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Evaluating the impact of the COVID-19 pandemic and state restrictions on public interest in tanning: a Google Trends analysis

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Public interest in tanning in the USA typically follows a seasonal pattern.1 Google Trends search data, which have previously been used to measure interest in dermatological issues,2 demonstrate peak annual interest for indoor tanning terms between March and June, and for outdoor tanning terms in July and August.1 We aimed to describe the impact of the initial COVID-19 pandemic on search trends in tanning and specifically to determine the correlation between indoor tanning interest and the stringency of COVID-19 restrictions.

This study utilized publicly available online datasets and did not qualify as human subject research; therefore, institutional review board approval was not required by the University of Connecticut Health Center.

We first summarized national Google Trends search volume index (SVI) results for indoor and outdoor tanning terms over several years to evaluate for any disruptions in seasonal patterns associated with the onset of the pandemic. We further utilized the Oxford COVID-19 Government Response Tracker stringency index (SI) to establish a rank ordering of each state’s COVID-19 restriction severity between March and June 2020. Given that growth in SVI for indoor tanning proved highly variable between specific states during this time, we compared the percentage change in state-specific SVIs for those with the greatest and least stringent restrictions. Statistical analysis was performed using two-sided, unpaired t-test with STATA 15.0. \( P < 0.05 \) was considered statistically significant.

Overall, nationwide SVI for indoor tanning terms declined abruptly by 57–84% in March 2020, whereas those for outdoor tanning peaked at 8–138% higher in summer 2020 compared with the same period in 2019 (Fig. 1). State SVI growth rates for the term ‘tanning bed’ between March and June 2020 ranged from 0.0 (Hawaii, Rhode Island) to 1011.1 (Indiana) (Fig. 2), with mean SVI growth being notably greater in the 25 states with the lowest SI than in those with the highest (321.3 vs. 188.2, \( P = 0.01 \)) (Table 1).

The data indicate an overall national decrease in indoor tanning searches during the initial surge in COVID-19 cases. By contrast, outdoor tanning terms experienced record peak interest in the summer of 2020, which may indicate high outdoor engagement despite the ongoing pandemic. This reinforces the important and established role of public health messaging in promoting sun-safe outdoor practices, even during periods of quarantine.

Interest in indoor tanning varied dramatically depending on the stringency of state-imposed COVID-19 restrictions. Although restrictions cannot be directly linked to indoor tanning interest, aggressive states ordered tanning salons closed for months (e.g. Connecticut) whereas others allowed salons to remain open (e.g. South Dakota).3,4 Restrictive tanning legislation was previously found to be most effective at modulating public interest in indoor tanning.5 States with more stringent restrictions also demonstrated greater encouragement of social distancing and had more expansive public information campaigns, which may also have contributed to the lower interest in indoor tanning.

The study has several limitations. First, tanning interest is driven by personal, societal and environmental factors, making it difficult to directly attribute the exhibited trend to the pandemic (e.g. fear of exposure to COVID-19) or the associated restrictions (e.g. closure of tanning salons). In addition, the SI relies on metrics that may not appreciably impact tanning behaviour (e.g. public event cancellations). Despite these shortcomings, this study is the first to characterize public interest in tanning during COVID-19, and further supports a role for public policy and legislation in influencing tanning practices.

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Figure 1 (a,b) Overview of national search volume index (SVI) for indoor and outdoor tanning terms, 2015–2020, showing seasonal variation in Google Trends SVI results for (a) indoor and (b) outdoor tanning terms from October 2015 to October 2020. Indoor search terms included ‘tanning salon’, ‘indoor tanning’, ‘tanning bed’ and ‘spray tan’, while outdoor search terms included ‘outside tanning’, ‘outdoor tanning’, ‘sunburn’ and ‘sunburn care’. The black arrow highlights the uncharacteristic SVI trough in April 2020. SVI ranged from 0 (no interest) to 100 (peak interest) for the chosen terms in the specified time period.
Table 1 Comparison of the growth in state-specific Google Trends search volume index by state and the overall stringency of COVID-19 restrictions by state during the period 15 March 2020 to 1 June 2020.a

| Comparison group         | SVIb for ‘tanning bed’ by state | SVI growth rateb,c | OxCGRT SI | P       |
|--------------------------|----------------------------------|--------------------|-----------|---------|
| Top 25 statesd,e         | 29.6 ± 21.0                      | 65.0 ± 24.4        | 188.2 ± 159.9b | 69.9 ± 4.7 | 0.01    |
| Bottom 25 states         | 21.9 ± 9.5                       | 79.4 ± 16.8        | 321.3 ± 193.2 | 56.4 ± 6.3 |         |
| Top 15 states            | 31.3 ± 21.0                      | 60.2 ± 22.3        | 155.2 ± 161.0 | 72.7 ± 5.7 | < 0.01  |
| Bottom 15 states         | 22.2 ± 8.7                       | 83.5 ± 15.6        | 320.8 ± 141.2 | 52.9 ± 5.7 |         |

OxCGRT, Oxford COVID-19 Government Response Tracker; SI, stringency index; SVI, search volume index. aData are mean ± SD; bSVI results and SVI growth rates for ‘tanning bed’ classified by overall stringency of state COVID-19 restrictions. SVIs range from 0 (no interest) to 100 (peak interest) during the study period; cSVI growth rate between these two values was calculated for each individual state, averaged across all states in each group, and the growth rate difference between groups was assessed for significance; dStates were grouped into categories based on their mean OxCGRT SI during the study period, with ‘top’ states indicating those with the greatest mean SI; eRanking of states from greatest to lowest SI: MD, NM, NY, KY, DE, ME, RI, FL, CA, CO, AK, NH, IL, VT, MT, ID, MN, CT, OH, PA, WV, HI, MI, NC, OR, MA, VA, WA, TX, KS, SC, NV, WY, WI, IN, NJ, TN, NE, MO, LA, GA, MS, OK, AL, IA, AZ, AR, UT, ND, SD.

Figure 2  (a,b) Relationship between (a) the growth in state-specific Google Trends search volume index (SVI) for the term ‘tanning bed’ by state and (b) the overall stringency of COVID-19 restrictions by state, March–June 2020. SVIs ranged from 0 (no interest) to 100 for the chosen terms in the specified time period, and were acquired from Google Trends data on ‘tanning bed’ search frequency between 15 March 2020 and 1 June 2020. The growth rate between March 15 and June 1, 2020 was subsequently calculated for each state. The degree of COVID-19 restrictions represents a mean of the Oxford COVID-19 Government Response Tracker Stringency Index during this same time period. The stringency index provides a quantitative estimate (range 0–100, higher values indicate more stringency) of state restrictions classified by the number of containment and closure policies for each state.
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