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Online Advertising for Cancer Prevention: Google Ads and Tanning Beds

Google receives more than 3.5 billion Internet searches daily,¹ and the advertisements on their results pages may provide a unique opportunity to transmit targeted public health information to a large audience. Skin cancer is more common than all other cancers combined,² and indoor tanning is a preventable risk factor that accounts for more than 450 000 new malignant neoplasms each year.³ Tanning bed use remains common, with 1 in 5 adolescents and more than half of college students exposed.³ Awareness of the dangers of tanning beds is one of the factors that can lead to behavior change. The goals

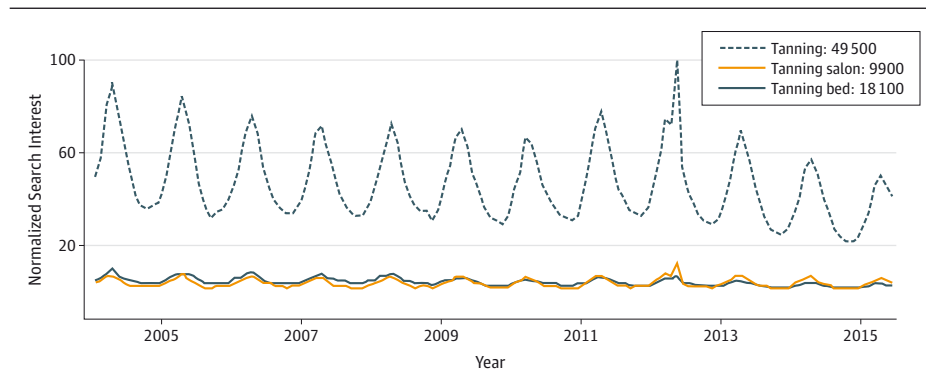
of this study were to examine the volume of tanning bed-related searches on Google and pilot the use of Google's advertising service for dissemination of skin cancer prevention messages to users entering searches related to tanning beds.

Methods | We used Google AdWords, a pay-per-click online advertising service that places 3-line, 105-character advertisements next to Google search results, to showcase skin cancer prevention advertisements. Google for Nonprofits provided free advertising.⁴ Google AdWords campaigns are organized by key words, which approximate the search terms that people type into Google. We developed a list of tanning bed-related key words and examined the search volume of these using Google AdWords Keyword Planner and Google Trends.^{5,6} Google Trends depicts relative search interest over time by normalizing Google search volume data by the total number of searches. Our campaign was restricted to North America and English-language searches. Clicking on the advertisement directed users to information from the Centers for Disease Control and Prevention's The Burning Truth Campaign.⁷ The University of California at San Francisco Committee on Human Research deemed that this study posed minimal risk and was exempt from institutional review board approval.

From April 1, 2014, to March 31, 2015, key words and advertisement content were iteratively modified based on impressions (advertisement display frequency), clicks (user clicks on the advertisement), and click-through rates (ratio of clicks to impressions). We divided the piloted advertisements into 3 thematic groups: appearance, health, and education. The 3 top performing advertisements in each group from the pilot period were selected to rotate evenly between April 2, and June 2, 2015. Although we were able to select key words and advertisements, Google's internal algorithms determined how often each advertisement was shown: advertisements that match the content of the destination website or those that perform well initially are shown more often.

Results | Each month Google processes an average of more than 75 000 searches with search terms *tanning*, *tanning bed*, and *tanning salon* (**Figure**).^{5,6} Google searches for tanning bed-related key words are cyclical, with peaks observed in April and May of each year. Together, our selected advertisements were shown 235 913 times and clicked more than 2000 times (**Table**). A click-

Figure. Trends in Google Search Terms Over Time



The graph shows monthly relative search popularity worldwide from January 2004 to June 2015. Google has normalized data by the total number of searches for each region; 100 represents peak interest.⁶ The figure key provides the 2014 average monthly search volume for each term.⁵

Table. Advertisement Performance^a

Message Category	Advertisement	Clicks ^b	Impressions ^c	CTR ^d
Educational	The Truth of Tanning Beds Do you know what you are doing to your skin? Educate yourself!	2062	198 276	1.04
	The Truth Behind UV Light Do you know what tanning beds do to your skin? Care for your skin!	132	17 464	0.76
	Know What Tanning Beds Do Are you sure you know what tanning does to your body? Educate yourself.	51	6058	0.84
Health	Protect Your Skin Tanning increases risk of cancer. Learn the truth about tans.	6	467	1.28
	Tanning Causes Cancer Study the research. Learn the truth about tanning.	32	3507	0.91
	Prevent Skin Cancer Don't indoor tan. Learn the truth about tans.	0	429	0
Appearance	Tanning Causes Wrinkles Tanning is not good for your skin. Learn the truth about indoor tans.	17	5577	0.31
	Prevent Skin Aging Tanning ages your skin. Learn the truth about tanning.	0	432	0
	Tanning Makes You Ugly Stop looking for a tanning bed. Learn the truth about tanning.	25	3703	0.68

Abbreviation: CTR, click-through rate.

^a April 2 to June 2, 2015.^b Clicks are the number of times a user clicked on the advertisement.^c Impressions indicate the number of times an advertisement is displayed.^d Click-through rate is the ratio of clicks divided by impressions and multiplied by 100.

through ratio of 1% is considered adequate for commercial advertisements. Although we were not able to formally compare the efficacy of different advertisements, the click-through rates varied among advertisement and message categories, with the appearance-based messages performing the worst.

Discussion | To promote healthy behaviors, we need approaches that reach large, targeted audiences. The enormous population using search engines and the ability to target messages based on search key words make online advertising a potentially useful and relatively inexpensive tool for public health. Our pilot study demonstrated the feasibility of using online advertising to deliver targeted prevention messages related to indoor tanning and skin cancer. However, the effect of these advertisements on health behavior remains unknown. Further studies of this approach are needed to explore the characteristics of messages that generate views and clicks, and ultimately to determine whether this type of intervention successfully changes behaviors.

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