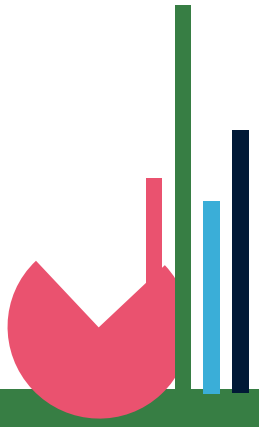
RANNSÓKNIR & GREINING
Icelandic Centre for Social Research & Analysis

Niðurstöður unnar úr Ungt fólk 2020

Rannsókn meðal nemenda í 8., 9. og 10. bekk

Rafrettunotkun barna á Íslandi
Umfang, áhrifaþættir og umhverfi



Ungt fólk 2020

Rafrettunotkun ungs fólks á Íslandi
Áhrifaþættir og umhverfi

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Inngangur

Forvarnarstarf meðal unglinga í grunnskólum hefur verið mjög öflugt undanfarin ár og er hið svokallaða „íslenska módel“ nú notað sem fyrirmynd að forvarnarstarfi víðs vegar í heiminum. Rannsóknir & greining hefur kappkostað að hámarka nýtingu rannsóknargagn-anna með því að greina staðbundnar niðurstöður fyrir sveitarfélög, skóla og aðra aðila sem vinna með börnum og ungmennum á hverju ári. Í dag er svo komið að Rannsóknir & greining vinnur á annað hundrað skýrslur á ári úr gögnum rannsóknanna í 5.-7. bekk, 8.-10. bekk og framhaldsskólum fyrir fyrrgreinda aðila.
Skýrslan greinir frá niðurstöðum könnunarinnar Ungt fólk 2020 sem lögð var fyrir nemendur í efstu bekkjum grunnskóla. Rannsóknir & greining hefur í rannsóknum sínum spurt um rafrettuneyslu síðastliðin fimm ár. Umtalsverð aukning hefur orðið í notkun rafrettna meðal ungs fólks og jókst dagleg notkun þannig um 293% milli áranna 2016 og 2019 meðal tíundubekkinga á Íslandi. Árið 2020 ákváðu sérfræðingar hjá Rannsóknum & greiningu að auka við spurningar um rafrettunotkun. Auk þeirra spurninga sem þegar hefur verið spurt um varðandi tíðni rafrettunotkunar var sérstökum spurningum bætt inn í spurningalistann 2020 til að dýpka skilning á viðhorfi, neyslumynstri og öðrum áhrifaþáttum rafrettunotkunar. Meðal annars var spurt um hvaða innihaldsefni ungmenni nota, svo sem nikótín, bragðefni, kannabisolíu o.fl. Þá var spurt um aðgengi ungmenna að veipvökvum, hvort þau eigi rafrettu, viðhorf ungmenna til skaðsemi veips og hvernig þau meta viðhorf foreldra sinna til veips og annarrar vímuefnanotkunar. Í eftirfarandi skýrslu eru spurningar um ofangreint greindar.

Aðferð og gögn

Ungt fólk rannsóknirnar eru þýðisrannsóknir, í því felst að rannsóknirnar eru ekki byggðar á hefðbundnum úrtökum heldur er reynt að ná til sem í þýðinu. Þetta er gert með því að leggja spurningalista fyrir alla nemendur sem mættir eru til skóla á tilteknum degi með það að leiðarljósi að lágmarka vikmörk niðurstaðnanna.

Niðurstöður þessara kannana eru því mjög áreiðanlegar, hvort sem litið er til tiltekinna landssvæða eða mismunandi hópa.

Þátttakendur og framkvæmd

Niðurstöðurnar í þessari skýrslu á eru byggðar á könnun sem lögð var fyrir alla nemendur í 8. til 10. bekk á Íslandi í febrúar árið 2020. Framkvæmd og úrvinnsla rannsóknarinnar var á vegum Rannsókna & greiningar við Háskólann í Reykjavík. Spurningalistar voru sendir í alla skóla á landinu þar sem kennarar sáu um að leggja þá fyrir eftir skýrum fyrirmælum. Með hverjum spurningalista fylgdi ómerkt umslag sem þátttakendur settu listann í að útfyllingu lokinni. Ítrekað var fyrir þátttakendum að rita hvorki nafn né kennitölu á spurningalistana svo útilokað væri að rekja svörin til þeirra. Jafnframt voru þeir vinsamlegast beðnir um að svara öllum spurningunum eftir bestu samvisku og biðja um hjálp ef þeir þyrftu á að halda.

Allir nemendur sem sátu í kennslustundum daginn sem könnunin fór fram svöruðu spurningalistanum alls 10.778. Samtals fengust gild svör frá 3766 nemendum í 8. bekk, 3494 nemendum í 9. bekk og 3409 í 10. bekk. Auk þeirra voru 109 einstaklingar sem ekki svöruðu spurningunni um í hvaða bekk þeir væru. Heildarsvarhlutfall á landsvísu var 85%.

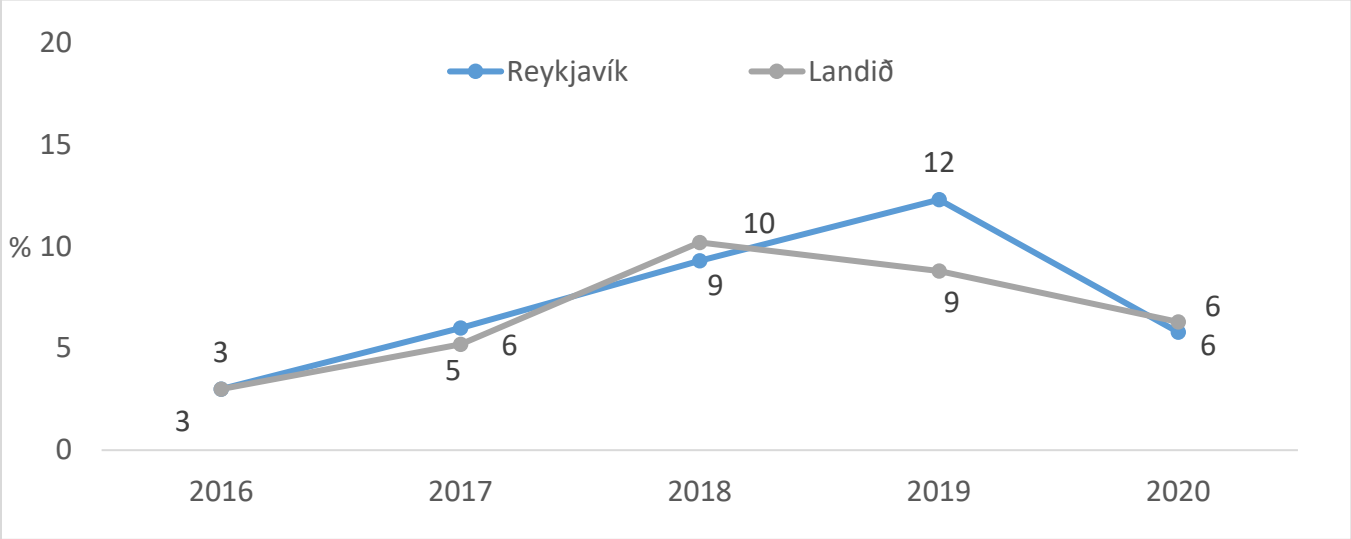
Mælitæki

Mælitæki rannsóknarinnar eru ítarlegir spurningalistar sem hafa verið þróaðir ár frá ári, fyrst af starfsfólki Rannsóknastofnunar uppeldis- og menntamála en frá árinu 1998 af Rannsóknum & greiningu. Spurningarnar eru mótaðar af fagfólki í félagsvísindum þar sem farið er eftir ströngum kröfum um að þær geti af sér öruggar niðurstöður, að áreiðanleiki og réttmæti sé ávallt í fyrirrúmi. Spurningalistinn fyrir 8.- 10. bekk árið 2020 var 30 blaðsíður og innihélt 83 spurningar í mismunandi mörgum liðum.

Úrvinnsla gagna

Í skýrslunni er hlutfall í prósentum sett fram á myndum en í töflum sést fjöldi nemenda sem svarar og prósentuhlutfall í sviga fyrir aftan. Samanburður er gerður á milli kynja, landsvæða og bekkja.

Umfang rafrettuneyslu á Íslandi meðal nemenda í efstu bekkjum grunnskóla



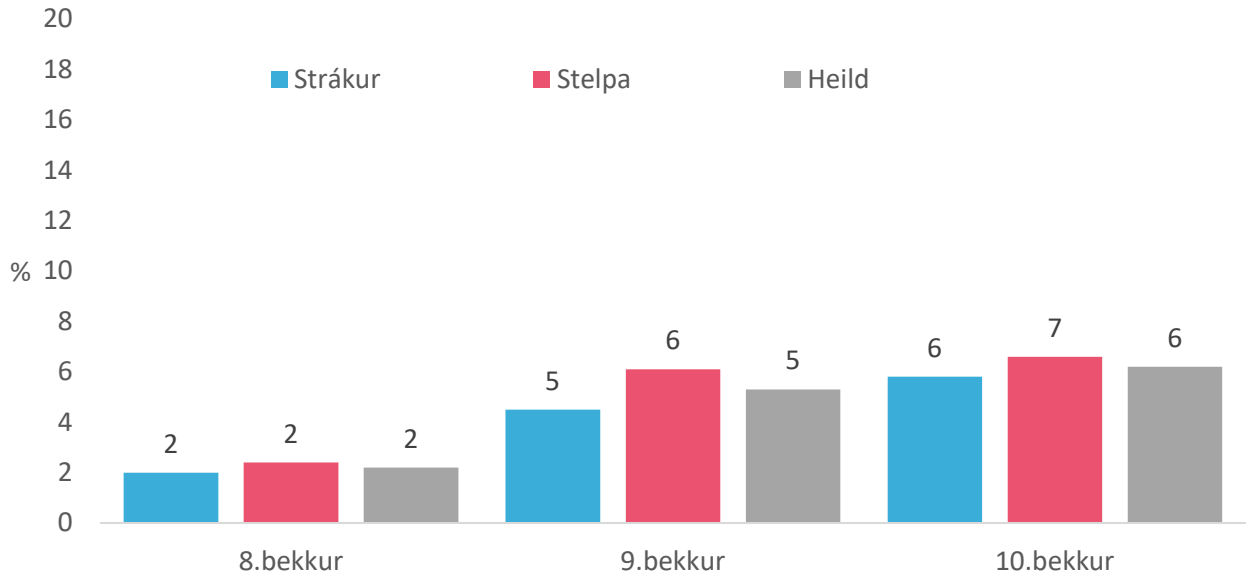
Dagleg notkun rafrettna meðal nemenda í 10. bekk, árin 2016 til 2020.

Tafla 1. Hve oft hefur þú notað raf-sígarettur um ævina? Hlutfall nemenda í 8., 9. og 10. bekk árin 2019 og 2020.

	2019			2020		
	10. bekkur	9. bekkur	8. bekkur	10. bekkur	9. bekkur	8. bekkur
Aldrei	61	71	82	65	71	84
1x-5x	15	14	11	14	14	9
6x-19x	6	5	3	6	5	3
20x eða oftar	18	10	5	15	11	4

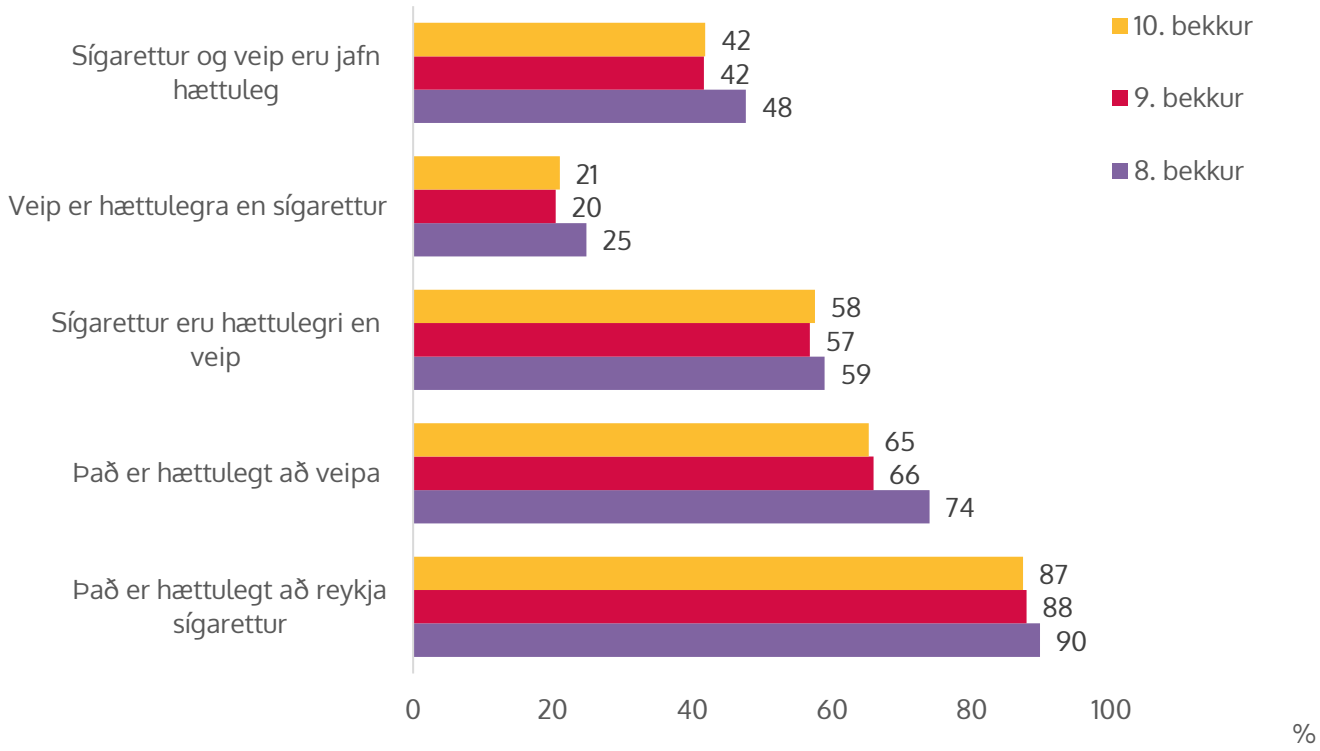
Tafla 2. Hve oft notar þú raf-sígarettur á dag? Hlutfall nemenda í 8., 9. og 10. bekk árin 2019 og 2020.

	2019			2020		
	10. bekkur	9. bekkur	8. bekkur	10. bekkur	9. bekkur	8. bekkur
Aldrei	82	88	94	92	94	98
Sjaldnar en einu sinni á dag	9	7	4	2	1	1
1-10 sinnum á dag	3	2	1	1	1	1
11 sinnum eða oftar á dag	6	3	1	4	4	1



Dagleg notkun rafrettna meðal nemenda í 10. bekk, árin 2016 til 2020

Viðhorf til rafrettunotkunar



Hlutfall nemenda sem er mjög sammála eftirfarandi fullyrðingum um skaðsemi sígarettna og veips. Niðurstöður úr könnun árið 2020.

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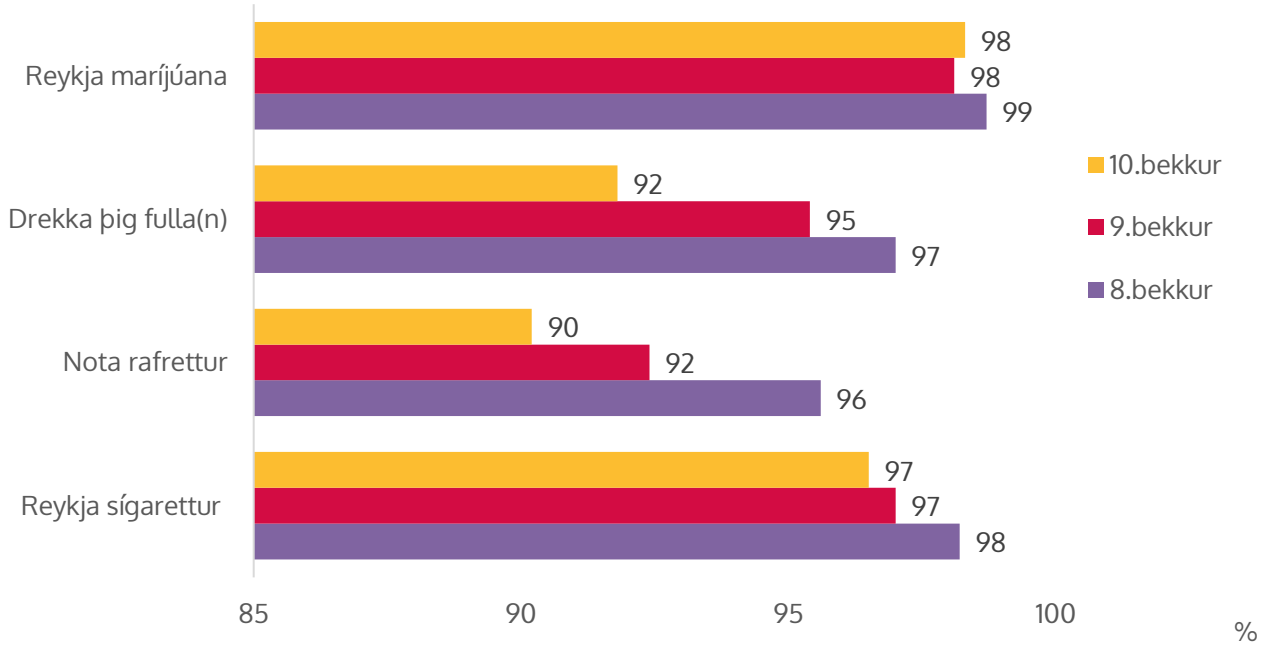
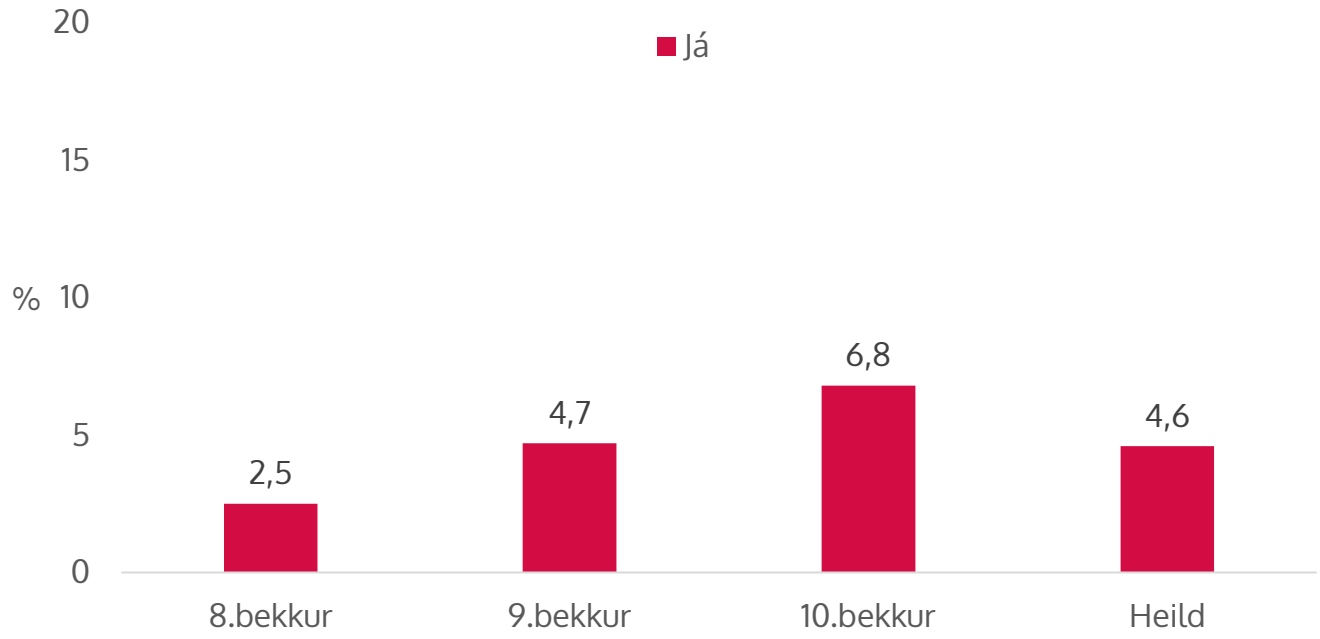


Hver yrðu viðbrögð foreldra þinna ef þú myndir.... Hlutfall nemenda sem segir foreldra vera algjörlega eða mjög mótfallna, greint eftir bekk.

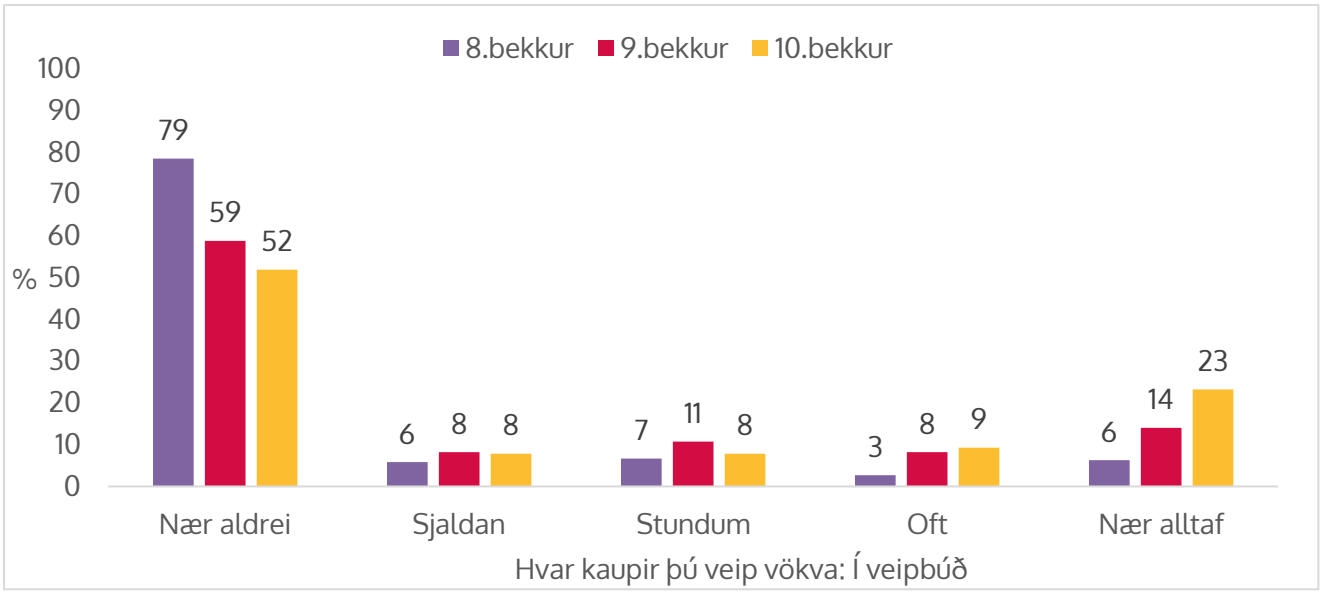
Að eiga og nota rafrettur



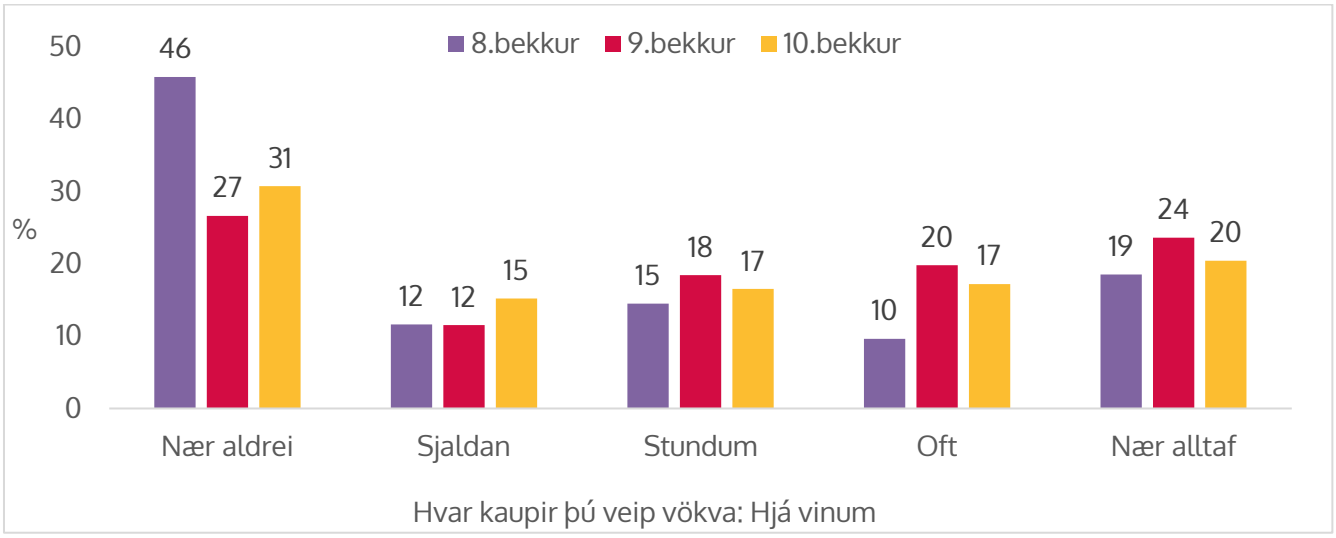
Átt þú rafrettu? Hlutfall nemenda í 8.,9.og 10. bekk 2020 sem svara spurningunni játandi.

Rafrettuvökvi

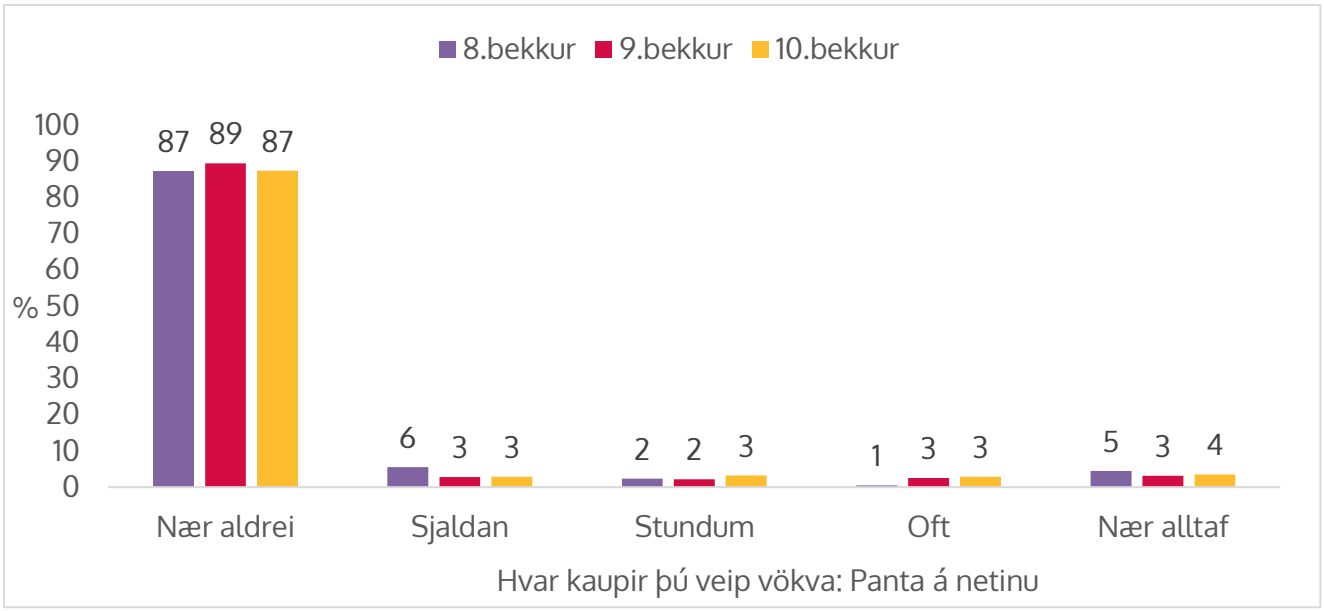
Rúmlega 1200 nemendur í 8., 9. og 10. bekk sem svara spurningum um rafrettur, bragðefni og notkun



Hvar kaupir þú veip vökva: Í veipbúð. Hlutfall nemenda í 8., 9. og 10. bekk 2020

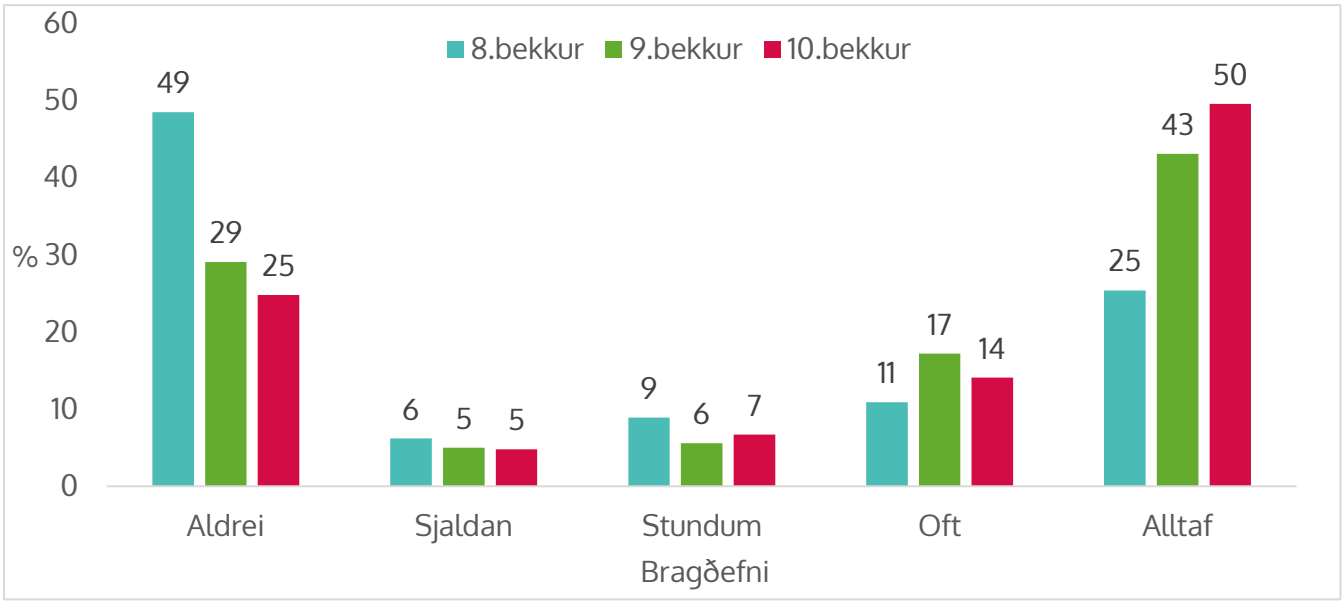


Hvar kaupir þú veip vökva: Hjá vinum. Hlutfall nemenda í 8., 9. og 10. bekk 2020.

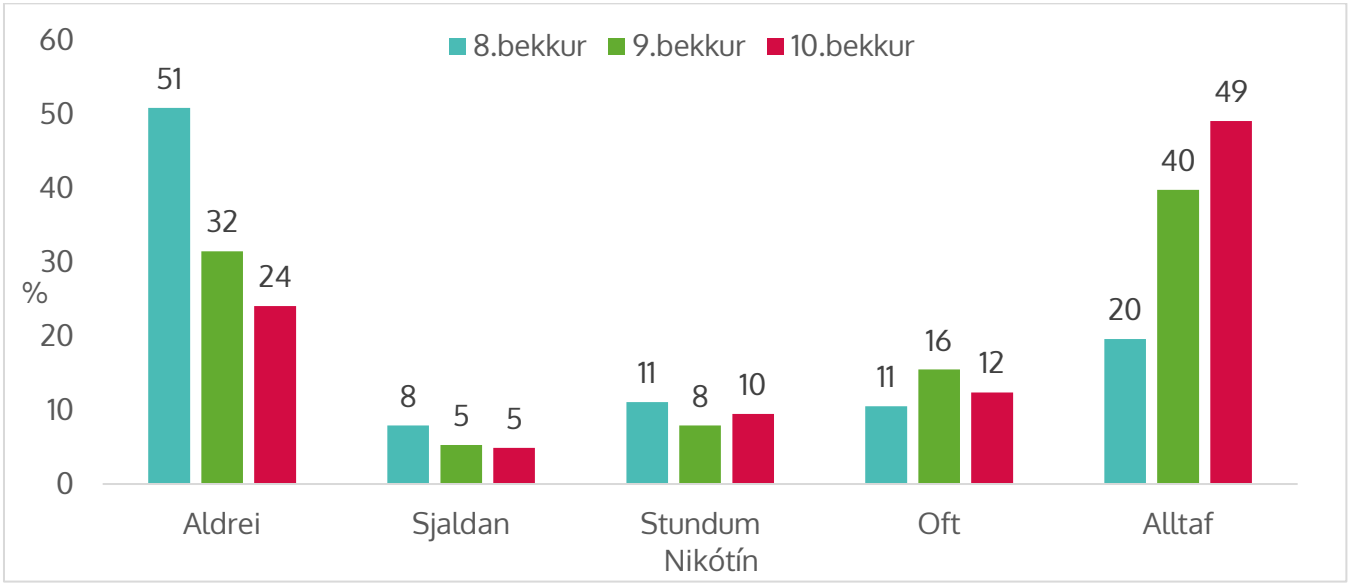


Hvar kaupir þú veip vökva: Panta á netinu. Hlutfall nemenda í 8., 9. og 10. bekk 2020

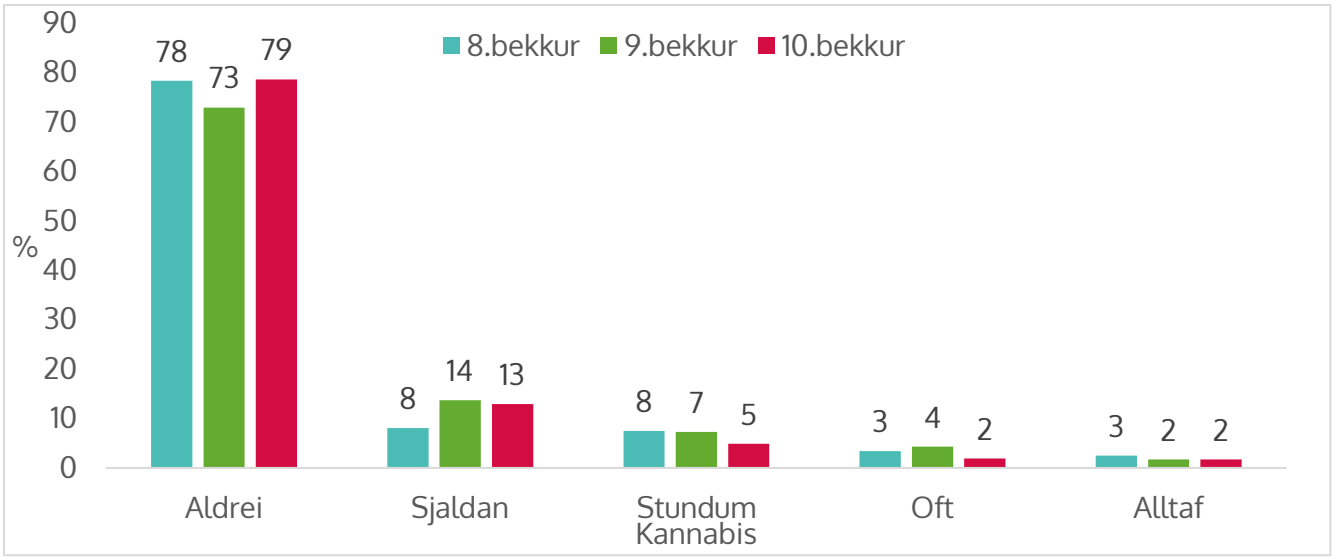
Hvað er í rafrettunum



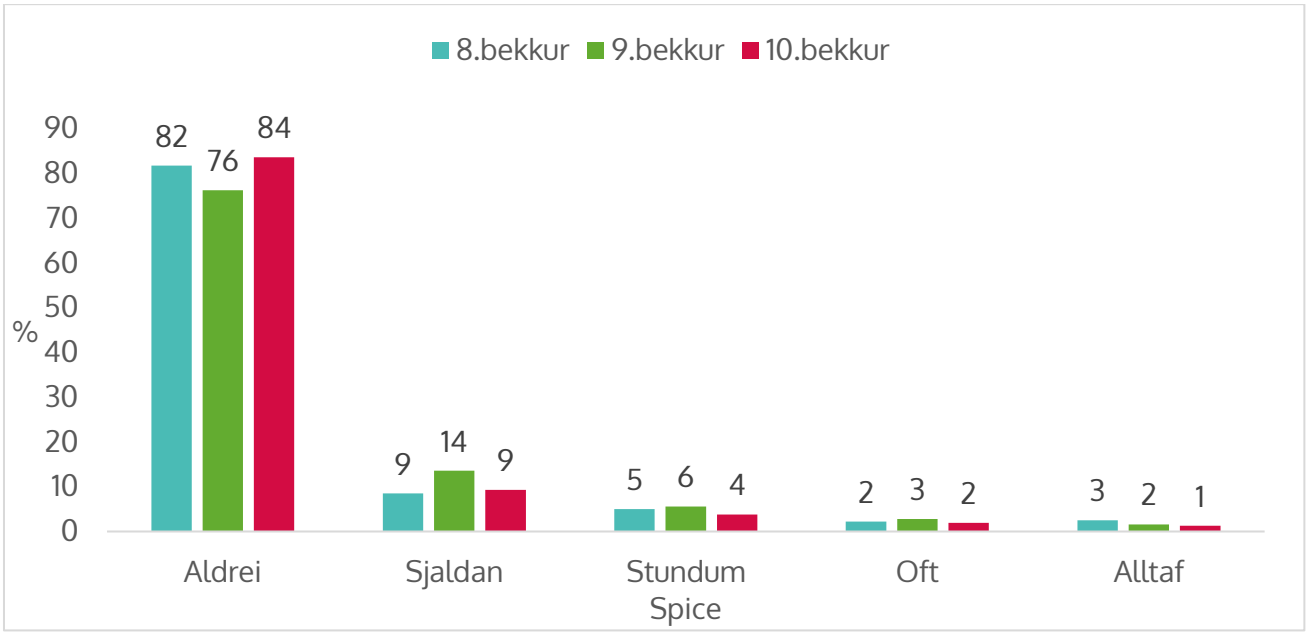
Hvert eftirtalinna efna er í veipvökvanum þínum, ef þú veipar: Bragðefni.
Hlutfall nemenda í 8., 9. og 10. bekk 2020



Hvert eftirtalinna efna er í veipvökvanum þínum, ef þú veipar: Nikótín.
Hlutfall nemenda í 8., 9. og 10. bekk 2020

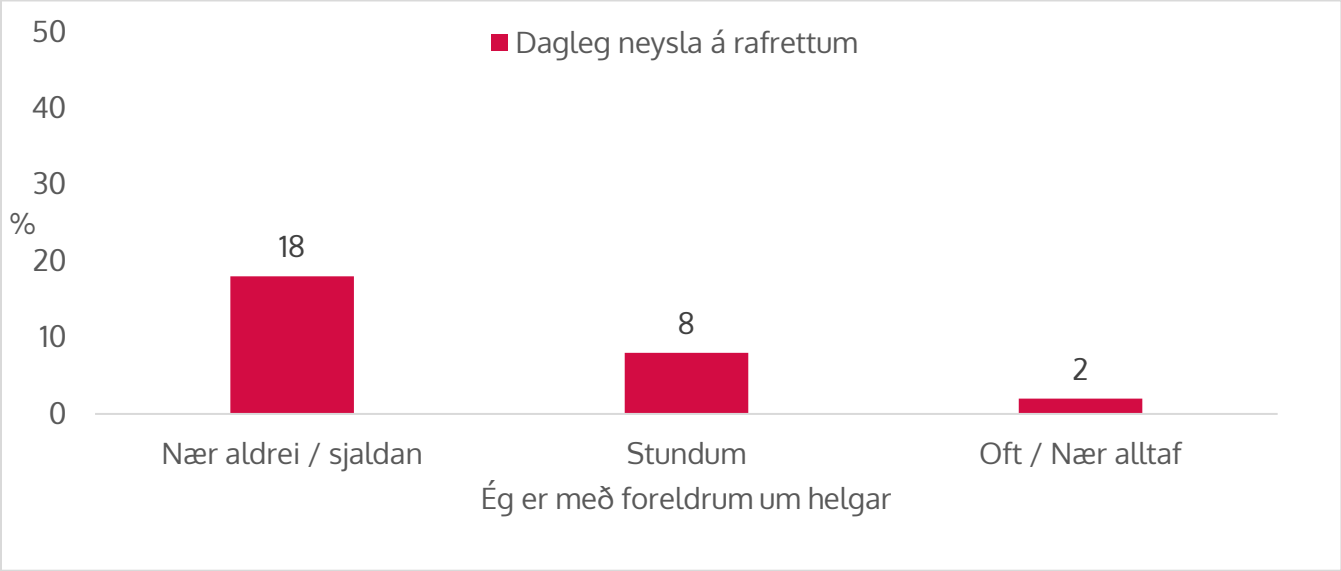


Hvert eftirtalinna efna er í veipvökvanum þínum, ef þú veipar: Kannbis.
Hlutfall nemenda í 8., 9. og 10. bekk 2020

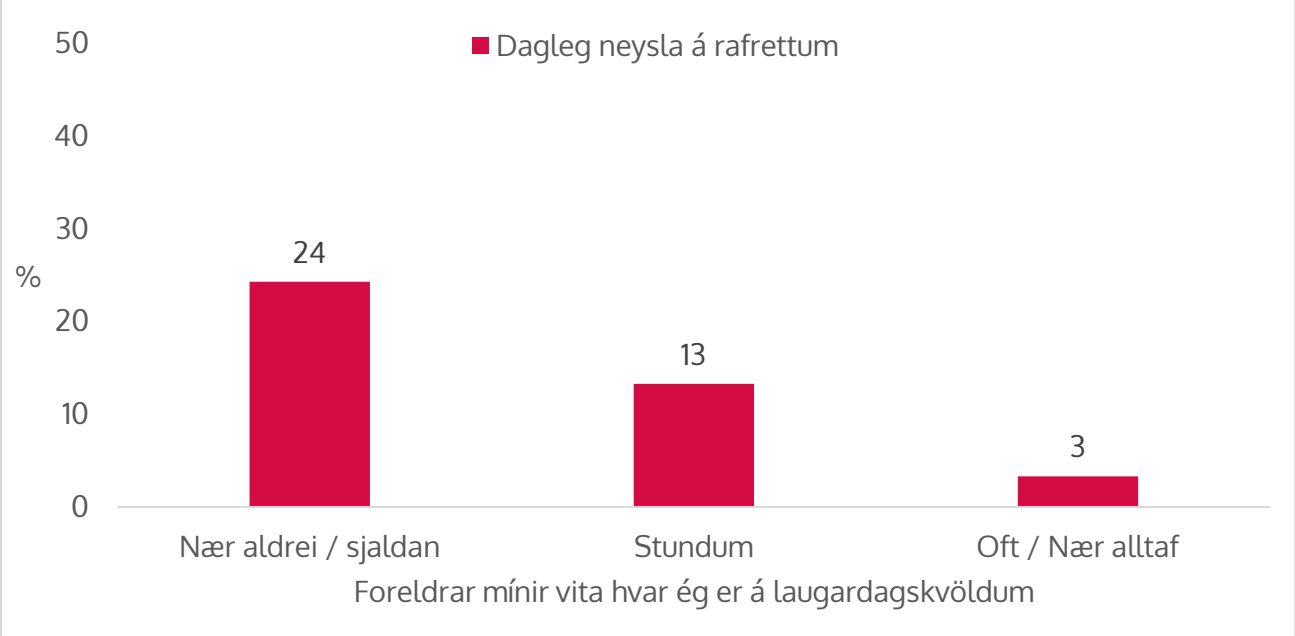


Hvert eftirtalinna efna er í veipvökvanum þínum, ef þú veipar: Spice. Hlutfall nemenda í 8., 9. og 10. bekk 2020

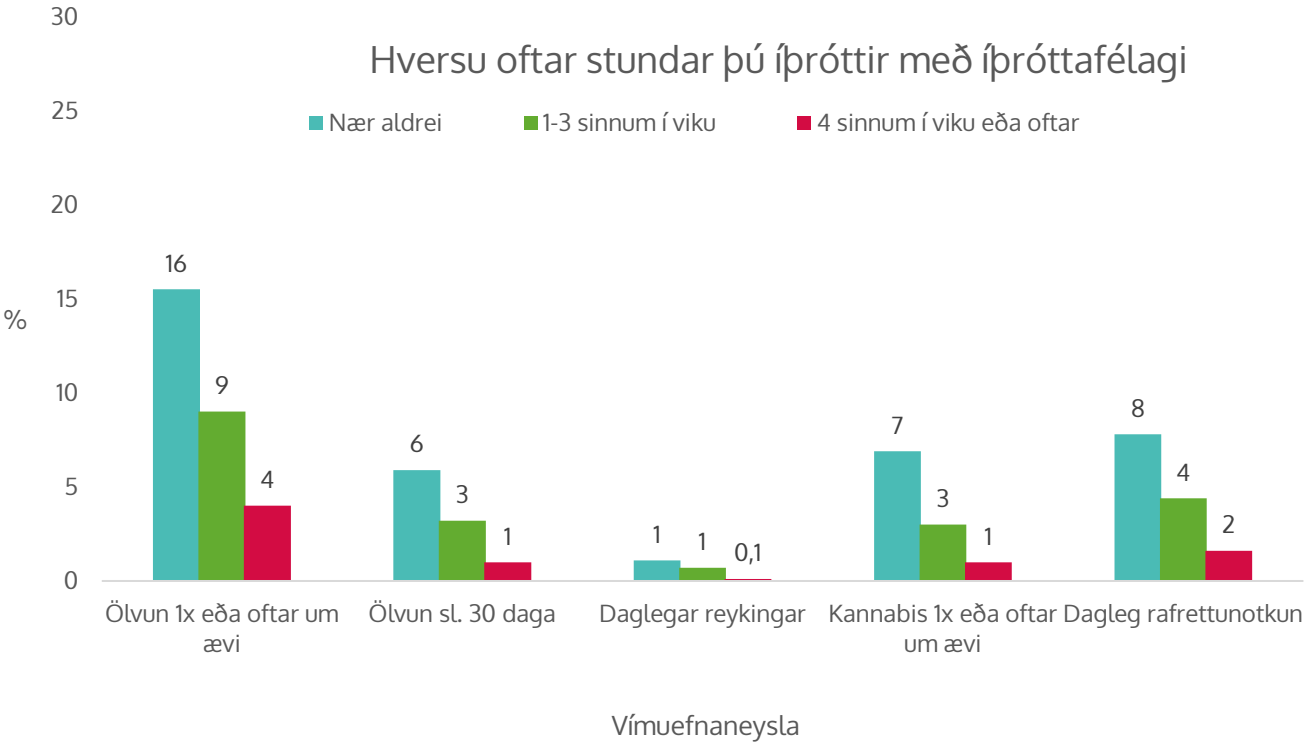
Áhættu- og verndandi þættir



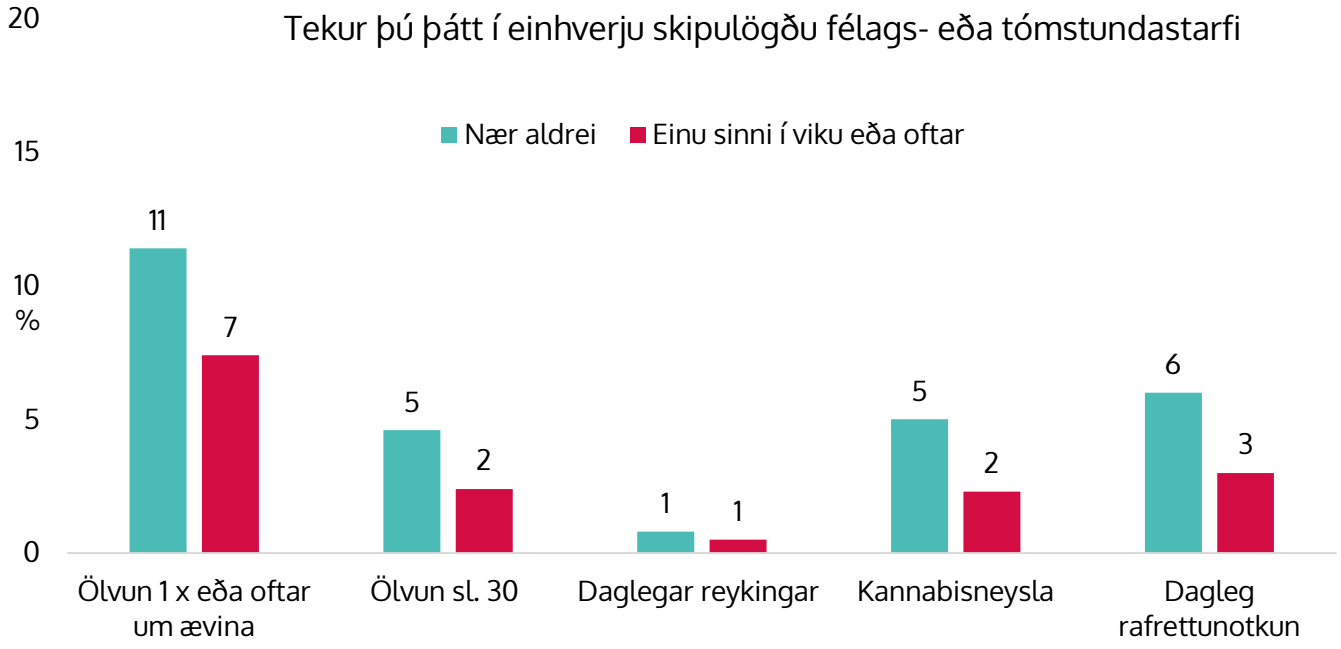
Dagleg rafrettuneysla, greint eftir spurningunni „Ég er með foreldrum um helgar“. Hlutfall nemenda í 8., 9. og 10. bekk árið 2020.



Dagleg rafrettuneysla, greint eftir spurningunni „Foreldrar mínir vita hvar ég er á laugardagskvöldum“. Hlutfall nemenda í 8., 9. og 10. bekk árið 2020.

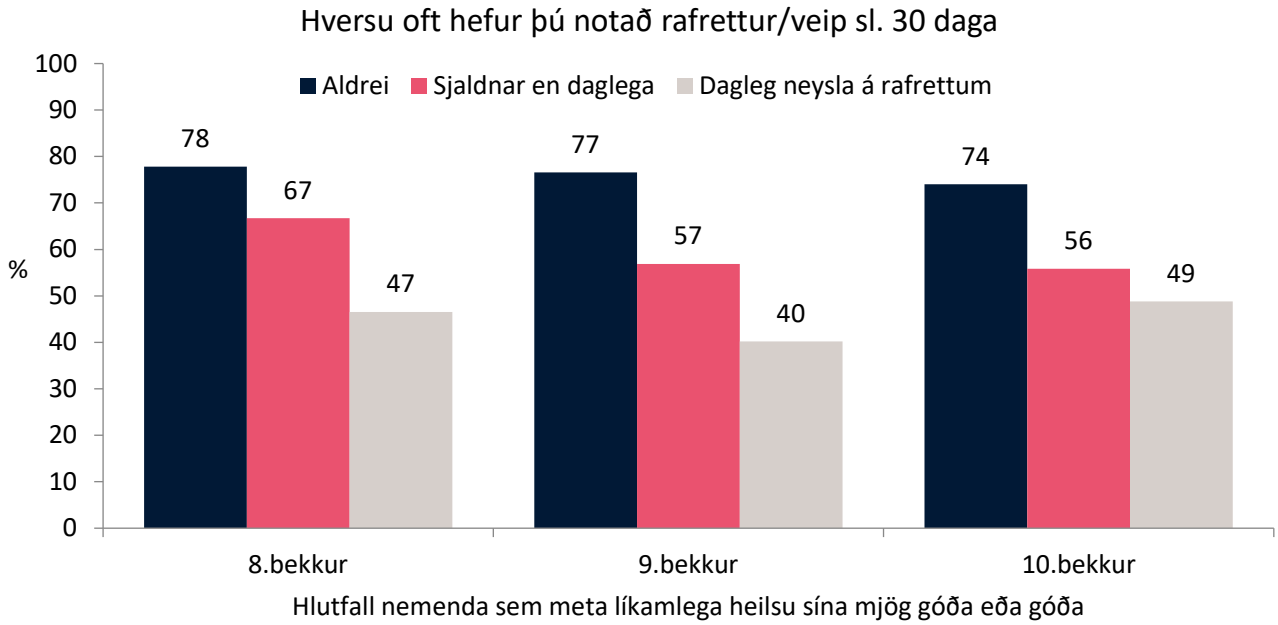


Vímuefnaneysla, greind eftir því hvort nemandi taki þátt í skipulögðu íþróttastarfi með íþróttafélagi. Hlutfall nemenda í 8., 9. og 10. bekk árið 2020.

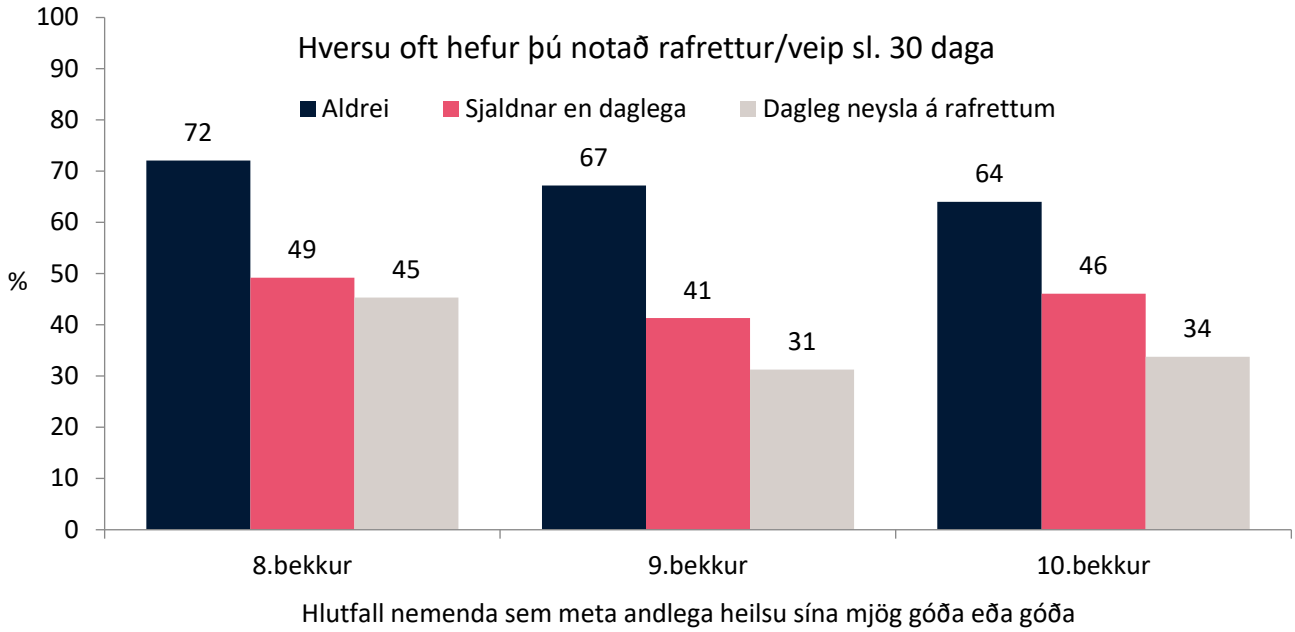


Vímuefnaneysla, greind eftir því hvort nemandi tekur þátt í skipulögðu félags- og tómstundastarfi. Hlutfall nemenda í 8., 9. og 10. bekk árið 2020.

Andleg og líkamleg heilsa



Hversu góð er **líkamleg heilsa þín**, hlutfall nemenda í 8., 9. og 10. bekk sem meta líkamlega heilsu sína mjög góða eða góða, greint eftir daglegri neyslu á rafrettum árið 2020.



Hversu góð er **andleg heilsa þín**, hlutfall nemenda í 8., 9. og 10. bekk sem meta líkamlega heilsu sína mjög góða eða góða, greint eftir daglegri neyslu á rafrettum árið 2020

Rannsóknir á rafrettum, bragðefnum og notkun

JAMA Network | Open.

Original Investigation | Substance Use and Addiction

Associations of Flavored e-Cigarette Uptake With Subsequent Smoking Initiation and Cessation

Abigail S. Friedman, PhD; SiQing Xu, BS

Abstract

IMPORTANCE Several states have banned sales of flavored e-cigarettes, but evidence on the association between vaping flavors and subsequent smoking initiation and cessation is limited.

OBJECTIVE To evaluate whether new uptake of flavored e-cigarettes is more strongly associated with subsequent smoking initiation and cessation than uptake of unflavored e-cigarettes, separately for youths (12-17 years), emerging adults (18-24 years), and prime-age adults (25-54 years).

DESIGN, SETTING, AND PARTICIPANTS This cohort study conducted secondary data analyses of longitudinal survey data from waves 1 to 4 of the Population Assessment of Tobacco and Health Study (collected from 2013 to 2018). The analytic sample was limited to 17 929 respondents aged 12 to 54 years at wave 1 who completed at least 3 consecutive waves of the survey and did not use e-cigarettes at baseline. Data were collected from 2013 to 2018 and analyzed in February 2020.

EXPOSURES Flavored vs unflavored e-cigarette use reported in wave 2 of the Population Assessment of Tobacco and Health Study.

MAIN OUTCOMES AND MEASURES Binary indicators captured wave 3 smoking among 7311 youths and 4634 emerging adults who did not smoke at baseline (ie, initiation) and not smoking at wave 3 among 1503 emerging adults and 4481 prime-age adults who smoked at baseline (ie, cessation). Smoking status was based on having smoked in the past 30 days for youths and established smoking (ie, current smoking among those who smoked at least 100 cigarettes in their lifetime) for emerging and prime-age adults.

RESULTS The youths who did not smoke at baseline, emerging adults who smoked at baseline, and prime-age adults who smoked at baseline consisted of 51.4% to 58.0% male participants and 66.9% to 77.0% white individuals. Vaping uptake was positively associated with smoking initiation in youth (adjusted odds ratio [AOR], 6.75; 95% CI, 3.93-11.57; $P < .001$) and in emerging adults (AOR, 3.20; 95% CI, 1.70-6.02; $P < .001$). Vaping uptake was associated with cessation in adults (AOR, 1.34; 95% CI, 1.02-1.75; $P = .03$). Vaping nontobacco flavors was no more associated with youth smoking initiation than vaping tobacco-flavors (AOR in youth, 0.66; 95% CI, 0.16-2.76; $P = .56$) but was associated with increased adult smoking cessation (AOR in adults, 2.28; 95% CI, 1.04-5.01; $P = .04$).

CONCLUSIONS AND RELEVANCE In this study, adults who began vaping nontobacco-flavored e-cigarettes were more likely to quit smoking than those who vaped tobacco flavors. More research is needed to establish the relationship between e-cigarette flavors and smoking and to guide related policy.

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Key Points

Question Does the association between vaping uptake and subsequent smoking differ between individuals favoring tobacco- vs nontobacco-flavored e-cigarettes?

Findings In this cohort study with 17 929 participants, multivariable analyses of nationally representative, longitudinal survey data evaluated differences in smoking initiation and cessation subsequent to vaping uptake among those who used flavored vs unflavored e-cigarettes, separately by age group. Relative to vaping tobacco flavors, vaping nontobacco-flavored e-cigarettes was not associated with increased youth smoking initiation but was associated with an increase in the odds of adult smoking cessation.

Meaning In this study, adults who vaped flavored e-cigarettes were more likely to subsequently quit smoking than those who used unflavored e-cigarettes.

+ Editorial

+ Supplemental content

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Correlates of youth vaping flavor preferences

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ABSTRACT

Among youth who use electronic nicotine delivery systems (ENDS), e-cigarettes are often the first tobacco product tried. Flavor is a common reason for experimentation with e-cigarettes. This study assessed flavor preferences and the choice of ENDS as an initial product among youth by selected demographic characteristics. The analysis sample included 1549 participants who had ever tried ENDS, drawn from a national online survey of youth aged 13–18 in 2017. Fruit was the most common favorite flavor among ENDS users, followed by menthol/mint/wintergreen. Preference for flavor varied by age, sex and racial/ethnic background. ENDS were the tobacco products most likely to be tried first, particularly among participants under age 17. Those who preferred fruit flavor were twice as likely to have tried ENDS first, compared to those with other flavor preferences, while those who preferred menthol/mint/wintergreen flavor were half as likely to have tried ENDS first. Our findings support an association between flavor and ENDS use. Our research supports previous findings indicating that: 1) flavor is one of the primary reasons for experimentation with ENDS among youth; 2) fruit flavor is strongly associated with use of ENDS as the first tobacco product; and 3) preference of fruit flavor varies by age, sex and racial/ethnic background. These findings have relevance for developing targeted messages for specific youth audiences and implications for tobacco regulatory policies. In addition to January 2020 federal regulations, the authors recommend tighter restrictions, specifically that the marketing and sale of all e-cigarette flavors other than tobacco be eliminated.

1. Introduction

Electronic nicotine delivery systems (ENDS), including electronic cigarettes, are devices capable of delivering nicotine and other constituents in an aerosolized form. Studies have reported high rates of e-cigarette awareness among middle school (84.3%) and high school (92.0%) students (Krishnan-Sarin et al., 2015; Barrington-Trimis et al., 2015). According to the 2019 National Youth Tobacco Survey, 27.5% of high school students and 10.5% of middle school students currently use e-cigarettes. More than five million of these students have used e-cigarettes in the past 30 days; nearly one million report using them daily (Cullen et al., 2019; Jamal et al., 2017). More than half (51.2%) of middle school e-cigarette users reported e-cigarettes as the first tobacco product tried (Krishnan-Sarin et al., 2015). Additionally, e-cigarette use was positively correlated with male gender, age, and non-Hispanic White race (Krishnan-Sarin et al., 2015; Jamal et al., 2017; Anand et al., 2015; Bostean et al., 2015; Morean et al., 2016).

Flavors are one of the top reasons for experimentation with e-cigarettes among youth, in addition to curiosity and peer influence (Audrain-McGovern et al., 2016; Bold et al., 2016; Kong et al., 2015; Zare et al., 2018). Data from the 2019 NYTS showed that, among current e-cigarette users, over 70% of high school students and nearly 60% of middle school students used e-cigarettes with flavorings. The most common flavors were fruit, menthol or mint, and candy, desserts, or other sweets (Cullen et al., 2019). Data from the 2016–2017 Population Assessment of Tobacco and Health (PATH) Study (Wave 4) also showed that 71% of current youth ENDS users said they used ENDS products "because they come in flavors I like." (Population Assessment of Tobacco and Health) Over 7000 e-liquids are available, with considerable variability regarding concentration of nicotine and flavorings (Barrington-Trimis et al., 2014; Zhu et al., 2014). Studies have typically categorized flavors as tobacco, menthol/mint, fruit, candy, sweet, and

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Do JUUL and e-cigarette flavours change risk perceptions of adolescents? Evidence from a national survey

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ABSTRACT

Introduction Use of JUULs and e-cigarettes is growing rapidly, particularly among adolescents. Research suggests that flavours may increase the appeal of these products, but little is known about how flavours influence perception. We examined whether youth perceptions about the health risks of JUULs and e-cigarettes vary with flavours.

Methods We conducted a national survey in 2018 of 1610 high-school students aged 14–18 who had ever heard of either JUULs or e-cigarettes. Respondents were asked to rate the lung cancer risk, the harm of second-hand vapour, potential for addiction and healthiness of differently flavoured JUUL and e-cigarette products. We investigated the relationship among flavour, risk perception and socio-demographic information.

Results We found that risk perceptions for both JUULs and e-cigarettes differ significantly by flavour type. Youths perceive fruit flavours to be less likely to lead to lung cancer (−0.909 (0.065)), have harmful second-hand vapour (−0.933 (0.060)) and be more addictive (1.104 (0.094)) relative to tobacco flavours. Candy, menthol/mint and alcohol flavours show similar patterns of risk association, although the magnitude is slightly smaller than for fruit flavours.

Conclusions Youths believe that flavours are related to the health risks of both JUULs and e-cigarettes despite the fact that these differences in risk by flavour have not been scientifically or systematically established. A policy concern is that misperceptions based on flavour may result in increased vaping by youths. The findings from this study support the assertion that banning fruit, menthol or mint and sweet flavours could reduce the appeal of JUULs and e-cigarettes to youth, with concomitant health protections.

INTRODUCTION

Adolescent e-cigarette use is on the rise and has recently surpassed combustible cigarette use nationwide.[1 2] The increase in e-cigarette use in 2017–2018 increased substantially, and in 2019 an estimated 10.5% of middle-school students and 27.5% of high-school students reported current e-cigarette use.[3 4] The recent and rapid rise in e-cigarette use prompted the US Surgeon General to declare a youth epidemic in 2018.[5] JUULs in particular now account for 75% of the electronic nicotine delivery system market, up from 40% market share in 2017.[6 7] JUULs and e-cigarettes may be attractive to adolescents because they are novel, trendy and generally perceived as less harmful than combustible cigarettes.[8–10]

Evidence suggests that the variety of flavours available in these products also make them more appealing.[9 11] Recent research reveals that youths are more likely to initiate e-cigarette use with non-tobacco flavoured products.[12–14] JUULs, which are a single brand and type of e-cigarettes, come only in a handful of flavours, including Virginia tobacco, classic tobacco, fruit medley, mango, crème brûlée, menthol, mint and cool cucumber. Content analysis of e-cigarette retail websites shows that almost all e-cigarettes are flavoured (including tobacco flavour).[15]

Despite the rise in sales and the prevalence of flavours, little is known about how flavours themselves influence youth perceptions of JUULs and e-cigarettes or the decision of whether and how much to use them. To our knowledge, two studies have directly examined the relationship between e-cigarette flavours and e-cigarette perceptions. In a cross-sectional study, Cooper *et al* found that youth e-cigarette users viewed flavoured e-cigarettes as 'less harmful' than non-flavoured e-cigarettes compared with youths who had never used cigarettes.[16] Pepper *et al* examined the impact of specific flavours on e-cigarette perceptions.[17] The researchers randomised adolescents to one of five e-cigarette flavours (tobacco, alcohol, menthol, candy or fruit) and assessed perceptions of health risks with the question, 'If you regularly used an e-cigarette or other vaping device with (flavour condition), how harmful to your health do you think it would be?' They found that adolescents perceived fruit-flavoured e-cigarettes as less harmful than tobacco-flavours but they saw no differences among the other flavours.

While previous research has examined youth perceptions of overall harmfulness, our study was built on prior research and examined four specific e-cigarette risks: the risk of lung cancer, the potential harms of second-hand vapour, the risk of long-term addiction and the overall healthiness of vaping. We also extended the literature by distinguishing between JUUL, about which less is known and whose use is growing rapidly, and e-cigarettes. While there may be some actual differences in risk by flavours due to the use of different chemical contents used in individual flavours and brands, evidence is very limited. Furthermore, if there are some differences in risk based on the current chemical make-up of a given flavour, these risks are likely to be idiosyncratic and not pertaining to all specifications of a broad category of flavours such as 'fruit' or 'candy.' In addition, if there are differences, they are unlikely to be known by these youths. Thus,

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Dripping and vape tricks: Alternative e-cigarette use behaviors among adolescents

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HIGHLIGHTS

- 21% of ever e-cigarette users ever dripped and 55% ever conducted vape tricks.
- The most frequently endorsed flavors used for both behaviors were fruit, candy, and mint.
- Nicotine concentrations for dripping was 3 mg and for vape tricks was 0 mg.
- Source for learning these behaviors were friends.
- Risky tobacco use behaviors were associated with dripping and vape tricks.

ARTICLE INFO

Keywords:
E-cigarettes
Adolescents
Vape tricks
Dripping

ABSTRACT

Introduction: E-cigarettes appeal to adolescents because of alternative uses, such as dripping (i.e., applying e-liquid directly on the atomizer) and conducting vape tricks (i.e., creating shapes from exhaled aerosol). However, little is known about these behaviors and adolescents who engage in these behaviors.
Method: Using cross-sectional surveys from 4 high schools in Connecticut in 2017 (N = 2945), we assessed the frequency of dripping and conducting vape tricks, product characteristics (e.g., nicotine, flavor) used for these behaviors, and where adolescents learn about these behaviors. We also conducted multinomial logistic regression analysis to assess whether demographics, age of e-cigarette use onset, past-month-use of e-cigarettes, and lifetime use of other tobacco products were associated with dripping and/or vape tricks.
Results: Among ever e-cigarette users (N = 1047), 20.5% ever dripped and 54.9% ever conducted vape tricks. The most frequently endorsed 1) flavors used for both behaviors were fruit, candy, and mint, 2) nicotine concentrations used for dripping was 3 mg and for vape tricks was 0 mg, and 3) the top source for learning these behaviors were friends. The multinomial model showed that earlier age of e-cigarette use onset, past-month-use of e-cigarettes, and lifetime use of other tobacco products were associated with dripping and vape tricks.
Discussion: Engaging in dripping and vape tricks was associated with risky tobacco use behaviors (e.g., earlier age of onset, other tobacco use), and involved exposure to nicotine and flavors. Reducing appeal of dripping and vape tricks and preventing product characteristics that facilitate these behaviors may reduce harm to adolescents.

1. Introduction

E-cigarettes are the most commonly used tobacco product among U.S. adolescents (Gentzke et al., 2019). Currently, 20.8% of U.S. high school students reported using e-cigarettes in the past month (Gentzke et al., 2019). E-cigarette use among adolescents is concerning because of the detrimental effect of nicotine on the developing brain (Abreu-Villaça, Seidler, Tate, & Slotkin, 2003; Yuan, Cross, Loughlin, & Leslie, 2015), the potential for developing nicotine addiction (Case et al., 2018; Morean, Krishnan-Sarin, & O'Malley, 2018), and the increased risk of combustible tobacco product use (Barrington-Trimis et al., 2018; Bold et al., 2017; Primack, Soneji, Stoolmiller, Fine, & Sargent, 2015; Soneji et al., 2017). Thus, preventing adolescent e-cigarette use is an important national public health objective (USDHHS, 2016). The U.S.

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E-cigarettes: banning flavours is better than an outright ban

As highlighted recently in *The Lancet Respiratory Medicine*,[1] the US Government intends to ban all flavoured electronic cigarettes (e-cigarettes), so far pioneered by the states of New York and Michigan. In the other hemisphere, India's cabinet has approved a ban on the production, sale, and import of all e-cigarettes, to stem the youth "epidemic" and consequent "health risks". We wonder if the repercussions of these absolute legislative controls were considered beforehand and feel that the USA might be taking the correct approach.

Teenage initiation into e-cigarette use is triggered by enticing flavours and the widespread, yet unproven, claim that vaping is safer than smoking.[2] Banning flavoured e-cigarettes directly targets this primary lure to adolescent vaping.[2] The escalating rise in vaping-associated lung injury (more than 1479 heterogeneous acute pneumonitis cases with 33 deaths), as reported by the US Centers for Disease Control and Prevention, has aroused profound concern.[1,3] The exact aetiology is under investigation, but tetrahydrocannabinol and vitamin E acetate present in cannabinoid-containing liquids were proposed as possibly culpable.[1,3] Still, popular e-cigarette flavourings diacetyl and 2,3-pentanedione have been found to impair airway epithelium ciliary function.[4] Additionally, several aldehyde flavourings are unstable, forming irritating, potentially toxic propylene glycol acetals when mixed with other components of vaping liquids.[5] Therefore, the manufacturers' listed constituents might not be the only chemicals present in the aerosols.[5] Extending the flavour ban to encompass cannabis-derived liquids, requiring manufacturer listing of the end-components of final vaping mixtures, and implementing controls to prevent their adulteration might be a suitable strategy going forward.

Reported plunges in tobacco cigarette smoking fail to correlate with vaping, and the presence of only a few adequate clinical trials leaves one hesitant to recommend e-cigarettes for long-term cessation of smoking. Nevertheless, if this proclaimed alternative to smoking is banned, what is to become of those who use e-cigarettes as aids to quit? With cigarettes remaining legal, the corollary is that nicotine-addicted vapers will either initiate smoking or be driven back to the pack. Thus, the US decision seems to have merit, targeting flavoured e-cigarettes without eliminating the device entirely. We suggest that only unflavoured, unadulterated nicotine-containing e-cigarettes be available as prescription products, restricting their use to those most likely to benefit. An adequate description of the safety profile and health risks of e-cigarettes, which is thus far deficient, is imperative. Health administrators would need to prepare the necessary guidelines and training programmes, including the management of persuasive patients who do not meet the requirements to be prescribed e-cigarettes.

We see eliminating e-cigarettes as a drastic move that negates the option as an alternative to smoking. However, banning flavoured or adulterated e-cigarettes enhances their safety profile and maintains the avenue as a possible smoking cessation aid.

We declare no competing interests.

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For more on the Indian ban of e-cigarettes see https://www.bbc.co.uk/news/world-asia-india-49738381

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NEWS

FDA bans most flavoured e-cigarettes as lung injury epidemic slows

Janice Hopkins Tanne

New York

The US Food and Drug Administration will ban most flavoured electronic cigarettes from 1 February.[1] The latest figures show that since the outbreak of the epidemic in summer 2019 more than 2500 people in the US have been admitted to hospital with lung problems related to e-cigarette use, of whom 55 have died.[2]

The FDA said that it would ban fruit, candy, and mint flavoured pods that contain vaping liquids but not pods flavoured with tobacco or menthol. Flavoured pods are popular with young people. The sale of vaping fluids from open tank systems in vaping shops will be allowed to continue.

President Donald Trump had earlier called for a ban on all flavoured vaping supplies. He apparently backed down from the broader ban because of the potential political fallout from jobs lost in the vaping industry, the *Washington Post* said.[3]

The health and human services secretary, Alex Azar, said that the new decision protected young people while keeping e-cigarettes available to adults who were trying to quit smoking. But several public health groups have criticised the decision as a lost opportunity to reduce vaping and tobacco use by young people.

An FDA study last year showed that about five million US students in middle school or high school (aged about 11 to 18) had used e-cigarettes in the previous 30 days.[4]

The legal age for buying tobacco products was recently raised nationwide to 21, the same as the legal age for drinking in the US.

By 12 May makers of all e-cigarette products will have to submit marketing applications to the FDA to be able to sell their products to consumers. Previously the FDA allowed them to sell vaping products under "enforcement discretion." They will now have to prove that the vaping products provide a health benefit, such as helping people stop smoking.

Meanwhile, the Centers for Disease Control and Prevention reported that as at 31 December 2561 people had been admitted to hospital for EVALI (e-cigarette or vaping product use associated lung injury) and 55 deaths. Two thirds of patients (67%) were male, and 78% were aged under 35. Although cases were reported in all states, Texas, California, and Illinois reported the highest numbers.[2]

The CDC said that data showed a gradual increase in visits to emergency departments related to e-cigarette use since 2017 but that numbers rose sharply in June 2019. The epidemic has been declining since a peak in September last year. All patients with e-cigarette related lung injury reported using vaping products, and vitamin E acetate has been identified as a chemical of concern. Tetrahydrocannabinol (THC) was found in most of the samples tested by the FDA, and most patients reported using products containing THC. However, other additives might also be involved. Vaping products acquired informally, such as from friends, family, or online dealers, were linked to most of the cases and played a major role in the outbreak, the CDC said.

The CDC told adults who were using vaping products to quit smoking not to go back to smoking but to consider using FDA approved medications to help them quit. If they continued to use e-cigarettes, they should look out for symptoms of lung injury and see a healthcare provider immediately if they developed symptoms, the agency said.

Two papers in the *Morbidity and Mortality Weekly Report* advised clinicians on careful discharge planning for patients with vaping associated lung injury to avoid readmission to hospital and death. Counselling on tapering corticosteroids and scheduling follow-up appointments would help prevent adverse outcomes, they said.[5 6]

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Flavored E-Cigarette Sales in the United States Under Self-Regulation From January 2015 Through October 2019

Alex Liber, MSPH, Zachary Cahn, PhD, Aidan Larsen, BA, and Jeffrey Drope, PhD

Objectives. To describe the evolution of flavored e-cigarette sales since the expansion of the JUUL brand, and to describe the effect of JUUL's November 2018 decision to self-regulate the flavors it sold in stores on flavored e-cigarette sales.

Methods. We used Scantrack data on sales of e-cigarettes in the United States from January 2015 to October 2019 provided by The Nielsen Company. National sales values were aggregated monthly in 5 flavor categories (fruit, menthol/mint, sweet, tobacco, and other).

Results. The expansion of JUUL sales coincided with an expansion in fruit-flavor sales through October 2018. Once JUUL withdrew fruit and sweet flavors from stores, menthol/mint came to dominate the e-cigarette market, but through 2019, a new surge in fruit-flavor sales by non-JUUL brands was observed.

Conclusions. After a decline in sales following JUUL's decision to withdraw some flavored products from stores, JUUL sales recovered within weeks and surpassed their previous maximum in those same channels, as consumption shifted to the menthol/mint and tobacco flavors that remained on shelves.

Public Health Implications. These trends suggest shortcomings of self-regulation and highlight the utility of government regulation. (*Am J Public Health.* 2020;110:785–787. doi:10.2105/AJPH.2020.305667)

See also Dasgupta and Fiala, p. 759, and the *AJPH* After FDA Vaping Guidance section, pp. 771–789.

E-cigarette use among US youths has dramatically increased over the past 2 years, which has been circumstantially tied to the presence of flavored e-cigarette products in the marketplace.[1] Given the association between flavored e-cigarettes and youth initiation,[2] little is known about the trends in sales of flavored e-cigarettes since 2016—a period in which a shift in the market also occurred, driven by the rapid growth of JUUL Labs toward small, rechargeable e-cigarettes that heat cartridges containing concentrated nicotine salt liquids.[3] Previous studies found that use of nontobacco or menthol-flavored e-cigarettes had increased—up to 56.4% of e-cigarette unit sales in December 2016[4]—but little is known about how the rise of JUUL affected sales of flavored e-cigarettes thereafter. In addition, data describing the effects of industry self-regulation of flavored product availability are lacking.

This study addressed these gaps by examining trends in sales of flavored e-cigarettes from January 2015 through October 2019 to characterize types of flavors and the effects of JUUL removing some flavors from store shelves.

METHODS

We used Scantrack data on sales of e-cigarettes in the United States provided by The Nielsen Company. The data set contains UPC-level sales of e-cigarettes split into dollar and unit volumes at 4-week increments in Nielsen-tracked channels (convenience, food, and drug stores), which were aggregated to the national level. Although Nielsen Scantrack covered only about 24% of all US e-cigarette sales in 2016, by 2019, the data set covered about 70% of all US e-cigarette sales.[5] That figure compares the value of all e-cigarette sales in the Nielsen data with the value of all e-cigarette sales as calculated by market research firm ECigIntelligence, which combines estimates of the number of e-cigarette users with an estimated per-capita annual expenditure on products to arrive at the full market size. Dollar sales data were aggregated to the national level under 5 brands (JUUL, NJOY, blu, VUSE, Logic, and other) and 5 flavor categories (fruit, menthol/mint [which are not clearly separable in the data set], sweet [nonfruit candy or desert flavors], tobacco, and other [including variety packs]). Sales of products without e-liquid were excluded. Figures were adjusted for inflation by using August 2019 as the base. We report "shares" or proportions of each flavor category over time among total e-cigarette sales.

RESULTS

Figure 1 shows that during 2015 and 2016, e-cigarette flavor shares remained relatively

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Flavored E-cigarette Use and Progression of Vaping in Adolescents

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abstract

OBJECTIVES: Electronic cigarettes (e-cigarettes) are available in nontraditional flavors (eg, fruit and candy) that are banned in combustible cigarettes in the United States. Whether adolescent use of e-cigarettes in nontraditional flavors prospectively predicts continuation of vaping and progression to more frequent vaping is unknown.

METHODS: High school students in Los Angeles, California, completed 5 semiannual surveys (2014–2017 [10th grade to 12th grade]). Among past-6-month e-cigarette users at survey waves 1 to 4 (N = 478), e-cigarette flavor (or flavors) used was coded into 2 mutually exclusive categories at each wave (use of ≥1 nontraditional flavors [fruit, candy, sweet or dessert, buttery, blends or combinations, and other] versus exclusive use of tobacco, menthol or mint, or flavorless). Flavor used during waves 1 to 4 was modeled as a time-varying, time-lagged regressor of vaping status and frequency outcomes 6 months later at waves 2 to 5.

RESULTS: Across waves 1 to 4, there were 739 (93.8%) observations of nontraditional-flavor use and 49 (6.2%) observations of exclusive use of tobacco, mint or menthol, or flavorless e-cigarettes. Use of e-cigarettes in nontraditional flavors (versus only tobacco, mint or menthol, or flavorless) was positively associated with vaping continuation (64.3% vs 42.9%; adjusted odds ratio = 3.76 [95% confidence interval 1.20 to 10.31]) and past-30-day number of puffs per nicotine vaping episode (mean: 3.1 [SD 5.5] vs 1.5 [SD 3.8]; adjusted rate ratio = 2.41 [95% confidence interval 1.08 to 5.92]) 6 months later. Flavor used was not associated with the subsequent number of past-30-day vaping days or episodes per day.

CONCLUSIONS: Adolescents who vaped e-cigarettes in nontraditional flavors, compared with those who exclusively vaped tobacco-flavored, mint- or menthol-flavored, or flavorless e-cigarettes, were more likely to continue vaping and take more puffs per vaping occasion 6 months later.

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Dr Leventhal conceptualized and designed the study, coordinated and supervised data collection, drafted the initial manuscript, and reviewed and revised the manuscript; Dr Goldenson conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript; Dr Cho conducted the analyses, wrote initial drafts of the Results and Analytic Plan sections, prepared the tables and figures, and reviewed and revised the manuscript; Dr Barrington-Trimis conceptualized and designed the study and reviewed and revised the manuscript; (Continued)

WHAT'S KNOWN ON THIS SUBJECT: Electronic cigarettes (e-cigarettes) in nontraditional flavors (eg, fruit and candy) are commonly used at e-cigarette use initiation by youth. Whether exposure to e-cigarettes in nontraditional flavors after youth start vaping prospectively predicts persistence and progression of vaping is unknown.

WHAT THIS STUDY ADDS: This study provides the first prospective longitudinal evidence indicating that among youth who vape e-cigarettes, use of e-cigarettes in nontraditional flavors is positively associated with subsequent persistence of vaping and puffs per vaping episode.

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For example, the FDA is addressing the youth e-cigarette epidemic with comprehensive compliance and enforcement measures. Since 2016, the FDA has conducted more than 2000 vape shop inspections, has issued more than 11 000 warning letters, and has filed more than 1900 civil money penalties to retailers—both online and in brick-and-mortar retail stores—for selling ENDS and their components to minors.

The agency is also enforcing the increased minimum age at which a young person can legally be sold tobacco products. In December 2019, the US president signed legislation raising the federal minimum age for sale of tobacco products to 21 years. "Tobacco 21" is in effect now. Research shows that the younger people are when they start to use tobacco products, the more likely they are to become addicted to nicotine. By enforcing the new federal minimum age of sale of tobacco products, the FDA can help prevent youths and young adults from accessing tobacco products and a lifetime of nicotine addiction.

We also know from past successes with the FDA's award-winning "The Real Cost" smoking prevention campaign that effective public education campaigns can produce incredible results in terms of knowledge, attitude, and behavior change. Using the success in reducing youths' cigarette use and in response to the growing rates of adolescent e-cigarette use, the FDA launched its newest full-scale effort in September 2018, "The Real Cost" Youth E-Cigarette Prevention Campaign. The campaign's messages are delivered through a variety of channels, including television, online video ads, banner ads, an interactive "The Real Cost" Web site, and social media.

Since its launch, "The Real Cost" E-Cigarette Prevention Campaign has generated significant viewership, including nearly 3.6 billion adolescent impressions in 16 months. Across social media platforms, we have engaged adolescent audiences with more than 950 000 likes, 130 000 shares, and 50 000 comments.

We will continue to expand these highly successful and innovative efforts to warn and inform youths about the dangers of all tobacco products, including e-cigarettes. Through public education, compliance and enforcement, an investment in research, and our rigorous science-based approach to regulation, we have developed a multifaceted strategy to ensure that we are doing all we can to protect youths from the harms of tobacco products. The FDA remains committed to ending the youth epidemic of e-cigarette use and preventing the next generation from facing a lifetime of addiction and other potential tobacco-related dangers.

Mitch Zeller, JD

CONFLICTS OF INTEREST

The author has no conflicts of interest to declare.

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Flavors Are a Major Driver of the Youth E-Cigarette Epidemic

See also Dasgupta and Fiala, p. 759, and the *AJPH* After FDA Vaping Guidance section, pp. 771–789.

Considerable declines in cigarette smoking have occurred among US high school students over the past two decades: smoking declined from 30% in 2000 to 6% in 2019.[1] However, e-cigarette use has increased substantially over the past decade, with current use among high school students increasing from about 1% in 2011 to nearly 28% in 2019.[1] This increase was of greater magnitude in recent years, which coincided with the growing popularity of cartridge-based e-cigarettes known as "pod mods," including those made by Juul, the market leader since 2017.[2] These newer products use nicotine salts, which allow higher levels of nicotine to be inhaled more easily and with less irritation than the free-base nicotine used in earlier e-cigarettes. Nicotine is an addictive drug that can harm adolescent brain development and prime the brain for addiction to other drugs.[3]

The increase in youth e-cigarette use has been driven by multiple factors, including advertising, high nicotine content, and the availability of flavors that appeal to youths.[3] Youths report that flavors are a primary reason they use e-cigarettes, and most youth e-cigarette users first initiate use with flavored products.[4] Among youth e-cigarette users in 2019, 70% reported using flavored varieties, making e-cigarettes the most common flavored tobacco product used among youths.[1]

Under authority from the 2009 Family Smoking Prevention and Tobacco Control Act (FSPTCA), the Food and Drug Administration issued a policy in January 2020 that prioritized enforcement against certain unauthorized cartridge-based e-cigarette flavors that appeal to youths, including fruit and mint. The policy was informed by available data, including from (1) a study of high school students that found the most commonly

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Note. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the US Centers for Disease Control and Prevention.

RESEARCH LETTER

Flavors of e-Cigarettes Used by Youths in the United States

Adolescent e-cigarette use has increased substantially since 2016.[1] To counteract such trends, public health agencies are considering regulatory restrictions of e-cigarettes in flavors popular among youths.[2,3] Whether certain flavors warrant inclusion or exemption from regulatory policies is unclear because recent estimates of the specific e-cigarette flavors adolescents use are lacking.

Related article

The myriad e-cigarette products available has complicated flavor preference research. JUUL's e-cigarette product, which has 8 flavor options, constituted 75% of all US e-cigarette sales in late 2018.[4] This study estimated the prevalence of JUUL e-cigarette flavors used among US youths in 2019.

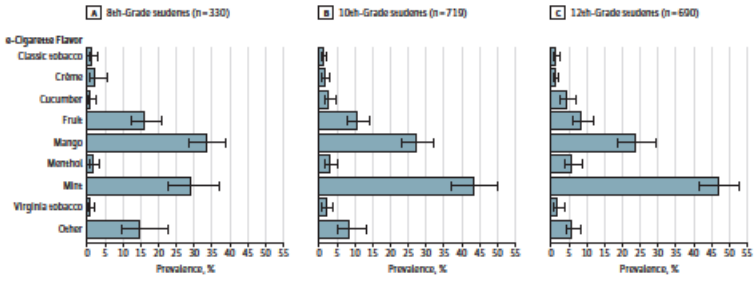
Methods | The Monitoring the Future (MTF) study surveyed nationally representative samples of US 8th-grade (response rate, 87%), 10th-grade (86%), and 12th-grade (80%) students from February 13 to June 3, 2019.[1] By design, every student had a 1-in-3 probability of being randomly assigned a module containing JUUL questions presented via tablet accompanied by pictures of JUUL devices. Weighted prevalences (with 95% CIs) of responses to "Which JUUL flavor do you use most often?" (forced-choice options; see Figure) were analyzed among past 30-day JUUL users by grade and further stratified by past 30-day use frequency (<20 vs ≥20 days). Analyses used Stata MP version 15.1 software (StataCorp) with "svy:" commands to account for MTF's complex sampling design. The University of Michigan Institutional Review Board approved the study. Informed consent (active or passive, per school policy) was obtained from parents for students younger than 18 years and from students aged 18 years or older.

Results | Among all 42 531 MTF respondents, 14 191 (33.36%) were administered the JUUL module, of whom 18.8% reported past 30-day vaping of any nicotine product and 12.6% reported using JUUL (7% in 8th grade, 15% in 10th grade, and 16% in 12th grade). The analytic sample included 1739 past 30-day JUUL users with flavor preference data (50% female; 5.0% black; 11.3% Hispanic; 2.3% Asian; 63.9% white; and 17.6% other race/ethnicity).

Among 8th-grade past 30-day JUUL users (n = 330), the flavors most often used were mango (33.5%; 95% CI, 28.7%-38.7%), mint (29.2%; 95% CI, 22.7%-36.8%), fruit (16.0%; 95% CI, 12.1%-20.9%), and other (14.8%; 95% CI, 9.4%-22.6%) (Figure). In 10th grade (n = 719), mint (43.5%; 95% CI, 37.1%-50.1%), mango (27.3%; 95% CI, 23.1%-31.9%), fruit (10.8%; 95% CI, 8.1%-14.1%), and other (8.4%; 95% CI, 5.2%-13.4%) flavors were most popular. In 12th grade (n = 690), mint (47.1%; 95% CI, 41.5%-52.8%), mango (23.8%; 95% CI, 18.8%-29.7%), fruit (8.6%; 95% CI, 6.0%-12.0%), and other (6.0%; 95% CI, 4.3%-8.4%) flavors were most popular. In all grades, remaining flavors had prevalences less than 6.0%, including tobacco-related flavors (<2.0%) (Figure). Flavor preferences were generally similar across youths who used JUUL on 20 or more vs fewer than 20 days in the past month, although the relative popularity of the mint flavor was more pronounced among more frequent users (Table).

Discussion | In this sample of US youths who self-reported using JUUL e-cigarettes in 2019, mint was the most popular flavor

Figure. Flavor Used Most Often Among US Youths, Past 30-Day JUUL e-Cigarette Users



Weighted prevalence estimates of forced-choice responses to "Which JUUL flavor do you use most often?" The "other" category did not specify any flavor and could represent various flavors compatible with the JUUL device made by manufacturers other than JUUL Labs. Error bars indicate 95% CIs.

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High school students' use of flavored e-cigarette e-liquids for appetite control and weight loss

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HIGHLIGHTS

- 13.8% of high school adolescents vaped flavored e-liquids for appetite control.
- 9.3% of high school adolescents vaped flavored e-liquids for weight loss.
- Weight-related flavored e-liquid use was associated with more frequent vaping.
- Weight-related flavored e-liquid use was associated with using more e-liquid flavors.
- Vaping candy-flavored e-liquid was associated with vaping for appetite control.

ARTICLE INFO

Keywords:
Adolescent
E-cigarette
Vape
Weight
Diet
Appetite

ABSTRACT

Background: Although weight-related reasons for smoking and vaping have been examined in adults, research in adolescents is lacking. Thus, we examined the prevalence and correlates of using flavored e-liquids for appetite control or weight loss in high school adolescents.

Method: The analytic sample included 529 students who completed a school-based survey in Connecticut in Spring 2017 (50.6% female, 79.5% White, mean age 16.27 [SD = 1.18], range 13–19 years). Inclusion criteria were past-30-day vaping, using ≥ 1 flavored e-liquid (past month), and having non-missing data on flavored e-liquid use for appetite control and weight loss. Participants reported on sex, age, race, past-30-day vaping and smoking frequency, nicotine e-liquid use, flavored e-liquid use (e.g., tobacco, mint, fruit, candy), and flavored e-liquid use for appetite control and/or weight loss.

Results: Adolescent e-cigarette users (past 30-days) reported vaping flavored e-liquids for appetite control (13.8%) and weight loss (9.3%). Using flavored e-liquids for appetite control or weight loss, respectively, was associated with more frequent vaping (OR = 1.21; 1.21) and using more flavored e-liquids (OR = 1.33; 1.28, p-values < 0.01). Vaping candy-flavored e-liquids (OR = 1.16, p = 0.02) uniquely was associated with vaping for appetite control.

Conclusions: A subset of adolescents reported using flavored e-liquids for weight-related reasons. These adolescents reported vaping more frequently than their counterparts, raising concerns about increased nicotine exposure. Research is needed to understand where adolescents learn about weight-motivated vaping (e.g., friends, social media) and whether weight-related motives promote e-cigarette initiation among e-cigarette naïve individuals or continued/escalating use among current users.

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Nicotine and marijuana attitudes among flavor-only vaping youth: New evidence from Monitoring the Future

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HIGHLIGHTS

- Flavor-only vaping is not associated with perceived risk and disapproval of traditional tobacco products.
- Flavor-only vaping is associated with attitudes concerning vaping nicotine.
- Flavor-only vaping is associated with attitudes concerning marijuana use.

ARTICLE INFO

Keywords:
Vaping
e-Cigarettes
Drug attitudes
Nicotine
Marijuana

ABSTRACT

Background: Vaping has become increasingly popular among youth and young adults in the last decade. At present, very little research has examined how vaping is associated with attitudes concerning the disapproval and perceived risk of using other substances. This paper examines the association between flavor-only vaping and attitudes concerning nicotine and marijuana use in a sample of high school students with no history of nicotine or marijuana use.

Methods: We employed negative binomial regression and logistic regression techniques to examine the associations between flavor-only vaping activity and attitudes concerning the risk and disapproval of nicotine and marijuana use utilizing data from the 2017 cohort of Monitoring the Future (MTF).

Results: The results suggest that, net of covariates, flavor-only vaping is not significantly associated with attitudes concerning traditional forms of nicotine use. However, flavor-only vaping does appear to be positively and significantly associated with the failure to disapprove and/or perceive the risk of vaping nicotine and regular marijuana use.

Conclusions: Flavor-only vaping is positively and significantly associated with the failure to disapprove and/or perceive the risk of vaping nicotine and regular marijuana use.

1. Introduction

Since e-cigarettes were first released in the early 2000s, vaping has become increasingly popular among youth and young adults (Arrazola et al., 2015; National Institute of Drug Abuse, 2018; Singh et al., 2016). Vaping refers to the use of an e-cigarette or vape pen to heat a liquid into a vapor that can then be inhaled. Liquids for vaping come in a variety of forms and flavors and can – but do not necessarily – contain psychoactive substances including nicotine and marijuana. In short, some, but not all, vaping liquids are flavor-only and do not contain psychoactive compounds. Recent estimates suggest that > 30% of high school students have vaped at least once in their lifetime (Miech, Patrick, O'Malley, & Johnston, 2017). In addition, research reveals that approximately 15% of high school age adolescents report use within the last 30 days (Johnston, O'Malley, & Miech, 2016; Westling, Rusby, Crowley, & Light, 2017). On the whole, these studies suggest that vaping is becoming increasingly common among youths.

While much of the previous research examining youth vaping has been concerned with increasing rates of nicotine vaping, other studies have suggested that vaping flavor-only liquids (without nicotine or marijuana) may be more popular among youths than nicotine vaping (Hamilton et al., 2015; Miech et al., 2017). A study by Miech and colleagues (2017), for instance, examined which substances high school students vaped during their most recent vaping incident and revealed

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RESEARCH BRIEF

Use of E-Cigarettes for Nicotine, Marijuana, and Just Flavoring Among U.S. Youth

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Introduction: E-cigarette use is gaining popularity among youth, but knowledge on patterns of youth vaping different substances is limited. This study examines risk factors associated with past-30-day self-reported vaping of nicotine, marijuana, and just flavoring among youth and the patterns (single, dual, and poly) of substances youth reported in their e-cigarettes.

Methods: The 2017 Monitoring the Future survey was analyzed. Weighted estimates of substances that youth vaped were calculated, and multivariable logistic regressions were performed to examine risk factors associated with youth vaping these substances. Analyses were conducted in 2019.

Results: Overall (n=14,560), 8.0% of participants reported currently vaping just flavoring, followed by 7.4% vaping nicotine and 3.6% vaping marijuana. Youth who were in 12th and 10th grade (versus 8th grade), male (versus female), current smokers (versus noncurrent smokers), and current marijuana users (versus noncurrent users) had increased risk of vaping nicotine, marijuana, and just flavoring. Black non-Hispanics were less likely than white non-Hispanics to report currently vaping. Among students who reported e-cigarette use in the last 30 days (n=1,685), only 24.9% reported vaping just flavoring only, and a majority (75.1%) reported vaping nicotine, marijuana, or multiple substances. Higher (versus lower) grade or increasing cigarette smoking intensity was associated with a higher proportion of students reporting vaping nicotine only and a lower proportion of students reporting vaping just flavoring only.

Conclusions: Youth e-cigarette use reveals a complex pattern, and youth reported vaping substances potentially addictive beyond just flavoring. Strategies and interventions to reduce youth e-cigarette use are needed.

Am J Prev Med 2020;58(2):244–249.

INTRODUCTION

The prevalence of current e-cigarette use among U.S. youth increased dramatically during 2017–2018.[1] The liquid used in e-cigarette products could contain nicotine, marijuana, and many different flavors.[2] A previous study[3] has found that about 60% of U.S. youth who use e-cigarettes reported vaping just flavoring, whereas <20% reported vaping nicotine. Tam and Warner[4] further reported that increasing cigarette smoking intensity was associated with an increasing proportion of students reporting vaping nicotine and a decreasing proportion of students reporting vaping just flavoring. However, both studies[3,4] were based on self-reported substances that students vaped at last use, which might underestimate the percentage of youth vaping substances other than flavoring.[3,4] The recent Monitoring the Future (MTF) report provided the national estimates for vaping specific substances (nicotine, marijuana, or just flavoring).[5] However, knowledge of the factors associated with youth vaping different substances is limited. Furthermore, no studies have reported patterns of youth vaping nicotine, marijuana, and just flavoring. Identifying substances vaped by youth is critical to formulating strategies and

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Use of Flavored E-Cigarettes Among Adolescents, Young Adults, and Older Adults: Findings From the Population Assessment for Tobacco and Health Study

Samir S. Soneji, PhD[1,2]; Kristin E. Knutzen, MPH[2]; and Andrea C. Villanti, PhD, MPH[3]

Abstract

Objectives: The use of flavored electronic cigarettes (e-cigarettes) is common among e-cigarette users, but little is known about the potential harms of flavorings, the extent to which the concurrent use of multiple flavor types occurs, and the correlates of flavor type use. The objective of this study was to assess the types of e-cigarette flavors used by adolescent (aged 12-17), young adult (aged 18-24), and older adult (aged ≥25) e-cigarette users.

Methods: We assessed the prevalence of flavored e-cigarette use within the past month by flavor types and concurrent use of multiple flavor types among past-month e-cigarette users sampled during Wave 2 (2014-2015) of the Population Assessment for Tobacco and Health Study among 414 adolescents, 961 young adults, and 1711 older adults. We used weighted logistic regression models for the use of fruit-, candy-, mint/menthol–, tobacco-, or other-flavored e-cigarettes and concurrent use of multiple flavor types. Covariates included demographic characteristics, e-cigarette use frequency, cigarette smoking status, current use of other tobacco products, and reasons for e-cigarette use.

Results: The leading e-cigarette flavor types among adolescents were fruit, candy, and other flavors; among young adults were fruit, candy, and mint/menthol; and among older adults were tobacco or other flavors, fruit, and mint/menthol. Compared with older adults, adolescents and young adults were more likely to use fruit-flavored e-cigarettes (adjusted odds ratio [aOR] = 3.35; 95% confidence interval [CI], 2.56-4.38; and aOR = 2.31; 95% CI, 1.77-3.01, respectively) and candy-flavored e-cigarettes (aOR = 3.81; 95% CI, 2.74-5.28; and aOR = 2.95; 95% CI, 2.29-3.80, respectively) and concurrently use multiple flavor types (aOR = 4.58; 95% CI, 3.39-6.17; and aOR = 2.28; 95% CI, 1.78-2.91, respectively).

Conclusions: Regulation of sweet e-cigarette flavors (eg, fruit and candy) may help reduce the use of e-cigarettes among young persons without substantially burdening adult e-cigarette users.

Keywords
electronic cigarettes, flavors, tobacco, regulation

The use of electronic cigarettes (e-cigarettes), especially flavored e-cigarettes, among adolescents has increased rapidly over time.[1-3] For example, the percentage of high school students who used e-cigarettes in the past month increased from 1.5% in 2011 to 20.8% in 2018.[4,5] Approximately 8 in 10 adolescent (aged 12-17) e-cigarette users and 6 in 10 young adult (aged 18-24) e-cigarette users reported that their first e-cigarette was flavored to taste like menthol, mint, clove, spice, candy, fruit, chocolate, alcohol (eg, wine or cognac), or other sweets.[3] Adolescent and young adult e-cigarette users report appealing flavors as a leading reason for use.[3,6] They also are more interested in experimenting with fruit-, candy-, or menthol-flavored e-cigarettes than

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