Amin S, T. Phillips K, M. Phillips M, Park SL, Pokhrel P. What Do We Know About the Use of Oral Nicotine Pouches? A Scoping Review of Quantitative Studies. *Hawaii J Health Soc Welf*. 2026;85(2):41-50. doi:10.62547/NOLD3340

What Do We Know About the Use of Oral Nicotine Pouches? A Scoping Review of Quantitative Studies

Samia Amin, PhD[1,2][a], Kristina T. Phillips, PhD[3,4], Michael M. Phillips, PhD[5], S. Lani Park, PhD[1], Pallav Pokhrel, PhD[1]

[1] Population Sciences Program, University of Hawai'i Cancer Center, University of Hawai'i at Mānoa, [2] Southern Arkansas University, [3] Center for Integrated Health Care Research (CIHR), Kaiser Permanente Hawaii, [4] Department of Health Systems Science, Kaiser Permanente Bernard J. Tyson School of Medicine, [5] Department of Public Health Sciences, University of Hawai'i at Mānoa

Keywords: Adolescent use, emerging products, harm reduction, marketing influence nicotine delivery, oral nicotine pouches

https://doi.org/10.62547/NOLD3340

Abstract

Oral nicotine pouches (ONPs) represent a rapidly emerging nicotine product. Little is known about the current state of quantitative research regarding patterns of ONP use; perceptions and motives related to ONP use; adverse consequences of ONP use; and use of ONPs relative to other tobacco products. To address this gap, this review aimed to summarize the findings of published, population-based research on ONPs. A comprehensive search of electronic databases (PubMed, Scopus, Web of Science, and Google Scholar) was conducted in March 2024 to identify relevant studies on ONP use. A narrative synthesis of the findings was performed. A total of 11 studies were identified including experimental (n=3), cross-sectional (n=7), or intervention-based (n=1). Nine to 10% of adolescents and young adults report ever using ONPs. ONP use is most common among young people who also currently smoke cigarettes or use electronic-cigarettes (e-cigarettes). Marketing messages centered around flavors and social facilitation appear to resonate with young people and experiencing pleasant flavors appears to a key motive for ONP use. Immediate adverse consequences of ONP use appear to be mild. Some evidence suggests that ONPs may be appealing as a reduced-harm alternative for habitual smokers. Evidence regarding ONP use patterns among adolescents and adults appears to be lacking. More longitudinal studies are needed to better understand the antecedents and consequences of ONP use. In addition, more studies are needed to compare the health effects of ONP vs. e-cigarettes and to better understand the dynamics of exclusive and dual use of e-cigarettes and ONP.

INTRODUCTION

Oral nicotine pouches (ONPs) are small, tobacco-free pouches containing pharmaceutical-grade nicotine and plant fibers.[1,2] Placed between the lip and gum, they release nicotine absorbed through the oral mucosa,[2] offering a smokeless nicotine experience and a potentially reduced-risk alternative for adult smokers unable or unwilling to quit.[3] Major tobacco companies have heavily invested in ONPs, marketing various brands such as Lyft, Velo, Zyn, Dryft, Nordic Spirit, and On! across the United Kingdom (UK), United States (US), Europe, and Sweden.[4-9] Regardless of whether they contain tobacco-derived or synthetic nicotine, ONPs are classified as tobacco products in the US.[10] Over the years, there has been a considerable increase in ONP consumption in the US,[11] with retail sales increasing from 126.06 to 808.14 million units between August-December 2019 and January-March 2022.[12] As of now, there are no published studies or reports specifically examining ONP use within Hawai'i. However, youth nicotine and electronic-cigarette (e-cigarette) use remain significant concerns in the state. Approximately 18% of Hawai'i middle school students currently use e-cigarette products, the highest rate reported among all states that collect comparable middle school data.[13] Given this high rate of youth e-cigarette use, it is critical to examine how emerging ONPs might impact nicotine use patterns among young people in Hawai'i.

Many questions remain about the public health impact of ONPs, including unclear patterns of use, user attitudes, relative appeal compared to other tobacco or nicotine products, and potential harm-reduction benefits.[14,15] Concerns exist that discreet use and flavors may attract youth or encourage dual use, undermining benefits associated with the products.[16-18] Although literature on ONPs is growing,[19,20] few reviews have synthesized population-based empirical evidence. This scoping review summarizes studies examining ONP user populations, brands, use patterns, beliefs, harm perceptions, motives, negative effects, appeal versus traditional tobacco, and harm-reduction potential compared to other nicotine products.

a Corresponding author

Population Sciences Program
University of Hawai'i Cancer Center
University of Hawai'i at Manoa
701 Ilalo St., Honolulu, HI, 96813

METHODS

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement 2020 was used in this review.[21] A literature search was conducted in March 2024 using the electronic databases PubMed, Scopus, the Web of Science. Google Scholar was used to search and identify the grey literature. Search terms on ONP included: oral nicotine pouch, nicotine pouches, nicotine-containing pouches, non-tobacco nicotine, tobacco-free nicotine. Boolean operators (AND, OR) were used to combine these terms during searches.

Studies were included if they met the following criteria: (1) published in the English language; (2) reported data on prevalence, usage patterns, and antecedents and consequences of ONP use; and (3) conducted in any geographical region with no age restriction. Studies were excluded if they: (1) were not available in full-text; (2) did not report original research findings (example: editorials, commentaries, reviews were excluded); (3) focused solely on non-epidemiological aspects (eg, chemical composition, manufacturing process) of ONPs; (4) reported only qualitative findings (example: findings based on interviews or focus groups); and (5) did not provide data specifically on ONP use, but rather on other forms of tobacco or nicotine products. The qualitative studies were excluded because of the differences in data analysis processes between qualitative and quantitative studies, making it challenging to draw coherent conclusions.[22] No restrictions were placed on study design to ensure inclusion of various types of studies, including experimental and observational studies.

Two independent reviewers screened titles, abstracts, and full texts per set inclusion and exclusion criteria, resolving disagreements by discussion or input from a third reviewer. Reference lists were hand-searched to ensure comprehensiveness. A final search update before submission found no new studies meeting the inclusion criteria. This process ensured relevant, up-to-date literature was comprehensively included.

Relevant data from included studies were extracted using a standardized form. This included information on study characteristics [eg, author(s), publication year, study design], participant characteristics (eg, age, gender, geographic location), prevalence estimates, patterns of use, factors associated with use, and key findings related to ONP use. A narrative synthesis of the findings from included studies was conducted to address the present research objectives.

RESULTS

An initial search identified 90 articles. After removing duplicates (7 articles) and other non-qualifying publications [eg, those with no full-text (5 articles) or non-epidemiological (3 articles), qualitative studies (3 articles)], 72 articles remained. An additional 46 citations were manually removed after reviewing the abstracts and titles. Full-text review of 26 articles yielded 11 eligible studies[23-33] including 3 experimental studies,[23-25] 1 prospective longitudinal study,[26] and 7 cross-sectional studies,[27-33] with 3 of the cross-sectional studies being part of a longitudinal study.[30,32,33]

Sample characteristics

Across studies (N = 20 895), the gender split was balanced; 47.4% male (n = 10 014) and 52.6% female (n = 10 881). Four studies involved 9490 adolescents (45.4%).[28,30,32,33] Two studies analyzed age-related ONP use,[28,30] 3 studies examined susceptibility (ie, likelihood of using, openness or willingness to use, ONP in the future),[28,32,33] and 2 studies assessed marketing impacts (text or images of product packaging or advertising) on ONP use.[28,33]

Race and ethnicity data were not consistently reported across all studies. Race data were available for 16 676 participants (79.8% of 20 895). Among participants with reported race, 56.1% were White (n = 9347), 10.0% Asian (n = 1665), 8.4% Black/African American (n = 1408), and 25.5% were categorized as other races (n = 4256). Among participants with reported ethnicity (n = 10 438), 30.6% (n = 3199) identified as Hispanic or Latino, including Hispanic other (21.1%, n = 2201), Hispanic White (4.7%, n = 491), and Hispanic multiracial (6.1%, n = 634). Among participants with reported ethnicity who identified as non-Hispanic, 54.5% (n = 5693) were non-Hispanic White, 12.7% (n = 1327) were non-Hispanic Asian, and 2.1% (n = 219) were categorized as non-Hispanic other.

Five studies reported participants' education levels,[23,24,31,33] with 1 including parental education.[33] Educational level data were available for 4644 participants (22.2% of the total sample, N = 20 895). Among those with reported education, 7.2% (n = 334) had less than a high school education, 32.1% (n = 1491) were high school graduates, 1.9% (n = 86) were currently in college, 31.3% (n = 1453) had some college education, 3.6% (n = 169) held an associate's degree, 15.8% (n = 733) held a bachelor's degree, and 8.1% (n = 378) had a master's degree or higher.

Across studies, there were approximately 2977 (14.2%) ever and 2102 (10.1%) current ONP users. The estimated total number of cigarette smokers across studies was 3038 (14.5%), and the total number of other tobacco users (including e-cigarette, nicotine lozenges, tablets, gums, toothpicks) was approximately 7203 (34.5%). Only 2 studies assessed outcomes based on plasma nicotine concentration, while the majority relied on self-reported outcomes to determine tobacco or nicotine product use.[23,25]

Study locations

All studies were conducted in the US except for 1, which was conducted in Sweden.[25] Six studies recruited participants nationwide from the US,[26-31] while 2 studies[23,24] were conducted in Ohio and 2 others in California.[32,33]

Study time frames

Eight studies[23,24,27-32] were published in 2023 and 3 studies[25,26,33] were published in 2022. The data collection periods for the studies varied, spanning from July 2020 to September 2022.[23,25]

Table 1. Summary of Included Quantitative Studies on Oral Nicotine Pouches (ONP)

Author	Study design (N)	Study aim	Major findings
Keller-Hamilton et al[23] 2023	Experimental (30)	Evaluated product appeal and nicotine delivery with varying ONP concentrations.	• Greater plasma nicotine delivery at 30 minutes observed with 6-mg nicotine concentration ONPs among adult smokers • None of the ONPs (6-mg vs 3-mg) provided as strong relief of craving symptoms at 5 minutes compared to cigarettes
Mays et al[24] 2023	Experimental (301)	Assessed the effects of ONP packaging image on smokers' and non-smokers' perceptions.	• All tobacco user groups perceived ONPs as significantly less harmful and less addictive than non-users • Packages displaying 6-mg nicotine concentration resulted in significantly lower perceived harm and addictiveness compared to packages without nicotine concentration display
Chapman et al[25] 2022	Experimental (24)	Evaluated two nicotine pouch variants' harm reduction potential compared to cigarettes.	• Cigarette had highest peak in plasma nicotine levels than ONPs [Cmax: 11.6 ng/ml (cigs) vs 5.1 ng/ml (Zone X #2) and 7.8 ng/ml (Zone X #3)] • ONPs reached peak levels much later [26 min for Zone X #2 (5.8 mg nicotine/pouch); 22 min for Zone X #3 (10.1 mg nicotine/ pouch)) compared to cigarette (8.5 min)] • ONPs were able to effectively reduce urge to smoke following use and maintain a similar urge to smoke profile to cigarette in the 4 h following product use.
Campbell et al[26] 2022	Prospective longitudinal (100)	Analyzed usage patterns of ONPs and combustible cigarettes.	• Proportion of ONP users decreased over time [week 1: 0% to week 6: 16%]. • Among ONP users, average pouches per day increased. • Users of 1-6 pouches per day decreased between week 1 (72%) and week 6 (41%) • Users of 7+ pouches per day increased between week 1 (27%) and week 6 (41%) • Combustible cigarette use decreased over the study period for 82% (79/97) of the study participants. • At week 6, approximately 　◦ 16% (15/97) of participants reduced their CPD by more than 50% 　◦ 18% (17/97) reduced their CPD between 30% and 50% 　◦ 49% 47/97, 49%) reduced their CPD between 1% and 30%.
Dowd et al[27] 2023	Cross-sectional (118)	Identified the use-characteristics, motives, dependence, and adverse effect of ONP.	• Reasons for ONP use: flavor (53%), nicotine level (25%), brand (22%). • 68% (80/118) of current tobacco cigarette users used ONPs where smoking not allowed. • 70% (83/118) of current e-cig users used ONPs where e-cigs not allowed. • Sample showed significant dependence levels [FTND-ST=7, SD=2].
Gaiha et al[28] 2023	Cross-sectional (6131)	Examined ONP use patterns, marketing impact on preferences.	• Use pattern by age (Years) • Ever-users: <21 years: 816 (22.3%); 21–40 years: 1209 (48.9%) • Past-30-day users: <21 years: 458 (12.5%); 21–40 years: 733 (29.7%) • Past-7-day users: <21 years: 383 (10.5%); 21–40 years: 615 (24.9%) • Marketing influence • Participants < 21 years were more likely to buy Zyn if they perceived marketing to contain messages about good tasting flavors (AOR 1.4, 95% CI 1.0–1.8; *P*=.009) and helping to feel comfortable in social situations (AOR 1.3, 95% CI 1.0–1.8; *P*=.033).

			• Participants < 21 years were more likely to buy Lucy [#]if they felt it could be used anywhere (AOR 1.5, 95% CI 1.0–2.3; *P*=.026)

Morean et al[29] 2023	Cross-sectional (609)	Examined young adults' awareness, use, and risk perceptions of ONPs.	• 41.5% (253/609) participants had heard of ONPs
			• 10.3% (63/609) had used ONPs
			• 23.5% (143/609) susceptible to future use
			• Perceptions Total Score (Mean ± SD)
			  ◦ Not Susceptible (n = 403): 2.5 ± 0.73
			  ◦ Susceptible (n = 143): 3.0 ± 0.62
			  ◦ Ever Use: 3.0 ± 0.75
			• Male young adults were more susceptible to use ONPs [AOR = 1.5, 95% CI 1.0, 2.2]
			• Male young adults had more favorable perceptions of ONPs [AOR = 2.5, 95% CI 1.8, 3.5]

Patel et al[30] 2023	Cross-sectional[a] (7832)	Examined the patterns of ONP use among young adults	• ONP users (current: 62.0%, ever: 50.6%) were 21+ years compared to non-ONP users (37.3%). • ONP users (current: 59.0%, ever: 63.8%) were mostly male, compared to non-ONP users (49.4%). • Current ONPs users were more often Hispanic (36.3%) and NH-Black (18.4%) compared to ever ONPs users (16.8% and 8.1%) and non-ONPs users (22.4% and 14.7%). • Ever ONPs users were more often NH-white (63.5%) compared to current ONPs users (37.78%) and non- ONPs users (50.6%). • ONP users (current: 80.9%, ever: 76.1%) ever smoked cigarettes compared to non-ONPs users (31.4%). • ONP users (current: 72.9%, ever: 33.1%) currently smoked cigarettes than non-ONPs users (15.4%). • ONP users (current: 51.0%, ever: 81.8%) ever used e-cigs compared to non-ONPs users (33.9.%). • ONP users (current: 49.4%, ever: 56.0%) currently used e-cigs compared to non-ONPs users (21.3%).
Sparrock et al[31] 2023	Cross-sectional (1582)	Investigated ONP awareness, use, susceptibility, and beliefs	• 46.6% (738/1583) were aware of ONPs • 23.2% (368/1583) believed that ONP is less harmful than smokeless tobacco • 16.1% (255/1583) believed that ONP is less addictive than smokeless tobacco • 18.9% (299/ 1583) believed that using ONP occasionally is not harmful • 14.6% (232/1583) believed that using ONP occasionally is not addictive • 33.2% (525/1583) believed that ONP is socially acceptable • 19.1% (302/1583) believed that ONP is for someone like themselves • Those who agree that ONP is less harmful than smokeless tobacco had higher odds of being susceptible than never ONP users (AOR = 4.8, 95% CI = 2.4 - 9.7), ever-not-current ONP users (AOR = 2.9, 95% CI = 1.3 - 6.3), and current ONP users (AOR = 10.6, 95% CI = 3.4 - 32.7).
Vogel et al[32] 2023	Cross-sectional (1167)	Compared ONP susceptibility with other nicotine products	• ONP use susceptibility rate of 8.7% • Lower vs higher SES adolescents: ↑ susceptible to ONP (OR=1.7; 95% CI = 1.0 – 3.1) • Sexual minority vs Heterosexual adolescents: ↑ susceptible to ONP (OR=1.8; 95% CI = 1.0 – 3.4)
Vogel et al[33] 2022	Cross-sectional[a] (3129)	Assessed willingness, harm perceptions, and hypothetical pouch (viewed text/imagery) product preferences in young adult non-users.	• 82.4% (963/1167) had never heard of ONP before • 19.1% (223/1167) of the overall sample were willing to use ONPs • 0.7% (8/1167) said they would definitely use them. • 49.1% (573/1167) were unsure if ONPs were more or less harmful than cigarettes • 19.7% (230/1167) viewed ONPs as less harmful than cigarette

	• 20.9% (244/1167) viewed ONP as harmful as cigarettes • 10.3% (120/1167) considered ONP more harmful than cigarettes • 52.4% (611/1167) were unsure how the harm of ONP compared to e-cigs • 13.6% (159/1167) viewed them as less harmful than e-cigs • 12.2% (142/1167) as more harmful (142) than e-cigs • 21.7% (253/1167) viewed them as harmful as e-cigs • 57.3% (668/1167) were uncertain about choosing ONP over cigarettes (668); 23.2% (271/1167) reported lower likelihood than cigarettes (271); 10.4% (122/1167) equal likelihood, and 9.1% (106/1167) greater likelihood • 29.7% (346/1167) reported lower likelihood of using ONP compared to e-cigs. • Among tobacco users, willingness to use ONP was higher compared to non-tobacco users (OR= 2.2; 95% CI = 1.1 – 4.6)

[a]Part of longitudinal study; #Lucy: Another brand of oral nicotine pouch

Abbreviations: AOR=Adjusted Odds Ratio; Cmax=Maximum Observed Plasma Concentration; CPD=cigarettes per day; FTND-ST=Fagerström Test for Nicotine Dependence-Smokeless Tobacco; NH=Non-Hispanic; SD=standard deviation; SES= socioeconomic status

Key findings

ONP brands

Among the ONP brands mentioned across studies, Zyn was notably the most common brand, cited across 7 studies.[23,24,27-30,33] On![29-31,33] and Velo[26,30,31,33] were the next most commonly mentioned brands, each appearing in 4 studies. Lucy[28] and Dryft,[33] though less prominent, were each mentioned in 1 study, respectively.

Patterns of use

Four studies provided insights into the usage patterns and susceptibility to use among adolescents.[28,30,32,33] Across these studies, 9.7% (578 of 5945) of the participants reported having ever used ONPs; 6.8% (418 of 6131) reported ONP use in the past 30 days; 8.6% (273 of 3139) reported intentions to use ONP and 7.8% (333 of 4269) reported willingness to use. Vogel et al (2023) found that 5.2% (162 of 3139) of the participants expressed willingness to try ONPs if offered by a friend.[32] Among young adults, Morean et al found that approximately 10% had ever used ONPs and 23.5% (144 of 609) participants were susceptible to future use.[29] In their prospective longitudinal study among adult cigarette smokers, Campbell et al found a decrease in the proportion of participants using ONPs over the study period.[26] However, the average number of pouches used per day increased among those who continued ONP use.

Beliefs and attitudes concerning ONPs

Three studies highlighted varying levels of awareness and perceptions regarding ONPs among participants, including youths and young adults.[29,31,33] In general, the studies found that adults' and young adults' perceptions of harms associated with ONPs were mixed.[29,31] In their young adult sample, Vogel et al (2022) found that 49% of participants were uncertain whether ONPs were less harmful than cigarettes and 52% were uncertain whether ONPs were less harmful than e-cigarettes.[33] Individuals who were more susceptible to using ONPs were more likely to report lower perceived harms associated with ONPs. They did not find an association between ONP harm perceptions and being a current cigarette smoker or an e-cigarette user.[33]

Dowd et al found that availability of ONPs in diverse, desirable flavors was the most common motive for ONP use.[27] Other important motives included nicotine consumption and brand-attraction.[27] Further, among cigarette smokers and e-cigarette users, Dowd et al found that being able to use ONPs where cigarette smoking or vaping was not allowed was a strong motive for ONP use.[27]

Two studies found that product packaging and marketing may influence ONP-related beliefs and perceptions.[24,28] Mays et al found that adult tobacco users and non-users who viewed ONP packaging displaying a 6mg nicotine concentration—compared to 3mg or no nicotine information—perceived the ONP as less harmful and less addictive.[4] Gaiha et al found that ever-users of Zyn, compared to never-users, were more likely to "like" Zyn and expressed increased likelihood of buying Zyn after being exposed to marketing contents.[28] Participants under 21 were more likely to consider buying Zyn if the marketing messages emphasized that Zyn provided access to pleasant flavors, helped them feel comfortable in social situations, and was produced by a cigarette company.[28] Vogel et al (2022) found that dual users of combustible and non-combustible tobacco were significantly more willing to use ONPs after being exposed to Facebook content containing ONP marketing.[33]

Negative consequences of ONP use

Two studies examined adverse effects of ONP use.[25,27] Dowd et al assessed dependence on ONP among current (past-30-day) users.[27] They found that the average dependence, as measured by the Fagerström Test for Nicotine Dependence-Smokeless Tobacco-FTND-ST, in the sample was in the range of "significant dependence" [Mean (SD) = 7 (2)].[27] Further Dowd et al reported various adverse effects, including mouth lesions (48%), followed by upset stomach (39%), sore mouth (37%), sore throat (21%), nausea (9%), "strange jaw sensation" (1%), and none (3%).[27] Overall, 97% of the sample endorsed at least 1 ONP-related adverse effect. Chapman et al noted mild adverse effects such as headaches or hiccups.[25] No clinically significant changes were detected in various health parameters, including clinical chemistry, hematology, urinalysis, blood pressure, pulse rate, and ECG parameters.[25] Chapman et al noted prevalence of various usage behaviors that may potentially increase the chances of experiencing adverse events, such as sucking the pouch, moistening the pouch with water before use, and using 2 pouches simultaneously.[25] Some participants noted the need to spit out the saliva while using ONPs.[26] Overall, however, no adverse events reported by participants were severe enough to require medical evaluation.[26]

ONPs use and other tobacco products

Two studies found that among adolescents, ever or current users of cigarettes and/or e-cigarette were more likely to have used ONP.[30,33] Patel et al found that among current ONP using adolescents, approximately 73% and 49% were likely to be current cigarette and e-cigarette users, respectively.[30] Morean et al found that among young adults, e-cigarette users were more susceptible to using ONPs.[29] In their sample of predominantly non-tobacco-using adolescents (78.5% of the sample did not currently use any tobacco products),[29] Vogel et al (2022) found that when asked about preferences for ONPs over combustible cigarettes, 23% reported lower likelihood of using ONP over cigarettes, 10% reported equal likelihood of using cigarettes and ONPs, and 9% reported greater likelihood of using ONPs than cigarettes.[33] The pattern was similar when ONPs were compared to e-cigarettes, with approximately 30% reporting a lower likelihood of using ONPs.

Two studies examined nicotine delivery and craving relief effects of ONPs compared with cigarette smoking among adult cigarette smokers.[23,25] Nicotine delivery was assessed in terms of plasma nicotine concentration at specific timepoints after ONP or cigarette use among smokers who had abstained from smoking prior to the experiment.[23,25] Each study compared a lower-nicotine-concentration ONP, a higher-nicotine-concentration ONP, and cigarette smoking. Both studies found that at a specific time-point post-administration, cigarette smoking resulted in higher plasma nicotine concentration and tended to show higher levels of craving relief, although the 5.8mg and 10.1mg nicotine pouches used by Chapman et al appeared to relieve craving at rates comparable to cigarette smoking.[23,25]

Campbell et al provided ONPs to adult daily cigarette smokers and followed them over a 6-week period.[26] Average per day cigarette smoking decreased for 82% of study participants. At the end of the 6-week period, cigarette consumption was reduced by more than half for 16% of the participants.[26]

DISCUSSION

This review synthesized current population-based, quantitative research on ONPs, examining studied populations, product types, use patterns, attitudes, motives, adverse effects, appeal, and harm reduction potential. Eleven studies (3 experimental,[23-25] 1 longitudinal,[26] 7 cross-sectional[27-33]) revealed key insights and identified gaps needing further investigation.

The majority of the studies (10 out of 11) were conducted in the US, where Zyn was the most commonly assessed ONP, reflecting its dominant market share.[13] Research on other brands remains limited but is expected to grow as more brands emerge.

Most studies examining ONP perceptions, susceptibility, and use patterns focused on adolescents and young adults.[28-30,32,33] This aligns with ONPs being the second most used nicotine product among US adolescents.[16] Ever-use prevalence in these groups ranges from 9%–10%, highlighting the need for continued monitoring.

The current findings suggest that marketing messages focused on flavors and social enhancement may be particularly effective among young people in terms of persuading them to use ONPs.[28] Experiencing a range of pleasant flavors appears to be a key motive guiding ONP use.[27] Further, how ONP products are packaged appear to influence individuals' perceptions of harms associated with ONP products.[24] Although current evidence regarding harm perceptions in the general population regarding ONP use appears to be mixed,[33] strategic marketing and packaging on the part of the manufacturers may successfully promote lower ONP harm perceptions, especially among regular tobacco users.[24]

Consistent with prior research showing that users of 1 tobacco product often use others,[34] current cigarette smokers and e-cigarette users are more likely to use ONPs.[29,30] Two studies compared nicotine delivery and craving relief of ONPs and cigarettes.[23,25] Of the 2 studies, 1 using ONPs with higher nicotine concentrations found that their nicotine delivery and craving-relief effects were comparable to cigarettes,[25] while the other found that Zyn did not deliver nicotine or relieve cravings to the same extent.[23] Campbell et al suggest ONPs may help reduce smoking.[26] However, whether ONPs promote complete switching or dual use remains unclear and warrants further research.

None of the reviewed studies compared ONPs and e-cigarettes or other smokeless tobacco products on product appeal, including nicotine delivery or craving-relief effects. The comparative health effects and public health impact of dual or substitutive use remain unclear. Given perceptions of both as reduced-harm products, dual use may increase. In Hawai‘i, where youth e-cigarette use is among the highest in the nation, understanding ONP use patterns is especially important. More research, especially longitudinal studies, is needed to examine exclusive and dual use patterns, initiation, maintenance, and consequences over time.

The studies reviewed predominantly included non-Hispanic White samples, highlighting the need to understand how race and ethnicity influence ONP use and its impact on other tobacco products to develop effective, equity-focused health communication. Additionally, examining ONP perceptions among vulnerable groups, such as those with mental health or substance use disorders, is crucial. Although adverse effects of ONPs are generally mild and manageable,[27] ongoing monitoring in larger, real-world studies is necessary. Further research should investigate specific health impacts such as cardiovascular effects, oral health, and fetal development and assess the frequency, severity, and long-term public health consequences of ONP use to guide appropriate regulations.

The findings of this review have important implications for tobacco control efforts in Hawai‘i. Given the state's diverse population and unique cultural context, understanding how ONP use and perceptions may vary across different ethnic groups is crucial. The review's finding that Asian or Black young adults were among current ONP users highlights the need for culturally tailored prevention and education efforts in multiethnic communities in Hawai‘i. No studies reported findings specifically for Native Hawaiian or Other Pacific Islander (NHOPI) participants, highlighting a critical gap in understanding ONP use in this population. Research is particularly needed in Hawai‘i to assess NHOPI youth and young adults' ONP use patterns, motivations, and potential health impacts, given their unique cultural and social context. Additionally, the appeal of flavors as a primary motivation for ONP use is particularly relevant in Hawai‘i, where the state legislature has considered flavor bans for e-cigarettes.[35,36] Policymakers may need to consider whether similar restrictions should apply to ONPs. Furthermore, as Hawai‘i continues to grapple with youth e-cigarette use, the potential for ONPs to become another attractive nicotine product for young people warrants close monitoring. The state's robust tobacco surveillance systems should be adapted to track ONP use, especially among youth and young adults. Lastly, commitment by the state of Hawai‘i to becoming smoke-free by 2030 necessitates a careful evaluation of how ONPs might impact smoking cessation efforts and overall nicotine use in the state.[37] As ONPs enter the Hawai‘i market, tobacco control stakeholders must balance potential harm reduction benefits for adult smokers with the risk of youth initiation and dual use among current tobacco users.

This scoping review has limitations such as strict inclusion criteria might have excluded relevant studies, most studies were cross-sectional limiting causal inferences, and self-reported outcomes might introduce bias. Despite these limitations, rigorous screening and diverse study designs provide a comprehensive overview of existing literature on ONP use.

CONCLUSIONS

This study summarized current evidence on ONP use, showing that patterns of use, harm perceptions, and motives, especially the appeal of flavors, are mostly studied among youths and young adults, with use common among current smokers and vapers. Findings suggest ONPs may appeal as a reduced-harm option for cigarette smokers, but more longitudinal research is needed to clarify usage trajectories and dual-use patterns with e-cigarettes.

Conflicts of interest

None.

Funding disclosure

This research was supported by the following grants R01CA228905 and R01DA053766

Submitted: August 24, 2024 PST. Accepted: October 02, 2025 PST. Published: February 02, 2026 PST.

References

1. Robichaud MO, Seidenberg AB, Byron MJ. Tobacco companies introduce “tobacco-free” nicotine pouches. *Tob Control*. 2020;29(1):e145-e146. doi:10.1136/tobaccocontrol-2019-055321

2. Azzopardi D, Liu C, Murphy J. Chemical characterization of tobacco-free “modern” oral nicotine pouches and their position on the toxicant and risk continuums. *Drug Chem Toxicol*. 2022;45(5):2246-2254. doi:10.1080/01480545.2021.1925691

3. Patwardhan S, Fagerström K. The new nicotine pouch category: a tobacco harm reduction tool? *Nicotine Tob Res*. 2022;24(4):623-625. doi:10.1093/ntr/ntab198

4. Swedish Match. *Q1 2019 Interim Report*. Accessed April 17, 2025. https://www.swedishmatch.com/globalassets/reports/interim-reports/2019_q1_swedish-match_en.pdf

5. British American Tobacco United Kingdom Limited. LYFT. Accessed April 17, 2025. https://www.lyft.co.uk

6. Altria. Altria enters growing oral nicotine products category with on! pouch product. Accessed April 17, 2025. http://investor.altria.com/file/Index?KeyFile=398170376

7. RJ Reynolds Vapor Company. VELO. Accessed April 17, 2025. https://www.velo.com/index.html

8. Kretek International Inc. Dryft. Accessed April 17, 2025. https://getdryft.com

9. Japan Tobacco International. JTI Sweden and Nordic Snus. Accessed April 17, 2025. https://www.jti.com/europe/sweden

10. Food and Drug Administration, HHS. Deeming tobacco products to be subject to the federal food, drug, and cosmetic act, as amended by the family smoking prevention and tobacco control act; restrictions on the sale and distribution of tobacco products and required warning statements for tobacco products. Final rule. *Fed Regist*. 2016;81(90):28973-29106.

11. Marynak KL, Wang X, Borowiecki M, et al. Nicotine pouch unit sales in the US, 2016-2020. *JAMA*. 2021;326(6):566-568. doi:10.1001/jama.2021.10366

12. Majmundar A, Okitondo C, Xue A, et al. Nicotine pouch sales trends in the US by volume and nicotine concentration levels from 2019 to 2022. *JAMA Netw Open*. 2022;5(11):e2242235. doi:10.1001/jamanetworkopen.2022.42235

13. Center for Disease Control and Prevention. 1995-2019 Middle School Youth Risk Behavior Survey Data. U.S. Department of Health & Human Services. Accessed July 16, 2025. http://nccd.cdc.gov/youthonline/

14. Robichaud MO, Seidenberg AB, Byron MJ. Tobacco companies introduce “tobacco-free” nicotine pouches. *Tob Control*. 2020;29(1):e145-e146. doi:10.1136/tobaccocontrol-2019-055321

15. Benowitz NL. Nicotine addiction. *N Engl J Med*. 2010;362(24):2295-2303. doi:10.1056/NEJMra0809890

16. Harlow AF, Vogel EA, Tackett AP, et al. Adolescent use of flavored non-tobacco oral nicotine products. *Pediatrics*. 2022;150(3):e2022056586. doi:10.1542/peds.2022-056586

17. Havermans A, Pennings JLA, Hegger I, et al. Awareness, use and perceptions of cigarillos, heated tobacco products and nicotine pouches: A survey among Dutch adolescents and adults. *Drug Alcohol Depend*. 2021;229(Pt B):109136. doi:10.1016/j.drugalcdep.2021.109136

18. Deery C. What are the health impacts of nicotine and tobacco products on young people? *Evid Based Dent*. 2023;24(4):159-160. doi:10.1038/s41432-023-00945-w

19. Han DH, Cho J, Harlow AF, et al. Young adults’ beliefs about modern oral nicotine products: Implications for uptake in nonvapers, dual use with e-cigarettes, and use to reduce/quit vaping. *Exp Clin Psychopharmacol*. 2023;31(2):455-463. doi:10.1037/pha0000595

20. Cornacchione Ross J, Kowitt SD, Rubenstein D, et al. Prevalence and correlates of flavored novel oral nicotine product use among a national sample of youth. *Addict Behav*. 2024;152:107982. doi:10.1016/j.addbeh.2024.107982

21. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi:10.1136/bmj.n71

22. Barnett-Page E, Thomas J. Methods for the synthesis of qualitative research: a critical review. *BMC Med Res Methodol*. 2009;9:59. doi:10.1186/1471-2288-9-59

23. Keller-Hamilton B, Alalwan MA, Curran H, et al. Evaluating the effects of nicotine concentration on the appeal and nicotine delivery of oral nicotine pouches among rural and Appalachian adults who smoke cigarettes: A randomized cross-over study. *Addiction*. 2024;119(3):464-475. doi:10.1111/add.16355

24. Mays D, Long L, Alalwan MA, et al. The effects of oral nicotine pouch packaging features on adult tobacco users' and non-users' product perceptions. *Int J Environ Res Public Health*. 2023;20(4):3383. doi:10.3390/ijerph20043383

25. Chapman F, McDermott S, Rudd K, et al. A randomised, open-label, cross-over clinical study to evaluate the pharmacokinetic, pharmacodynamic and safety and tolerability profiles of tobacco-free oral nicotine pouches relative to cigarettes. *Psychopharmacology (Berl)*. 2022;239(9):2931-2943. doi:10.1007/s00213-022-06178-6

26. Campbell C, Feehan M, Kanitscheider C, et al. Designing studies to inform tobacco harm reduction: learnings from an oral nicotine pouch actual use pilot study. *JMIR Form Res*. 2022;6(8):e37573. doi:10.2196/37573

27. Dowd AN, Thrul J, Czaplicki L, et al. A cross-sectional survey on oral nicotine pouches: characterizing use-motives, topography, dependence levels, and adverse events. *Nicotine Tob Res*. 2024;26(2):245-249. doi:10.1093/ntr/ntad179

28. Gaiha SM, Lin C, Lempert LK, Halpern-Felsher B. Use, marketing, and appeal of oral nicotine products among adolescents, young adults, and adults. *Addict Behav*. 2023;140:107632. doi:10.1016/j.addbeh.2023.107632

29. Morean ME, Bold KW, Davis DR, et al. Awareness, susceptibility, and use of oral nicotine pouches and comparative risk perceptions with smokeless tobacco among young adults in the United States. *PLoS One*. 2023;18(1):e0281235. doi:10.1371/journal.pone.0281235

30. Patel M, Kierstead EC, Kreslake J, Schillo BA. Patterns of oral nicotine pouch use among U.S. adolescents and young adults. *Prev Med Rep*. 2023;34:102239. doi:10.1016/j.pmedr.2023.102239

31. Sparrock LS, Phan L, Chen-Sankey J, et al. Nicotine Pouch: Awareness, Beliefs, Use, and Susceptibility among Current Tobacco Users in the United States, 2021. *Int J Environ Res Public Health*. 2023;20(3):2050. doi:10.3390/ijerph20032050

32. Vogel EA, Barrington-Trimis JL, Harlow AF, et al. Prevalence of and disparities in adolescents' susceptibility to novel oral nicotine products marketed as "tobacco-free." *Prev Med*. 2023;166:107387. doi:10.1016/j.ypmed.2022.107387

33. Vogel EA, Barrington-Trimis JL, Kechter A, et al. Differences in young adults' perceptions of and willingness to use nicotine pouches by tobacco use status. *Int J Environ Res Public Health*. 2022;19(5):2685. doi:10.3390/ijerph19052685

34. Huang S, Chen Q, Griffin P, Liu G, Azagba S. Longitudinal transitions in tobacco use in youth and young adults: A latent transition analysis of the population assessment of tobacco and health study from Wave 1 to 5. *Addict Behav*. 2023;138:107548. doi:10.1016/j.addbeh.2022.107548

35. Juarez DT, Seto J, Guimaraes A, et al. Hawaii state legislator views on e-cigarettes and likelihood of legislative action. *J Am Pharm Assoc (2003)*. 2015;55(5):511-516. doi:10.1331/JAPhA.2015.15003

36. Lau J. Lawmakers pass ban on flavored e-cigarettes despite intense opposition. Civil Beat. May 2022. Accessed April 17, 2025. https://www.civilbeat.org/2022/05/lawmakers-pass-ban-on-flavored-e-cigarettes-despite-intense-opposition/

37. Hawai'i State Department of Health. *Hawai'i Tobacco Prevention and Control Plan 2030*. Chronic Disease Prevention and Health Promotion Division; 2024. Accessed April 17, 2025. https://hhsp.hawaii.gov/assets/pdf/HHSP_Tobacco_Plan_WEB.pdf