Characterization of Problematic Alcohol Use Among Physicians: A Systematic Review

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Abstract

IMPORTANCE Problematic alcohol use in physicians poses a serious concern to physicians’ health and their ability to provide care. Understanding the extent and characteristics of physicians with problematic alcohol use will help inform interventions.

OBJECTIVE To estimate the extent of problematic alcohol use in physicians and how it differs by physician sex, age, medical specialty, and career stage (eg, residency vs practicing physician).

EVIDENCE REVIEW Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) 2020-compliant systematic review, searching Medline, Embase, and PsychInfo from January 2006 to March 2020. Search terms included Medical Subject Headings terms and keywords related to physicians as the population and problematic alcohol use as the primary outcome. The quality of studies was assessed using the Newcastle-Ottawa Scale. We included articles where problematic alcohol use was measured by a validated tool (ie, Alcohol Use Disorders Identification Test [AUDIT], AUDIT Version C [AUDIT-C], or CAGE [Cut down, Annoyed, Guilty, and Eye-opener] questionnaire) in practicing physicians (ie, residents, fellows, or staff physicians).

FINDINGS Thirty-one studies involving 51,680 participants in 17 countries published between January 2006 and March 2020 were included. All study designs were cross-sectional, self-reported surveys. Problematic alcohol use varied widely regardless of measurement method (0 to 34% with AUDIT, 9% to 35% with AUDIT-C, 4% to 22% with CAGE). Reported problematic alcohol use increased over time from 16.3% in 2006 to 2010 to 26.8% in 2017 to 2020. The extent of problematic use by sex was examined in 19 studies, by age in 12 studies, by specialty in 7 studies, and by career stage in 5 studies. Seven of 19 studies (37%) identified that problematic alcohol use was more common in males than females. Based on the wide heterogeneity of methods for included studies, limited conclusions can be made on how problematic alcohol use varies among physicians based on age, sex, specialty, and training stage.

CONCLUSIONS AND RELEVANCE Studies about problematic alcohol use in physicians demonstrate a high degree of heterogeneity in terms of methods of measurement, definitions for problematic alcohol use, and cohorts assessed. Most studies are primarily self-reported, precluding the ability to determine the true prevalence among the profession. Few studies provide relevant comparisons to aid in identifying key risk groups for targeted interventions.

Key Points

Question How common is problematic alcohol use among physicians, and what characteristics are associated with it in physicians?

Findings In this systematic review of 31 studies involving 51,680 participants in 17 countries, problematic alcohol use in physicians was identified by a self-reported survey, with reported use increasing over time. Methods of assessment and outcome definitions were highly variable, and limited information was identified on how problematic alcohol use varies among physicians based on age, sex, specialty, and training stage.

Meaning Key epidemiologic information of the prevalence of problematic alcohol use in physicians and associated risk factors are unknown, hampering the ability to identify high-risk individuals for targeted interventions.

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Introduction

Emerging evidence suggests physicians are at a higher risk of burnout and mental health conditions, including depression and anxiety, than the general population.1-8 Physicians are prone to occupational distress, which may facilitate problematic drinking habits, including drinking alcohol frequently, binge drinking, and alcohol use disorder.9 Although historical evidence suggests problematic alcohol use may be similar to those of the general population, this may be shifting over the last few decades with changes in the demographic composition of the physician workforce.10-15

Identifying problematic alcohol use in physicians is difficult. Behaviors that may indicate problematic alcohol use in a physician may include changes in behavior from baseline, loss of reliability, frequent medical complaints, mood changes, and legal problems due to impaired driving.10,16 Physicians with problematic alcohol use may be high functioning, making the identification of potential impairment challenging.17 Furthermore, societal stigma and fear of reprisal from professional colleges for reporting or seeking care for problematic alcohol use may encourage physicians with problematic alcohol use to keep their problems hidden.18

Given the long-term effects of alcohol on cognitive processes (including judgment, mood, impulse control, and learning), as well as health impacts (including cardiovascular disease, cancer, and liver cirrhosis), decreasing problematic alcohol use in physicians will improve physician health and well-being with the potential to improve patient care.19-22 Regarding patient care, problematic alcohol use has obvious and foreseeable clinical sequelae, such as an increase in physician error and absenteeism.11,23 As such, we conducted a systematic review of the literature to determine how common problematic alcohol use is reported by physicians and whether it differs by sex, age, specialty or career stage.

Methods

Protocol

This review followed an a priori protocol (PROSPERO CRD42022304799) developed and conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) reporting guideline (Figure). We included peer-reviewed published studies or prepublication reporting on problematic alcohol use as measured with Alcohol Use Disorders Identification Test (AUDIT), AUDIT Version C (AUDIT-C), and the Cut down, Annoyed, Guilty, and Eye-opener (CAGE) questionnaire, among medical residents, fellows, and staff physicians that were published in English between January 2006 and March 2020. We excluded studies that (1) examined the prevalence of problematic alcohol use in medical students or nonphysician health care professionals (eg, nurses);
The primary outcome of interest in this study was the prevalence of alcohol use disorders or unhealthy alcohol use in this population, identified by standardized questionnaire, including the AUDIT, AUDIT-C, and the CAGE questionnaire. For this review, problematic alcohol use included hazardous, potentially hazardous, risky, at-risk, harmful, problematic, or heavy drinking or alcohol use, as well as alcohol misuse, alcohol dependence, and alcohol use more than low-risk guidelines and alcohol use disorder. Further detailed descriptions of the AUDIT, AUDIT-C, and CAGE questionnaires, including their structure, sensitivity, specificity, and what contexts they have been validated in, are included in eAppendix 1 in the Supplement 1. Details on the search strategy, data selection, and extraction and quality assessment are provided in eAppendix 2 in Supplement 1.

Because there was a high degree of heterogeneity in the methods of measurement and definitions used, data synthesis (ie, meta-analysis and meta-regression) were not conducted.

Results

Study Characteristics

This review included 31 cross-sectional studies, involving a total of 51,680 medical residents and physicians across 17 countries. The characteristics of all studies can be found in Table 1.

Our search of Medline, Embase, and PsycInfo yielded 30,857 records. After screening titles and abstracts, 447 were deemed eligible for full-text review. Of these, 32 studies were unable to be retrieved, 242 were published prior to January 2006, 58 lacked a clear outcome definition (eg, a validated questionnaire was not used), 48 were not original articles (eg, comments, letters, and reviews), 21 were not in English, and 15 included mixed populations (eg, health care workers without separate data reported for physicians). In total, 31 studies satisfied the inclusion and exclusion criteria of this study.

The number of participants in each study ranged from 36 to 7288 (median, 790; mean, 1667). Sixteen studies took place in Europe (3 in Denmark, 2 each in Austria, Germany, and Italy, 1 each in Belgium, Finland, France, Lithuania, Switzerland, and Spain, and 1 in Norway and Germany), 8 in North America (all in the US), 2 in Australia, 2 in Africa (both in Nigeria), and 1 each in South America (Brazil), Asia (Lebanon), and Oceania (Fiji). Eight studies included participants from a single specialty, 7 studies did not report the specialties of their participants, and 16 studies included participants from a variety of specialties. Twelve studies included fully trained physicians only (either reported this directly or this was assumed because the study reported time in practice), 7 studies included residents only, 7 studies included physicians in varying career stages, and 5 studies included physicians in varying career stages.

The primary outcome was identified via self-report in all studies. No population-based studies using routinely collected health data were identified. The questionnaire used to identify problematic alcohol use was the CAGE in 7 of 31 studies, the AUDIT in 16 of 31 studies, and the AUDIT-C in 11 of 31 studies. Three studies used more than 1 questionnaire. The cut-off for what constituted problematic alcohol use varied between studies using the AUDIT and AUDIT-C. Additionally, 12 studies used different scoring cut-offs for problematic drinking based on sex, whereas 19 studies did not.

Studies using the AUDIT commonly used a cut-off of greater or equal to 8, but some used greater or equal to 7 or 6. The AUDIT questionnaire is well validated, with high sensitivity, and lower but still acceptable specificity for problematic alcohol use, although rates vary depending on the cut-off score used to identify a positive screen of a total of 40 possible points. A previous study demonstrated that among those diagnosed as having hazardous or harmful alcohol use, 92% had an AUDIT score of 8 or more, and 94% of those with nonhazardous consumption had a score of less than 8.
<table>
<thead>
<tr>
<th>Source</th>
<th>Location</th>
<th>Study design</th>
<th>Sample, No.</th>
<th>Response rate (%)</th>
<th>Outcome assessment</th>
<th>Definition of outcome</th>
<th>Outcome, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorensen et al, 2015</td>
<td>Denmark</td>
<td>CSS</td>
<td>1943</td>
<td>49</td>
<td>AUDIT</td>
<td>Hazardous use: 8-15&lt;br&gt; Harmful use: 16-19&lt;br&gt; Alcohol dependence: ≥20</td>
<td>Hazardous: 300 (15.4) Harmful: 46 (2.4)</td>
</tr>
<tr>
<td>Patel et al, 2017</td>
<td>Fiji</td>
<td>CSS</td>
<td>36</td>
<td>83.7</td>
<td>AUDIT</td>
<td>Zone II (8 [7 in F]-15): alcohol use &gt; low-risk guidelines&lt;br&gt; Zone II: 10 (27.8)</td>
<td>Zone III: 2 (5.6)</td>
</tr>
<tr>
<td>Axisa et al, 2020</td>
<td>New South Wales, Australia</td>
<td>CSS</td>
<td>59</td>
<td>88</td>
<td>AUDIT</td>
<td>Risky drinking: M: 8-15, F: 7-15&lt;br&gt; High-risk drinking: ≥16</td>
<td>Risky or high risk: 12 (20)</td>
</tr>
<tr>
<td>Tobias et al, 2019</td>
<td>Maranhao, Northeastern Brazil</td>
<td>CSS</td>
<td>317</td>
<td>NR</td>
<td>AUDIT</td>
<td>Alcohol misuse: &gt;8</td>
<td>39 (12.3)</td>
</tr>
<tr>
<td>Srensen et al, 2016</td>
<td>Denmark</td>
<td>CSS</td>
<td>1943</td>
<td>49</td>
<td>AUDIT</td>
<td>Hazardous alcohol use: ≥8</td>
<td>346 (18.3)</td>
</tr>
<tr>
<td>Obadeji et al, 2015</td>
<td>Ado-Ekiti, Nigeria</td>
<td>CSS</td>
<td>122</td>
<td>90.4</td>
<td>AUDIT</td>
<td>Hazardous use: ≥5&lt;br&gt; Harmful use: score not defined&lt;br&gt; Harmful: 1 (0.8)</td>
<td>Hazardous: 8 (6.6)</td>
</tr>
<tr>
<td>Issa et al, 2012</td>
<td>Nigeria</td>
<td>CSS</td>
<td>241</td>
<td>68.9</td>
<td>AUDIT</td>
<td>Hazardous use: ≥5</td>
<td>10 (4.1)</td>
</tr>
<tr>
<td>Aalto et al, 2006</td>
<td>Finland</td>
<td>CSS</td>
<td>1909</td>
<td>59.8</td>
<td>AUDIT</td>
<td>Heavy drinking: ≥8</td>
<td>276 (14.5)</td>
</tr>
<tr>
<td>Talih et al, 2016</td>
<td>Lebanon</td>
<td>CSS</td>
<td>118</td>
<td>38</td>
<td>AUDIT</td>
<td>Harmful or hazardous use: ≥8</td>
<td>7 (6)</td>
</tr>
<tr>
<td>Bazargan et al, 2009</td>
<td>California, US</td>
<td>CSS</td>
<td>763</td>
<td>41</td>
<td>AUDIT</td>
<td>Hazardous drinking: &gt;8</td>
<td>43 (5.7)</td>
</tr>
<tr>
<td>Pedersen et al, 2016</td>
<td>Denmark</td>
<td>CSS</td>
<td>1841</td>
<td>46</td>
<td>AUDIT</td>
<td>Risky or hazardous alcohol use: ≥8</td>
<td>346 (18.8)</td>
</tr>
<tr>
<td>Fond et al, 2018</td>
<td>Metropolitan France</td>
<td>CSS</td>
<td>2165</td>
<td>NR</td>
<td>AUDIT</td>
<td>Alcohol use disorder: M: ≥7, F: ≥6</td>
<td>736 (34.0)</td>
</tr>
<tr>
<td>Nash et al, 2010</td>
<td>Australia</td>
<td>CSS</td>
<td>2999</td>
<td>36</td>
<td>AUDIT</td>
<td>Potentially hazardous drinking: ≥8</td>
<td>438 (14.6)</td>
</tr>
<tr>
<td>Rosta and Aasland, 2010</td>
<td>Norway and Germany</td>
<td>CSS</td>
<td>2500</td>
<td>67.2</td>
<td>AUDIT in Norway; AUDIT-C in Germany</td>
<td>Hazardous drinking: ≥5</td>
<td>524 (21.0)</td>
</tr>
<tr>
<td>Wurst et al, 2013</td>
<td>Salzburg, Austria</td>
<td>CSS</td>
<td>456</td>
<td>18.6</td>
<td>AUDIT and AUDIT-C</td>
<td>At-risk drinking: AUDIT-C &gt;5, AUDIT &gt;8&lt;br&gt; AUDIT-C: 159 (34.9)</td>
<td>AUDIT-C: 61 (13.4)</td>
</tr>
<tr>
<td>Sebo et al, 2007</td>
<td>Switzerland</td>
<td>CSS</td>
<td>1784</td>
<td>65</td>
<td>AUDIT-C</td>
<td>Hazardous drinking: M: &gt;5, F: &gt;4</td>
<td>533 (30)</td>
</tr>
<tr>
<td>Oreskovitch et al, 2015</td>
<td>US</td>
<td>CSS</td>
<td>7288</td>
<td>26.7</td>
<td>AUDIT-C</td>
<td>Alcohol abuse or dependence: M: ≥5, F: ≥4</td>
<td>1100 (15.1)</td>
</tr>
<tr>
<td>Oreskovitch et al, 2012</td>
<td>US</td>
<td>CSS</td>
<td>7197</td>
<td>28.7</td>
<td>AUDIT-C</td>
<td>Alcohol abuse and possible dependence: M: ≥5, F: ≥4</td>
<td>1112 (15.4)</td>
</tr>
<tr>
<td>Lamberi et al, 2017</td>
<td>Naples, Italy</td>
<td>CSS</td>
<td>500</td>
<td>100</td>
<td>AUDIT-C</td>
<td>Hazardous alcohol consumption: M: ≥4, F: ≥3</td>
<td>43 (8.6)</td>
</tr>
<tr>
<td>Lebares et al, 2018</td>
<td>US</td>
<td>CSS</td>
<td>566</td>
<td>10</td>
<td>AUDIT-C</td>
<td>Hazardous drinking: M: ≥4, F: ≥3</td>
<td>194 (34.3)</td>
</tr>
<tr>
<td>Rosta, 2008</td>
<td>Germany</td>
<td>CSS</td>
<td>1917</td>
<td>58</td>
<td>AUDIT-C</td>
<td>Hazardous drinking: ≥5</td>
<td>380 (19.8)</td>
</tr>
<tr>
<td>Albano et al, 2020</td>
<td>Italy</td>
<td>CSS</td>
<td>639</td>
<td>NR</td>
<td>AUDIT-C</td>
<td>Hazardous drinking: M: ≥4, F: ≥3</td>
<td>58 (9.1)</td>
</tr>
<tr>
<td>McBeth et al, 2008</td>
<td>US</td>
<td>CSS</td>
<td>2397</td>
<td>56</td>
<td>CAGE</td>
<td>Screen positive for alcohol abuse (CAGE): ≥2</td>
<td>133 (5.6)</td>
</tr>
</tbody>
</table>
than 8. Sensitivity varies between 97% for hazardous use, 95% for harmful drinking, and 51% to 59% for at-risk or heavy drinking. Specificity varies between 78% for hazardous use, 85% for harmful use, and 91% to 96% for at-risk heavy drinking.57,58

Most studies37-42,44,45,47 using the AUDIT-C used a cut-off of greater than 5 or 4. A cut-off of 4 or more has a sensitivity of 86% and specificity of 72% in identifying patients with heavy drinking and/or active problematic alcohol use or dependence.59

Studies48-54 using the CAGE questionnaire all were consistent, with a score of greater than or equal to 2 constituting a positive screen for alcohol abuse. The CAGE has demonstrated a mean (SD) sensitivity of 71% and specificity of 90% in varied samples of patients.60 The scoring criteria for each study can be found in Table 1.

### Extent of Problematic Alcohol Use Among Physicians

The reported extent of problematic alcohol use in physicians varied widely across all studies. The proportion of a positive screen varied between 0% to 34% for studies24-38,48 using the AUDIT, 8.6% to 34.9% for studies37-47 using the AUDIT-C, and 3.8% to 22.0% for studies48-54 using the CAGE questionnaire. The response rates varied between 6.1% to 100%, and 4 studies27,35,46,52 did not report a response rate. (Tables 1, 2, and 3).

### Differences in Problematic Alcohol Use in Physicians by Sex

Nineteen studies24,26,28-31,36-38,40-46,48,50,54 reported problematic alcohol use by sex (Table 2). Of these studies, the proportion of the male sample size varied between 25% and 75.5%. Problematic alcohol use was significantly higher in males than females in 7 studies and higher in females than males in 4 studies. In general, recent studies (ie, published between 2015-2020) were more likely to report a female preponderance in problematic alcohol use. All (3 of 3) of the studies41,42,44 of physicians in the US reported higher rates of problematic alcohol use in females than males. One43 of 2 studies43,46 including Italian physicians showed that females were more likely to be at risk of high-risk drinking, while their male colleagues were more at risk of low-risk drinking, compared to no risk drinking. The other study46 in Italy showed that females were more likely to screen positive for hazardous alcohol consumption. Studies in the rest of Europe24,28,31,37,40,45,48,50,54 and Nigeria29,30 demonstrated that males were at a greater risk of screening positive for problematic alcohol use, while evidence in Australia was inconclusive.76,36,38

### Differences in Problematic Alcohol Use in Physicians by Age

Twelve studies24,28,30,31,36,37,41,42,46,48,50,54 reported problematic alcohol use by age (Table 2). All studies24,28,30,31,36,37,41,42,48,50,54 reported problematic alcohol use by age based on age groupings except for one study,46 which reported it as a median and range. Problematic alcohol use was higher in younger physicians in 2 studies and higher in older physicians in 2 studies. There were no

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### Table 1. Design, Method of Measurement, and Outcomes for Included Studies Assessing Alcohol Use in Physicians (continued)

| Source            | Location | Study design | Sample, No. | Response rate (%) | Outcome assessment | Definition of outcome | Outcome, No. (%)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrath et al,50 2012 Germany</td>
<td>CSS 790</td>
<td>38.6</td>
<td>CAGE</td>
<td>Screen positive for alcohol abuse: ≥2</td>
<td>790 (18.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rath et al,51 2015 US</td>
<td>CSS 436</td>
<td>40.1</td>
<td>CAGE</td>
<td>Screen positive for alcohol abuse: ≥2</td>
<td>60 (15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mikalauskas et al,52 2018 Lithuania</td>
<td>CSS 220</td>
<td>NR</td>
<td>CAGE</td>
<td>Screen positive for alcohol abuse: ≥2</td>
<td>48 (22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vetter et al,53 2018 US</td>
<td>CSS 374</td>
<td>21.4</td>
<td>CAGE</td>
<td>Screen positive for alcohol abuse: ≥2</td>
<td>64 (17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pjrek et al,54 2019 Austria</td>
<td>CSS 131</td>
<td>32.8</td>
<td>CAGE</td>
<td>Screen positive for alcohol abuse: ≥2</td>
<td>5 (3.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: AUDIT indicates Alcohol Use Disorders Identification Test; AUDIT-C, Alcohol Use Disorders Identification Test Version C; CAGE, Cut down, Annoyed, Guilty, and Eye-opener; CSS, cross-sectional survey; F, female; M, male; NR, not reported.
Table 2. Studies Assessing Alcohol Use in Physicians by Age and Sex

<table>
<thead>
<tr>
<th>Source</th>
<th>Location</th>
<th>Male, No. (%)</th>
<th>Female, No. (%)</th>
<th>Outcome assessment</th>
<th>Definition of outcome</th>
<th>Outcome by sex</th>
<th>Age distribution, n (%)</th>
<th>Outcome by age, y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romero-Rodriguez et al, 2019</td>
<td>Spain</td>
<td>653 (37.1)</td>
<td>1107 (62.9)</td>
<td>AUDIT-C</td>
<td>Hazardous drinking: M, ≥5; F, ≥4</td>
<td>M, 222 (34.2); F, 264 (24.0)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Aasland, 37</td>
<td></td>
<td>2006</td>
<td>15 (25.0)</td>
<td>44 (75.0)</td>
<td>AUDIT</td>
<td>Risky drinking: M, 8-15; F, 7-15; high-risk drinking: ≥16</td>
<td>Risky or high risk: M, 0; F, 12 (27)</td>
<td>NA</td>
</tr>
<tr>
<td>Srensen et al, 2016</td>
<td>Denmark</td>
<td>927 (47.7)</td>
<td>1016 (53.3)</td>
<td>AUDIT</td>
<td>Hazardous alcohol use: ≥8</td>
<td>M, 214 (23.1); F, 132 (13.0)</td>
<td>20-40, 557 (20.9); 41-50, 449 (16.8); 51-60, 564 (21.1); ≥61, 302 (11.3)</td>
<td>20-40, 103 (18.5); 41-50, 59 (13.1); 51-60, 113 (20.0); ≥61, 71 (23.5)</td>
</tr>
<tr>
<td>Obadeji et al, 2015</td>
<td>Nigeria</td>
<td>74 (61)</td>
<td>47 (0.39)</td>
<td>AUDIT</td>
<td>Hazardous use: M, 8 (10.8); F, 0; harmful use: M, 1 (4.1); F, 0</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Lambert et al, 2017</td>
<td>Naples, Italy</td>
<td>208 (41.6)</td>
<td>292 (58.4)</td>
<td>AUDIT-C</td>
<td>Hazardous alcohol consumption: M, ≥4; F, ≥3</td>
<td>M, 15 (7.2); F, 28 (9.6)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Sørensen et al, 2015</td>
<td>Denmark</td>
<td>927 (47.7)</td>
<td>1016 (53.3)</td>
<td>AUDIT</td>
<td>Hazardous use: 8-15; harmful use: 16-19; alcohol dependence: ≥20</td>
<td>AUDIT 8-15: M, 185 (21.7); F, 115 (12.6); AUDIT ≥16: M, 29 (3.4); F, 17 (1.8)</td>
<td>20-40, 557 (28.7); 41-50, 453 (23.3); 51-60, 564 (29.0); ≥61, 373 (19.2)</td>
<td>20-40, 91 (17.7); 41-50, 46 (10.7); AUDIT ≥16: mean (SD), 46.5 (12.5); 20-40, 12 (2.4); 41-50, 13 (3.1)</td>
</tr>
<tr>
<td>Oreskovich et al, 2012</td>
<td>US</td>
<td>6079 (84)</td>
<td>1041 (14.4)</td>
<td>AUDIT-C</td>
<td>Alcohol abuse and possible dependence: M, ≥5; F, ≥4</td>
<td>M, 846 (13.9); F, 266 (25.6)</td>
<td>≤35, 194 (2.7); 35-44, 1956 (22.2); 44-54, 2338 (21.1); 55-64, 2077 (28.9); ≥65, 1015 (14.1)</td>
<td>≤35, 33 (17.0); 35-44, 307 (19.2); 45-54, 379 (16.9); 55-64, 288 (13.9); ≥65, 105 (10.3)</td>
</tr>
<tr>
<td>Unrath et al, 2012</td>
<td>Germany</td>
<td>551 (69.7)</td>
<td>239 (30.2)</td>
<td>CAGE</td>
<td>Screen positive for alcohol abuse: ≥2</td>
<td>M, 551 (20.5); F, 239 (15.1)</td>
<td>31-45, 142 (18.0); 46-60, 502 (63.5); ≥61, 146 (18.5)</td>
<td>31-45, 142 (13.4); 46-60, 502 (20.7); &gt;60, 146 (17.8)</td>
</tr>
<tr>
<td>Albano et al, 2020</td>
<td>Italy</td>
<td>279 (43.7)</td>
<td>360 (56.3)</td>
<td>AUDIT-C</td>
<td>Hazardous drinking: M, ≥4; F, ≥3</td>
<td>Low risk: M, 162 (58.3); F, 139 (38.6); high risk: M, 22 (7.9); F, 36 (10)</td>
<td>46 (22-69)*</td>
<td>At or high-risk: 54.3 (26-69)*</td>
</tr>
<tr>
<td>Rosta and Aasland, 2010</td>
<td>Norway and Germany</td>
<td>Norway: 398 (66.2); Germany: 1173 (61.8)</td>
<td>Norway; 203 (34.8); Germany: 725 (38.2)</td>
<td>AUDIT in Norway; AUDIT-C in Germany</td>
<td>Hazardous drinking: ≥5</td>
<td>M, 27-44, 1676 (67); 45-65, 823 (33)</td>
<td>27-44, 311 (18.5); 45-65: 213 (22.9)</td>
<td></td>
</tr>
<tr>
<td>Joos et al, 2013</td>
<td>Belgium</td>
<td>800 (53.3)</td>
<td>701 (46.7)</td>
<td>AUDIT and CAGE</td>
<td>Hazardous drinking (AUDIT): M, ≥8; F, ≥6; screen positive for alcohol abuse (CAGE): ≥2</td>
<td>Hazardous drinking: M, 166 (20.7); F, 105 (14.0); positive CAGE: M, 175 (21.9); F, 99 (14.1)</td>
<td>48.24 (12.7); &lt;30, 87 (5.8); 30-44, 538 (35.2); 45-54, 356 (23.7); 55-64, 342 (22.8); &gt;65, 164 (10.9)</td>
<td>Hazardous drinking: &lt;30, 11 (12.6); 30-44, 77 (14.4); 45-54, 53 (14.0); 55-64, 70 (20.5); &gt;65, 55 (31.7); positive CAGE: &lt;30, 5 (5.7); 30-44, 82 (15.3); 45-54, 80 (22.5); 55-64, 71 (20.8); ≥65, 30 (18.3)</td>
</tr>
<tr>
<td>Nash et al, 2010</td>
<td>Australia</td>
<td>2098 (70)</td>
<td>868 (28.9)</td>
<td>AUDIT</td>
<td>Potentially hazardous drinking: ≥8</td>
<td>M, 366 (17); F, 72 (8)</td>
<td>&lt;40, 485 (16.2); 40-49, 874 (29.1); 50-59, 924 (30.8); ≥60, 688 (22.9)</td>
<td>&lt;40, 46 (9.5); 40-49, 145 (16.6); 50-59, 157 (17.0); ≥60, 90 (13.1)</td>
</tr>
<tr>
<td>Pjrek et al, 2019</td>
<td>Austria</td>
<td>73 (55.7)</td>
<td>58 (44.3)</td>
<td>CAGE</td>
<td>Screen positive for alcohol abuse: ≥2</td>
<td>M, 4 (5.5); F, 1 (1.7)</td>
<td>49.64 (6.74); 38-62; ≥49, 69 (52.7); ≥50, 62 (47.3)</td>
<td>≥40, 9 (6.5); ≥50, 157 (17.0); ≥60, 88 (13.3)</td>
</tr>
<tr>
<td>Issa et al, 2012</td>
<td>Nigeria</td>
<td>182 (75.5)</td>
<td>59 (24.5)</td>
<td>AUDIT</td>
<td>Hazardous use: ≥5</td>
<td>M, 10 (5.5); F, 0</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Aalto et al, 2006</td>
<td>Finland</td>
<td>712 (37.3)</td>
<td>1197 (62.7)</td>
<td>AUDIT</td>
<td>Heavy drinking: ≥8</td>
<td>M, 192 (27); F, 84 (7)</td>
<td>≥30, 214 (11.2); 31-40, 623 (32.6); 41-50, 708 (37.1); ≥51, 364 (19.1)</td>
<td>≥30, 32 (15.0); ≥31-40, 89 (13.3); 41-50, 88 (12.4); ≥51, 73 (20.1)</td>
</tr>
</tbody>
</table>

(continued)
significant differences in problematic alcohol use by age in 5 studies, and 3 studies did not report the statistical significance of their results.

**Differences in Problematic Alcohol Use by Medical Specialty**

Seven studies reported problematic alcohol use by medical specialty (Table 3). Five studies compared physicians across all specialties, while 2 studies compared problematic alcohol use in (1) surgeons vs general practitioners or medical officers vs all other physicians and (2) psychiatrists vs nonpsychiatrists. The extent of problematic alcohol use by medical specialty was similar in 5 studies. One study found that surgeons (including general surgery, obstetrics and gynecology, and surgical subspecialties) and anesthetists were significantly associated with hazardous drinking (OR, 1.4; 95% CI, 1.1-1.8; \(P < .001\)) compared with nonsurgical specialties (including internal medicine and subspecialties, pediatrics and psychiatry). Another study found that the prevalence of alcohol abuse or dependence was statistically significant (\(P = .001\)) between specialties, with the highest prevalence among dermatologists and orthopedic surgeons and the lowest prevalence among general pediatricians and neurologists.

**Differences in Problematic Alcohol Use by Career Stage**

Five studies reported problematic alcohol use by career stage (Table 3). One study found hazardous drinking was higher in practicing physicians vs residents (29.4% vs 24.0% based on an AUDIT-C score of \(\geq 5\) in males and \(\geq 4\) in females; \(P = .05\)). Another study used the AUDIT-C to assess alcohol misuse and alcohol abuse based on postgraduate year (PGY) of training. Rates of alcohol misuse increased significantly with the year of training (\(P = .011\)), while alcohol abuse varied. Another study compared the extent of hazardous (AUDIT 8-15) and harmful alcohol use (AUDIT 16-19) in medical specialists and general practitioners vs junior doctors with no significant difference detected (\(P = .754\)). One study reported that among hazardous users (AUDIT \(\geq 5\)), 30% were intern, 50% were residents, and 20% were consultants, but no indicators of statistical significance were reported. Although this study did not formally report outcomes based on the career stage, Oreskovich et al found that the extent of problematic alcohol use or dependence based on the AUDIT-C \(\geq 5\) in males and \(\geq 4\) in females) decreased significantly with years of practice (\(P < .001\)).
### Table 3. Studies Assessing Alcohol Use in Physicians by Specialty Type and/or Career Stage

<table>
<thead>
<tr>
<th>Source</th>
<th>Outcome assessment</th>
<th>Definition of outcome</th>
<th>Specialty distribution</th>
<th>Outcome by specialty</th>
<th>Stage distribution</th>
<th>Outcome by career stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosta, et al, 2008</td>
<td>AUDIT-C</td>
<td>Hazardous drinking: ≥5</td>
<td>Surgery, 482 (25.7); internal medicine, 561 (29.3); anesthesiology, 264 (13.8); obstetrics and gynecology, 136 (7.1); pediatrics, 100 (5.2); neurology, 65 (3.4); psychiatry and psychotherapy, 54 (2.8); radiology, 82 (4.3); urology, 56 (2.9); other, 105 (5.5)</td>
<td>Surgery, 113 (23.8); internal medicine, 97 (17.9); anesthesiology, 63 (24.8); obstetrics and gynecology, 20 (15.4); pediatrics, 8 (8.2); neurology, 9 (13.8); psychiatry and psychotherapy, 4 (7.7); radiology, 20 (24.7); urology, 18 (34.0); other, 11 (12.0)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Sorensen et al, 2015</td>
<td>AUDIT</td>
<td>Hazardous use: 8-15; harmful use: 16-19; alcohol dependence: ≥20</td>
<td>Emergency, 126 (6.9); general practice, 761 (41.7); occupational medicine, 31 (1.7); psychiatry, 92 (5.0); internal medicine, 337 (18.5); surgery, 172 (9.4); other, 305 (16.7); missing, 119</td>
<td>AUDIT 8-15: emergency: 23 (18.2); general practice, 110 (14.2); occupational medicine, 6 (18.6); psychiatry, 13 (14.3); internal medicine, 71 (21.4); surgery, 34 (20.0); other, 41 (12.7); AUDIT ≥16: emergency: 7 (5.6); general practice, 15 (1.5); occupational medicine, 1 (3.1); psychiatry, 2 (2.6); internal medicine, 8 (2.5); surgery, 3 (1.9); other, 9 (2.8)</td>
<td>Medical specialists and general practitioners: 1263 (68.9); junior doctors: 578 (31.3)</td>
<td>AUDIT 8-15, 16+; medical specialists and general practitioners: 204 (16.2), 31 (2.5); junior doctors: 96 (16.6), 15 (2.6)</td>
</tr>
<tr>
<td>Joos et al, 2013</td>
<td>AUDIT and CAGE</td>
<td>Hazardous drinking (AUDIT); M, 8-16; F, 8-15; screen positive for alcohol abuse (CAGE); ≥2</td>
<td>Surgery, 156 (10.4); anesthesia and reanimation, 116 (7.7); psychiatry and neurology, 208 (13.9); internal medicine, 267 (17.8); pediatrics, 141 (9.4); gynecology and obstetrics, 134 (8.9); other, 479 (31.9)</td>
<td>Hazardous drinking: surgery, 24 (15.4); anaesthesia and reanimation: 22 (19.0); psychiatry and neurology, 41 (19.7); internal medicine, 44 (16.5); pediatrics, 20 (14.2); gynecology and obstetrics, 31 (23.1); other, 88 (18.4); positive CAGE: surgery, 23 (14.7); anaesthesia and reanimation, 30 (25.9); psychiatry and neurology, 44 (22.1); internal medicine, 40 (15.7); pediatrics, 16 (11.3); gynecology and obstetrics, 29 (21.6); other, 88 (18.4)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Nash et al, 2010</td>
<td>AUDIT</td>
<td>Potentially hazardous drinking: ≥8</td>
<td>General practitioner, 590 (19.9); obstetrician and gynecologist, 179 (6.0); surgeon, 357 (12.0); anesthetist, 351 (11.8); psychiatrist, 231 (7.8); pathologist, 89 (2.6); radiologist, 107 (3.6); physician, 480 (16.1); accident or emergency specialist, 63 (2.1); pediatrician, 142 (4.8); in training, 254 (8.5); other, 128 (4.3); missing, 28</td>
<td>General practitioner, 73 (12); obstetrician and gynecologist, 27 (15); surgeon, 67 (19); anesthetist, 63 (18); psychiatrist, 35 (15); pathologist, 811 (12); radiologist, 16 (15); physician, 65 (14); accident or emergency specialist, 10 (16); pediatrician, 16 (11); in training, 33 (13); other, 22 (17)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Isa et al, 2012</td>
<td>AUDIT</td>
<td>Hazardous use: ≥5</td>
<td>Surgeons, 116 (48.1); general practitioner or medical officers, 10 (4.2); all other physicians, 115 (47.7)</td>
<td>Surgeons, 5 (4.2); all other physicians, 5 (4.3); general practitioner or medical officers, 0</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Fond et al, 2018</td>
<td>AUDIT</td>
<td>Alcohol use disorder: M, ≥7; F, ≥6</td>
<td>Psychiatrists, 302 (13.9); other, 1863 (86.1)</td>
<td>Psychiatrists, 123 (40.7); other, 613 (32.9)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Romero-Rodriguez et al, 2019</td>
<td>AUDIT-C</td>
<td>Hazardous drinking: M, ≥5; F, &gt;4</td>
<td>NA</td>
<td>NA</td>
<td>Physicians, 1330 (75.6); residents, 201 (11.4)</td>
<td>Physicians, 389 (29.4); residents, 50 (24)</td>
</tr>
<tr>
<td>Lebears et al, 2018</td>
<td>AUDIT-C</td>
<td>Alcohol misuse: M, ≥4; F, ≥3; alcohol abuse: M, ≥5; F, ≥4</td>
<td>NA</td>
<td>NA</td>
<td>Intern, 188 (33.3); PGY2, 104 (18.4); PGY3, 74 (13.1); PGY4, 62 (11.0); PGY5, 70 (12.4); lab, 66 (11.7)</td>
<td>Alcohol misuse; interns, 66 (41.25); PGY2, 45 (56.96); PGY3, 38 (61.29); PGY4, 21 (42.86); PGY5, 24 (42.11); lab, 33 (61.11); alcohol abuse; interns: 45 (28.13); PGY2, 28 (35.44); PGY3, 23 (37.10); PGY4, 16 (52.65); PGY5, 19 (33.33); lab, 23 (42.59)</td>
</tr>
</tbody>
</table>

**Abbreviations:** AUDIT indicates Alcohol Use Disorders Identification Test; AUDIT-C, Alcohol Use Disorders Identification Test Version C; CAGE, Cut down, Annoyed, Guilty, and Eye-opener; NA, not applicable.
Risk-of-Bias Assessment

Risk-of-bias assessment based on the Newcastle-Ottawa Risk-of-Bias Score found that 21 studies were graded as good quality, with 10 as poor (Table 4). All studies lost a point based on self-reported data. Most were penalized as not being representative of the target population (ie, a wide range of diverse physicians by specialty, sex, age, and career stage) or an unclear response rate (ie, less than 50%).

Discussion

We conducted a systematic review to determine the extent of problematic alcohol use in physicians and identify high-risk groups or periods to inform screening and interventions. Overall, we identified 31 self-reported, cross-sectional, survey-based studies that reported the extent of problematic alcohol use in physicians. Most studies had low response rates, with only 4 of 31 studies exceeding 80%. Importantly, no population-based studies were identified, thereby limiting our understanding of the prevalence of problematic alcohol use in physicians.

AUDIT, AUDIT-C, and/or the CAGE questionnaire were most used to identify problematic alcohol; however, the definition of what constituted a positive screen for problematic alcohol use varied widely between studies (0%-34% using AUDIT, 8.6%-34.9% using AUDIT-C, and 3.8%-22.0%...
those using CAGE). In comparison, the prevalence of alcohol use disorder worldwide in 2019 was 1.45%, with prevalence rates highest in males aged 25 to 34 years.\textsuperscript{61,62} There is evidence to suggest that doctors are at an increased risk of anxiety and depression compared to the general population.\textsuperscript{3,63,64} Our results suggest that problematic alcohol use is also higher in physicians compared to the general population, although population-based studies with longitudinal designs or using health administrative data are needed to verify this trend.

We did observe an increase in the reported proportion of problematic alcohol use in physicians over the last 15 years from 16.3\% to 26.8\%. It remains unknown whether this increase is indeed accurate or whether it is due to increased transparency by physicians in self-reporting problematic alcohol use because of a changing culture of medicine.

The extent of problematic alcohol use by sex was examined in most (19 of 31) studies, and the largest proportion of these studies (7 of 19) reported a higher extent of problematic use in males than females. There were no clear differences in the extent of problematic alcohol use by age, physician specialty, and career stage. As such, key information on the extent of problematic alcohol use among physicians remains unknown.

Available data surrounding the extent of problematic alcohol use in physicians have historically come from license and disciplinary actions, known or registered problematic users, mortality rates, hospital admissions, and treatment populations, and surveys of selected groups of physicians.\textsuperscript{12} As these are highly select groups, the prevalence of problematic alcohol use in physicians remains unknown. Studies included in the current review are self-reported and are prone to biases limiting generalizability and accuracy. Self-reported alcohol consumption has been shown to amount to approximately 40\% to 60\% of total alcohol sales in the general population, which highlights the high likelihood that the extent on problematic alcohol use using self-reported data is likely a vast underestimation of its true prevalence.\textsuperscript{65,66} Most studies reported low response rates suggesting physicians may be hesitant to participate in studies assessing problematic alcohol use. Physicians who use alcohol-related screening questionnaires as part of their practice may be familiar with the scoring systems and may answer in such a way as to screen negative for problematic alcohol use. Physicians may be likely to underreport use for fear of reprisal by colleagues and licensing boards. Therefore, the low levels of problematic alcohol use identified in this review likely underestimate the scale and consequent harms from alcohol use by physicians.

Periods of risk, specifically by age or career stage, that may increase one's risk of problematic alcohol use were not identifiable. No differences in the extent of problematic alcohol use based on age was noted, suggesting that all age periods are equal risk or the heterogeneity and underreporting make identification of a true high risk age group difficult. Previous research suggests problematic alcohol use is higher in medical students than in practicing physicians, consistent with higher alcohol use in the general population.\textsuperscript{67-72} However, this may culturally based as Western countries are more likely to consume more alcohol in general.\textsuperscript{73} We were unable to identify differences in problematic alcohol use based on career stage, and it remains unclear whether career stage may influence a physician's risk of problematic alcohol use.

In regard to sex-based differences, studies seem to report a male preponderance in problematic alcohol use, yet given the wide heterogeneity of the studies in terms of outcome reporting, quality of evidence, and geographical distribution, definitive conclusions are uncertain. Trends in drinking patterns in female physicians are likely driven by changing drinking patterns in women in general, suggesting that sex differences in drinking prevalence are converging.\textsuperscript{74,75} In the United States, the prevalence of high-risk drinking between 2001 and 2012 increased by 57.9\% in women, relative to a 15.5\% increase in men.\textsuperscript{76} We found geographic differences with female physicians in the US and Italy being more likely to screen positive for problematic alcohol use than men, whereas the converse was true in the rest of Europe and Nigeria. This observed geographic variability in sex differences appears consistent with the general population.\textsuperscript{77} Stress-related drinking has been noted to be a unique factor in alcohol use in women, and given the stressful nature of the profession of medicine, female physicians may be at an increased risk.\textsuperscript{78} Furthermore, the phenomenon of telescoping is
more prevalent in female physicians than male physicians, as they are more likely to initiate alcohol use at a later age, but with shorter times from use to dependence and treatment. Female medical students may be more prone to developing problematic drinking habits throughout medical school, such that by the end of their training, rates of problematic alcohol use are similar between males and females.

The identification of specialty-related differences in problematic alcohol use would also be very helpful to inform targeted screening for problematic alcohol use in physicians, workplace health promotion, and system-level change. Nonetheless, we found only 2 studies reported the extent of problematic alcohol use by specialty. These 2 studies reported surgical specialties are more likely to screen positive for problematic alcohol use relative to those in a nonsurgical specialty. Future research should aim to identify what specialties, including surgery, are associated with an increased risk of alcohol use and what environmental factors may be related.

Cultural changes minimizing stigma and reducing obstacles to seeking help may encourage physicians who suffer in silence to seek help. Future research could also aim to better understand factors that limit physician disclosure of problematic alcohol use and ultimately deconstruct these factors to promote care-seeking behavior in physicians. Furthermore, a clearer understanding of what sex, age, physician specialties, and career stages are most at risk for problematic alcohol use would help inform the development of physician health programs that identify problematic alcohol use and establish timely interventions for those in need.

Limitations
This review has limitations. The primary outcomes of studies included in this review were very heterogeneous, which rendered comparison between studies quite challenging. We chose to include studies that reported on hazardous, potentially hazardous, risky, at-risk, harmful, problematic, or heavy drinking or alcohol use, as well as alcohol misuse, alcohol dependence, alcohol use more than low-risk guidelines, and alcohol use disorder. This was chosen to provide as comprehensive a picture as possible of the nature of problematic alcohol use in physicians. Nonetheless, some of these outcomes are discrete entities; for example, alcohol use more than low-risk guidelines is different from alcohol use disorder. We also did not select a specific cut-off for what constituted problematic alcohol use based on the AUDIT or AUDIT-C questionnaires and rather reported on the individual outcomes that were reported by each study however unstandardized they were. This made direct comparisons difficult and outlined the need for a large population-based study assessing the prevalence of problematic alcohol use based on an internationally accepted definition and standardized reporting. Furthermore, although this review included studies from across the globe, which increases the applicability and external validity of the review, cultural factors related to drinking patterns make it challenging to compare patterns of problematic alcohol use between countries. Lastly, given the number of articles retrieved in our initial literature search, we excluded articles that reported on binge drinking only. Nonetheless, binge drinking is not without its consequences and is generally considered to be a behavior indicative of problematic alcohol use and could contribute to physician impairment and poor patient outcomes.

Conclusions
In this systematic review, we found that the prevalence of self-reported problematic alcohol use in physicians varied widely. All studies were survey-based and self-reported, with variable outcome definitions of problematic alcohol use and inconsistent reporting on differences across sex, age, physician specialty, and career stage. Future population-based studies with longitudinal designs or using health administrative data could help identify the prevalence of and salient risk factors for problematic alcohol use in physicians.
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Data Sharing Statement: See Supplement 2.

REFERENCES


SUPPLEMENT.
eAppendix 1. Additional Methodological Details
eAppendix 2. Detailed Search Strategy

SUPPLEMENT 2.
Data Sharing Statement