) of these harm-reduction products. There is evidence that ENDS use is related to increased cigarette smoking cessation rates compared to nicotine replacement therapy in clinical trials but ENDS are still not designated as an official FDA-approved cigarette smoking cessation treatment (Lindson et al., 2025). Oral nicotine pouch products may reduce cigarette smoking, but evidence is limited by the small number of studies and the fact that these studies were frequently industry-funded (Heshmati et al., 2025; Hartmann-Boyce et al., 2025), and current evidence related to heated tobacco products is insufficient (Tattan-Birch et al., 2022). Beliefs that these harm-reduction tobacco products might be effective for cigarette smoking cessation (whether it is true or not) can impact individual cessation behaviors (Seidenberg et al., 2024; Tan et al., 2024). Identifying differences in beliefs among sociodemographic and behavioral subgroups regarding harm reduction tobacco products is important for tailored education and communication about risks and benefits of these harm reduction products in clinics and for public awareness. This study used data from US adults to examine sociodemographic differences in the belief that each of four types of harm-reduction nicotine and tobacco products could aid in cigarette smoking cessation.

2. Methods

2.1. Study design and population

We analyzed the Health Information National Trends Survey (HINTS) 7 (2024) (National Cancer Institute, 2026), a cross-sectional, nationally representative survey conducted by the National Cancer Institute among civilian, non-institutionalized adults aged 18 years or older in the United States. The HINTS 7 was collected from March 25, 2024, to September 16, 2024, using multi-stage, stratified sampling, enabling population-level estimation. We included all adult survey respondents ($n = 7278$).

2.2. Measures

Our outcome was endorsement of the belief that people can quit smoking cigarettes using each of four harm-reduction tobacco products. The question was "Do you believe that any of the following tobacco products can help people quit smoking cigarettes?" and participants were asked to "choose all that apply" from the following options: (1) electronic nicotine devices (ENDs) such as e-cigarettes, (2) nicotine pouches, (3) heated tobacco products such as IQOS, (4) other modified-risk tobacco products such as general snus or VLN King and VLN Menthol King, (5) None of these can help smokers quit smoking, and (6) I don't know. This variable was introduced in HINTS 7 and not assessed in earlier surveys.

We selected predictors a priori based on previous literature about cigarette smoking and cessation behaviors (U.S. Department of Health and Human Services, 2020; US Department of Health and Human Services, 2014). These predictors were age (18–34 years, 35 years or older), sex (female, male), race or ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic Other), annual household income ($0–$74,999, $75,000 or more), current cigarette smoking (no, yes), current use of each product mentioned in the outcome (ENDS, nicotine pouches, heated tobacco products, other modified-risk tobacco products; no, yes for each; note: for analyses involving "None of these can help smokers quit smoking" and "I don't know" outcomes, we combined variables and created a variable for current use of *any* harm reduction products), past-12-month cannabis use (no, yes; "Have you used any product containing marijuana in the past 12 months?"; note: this variable was not assessed for the past-30-day time frame), past-30-day days of alcohol use (continuous range from 0 to 30; "During the past 30 days, on how many days did you have at least one drink of any alcoholic beverage?"), ever diagnosis of chronic diseases (cancer, heart diseases, high blood pressure, diabetes, pulmonary diseases; none, any), and ever diagnosis of depression or anxiety disorders (no, yes).

2.3. Statistical analysis

We conducted descriptive statistics for study variables, presenting unweighted ns and weighted percentages for categorical variables and weighted means and standard deviations for continuous variables. We conducted a bivariate association between each of the six outcomes and predictors using Rao–Scott adjusted chi-squared tests for categorical predictors and Wald-adjusted *t*-tests for continuous predictors. We then conducted six multivariable binomial logistic regression models for each of the six outcomes (i.e., ENDS, nicotine pouches, heated tobacco products, other modified-risk tobacco products, none of these can help smokers quit smoking, I don't know) by a priori predictors. We were unable to run our a priori planned sensitivity analysis that would limit samples to individuals with current cigarette smoking due to insufficient sample size and statistical power. Instead, we estimated and presented the prevalence of beliefs related to each outcome among adults who currently smoke ($n = 699$), without adjusting for predictors.

To adjust multiple comparisons, we conservatively considered $p < 0.008$ (=0.05/6) as a statistical significance cut-off. The complex sampling design and sampling weight of the HINTS 7 were applied, and jackknife methods were used for variance estimation. This study followed the STROBE (STrengthening the Reporting of OBservational Studies in Epidemiology) guidelines (Elm et al., 2007). The secondary data analysis of de-identified, publicly available national data was exempt from Institutional Review Board review. STATA 19.5 (College Station, TX) was used for all statistical analyses.

3. Results

Table 1 shows the descriptive statistics of study variables for the full sample and stratified by belief in each harm-reduction tobacco product for cigarette smoking cessation. Among the total adult respondents ($n = 7278$), 25.19% (weighted) were aged 18–34 years, 48.80% were women, 60.55% were non-Hispanic White, and 56.92% had an annual household income of $0–$74,999.

In the full sample, the percentage of respondents who believed that the harm-reduction tobacco products could help cigarette smoking cessation was as follows: 12.84% for ENDS (95% CI = 11.39, 14.46), 17.45% for nicotine pouches (95% CI = 15.66, 19.40), 2.71% for heated tobacco products (95% CI = 2.17, 3.37), 3.80% for other modified-risk tobacco products (95% CI = 3.04, 4.76), 21.70% for "none of these products can help smokers quit smoking" (95% CI = 19.80, 23.73), and 57.52% for "I don't know" (95% CI = 55.45, 59.56).

When the sample was restricted to adults who currently smoke ($n = 699$), 15.91% endorsed ENDS (95% CI = 11.32, 21.90), 16.34% endorsed nicotine pouches (95% CI = 11.53, 22.64), 4.16% endorsed heated tobacco products (95% CI = 2.27, 7.50), 4.66% endorsed other modified risk tobacco products (95% CI = 2.76, 7.75), 26.28% endorsed "none of these products can help smokers quit smoking" (95% CI = 21.25, 32.03), and 47.26% endorsed "I don't know" (95% CI = 40.30, 54.31) (see **Supplemental Fig. 1**).

Table 2 shows the results of the six multivariable logistic regression models for the selection of each outcome for the full sample. ENDS were more likely to be endorsed as a cigarette smoking cessation aid by males

Table 1
Descriptive statistics of study variables overall and stratified by beliefs related to harm reduction tobacco products as a cigarette smoking cessation aid among total adult respondents, Health Information National Trends Survey (HINTS) 7, 2024.

Predictors	Total	Electronic Nicotine Devices (ENDS)		Nicotine Pouches		Heated Tobacco Products		Other Modified Risk Tobacco Products		None of these can help smokers quit smoking		I don't know	
		No (n = 6098, 87.16%)	Yes (n = 653, 12.84%)	No (n = 5700, 82.55%)	Yes (n = 1051, 17.45%)	No (n = 6591, 97.29%)	Yes (n = 160, 2.71%)	No (n = 6516, 96.19%)	Yes (n = 235, 3.80%)	No (n = 5294, 78.30%)	Yes (n = 1457, 21.70%)	No (n = 2668, 42.48%)	Yes (n = 4083, 57.52%)
Age, years			<0.01		<0.01		0.02		<0.01		0.82		<0.01
35 or older	5585 (74.81)	5060 (89.42)	457 (10.58)	4718 (83.99)	799 (16.01)	5408 (97.71)	109 (2.29)	5368 (97.22)	149 (2.78)	4324 (78.07)	1193 (21.93)	2080 (39.98)	3437 (60.02)
18–34	1080 (25.19)	897 (79.99)	181 (20.01)	838 (77.39)	240 (22.61)	1030 (95.95)	48 (4.05)	996 (92.93)	82 (7.07)	848 (78.55)	230 (21.45)	530 (51.13)	548 (48.87)
Sex			<0.01		0.01		<0.01		<0.01		0.68		0.05
Female	4017 (48.80)	3627 (89.98)	333 (10.02)	3376 (84.83)	584 (15.17)	3887 (98.63)	73 (1.37)	3844 (97.45)	116 (2.55)	3090 (77.92)	870 (22.08)	1520 (39.92)	2440 (60.08)
Male	2646 (51.20)	2328 (84.28)	302 (15.72)	2181 (80.18)	449 (19.82)	2546 (95.98)	84 (4.01)	2519 (95.06)	111 (4.93)	2080 (78.65)	550 (21.35)	1076 (44.97)	1554 (55.03)
Race/ethnicity			<0.01		<0.01		0.19		0.05		0.31		0.14
Non-Hispanic White	3548 (60.55)	3147 (85.86)	376 (14.14)	2917 (79.99)	606 (20.01)	3454 (97.51)	69 (2.48)	3420 (96.48)	103 (3.51)	2778 (78.09)	745 (21.91)	1407 (44.03)	2116 (55.97)
Non-Hispanic Black	968 (11.05)	899 (93.82)	59 (6.18)	838 (89.39)	120 (10.61)	936 (98.05)	22 (1.94)	930 (97.97)	28 (2.02)	771 (79.06)	187 (20.94)	331 (35.01)	627 (64.99)
Hispanic	1323 (17.52)	1194 (88.22)	116 (11.78)	1133 (85.01)	177 (14.99)	1269 (96.44)	41 (3.56)	1242 (94.40)	68 (5.60)	987 (74.95)	323 (25.05)	555 (46.03)	755 (53.97)
Non-Hispanic Others	599 (10.87)	519 (84.02)	76 (15.98)	481 (82.63)	114 (17.37)	572 (95.88)	23 (4.12)	564 (94.42)	31 (5.57)	467 (81.69)	128 (18.31)	258 (42.02)	337 (57.98)
Income			0.17		<0.01		0.09		0.52		<0.01		0.96
$0–$74,999	4451 (56.92)	3623 (88.20)	358 (11.80)	3457 (86.30)	524 (13.70)	3902 (97.78)	79 (2.21)	3851 (96.41)	130 (3.59)	3061 (76.24)	920 (23.76)	1574 (42.44)	2407 (57.56)
$75,000 or more	2812 (43.08)	2460 (85.82)	295 (14.18)	2229 (77.97)	526 (22.03)	2674 (96.67)	81 (3.32)	2650 (95.90)	105 (4.09)	2223 (81.06)	532 (18.94)	1088 (42.35)	1667 (57.65)
Current cigarette smoking[1]			0.18		0.66		0.12		0.40		0.06		<0.01
No	6012 (87.92)	5435 (87.58)	536 (12.42)	5055 (82.44)	916 (17.56)	5838 (97.47)	133 (2.52)	5777 (96.32)	194 (3.68)	4705 (79.04)	1266 (20.96)	2277 (40.98)	3694 (59.11)
Yes	699 (12.08)	585 (84.09)	111 (15.91)	571 (83.66)	125 (16.34)	670 (95.84)	26 (4.16)	659 (95.34)	37 (4.66)	522 (73.72)	174 (26.28)	358 (52.74)	338 (47.26)
Current use of ENDS[1]			<0.01										
No	6348 (92.72)	5810 (89.83)	502 (10.17)	–	–	–	–	–	–				
Yes	328 (7.27)	187 (52.92)	141 (47.08)	–	–	–	–	–	–				
Current use of nicotine pouches[1]					<0.01								
No	6602 (98.47)	–	–	5576 (82.83)	991 (17.17)	–	–	–	–				
Yes	76 (1.52)	–	–	32 (56.68)	44 (43.32)	–	–	–	–				
Current use of IQOS							<0.01						
No	6654 (99.70)	–	–	–	–	6468 (97.33)	151 (2.67)	–	–				
Yes	23 (0.30)	–	–	–	–	18 (82.81)	5 (17.19)	–	–				

(*continued on next page*)

Table 1 (*continued*)

Predictors	Total	Electronic Nicotine Devices (ENDS)		Nicotine Pouches		Heated Tobacco Products		Other Modified Risk Tobacco Products		None of these can help smokers quit smoking		I don't know	
		No (n = 6098, 87.16%)	Yes (n = 653, 12.84%)	No (n = 5700, 82.55%)	Yes (n = 1051, 17.45%)	No (n = 6591, 97.29%)	Yes (n = 160, 2.71%)	No (n = 6516, 96.19%)	Yes (n = 235, 3.80%)	No (n = 5294, 78.30%)	Yes (n = 1457, 21.70%)	No (n = 2668, 42.48%)	Yes (n = 4083, 57.52%)
Current use of other modified risk tobacco products[1]									<0.01				
No	6643 (99.57)	–	–	–	–	–	–	6385 (96.27)	223 (3.73)				
Yes	34 (0.43)	–	–	–	–	–	–	25 (71.99)	9 (28.01)				
Current use of any harm reduction products[1,2]											0.03		<0.01
None										4839 (77.67)	1359 (22.33)	2333 (40.28)	3865 (59.72)
Any										356 (86.13)	64 (13.87)	275 (64.91)	145 (35.09)
Past-12-month cannabis use			<0.01		<0.01		<0.01		0.06		0.94		<0.01
No	5273 (76.72)	4824 (89.48)	414 (10.52)	4488 (84.32)	750 (15.68)	5129 (97.88)	109 (2.12)	5081 (96.57)	157 (3.42)	4108 (78.38)	1130 (21.62)	1963 (39.93)	3275 (60.07)
Yes	1374 (23.28)	1133 (78.68)	236 (21.32)	1079 (75.80)	290 (24.20)	1319 (95.16)	50 (4.83)	1293 (94.70)	76 (5.30)	1081 (78.54)	288 (21.46)	652 (51.44)	717 (48.56)
Days for alcohol use in the past 30 days			0.05		0.10		0.05		0.25		<0.01		0.77
Continuous range from 0 to 30	4.66 (7.64)	4.49 (7.60)	5.68 (7.36)	4.53 (7.68)	5.21 (7.28)	4.60 (7.59)	6.50 (8.21)	4.61 (7.60)	5.56 (7.97)	4.85 (7.75)	3.92 (7.06)	4.60 (7.22)	4.69 (7.91)
Ever diagnosis of chronic diseases			<0.01		0.01		0.29		0.06		0.65		0.01
None	2708 (50.27)	2385 (84.98)	310 (15.02)	2218 (80.47)	477 (19.53)	2615 (96.89)	80 (3.11)	2574 (95.46)	121 (4.53)	2092 (77.88)	603 (22.12)	1134 (45.17)	1561 (54.83)
Any	4074 (49.73)	3624 (89.31)	335 (10.69)	3396 (84.64)	563 (15.36)	3881 (97.66)	78 (2.34)	3848 (96.89)	111 (3.10)	3128 (78.72)	831 (21.28)	1494 (39.77)	2465 (60.23)
Ever diagnosis of depression or anxiety disorders			<0.01		<0.01		0.71		0.15		0.75		<0.01
No	5031 (71.10)	4460 (89.15)	412 (10.85)	4160 (84.26)	712 (15.74)	4760 (97.35)	112 (2.65)	4714 (96.53)	158 (3.47)	3848 (78.25)	1024 (21.75)	1831 (40.25)	3041 (59.75)
Yes	1866 (28.90)	1579 (82.09)	238 (17.91)	1486 (78.41)	331 (21.59)	1770 (97.08)	47 (2.92)	1741 (96.26)	76 (4.74)	1403 (78.88)	414 (21.12)	809 (47.53)	1008 (52.47)

Note: ENDS products include e-cigarettes; Heated tobacco products include IQOS; Other modified Risk Tobacco Products include General Snus, VLN KING, VLN Menthol King.
P-values are based on Rao-Scott adjusted chi-squared tests.
The belief in each harm reduction product is a cigarette smoking cessation aid was assessed using the question "Do you believe that any of the following tobacco products can help people quit smoking cigarettes?" Respondents were asked to choose as many as apply for the four products (ENDS Products, Nicotine Pouches, Heated Tobacco Products, Other Modified Risk Tobacco Products) and were also given two additional options of "None of these can help smokers quit smoking", and "I don't know."

[1] Current use of each tobacco product was assessed as "Do you now use any of the following tobacco products every day or some days" with "Mark all that apply" option.

[2] Current use of any harm reduction products was defined as endorsing current use of any of the following products: ENDS, nicotine pouches, heated tobacco products, or other modified-risk tobacco products.

Table 2
Results of the multivariable logistic regression models for beliefs that harm reduction products are a cigarette smoking cessation aid by various sociodemographic and behavioral factors among total adult respondents, Health Information National Trends Survey (HINTS) 7, 2024.

Predictors	Outcome 1: Electronic Nicotine Devices (ENDS)	Outcome 2: Nicotine Pouches	Outcome 3: Heated Tobacco Products	Outcome 4: Other Modified Risk Tobacco Products	Outcome 5: None of these can help smokers quit smoking	Outcome 6: I don't know
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Age, years						
35 or older	Ref	Ref	Ref	Ref	Ref	Ref
18–34	1.53 (0.99, 2.37)	1.59 (1.12, 2.25)	1.77 (0.93, 3.38)	**2.69 (1.42, 5.12)**	1.00 (0.73, 1.38)	0.72 (0.55, 0.95)
Sex						
Female	Ref	Ref	Ref	Ref	Ref	Ref
Male	**1.79 (1.27, 2.52)**	1.39 (1.04, 1.87)	**3.07 (1.78, 5.32)**	2.00 (1.19, 3.39)	0.94 (0.75, 1.18)	0.84 (0.66, 1.06)
Race/ethnicity						
Non-Hispanic White	Ref	Ref	Ref	Ref	Ref	Ref
Non-Hispanic Black	**0.51 (0.32, 0.81)**	**0.58 (0.41, 0.81)**	0.97 (0.45, 2.08)	0.60 (0.30, 1.20)	0.82 (0.56, 1.19)	1.40 (1.04, 1.87)
Hispanic	0.86 (0.56, 1.34)	0.82 (0.58, 1.16)	1.44 (0.66, 3.18)	1.43 (0.79, 2.60)	1.11 (0.82, 1.49)	0.90 (0.67, 1.20)
Non-Hispanic Others	1.35 (0.83, 2.19)	0.84 (0.55, 1.28)	1.62 (0.66, 4.01)	1.19 (0.52, 2.71)	0.69 (0.41, 1.14)	1.15 (0.74, 1.79)
Income						
$0–$74,999	Ref	Ref	Ref	Ref	Ref	Ref
$75,000 or more	1.43 (0.99, 2.05)	**1.82 (1.37, 2.40)**	1.77 (0.93, 3.40)	1.39 (0.85, 2.25)	**0.72 (0.58, 0.89)**	0.95 (0.79, 1.15)
Current cigarette smoking[1]						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	0.71 (0.36, 1.41)	0.79 (0.46, 1.35)	1.41 (0.58, 3.44)	0.96 (0.43, 2.13)	1.49 (1.02, 2.18)	0.78 (0.53, 1.14)
Current use of each tobacco products mentioned in the outcome[1, 2]						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	**6.45 (3.84, 10.81)**	2.82 (0.92, 8.67)	4.33 (0.82, 22.92)	**9.61 (2.93, 31.53)**	0.47 (0.26, 0.87)	**0.50 (0.32, 0.79)**
Past-12-month cannabis use						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	1.53 (1.04, 2.23)	1.53 (1.09, 2.16)	2.01 (1.08, 3.74)	1.21 (0.73, 2.03)	1.02 (0.75, 1.39)	0.79 (0.60, 1.03)
Days for alcohol use in the past 30 days						
Continuous, range from 0 to 30	1.01 (0.99, 1.03)	1.00 (0.98, 1.02)	1.02 (0.98, 1.05)	1.02 (0.99, 1.05)	0.99 (0.97, 1.00)	1.00 (0.99, 1.01)
Ever diagnosis of chronic diseases						
None	Ref	Ref	Ref	Ref	Ref	Ref
Any	0.77 (0.57, 1.04)	0.85 (0.68, 1.07)	0.91 (0.50, 1.65)	0.94 (0.57, 1.54)	0.93 (0.73, 1.18)	1.13 (0.93, 1.37)
Ever diagnosis of depression or anxiety disorders						
No	Ref	Ref	Ref	Ref	Ref	Ref
Yes	1.50 (1.09, 2.08)	**1.58 (1.19, 2.10)**	1.25 (0.66, 2.34)	1.54 (0.90, 2.61)	0.98 (0.77, 1.23)	0.81 (0.66, 1.00)

aOR = Adjusted Odds Ratio; 95% CI = 95% Confidence Interval.
Notes: p-value of <0.008 (0.05/6) was considered the level for statistical significance based on the multiple comparisons adjustment.
The belief in each harm reduction product is a cigarette smoking cessation aid was assessed using the question "Do you believe that any of the following tobacco products can help people quit smoking cigarettes?" Respondents were asked to choose as many as apply for the four products (ENDS Products, Nicotine Pouches, Heated Tobacco Products, Other Modified Risk Tobacco Products) and were also given two additional options of "None of these can help smokers quit smoking", and "I don't know."
ENDS products include e-cigarettes; Heated tobacco products include IQOS; Other Modified Risk Tobacco Products include General Snus, VLN KING, VLN Menthol King.
[1] Current use of each tobacco product was assessed as "Do you now use any of the following tobacco products every day or some days" with "Mark all that apply" option.
[2] For example, those with current use of ENDS and beliefs in ENDS as a harm reduction product or those with current use of nicotine pouches and beliefs in nicotine pouches as a harm reduction product.

(versus females; aOR = 1.79, 95% CI = 1.27, 2.52) and adults who reported current e-cigarette use (versus no current e-cigarette use; aOR = 6.45, 95% CI = 3.84, 10.81) and less likely to be endorsed by non-Hispanic Black adults (versus non-Hispanic White adults; aOR = 0.51, 95% CI = 0.32, 0.81).

Nicotine pouches were more likely to be endorsed as a cigarette smoking cessation aid by adults with $75,000 or more as their annual household income (versus $0–74,999; aOR = 1.82, 95% CI = 1.37, 2.40), and adults ever diagnosed with depression or anxiety disorders (versus never diagnosed with depression or anxiety disorders; aOR = 1.58, 95% CI = 1.19, 2.10) and less likely to be endorsed by non-Hispanic Black adults (versus non-Hispanic White adults; aOR = 0.58,

95% CI = 0.41, 0.81).

Heated tobacco products were more likely to be endorsed as a cigarette smoking cessation aid by males (versus females; aOR = 3.07, 95% CI = 1.78, 5.32).

Other modified-risk tobacco products were more likely to be endorsed as a cigarette smoking cessation aid by adults aged 18–34 years (versus 35 years or older; aOR = 2.69, 95% CI = 1.42, 5.12), and adults who reported current use of other modified-risk tobacco products (versus non-use; aOR = 9.61, 95% CI = 2.93, 31.53).

"None of these can help smokers quit smoking" was less likely to be selected by those who had an income of $75,000 or more (versus $0–$74,999; aOR = 0.72, 95% CI = 0.58, 0.89).

"I don't know" was less likely to be selected by those who currently used any harm reduction nicotine products (vs. non-use; aOR = 0.50, 95% CI = 0.32, 0.79).

4. Discussion

This study found that the belief that four categories of harm-reduction tobacco products (i.e., ENDS, nicotine pouches, heated tobacco products, other modified-risk tobacco products) could help with cigarette smoking cessation were endorsed by a minority of adults (in the full sample and among those with current smoking) and differed by sociodemographic and behavioral factors including age, sex, race, income level, other harm-reduction product use, and mental health symptoms. To our knowledge, this is the first study to identify sociodemographic and behavioral subgroup differences in the endorsement of beliefs related to whether harm-reduction tobacco could help with cigarette smoking cessation at the US population level.

Younger adults were more likely to endorse the belief that other modified-risk tobacco products can help people quit smoking cigarettes than older adults. This is in line with previous literature suggesting that young adults who had never smoked cigarettes also expressed interest in using modified-risk tobacco products (O'Brien et al., 2018).

Males were more likely to endorse the belief that ENDS and heated tobacco products can help people quit smoking cigarettes than females. Previous literature suggested that men were more likely than women to use ENDS to quit smoking (Piñeiro et al., 2016). Males were also more likely to report lifetime heated tobacco product (e.g., IQOS) use than females (Lee & Mattingly, 2025).

Higher–income earners were also more likely to endorse the belief that ENDS can help people quit smoking cigarettes than lower-income earners. Adults who smoke with higher incomes were more likely than lower-income individuals to switch to ENDS from cigarette smoking in the context of quitting cigarettes (Harlow et al., 2019). Further, low-income adults who smoke were more likely to believe ENDS are more harmful than cigarettes (Harlow et al., 2019). Notably, higher-income earners were also less likely to select "none of these harm reduction products can help smokers to quit smoking" than lower-income earners, suggesting that higher-income earners might be more likely to believe in harm reduction products, in general, as effective smoking cessation alternatives compared to lower-income earners.

We found that those who already used harm-reduction tobacco products were more likely to endorse the belief that ENDS and other modified-risk tobacco products can help people quit smoking cigarettes than those who did not use harm-reduction products. Among adults who already used harm-reduction tobacco products, many agreed that ENDS were safer and less harmful than cigarettes, which might be related to their ENDS use (Choi & Forster, 2014; Wackowski et al., 2016). Note that adults who already used the harm reduction products were less likely to report "I don't know", suggesting that they might have their own opinion about harm reduction products as cigarette smoking cessation alternatives; future research should examine whether opinions were formed before use of these products or were informed by using these products.

Adults with mental health symptoms were more likely to endorse the belief that nicotine pouches can help people quit smoking cigarettes than adults without mental health symptoms. However, limited evidence exists regarding nicotine pouches for cigarette smoking cessation among adults with mental health concerns. A previous study observed that internalizing tendencies were associated with higher levels of considering switching from cigarette smoking to nicotine pouches among adults with current smoking who have tried to quit cigarette smoking in the past (Lee & Cassidy, 2026). However, another study analyzing a US national dataset from 2022 to 2023 found no significant difference in the *actual* use of nicotine pouches to quit cigarettes by mental health conditions among adults who smoke cigarettes (Lee et al., 2025). This must be reexamined using other datasets.

Finally, Black individuals were less likely to endorse the belief that ENDS or nicotine pouches can help people quit smoking cigarettes than White individuals. Our findings were aligned with previous findings related to racial differences in actual e-cigarette and nicotine pouch use for smoking cessation. Black adults who smoke were more likely than White adults who smoke to believe that ENDS were more harmful than cigarettes (Harlow et al., 2019, 2023) and less likely to use ENDS to quit (Harlow et al., 2023; Lee et al., 2023). Further, non-Hispanic Black adults who smoke cigarettes were less likely to use nicotine pouches for their smoking cessation (Lee et al., 2025).

All in all, these beliefs in each harm-reduction tobacco product for cigarette smoking cessation should be considered in clinical guidelines and tobacco regulatory policies to correctly communicate about the risks and benefits of harm-reduction tobacco products for smoking cessation.

Several limitations should be noted. First, we relied on cross-sectional self-report survey data, so we could not identify causal relationships and temporality. Second, the HINTS dataset assessed the civilian, non-institutionalized US population, and results may not generalize to other populations. Third, we were unable to run sensitivity analyses among those with current or lifetime cigarette smoking due to insufficient statistical power. Fourth, possible unmeasured confounders, such as cigarette dependence and general risk perception of each type of tobacco use, are lacking in the HINTS dataset.

5. Conclusions

To our knowledge, this is the first study to identify sociodemographic and behavioral subgroup differences in the endorsement of beliefs related to whether harm-reduction tobacco products (ENDS, nicotine pouches, heated tobacco, and other modified-risk tobacco products) could help with cigarette smoking cessation. Future research should examine how these beliefs impact behavior during a quit attempt (e.g., using these products) and whether these harm reduction products are actually effective for cigarette smoking cessation, particularly among these subgroups. The findings can also inform clinical guidelines and tobacco regulatory policies, such as education and communication about tobacco harm-reduction approaches and their risks and benefits to people who smoke cigarettes.

CRediT authorship contribution statement

Juhan Lee: Writing – original draft, Investigation, Formal analysis, Conceptualization. **Deborah Jarmel:** Writing – review & editing, Investigation. **Andrea H. Weinberger:** Writing – review & editing, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2026.103493.

Data availability

Data will be made available on request.

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