Conflict of Interest Disclosures: Dr Nieman is a nonprofit board member of Access HEARS. Dr Poe is a paid consultant for Acclarent Inc, but has no equity interest. Dr Reed reports nonfinancial relationships as a scientific advisor to Shoebox, Inc and Good Machine Studio. Dr Goman is a consultant to Cochlear Ltd and Auditory Insight. Mr Betz has equity and future royalties from MiDiagnostics. No other conflicts are reported.

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Marketing Claims About Using Hearing Aids to Forestall or Prevent Dementia

Dementia has long been a feared consequence of aging. Increasingly, it has been portrayed in the media and understood by the public as a “lifestyle disease” that can be prevented through judicious behavioral choices and/or product use.1 2 Product marketing claims of dementia prevention are likely to be highly salient to older people. We surveyed the websites of leading hearing aid brands for claims that using hearing aids can forestall or prevent dementia.

Methods | In this cross-sectional study, we extracted text from the US websites of the 16 brands included in a recent Consumer Reports review of hearing aids.3 Google Search was used to create search engines, and Python library Beautiful Soup, version 4.8.2, and RE, version 3.7.6 (Python Software Foundation) were used to extract the search term dementia and surrounding text from the sites on November 26, 2019; content from PDFs and videos was not extracted. We reviewed outputted text to extract causal claims (ie, claims that using a hearing aid prevents or can prevent dementia, or that failure to do so increases dementia risk). We did not extract more tempered claims about potential causality (ie, using a hearing aid potentially may, may, or could prevent dementia). One of the authors (J.B.) and a research assistant extracted claims independently. The research team discussed and resolved disagreements about classification of claims. This research was exempt from institutional review board approval because it did not involve human subjects.

Table Causal Claims From Hearing Aid Brand Websites*  

<table>
<thead>
<tr>
<th>Brand</th>
<th>Causal marketing claim</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>“As you may know, the benefits of hearing instruments reach beyond regaining lost sound…most importantly, hearing instruments help prevent serious conditions such as anxiety, depression and dementia that are associated with untreated hearing loss.”</td>
</tr>
<tr>
<td>1</td>
<td>“Studies show that the proper use of hearing aids can lower your risk factor [sic] of dementia. In fact, a study…”</td>
</tr>
<tr>
<td>1</td>
<td>“The returns on an investment in quality hearing instruments include better performance at work, a deeper, richer social life, and more resistance to the anxiety, depression and dementia associated with long-term hearing loss.”</td>
</tr>
<tr>
<td>2</td>
<td>“Treating hearing loss early can reduce the stress that hearing puts on the brain, thus decreasing your risk of developing serious conditions like depression, dementia, and more.”</td>
</tr>
<tr>
<td>3</td>
<td>“[Researcher X’s] extensive studies have also led him to conclude that treating hearing loss can ‘help reduce the risk of cognitive decline and dementia,’ with hearing aids being the most common and successful hearing loss treatment method available.”</td>
</tr>
<tr>
<td>3</td>
<td>“To do something about your hearing loss and help lessen the risk of dementia, consult with a hearing health care professional. To do that, simply call…or click here and we can help schedule a consultation with a provider near you.”</td>
</tr>
<tr>
<td>3</td>
<td>“Untreated hearing loss increases your chance of developing dementia. Treating hearing loss early—on the other hand—is one of nine things you can do to help reduce your risk of dementia.”</td>
</tr>
<tr>
<td>3</td>
<td>“Getting your hearing checked and treated early could mean better long-term brain performance, a lesser chance of Alzheimer and dementia, and overall, better long-term health and wellness. A recent study has even shown that getting your hearing checked early can help prevent cognitive decline.”</td>
</tr>
<tr>
<td>4</td>
<td>“A recent research study published in a medical journal called The Lancet found that hearing loss was the top preventable risk factor for dementia. It explained that correcting hearing difficulties early on [sic], drastically reduced the risk of getting dementia.”</td>
</tr>
<tr>
<td>4</td>
<td>“The study has found that hearing aids, when used properly and consistently, can slow down the rate in which older adults who suffer from hearing loss experience cognitive decline…. Wearing your prescribed hearing aids can help preserve your mental state and, as the study has revealed, slow down cognitive decline…. So while hearing aids can’t be considered a magic bullet in the war against solving dementia [sic] they do present some form of reprieve.”</td>
</tr>
<tr>
<td>4</td>
<td>“The findings of a recent major study point to a proven link between untreated hearing loss and the development of Alzheimer Disease and dementia. Catching and treating hearing loss early can help delay, or prevent, its onset.”</td>
</tr>
<tr>
<td>4</td>
<td>“Acting at the first sign of hearing loss is a great way to avoid future health difficulties such as dementia.”</td>
</tr>
<tr>
<td>4</td>
<td>“Hearing aids can help prevent dementia.”</td>
</tr>
<tr>
<td>5</td>
<td>“There are many studies that show a connection between hearing loss and dementia, a condition marked by memory loss and trouble thinking or problem-solving. The good news is that treating hearing loss aggressively can actually help ward off cognitive decline and dementia.”</td>
</tr>
<tr>
<td>5</td>
<td>“Hearing aids can help prevent dementia.”</td>
</tr>
<tr>
<td>5</td>
<td>“On average, people wait seven years before treating their hearing loss. Waiting to address hearing loss issues cannot only negatively impact the quality of social interactions but also contribute to health conditions such as dementia or depression.”</td>
</tr>
<tr>
<td>5</td>
<td>“Treating hearing loss aggressively can actually help ward off cognitive decline and dementia.”</td>
</tr>
<tr>
<td>6</td>
<td>“Hearing aids can reduce the effects of dementia and Alzheimer’s.”</td>
</tr>
</tbody>
</table>

*Quoted claims obtained from a review of 16 brands’ US websites, as described in the Methods. Does not include content in PDFs or videos.

Results | Six of the 16 brand websites featured causal claims. There were 18 claims in all. The number of claims per brand ranged from 1 to 5. The Table shows the excerpted claims. Some are presented in the context of research findings or (putative) quotes from researchers. Some refer to the effects of “treating hearing loss” or failing to do so; others specifically refer
to using hearing aids. All were presented in the context of the benefits of wearing hearing aids.

**Discussion** | Of 16 leading hearing aid brand sites, 6 featured causal claims about the effectiveness of hearing aids and/or treating hearing loss in preventing or forestalling dementia. Some websites included up to 5 claims.

There are many brands of hearing aids. Our sampling frame is the same as one used in a recent *Consumer Reports* survey and so presumably captures many popular brands, but our findings may not generalize to excluded brands. We examined brand websites rather than social media or newspaper advertisements. Brand messages may differ in these other venues.

Many good reasons for using hearing aids are supported by clinical trial evidence, but there is no such evidence for dementia prevention. Current evidence comes from cohort studies and is both mixed and inevitably confounded. Based on a recent review, the World Health Organization has concluded that while hearing loss interventions “have the potential to substantially improve outcomes for older people on multiple domains...[t]here is insufficient evidence to recommend use of hearing aids to reduce the risk of cognitive decline and/or dementia.”

We recommend that in marketing, manufacturers and vendors should carefully consider their claims of effectiveness in dementia prevention.

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**Author Contributions:** Dr. Blustein had full access to all of 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:** Blustein.

**Drafting of the manuscript:** Blustein, Weinstein.

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

**Statistical analysis:** Blustein.

**Study supervision:** Blustein.

**Conflict of Interest Disclosures:** Dr Blustein serves on the Board of Directors of the Hearing Loss Association of America (HLAA); the views expressed here are hers and do not reflect those of HLAA. Dr Weinstein reported lecturing at 2 meetings sponsored by Sonova and 2 sponsored by Starkey Hearing Technologies on the research and evidence base regarding social isolation, hearing loss, and dementia and interventions for these issues; she does not mention any particular manufacturers in her lectures. Dr Chodosh reported receiving research funding from the National Institutes of Health and the US Department of Veterans Affairs for studies related to dementia and other cognitive disorders and hearing loss.

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**OBSERVATION**

**Development of Eruptive Squamous Atypia 2 Weeks Post Fractional Carbon Dioxide Laser Resurfacing**

Eruptive squamous atypia, often synonymous with keratoacanthoma (KA), is a low-grade skin tumor that typically presents in areas of the skin that experience trauma including surgery, tattoo application, and radiation. We present a case of eruptive squamous atypia that developed 2 weeks after fractional carbon dioxide (CO2) laser resurfacing of the face. In this case report, we discuss its presentation, treatment options, recovery, and the necessity for early biopsy to diagnose skin lesions that appear after laser resurfacing.

The collected information was compliant with the Health Insurance Portability and Accountability Act, and written informed consent was obtained.

**Report of a Case** | A white woman in her 60s was seen in consultation for facial rejuvenation. She was found to have panfacial lipoatrophy as well as photodamaged skin. She had a medical history of nasal basal cell carcinoma.

To address her severe volume loss, dychromias, and rhytids, she consented to facial fat grafting and laser resurfacing of the full face. She underwent fractional CO2 laser resurfacing with a Deka Dot Smartxide laser (Deka, Inc) as well as fat transfer to her temples, forehead, and midface. The patient followed our standard regimen including antiviral and antibiotic medication, as well as vinegar soaks and petroleum jelly application.

After 2 weeks, she reported wart-like lesions that developed on her face (Figure 1). She was seen by her dermatologist who noted firm, verruocid keratotic papules that were itchy and irritated. They did not respond to conservative treatment, which included hydrocortisone, mupirocin ointment, and topical crisaborole ointment. A shave biopsy of a representative lesion showed an atypical squamous proliferation consistent with a possible eruptive keratoacanthoma (Figure 2).

Because of patient concerns about scarring, we first performed cryotherapy to treat the lesions on her right cheek 1 month after fractional CO2 laser resurfacing. At the same time, a second shave biopsy confirmed verrucous actinic keratosi.