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## Authors

de Vere Hunt, Isabella

Cai, Zhuo Ran

Nava, Vanessa

et al.

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INCLUSIVITY IN PEOPLE, METHODS, AND OUTCOMES

RESEARCH ARTICLE

## A Social Media–Based Public Health Campaign to Reduce Indoor Tanning in High-Risk Populations



Isabella de Vere Hunt, BM, BCh,<sup>1,2</sup> Zhuo Ran Cai, MD,<sup>1</sup> Vanessa Nava, BS,<sup>1</sup>  
Natnaelle E. Admassu, MD, MS,<sup>3</sup> Stephanie Bousheri, BS,<sup>1</sup> Tiffani Johnson, BS,<sup>1</sup> Anna Tomz<sup>1</sup>,  
Jessica Thompson, BA,<sup>1</sup> Lucy Zhang, BA,<sup>1</sup> Sherry Pagoto, PhD,<sup>4</sup>  
Mackenzie R. Wehner, MD, MPhil,<sup>5,6</sup> Maya B. Mathur, PhD,<sup>7</sup> Eleni Linos, MD, MPH, DrPH<sup>1,8</sup>

**Introduction:** Indoor tanning beds cause more than 450,000 new skin cancers each year, yet their use remains common, with a global indoor tanning prevalence of 10.4%. Social media provides an opportunity for cost-effective, targeted public health messaging. We sought to direct Instagram users at high risk of indoor tanning to accurate health information about the risks of indoor tanning and to reduce indoor tanning bed use.

**Methods:** We disseminated a public health campaign on Instagram on April 6–27, 2022 with 34 video and still-image advertisements. We had 2 target audiences at high risk of indoor tanning: women aged 18–30 years in Kentucky, Nebraska, Ohio, or Tennessee interested in indoor tanning and men aged 18–45 years in California interested in indoor tanning. To evaluate the impact of the campaign, we tracked online metrics, including website visits, and conducted an interrupted time-series analysis of foot traffic data in our target states for all tanning salons documented on SafeGraph from January 1, 2018 to 3 months after the campaign.

**Results:** Our indoor tanning health information advertisements appeared on Instagram feeds 9.1 million times, reaching 1.06 million individuals. We received 7,004 views of our indoor tanning health information landing page (Average Time on Page of 56 seconds). We did not identify a significant impact on foot traffic data on tanning salons.

**Conclusions:** We show the successful use of social media advertising to direct high-risk groups to online health information about indoor tanning. Future research quantifying tanning visits before and after indoor tanning interventions is needed to guide future public health efforts.

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From the <sup>1</sup>Program for Clinical Research and Technology, Stanford University, Stanford, California; <sup>2</sup>Nuffield Department of Primary Care Health Sciences, Medical Sciences Division, University of Oxford, Oxford, United Kingdom; <sup>3</sup>Memorial Sloan Kettering Cancer Center, New York, New York; <sup>4</sup>Department of Allied Health Sciences, University of Connecticut, Mansfield, Connecticut; <sup>5</sup>Department of Health Services Research, The University of Texas MD Anderson Cancer Center, Houston, Texas; <sup>6</sup>Department of Dermatology, The University of Texas MD Anderson Cancer Center, Houston, Texas; <sup>7</sup>Quantitative Sciences Unit,

Department of Pediatrics, Stanford University, Stanford, California; and <sup>8</sup>Department of Dermatology, Stanford University, Stanford, California

Address correspondence to: Eleni Linos, MD, MPH, DrPH, Department of Dermatology, Stanford University, 269 Campus Drive, Suite 4235 CCSR, Palo Alto CA 94305. E-mail: [linos@stanford.edu](mailto:linos@stanford.edu).

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## INTRODUCTION

Indoor tanning causes more than 450,000 new skin cancers yearly, including 10,000 melanomas.<sup>1</sup> Yet, its use remains common, with a global indoor tanning prevalence of 10.4% in adults.<sup>2</sup> In the U.S., the highest rates of indoor tanning are reported among White women aged between 18–21 years.<sup>3</sup> However, *sexual minority men* (SMM), defined as gay and bisexual men, are also at high risk, with a sixfold higher lifetime prevalence of tanning bed use and more than twofold higher lifetime prevalence of skin cancer than heterosexual men.<sup>4</sup> In a population-based study, SMM aged between 18–34 years were found to have an indoor tanning prevalence of 19.6%, compared with 2% for straight men.<sup>5</sup> Furthermore, evidence suggests that the indoor tanning industry may be targeting SMM, with indoor tanning salons more likely to be located near neighborhoods with higher concentrations of male–male partnered households.<sup>6</sup>

Reducing indoor tanning is a key target in the Surgeon General's 2014 Call to Action to Prevent Skin Cancer.<sup>7</sup> Social media provides an opportunity for cost-effective, large-scale public health messaging to reduce indoor tanning, with the capacity to directly target distinct high-risk populations with targeted messaging.<sup>8</sup>

## METHODS

### Intervention

We designed a 3-week public health campaign for dissemination on Instagram with 34 video and still-image advertisements with the following themes: risk of skin cancer, risk of accelerated skin aging, targeting of SMM by the tanning industry, and celebrity messages encouraging skin protection (Figure 1). There was a total of 7 video advertisements, each 10–15 seconds long, and a total of 27 still-image advertisements. We utilized the Health Belief Model framework to inform our messaging,<sup>9</sup> developing advertisements conveying the risk of skin cancer (Figure 1A). We also designed content aiming to leverage appearance-based motivations for indoor tanning.<sup>10</sup> This approach has shown success in the field of smoking cessation, with a computer-generated photoaging intervention achieving behavioral change in young adults.<sup>11</sup> Furthermore, in a cluster-randomized trial of Brazilian secondary school pupils, the use of a photoaging app based on ultraviolet (UV) exposure along with information about UV protection resulted in an increase in self-reported skin cancer protection behavior in the intervention group.<sup>12</sup> We therefore developed a number of advertisements orientated around portraying rapid skin aging (Figure 1B). We also developed a new messaging technique designed for SMM, informed by in-

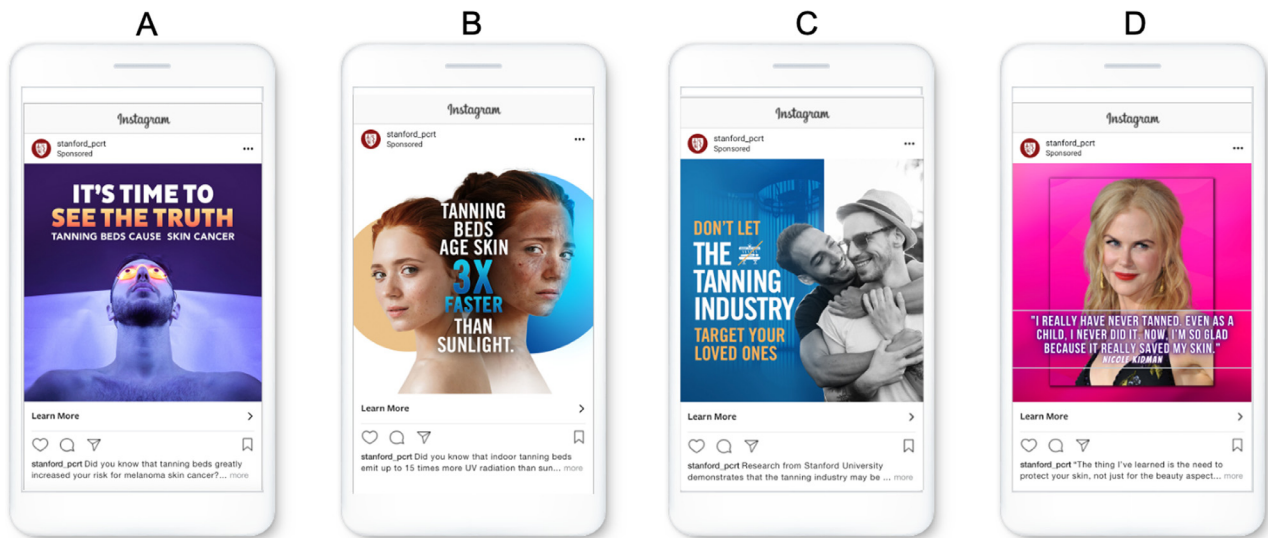
depth focus groups exploring motivations among SMM for indoor tanning, which aimed to utilize the outrage people might feel at possible targeting of SMM by the tanning industry (Figure 1C).<sup>13</sup> Finally, we designed a fourth group of advertisements with celebrity messages encouraging skin protection aiming to leverage the role of social influence (Figure 1C).<sup>14–16</sup> We partnered with the design company IDEO and independent graphic designer Youssef Arj for the development of these advertisements.<sup>17</sup>

Instagram was chosen as the platform for dissemination because over 60% of Instagram's user base are young people aged 18–34 years—the most frequent users of indoor tanning beds.<sup>18</sup> In addition, higher rates of indoor tanning have been shown to be associated with regular Instagram and Twitter use, with a cross-sectional survey of non-Hispanic White women showing that respondents who reported at least occasional use of Instagram had double the odds of reporting indoor tanning in the past year.<sup>19</sup> Furthermore, Instagram facilitates interest-based targeting, allowing us to specifically target individuals interested in indoor tanning.

The release of advertisements was staggered throughout the 3-week period on the advice of social media consultant Liz Perle to maximize campaign engagement, with each piece of individual content running for 2 weeks (12 ads were launched on Wednesday, April 6; 9 ads were launched on Monday, April 11; and a final 13 ads were launched on Wednesday, April 13).

### Study Population

Advertisements were directed towards 2 high-risk populations utilizing the detailed targeting function on Meta Ads Manager to select individuals interested in indoor tanning: women aged 18–30 years in Kentucky, Nebraska, Ohio, or Tennessee; and men aged 18–45 years in California. Instagram interests are determined by a Meta algorithm utilizing information from tracking pixels to determine the type of online content with which a user engages. Kentucky, Nebraska, Ohio, and Tennessee were chosen as intervention states owing to the high concentrations of indoor tanning beds.<sup>20</sup> California was chosen because it has the largest lesbian, gay, bisexual, transgender, queer or questioning (LGBTQ+) population in the U.S., including 3 of the top 10 U.S. cities with the largest LGBTQ+ populations where tanning salons are clustered.<sup>6</sup> We also partnered with 3 California-based gay male Instagram influencers—users of social media with established credibility among online followers—who disseminated video messages aligned with our campaign: @princedylan (22,600 followers), @mattxiv (1 million followers), and @maxisms (1.2 million followers).



**Figure 1.** Example of campaign ads from each of the 4 messaging strategies: (A) risk of skin cancer, (B) risk of accelerated skin aging, (C) targeting of gay men by the tanning industry, and (D) celebrity messages encouraging skin protection.

### Measures and Statistical Analysis

To evaluate the impact of the campaign, we used Square-space Analytics to track the number and duration of views of our indoor tanning health information landing page,<sup>21</sup> in addition to online outcome metrics, including views, likes, and shares. To estimate the potential impacts of our campaign on foot traffic data to tanning salons in our target states, we conducted an interrupted time series (ITS) analysis of normalized foot traffic data from all tanning salons documented on the geospatial data platform SafeGraph from January 1, 2018 to 3 months after the end of our campaign in our target states. We used a validated algorithm to identify businesses on SafeGraph offering UV indoor tanning.<sup>20</sup> We used a negative binomial regression model with a term for week number, 6 autoregressive terms, and 3 pairs of Fourier terms to account for seasonality in tanning salon visit trends (Appendix 1, available online). The Stanford IRB approved this study (IRB Number 50303).

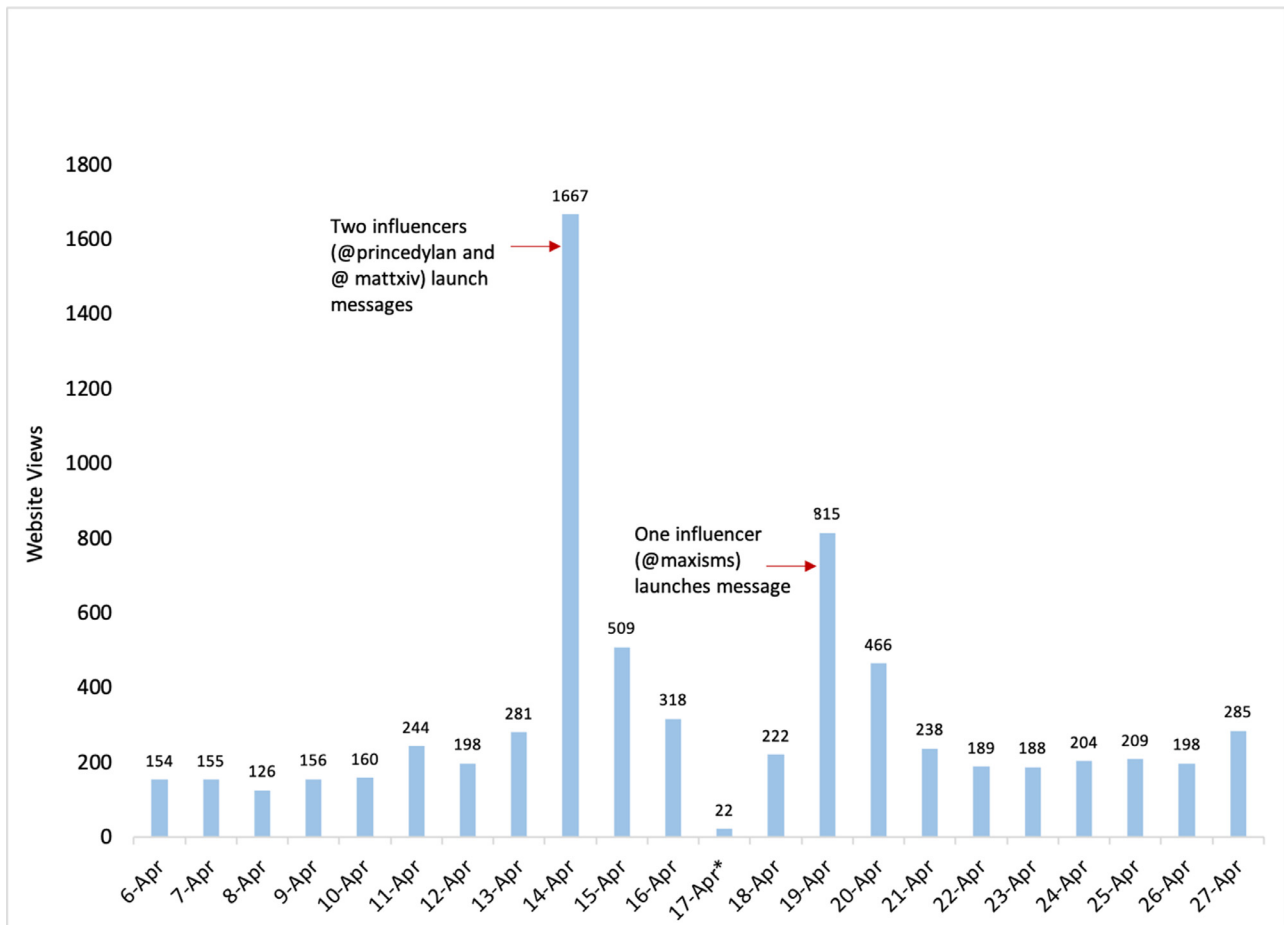
### RESULTS

During the campaign (April 6–27, 2022), the advertisements appeared on Instagram feeds 9.1 million times, reaching 1.06 million individuals an average of 8.6 times each. Overall, they received 6,915 likes and were shared 1,178 times. We received 7,004 views of our indoor tanning health information landing page (Average Time on Page of 56 seconds), with 17.6% of people clicking through to 1 of the 4 subpages: (1) the tanning industry targets gay men (585 views; Average Time on Page of 56

seconds), (2) indoor tanning causes cancer (316 views; Average Time on Page of 47 seconds), (3) indoor tanning speeds up skin aging (181 views; Average Time on Page of 29 seconds), and (4) best ways to protect your skin (149 views; Average Time on Page of 77 seconds). On the days when influencers launched their messages, we saw substantial increases in website traffic to the tanning health information page (Figure 2). The cost of disseminating the advertisements on Instagram was \$54,306, and payments to influencers totaled \$14,000. Our ITS analysis of foot traffic data to tanning salons did not identify a significant change in weekly tanning salon visits between April 18, 2022 and June 26, 2022, with our model showing neither an intercept change (rate ratio=0.94, 95% CI=0.29, 3.01,  $p=0.91$ ) nor a slope change (rate ratio=1.01, 95% CI=0.90, 1.13,  $p=0.90$ ) (Figure 3).

### DISCUSSION

We describe a public health campaign using social media–based dissemination of targeted public health messages to direct populations at high risk of indoor tanning to tailored health information. We received 7,004 views of our indoor tanning health information landing page, with an Average Time on Page of 56 seconds. This is higher than the benchmark target for Average Time on Page of 52 seconds used across multiple commercial industries.<sup>22</sup> We also show the success of a new messaging strategy highlighting the apparent targeting of SMM by the tanning industry to



**Figure 2.** Website traffic to indoor tanning health information page throughout the 3-week campaign, indicating launch dates for influencer content.

The asterisk (\*) denotes that campaign was paused on April 17 owing to a billing issue on Meta Ad Manager and restarted on April 18.

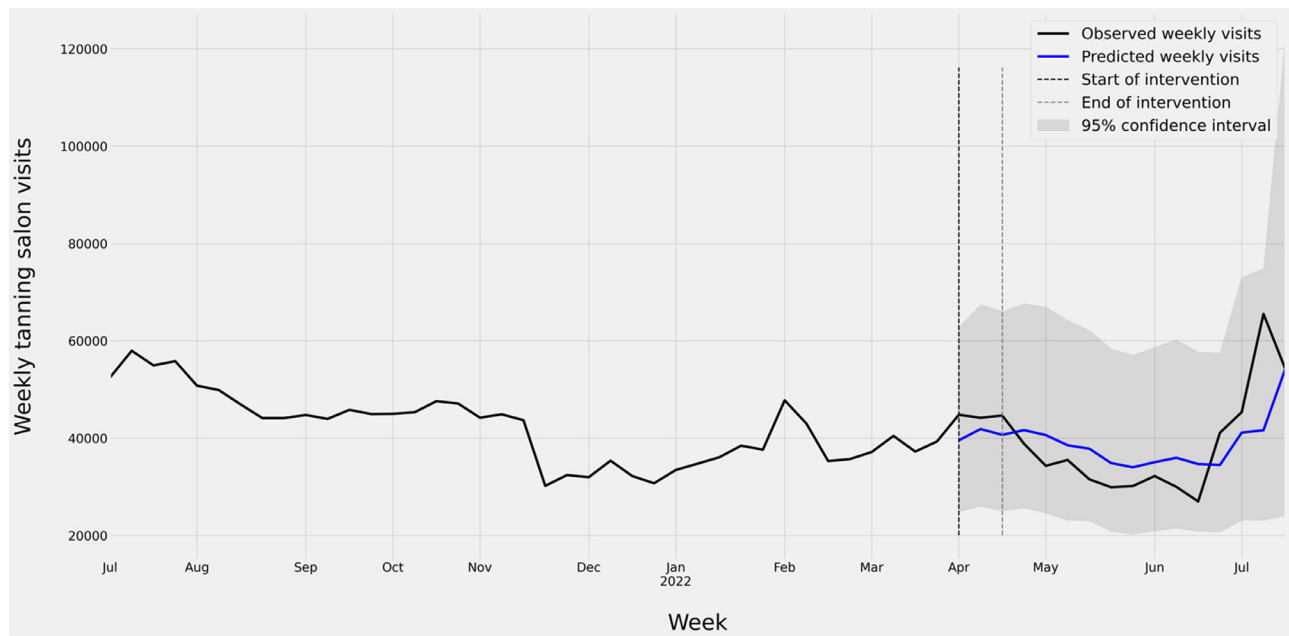
drive engagement with health information. This messaging concept draws on work by the nonprofit tobacco control organization Truth Initiative, which exposed the targeting of LGBTQ+ communities by the tobacco industry.<sup>23</sup> Furthermore, we show proof of principle of partnering with social media influencers to leverage their position as trusted messengers in a social marketing context. For this campaign, we partnered with 3 California-based gay male Instagram influencers, who shared messages aligned with our campaign. In future work, also partnering with young female influencers with young female followers who are interested in indoor tanning could improve campaign impact.

Social media platforms are used by the indoor tanning industry to advertise to their target audiences, yet there is a concerning lack of accurate health information about indoor tanning on social media: over a 2-week period, 154,496 tweets mentioning indoor tanning were analyzed, with only 2.56% mentioning the risk of skin

cancer.<sup>24</sup> Utilizing these same platforms for public health messaging offers an opportunity to provide easily accessible, accurate health information.

### Limitations

Most evaluation measures of indoor tanning interventions rely on self-reports of indoor tanning behaviors.<sup>25</sup> In addition to capturing individuals seeking further health information, this study pilots an innovative approach to evaluating behavior change by analyzing foot traffic data to tanning salons. Although we observed a nonstatistically significant drop in weekly tanning salon visits shortly after the start of our intervention, we did not identify a significant impact of our campaign on tanning salon visits as estimated by foot traffic data. This could reflect an inability to achieve behavioral change, with a need to alter campaign content or increase its duration and reach, or that we failed to capture effects: SafeGraph currently only holds data on 10% of the U.S. population, limiting the ability to detect small effect



**Figure 3.** Observed and predicted weekly tanning salon visits in California, Kentucky, Nebraska, Ohio, and Tennessee between July 1, 2021 and July 25, 2022.

sizes. Furthermore, the unprecedented changes to tanning foot traffic data due to the coronavirus disease 2019 (COVID-19) pandemic posed challenges to the fit of our ITS model (Appendix 1, available online). Prolonging campaign duration and increasing the volume of advertisements could also have resulted in a greater campaign impact.

## CONCLUSIONS

In conclusion, we show the successful use of social media advertising to direct high-risk groups to online health information about indoor tanning and the role of partnering with social media influencers to achieve this. Future research quantifying indoor tanning visits before and after intervention is needed to guide public health efforts in this field.

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## CREDIT AUTHOR STATEMENT

Isabella de Vere Hunt: Methodology, Investigation, Data curation, Formal analysis, Visualization, Writing – original draft. Zhuo Ran Cai: Methodology, Investigation, Data curation, Formal analysis, Visualization, Writing – review & editing. Vanessa Nava: Investigation, Writing – review & editing. Natnaelle E. Admassu: Methodology, Writing – review & editing. Stephanie Bousher: Methodology, Writing – review & editing. Tiffani Johnson: Investigation, Writing – review & editing. Anna Tomz: Investigation, Writing – review & editing. Jessica Thompson: Investigation, Writing – review & editing. Lucy Zhang: Conceptualization, Writing – review & editing. Sherry Pagoto: Methodology, Writing – review & editing. Mackenzie R. Wehner: Formal analysis, Writing – review & editing. Maya B. Mathur: Formal analysis, Writing – review & editing. Eleni Linos: Funding acquisition, Conceptualization, Methodology, Supervision, Writing – review & editing.

## SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at [doi:10.1016/j.focus.2023.100123](https://doi.org/10.1016/j.focus.2023.100123).

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