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Authors Contributions: Mr Emdin and Dr Odutayo contributed equally as first authors, had full access to all the data in the study, and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Emdin, Odutayo, Hsiao, Hopewell, Altman. Acquisition, analysis, or interpretation of data: Emdin, Odutayo, Hsiao, Shakir, Rahimi. Drafting of the manuscript: Emdin, Odutayo, Hsiao, Rahimi, Altman. Critical revision of the manuscript for important intellectual content: Emdin, Odutayo, Hsiao, Shakir, Hopewell. Statistical analysis: Emdin, Odutayo, Hsiao. Administrative, technical, or material support: Odutayo. Study supervision: Hopewell, Rahimi, Altman.

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Editor’s Note

Confronting Bias

For more than 20 years, steady progress has been made along the road to clinical trial transparency. What started with steps taken by medical journals, including disclosure of trial funding, disclosure of authors’ conflicts of interest, publication of trial protocols, and statements of authors’ contributions, has been strengthened by recent advances to require publicly accessible clinical trial registration and results reporting. Encouragingly, progress continues to be made, as there is now considerable momentum toward clinical trial data sharing. Each of these steps was taken with the intention to reduce the potential for bias in the peer-reviewed literature, mitigating problems such as selective publication and selective outcome reporting or guest authorship and ghostwriting and ensuring that research findings are fully disseminated, fairly and objectively, in a way that allows an informed assessment of the evidence.

Until this study by Emdin and colleagues, there have been few evaluations of these interventions with the goal of determining whether they effectively reduce bias in the peer-reviewed literature. In their study of cardiovascular randomized clinical trials published in December 2012, they found that half of the 191 trials were reported as nonregistered and that these nonregistered trials were more likely than trials that were reported as registered, 70% vs 52%, to report statistically significant positive outcomes, even after accounting for other trial design differences. The higher rate of reporting positive outcomes among non-registered trials raises concerns about bias, suggesting, but not proving, that clinical trial registration at least partially mitigates selective outcome reporting. Bias may be mitigated by registration (1) because authors are more likely to present a balanced view of their research knowing that the prespecified protocol is available for review or (2) because editors and peer reviewers can access the registry and inquire about outcomes that were selectively reported.

More needs to be done to ensure compliance with clinical trial registration. The International Committee of Medical Journal Editors began requiring, as a condition of publication, registration in a public trials registry as of September 2005. Moreover, the Declaration of Helsinki now states that “Every research study involving human subjects must be registered in a publicly accessible database before recruitment of the first subject.” Yet half of the published trials that Emdin and colleagues identified were not reported as registered. To more effectively confront bias, all medical journals should refuse to publish unregistered trials. In addition, journals should ensure publication of trial registration numbers so that editors, peer reviewers, and readers have access to summary information that was registered and prespecified as part of each study’s protocol.

Joseph S. Ross, MD, MHS

Conflict of Interest Disclosures: None reported.


Feeling Old vs Being Old: Associations Between Self-perceived Age and Mortality

Self-perceived age reflects appraisals of health, physical limitations, and well-being in later life. Older people typically feel younger than their chronologic age, and it is thought that those who feel younger than their actual age have reduced mortality. We sought to confirm this relationship in a large representative population sample, and to understand the role...
of existing health problems, poor physical function, depression, sociodemographic factors, social isolation, impaired cognitive function, and health behaviors in explaining the association.

Methods | This study was approved by the National Research Ethics Service, and all participants provided written consent. We analyzed data from the second wave (2004-2005) of the English Longitudinal Study of Ageing. Self-perceived age was measured by asking respondents, “How old do you feel you are?” All-cause mortality and deaths from cancer and cardiovascular disease up to March 2013 were recorded. We divided participants into those whose self-perceived age was close to their chronologic age (1 year older to 2 years younger), those who felt more than 1 year older than their chronologic age, and those who felt 3 or more years younger than their actual age (similar results emerged when the difference between self-perceived and actual age was modeled as a continuous variable). Cox proportional hazards regression models were used to test associations between self-perceived age and mortality, adjusting for different sets of covariates.

Results | The sample consisted of 6489 individuals 52 years and older. Mean (SD) actual age was 65.8 (9.3) years, while the mean self-perceived age was 56.8 (13.3) years. Most respondents (69.6%) felt 3 or more years younger than their actual age, with 25.6% having a self-perceived age close to their chronologic age and 4.8% who felt more than 1 year older than their chronologic age.

The crude mortality rate during the mean follow-up period of 99 months was 14.3% in participants who felt younger, 18.5% in those who felt about their actual age, and 24.6% in those who felt older (Table 1). Adjustment for covariates had

### Table 1: Self-perceived Age and All-Cause Mortality Risk

<table>
<thead>
<tr>
<th>Perceptions of Age</th>
<th>Younger (n = 4515)</th>
<th>About the Same (n = 1661)</th>
<th>Older (n = 313)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death, No. (%)</td>
<td>646 (14.3)</td>
<td>307 (18.5)</td>
<td>77 (24.6)</td>
</tr>
<tr>
<td>Model 1: age and sex</td>
<td>1 [Reference]</td>
<td>1.29 (1.12-1.47)</td>
<td>.001</td>
</tr>
<tr>
<td>Model 2: age, sex, and sociodemographic factors</td>
<td>1 [Reference]</td>
<td>1.27 (1.10-1.45)</td>
<td>.001</td>
</tr>
<tr>
<td>Model 3: age, sex, and depression</td>
<td>1 [Reference]</td>
<td>1.22 (1.07-1.40)</td>
<td>.004</td>
</tr>
<tr>
<td>Model 4: age, sex, and social engagement</td>
<td>1 [Reference]</td>
<td>1.25 (1.09-1.44)</td>
<td>.001</td>
</tr>
<tr>
<td>Model 5: age, sex, and cognitive function</td>
<td>1 [Reference]</td>
<td>1.24 (1.08-1.42)</td>
<td>.002</td>
</tr>
<tr>
<td>Model 6: age, sex, and physical health</td>
<td>1 [Reference]</td>
<td>1.06 (0.92-1.22)</td>
<td>.43</td>
</tr>
<tr>
<td>Model 7: age, sex, and mobility</td>
<td>1 [Reference]</td>
<td>1.18 (1.03-1.36)</td>
<td>.02</td>
</tr>
<tr>
<td>Model 8: age, sex, and health behavior</td>
<td>1 [Reference]</td>
<td>1.21 (1.05-1.38)</td>
<td>.007</td>
</tr>
<tr>
<td>Model 9: fully adjusted</td>
<td>1 [Reference]</td>
<td>1.05 (0.91-1.20)</td>
<td>.51</td>
</tr>
</tbody>
</table>

### Table 2: Self-perceived Age and Mortality Risk Subgroup Analyses

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Younger</th>
<th>About the Same</th>
<th>Older</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excluding Deaths in First 12 Months (945 Deaths)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage who died (95% CI)</td>
<td>11.4 (12.4-14.3)</td>
<td>16.3 (14.7-17.8)</td>
<td>26.3 (22.8-29.9)</td>
</tr>
<tr>
<td>Age and sex, HR (95% CI)</td>
<td>1 [Reference]</td>
<td>1.25 (1.08-1.44)</td>
<td>2.68 (2.09-3.42)</td>
</tr>
<tr>
<td>Fully adjusted, HR (95% CI)</td>
<td>1 [Reference]</td>
<td>1.03 (0.89-1.19)</td>
<td>1.50 (1.15-1.95)</td>
</tr>
<tr>
<td>Death From Cancer (363 Deaths)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage who died (95% CI)</td>
<td>5.3 (4.6-6.0)</td>
<td>6.2 (5.1-7.3)</td>
<td>6.7 (4.2-9.2)</td>
</tr>
<tr>
<td>Age and sex, HR (95% CI)</td>
<td>1 [Reference]</td>
<td>1.20 (0.95-1.51)</td>
<td>1.54 (0.96-2.46)</td>
</tr>
<tr>
<td>Fully adjusted, HR (95% CI)</td>
<td>1 [Reference]</td>
<td>1.03 (0.81-1.30)</td>
<td>1.13 (0.69-1.84)</td>
</tr>
<tr>
<td>Death From Cardiovascular Disease (327 Deaths)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage who died (95% CI)</td>
<td>4.5 (3.9-5.1)</td>
<td>5.6 (4.6-6.6)</td>
<td>10.2 (7.9-12.5)</td>
</tr>
<tr>
<td>Age and sex, HR (95% CI)</td>
<td>1 [Reference]</td>
<td>1.30 (1.02-1.65)</td>
<td>3.10 (2.04-4.63)</td>
</tr>
<tr>
<td>Fully adjusted, HR (95% CI)</td>
<td>1 [Reference]</td>
<td>1.09 (0.85-1.39)</td>
<td>1.55 (1.01-2.38)</td>
</tr>
</tbody>
</table>

Abbreviation: HR, hazard ratio.

* Percentage of mortality adjusted for age and sex (95% CIs) and adjusted HRs with 95% CIs.
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.

Conflict of Interest Disclosures: None reported.

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Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.


Letters

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...