ALCOHOL CONSUMPTION, ABSTAINING, HEALTH UTILITY, AND QUALITY OF LIFE – A GENERAL POPULATION SURVEY IN FINLAND

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Abstract — Aims: To examine the associations between alcohol consumption and utility-based health-related quality of life (HRQoL), subjective quality of life (QoL), self-rated health (SRH), and mental distress. Methods: Representative general population survey in Finland, with 5871 persons aged 30–64 years. HRQoL was measured with two health utility instruments (15D and EQ-5D), QoL and SRH were measured with RATING scales, and mental distress with a General Health Questionnaire (GHQ-12). Past alcohol problems were diagnosed with a structured psychiatric interview known as the composite international diagnostic interview (CIDI). Alcohol consumption was examined with a self-report questionnaire. Results: Negative associations between alcohol and well-being were observed on several measures for women consuming more than 173 g and men more than 229 g per week. Former drinkers scored worst on most measures, even in comparison to the highest drinking decile. For women, moderate alcohol use associated with better SRH and EQ-5D as compared to abstainers. However, the possible health utility benefits associated with moderate alcohol consumption were of clinically insignificant magnitude. Conclusions: Failure to separate former drinkers and other abstainers produces a significant bias favoring moderate drinkers. As the possible health utility benefits of moderate alcohol use were clinically insignificant, it suffices to investigate mortality, when estimating the public health impact of moderate alcohol consumption using quality-adjusted life years.

INTRODUCTION

Excessive consumption of alcohol ranks among the world’s major public health problems (Room et al., 2003; Rehm et al., 2006), but mortality captures only a part of the effects of alcohol. WHO estimates that alcohol causes 8% of the male mortality, but up to 14% of disability-adjusted life years that are attributable to risk factors in developed countries (WHO, 2001). Thus, it is also important to measure other aspects of health and well-being. Quality of life (QoL) and health-related quality of life (HRQoL, the component of QoL that health and health care can influence) have become increasingly important as outcome measures of health care and public health interventions in recent years, partly due to the epidemiological transition of disease burden from high-mortality diseases, such as infections, to chronic conditions (Murray and Lopez, 1996). Another relevant trend is the change in health care from paternalism (when success of treatments could be determined by professionals alone) to increased respect for patients’ subjective valuations. Generic, preference-based HRQoL measures yield estimates of health utilities that combine the different domains of HRQoL into a single score. Health utilities are the qualitative component of quality-adjusted life years (QALYs), which combine mortality and morbidity into a single index. These can be used for direct comparison between different conditions and treatments, a necessity in planning rational public health policy. This contrasts with self-rated health (SRH), for example, which is difficult to quantify in a policy-relevant way, making it hard to appraise the practical significance of the J-curve observed between alcohol consumption and SRH (Poikolainen et al., 1996; Poikolainen and Vartiainen, 1999; San José et al., 1999; Gronbaek, 2004). The British National Institute for Health and Clinical Excellence recommends using QALYs as the preferred outcome measure in cost effectiveness analysis (Rawlins and Culyer, 2004). We are aware of no previous population studies investigating health utility and alcohol consumption.

Abstainers have been shown to have increased mortality risk, possibly partly due to the cardioprotective effects of moderate alcohol consumption (Gronbaek, 2004; Rimm and Moats, 2007), leading to the typically J-shaped relationship between alcohol consumption and mortality (Bagnardi et al., 2004; Di Castelnuovo et al., 2006). However, the relatively poor health of abstainers may also be partly due to the failure to separate former and infrequent drinkers from long-term abstainers (Fillmore et al., 2006). A proportion of abstainers have quit drinking due to declining health, ageing, or psychosocial problems related to alcohol use, and these former drinkers appear to have higher mortality, lower socioeconomic status, and more detrimental health-related behavior than long-term abstainers (Fillmore et al., 1998; Gmel et al., 2003). Thus, light drinking may actually partly reflect, but not cause, relatively good health, or other protective characteristics of the individual (Di Castelnuovo et al., 2006; Johansson et al., 2006; Fillmore et al., 2007).

This study aimed to examine and quantify the association between health utility and alcohol consumption in a representative population sample, accounting for sociodemographic factors and former drinker status, and to compare these results with subjective QoL, SRH, and mental distress.

METHODS

The study was based on the Health 2000 survey, which comprehensively represents the Finnish population aged 30 and...
over in year 2000. The methods and basic results have been published (Aromaa and Koskinen, 2004) and are available at www.ktl.fi/health2000. The survey had a two-stage, stratified cluster sampling design. The original sample for the present study included 5871 persons aged 30–64 years. Subjects older than this were excluded because in old age, heavy alcohol consumption is quite uncommon; hence, alcohol is likely to affect the elderly differently than working aged populations and the association between alcohol and health may be distorted by selective mortality. Pregnant women (n = 31) were excluded. The study was approved by the ethics committee of the National Public Health Institute.

Alcohol use patterns and alcohol-related disorders

Alcohol use was measured with a detailed self-report questionnaire. The participants were asked whether they (a) had been teetotal for their entire life (or tasted alcohol maximum ten times); (b) had used alcohol earlier, but then quit; (c) used alcohol currently. The frequency of drinking during the last year was assessed. The quantity of alcohol consumption was investigated by asking the respondents to report their average weekly consumption during the last month, separately for spirits, wine and beer, cider or premixed drinks. The answers were converted into grams of alcohol per week. To optimize the benefits of our large sample when investigating the “J-curve hypothesis,” we attempted to classify alcohol consumption into equally sized deciles. However, as there were more than 10% of abstainers and the scale was not fully continuous at the lowest end, it was impossible to achieve ten equally sized groups. As women belonging to the highest-drinking decile still drank relatively little (mean 214 g/week, a little over two drinks per day), we divided the highest decile into two groups. Alcohol consumption information was available for 85.9% of the sample.

Prevalence of lifetime alcohol dependence and abuse were diagnosed with the Munich version of the composite international diagnostic interview (M-CIDI) (Wittchen et al., 1998; Pirkola et al., 2005) using DSM-IV (1994) criteria.

Abstainers (those who reported no drinks during the past month) were first classified into two groups: “former drinkers” includes abstainers who said they had used alcohol earlier but since quit, as well as those who had received a lifetime diagnosis of an alcohol use disorder, plus “other abstainers”. We used a one month time-frame for abstinence in our primary analysis, as we hypothesized it to be implausible that alcohol use below that level would have significant direct effects on subjective well-being. However, to further investigate different subgroups of abstainers in terms of the proposed “infrequent” and “former drinker” misclassification errors, we further categorized former drinkers and other abstainers into six groups with regard to (a) alcohol-related diagnoses and (b) whether they had drunk alcohol during the last year, but not the last month.

QoL and HRQoL measurement

HRQoL and QoL information was collected using self-administered questionnaires (Saami et al., 2006). For the HRQoL measurement, two established, generic, preference-based HRQoL measures were used: the EQ-5D and the 15D. Both instruments were used as there is no gold standard for HRQoL measurement (Tengs and Wallace, 2000; Saami et al., 2006). The 15D (Sintonen, 1994, 1995, 2001) has 15 dimensions with five categories of severity: mobility, vision, hearing, breathing, sleeping, eating, speech, elimination, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity (available at www.15d-instrument.net). The 15D index (Sintonen, 1995) ranges between 1 (full health) and 0 (dead). We included subjects with 12 or more completed 15D dimensions; missing values were imputed as recommended (Sintonen, 1994). Changes of over 0.02–0.03 points on the 15D scale are considered clinically significant (Sintonen, 2001). The EQ-5D (1990; Brooks, 1996; Rabin and de Charro, 2001) has five dimensions with three categories of severity: mobility, self-care, usual activities, pain or discomfort, and anxiety or depression (www.euroqol.org). The EQ-5D TTO index (Kind et al., 1999) ranges between 1 (full health) and −0.59 (0 = being dead, so health states worse than dead are theoretically possible). Only those respondents fully completing the EQ-5D questionnaire were included in the analysis. There is no unequivocally agreed threshold for minimum clinically significant change on the EQ-5D, but thresholds around 0.07 points have been observed (Walters and Brazier, 2005).

The 15D compares favorably with similar HRQoL instruments in most of the important properties (Sintonen, 1994, 1995; Hawthorne et al., 2001; Sintonen, 2001; Stavem et al., 2001). Although the EQ-5D is among the most extensively evaluated of HRQoL measures (Garratt et al., 2002), it is problematic in the general population samples due to low sensitivity in detecting deviations from full health (Saami et al., 2006). Thus, we concentrate on the 15D results here, but also report EQ-5D scores for comparison.

Subjective QoL was measured by asking the respondents to rate their current quality of life as a whole, over the last 30 days, on a scale from 0 to 10. QoL information was available for 85.1%, EQ-5D for 78.5%, and 15D for 80.2% of the sample.

SRH and mental distress

To compare the preference-based HRQoL results with the findings from more conventional instruments, we also analyzed SRH and mental distress. SRH is a simple and widely used global measure of health that principally reflects the respondent’s physical health (Manderbacka, 1998). It is a strong predictor of future health problems (Farmer and Ferraro, 1997; Ried et al., 2006) and mortality (Idler et al., 2000; DeSalvo et al., 2006). In order to capture even small differences in the range of morbidity, we measured SRH by asking the respondents to rate their current health on a scale from 0 to 10.

Mental distress was measured with the 12-question version of the General Health Questionnaire (GHQ-12) (Goldberg et al., 1997). The scale ranges from 0 to 12, with higher scores indicating greater mental distress. GHQ is also widely used as a screening instrument for identifying mental disorders. Ideal cut-off points for identifying mental disorders vary between populations, but generally fall between >1 and >3 positive answers (Goldberg et al., 1997; Schmitz et al., 1999; Holi et al., 2003). GHQ-12 and SRH were available for 84.8% and 85.1% of the sample, respectively.
<table>
<thead>
<tr>
<th>Grouping</th>
<th>n</th>
<th>Mean alcohol consumption g/week</th>
<th>Age</th>
<th>Income, euros/month</th>
<th>Living arrangement (% living alone)</th>
<th>Education (% basic/middle/high)</th>
<th>15D HRQoL score</th>
<th>EQ-5D HRQoL score</th>
<th>QoL</th>
<th>SRH</th>
<th>GHQ-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>All men</td>
<td>2380</td>
<td>140</td>
<td>46.3 (38–54)</td>
<td>1590 (930–2100)</td>
<td>17.8</td>
<td>3.12/41.4/27.4</td>
<td>0.931 (0.901–0.986)</td>
<td>0.882 (0.796–1)</td>
<td>7.74 (7–9)</td>
<td>7.65 (7–9)</td>
<td>1.66 (0–2)</td>
</tr>
<tr>
<td>0 g/week “Other abstainers”</td>
<td>270</td>
<td>0</td>
<td>48.1 (39–57)</td>
<td>1240 (630–1610)</td>
<td>20.1</td>
<td>44.1/39.3/16.7</td>
<td>0.920 (0.884–0.988)</td>
<td>0.851 (0.76–1)</td>
<td>7.75 (7–9)</td>
<td>7.60 (7–9)</td>
<td>1.46 (0–1)</td>
</tr>
<tr>
<td>0 g/week “Former drinkers”</td>
<td>147</td>
<td>0</td>
<td>49.9 (44–58)</td>
<td>1171 (630–1470)</td>
<td>30.5</td>
<td>54.2/32.0/13.8</td>
<td>0.885 (0.827–0.965)</td>
<td>0.782 (0.691–1)</td>
<td>7.25 (6–9)</td>
<td>6.95 (5–8)</td>
<td>2.58 (0–4)</td>
</tr>
<tr>
<td>1–7 g/week</td>
<td>94</td>
<td>6</td>
<td>48.3 (39–56)</td>
<td>1350 (800–1860)</td>
<td>17.2</td>
<td>41.6/34.4/24.0</td>
<td>0.932 (0.900–0.994)</td>
<td>0.877 (0.744–1)</td>
<td>7.63 (7–9)</td>
<td>7.52 (7–9)</td>
<td>1.60 (0–2)</td>
</tr>
<tr>
<td>8–24 g/week</td>
<td>234</td>
<td>18</td>
<td>45.7 (36–54)</td>
<td>1514 (1010–1890)</td>
<td>13.5</td>
<td>27.9/47.3/24.8</td>
<td>0.940 (0.911–0.993)</td>
<td>0.909 (0.796–1)</td>
<td>7.94 (7–9)</td>
<td>7.87 (7–9)</td>
<td>1.24 (0–1)</td>
</tr>
<tr>
<td>25–49 g/week</td>
<td>241</td>
<td>38</td>
<td>45.6 (37–54)</td>
<td>1544 (870–1900)</td>
<td>12.3</td>
<td>26.2/40.3/33.5</td>
<td>0.945 (0.922–0.993)</td>
<td>0.894 (0.796–1)</td>
<td>7.90 (7–9)</td>
<td>7.81 (7–9)</td>
<td>1.28 (0–2)</td>
</tr>
<tr>
<td>50–73 g/week</td>
<td>227</td>
<td>63</td>
<td>46.1 (37–53)</td>
<td>1702 (1050–2180)</td>
<td>12.4</td>
<td>26.6/43.9/29.5</td>
<td>0.945 (0.923–0.995)</td>
<td>0.896 (0.796–1)</td>
<td>7.89 (7–9)</td>
<td>7.75 (7–9)</td>
<td>1.38 (0–1)</td>
</tr>
<tr>
<td>74–105 g/week</td>
<td>239</td>
<td>90</td>
<td>45.2 (37–52)</td>
<td>1747 (1170–2230)</td>
<td>13.9</td>
<td>26.6/39.3/34.0</td>
<td>0.950 (0.926–0.993)</td>
<td>0.893 (0.796–1)</td>
<td>7.99 (7–9)</td>
<td>7.88 (7–9)</td>
<td>1.36 (0–1)</td>
</tr>
<tr>
<td>106–146 g/week</td>
<td>217</td>
<td>126</td>
<td>44.8 (38–51)</td>
<td>1639 (980–2180)</td>
<td>18.7</td>
<td>28.3/44.8/26.9</td>
<td>0.939 (0.910–0.986)</td>
<td>0.909 (0.796–1)</td>
<td>7.95 (7–9)</td>
<td>7.82 (7–9)</td>
<td>1.43 (0–2)</td>
</tr>
<tr>
<td>147–228 g/week</td>
<td>238</td>
<td>185</td>
<td>45.3 (38–52)</td>
<td>1906 (1110–2310)</td>
<td>16.6</td>
<td>22.0/38.1/39.9</td>
<td>0.938 (0.920–0.986)</td>
<td>0.902 (0.796–1)</td>
<td>7.92 (7–9)</td>
<td>7.89 (7–9)</td>
<td>1.66 (0–2)</td>
</tr>
<tr>
<td>229–348 g/week</td>
<td>237</td>
<td>276</td>
<td>46.8 (41–52)</td>
<td>1756 (1050–2230)</td>
<td>17.6</td>
<td>27.8/41.9/30.3</td>
<td>0.920 (0.888–0.977)</td>
<td>0.883 (0.796–1)</td>
<td>7.54 (7–9)</td>
<td>7.59 (7–8)</td>
<td>2.19 (0–3)</td>
</tr>
<tr>
<td>&gt;348 g/week</td>
<td>236</td>
<td>624</td>
<td>46.0 (39–53)</td>
<td>1669 (935–2180)</td>
<td>26.8</td>
<td>31.1/46.7/22.2</td>
<td>0.914 (0.878–0.976)</td>
<td>0.866 (0.727–1)</td>
<td>7.18 (6–8)</td>
<td>7.18 (7–8)</td>
<td>2.41 (0–3)</td>
</tr>
</tbody>
</table>

*aInterquartile range in parentheses.
*bIncludes participants with valid alcohol consumption data.
Table 2. Sociodemographic characteristics of women included in the sample. Mean weekly alcohol consumption and unadjusted scores of HRQoL, subjective QoL, SRH, and mental distress

<table>
<thead>
<tr>
<th>Grouping</th>
<th>n</th>
<th>Mean alcohol consumption g/week</th>
<th>Age (yr)</th>
<th>Income, euros/month</th>
<th>Living arrangement (% living alone)</th>
<th>Education 15D HRQoL score</th>
<th>EQ-5D HRQoL score</th>
<th>QoL</th>
<th>SRH</th>
<th>GHQ-12a</th>
</tr>
</thead>
<tbody>
<tr>
<td>All women</td>
<td>2603b</td>
<td>41.2</td>
<td>46.4 (38–54)</td>
<td>1470 (870–1860)</td>
<td>17.4</td>
<td>29.9/31.1/38.9</td>
<td>0.927 (0.899–0.977)</td>
<td>0.868 (0.796–1)</td>
<td>7.95 (7–9)</td>
<td>7.79 (7–9)</td>
</tr>
<tr>
<td>0 g/week “Other abstainers”</td>
<td>735</td>
<td>0</td>
<td>48.2 (39–57)</td>
<td>1210 (670–1470)</td>
<td>18.9</td>
<td>41.2/30.8/28.0</td>
<td>0.922 (0.888–0.977)</td>
<td>0.843 (0.727–1)</td>
<td>7.89 (7–9)</td>
<td>7.51 (7–9)</td>
</tr>
<tr>
<td>0 g/week “Former drinkers”</td>
<td>90</td>
<td>0</td>
<td>45.9 (38–52)</td>
<td>1230 (700–1610)</td>
<td>24.3</td>
<td>40.7/24.8/34.5</td>
<td>0.883 (0.794–0.977)</td>
<td>0.780 (0.725–1)</td>
<td>7.16 (6–9)</td>
<td>7.04 (6–9)</td>
</tr>
<tr>
<td>1–7 g/week</td>
<td>237</td>
<td>5</td>
<td>48.9 (41–57)</td>
<td>1630 (1050–1980)</td>
<td>19.5</td>
<td>28.4/29.6/42.0</td>
<td>0.926 (0.899–0.977)</td>
<td>0.864 (0.796–1)</td>
<td>7.89 (7–9)</td>
<td>7.76 (7–9)</td>
</tr>
<tr>
<td>8–16 g/week</td>
<td>281</td>
<td>13</td>
<td>44.7 (37–52)</td>
<td>1430 (980–1860)</td>
<td>12.4</td>
<td>25.2/33.2/41.6</td>
<td>0.934 (0.905–0.977)</td>
<td>0.880 (0.796–1)</td>
<td>8.01 (7–9)</td>
<td>7.98 (7–9)</td>
</tr>
<tr>
<td>17–24 g/week</td>
<td>221</td>
<td>21</td>
<td>45.5 (38–53)</td>
<td>1550 (990–1860)</td>
<td>13.9</td>
<td>22.8/31.7/45.6</td>
<td>0.938 (0.915–0.984)</td>
<td>0.890 (0.796–1)</td>
<td>8.09 (7–9)</td>
<td>7.99 (8–9)</td>
</tr>
<tr>
<td>25–39 g/week</td>
<td>273</td>
<td>33</td>
<td>45.2 (38–52)</td>
<td>1690 (1110–2100)</td>
<td>13.9</td>
<td>20.2/28.1/51.8</td>
<td>0.941 (0.920–0.984)</td>
<td>0.905 (0.796–1)</td>
<td>8.09 (8–9)</td>
<td>8.20 (8–9)</td>
</tr>
<tr>
<td>40–61 g/week</td>
<td>248</td>
<td>50</td>
<td>45.3 (38–52)</td>
<td>1530 (950–1890)</td>
<td>18.0</td>
<td>27.3/35.5/37.2</td>
<td>0.935 (0.913–0.977)</td>
<td>0.884 (0.796–1)</td>
<td>8.13 (8–9)</td>
<td>7.96 (7–9)</td>
</tr>
<tr>
<td>62–117 g/week</td>
<td>263</td>
<td>83</td>
<td>45.0 (37–52)</td>
<td>1512 (960–1890)</td>
<td>14.7</td>
<td>26.6/34.6/38.8</td>
<td>0.929 (0.900–0.977)</td>
<td>0.878 (0.796–1)</td>
<td>8.07 (8–9)</td>
<td>7.93 (7–9)</td>
</tr>
<tr>
<td>118–173 g/week</td>
<td>130</td>
<td>142</td>
<td>45.8 (39–53)</td>
<td>1820 (1050–2230)</td>
<td>24.5</td>
<td>18.1/30.6/51.3</td>
<td>0.925 (0.890–0.977)</td>
<td>0.897 (0.796–1)</td>
<td>7.90 (7–9)</td>
<td>7.86 (8–9)</td>
</tr>
<tr>
<td>&gt;173 g/week</td>
<td>125</td>
<td>289</td>
<td>45.1 (39–51)</td>
<td>1650 (870–2230)</td>
<td>21.0</td>
<td>27.0/27.4/45.3</td>
<td>0.914 (0.890–0.971)</td>
<td>0.868 (0.796–1)</td>
<td>7.64 (7–9)</td>
<td>7.66 (7–8)</td>
</tr>
</tbody>
</table>

*aInterquartile range in parentheses.
*bIncludes participants with valid alcohol consumption data.
Table 3. Characteristics of subgroups of abstainers (people who had not drunk during the last month) and regression results comparing 15D HRQoL scores of different subgroups of abstainers

<table>
<thead>
<tr>
<th>Subgroups of people not drinking within last month</th>
<th>n</th>
<th>Age</th>
<th>% male</th>
<th>15D score (95% CI)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;12 month abstainers, not former drinkers</td>
<td>390</td>
<td>51.0</td>
<td>29</td>
<td>Comparison group</td>
</tr>
<tr>
<td>1–12 month abstainers, not former drinkers</td>
<td>615</td>
<td>46.8</td>
<td>28</td>
<td>0.001 (−0.010 to 0.011)</td>
</tr>
<tr>
<td>Former drinkersb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No alcohol-related diagnoses, abstaining 1–12 months</td>
<td>28</td>
<td>45.2</td>
<td>42</td>
<td>−0.011 (−0.036 to 0.014)*</td>
</tr>
<tr>
<td>No alcohol-related diagnoses, abstaining &gt;12 months</td>
<td>78</td>
<td>50.8</td>
<td>53</td>
<td>−0.026 (−0.051 to −0.001)*</td>
</tr>
<tr>
<td>Alcohol-related diagnosis, abstaining 1–12 months</td>
<td>47</td>
<td>44.2</td>
<td>70</td>
<td>−0.042 (−0.067 to −0.017)**</td>
</tr>
<tr>
<td>Alcohol-related diagnosis, abstaining &gt;12 months</td>
<td>62</td>
<td>50.4</td>
<td>85</td>
<td>−0.040 (−0.069 to −0.012)**</td>
</tr>
<tr>
<td>Current drinkers</td>
<td>3763</td>
<td>45.9</td>
<td>55</td>
<td>−0.002 (−0.010 to 0.007)</td>
</tr>
</tbody>
</table>

¹Marginal effects, controlling for age, gender, living arrangement, education, and income. bFormer drinkers: people not drinking any alcohol within the last month, and either having a history of alcohol use disorder or deliberately quitting drinking.

The values are significant at *P < 0.05, **P < 0.01.

Sociodemographic factors

Information about sociodemographic factors was collected using structured interviews. Education was classified as basic, secondary, or higher. Family income, adjusted for family size (OECD, 1982), was divided into quintiles. Living arrangements were defined as married, cohabiting, living with other(s) than a partner, and living alone (Joutsenniemi et al., 2006).

Statistical methods

All analyses accounted for the two-stage sampling design and used poststratification weights to correct for nonresponse (Aromaa and Koskinen, 2004) using Stata 8.2 (StataCorp, 2003).

To estimate the association between alcohol consumption and the measures of well-being, we created separate multiple regression models using each of the instruments (15D, EQ-5D, QoL, SRH, and GHQ-12) as dependent variables, separately for both genders. To estimate the effects of the sociodemographic factors, two sets of regression models were created in a stepwise manner: the first set of models controlled for only age, and the second set of models also controlled for education, income, and living arrangements. All covariates were entered as dummy variables in the models. Abstainers who were not former drinkers (“other abstainers”) were the reference group. Linear regression for survey data was used to analyze SRH, QoL, and GHQ-12. As the HRQoL measures have a ceiling effect (55.4% of the respondents scored full health on the EQ-5D and 17.3% on the 15D), we used a Tobit model to account for this censoring (Tobin, 1958; Austin et al., 2000; Saarni et al., 2006). We report the marginal effects of the unconditional expected value of the HRQoL score, valued at the means of the explanatory variables (Cong, 2000). These marginal effects are interpreted comparably to beta-coefficients of linear regression, i.e., as the change in HRQoL score (health utility) associated with the alcohol consumption group in question (adjusted for age or age and other covariates), compared with the “other abstainers” group.

To investigate the different groups of nondrinkers, we created a separate Tobit regression model comparing the 15D scores of the four mutually exclusive categories of “former drinkers” (those with a history of alcohol use disorder or not, those having had a drink within the last year or not) and two categories of “other abstainers” (those having had a drink within the last year or not). The genders were combined to avoid too small subgroups. Drinkers were included as one group and gender and sociodemographic variables were controlled for.

Fig. 1. 15D HRQoL differences (scale 0–1) associated with different alcohol consumption levels for women. Controlling for age, or age, education, income, and living arrangements. 95% confidence intervals.

Fig. 2. Subjective QoL differences (scale 0–10) associated with different alcohol consumption levels for women. Controlling for age, or age, education, income, and living arrangements. 95% confidence intervals.
RESULTS

The characteristics of the sample are described in Tables 1, 2, and 3. Alcohol consumption among women was clearly lower than among men, and there were twice as many female abstainers. Former drinkers achieved the worst unadjusted scores on almost all the measures. The results of the regression models concerning each outcome variable are presented in Figs. 1–8 and as supplementary tables. Figures are presented separately for both the genders and for each explanatory variable except EQ-5D, which is presented only in the supplementary tables. Each figure presents two curves: one adjusting for age and another adjusting also for socioeconomic status (SES) variables.

HRQoL

Former drinkers also scored the worst on 15D and EQ-5D after adjusting for all the sociodemographic variables. Of the drinkers, only the highest consuming groups (women and men drinking means being 289 g and 624 g/week, respectively) achieved statistically significantly lower 15D scores than abstainers who were not former drinkers. This was not found on EQ-5D. Moderate drinkers’ HRQoL scores were better than “other abstainers,” but the differences were clinically insignificant and also not statistically significant in the fully controlled models, with the exception of one group of women on EQ-5D.

Subjective QoL, SRH, and mental distress

For women, former drinkers scored the worst on QoL and SRH. Moderate drinkers had statistically significantly better SRH than other abstainers, but this was not observed on QoL or GHQ. In contrast, the highest drinking groups had statistically significantly poorer QoL and higher mental distress than other abstainers, but this was not found on SRH. For men, all the three measures yielded similar results: former drinkers and those who...
drank over 229 g/week had statistically significantly worse scores than other abstainers. In the fully controlled models, other abstainers actually had the best scores, and there were no signs of a J-shaped association between well-being and drinking.

**Subgroups of abstainers**

No significant differences in 15D scores emerged between those abstaining for 1–12 months or over one year when groups with otherwise similar drinking status were compared and the sociodemographic variables were controlled for (Table 3).
Fig. 8. Mental distress differences (GHQ-12, scale 0–12 with higher scores indicating higher distress) associated with different alcohol consumption levels for men. Controlling for age, or age, education, income, and living arrangements. 95% confidence intervals.

DISCUSSION

On the basis of a comprehensive population survey, we examined how alcohol consumption associated with utility-based HRQoL and other aspects of well-being, taking account of sociodemographic factors and possible bias resulting from the classification of former and infrequent drinkers as abstainers.

We found that the abstainers who were former drinkers were clearly different from other abstainers. Former drinkers achieved worse scores on all the measures of well-being compared to other abstainers, scoring worse or equal to the decile consuming the most alcohol. No differences were found between those abstaining for 1–12 months and those abstaining for over one year. Thus, our results highlight the importance of “former drinker misclassification error,” where investigating abstainers as one homogenous group produces flawed estimates of the effects of abstaining on health. However, no evidence was found against classifying very infrequent drinkers as abstainers.

For women, positive associations between moderate alcohol use and well-being were observed on SRH and also to some extent on HRQoL. These measures appeared to capture the positive aspects of moderate drinking better, whereas QoL and GHQ more sensitively captured the negative aspects of heavy drinking. For men, only the HRQoL instruments found positive associations between moderate alcohol consumption and well-being. EQ-5D appears to report relatively better quality of life for drinkers than 15D.

Adding sociodemographic factors to the regression models (a) did not change the results for former drinkers, (b) decreased or abolished the positive effects of moderate alcohol consumption, and (c) increased or did not change the negative effects of high alcohol consumption. The positive associations observed between moderate alcohol consumption and well-being were, at least to a large extent, explained by the better than average sociodemographic status of moderate drinkers.

The health utility scores of former drinkers were statistically and clinically significantly below those of the other abstainers, and the poor results of the highest drinking group also approached clinical significance. No group of moderate drinkers showed clinically significantly improved health utility. Thus, for estimating the public health burden of alcohol use using QALYs, most of the possible benefits of moderate alcohol consumption can probably be captured by analyzing mortality, whereas estimating the harmful effects of heavy alcohol consumption and alcohol use disorders also requires analyzing morbidity.

Comparison to previous studies

Concerning mortality, our results concur with studies that have separated former drinkers from other abstainers and found this to significantly reduce the estimated benefits of moderate alcohol consumption (Di Castelnuovo et al., 2006; Fillmore et al., 2006, 2007). A recent review on quality of life and alcoholism, including clinical trials, found 36 studies using 12 different QoL-related measures, but only one clinical study examining health utility, making direct comparisons difficult (Donovan et al., 2005). Clinical studies cannot be used to estimate the population-level burden of alcohol, as they unsurprisingly report far worse results for alcohol users than population studies (Foster et al., 1999, 2002; Saarni et al., 2007) Still, the negative impact of heavy drinking on HRQoL found in our study can be considered relatively small, being below the 0.03 level of
minimal clinical significance and clearly lower than that found for common psychiatric conditions (Saarni et al., 2007). Analogously, the magnitude of improved HRQoL found for moderate alcohol users compared to other abstainers can be considered negligible, as the highest point-estimate was 0.007 on 15D.

We are aware of no previous surveys investigating health utility, but there are surveys using other HRQoL instruments, especially the SF-36. Some have found that former drinkers score worse than other abstainers and moderate drinkers better than abstainers (Saito et al., 2005; Stranges et al., 2006), but there are also contrary results (van Dijk et al., 2004). This disparity may be due to different populations, response rates, and classifications of abstainers. Interestingly, however, none of these studies found that heavy drinkers had lowered HRQoL, as we did.

Considering other measures of well-being, a recent review on moderate drinking, mental health, and QoL (El-Guebaly, 2007) identified five surveys investigating SRH and three investigating general mental health. Most of these surveys observed beneficial effects associated with moderate drinking, but the categorizations of abstainers and drinkers and the adjustments for confounders varied greatly. Most did not control for former drinkers (San Jose et al., 1999; Guallar-Castillon et al., 2001; Wang et al., 2006), but the studies that did still found moderate drinkers to have better SRH than abstainers (Poikolainen et al., 1996; Power et al., 1998; French and Zavala, 2007). Interestingly, only the previous Finnish study (Poikolainen et al., 1996) found former drinkers to differ from other abstainers. This suggests the possibility of cultural differences in well-being among subpopulations of abstainers.

No previous studies have used a direct measurement of QoL, but some have investigated life satisfaction (LS), a related concept, or used GHQ (Hingson et al., 1981; Roberts et al., 1995; Koivumaa-Honkanen et al., 2000). Also, these studies have found moderate drinkers to have positive life satisfaction and low mental distress, but this association mostly disappeared if sociodemographic factors were controlled for, and no study separated former drinkers from other abstainers.

To sum up, there are many studies suggesting a J-shaped relationship between alcohol consumption and different measures of health and well-being, although not all agree and only a minority of them have controlled for former drinking. The most consistent results supporting the J-curve come from mortality studies and those investigating a dichotomous measure of SRH. The problem with the latter measure is that it is difficult to quantify the odds of good SRH in a policy-relevant way. It is entirely possible that SRH has a J-shaped relationship with alcohol consumption, but the health utility gains of moderate alcohol consumption are still clinically insignificant. Actually, this could even be expected, given that the health benefits of moderate alcohol consumption appear related to cardiovascular diseases (CVD). The health burden of CVD consists mainly of premature mortality and less of functional limitations and loss of HRQoL during the lifetime (Manuel et al., 2002). For example, people may be aware of having health problems like a poor lipid profile and high blood pressure, but these are not expected to greatly influence the experienced health utility. Thus, the effects of alcohol via CVD are not likely to have a great impact on HRQoL. If this is the case, it supports the hypothesis that mortality is a sufficient measure for estimating the possible positive public health impact of moderate alcohol use with QALYs.

Strengths and limitations

The main strengths of the study are the large representative sample, high response rate, and thorough measurements. A structured diagnostic mental health interview allowed us to reliably distinguish former drinkers from other abstainers. The high response rate may have also helped us to capture former and current heavy drinkers with serious problems, explaining the low scores found for these groups. However, even our values are likely to be underestimates, as persons with the most severe health and alcohol problems are the most likely to fail to participate in surveys.

We took account of possible sociodemographic determinants of well-being and alcohol consumption by adjusting for age, education, income, and living arrangements. Many factors associated with both alcohol use and health (especially somatic and psychiatric illnesses) were left out, as the direction of causality is often unclear. Although the factors included are essential, they are unlikely to account for all of the determinants of both alcohol consumption and well-being. The hypothesis of residual confounding implies that the positive associations observed between moderate alcohol consumption and well-being could have flattened out further or disappeared if all the confounding factors were accounted for. As with all cross-sectional studies, no firm conclusions about the direction of causality can be made.

CONCLUSIONS

Heavy drinking associated with poor results on all measures of health utility, QoL, SRH, and mental distress, but only among those with the highest levels of alcohol consumption. The scores of abstainers who were former drinkers were generally worse or comparable to those in the highest drinking decile. In future studies, it is essential to clearly differentiate between former drinkers and other abstainers. After adjustment for sociodemographic factors, moderate consumption of alcohol associated with minimal or no positive effects on well-being and health utility. Mortality may be a sufficient measure for estimating the net public health effects of moderate alcohol use.

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SUPPLEMENTARY DATA

Supplementary data for this journal is available online at www.alcalc.oupjournals.org.
REFERENCES

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