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Short communication

Tobacco and cannabis use advertisements targeting adolescents and young adults on Snapchat in 2019

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ABSTRACT

Social media platforms offer opportunities for targeted health communication ads to improve tobacco and cannabis prevention efforts. This study described tobacco and cannabis-related ads targeted towards adolescents and young adults on Snapchat. Data comprised of publicly available tobacco (n = 70) and cannabis-related (n = 64) ads from Snapchat in 2019. Identified themes included: *Health consequences* (Health effects of tobacco or cannabis use), *Financial & legal consequences* (Adverse financial or legal implications of substance use), *Quitting* (Resources for cessation), *Industry tactics* (Tobacco industry misleads individuals), *Policy advocacy* (Cannabis law reforms or legalization). Ad performance metrics included average *Ad Impressions* (number of views per ad) and *Ad Spend* (cost per ad). Ads were also categorized by *Sponsoring Organizations* (Government or Advocacy organizations). *Health Consequences* was the predominant theme followed by *Quitting* among tobacco-related ads. Government organizations sponsored most tobacco-related ads. Tobacco-related ads targeting adolescents received mean = 4,122,071 impressions and cost mean = \$10,385.6 per ad. Tobacco-related ads targeting young adults received mean = 2,151,217 impressions and cost mean = \$5,382.1 per ad. *Health Consequences* was a predominant theme among cannabis-related ads followed by *Policy Advocacy*. Advocacy organizations sponsored most cannabis-related ads targeting young adults. Cannabis-related ads targeting adolescents received mean = 415,293.8 impressions and cost mean = \$793.92 per ad. Cannabis-related ads targeting young adults received mean = 293,267.7 impressions, and cost mean = \$740.58. Government and advocacy organization sponsored ads reached millions of adolescents and young adults on Snapchat. Prevention campaigns may consider these number of impressions and cost per ad by theme when designing platform specific ads in the future.

1. Introduction

Tobacco and cannabis use among adolescents and young adults is a public health concern. (Tobacco, 2020; Marijuana, 2021) Nicotine alters normal brain development in adolescents and young adults, (England et al., 2015) possibly impairing cognitive development and long-term functioning. (Jasinska et al., 2014; Valentine and Sofuoglu, 2018) Cannabis use is linked to adverse health outcomes including impaired short-term memory and attention, and risk for cannabis dependence. (Marijuana, 2021) To combat adolescent and young adult tobacco and cannabis use, health communication campaigns have been deployed in the past; however, their success in preventing use of these substances has varied. (Atusingwize et al., 2015; Meernik et al., 2016) Health communication strategists have turned to social media platforms to

promote campaign ads, (Majmundar and Moran, 2021) target their intended audience (e.g., select the characteristics of their audience by age and location) with tailored messages, (Majmundar et al., 2020) and track ad performance in real-time. (Allem et al., 2017) However, each social media platform offers unique user experiences and audience engagement with ads vary across platforms even for identical messages. (Reuter et al., 2021) As such, characterizing platform-specific health communication strategies could be vital to enhance ad performance. For example, the United States Food and Drug Agency (FDA), Center for Tobacco Products (CTP) is charged with 'identifying effective messages, message components and communication channels to prevent initiation and countering uptake of ENDS by youth' and Snapchat provides one such communication channel to evaluate effective messages. (Products FCGT, 2019).

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Snapchat is a popular platform among adolescents and young adults in the U.S. (Pew Research Center, 2020; Pew Research Center, 2018; Massey et al., 2021; Statista, 2020) The platform allows its users to post ephemeral “snaps” (i.e., text, pictures and videos that disappear after a few seconds of viewing) to their followers. While advertisers have taken advantage of Snapchat’s younger audience through targeted ads (e.g., by age), and real-time metrics that track ad impressions, (Inc and Measurement, 2021) there has been no research on the content of tobacco and cannabis-related ads on the platform. This study used a publicly available library of ads from Snapchat in 2019, with the objective of content-analyzing tobacco and cannabis-related ads targeted towards two age-groups: adolescents (under 18 years of age) and young adults (18–24 years old). By documenting themes, performance (i.e., impressions, spend), and type of sponsoring organization (i.e., government, advocacy), this study will inform future social media health education campaigns.

2. Materials and methods

2.1. Data collection

Data were drawn from Snapchat’s publicly available library of political ads from 2019 (<https://snap.com/en-US/political-ads>). Data included the ad (video or picture), its corresponding ad metrics, including *Ad Spend* (total dollar amount spent on an ad), *Ad Impressions* (total number of times an ad was viewed by Snapchat users), *Target Audience* (e.g., 15–17, 15–24, 13–16 years of age), and *Sponsoring Organizations* (e.g., Government (e.g., California Department of Public Health Education) and Advocacy organizations (e.g., Truth Initiative)). The sampling frame consisted of (n = 1790) ads released in the U.S. Ads included a combination of a still image, video or text overlaid on a still image or video. Four coders were trained on coding procedures by the lead and senior authors. Each coder was assigned ads from the sampling

frame to identify (n = 70) tobacco- (i.e., ads referencing the topic of tobacco, including e-cigarettes) and (n = 64) cannabis-related ads (i.e., ads referencing the topic of cannabis including marijuana).

2.2. Coding strategy

The unit of analysis consisted of the ad image or video and, when present, the text overlay. Investigators worked collaboratively to become familiar with the data, generated a coding frame, and identified commonly appearing themes. *Ad Themes* included (A) *Health Consequences* (e.g., harm to lungs, air pollution, secondhand smoke exposure), (B) *Financial & Legal Consequences* (e.g., loss of a scholarship, fines), (C) *Quitting* (e.g., “Ready to quit Juul? We can help. Text DITCHJUUL to 88709”), (D) *Industry Tactics* (e.g., “Big tobacco wants to Fuul you”), (E) *Policy Advocacy* (e.g., Let’s decriminalize marijuana), and (F) *Other* (ads not categorized to the above-mentioned themes e.g., “Don’t let weed slow you down”). Please see Supplemental Table 1 for example ads for each category. Four authors coded the ads; a subsample (n = 22, 16.4% of the analytic sample) was double-coded to determine reliability. Coding discrepancies were resolved by the first and last author. Coding agreement was acceptable, ranging from Cohen’s kappa 0.73 to 1. (McHugh, 2012).

2.3. Measures

The Snapchat Ad Library also provided metrics pertaining to audience targeting and ad performance. Separate dichotomous variables pertaining to each of the *Target audience* groups comprised of: Adolescents (under 18 years of age) and Young adults (18–24 years), which were not mutually exclusive categories because Snapchat advertisers can target anyone under or over a specific age. For example, if an advertiser chose to target those under 21 years old, the ads reached adolescents and young adults. *Sponsoring Organizations* were categorized

Table 1
Characteristics of tobacco and cannabis-related ads.

	Tobacco-related ads			Cannabis-related ads		
	Overall tobacco (n = 70)	Targeting adolescents (n = 30)	Targeting young adults (n = 45)	Overall cannabis (n = 64)	Targeting adolescents (n = 26)	Targeting young adults (n = 43)
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Ad themes						
Health consequences	37 (52.86)	16 (53.33)	20 (44.44)	20 (31.25)	8 (30.77)	11 (25.58)
Financial and Legal consequences	0 (0)	0	0	7 (10.94)	6 (23.08)	2 (4.65)
Quitting	18 (25.71)	9 (30.00)	14 (31.11)	0 (0)	0	0
Industry tactics	8 (11.43)	0	8(17.78)	0 (0)	0	0
Policy advocacy	1 (1.43)	0	1(2.22)	14 (21.88)	0	14(32.56)
Other	2 (2.86)	2(6.67)	0	18 (28.13)	7(26.92)	14(32.56)
Ad metrics						
Impressions M(SD)	2,532,111 (5,702,493)	4,122,071 (7,759,205)	2,151,217 (5,027,145)	331,226.5 (320646.8)	415,293.8 (262,814.8)	293,267.7 (337,050.1)
Spend M(SD)	7,027.9(13059.3)	10,385.6 (15,313.62)	5,382.13 (10,330.21)	802 (664.82)	793.92(490.64)	740.58(733.14)
Sponsoring organizations						
Government	67 (95.71)	0	1 (2.22)	19 (29.69)	26 (100)	24 (55.81)
Advocacy	3 (4.29)	30 (100)	44 (97.78)	45 (70.31)	0	19 (45.19)

Notes:

1. *Targeting adolescents* and *Targeting young adults* were not mutually exclusive categories because Snapchat advertisers can choose to target anyone under or over a specific age. For example, if an advertiser chose to target those under 21 years old, the ads reached both adolescents and young adults.
2. The *Overall tobacco* or *Overall cannabis* columns represent ads targeted at all age groups (i.e., adolescents, young adults, and other age groups). Excess ads for some of the *Ad Themes* (i.e., $(\text{N}_{\text{RowOverallTobacco}} - \text{N}_{\text{Rowsum(Targeting adolescents and Targeting young adults)}})$ or $(\text{N}_{\text{RowOverallCannabis}} - \text{N}_{\text{Rowsum(Targeting adolescents and Targeting young adults)}})$) were targeted at age groups other than adolescents and young adults.
3. Ads in the dataset were targeted at both adolescents and young adults. As a result, for many *Ad Themes*, the row sum of ads in the *Targeting adolescents* and *Targeting young adults* column may be higher than the number of ads indicated in the corresponding row of the *Overall tobacco* or *Overall cannabis* columns (i.e. $\text{N}_{\text{Rowsum(Targeting adolescents and Targeting young adults)}} > \text{N}_{\text{RowOverallTobacco}}$ or $\text{N}_{\text{Rowsum(Targeting adolescents and Targeting young adults)}} > \text{N}_{\text{RowOverallCannabis}}$).
4. Sponsoring organizations included: Truth Initiative, California Department of Public Health Education, Warren for President, North Central District Health Department (NCDHD), City of Denver, Cannabis Control Commission, CoMo/Boone County PHHS, Facts over Flavors, Fuul, Make it Legal Florida.
5. Themes for 4 tobacco-related ads and 5 cannabis-related ads could not be determined because the corresponding hyperlinks to the actual ads were either missing or not working.

in terms of Government (e.g., California Department of Public Health Education) and Advocacy organizations (e.g., Truth Initiative) based on the information listed on the organization's official website. *Ad Impressions* (number of times an ad was viewed) and *Ad Spend* (dollar value spent on an ad) were also included. Data collection and analyses were approved by the Institutional Review Board of the senior author's university.

2.4. Analysis

Descriptive statistics, including total and percentage or mean number of ads for each theme, were calculated using Stata 16.0 (College Station, TX). [Table 1](#) presents characteristics of tobacco- and cannabis-related ads. Columns *Overall tobacco* and *Overall cannabis* indicate the n(%) of all ads pertinent to tobacco and cannabis and targeted at all age groups (i.e., adolescents, young adults, and other age groups), *Targeting young adults* and *Targeting adolescents* indicate the n(%) of ads reaching those respective age groups. Ads for some of the *Ad Themes* (i.e., $(n_{\text{RowOverallTobacco}} - n_{\text{Rowsum(Targeting adolescents and Targeting young adults)})$ OR $(n_{\text{RowOverallCannabis}} - n_{\text{Rowsum(Targeting adolescents and Targeting young adults)})$) were targeted at age groups other than adolescents and young adults. Ads in the dataset were also targeted at both adolescents and young adults. As a result, for many *Ad Themes*, the row sum of ads in the *Targeting adolescents* and *Targeting young adults* column may be higher than the number of ads indicated in the corresponding row of the *Overall tobacco* or *Overall cannabis* columns (i.e. $n_{\text{Rowsum(Targeting adolescents and Targeting young adults)}} > n_{\text{RowOverallTobacco}}$ OR $n_{\text{Rowsum(Targeting adolescents and Targeting young adults)}} > n_{\text{RowOverallCannabis}}$).

3. Results

Among the tobacco-related ads, the most common theme was *Health Consequences* (52.9% overall tobacco, 53.3% ads targeting adolescents, 44.4% ads targeting young adults), followed by *Quitting* (25.7% overall tobacco, 30% ads targeting adolescents, 31.1% ads targeting young adults), and *Industry Tactics* (11.4% overall tobacco, 0% ads targeting adolescents, 17.8% ads targeting young adults). Ads targeting adolescents had higher *Ad Impressions* (Overall tobacco: Mean: 2,532,111 [SD: 5,702,493], Ads targeting adolescents: Mean: 4,122,071 impressions [SD: 775,9205 views]; Ads targeting young adults: Mean: 2,151,217 views [SD: 502,7145 impressions]) and higher *Ad Spend* (Overall tobacco: Mean: \$7,027.9 [SD: \$13,059.3], Ads targeting adolescents: Mean: \$10,385.6 [SD: \$15,313.62]; Ads targeting young adults: Mean: \$5,382.1 [SD: \$10,330.2]). Government organizations sponsored a majority of the ads overall (95.7%). Government organizations did not sponsor any ads targeted towards adolescents and only 1 ad targeted towards young adults.

Among the cannabis-related ads, the most common theme was *Health Consequences* (31.2% overall cannabis, 30.8% ads targeting adolescents, 25.6% ads targeting young adults), followed by *Policy Advocacy* (21.9% overall cannabis, 0% ads targeting adolescents, 32.6% ads targeting young adults), and *Financial and Legal Consequences* (10.9% overall cannabis, 23.1% ads targeting adolescents, 4.6% ads targeting young adults). Ads targeting adolescents had higher *Ad Impressions* (Overall cannabis: Mean: 331,226.5 impressions [SD: 320,646.8 impressions], Ads targeting adolescents: Mean: 415,293.8 impressions [SD: 262,814.8 impressions]; Ads targeting young adults: Mean: 293,267.7 impressions [SD: 337,050.1 impressions]), and higher *Ad Spend* (Overall cannabis: Mean:\$802 [SD: \$664.82], Ads targeting adolescents: Mean: \$793.92 [SD: \$490.64]; Ads targeting young adults: Mean: \$740.58 [SD: \$733.14]). Advocacy organizations sponsored most of the ads (73.0%) but did not sponsor any ads targeted towards adolescents.

4. Discussion

This study characterized tobacco and cannabis-related ads targeted

towards adolescents and young adults on Snapchat. *Health Consequences* was a common theme among tobacco ads followed by *Quitting* and *Industry Tactics*. *Health Consequences* was a predominant theme among cannabis ads followed by *Policy Advocacy* and *Financial and Legal Consequences*. Most of the tobacco and cannabis ads received more than a million impressions. Government organizations sponsored none of the tobacco-related ads targeted at adolescents and none of the cannabis-related ads targeted at adolescents were sponsored by advocacy organizations, which may indicate future priority age groups for health education campaigns sponsored by these organizations.

Insights from this study add to the growing literature documenting characteristics of tobacco and cannabis ads appearing on social media platforms. While this study found that *Health Consequences* and *Quitting* were predominant themes for tobacco-related ads, prior research, investigating tobacco-related ads on Facebook and Instagram, found that tobacco regulations, addiction, and flavors were common themes. (Majmundar and Moran, 2021) Additionally, this study used objective ad metrics such as *Ad Impressions* and *Ad Spend*, overcoming limitations from instrument and recall bias that were present in prior ad evaluations. (Chan 2020) Collectively, these studies demonstrate that data from publicly available social media ad libraries can be used to provide an understanding of ad performance and cost by theme and inform tobacco and cannabis use prevention strategies. For example, the US FDA Center for Tobacco Products could use evidence-based narrative health communication strategies to develop *snaps* (or short videos) offering a meaningful narrative that could be a part of a series of other similar *snaps* in a campaign. For example, *snaps* could include narration of individuals' personal experience with smoking and resulting health effects. Similarly, nonprofit public health organizations can create health education campaigns that include *snaps* of adolescents sharing their experience with vape cessation support offered by these organizations. Campaigns supported federal agencies or advocacy organizations could also evaluate their campaign's reach using similar methods described in this study.

Tobacco and cannabis-related ads on Snapchat received impressions in the millions. Our findings could serve as baseline data for future ad campaigns. According to Snapchat's policy, ads that "promote cigarettes (including e-cigarettes), cigars, vaping products, tobacco, nicotine, or related products of any kind" are prohibited. (Snap Inc., 2022) Leveraging Snapchat's platform features can help monitor and amplify the reach of health education campaigns. For instance, incorporating *Snapcodes* (codes similar to QR codes) in health messages can link members of the audience to additional evidence-based resources related to cessation. As indicated by past work, use of geofencing to deliver tailored messages to adolescents and young adults in specific geographic locations could improve the impact of the messages. (England et al., 2021) More generally, ad targeting features are available on most social media platforms suggesting that communication strategists could deploy similar messaging across platforms and evaluate exposure and engagement by target population. This may be crucial while considering hard-to-reach populations or those who may be priority populations for tobacco or cannabis use prevention.

Government and advocacy organizations may turn to Snapchat for targeted reach for their tobacco and cannabis-related ads. Using a public dataset, the present study demonstrated how a communication strategist could collect and analyze ad metrics to inform future efforts. For example, a campaign may find that highlighting health consequences of poly-use of cannabis and tobacco (e.g., vaping marijuana) may outperform a campaign that highlights legal consequences. Future research should explore determining factors shaping ad performance metrics on the adoption of sponsored social media health education campaigns.

Findings may not generalize to other social media platforms or other time periods. This study could not determine if each ad was viewed in its entirety or viewed passively. This study was unable to determine whether all tobacco or cannabis-related ads were captured in the library or perform significance testing between themes and other categories of

ads due to sample size. Additionally, we were unable to compare characteristics of ads sponsored on Snapchat and other platforms during 2019, which limits the interpretability of the findings. However, a prior study suggests that a million views or impressions is considered large on social media platforms. (Escobedo et al., 2021).

5. Conclusions

This study was the first to characterize tobacco and cannabis-related ads on Snapchat, describing ad performance and reporting on the sponsoring organizations. By documenting ad themes, performance (i.e., impressions, spend), and type of sponsoring organization, this study should provide information that communication strategists can utilize in the future.

CRedit authorship contribution statement

Anuja Majmundar: Conceptualization, Methodology, Software, Formal analysis, Data curation, Writing – original draft, Writing – review & editing. **Maya Chu:** Formal analysis, Writing – review & editing. **Cindy Perez:** Formal analysis, Writing – review & editing. **Yannie Hoang:** Formal analysis, Writing – review & editing. **Jared Yuan:** Formal analysis, Writing – review & editing. **Jennifer B. Unger:** Writing – review & editing, Supervision, Funding acquisition. **Jon-Patrick Allem:** Conceptualization, Writing – review & editing, Supervision, Funding acquisition.

Declaration of Competing Interest

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

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References

- Allem, J.-P., Escobedo, P., Chu, K.-H., Soto, D.W., Cruz, T.B., Unger, J.B., 2017. Campaigns and counter campaigns: Reactions on Twitter to e-cigarette education. *Tob. Control* 26 (2), 226–229.
- Atusingwize, E., Lewis, S., Langley, T., 2015. Economic evaluations of tobacco control mass media campaigns: a systematic review. *Tob. Control* 24 (4), 320. <https://doi.org/10.1136/tobaccocontrol-2014-051579>.
- Chan, L., O'Hara, B., Phongsavan, P., Bauman, A., Freeman, B., 2020. Review of evaluation metrics used in digital and traditional tobacco control campaigns. *J. Med. Internet Res.* 22 (8), e17432 <https://doi.org/10.2196/17432>.
- England, L.J., Bunnell, R.E., Pechacek, T.F., Tong, V.T., McAfee, T.A., 2015. Nicotine and the developing human: A neglected element in the electronic cigarette debate. *Am. J. Prev. Med.* 49 (2), 286–293.
- England, K.J., Edwards, A.L., Paulson, A.C., et al., 2021. Rethink Vape: Development and evaluation of a risk communication campaign to prevent youth E-cigarette use. *Addict. Behav.* 113 <https://doi.org/10.1016/j.addbeh.2020.106664>.
- Escobedo, P., Rosenthal, E.L., Saucier, C.J., et al., 2020. Electronic cigarette product placement and imagery in popular music videos. *Nicotine Tob. Res.* 23 (8), 1367–1372. <https://doi.org/10.1093/ntr/ntaa273>.
- FDA Center for Tobacco Products. Research priorities, 2019. <https://www.fda.gov/tobacco-products/research/research-priorities>. January 6, 2022.
- Jasinska, A.J., Zorick, T., Brody, A.L., Stein, E.A., 2014. Dual role of nicotine in addiction and cognition: a review of neuroimaging studies in humans. *Neuropharmacology* 84, 111–122.
- Majmundar, A., Moran, M.B., 2021. For or against tobacco control: Sponsored tobacco advocacy messages on Facebook and Instagram. *Nicotine Tob. Res.* <https://doi.org/10.1093/ntr/ntab111>.
- Majmundar, A., Le, N., Moran, M.B., et al., 2020. Public response to a social media tobacco prevention campaign: content analysis. *JMIR Public Health Surveill* 6 (4). <https://doi.org/10.2196/20649>.
- NIDA. Marijuana, 2021. <https://www.drugabuse.gov/drug-topics/marijuana>. June 3, 2021.
- C.D.C. Marijuana and public health, 2021. <https://www.cdc.gov/marijuana/index.htm>.
- Massey, Z.B., Brockenberry, L.O., Harrell, P.T., 2021. Vaping smartphones and social media use among young adults: Snapchat is the platform of choice for young adult vapers. *Addict. Behav.* 112, 106576. <https://doi.org/10.1016/j.addbeh.2020.106576>.
- McHugh, M.L., 2012. Interrater reliability: the kappa statistic. *Biochem. Med. (Zagreb)* 22 (3), 276–282.
- Meernik, C., Jarman, K., Wright, S.T., Klein, E.G., Goldstein, A.O., Ranney, L., 2016. Eye tracking outcomes in tobacco control regulation and communication: a systematic review. *Tob. Regul. Sci.* 2 (4), 377–403. <https://doi.org/10.18001/TRS.2.4.9>.
- Pew Research Center. Teens, Social Media & Technology 2018, 2018. <https://www.pewresearch.org/internet/2018/05/31/teens-social-media-technology-2018/>. February 15, 2020.
- Pew Research Center. Social Media Use in 2020, 2021. <https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/>. May 25, 2021.
- Reuter, K., Wilson, M.L., Moran, M., et al., 2021. General audience engagement with antismoking public health messages across multiple social media sites: Comparative analysis. *JMIR Public Health Surveill* 7 (2), e24429. <https://doi.org/10.2196/24429>.
- Snap Inc. Snapchat Ads Measurement, 2021. <https://forbusiness.snapchat.com/advertising/measurement>. May 30, 2021.
- Snap Inc. Advertising Policies 2022, 2022. <https://snap.com/en-US/ad-policies>. January 6, 2022.
- Statista. Percentage of U.S. internet users who use Snapchat as of 3rd quarter 2020, by age group, 2020. <https://www.statista.com/statistics/814300/snapchat-users-in-the-united-states-by-age/>. January 3, 2022.
- CDC. Tobacco and Cancer 2020, 2020. <https://www.cdc.gov/cancer/tobacco/index.htm>. May 30, 2021.
- Valentine, G., Sofuoglu, M., 2018. Cognitive effects of nicotine: recent progress. *Curr. Neuropharmacol.* 16 (4), 403–414. <https://doi.org/10.2174/1570159X15666171103152136>.