pronounced effects on the associations between self-perceived age and mortality. Nevertheless, when we combined the factors that were independently associated with mortality in models 1 through 8, feeling older than actual age remained a significant independent predictor of mortality (model 9: hazard ratio, 1.41; 95% CI, 1.10–1.82). Results were similar after excluding deaths occurring within 12 months of baseline (Table 2). Analyses of separate causes of death showed a strong relationship between self-perceived age and cardiovascular death, but no association between self-perceived age and cancer mortality (Table 2).

Discussion | We found that self-perceived age predicted all-cause and cardiovascular mortality during the following 8 years. Although baseline health, physical disability, and health behavior accounted for some of the association, after adjusting for all covariates, there remained a 41% greater mortality hazard in people who felt older than their actual age compared with those who felt younger than their actual age. Our study used data from a large nationally representative survey and a simple measure of self-perceived age. We tested for reverse causality by excluding deaths within 12 months of baseline and found that the association was not due to participants in the terminal phases of their lives rating themselves as feeling older than their real age.

The mechanisms underlying these associations merit further investigation. Possibilities include a broader set of health behaviors than we measured (such as maintaining a healthy weight and adherence to medical advice), and greater resilience, sense of mastery, and will to live among those who feel younger than their age. Self-perceived age has the potential to change, so interventions may be possible. Individuals who feel older than their actual age could be targeted with health messages promoting positive health behaviors and attitudes toward aging.

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Author Contributions: Dr Steptoe had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: All authors.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Steptoe.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Steptoe.

Obtained funding: Steptoe.

Study supervision: Steptoe.

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Indoor Tanning–Related Injuries Treated in a National Sample of US Hospital Emergency Departments

Indoor tanning exposes users to intense UV radiation, which is a known carcinogen. However, little is known about the more immediate adverse outcomes of indoor tanning. To our knowledge, this study provides the first national estimates of indoor tanning–related injuries treated in US hospital emergency departments (EDs).

Methods | Data. Nonfatal indoor tanning-related injury data from 2003 to 2012 were obtained from the National Electronic Injury Surveillance System–All Injury Program (NEISS-AIP), a nationally representative sample of 66 NEISS hospital EDs, on approximately 500 000 nonfatal injury-related ED visits annually. Trained coders review ED medical records to extract data, including age, sex, diagnosis, body region affected, consumer products involved, disposition at discharge, location where injury occurred, and a case narrative describing the cause of injury. Deidentified nonfatal injury surveillance data for this study were obtained by the Centers for Disease Control and Prevention through an interagency agreement with the US Consumer Product Safety Commission, which operates the NEISS-AIP. Use of these deidentified NEISS data did not require Centers for Disease Control and Prevention institutional review board approval.

Case Definition. Cases were initially selected if they were classified as unintentional injuries, involved the use of an indoor tanning device, and the narrative contained one of the following keywords: indoor tanning, tanning, tanning salon, tanning booth, tanning bed, sun lamp, ultraviolet, or UV. Cases were reviewed and classified by 3 study researchers (G.P.G., M.W., and J.L.A.) to confirm they met the case...
definition; classification differences were resolved by consensus. Injuries were classified into 5 types: skin burns, eye injuries, lacerations and muscle and bone injuries, syncope, and other injuries (Table).

### Table. National Estimates of Indoor Tanning–Related Injuries Treated in Hospital Emergency Departments, United States, 2003-2012

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Sample Cases, No.</th>
<th>Average Annual No. of Injuries (95% CI)</th>
<th>Average Annual % of Injuries (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>405</td>
<td>3234 (2344-4123)</td>
<td>100</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>77</td>
<td>574 (387-762)</td>
<td>17.8 (12.0-23.6)</td>
</tr>
<tr>
<td>Female</td>
<td>328</td>
<td>2659 (1866-3452)</td>
<td>82.2 (57.7-106.8)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>313</td>
<td>2517 (1649-3386)</td>
<td>77.8 (51.0-104.7)</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>92</td>
<td>716 (360-1073)</td>
<td>22.2 (11.1-33.2)</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;18</td>
<td>54</td>
<td>412 (95-241)</td>
<td>12.7 (3.0-7.4)</td>
</tr>
<tr>
<td>18-24</td>
<td>145</td>
<td>1150 (752-1547)</td>
<td>35.5 (23.3-47.8)</td>
</tr>
<tr>
<td>25-34</td>
<td>103</td>
<td>870 (598-1141)</td>
<td>26.9 (18.5-35.3)</td>
</tr>
<tr>
<td>35-44</td>
<td>69</td>
<td>579 (262-895)</td>
<td>17.9 (8.1-27.7)</td>
</tr>
<tr>
<td>≥45</td>
<td>34</td>
<td>223 (121-326)</td>
<td>6.9 (3.7-10.1)</td>
</tr>
<tr>
<td>Location where injury occurred</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>23</td>
<td>168 (95-241)</td>
<td>5.2 (3.0-7.4)</td>
</tr>
<tr>
<td>Public property/place</td>
<td>248</td>
<td>2084 (1628-2540)</td>
<td>64.0 (50.3-78.5)</td>
</tr>
<tr>
<td>Unknown</td>
<td>134</td>
<td>982 (461-1503)</td>
<td>30.4 (14.2-46.5)</td>
</tr>
<tr>
<td>Type of injuryc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin burn</td>
<td>319</td>
<td>2572 (1690-3455)</td>
<td>79.5 (52.3-106.8)</td>
</tr>
<tr>
<td>Eyed</td>
<td>22</td>
<td>187 (94-281)</td>
<td>5.8 (2.9-8.7)</td>
</tr>
<tr>
<td>Laceration/muscle/bonee</td>
<td>28</td>
<td>180 (88-272)</td>
<td>5.6 (2.7-8.4)</td>
</tr>
<tr>
<td>Syncopef</td>
<td>37</td>
<td>308 (203-412)</td>
<td>9.5 (6.3-12.8)</td>
</tr>
<tr>
<td>Otherg</td>
<td>14</td>
<td>111 (58-164)</td>
<td>3.4 (2.0-4.9)</td>
</tr>
<tr>
<td>Visit disposition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated and released</td>
<td>389</td>
<td>3107 (2233-3980)</td>
<td>96.1 (69.1-123.1)</td>
</tr>
<tr>
<td>Otherh</td>
<td>16</td>
<td>126 (69-183)</td>
<td>3.9 (1.1-5.7)</td>
</tr>
</tbody>
</table>

*Numbers may not sum to totals and percentages may not sum to 100 due to rounding.

Statistical Analysis. Researchers identified 405 nonfatal indoor tanning–related cases from the NEISS-AIP. Sample weights were applied to provide annualized national estimates of indoor tanning–related injuries. Trends in indoor tanning–related injuries from 2003 to 2012 were examined with negative binomial regression. Data were analyzed using SAS, version 9.3 (SAS Institute, Inc), and Joinpoint, version 4.1.0 (Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute; http://surveillance.cancer.gov/joinpoint/), software.

### Results

On average, an estimated 3234 indoor tanning–related injuries were treated each year in US hospital EDs from 2003 to 2012 (Table). Most injuries occurred among females (82.2%), non-Hispanic whites (77.8%), persons aged 18 to 24 years (35.5%), and in public settings (such as tanning salons) (64.4%). Most injuries were skin burns (79.5%), followed by syncope (9.5%) and eye injuries (5.8%). Indoor tanning–related injuries have decreased significantly from 6487 in 2003 to 1957 in 2012 (P < .001) (Figure).

### Discussion

Indoor tanning is associated with a substantial number of injuries treated in US hospital EDs. The majority of injuries were skin burns, and injuries occurred at the highest rates among younger adults and non-Hispanic white females, the
population with the highest rates of indoor tanning. From 2003 to 2012, indoor tanning–related injuries treated in hospital EDs declined, likely due to reductions in indoor tanning. Most patients were treated in the ED and released, not requiring hospitalization. However, burns severe enough to warrant an ED visit clearly indicate overexposure to UV radiation and increase skin cancer risk.

Serious injuries occur despite US Food and Drug Administration standards and guidelines on indoor tanning devices. Although the Food and Drug Administration requires manufacturers of tanning devices to install timers to limit exposure, several case narratives in our study described patients falling asleep while tanning, raising concerns about timers either malfunctioning or being intentionally overridden. A study of tanning salons in North Carolina found that only 5% complied with Food and Drug Administration–recommended exposure schedules. The Food and Drug Administration reclassified indoor tanning devices in 2014, requiring new standards and labeling.

Limitations of this study include not being able to capture injuries left untreated or treated in other settings. In addition, NEISS-AIP case narratives may not provide enough details to characterize injury circumstances. Lastly, location of injury was unknown for 30.4% of cases, and small sample sizes resulted in some unstable estimates. Despite these limitations, this study provides the first nationally representative estimates of indoor tanning-related injuries, allowing for continued monitoring of such injuries. Compliance with current federal and state regulations could be monitored to identify opportunities to decrease harm from indoor tanning. A decrease in indoor tanning could reduce associated injuries and future cases of skin cancer.

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Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Guy, Watson, Annest.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Guy, Haileyesus, Annest.

Administrative, technical, or material support: Guy, Watson, Annest.

Conflict of Interest Disclosures: None reported.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Letters

through most other states require some level of parental consent for those younger than 18 years to use indoor tanning facilities,\(^4\) the risks of UV light and radiation are plain to see.

Joseph S. Ross, MD, MHS

Conflict of Interest Disclosures: None reported.


COMMENT & RESPONSE

Headaches and Neuroimaging

To the Editor As a coauthor of the American Headache Society’s Choosing Wisely list,\(^1\) which includes headache imaging, and author of many publications on imaging for headaches, I concur with the Research Letter by Callaghan and colleagues\(^2\) and the Editor’s Note by Katz\(^3\) that neuroimaging is over-ordered for headaches. However, as a busy clinician, I often do not practice as the authors and myself preach.

Many anxious patients and their family members are not reassured even after a long discussion about the low yield of imaging with perhaps a 1% to 3% chance of a significant abnormality detected as discussed in the Research Letter.\(^2\) Not surprisingly, in a 32-year career, I can recall numerous cases when scans were performed in this circumstance with significant incidental findings. The suggestion of requiring preauthorizations is wrongheaded when almost all scans are authorized, and we are not compensated for the considerable time we spend in obtaining authorizations (I have spent 15-20 minutes for single authorizations including the time on hold). I concur that anxious patients are less likely to obtain scans when they have a high deductible, but then patients in need of any type of testing may not have it done or be forced to go to the emergency department where they will receive exorbitant bills.

As Katz\(^3\) suggests, we are concerned about exposure to unnecessary radiation in the case of computed tomographic scans and recommend magnetic resonance imaging when available rather than computed tomography except in emergency settings.\(^1\) Increasing education among nonneurologists about headaches in general and use of testing is a priority.

The authors of both publications do not discuss the contribution of medical malpractice to overuse of imaging by physicians. If I follow the recommendations and not obtain imaging, guidelines will not indemnify me or protect me in a malpractice suit.\(^4,5\) I treated a pregnant patient for a new-onset headache due to a cerebral neoplasm. She successfully sued her prior neurologist (and received $250 000 at settlement) who appropriately declined months earlier to obtain a scan as the authors recommend when she presented with a many-year history of typical migraines for which guidelines do not recommend imaging.

So I disagree. Optimizing headache neuroimaging practices is not a major national priority, but national tort reform is. If we are not legally accountable when we “miss” 1% to 3% of significant abnormalities, then we may save some money on overused neuroimaging.

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Conflict of Interest Disclosures: None reported.


To the Editor I read with interest the research letter by Callaghan et al\(^1\) highlighting high utilization of computed tomography (CT) and magnetic resonance imaging (MRI) of the brain in patients with headache, with an estimated annual imaging cost of almost a billion dollars. There are 2 points that I would like to make.

It should be stated that simply decreasing the utilization of neuroimaging in patients with chronic headache might not translate into overall health care cost savings. In patients who scored higher on the Hospital Anxiety and Depression Scale (a self-assessment scale of depression and anxiety), early neuroimaging—by decreasing the use of other medical resources—in fact proved to be a cost-saving strategy.\(^2\) While I agree that optimizing headache neuroimaging practices should be a high priority, this should be done without losing sight of overall health care costs for managing these patients.

On the basis of the report by Callaghan et al,\(^1\) we can expect that for many patients with headache, physician-patient interaction will result in a decision to perform neuroimaging. It may be that to many such patients or to their treating physicians, a 1% to 2% pretest probability of significant intracranial disease quoted by authors seems too high to forego a noninvasive test that can provide a high level of surety of absence of underlying treatable diseases such as brain tumor. While it is important to minimize unnecessary neuroimaging, efforts for cost containment need not end there. Fortunately, MRI—the more frequently used,\(^1\) more expensive, and radiation-free modality often chosen for imaging these patients—happens to be amenable to significant efficiency improvement. Our research has indicated that a 2-tiered approach to MRI, in