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## Directing the public to evidence-based online content

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### Abstract

To direct online users searching for gynecologic cancer information to accurate content, the Centers for Disease Control and Prevention's (CDC) 'Inside Knowledge: Get the Facts About Gynecologic Cancer' campaign sponsored search engine advertisements in English and Spanish. From June 2012 to August 2013, advertisements appeared when US Google users entered search terms related to gynecologic cancer. Users who clicked on the advertisements were directed to relevant content on the CDC website. Compared with the 3 months before the initiative (March–May 2012), visits to the CDC web pages linked to the advertisements were 26 times higher after the initiative began (June–August 2012) ( $p < 0.01$ ), and 65 times higher when the search engine advertisements were supplemented with promotion on television and additional websites (September 2012–August 2013) ( $p < 0.01$ ). Search engine advertisements can direct users to evidence-based content at a highly teachable moment—when they are seeking relevant information.

### Keywords

internet; search engine; advertising; communication; neoplasms; gynecologic

## INTRODUCTION

When searching for health information, most US adults consult the internet.<sup>1,2</sup> Online users typically identify health content using a search engine<sup>2</sup> and do not look beyond the first page

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### CONTRIBUTORS

CAG, ANV, JS, and AGH contributed to designing the study, interpreting the results, and revising the manuscript. CPC conceived the study, analyzed the data, and drafted the manuscript. NAH contributed to the data analysis plan and revising the manuscript.

### COMPETING INTERESTS

None.

### PROVENANCE AND PEER REVIEW

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of search results.<sup>3,4</sup> However, the order in which search results are displayed may not correlate with the quality of health information they provide.<sup>5</sup>

The accuracy of information on gynecologic cancer websites is variable,<sup>6–10</sup> and misinformation about gynecologic cancers has also been widely disseminated through email.<sup>11,12</sup> To increase the prominence of accurate gynecologic cancer information, the Centers for Disease Control and Prevention's (CDC) 'Inside Knowledge: Get the Facts About Gynecologic Cancer' campaign sponsored English and Spanish advertisements on Google, the leading US search engine.<sup>13</sup>

## METHODS

From June 2012 to August 2013, when US Google users entered English or Spanish search terms related to gynecologic cancer (eg, 'uterine cancer' and 'symptoms of ovarian cancer'), advertisements linked to CDC web pages appeared on the first page of the search results. The advertisements offered general, symptom, or prevention information about gynecologic cancers (eg, 'Know the signs? Learn about cervical, ovarian, and uterine cancers. Info from the CDC.'). To refresh content, the advertisements were redesigned three times during the 18-month period analyzed. Development of the advertisements was guided by formative and materials testing research with women and healthcare providers.<sup>14,15</sup> In addition, Spanish advertisements were reviewed by native Spanish speakers to ensure correct language use and cultural appropriateness.

Each search engine advertisement was linked to one of six CDC web pages (three English and three Spanish) with relevant content:

- Gynecologic cancer basic information: [http://www.cdc.gov/cancer/gynecologic/basic\\_info/index.htm](http://www.cdc.gov/cancer/gynecologic/basic_info/index.htm) and [http://www.cdc.gov/spanish/cancer/gynecologic/basic\\_info/](http://www.cdc.gov/spanish/cancer/gynecologic/basic_info/)
- Gynecologic cancer symptoms: [http://www.cdc.gov/cancer/gynecologic/basic\\_info/symptoms.htm](http://www.cdc.gov/cancer/gynecologic/basic_info/symptoms.htm) and [http://www.cdc.gov/spanish/cancer/gynecologic/basic\\_info/symptoms.htm](http://www.cdc.gov/spanish/cancer/gynecologic/basic_info/symptoms.htm)
- Prevention and screening information: [http://www.cdc.gov/cancer/gynecologic/basic\\_info/prevention.htm](http://www.cdc.gov/cancer/gynecologic/basic_info/prevention.htm) and [http://www.cdc.gov/spanish/cancer/gynecologic/basic\\_info/prevention.htm](http://www.cdc.gov/spanish/cancer/gynecologic/basic_info/prevention.htm)

From June to August 2012, the search engine advertisements ran in isolation, without any additional promotion. From September 2012 to August 2013, the search engine initiative was supplemented with television advertisements on CNN, HLN, NBC, and MSNBC, and advertisements on Facebook, YouTube, [Univision.com](http://www.univision.com), and other websites. To the authors' knowledge, no other large-scale multimedia gynecologic cancer awareness initiatives were active during the period analyzed.

Key metrics provided by Google included impressions (number of times advertisements were displayed), clicks (number of times users activated web page links in advertisements), click-through rate (clicks divided by impressions), and cost-per-click (cost of placing

advertisements divided by clicks). Data retrieved from the CDC website included the number and duration of visits to the web pages linked to the search engine advertisements; comparisons between the pre-initiative period and phases of the initiative were analyzed using t tests. It should be noted that the number of clicks reported by Google was greater than the number of visits to the linked CDC web pages. CDC's web analytics software logged a visit only if a user completed the transfer from Google and remained on the linked web page for at least 1 s.

## RESULTS

Google displayed English advertisements more than 59 million times (impressions), and users clicked on them 1 007 659 times (1.70% click-through-rate); Spanish advertisements were shown 9.5 million times and users clicked on them 287 875 times (3.01% click-through rate) (results not shown).

Compared with the pre-initiative period (March–May 2012), traffic on the CDC web pages linked to the search engine advertisements was 26 times higher after the initiative began (June–August 2012) ( $p<0.01$ ), and 65 times higher when the search engine advertisements were supplemented with advertisements on television and additional websites (September 2012–August 2013) ( $p<0.01$ ) (figure 1).

The monthly volume of visits to CDC web pages that were linked to the search engine advertisements was relatively consistent during the pre-initiative period (range: 1336–1703 visits) and when search engine advertisements were shown in isolation (range: 33 836–43 362 visits) (results not shown). When search engine advertisements were supplemented with promotion on television and other websites, monthly traffic varied widely, corresponding to the level of supplemental advertising: the highest traffic level achieved (165 551 visits) was in December 2012, when supplemental promotion involved widespread advertisements on television and other websites, and the lowest level (45 734 visits) occurred in July 2013 when there was minimal supplemental promotion (results not shown).

The percentage of visits to web pages linked to the search engine advertisements that lasted 30 s or longer significantly increased when the search engine advertisements were displayed without supplemental promotion: English: 43.8% pre-initiative, 70.4% with search engine advertisements but no additional promotion ( $p<0.001$ ); Spanish: 39.0% pre-initiative, 76.2% with search engine advertisements but with no additional promotion ( $p<0.001$ ) (results not shown). This increase in visit time persisted when advertisements on television and other websites supplemented the search engine advertisements: English 69.0%; Spanish 74.6% (results not shown).

Following the automated adjustments made by Google during the first week of the initiative, weekly cost-per-click ranged from \$0.64 to \$0.84 for English search engine advertisements (mean \$0.71) and from \$0.36 to \$0.75 for Spanish search engine advertisements (mean \$0.57) (results not shown).

## DISCUSSION

Search engine advertising was associated with a significant rise in traffic on CDC's 'Inside Knowledge' website, and further gains were realized when search engine advertisements were supplemented with advertisements on television and other internet sites. The initiative was also associated with a significant increase in web page visits lasting 30 s or longer, which suggests that users referred through search engine advertisements were receptive to the content. Search engine advertisements in Spanish had lower costs and higher click-through rates than those in English, which appeared to be due to less competition for sponsorship of Spanish search terms at the time of this initiative. Less demand from potential sponsors translated into lower costs and fewer advertisements vying for users' attention.

To date, studies involving search engine advertisements in the peer-reviewed literature have primarily focused on recruiting research participants.<sup>16-18</sup> The present study augments the limited literature on the use of search engine advertisements to disseminate public health messages and provides comparison data on reaching English- and Spanish-speaking users. However, the results reported here may be more relevant for women than men, as the initiative involved internet searches related to gynecologic cancer. In addition, the scope of this study was limited to process evaluation. A community trial is currently being designed to explore the impact of exposure to 'Inside Knowledge' materials on women's knowledge of key campaign messages and appropriate care-seeking in response to experiencing symptoms that could signal gynecologic cancer.

Search engine advertisements can aid health communication campaigns by positioning evidence-based content on the critical first page of search results. In addition, the interactive, digital nature of online advertising generates real-time data that can guide frequent adjustments to improve performance and reduce costs. Further, search engine advertisements appear in response to user-initiated inquiries, thus they reach individuals at a highly teachable moment.

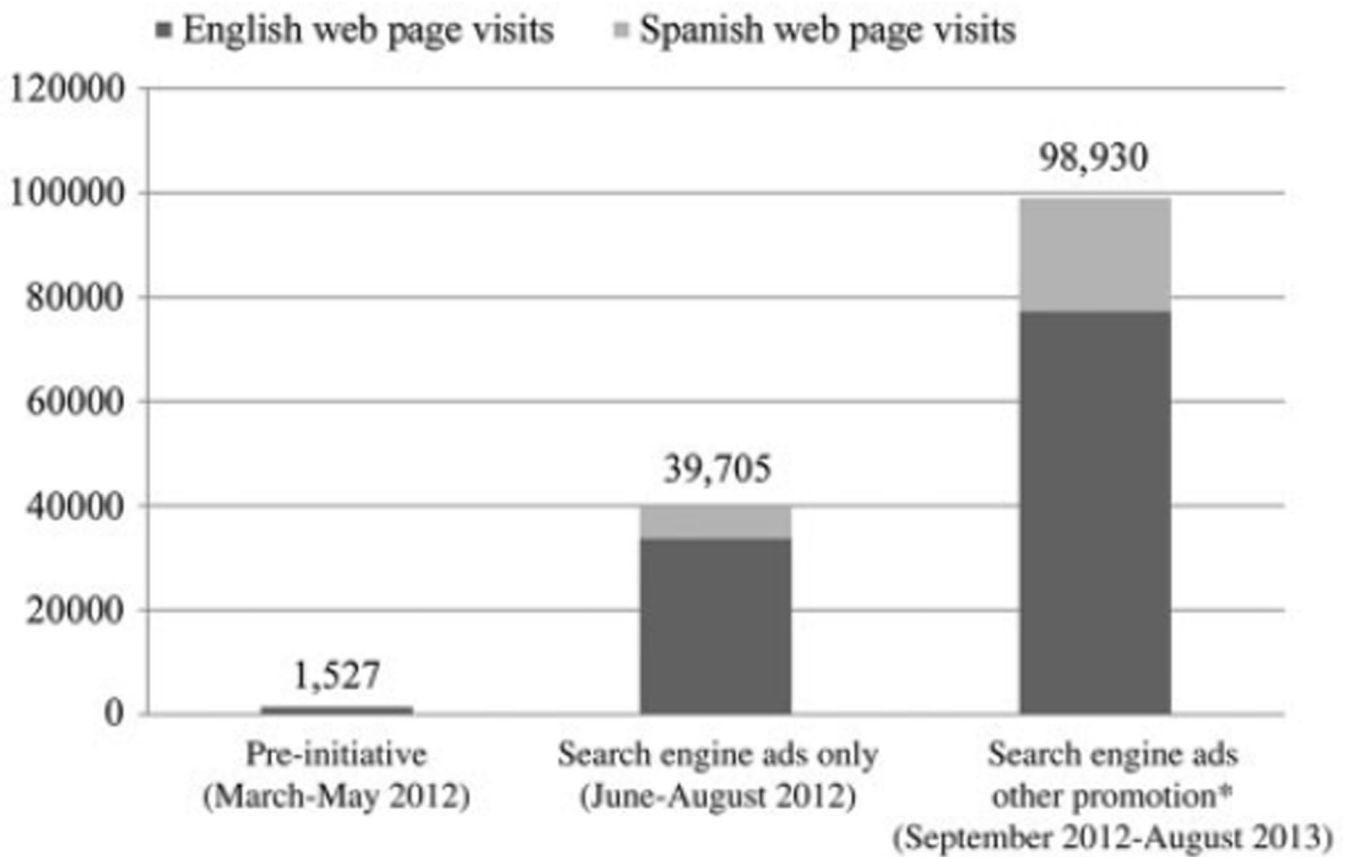
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\*Search engine ads were supplemented with promotion on television and other websites.

**Figure 1.**  
Mean monthly visits to web pages linked to search engine advertisements (ads) related to Centers for Disease Control and Prevention's 'Inside Knowledge: Get the Facts About Gynecologic Cancer' Campaign, April 2012–August 2013.