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Representation of commercial and traditional tobacco on social media: deconstructing historical narratives to address the Indigenous youth tobacco epidemic

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ABSTRACT

Background Tobacco has significant cultural and spiritual uses in many Indigenous communities. The tobacco industry has long appropriated American Indian or Alaska Native (AI/AN or Indigenous) cultural imagery in print media and signage to advertise commercial tobacco products. In the internet era, little is known about the representation of commercial tobacco product advertising using AI/AN terms and images on social media.

Methods With structured platform searches, custom data collection approaches and a combination of manual content analysis and natural language processing approaches (NLP), we identified and characterised content using the hashtag #TraditionalTobacco (specific to Indigenous contexts) on Instagram and Twitter.

Results Using a combination of manual annotation and NLP, we identified prevalent themes and discussion topics, such as misrepresentation of traditional AI/AN uses of tobacco, appropriation of AI/AN imagery in retail advertising of tobacco and different uses for tobacco among North American Indigenous communities in 486 Instagram posts and 89 tweets. The representation of retail and recreational use of tobacco was more prevalent than traditional tobacco use on Instagram, a platform popular among youth and adolescents, while tobacco-related conversations on Twitter (X) primarily focused on debunking misconceptions about traditional tobacco use. Several tobacco retailers using AI/AN imagery in their advertising claimed to be affiliated with an AI/AN community, but we were unable to verify if these claims were authorised or legitimate.

Conclusions Findings may inform the design of culturally appropriate tobacco cessation interventions among AI/AN youth and lead to greater regulation of commercial tobacco product advertising.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Tobacco retail advertising is targeted towards vulnerable populations, but there is an evidence gap specific to the misuse of Indigenous terms and imagery to promote online commercial tobacco product sales.

WHAT THIS STUDY ADDS

⇒ A review of content using a hashtag specific to Indigenous communities found that the representation of content depicting retail advertising of tobacco far exceeded traditional Indigenous uses of tobacco and health promotion efforts. Retail commercial tobacco advertising using Indigenous cultural imagery was not flagged as potentially sensitive content by platforms.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The findings of this study illustrate how triballydirected infodemiology approaches can respect Indigenous Data Sovereignty and inform American Indian or Alaska Native (AI/AN) public health practice. This study also identifies opportunities for regulation of commercial advertising of tobacco on social media and development of AI/AN tobacco cessation interventions and policy initiatives.

INTRODUCTION

According to the Centers for Disease Control and Prevention, 22.6% of American Indian and Alaska Native (AI/AN) adults smoke cigarettes, making smoking more common among this group compared with any other racial group.[1] The use of commercial tobacco and related products among AI/AN adolescents is a serious public health concern in the USA. It is estimated that AI/AN adolescent current cigarette use is at 16.2% (vs 5.8% of peers) and AI/AN adolescent current vape use at 40.0% (vs 27.5% of peers).[2–4] Compared with non-Hispanic white adolescents, AI/AN adolescents display higher prevalence of lifetime and past 30-day vaping, as well as use of both e-cigarettes and cigarettes, underscoring the need to better understand social drivers of cigarette, vape and related substance use disparities.[5–9]

The underlying aetiologies of AI/AN commercial tobacco use are complex and must be understood through a lens that incorporates historic influences on AI/AN health.[10 11] Long before the commercialisation of tobacco, many AI/AN communities used tobacco for ceremonial and spiritual purposes.[12 13] Centuries of hostility towards AI/AN communities disrupted many traditional practices, including ceremonies, dances and the use of tobacco by elders and healers.[14–16] The disruption of AI/AN cultures has contributed to many of the disparities that are observed today, including tobacco-related health disparities.[7 17–22]

The resurgence of AI/AN cultural practices has facilitated research aimed at addressing health disparities. This includes supporting cultural connectedness, which promotes health in AI/AN adolescents and discourages adverse substance

use.[23] In the setting of traditional tobacco use, researchers have sought to understand drivers of commercial tobacco use among AI/AN adults and adolescents, cultural protective factors against AI/AN alcohol and substance use, and marketing of commercial tobacco products to AI/AN communities.[24–27] It is thought that misuse of AI/AN cultural imagery by the tobacco and sports industries, among others, distorts the importance of cultural connectedness and may contribute to AI/AN-tobacco and related substance use disparities.[28–31] For example, a focus group of AI/AN adolescents in California found that respondents saw these types of AI/AN-based depictions as offensive and stereotypical to their respective cultural traditions and uses of tobacco.[22] Another survey of AI/AN adolescents in California found that self-reported cultural and ethnic identity was negatively associated with cigarette and alcohol use.[32]

In the Internet era, there is interest in understanding how users interact with social media content and topics specific to AI/AN communities, such as culture, identity and health.[33–36] To date, the number of studies investigating themes associated with traditional tobacco, including the use of AI/AN cultural imagery in digital commercial tobacco advertising targeted towards AI/AN users, is limited, with no social media research having been done to our knowledge. Youth and adolescents engaging with online commercial tobacco advertising may be more susceptible to tobacco use.[37–39]

Prior studies have analysed social media data to characterise marketing of commercial tobacco products, analyse tobacco-related content and user discourse about product appeal and identify opportunities for policy initiatives aimed at advancing state and federal tobacco control goals.[40 41] In this study, we conduct a multiplatform social media infodemiology study (ie, studying the determinants and distribution of information in electronic media to inform public health) of text-based and image-based content containing depictions of commercial and traditional tobacco use. The objective was to identify major themes and forms of engagement associated with traditional tobacco discourse and propose multilevel public health and policy recommendations.

METHODS

This multiplatform infodemiology study involved data collection and analysis from two social media platforms: Twitter (X) and Instagram specific to the keyword "traditional tobacco" and hashtag "#TraditionalTobacco." The rationale and process for keyword selection are detailed in online supplemental file 1. These platforms were chosen on the basis of their diversity of platform features (eg, Twitter (now known as 'X'), a microblogging platform, and Instagram, an image and video sharing site,) general availability of data and the prevalence of traditional tobacco-related content as detected in manual searches. A subanalysis of Reddit data is included in online supplemental file 1, which we excluded based on the discussion board style of that platform.

Instagram is a popular video and image sharing social media platform among youth and adolescents, where 62% of American teenagers ages 13–17 reported using it compared with 47% of adults.[42 43] Twitter (X) is a popular microblogging social networking site that is used by an estimated 23% of American teens and 22% of adults.[42 43] Importantly, it is a platform observed as including online discourse regarding various AI/AN-specific discussion topics, tobacco promotion and tobacco use.[35 44 45] These platforms were also chosen over others such as Snapchat and WhatsApp, because Twitter and Instagram are open-network platforms rather than closed-network platforms focused on one-to-one messaging, closed-group messaging and tiers of restricted access set by individual users. Other platforms, TikTok and YouTube, though popular among youth, are primarily video sharing platforms, requiring different data collection and content coding approaches compared with the reliance on text analysis that was conducted in this study.

Data collection for text and image-based data was accomplished using custom data collection approaches in the Python programming language for Instagram and using the public streaming API for Twitter. A total of 486 Instagram posts posted between 2014 to 2022 were returned in July 2022, and a total of 17 456 Tweets posted between 2009 and 2023 were returned. Additional details regarding the data collection and cleaning process are available in online supplemental file 1.

Data analysis

Codebook development

A deductive coding scheme adapted from a methodological review of tobacco-related research on social media by Malik *et al* was used as a general framework to code textual and image data from Instagram and Twitter, which we detail in online supplemental file 1.[46–52] In short, our adapted codebook identified manual content coding approaches focused on visually inspecting a social media post comment, image and metadata for themes including characteristics of commercial tobacco advertisements, type of tobacco use or behaviour depicted (recreational vs commercial or retail), individual or organisation posting content and user engagement. The code book was first developed by author AJC, who then presented it to the content for consensus agreement by authors TM and TKM. Our major inclusion criteria for study-relevant content were posts containing words or phrases abstracted from Malik *et al* and other AI/AN-focused literature and health promotion campaigns we identified, especially if there was phrasing or imagery specific to our content categories. Ultimately, our four major categories (recreational use, cultural use, advertising and health promotion) were derived from our review of existing traditional tobacco literature and existing AI/AN social media reviews to develop a study code book appropriate for the platforms included in this study.[35 52 53] Additional content analysis focused on characterisation of traditional tobacco discourse on social media and included whether a retail brand or non-profit organisation claimed to be AI/AN or AI/AN-affiliated; whether content depicted recreational use or described AI/AN traditional tobacco use or was associated with a health promotion campaign or effort to push back against misrepresentation of traditional tobacco among Indigenous communities; and if content used AI/AN or Indigenous cultural imagery to market commercial tobacco products.

Content analysis and thematic detection

Data analysis was conducted specific to the volume and type of data per each platform analysed. For Instagram, due to the relatively low volume of data collected, all content was manually annotated using the deductive content coding approach described. We categorised study-relevant Instagram posts into four specific themes, including recreational tobacco use, retail advertising of commercial tobacco (eg, cigarettes, vapes), AI/AN traditional tobacco use and AI/AN traditional tobacco health promotion campaigns or efforts. Annotations were also made if retail content used AI/AN cultural imagery. Additional hashtags used in tweets were also collected to elucidate traditional tobacco health promotion campaign engagement and general theme

construction based on hashtag keywords and co-occurrence. The level of user engagement (the number of comments made by users to a post) was also assessed between content themes using two-tailed t-tests, but none were significant at the level of alpha=0.05.

For Twitter (X), due to the larger dataset collected, analysis was first conducted using a pretrained natural language processing model (the two-word k-means Bidirectional Encoder Representations from Transformers (BERTopic V.0.6.0) model) to identify content associations for subsequent manual annotation relevant to the study inclusion criteria and objective.[54] As an unsupervised model, BERTopic clustered topics were then manually reviewed and selected for relevance annotated per the study code book. Specifically, the Top 100 Tweets from each outputted cluster (based on interaction score and not all clusters had at least 100 posts, n=1833) were analysed by the authors using the study code book and specifically for characterising any discussion related to AI/AN traditional tobacco themes of interest.

For all codes, a kappa value of 0.965 for content signal and manual annotation was obtained between authors AJC and TM, who have experience reviewing substance use content on social media. Consensus was reached for all disagreements. For more details on specific content analysis and thematic detection on each platform, please see online supplemental file 1.

RESULTS

Each platform had different subthemes discussed by online users among the defined content categories. Retail advertising of commercial tobacco products was only detected in the Instagram sample, whereas Twitter focused more on differentiating commercial and traditional tobacco use and health promotion. The size of the data samples and proportion of study-relevant content (signal) also varied between platforms. The highest proportion of content focused on traditional use of tobacco or health promotion efforts was on Instagram (15%, n=73 posts), followed by Twitter (4%, n=74 out of 1833 posts) (see table 1).

Instagram

A total of 486 Instagram posts were identified from 2014 to 2022 (the timeline for all content responsive to the API search) that contained the hashtag or phrase #TraditionalTobacco. Recreational tobacco use was the most prevalent theme in the sample (n=321, 66%), followed by retail advertising of commercial tobacco (n=92, 19%), depictions of AI/AN traditional tobacco use (n=44, 9%), AI/AN traditional tobacco health promotion (29, n=6%) and use of AI/AN cultural imagery (n=7, within the retail advertising content). Retail advertising of commercial tobacco products (eg, pipes, hookah) on Instagram often described traditional tobacco products as natural or additive free. Additional advertising content incorporated historical AI/AN use of tobacco on their websites to market snuff (powered tobacco) for inhalation or systemic absorption in the mouth.

User engagement on Instagram (defined as comments per post) was comparable between themes detected for AI/AN traditional tobacco use (average number of comments per post=1.26) and retail advertising of commercial tobacco (avg=1.25) and lowest for AI/AN traditional tobacco health promotion campaigns (avg=0.48). When specifically examining platform posts involving AI/AN health promotion content on Instagram, we observed that engagement with this content was less than engagement with other types of content detected, suggesting that these campaigns may have limited reach to their intended audiences compared with other forms of content mentioning #TraditionalTobacco (health promotion vs advertising, p=0.1030).

Identified social media health promotion campaigns (eg, from the American Indian Cancer Foundation) included user and population-specific hashtags (eg, #AmericanIndian, #AlaskaNative) or culturally informed messaging (eg, #BreathIsSacred) and are reported in table 2 along with other hashtags that were also present. These additional hashtags provide initial context to other co-occurring themes or conversational groupings that users associate with a #TraditionalTobacco mention in an Instagram post, though they were not further subcoded for thematic meaning beyond their content theme (eg, health promotion, retail advertising, recreational use or AI/AN traditional tobacco use).

When comparing hashtags used in Instagram posts (table 2), retail advertising of commercial tobacco and recreational tobacco use content themes had higher use of hashtags compared with posts in the health promotion and AI/AN traditional tobacco use categories. The most prevalent AI/AN traditional tobacco user-generated hashtags in our sample were #2spirit (n=36) and #Ancestralhealing (n=9), which are also culturally significant terms based on gender and spirituality. The two most used hashtags for AI/AN traditional tobacco health promotion were #AlaskaNative (n=18) and #AmericanIndian (n=11), which are racial identifiers that may promote community identification or result in this content being targeted towards specific user groups. Other health-related hashtags in health promotion #TraditionalTobacco content included intersections with cancer, Chronic Obstructive Pulmonary Disease (COPD) and anxiety. Hashtags specific to AI/AN communities were not detected in retail advertising and recreational use themes.

Twitter (X)

After conducting unsupervised topic exploration, BERT produced 20 distinct content clusters from the set of unduplicated Tweets. Content was clustered based on detected semantic

Table 1 Summary description of Instagram results based on exemplar content themes

Theme (*Subtheme)	Theme size (%)	Exemplar post
Recreational Tobacco Use	321 (66)	*My favorites: coffee, [snuff product], and dark chocolate.*
Retail Advertising of Commercial Tobacco	92 (19)	*[Pipe tobacco product] is back on shelves! Buy it from [link] or go to link in biography.*
AI/AN Traditional Tobacco Use	44 (9)	*We will soon have asemaa available in the form of dried leaf, flowers, and seeds. Keep tobacco sacred.*
AI/AN Traditional Tobacco Health Promotion Campaigns	29 (6)	*Keep tobacco sacred while protecting your children and future generations from commercial tobacco. Get help to quit smoking by calling the American Indian Commercial Tobacco Program.*
Use of AI/AN Cultural Imagery by Retail Advertiser*	7 (1)	Image content: drums, tomahawks, headdresses, bird feathers, peace pipes, 'Join the Tribe', 'Indigenous Owned', 'Cherokee', 'Mohawk-made'

AI/AN, American Indian or Alaska Native.

Table 2 Top 10 Instagram hashtags by tobacco content theme from 2014 to 2022

AI/AN traditional tobacco health promotion	#/(n)	Retail advertising of commercial tobacco	#/(n)	Recreational tobacco use	#/(n)	AI/AN traditional tobacco use	#/(n)
AlaskaNative	18	BAStobacco	83	1792flake	321	2spirit	36
AmericanIndian	11	BaranAlmasSahra	25	221b	149	Ancestralhealing	9
Anishinaabe	8	Cigar	25	221bbakerstreet	143	Camagu	7
Anishnaabe	8	Cigarette	21	6photosnuff	142	DetroitHustlesHarder	6
Anxiety	8	Denpasar	18	8deco	138	DreamOfWildHealth	6
BreathisSacred	7	Djember	18	Flensburger	130	Edmonton	6
CDCTips	7	Ecommerce	18	Gawithtobacco	120	IndigenousKnowledge	5
COPD	6	FlavourTobacco	17	Hoegaarden	119	KNOW	5
CRIHB	6	Gawithtobacco	17	Kendal	119	LetsGo	5
Cancer	6	HookahTobacco	17	Savinelli	108	Lit	5
Total (n, %)	85 (4)		259 (14)		1489 (77)		90 (5)

AI/AN, American Indian or Alaska Native; CDC, Centers for Disease Control and Prevention; COPD, Chronic Obstructive Pulmonary Disease; CRIHB, California Rural Indian Health Board.

similarity. With BERT, observations can only be made within a cluster, not between clusters. After coding the Top 100 Tweets in each cluster (those most interacted with based on metadata), there were a total of 89 of 1833 study-relevant unique Tweets detected. There were three clusters that had at least four study-relevant Tweets (clusters 2, 10 and 17), which are detailed by category theme (manually annotated) and an example post (paraphrased for anonymity) in table 3. All clusters featured conversations pertaining to Indigenous tobacco use. Cluster 10, a mix of personal accounts and health promotion efforts, was the largest of the three samples (including themes of appropriation of Indigenous cultures, community movements, purpose of traditional tobacco and health effects). Content primarily focused on the holistic health benefits of traditional tobacco use in Indigenous communities, community movements about reclaiming tobacco for cultural use, and a case study on how traditional tobacco and culture can be used as adjuncts to Western medical treatments. Cluster 2 focused on personal accounts differentiating between commercial tobacco products and traditional tobacco in First Nations and other Indigenous communities. Themes included negative sentiment posts about cannabis use, educational articles about traditional tobacco and mentions of traditional tobacco health promotion campaigns using hashtags similar to those observed in the Instagram sample. Cluster 17 exclusively contained health promotion content about distinguishing between different kinds of tobacco use. This was the only cluster that discussed cultural humility or safety in the context of asking Indigenous users about their own tobacco use in a non-stigmatising manner, asking whether they use it recreationally or for cultural purposes. A table is available in online supplemental file 1 detailing the exemplar subthemes and topics we observed in these clusters.

DISCUSSION

To date, no research study has investigated #TraditionalTobacco content using keywords specific to Indigenous communities (eg, AI/AN, First Nations) on social media. In this tribally directed infodemiology study, we examined hundreds of social media posts using multiple approaches for content coding and topic modelling on traditional tobacco content with social and cultural relevance to AI/AN populations. Here, the utility of topic modelling is that large amounts of data can be sorted based on a content feature, such as semantic similarity, then manually reviewed for topics of interest. We were able to sort through thousands of posts from Twitter (X) and content specific to AI/AN traditional tobacco use and health promotion. Interestingly, no posts in our identified sample contained tobacco advertising content, unlike what we observed on Instagram, suggesting that individuals and retailers favour specific platforms for dissemination of content.

Our study found that retail advertising of commercial tobacco that represents itself as traditional tobacco is more represented than AI/AN traditional tobacco use. We also identified retailers using AI/AN cultural imagery to market their products, similar to appropriations of AI/AN imagery and cultural expressions (eg, Natural American Spirit brand) in historical tobacco marketing. Prior studies have examined the misappropriation of AI/AN culture and traditional tobacco by the industry as a marketing tactic in non-digital promotional materials (eg, product packaging, print ads, radio), but not on dynamic social media platforms.[28] This branding may suggest to consumers that these tobacco products are 'traditional' in the sense of being free of artificial ingredients and additives (eg, flavours). All of these specific products were marketed for recreational use.

Table 3 Summary description of Twitter (X) results based on category codes

Cluster	Size	Category (n, %)	Exemplar post
Cluster 10	56	Traditional tobacco use (27, 48)	*I plan to offer tobacco and carry sage to my vaccine appointment this weekend. Combining Western and traditional medicines is possible.*
		AI/AN traditional tobacco health promotion (29, 52)	*Join us and our Indigenous social work on [date] to discuss traditional vs commercial tobacco and the dangers of second-hand smoke.*
Cluster 2	14	Traditional tobacco use (14, 100)	*I will put tobacco into my traditional regalia for my own use and to share with event attendees.*
Cluster 17	4	AI/AN traditional tobacco health promotion (4, 100)	*We would like to distinguish between different uses of tobacco, particularly in Indigenous communities.*

AI/AN, American Indian or Alaska Native.

The adverse health impacts of commercial tobacco use are significant. We observed that no commercial tobacco product advertising on social media included a platform-specific health warning statement, suggesting that there may be regulatory gaps allowing companies, retailers and other organisations to market and distribute their products on social media platforms. Monitoring and regulation of online tobacco advertising has long been identified as a challenge due to the rapid dissemination of posts on multimedia and internet-based platforms and may be specifically challenging when targeted towards AI/AN communities.[37] This accessibility has the potential to further health disparities, especially among adolescent tobacco users who may be more vulnerable to the social pressures of tobacco use and warrants additional research specific to the assessment of disclosure and presentation of health warning specific language for AI/AN-related tobacco commercial product content.

Further, in our sample of data, AI/AN health promotion campaigns had fewer interactions among Instagram users compared with tobacco product advertising content, suggesting that important public health content may not be reaching users. Promoting health campaigns against tobacco use is critical, as certain AI/AN populations may lack resources to improve health literacy to understand the potential harms of commercial tobacco use. Hence, these preliminary results warrant further research into how commercial tobacco-related content that uses AI/AN hashtags, imagery, and social and cultural expressions are elevated in user feeds algorithmically and may lead to greater engagement, including the potential impact of marketing strategies (eg, selection of hashtags, product promotional content)

In the context of traditional tobacco use, one post (shown in table 3, cluster 2) incorporated mentions of cultural regalia and cultural identity with the use of traditional tobacco, which reaffirms findings from the federal government that cultural connectedness and traditional tobacco are important to Indigenous Peoples.[13] Recently, several AI/AN-specific tobacco prevention and cessation initiatives (eg, the SmokefreeNATIVE initiative between the US National Cancer Institute and Indian Health Service) have launched, including campaigns specifically targeting AI/AN youth vaping prevention (eg, the US Food and Drug Administration Next Legends Campaign). These initiatives can help counter pro-smoking messaging and other advertising content reported in this study.

To counter heavy exposure to retail advertising and tobacco and vaping-related content misusing AI/AN cultural imagery on social media, AI/AN communities and advocates may be able to use these same platforms to reclaim cultural narratives and overcome stereotypical representations of AI/AN communities. Such efforts can prioritise AI/AN cultures, values and traditions in the design and implementation of social media-based health interventions.[55 56 57] Other strategies include legal and regulatory reform of legislation protecting AI/AN cultures and expressions. For example, the US Indian Arts and Crafts Act of 1990 prohibits the use of AI/AN art, craft products and related imagery in retail advertising unless the seller is affiliated with an AI/AN government.[58–60] Considering these issues, we present some preliminary recommendations for appropriate stakeholders that address issues related to tobacco control and traditional tobacco practices as they pertain to AI/AN individuals and communities (see box 1). Acting on these recommendations and identifying best practices in related health promotion efforts may better promote cultural uses of traditional tobacco and cessation of commercial tobacco products among AI/AN adolescents and other groups experiencing tobacco-related health disparities.

Box 1 Multilevel recommendations for stakeholders when addressing tobacco control and traditional tobacco use in community-based settings and social media platforms

Indigenous communities and health programmes

⇒ Embed traditional tobacco teachings into cultural revitalisation programmes.
⇒ Engage K-12 students in American Indian or Alaska Native (AI/AN) health organisations in traditional tobacco health promotion campaigns and promote healthy social networks.
⇒ Disseminate best practices promoting commercial tobacco cessation and non-use for implementation in other culturally distinct communities.
⇒ Identify youth ambassadors to discuss importance of tobacco cessation and launch social media campaigns to connect with their peers.

Tobacco retailers

⇒ Partner with local Indian Health Service, Tribal and Urban Indian Health Programmes to identify commercial tobacco product advertising that may further stereotyping against or misrepresent AI/AN cultures.

Local, tribal, state and federal governments

⇒ Regulate the use of AI/AN imagery in commercial tobacco product advertising as a matter of public health.
⇒ Craft grantmaking and other funding opportunities for Tribal health programmes to develop culturally-appropriate tobacco cessation programmes.
⇒ Add a nominal excise tax to sales of commercial tobacco products on Tribal lands and use funding for tobacco cessation efforts.

Social media platforms

⇒ Implement supervised and unsupervised means of content moderation trained on tobacco use, attempted sales of commercial tobacco products and misuse or appropriation of AI/AN cultural imagery to sell retail products.
⇒ Revise content reporting policies to allow users and AI/AN health organisations to report culturally harmful content and multimedia.
⇒ Empower and promote AI/AN health promotion campaigns to advertise culturally appropriate messaging and media on Tribal lands at discounted rates.
⇒ Require account verification for commercial tobacco retailers with requirements that will minimise the risk of harm to social media users.
⇒ Institute user age filter for recreational tobacco-related use.

This non-exhaustive list of recommendations will require coordination between different Indigenous and non-Indigenous entities and robust community engagement with AI/AN Tribal governments who are able to regulate the sale of commercial tobacco products on their lands. Efforts specific to social media, such as engaging youth ambassadors and health-focused non-profits, might also consider promoting cultural narratives around traditional tobacco use and its significance in Indigenous cultures in partnership with AI/AN health organisations.

The insights generated from our research findings can be used by tribal public health practitioners to conduct focus groups and interviews with AI/AN youth with substance use disorders to develop social media-based interventions and

community-directed cessation programmes. Tribally directed infodemiology approaches should continue to be used to characterise other salient AI/AN health topics in partnership with AI/AN communities. By bringing together data scientists, public health practitioners and AI/AN health advocates to address the national substance use epidemic among AI/AN communities, disparities in tobacco and substance use can be narrowed while also promoting social media consent tailored for AI/AN social media users and can also inform the development of culturally appropriate tobacco prevention efforts and policy initiatives by AI/AN public health practitioners and allies.

Limitations

This study was limited to the collection and analysis of social media content from three platforms in the English language not inclusive of the full range of social media platforms available or widely used in North America and due to general data availability restrictions for some platforms not examined. It is also important that this social media study is not generalisable to the AI/AN population, nor did it analyse content from AI/AN individuals, but it may provide insights into how social media users interact with content specific to AI/AN discussion topics. This study also did not assess the age of users who interacted with traditional tobacco content, nor did it check if promotional content was connected to retailers who used sufficient age verification procedures. Despite these limitations, we believe this study provides important formative data that can be used to design surveys and interviews characterising how social media-based commercial tobacco advertising influences AI/AN adult and adolescents' attitudes and beliefs about traditional and commercial tobacco use.[59 60] Further, while infodemiology-driven social media research has the potential to rapidly collect, process and analyse user-generated data, it must also respect the privacy of users and communities in a way that does not further bias or discrimination against specific demographic groups. Social media users may not be aware that public platforms can be used for academic research and that there are potential risks of user reidentification that may lead to emotional distress and other harms.[61–63] It is also important to consider user demographics more or less likely to use these platforms, considering factors like age, household Internet access, and education attainment and how that may impact exposure to tobacco-related content. The responsible use of these data-driven technologies is paramount to public health, responsible conduct of research, and the generation of impactful infodemiology research that supports tobacco control goals in AI/AN and Indigenous communities.

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Contributors AJC, RC and TKM were responsible for the design of the work. AJC and ZL were responsible for data collection. AJC, TM and TKM were responsible for data review and analysis. All authors contributed to writing and approve of the final manuscript. Author TKM is the guarantor.

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