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Fitzgerald, Niamh; Angus, Kathryn; Emslie, Carol; Shipton, Deborah; Bauld, Linda

Published in:
Addiction

DOI:
[10.1111/add.13452](https://doi.org/10.1111/add.13452)

Publication date:
2016

Document Version
Peer reviewed version

[Link to publication in ResearchOnline](#)

Citation for published version (Harvard):

Fitzgerald, N, Angus, K, Emslie, C, Shipton, D & Bauld, L 2016, 'Gender differences in the impact of population-level alcohol policy interventions: evidence synthesis of systematic reviews', *Addiction*, vol. 111, no. 10, pp. 1735–1747. <https://doi.org/10.1111/add.13452>

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Final version accepted by Addiction, May 2016.

Gender differences in the impact of population-level alcohol policy interventions: evidence synthesis of systematic reviews.

Niamh Fitzgerald¹, Kathryn Angus¹, Carol Emslie², Deborah Shipton³, Linda Bauld¹

¹Institute for Social Marketing, UK Centre for Tobacco and Alcohol Studies, School of Health Sciences, University of Stirling, FK9 4LA, UK

²Institute for Applied Health Research / School of Health & Life Sciences, Glasgow Caledonian University, G4 0BA, UK

³NHS Health Scotland, Glasgow, G2 6QE, UK

Running head: Alcohol policy and gender: evidence synthesis

Word count: 3,972

Declarations of interest: The authors declare no competing interests. The work leading to this paper was funded and commissioned by Glasgow Centre for Population Health. No contractual constraints on publishing were imposed by the funder.

Abstract

Background: Consistent review-level evidence supports the effectiveness of population-level alcohol policies in reducing alcohol-related harms. Such policies interact with well-established social, cultural and biological differences in how men and women perceive, relate to and use alcohol, and with wider inequalities, in ways which may give rise to gender differences in policy effectiveness.

Aims: To examine the extent to which gender-specific data and analyses were considered in, and are available from, systematic reviews of population-level alcohol policy interventions, and where possible, to conduct a narrative synthesis of relevant data.

Methods: A prior systematic 'review of reviews' of population level alcohol interventions 2002-2012 was updated to May 2014, all gender-relevant data extracted, and the level and quality of gender reporting assessed. A narrative synthesis of extracted findings was conducted.

Results: Sixty-three systematic reviews, covering ten policy areas, were included. Five reviews (8%) consistently provided information on baseline participation by gender for each individual study in the review and twenty-nine (46%) reported some gender-specific information on the impact of the policies under consideration. Specific findings include evidence of possible gender differences in the impact of and exposure to alcohol marketing, and a failure to consider potential unintended consequences and harm to others in most reviews.

Conclusions: Gender is poorly reported in systematic reviews of population-level interventions to reduce alcohol-related harm, hindering assessment of the intended and unintended effects of such policies on women and men.

1 Introduction

2 The identification and implementation of effective policies to reduce the adverse consequences of
3 alcohol is a major public health imperative (1). While the heterogeneity of the interventions and
4 outcomes may impede understanding of the mechanisms of effect, (2–4), consistent review-level
5 evidence supports the effectiveness of population-level alcohol policy interventions. These include
6 those involving regulatory enforcement such as increased taxation or price controls, drink-driving
7 limits, and the regulation of availability and marketing (4,5).

8
9 There is persistent and strong evidence, from multiple countries worldwide, that men and women
10 relate to, perceive and use alcohol differently (6,7). *“Nearly everywhere that epidemiological or
11 ethnographic research has been carried out, historically and cross-culturally, men have consumed
12 more alcohol than women”* (8)(p153). Women are more likely to abstain; men are more likely to
13 drink heavily and develop alcohol problems (7,9). Women are more likely to suffer intimate partner
14 violence; men to engage in drink-driving (5).

15
16 While sex-linked biological differences influence alcohol consumption and related harms (7,10), the
17 variation in magnitude of differences in drinking between men and women (6,7,10,11), and the
18 convergence in consumption levels between men and women in many countries over recent
19 decades (7,11–14), suggest that societal and cultural influences may be more important. Public
20 excessive drinking has historically been perceived as a demonstration of ‘masculinity’ in western
21 societies (15). Alcohol consumption has historically been associated with fewer social sanctions for
22 men than women (10,16), particularly among poorer populations (17).

23
24 The convergence in drinking between women and men has largely been attributed to a rise in
25 women’s drinking rather than a fall in men’s (18–21). Hypothesized influences include greater
26 gender equality, marriage and parenting at an older age, increasing female participation in the
27 workplace and financial independence, changes in drinking environments such as bar design, and
28 more mixed-gender drinking occasions (16). The alcohol industry is likely to have played, and
29 continues to play, a role through deliberate differentiation between men and women in product
30 development, targeting and marketing: *“in many countries [women] have been the obvious group in
31 which the market has been far from saturated”* (16).

32
33 Policies which attempt to reduce alcohol-related harms interact with social, cultural and biological
34 differences in how men and women relate to, perceive, and use alcohol. For this reason alone, there
35 may be gender differences in the effectiveness and unintended effects of alcohol policy
36 interventions. In addition, these differences intersect with wider gender inequality, which is
37 acknowledged as an influential social determinant of health (22–24): *“sex and society interact to
38 determine who is well or unwell, who is treated or not, who is exposed or vulnerable to ill health and
39 how, whose behaviour is risk-prone or risk-averse, and whose health needs are acknowledged or
40 dismissed”* (23). Increasing recognition of structural gender inequality, and its links with economic
41 and other inequality, has led to efforts to ‘mainstream gender’ within policy-making more broadly
42 (25–28), as well as calls for greater attention to gender in research(23,24,29–31).

43
44 ‘Umbrella’ reviews (reviews of reviews) are increasingly used to synthesize systematic review
45 evidence (32). Published umbrella alcohol policy reviews (4,5) have not focused on how well-
46 represented females are in studies, or the potential role of gender differences in influencing overall
47 policy effectiveness. Therefore, the aims of this umbrella review were to:

- 48
49 • examine the extent to which sex/gender data and analyses were considered in, and are
50 available from, systematic reviews of population-level alcohol policy interventions

- 51 • conduct a narrative synthesis of findings from systematic reviews relating to sex/gender
52 differences in effectiveness or potential effectiveness of such interventions.

53

54 Given the difficulty of separating differences in 'sex' (biological differences between men and
55 women) and 'gender' (cultural constructions of masculinity and femininity), we refer to 'gender' to
56 encompass both, in line with current thinking (33).

57

58

59 **Methods**

60 Search Strategy

61 Martineau and colleagues previously conducted a review of reviews in 10 alcohol policy areas ("the
62 Martineau review") without focusing on sex/gender (4). It was used as the starting point for this
63 umbrella review. Their search strategy (Table 1) from October 2012, identified 52 reviews from
64 2002 onwards from six databases (4); all 52 were included in this current review.

65 <Table 1 to be inserted here>

66

67 The Martineau review search strategy was re-run for the period 1st July 2012 to 19th May 2014, to
68 allow for delays in indexing. Six academic literature databases were searched: five the same as
69 those searched by Martineau and colleagues (*Medline, Database of Abstracts of Reviews of Effects*
70 *(DARE), Cochrane Database of Systematic Reviews, Campbell Collaboration Library of Systematic*
71 *Reviews*, and a site search of the National Institute for Health and Care Excellence's (NICE) website);
72 and one covering the same subject areas (*Applied Social Sciences Index and Abstracts*) as an older
73 database used by Martineau and colleagues (*Social Policy and Practice*). No reviews included in
74 Martineau were identified only in the latter database.

75 Results Screening

76 The search results were downloaded into bibliographic software (RefWorks) and duplicates
77 removed. Two researchers (KA, NF) assessed the new reviews by first applying the Martineau review
78 inclusion criteria (4)(p.259) to titles and abstracts, and then, if necessary, to the full text. The
79 inclusion criteria were:

80 1. Does the review have a stated aim to evaluate interventions to reduce alcohol use

81 and/or related harm, and report outcome data on alcohol use and/or related harm?

82 2. Does the review concern intervention effectiveness? (*And include studies with*
83 *controlled, before-and-after or time series designs.*)

84 3. Is at least one of the interventions reviewed population level? (*Exclude interventions*
85 *involving interaction between health professionals and individuals or groups, and*
86 *interventions selectively targeting high-risk individuals, such as those convicted of*
87 *alcohol-related offences.*)

88 4. Is the review a systematic review? (*If the study reports search strategy details, inclusion*
89 *and exclusion criteria, and clearly identifies all included studies. Exclude reviews of*
90 *reviews.*)

91

92 If the answer to all four questions above was yes, the review was included and assigned to the
93 relevant policy area. In the event of any disagreement or doubt about eligibility that could not be
94 resolved by discussion between KA and NF, a third researcher (LB) read the review to resolve
95 disagreement by majority opinion. We planned to use updated reviews in place of the original
96 reviews; however no updated reviews were identified by our search.

97

98 The Martineau review did not limit the searches by language, although all the included reviews were
99 in English. In our updated search, we excluded non-English language reviews due to lack of
100 resources for full-text translation. We planned to list any identified by our search, however none
101 emerged. In both the original and updated searches, reviews were not excluded on the basis of
102 methodological quality other than as outlined in the above criteria. This is in line with guidance on
103 synthesizing evidence on health equity which emphasises an inclusive approach (34).

104

105 Data Extraction

106

107 Each review was assessed for relevant sex/gender content as follows:

108

- 109 • Searchable PDF documents: electronic searches were conducted for key terms (including:
110 male female women woman man men girl boy gender sex mother father maternal paternal
111 daughter son pregnant pregnancy schoolgirl schoolboy husband wife wives spouse spousal);
- 112 • Data extraction tables within reviews: scanned for findings reported by gender using the
113 abbreviations 'f' and 'm', or 'w' and 'm'.
- 114 • PDF documents that were not fully text-searchable or photocopies: full text read carefully
115 for key terms.

116

117 Data were extracted from systematic reviews using a standardised framework (Table 2), which was
118 developed and revised by two researchers (NF, KA). Initially, data were extracted using the
119 preliminary framework from three reviews, one from each of three policy areas, by the two
120 researchers independently. The results were reconciled, and a consensus reached on adaptations to
121 the framework. The adapted framework was applied independently to two new reviews in two
122 more policy areas. The final version of the data extraction framework (Table 2) was agreed and
123 applied to all the remaining identified reviews by one researcher. A sample of reviews in each policy
124 area was checked for accuracy by a second researcher.

125

126 Many reviews included studies not relating to population-level alcohol policy interventions (e.g.
127 studies measuring the effectiveness of policy interventions for other addictive substances or those
128 targeting an individual rather than a population). As in the Martineau review, data relating to these
129 studies were not extracted. Within the eligible reviews, data were extracted from relevant studies
130 of any design.

131

132 <Table 2 to be inserted here>

133 Data analysis

134

135 The level and quality of reporting of sex/gender data in the reviews was analysed summatively for
136 each policy area using the items included in the data extraction framework (Table 2). An overall
137 narrative synthesis of sex/gender-relevant findings was conducted, as well as for individual policy
138 areas.

139

140 **Results**

141 In total, 63 unique systematic reviews were identified and included (52 from the Martineau review,
142 and 11 from our updated search: see Figure 1). Table 3 shows the reviews categorised into 10
143 broad alcohol policy areas as defined by Martineau: three reviews covered two policy areas and one
144 review covered three policy areas.

145

146 <Figure 1 to be inserted here>

147
148 <Table 3 to be inserted here>

149
150 Level of consideration and availability of gender-relevant data (Table 4)

151
152 <Table 4 to be inserted here>

153
154 Most of the systematic reviews (87%, n=55) did not plan to conduct pooled analysis of intervention
155 effects by gender (Table 4). Seven of the 8 reviews which did plan to do so reported insufficient data
156 in the primary studies to enable such analysis (35–41). The eighth of these reported pooled effects
157 by gender in the area of higher education interventions (42), and a review of mass media
158 interventions did post-hoc pooled gender analysis (43) (see policy findings below).

159
160 Five reviews (8%) (37–39,41,44) ‘consistently’ provided information on baseline participation by
161 gender for the individual studies included in the review; four of these were conducted for the
162 Cochrane Library. Another review sometimes (45) and another rarely (46) provided such
163 information; the rest (89%, n=56) never did so.

164
165 More than half of the reviews (54%, n=34) provided no information on individual study findings
166 relating to the impact of the reviewed policy by gender, and there was wide variation in the location,
167 quality and level of detail of information provided for those which did (Table 4).

168
169 Gender-relevant findings from systematic reviews

170
171 Notwithstanding the gaps in reporting at review level, available information relevant to gender is
172 outlined below by policy area.

173
174 **Alcohol server setting/drinking environment (Table S1 – 6 reviews)**

175 Five reviews focused on policies to prevent alcohol-related harm or intoxication in or around
176 licensed premises (47–51), with between 13 and 26 studies in each; a further review included a
177 single study of warning labels (52). Across all six reviews, gender-relevant findings were reported
178 only for a single included study - of ‘Operation Drinksafe’ (a personalised risk-assessment in bars
179 involving the AUDIT screening tool and breath alcohol concentration measurement) – which
180 reported a greater reduction in AUDIT scores in women (p1588, Van Beurden et al., (2000) cited in
181 (47)).

182
183 **Sales Availability (Table S2 – 8 reviews)**

184 Eight reviews, including between 13 and 132 studies, considered policies limiting the availability of
185 alcohol through hours/days of sale, outlet density and/or purchase age (53–60). Gender-relevant
186 findings were reported for very few (15% or less) of the included studies in each review. Such data
187 were reported for 5 of 88 studies in one review (54), all of which suggested that increasing outlet
188 density was associated with increased consumption or harms (suicides, night-time crashes, assaults)
189 in males, less so in females. Another review (60) reported relevant findings for 10 of 69 studies, that
190 were more mixed suggesting either no effect or an enhanced effect in males.

191
192 In another review, relevant data were reported from one paper which found that following an
193 extension of hours of sale in Scotland, women’s drinking increased while men’s decreased (Knight &
194 Wilson (61) as cited in (59)). The same paper was cited in another review (56) as finding that the
195 introduction of Sunday alcohol sales in Scotland was associated with an increase in consumption
196 amongst males aged 18-45, with no significant change in women’s drinking..

197

198 Two reviews cited studies considering the effect of increased availability on assaults against women;
199 one suggested no effect (Norstrom & Skog, 2003 cited in (56)) and the other found a decrease in
200 assaults against women but could not conclude causation (Duailibi et al., 2007, cited in (62)).
201

202 No gender-relevant data were reported for the 132 studies included in the one review of minimum
203 drinking age laws (58).
204

205 **Illicit alcohol – 1 review**

206 No gender relevant data were reported for the 14 studies included in the review of policy options to
207 address illicit alcohol (63).
208

209 **Taxation/pricing (Table S3 – 4 reviews)**

210 Gender relevant findings were reported for fewer than 25% of the studies included in the reviews,
211 which included between 9 and 50 studies overall. No consistent differences in the direct effect of
212 increased price/taxation on consumption or harms in men compared to women were found.
213

214 Two reviews (46,64) reported findings from 5 studies suggesting that higher prices were associated
215 with decreased male but not female harms, including suicide (Markowitz, 2003, cited in (46,64)) and
216 sexually transmitted diseases (Grossman 2004; Carpenter 2005 both cited in (46); Markowitz et al.,
217 2005; Chesson et al., 2000 both cited in (64)). A sixth study found an association between higher
218 prices and improved use of birth control and condoms that was only significant in males (Grossman
219 & Markowitz, 2005 cited in (64)). One other study (Heeb et al., 2003 cited in (65)) found a greater
220 increase in male spirits drinking with a decrease in price.
221

222 Three studies found greater decreases in female than male drinking or harms with increased price
223 (Chaloupka & Wechsler, 1996; Makela et al., 2008; Academy of Medical Sciences, 2004, all in (46);
224 the latter also cited in (60)). A further study (Herttua et al.2008a, as cited in (60)) found that a tax
225 reduction increased alcohol deaths more in females than in males.
226

227 Finally, one study did not find any evidence that an overall increase in spirits consumption following
228 a decrease in price differed by gender (Kuo et al., 2003 cited in (65)).
229

230 There was some consistency in studies considering indirect impact with five studies, all cited in one
231 review (46), suggesting an increase in price would reduce rapes (Cook and Moore, 1993), child abuse
232 perpetrated by females (but not males) (Markowitz & Grossman, 2000), sexual assault against
233 women (Markowitz, 2000, second listing), unwanted pregnancies/teen abortions (Sen et al., 2003
234 also cited in (64)) and violence aimed at wives (Markowitz, 2000).
235
236

237 **Alcohol Marketing, Mass Media, Promotion, Counter-Advertising (Table S4 – 7 reviews)**

238 Of the 7 reviews, Booth et al. (46) included the most relevant findings: males were found more likely
239 to be exposed to or influenced by broadcast advertising in 7 studies (Aitken, 1988; Casswell & Zhang,
240 1998; Chen et al., 2005; Kelly, 1998; Sargent, 2006; Stacy, 2004; Zwarun, 2006; all cited in (46)),
241 notably for beer, and such exposure was associated with increased consumption of beer in two
242 studies (Collins et al., 2003; Connolly, 1994, both cited in (46)). Two studies found that point of sale
243 pricing/advertising may have increased female drinking to a greater extent than male drinking
244 (Saffer & Dave, 2003; Smith et al., 2005; both cited in (46)); 2 found no gender difference (Pederson,
245 2002; Yang & Raghbir, 2005; both cited in (46)). Two studies found a greater exposure of females
246 to billboard and print media advertising (Dring & Hope, 2001; Jernigan, 2004; both cited in (46)) and
247 2 studies suggested that the effects of advertising bans were generally larger for females (Saffer &
248 Dave, 2003; Saffer & Dave, 2006; both cited in (46)). One study found an association between

249 possession of alcohol promotional items and binge drinking in girls and a stronger association
250 between such possession and alcohol initiation in girls rather than in boys (Fisher, 2007, cited in
251 (46)). Finally, a different study found that males were more likely to have alcohol promotional
252 clothing items and that that was associated with a range of drinking variables (Workman, 2004, cited
253 in (46)).

254 The Jackson et al. review (60) was conducted by members of the same team as the Booth review
255 (46). It covered three policy areas, and rather than conducting a new review, reported on the earlier
256 findings from the Booth review, however it summarised the findings slightly differently. It reported
257 that younger age-groups and 15 to 17 year old girls experienced the greatest impact of alcohol
258 advertising, but did not highlight the finding from Booth that males may be more influenced by and
259 exposed to broadcast advertising.

260

261 **Drink-driving (Table S5 – 12 reviews)**

262 No two reviews reported gender-relevant information from the same primary studies of drink-
263 driving policy. Reported studies suggested that such interventions have more of an impact on males
264 than on females in reducing consumption: (Carpenter et al., 2007 cited in (36)); breath alcohol
265 concentration (Zwicker, 2007 cited in (35); Kloeden & McLean, 1997; 1994 cited in (36)); crash-
266 related hospital admissions (Hardes et al., 1985 cited in (66)); road traffic fatalities (Albalade et al.,
267 2006, cited in (36)); and insurance claims for crashes (Mercer et al., 1996 also cited in (66)). Other
268 studies suggested that females tended to be more compliant with drink driving laws (Timmerman et
269 al., 2003; Boots and Midford, 1999 both cited in (67); Kaplan and Prato, 2007 cited in (36)). A small
270 number of studies across the reviews involved male drivers only.

271

272 **School-Based Interventions (Table S6 – 17 reviews)**

273 There was no consistent evidence of gender differences in the effectiveness of school programmes
274 targeting alcohol. Across all the reviews, gender relevant findings were reported for 14 studies, of
275 which six suggested greater impact of the intervention in females, five suggested greater impact in
276 males, and three found no gender differences. There was limited evidence that males may have
277 responded better to classroom management interventions such as the 'Good Behaviour Game'
278 (Kellam et al., 2008 cited in (38)). However, the review-level evidence for the effectiveness of
279 school-based interventions was weak overall (4).

280

281 **Higher Education-Based Interventions (Table S7 – 5 reviews)**

282 There was no evidence to suggest gender differences in the effects of a range of higher-education
283 interventions focusing on alcohol. One meta-analysis (42) of 62 individual and group-level
284 interventions for first year college students found that gender was not a significant moderator for
285 alcohol consumption post-intervention.

286

287 **Interventions Targeting Families/Communities (Table S8 – 4 reviews)**

288 Reported review-level findings did not suggest a consistent gender difference in the efficacy of
289 family and community interventions: two cited studies found no significant moderation of effect by
290 gender (Brody, 2006, Haggerty, 2007, both in (39)); another study suggested a negative impact on
291 females only (Wiggins et al., 2009, cited in (68)); another a greater positive impact on males (Perry et
292 al., 2003, cited in (69)); and a final study found a greater positive impact on females (Spath et al.,
293 1999a cited in (39)).

294

295 Four trials of a female only intervention for daughters and their parents (mostly mothers) showed
296 signs of efficacy in the short to medium term (39) (p.12).

297

298 **Workplace Interventions (Table S9 – 4 reviews)**

299 Few relevant findings were reported and there was no clear evidence overall for any specific gender
300 differences from the studies cited in these reviews (41,45,70,71).

301

302

303 **Discussion**

304 Although there is widespread recognition that *“explicitly identifying to whom the evidence does or*
305 *does not apply, is necessary to formulate social policy initiatives... and to determine what*
306 *interventions are appropriate with particular populations”* (72), gender has not been well-reported in
307 reviews of population-level alcohol policy. Across 10 policy areas, and 63 reviews of population-level
308 alcohol policies, few or no reviews reported results by gender and some reported a lack of such data
309 in the primary studies. Notwithstanding the lack of data in the reviews, the information extracted
310 suggests that there are likely to be gender differences that are relevant to policy effectiveness in
311 some areas.

312

313 Policy Implications

314

315 Possible gender differences exist in the area of alcohol marketing/mass media interventions, where
316 young men may be more affected by broadcast advertising especially for beer; and young women by
317 billboard/print advertising. If broadcast advertising was subjected to restrictions (as has been
318 suggested (73) p19), which were not applied to print advertising, that may reduce advertising
319 exposure to a greater extent in young men and requires further investigation.

320

321 In school and family interventions, a number of studies evaluated single-gender interventions aimed
322 at daughters (along with a parent, mainly their mothers) cited in (37,38). These may reinforce
323 gender stereotypes and inequality, for example, by invoking even by their existence, a sense of
324 drinking being somehow more problematic, shameful or inappropriate for girls, than for boys (see de
325 Visser (74,75)). It has been suggested that mass media campaigns focusing on ‘binge drinking’ can
326 fall into this category or engage in ‘victim-blaming’ in relation to sexual assaults sustained after
327 drinking alcohol (76). No measures of this potential unintended outcome were reported in any of
328 the included reviews.

329

330 While there were no consistent trends in the many gender differences reported in the impact of
331 increased alcohol prices or taxation on consumption or harms, studies did consistently report that
332 such interventions may have reduced harms such as assaults. Importantly, these indirect outcomes
333 were not reported in reviews for eight of the ten policy areas, despite an increasing focus on ‘harm
334 to others’ from alcohol (77,78).

335

336 Research implications

337 This review suggests a significant gap in the literature, which is not unusual. Similar ‘gender
338 blindness’ has been reported in research in other health areas (79–81) and is both a symptom of,
339 and contributor to, wider gender inequality (22–24). More basic research is required to better
340 consider, measure and report on the effectiveness of alcohol policy interventions by gender, as well
341 as potential unintended consequences such as gender stereotyping, and indirect effects including
342 ‘harm to others’.

343

344 Current developments may improve the analysis and reporting of sex and gender in health research.
345 Many research and governmental organisations require sex/gender issues to be addressed in
346 research proposals and policy initiatives (72). In addition, a group of science editors have consulted
347 on common standards for reporting of sex/gender differences in scientific research (31). Specific
348 guidance is available on how to address sex and gender issues in systematic reviews of policy
349 interventions (82).

350

351 It remains to be seen how transformative initiatives to incorporate a gendered perspective will be:
352 long-standing efforts to mainstream gender into policy-making (83) have faced challenges (84) and
353 criticism for having a narrow 'technocratic' focus on processes (such as gender impact assessment
354 (85)) while failing to achieve societal change (25,28). This review focused only on gender, however it
355 is important to acknowledge that gender inequality intersects with other forms of inequality
356 (including economic, racial, sexual orientation) in complex ways (23,30). These interactions can have
357 important implications for alcohol-related harms (17,86,87), and require a broader focus in both
358 research and policy (22,29).

359

360 Strengths and limitations

361 This umbrella review synthesizes a large amount of evidence about the impact of population-level
362 alcohol policy interventions on males and females, and adds to the current literature on alcohol and
363 gender, which focuses predominantly on consumption and consequences (7). Its value is
364 constrained by a lack of focus on, and low levels of reporting of, gender-relevant data at review
365 level, either due to gaps in primary studies, selective reporting in the reviews, or more likely both.
366 This makes it difficult to speculate on the reasons for the differences found or to assume their wider
367 transferability. Different reviews reported different aspects of the same primary studies and
368 working from reviews impeded judgement of the quality of the primary evidence. Even reviews
369 which sought to analyse by gender were largely unable to do so, suggesting that further study of the
370 primary literature may not yield results that are any more conclusive.

371

372 **Conclusions**

373 Gender differences in experiences of direct and indirect harm from alcohol are well established (87–
374 89) but appear to be rarely considered in policy reviews. Available evidence from systematic reviews
375 suggests that there may be plausible and important gender differences in the impact of population-
376 level alcohol policy interventions which require further consideration in research and policy,
377 particularly in the area of advertising controls and mass media campaigns.

378

379 **Acknowledgements:** Funding for this review from Glasgow Centre for Population Health is gratefully
380 acknowledged. Special thanks to Fred Martineau, Mark Petticrew, Elizabeth McGill and co-authors,
381 for sharing their review data and answering our queries. NF, KA and LB are members of the UK
382 Centre for Tobacco and Alcohol Studies (www.ukctas.net). Funding for UKCTAS from the British
383 Heart Foundation, Cancer Research UK, the Economic and Social Research Council, the Medical
384 Research Council and the National Institute of Health Research, under the auspices of the UK Clinical
385 Research Collaboration, is also gratefully acknowledged.

386

387 **References**

- 388 1. Beaglehole R, Bonita R, Horton R, Adams C, Alleyne G, Asaria P, et al. Priority actions for the
389 non-communicable disease crisis. *Lancet*. Elsevier; 2011 Apr 23;377(9775):1438–47.
- 390 2. Holmes J, Meier PS, Booth A, Brennan A. Reporting the characteristics of the policy context
391 for population-level alcohol interventions: A proposed "Transparent Reporting of Alcohol
392 Intervention ContExts" (TRAICE) checklist. *Drug Alcohol Rev*. 2014 Nov;33(6):596–603.
- 393 3. Holmes J, Guo Y, Maheswaran R, Nicholls J, Meier PS, Brennan A. The impact of spatial and
394 temporal availability of alcohol on its consumption and related harms: a critical review in the
395 context of UK licensing policies. *Drug Alcohol Rev*. 2014 Sep;33(5):515–25.
- 396 4. Martineau F, Tyner E, Lorenc T, Petticrew M, Lock K. Population-level interventions to reduce
397 alcohol-related harm: an overview of systematic reviews. *Prev Med (Baltim)*. Elsevier Inc.;

- 398 2013 Oct;57(4):278–96.
- 399 5. Babor TF, Caetano R, Casswell S, Edwards G, Giesbrecht N, Graham K, et al. Alcohol: No
400 Ordinary Commodity: Research and Public Policy. 2nd ed. OUP Oxford; 2010. 384 p.
- 401 6. McCartney G, Mahmood L, Leyland AH, Batty GD, Hunt K. Contribution of smoking-related
402 and alcohol-related deaths to the gender gap in mortality: evidence from 30 European
403 countries. *Tob Control*. 2011 Mar 12;20(2):166–8.
- 404 7. Erol A, Karpyak VM. Sex and gender-related differences in alcohol use and its consequences:
405 Contemporary knowledge and future research considerations. *Drug Alcohol Depend*. Elsevier
406 Ireland Ltd; 2015;156:1–13.
- 407 8. Wilsnack RW, Wilsnack SC. Gender and alcohol: consumption and consequences. *Alcohol*
408 *Science, Policy, and Public Health*. 2013. p. 153–60.
- 409 9. Emslie C, Lewars H, Batty GD, Hunt K. Are there gender differences in levels of heavy, binge
410 and problem drinking? Evidence from three generations in the west of Scotland. *Public*
411 *Health*. 2009 Jan;123(1):12–4.
- 412 10. Wilsnack SC. The GENACIS project : a review of findings and some implications for global
413 needs in women-focused substance abuse prevention and intervention. *Subst Abuse Rehabil*.
414 2012;3(Suppl 1):5–15.
- 415 11. Wilsnack RW, Wilsnack SC, Kristjanson AF, Vogeltanz-Holm ND, Gmel G. Gender and alcohol
416 consumption: patterns from the multinational GENACIS project. *Addiction*. 2009
417 Sep;104(9):1487–500.
- 418 12. Kuntsche E, Kuntsche S, Knibbe R, Simons-Morton B, Farhat T, Hublet A, et al. Cultural and
419 gender convergence in adolescent drunkenness: evidence from 23 European and North
420 American countries. *Arch Pediatr Adolesc Med*. American Medical Association; 2011 Feb
421 7;165(2):152–8.
- 422 13. Lyons AC, Willott SA. Alcohol Consumption, Gender Identities and Women’s Changing Social
423 Positions. *Sex Roles*. 2008 Jun 28;59(9-10):694–712.
- 424 14. Keyes KM, Grant BF, Hasin DS. Evidence for a closing gender gap in alcohol use, abuse, and
425 dependence in the United States population. *Drug Alcohol Depend*. 2008 Jan 11;93(1-2):21–
426 9.
- 427 15. Emslie C, Hunt K, Lyons A. The role of alcohol in forging and maintaining friendships amongst
428 Scottish men in midlife. *Heal Psychol*. 2013;32(1):33–41.
- 429 16. Holmila M, Raitasalo K. Gender differences in drinking: why do they still exist? *Addiction*.
430 2005 Dec;100(12):1763–9.
- 431 17. Schmidt LA. The equal right to drink. *Drug Alcohol Rev*. 2014 Nov;33(6):581–7.
- 432 18. Plant M. Women and Alcohol: Contemporary and Historical Perspectives. Free Association
433 Books; 1997.
- 434 19. Leon DA, McCambridge J. Liver cirrhosis mortality rates in Britain from 1950 to 2002: an
435 analysis of routine data. *Lancet*. 2006 Jan 7;367(9504):52–6.
- 436 20. Smith L, Foxcroft D. Drinking in the UK An exploration of trends. 2009.
- 437 21. Shipton D, Whyte B, Walsh D. Alcohol-related mortality in deprived UK cities: worrying trends
438 in young women challenge recent national downward trends. *J Epidemiol Community Health*.
439 2013 Oct 1;67(10):805–12.
- 440 22. Greaves L, Jategaonkar N. Tobacco policies and vulnerable girls and women: toward a
441 framework for gender sensitive policy development. *J Epidemiol Community Heal*.
442 2006;60(Supplement 2):ii57–65.

- 443 23. Sen G, Ostlin P. Gender inequity in health: why it exists and how we can change it. *Glob Public*
444 *Health*. 2008;3 Suppl 1(April 2015):1–12.
- 445 24. Doyal L. Sex, gender, and health: the need for a new approach. *Bmj*. 2001;323(7320):1061–3.
- 446 25. True J. Mainstreaming Gender in Global Public Policy. *Int Fem J Polit*. Taylor & Francis; 2003
447 Nov 4;5(3):368–96.
- 448 26. Pollack MA, Hafner-Burton E. Mainstreaming gender in the European Union. *J Eur Public*
449 *Policy*. Taylor & Francis; 2011 Feb 4;7(3):432–56.
- 450 27. Himmelweit S. Making Visible the Hidden Economy: The Case for Gender-Impact Analysis of
451 *Economic Policy*. *Fem Econ*. Taylor & Francis; 2002 Jan 20;8(1):49–70.
- 452 28. Daly M. Gender mainstreaming in theory and practice. *Soc Polit*. 2005;12(3):433–50.
- 453 29. Ostlin P, Eckermann E, Mishra US, Nkowane M, Wallstam E. Gender and health promotion: a
454 multisectoral policy approach. *Health Promot Int*. 2006;21 Suppl 1:25–35.
- 455 30. Ostlin P, Sen G, George A. Paying attention to gender and poverty in health research: content
456 and process issues. *Bull World Health Organ*. 2004 Oct;82(10):740–5.
- 457 31. European Association of Science Editors. Consultation Draft: Engendering Change in Scientific
458 *Publishing : A Common Standard for Sex and Gender Policies in Scientific Reporting and*
459 *Editorial Management*. 2014.
- 460 32. Bambra C, Gibson M, Sowden a, Wright K, Whitehead M, Petticrew M. Tackling the wider
461 social determinants of health and health inequalities: evidence from systematic reviews. *J*
462 *Epidemiol Community Health*. 2010 Apr;64(4):284–91.
- 463 33. Annandale E. *The sociology of health and medicine. A critical introduction*. Cambridge: Polity
464 Press; 1998.
- 465 34. Welch V a, Petticrew M, O’Neill J, Waters E, Armstrong R, Bhutta Z a, et al. Health equity:
466 evidence synthesis and knowledge translation methods. *Syst Rev*. *Systematic Reviews*; 2013
467 Jan;2(1):43.
- 468 35. Bergen G, Pitan A, Qu S, Shults R a, Chattopadhyay SK, Elder RW, et al. Publicized sobriety
469 checkpoint programs: a community guide systematic review. *Am J Prev Med*. Elsevier; 2014
470 May;46(5):529–39.
- 471 36. Killoran AA, Canning U, Doyle N, Sheppard L. Review of effectiveness of laws limiting blood
472 alcohol concentration levels to reduce alcohol-related road injuries and deaths. 2010.
- 473 37. Foxcroft DR, Tsertsvadze A. Universal multi-component prevention programs for alcohol
474 misuse in young people (Review). *Cochrane Database Syst Rev*. 2011;(9):Art.No.: CD009307.
475 DOI: 10.1002/14651858.CD009307.
- 476 38. Foxcroft DR, Tsertsvadze A. Universal school-based prevention programs for alcohol misuse in
477 young people (Review). *Cochrane Database Syst Rev*. 2011;(5):Art.No.: CD009113. DOI:
478 10.1002/14651858.CD009113.
- 479 39. Foxcroft D, Tsertsvadze A. Universal family-based prevention programs for alcohol misuse in
480 young people (Review). *Cochrane Database Syst Rev*. 2011;(9):Art.No.: CD009308. DOI:
481 10.1002/14651858.CD009308.
- 482 40. Hale DR, Fitzgerald-Yau N, Viner RM. A systematic review of effective interventions for
483 reducing multiple health risk behaviors in adolescence. *Am J Public Health*. 2014
484 May;104(5):e19–41.
- 485 41. Webb G, Shakeshaft A, Sanson-Fisher R, Havard A. A systematic review of work-place
486 interventions for alcohol-related problems. *Addiction*. 2009 Mar;104(3):365–77.

- 487 42. Scott-Sheldon L a J, Carey KB, Elliott JC, Garey L, Carey MP. Efficacy of alcohol interventions
488 for first-year college students: a meta-analytic review of randomized controlled trials. *J*
489 *Consult Clin Psychol.* 2014 Apr;82(2):177–88.
- 490 43. Derzon JH, Lipsey MW. A meta-analysis of the effectiveness of mass-communication for
491 changing substance-use knowledge, attitudes and behavior. *Mass media and drug*
492 *prevention.* 2002.
- 493 44. Moreira M, Smith L, Foxcroft D. Social norms interventions to reduce alcohol misuse in
494 University or College students (Review). *Cochrane Database Syst Rev.* 2009;(3):Art. No.:
495 CD006748. DOI: 10.1002/14651858.CD006748.
- 496 45. Kazemi DM, Berry-Cabán CS, Becker C, Hiebert J. Review of interventions designed to address
497 drinking among soldiers. *Mil Psychol.* 2013;25(4):365–80.
- 498 46. Booth A, Meier P, Stockwell T, Sutton A, Wilkinson A, Wong R. Independent review of the
499 effects of alcohol pricing and promotion: Part A : *Systematic Reviews.* Sheffield; 2008.
- 500 47. Bolier L, Voorham L, Monshouwer K, van Hasselt N, Bellis M. Alcohol and drug prevention in
501 nightlife settings: a review of experimental studies. *Subst Use Misuse.* 2011 Jan;46(13):1569–
502 91.
- 503 48. Brennan I, Moore SC, Byrne E, Murphy S. Interventions for disorder and severe intoxication in
504 and around licensed premises, 1989-2009. *Addiction.* 2011 Apr;106(4):706–13.
- 505 49. Jones L, Hughes K, Atkinson AM, Bellis M a. Reducing harm in drinking environments: a
506 systematic review of effective approaches. *Health Place.* Elsevier; 2011 Mar;17(2):508–18.
- 507 50. Ker K, Chinnock P. Interventions in the alcohol server setting for preventing injuries (Review
508). *Cochrane Database Syst Rev.* 2008;(3):Art. No.: CD005244. DOI:
509 10.1002/14651858.CD005244.
- 510 51. Rammohan V, Hahn R a, Elder R, Brewer R, Fielding J, Naimi TS, et al. Effects of dram shop
511 liability and enhanced overservice law enforcement initiatives on excessive alcohol
512 consumption and related harms: Two community guide systematic reviews. *Am J Prev Med.*
513 Elsevier Inc.; 2011 Sep;41(3):334–43.
- 514 52. Scholes-Balog KE, Heerde J a, Hemphill S a. Alcohol warning labels: unlikely to affect alcohol-
515 related beliefs and behaviours in adolescents. *Aust N Z J Public Health.* 2012 Dec;36(6):524–9.
- 516 53. Bryden A, Roberts B, McKee M, Petticrew M. A systematic review of the influence on alcohol
517 use of community level availability and marketing of alcohol. *Health Place.* Elsevier; 2012
518 Mar;18(2):349–57.
- 519 54. Campbell CA, Hahn RA, Elder R, Brewer R, Chattopadhyay S, Fielding J, et al. The effectiveness
520 of limiting alcohol outlet density as a means of reducing excessive alcohol consumption and
521 alcohol-related harms. *Am J Prev Med.* 2009 Dec;37(6):556–69.
- 522 55. Hahn R a, Middleton JC, Elder R, Brewer R, Fielding J, Naimi TS, et al. Effects of alcohol retail
523 privatization on excessive alcohol consumption and related harms: a community guide
524 systematic review. *Am J Prev Med.* Elsevier Inc.; 2012 Apr;42(4):418–27.
- 525 56. Middleton JC, Hahn R a, Kuzara JL, Elder R, Brewer R, Chattopadhyay S, et al. Effectiveness of
526 policies maintaining or restricting days of alcohol sales on excessive alcohol consumption and
527 related harms. *Am J Prev Med.* Elsevier Inc.; 2010 Dec;39(6):575–89.
- 528 57. Popova S, Giesbrecht N, Bekmuradov D, Patra J. Hours and days of sale and density of alcohol
529 outlets: impacts on alcohol consumption and damage: a systematic review. *Alcohol Alcohol.*
530 2009;44(5):500–16.
- 531 58. Wagenaar AC, Toomey TL. Effects of Minimum Drinking Age Laws : Review and Analyses of
532 the Literature from 1960 to 2000. *J Stud Alcohol.* 2002;Supplement:206–25.

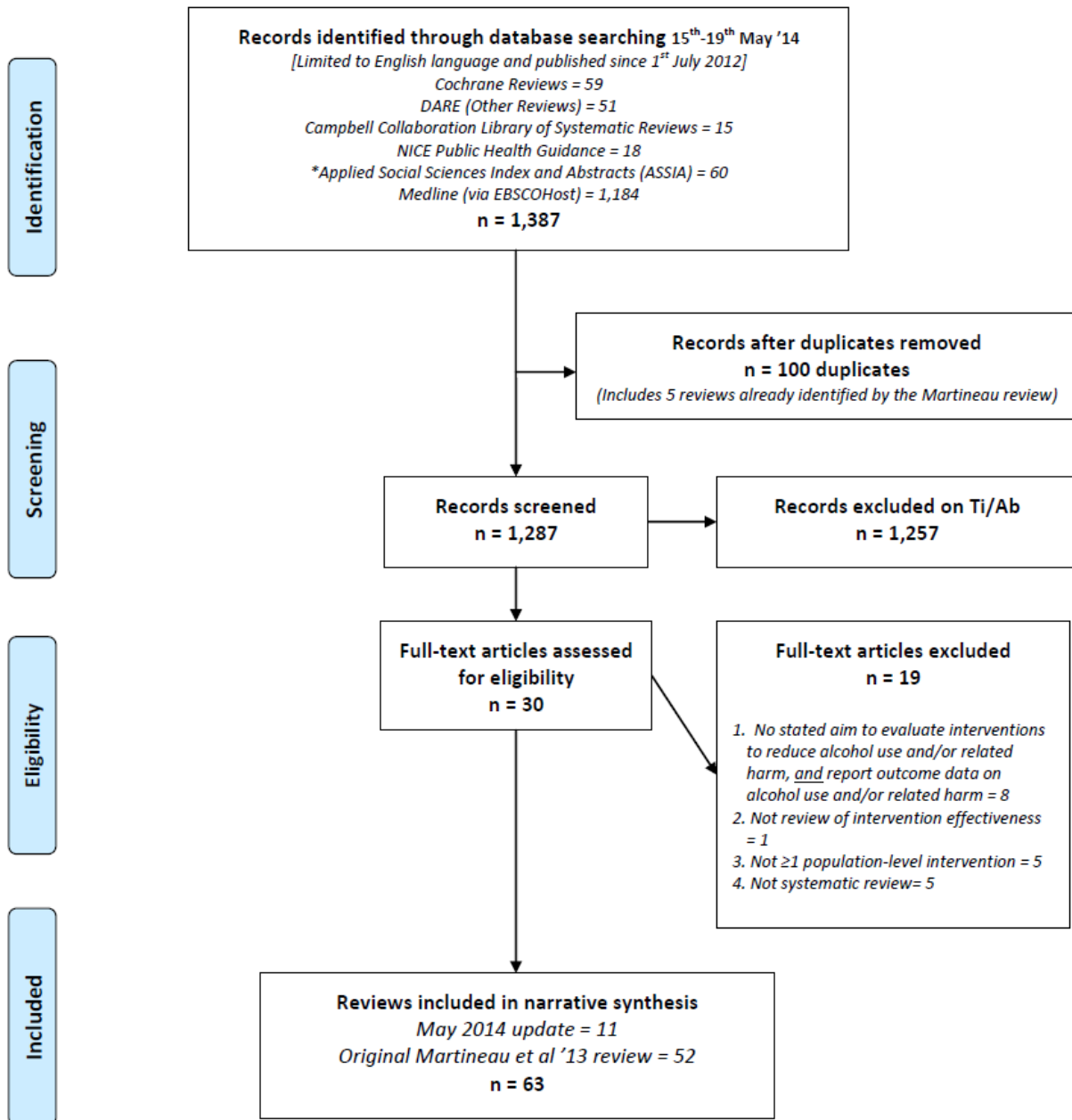
- 533 59. Hahn R a, Kuzara JL, Elder R, Brewer R, Chattopadhyay S, Fielding J, et al. Effectiveness of
534 policies restricting hours of alcohol sales in preventing excessive alcohol consumption and
535 related harms. *Am J Prev Med*. Elsevier Inc.; 2010 Dec;39(6):590–604.
- 536 60. Jackson R, Johnson M, Campbell F, Messina J, Guillaume L, Meier P, et al. Interventions on
537 Control of Alcohol Price , Promotion and Availability for Prevention of Alcohol Use Disorders
538 in Adults and Young People. Sheffield; 2010.
- 539 61. Knight I, Wilson P. *Scottish Licensing Laws*. London; 1980.
- 540 62. Popova S, Giesbrecht N, Bekmuradov D, Patra J. Hours and days of sale and density of alcohol
541 outlets: impacts on alcohol consumption and damage: a systematic review. *Alcohol Alcohol*.
542 2009;44(5):500–16.
- 543 63. Lachenmeier DW, Taylor BJ, Rehm J. Alcohol under the radar: do we have policy options
544 regarding unrecorded alcohol? *Int J drug policy*. Elsevier B.V.; 2011 Mar;22(2):153–60.
- 545 64. Wagenaar AC, Tobler AL, Komro K a. Effects of alcohol tax and price policies on morbidity and
546 mortality: a systematic review. *Am J Public Health*. 2010 Nov;100(11):2270–8.
- 547 65. Elder RW, Lawrence B, Ferguson A, Naimi TS, Brewer RD, Chattopadhyay SK, et al. The
548 effectiveness of tax policy interventions for reducing excessive alcohol consumption and
549 related harms. *Am J Prev Med*. Elsevier Inc.; 2010 Mar;38(2):217–29.
- 550 66. Elder RW, Shults RA, Sleet DA, Nichols JL, Zaza S, Thompson RS. Effectiveness of Sobriety
551 Checkpoints for Reducing Alcohol-Involved Crashes. *Traffic Inj Prev*. 2002;3:266–74.
- 552 67. Ditter SM, Elder RW, Shults R a, Sleet D a, Compton R, Nichols JL. Effectiveness of designated
553 driver programs for reducing alcohol-impaired driving: a systematic review. *Am J Prev Med*.
554 2005 Jun;28(5 Suppl):280–7.
- 555 68. Jones L, Bates G, Downing J, Sumnall H, Bellis MA. A review of the effectiveness and cost
556 effectiveness of alcohol and sex and relationship education for all children and young people
557 aged 5-19 years in community settings. 2010.
- 558 69. Petrie J, Bunn F, Byrne G. Parenting programmes for preventing tobacco, alcohol or drugs
559 misuse in children <18: a systematic review. *Health Educ Res*. 2007 Apr;22(2):177–91.
- 560 70. Cashman C, Ruotsalainen J, Greiner B, Beirne P, Verbeek J. Alcohol and drug screening of
561 occupational drivers for preventing injury (Review). *Cochrane Database Syst Rev*.
562 2009;(2):Art. No.: CD006566. DOI: 10.1002/14651858.CD006566.
- 563 71. Janer G, Sala M, Kogevinas M. Health promotion trials at worksites and risk factors for cancer.
564 *Scand J Work Environ Health*. 2002 Jun;28(3):141–57.
- 565 72. Runnels V, Tudiver S, Doull M, Boscoe M. The challenges of including sex/gender analysis in
566 systematic reviews: a qualitative survey. *Syst Rev*. BioMed Central Ltd; 2014 Jan 10;3(1):33.
- 567 73. Scottish Governement. *Changing Scotland’s Relationship with Alcohol : A Framework for
568 Action Progress Report February 2012*. Edinburgh; 2012.
- 569 74. de Visser RO, McDonnell EJ. “That”s OK. He’s a guy’: a mixed-methods study of gender
570 double-standards for alcohol use. *Psychol Health*. Routledge; 2012 Jan;27(5):618–39.
- 571 75. de Visser R, Smith J, Abraham C, Wheeler Z. *Gender, alcohol, and interventions*. London;
572 2012.
- 573 76. Brown R, Gregg M. The pedagogy of regret: Facebook, binge drinking and young women.
574 *Contin J Media Cult Stud*. Special Is(Forthcoming):1–31.
- 575 77. Wood K, Patterson C, Katikireddi SV, Hilton S. Harms to “others” from alcohol consumption in
576 the minimum unit pricing policy debate: a qualitative content analysis of UK newspapers
577 (2005-12). *Addiction*. 2014 Apr;109(4):578–84.

- 578 78. Gell L, Ally A, Buykx P, Hope A, Meier P. Alcohol's Harm to Others. 2015. London; 2015.
- 579 79. Emslie C. Women, men and coronary heart disease: a review of the qualitative literature. *J*
580 *Adv Nurs*. 2005 Aug;51(4):382–95.
- 581 80. Amos A, Greaves L, Nichter M, Bloch M. Women and tobacco: a call for including gender in
582 tobacco control research, policy and practice. *Tob Control*. 2012 Mar 1;21(2):236–43.
- 583 81. Emslie C, Ridge D, Ziebland S, Hunt K. Exploring men's and women's experiences of
584 depression and engagement with health professionals: more similarities than differences? A
585 qualitative interview study. *BMC Fam Pract*. 2007 Jan;8:43.
- 586 82. Doull M, Runnels V, Tudiver S. Sex and Gender in Systematic Reviews Planning Tool. 2011.
- 587 83. Sen G, Östlin P, George A. Unequal , Unfair , Ineffective and Inefficient Gender Inequity in
588 Health : Why it exists and how we can change it Final Report to the WHO Commission on
589 Social Determinants of Health. World Health. Stockholm; 2007.
- 590 84. Payne S. Beijing Fifteen Years On : The Persistence of Barriers to Gender Mainstreaming in
591 Health Policy Beijing Fifteen Years On : The Persistence of Barriers to Gender Mainstreaming
592 in Health Policy. 2013;18(4):515–42.
- 593 85. European Commission. A guide to gender impact assessment. EU Comm Bruxelles. 2003;
- 594 86. Hughes TL, Wilsnack SC, Kantor LW. The Influence of Gender and Sexual Orientation on
595 Alcohol Use and Alcohol-Related Problems: Toward a Global Perspective. *Alcohol Res Curr*
596 *Rev*. 2014;38(1):e – 1–012.
- 597 87. Probst C, Roerecke M, Behrendt S, Rehm J. Gender differences in socioeconomic inequality of
598 alcohol-attributable mortality: A systematic review and meta-analysis. *Drug Alcohol Rev*.
599 2014 Aug 8;
- 600 88. Nolen-Hoeksema S. Gender differences in risk factors and consequences for alcohol use and
601 problems. *Clin Psychol Rev*. 2004 Dec;24(8):981–1010.
- 602 89. Wilsnack SC, Wilsnack RW, Kantor LW. Focus On: Women and the Costs of Alcohol Use.
603 *Alcohol Res Curr Rev*. 2013;35(2).
- 604 90. Elder RW, Shults R a, Sleet D a, Nichols JL, Thompson RS, Rajab W. Effectiveness of mass
605 media campaigns for reducing drinking and driving and alcohol-involved crashes: a systematic
606 review. *Am J Prev Med*. 2004 Jul;27(1):57–65.
- 607 91. Janssen MM, Mathijssen JJP, van Bon-Martens MJH, van Oers H a M, Garretsen HFL.
608 Effectiveness of alcohol prevention interventions based on the principles of social marketing:
609 a systematic review. *Subst Abuse Treat Prev Policy*. Substance Abuse Treatment, Prevention,
610 and Policy; 2013 Jan;8(1):18.
- 611 92. Snyder LB, Hamilton M a, Mitchell EW, Kiwanuka-Tondo J, Fleming-Milici F, Proctor D. A
612 meta-analysis of the effect of mediated health communication campaigns on behavior
613 change in the United States. *J Health Commun*. 2004 Jan;9 Suppl 1(October 2012):71–96.
- 614 93. Stead M, Gordon R, Angus K, McDermott L. A systematic review of social marketing
615 effectiveness. *Health Education*. 2007. 126-191 p.
- 616 94. Phillips RO, Ulleberg P, Vaa T. Meta-analysis of the effect of road safety campaigns on
617 accidents. *Accid Anal Prev*. Elsevier Ltd; 2011 May;43(3):1204–18.
- 618 95. Pollack KM, Frattaroli S, Young JL, Dana-Sacco G, Gielen AC. Motor vehicle deaths among
619 American Indian and Alaska Native populations. *Epidemiol Rev*. 2012 Jan;34(1):73–88.
- 620 96. Russell K, Vandermeer B, Hartling L. Graduated driver licensing for reducing motor vehicle
621 crashes among young drivers (Review). *Cochrane Database Syst Rev*. 2011;(10):Art. No.:
622 CD003300. DOI: 10.1002/14651858.CD003300.

- 623 97. Shults RA, Elder RW, Nichols JL, Sleet DA, Compton R, Chattopadhyay SK. Effectiveness of
624 multicomponent programs with community mobilization for reducing alcohol-impaired
625 driving. *Am J Prev Med.* Elsevier Inc.; 2009 Oct;37(4):360–71.
- 626 98. Elder RW, Nichols JL, Shults R a, Sleet D a, Barrios LC, Compton R. Effectiveness of school-
627 based programs for reducing drinking and driving and riding with drinking drivers: a
628 systematic review. *Am J Prev Med.* 2005 Jun;28(5 Suppl):288–304.
- 629 99. Erke A, Goldenbeld C, Vaa T. The effects of drink-driving checkpoints on crashes--a meta-
630 analysis. *Accid Anal Prev.* 2009 Sep;41(5):914–23.
- 631 100. Goss C, Van Bramer L, Gliner J, Porter T, Roberts I, DiGuseppi C. Increased police patrols for
632 preventing alcohol-impaired driving (Review). *Cochrane Database Syst Rev.* 2008;(4):Art.
633 No.: CD005242. DOI: 10.1002/14651858.CD005242.
- 634 101. Bonell C, Parry W, Wells H, Jamal F, Fletcher A, Harden A, et al. The effects of the school
635 environment on student health: a systematic review of multi-level studies. *Health Place.*
636 Elsevier; 2013 May;21:180–91.
- 637 102. Rodriguez DM, Teesson M, Newton NC. A systematic review of computerised serious
638 educational games about alcohol and other drugs for adolescents. *Drug Alcohol Rev.* 2014
639 Mar;33(2):129–35.
- 640 103. Champion KE, Newton NC, Barrett EL, Teesson M. A systematic review of school-based
641 alcohol and other drug prevention programs facilitated by computers or the internet. *Drug*
642 *Alcohol Rev.* 2013 Mar;32(2):115–23.
- 643 104. Langford R, Bonell C, Jones H, Poulou T, Murphy S, Waters E, et al. The WHO Health
644 Promoting School framework for improving the health and well-being of students and their
645 academic achievement (Review). *Cochrane Database Syst Rev.* 2014;(4):Art. No.: CD008958.
646 DOI: 10.1002/14651858.CD008958.
- 647 105. Jones L, Bates G, Downing J, Sumnall H, Bellis MA. A review of the effectiveness and cost-
648 effectiveness of personal , social and health education on sex in and secondary schools
649 focusing relationships and alcohol education for young people aged 11 to 19 years. 2009.
- 650 106. Jones L, Bates G, Downing J, Sumnall H, Bellis MA. A review of the effectiveness and cost-
651 effectiveness of personal , social and health education in primary schools focusing on sex and
652 relationships and alcohol education for young people aged 5 to 11 years. Liverpool; 2009.
- 653 107. Lemstra M, Bennett N, Nannapaneni U, Neudorf C, Warren L, Kershaw T, et al. A systematic
654 review of school-based marijuana and alcohol prevention programs targeting adolescents
655 aged 10–15. *Addict Res Theory.* 2010 Jan;18(1):84–96.
- 656 108. Daykin N, Orme J, Evans D, Salmon D, McEachran M, Brain S. The impact of participation in
657 performing arts on adolescent health and behaviour: a systematic review of the literature. *J*
658 *Health Psychol.* 2008 Mar;13(2):251–64.
- 659 109. D’Onise K, Lynch JW, Sawyer MG, McDermott R a. Can preschool improve child health
660 outcomes? A systematic review. *Soc Sci Med.* Elsevier Ltd; 2010 May;70(9):1423–40.
- 661 110. Fletcher A, Bonell C, Hargreaves J. School effects on young people’s drug use: a systematic
662 review of intervention and observational studies. *J Adolesc Health.* 2008 Mar;42(3):209–20.
- 663 111. Jackson C, Geddes R, Haw S, Frank J. Interventions to prevent substance use and risky sexual
664 behaviour in young people: a systematic review. *Addiction.* 2012 Apr;107(4):733–47.
- 665 112. Loveland-cherry CJ. Alcohol, Children and Adolescents. *Annual review of nursing research.*
666 2005. p. 135–77.
- 667 113. Teesson M, Newton NC, Barrett EL. Australian school-based prevention programs for alcohol
668 and other drugs: a systematic review. *Drug Alcohol Rev.* 2012 Sep;31(6):731–6.

- 669 114. Borsari B, Hustad JTP, Capone C. Alcohol Use in the Greek System , 1999-2009 : A Decade of
670 Progress. *Curr Drug Abuse Rev.* 2009;2:216–25.
- 671 115. Martens MP, Dams-O’Connor K, Beck NC. A systematic review of college student-athlete
672 drinking: Prevalence rates, sport-related factors, and interventions. *J Subst Abuse Treat.* 2006
673 Oct;31(3):305–16.
- 674 116. Reavley N, Jorm AF. Prevention and early intervention to improve mental health in higher
675 education students: a review. *Early Interv Psychiatry.* 2010 May;4(2):132–42.
- 676

Figure 1: Flow diagram of the review screening process updating the searches from Martineau *et al.* 2013



*Substitution database for Social Policy and Practice

Table 1: Search Strategy from Martineau et al., 2013 (4).

Alcohol terms	<u>AND</u>	Policy settings and interventions terms: <ul style="list-style-type: none"> • sexual or risky behaviour • roads and transport • public space • domestic • workplace • school • leisure • social • availability • affordability • acceptability 	<u>AND</u>	Population-level terms	<u>AND</u>	Systematic review terms
		<u>OR</u> Outcomes terms: <ul style="list-style-type: none"> • mental harm • communicable diseases • unintentional injury and accidents • violence and crime • employment • economic • environment • social 				
		<u>OR</u> Specific interventions terms				
<p>See Appendix A. 'Supplementary Data' of the Martineau review for the complete search strategy. Online at http://dx.doi.org/10.1016/j.vpmed.2013.06.019</p>						

Table 2: Final Framework for Data Extraction from Reviews

Item	Item description and/or instructions/response options
Study Details	
A. Review Title	Brief reference e.g. Jackson et al., 2010
B. Citation	Full citation.
C. Relevant studies	Number of relevant studies/total number of studies in review. Studies deemed relevant if they relate to a population-level alcohol policy intervention as defined by the Martineau review, and of any design.
Gender focus of review	
D. Did this review have a major and a priori focus on gender equity?	If so, enter 1, 2 or 3 to indicate which type, using criteria from Welch et al., 2013 (34) (p2): Type 1 Reviews assess effects of interventions in disadvantaged populations; Type 2 Reviews assess effects of interventions aimed at reducing social gradients across populations; Type 3 Reviews have a major focus on equity and are “designed to assess the effects of interventions not aimed at reducing inequity but where it is important to understand the effects of the intervention on equity, positive or negative”.
E. Was post-hoc analysis conducted of the effects of the intervention by gender?	Yes/No or N/A (not applicable) if a priori analysis by gender was planned.
F. Extract all gender-relevant data except from single-gender studies.	Cut and paste any data on gender if relevant to population level alcohol interventions or policy.
G. Extract all data from single-gender studies.	Cut and paste any data from single gender studies if relevant to population level alcohol interventions or policy.
Pooled data for all studies in review	
H. Is pooled baseline participation by gender reported?	Yes/No
I. If yes to 8, extract data	Provide data or N/A
J. Were pooled intervention effects by gender reported?	Yes/No
K. If yes to 10, extract data	Provide data or N/A
Data provided for individual studies in review Excluding single gender studies & only including data from population-level alcohol studies.	
L. Baseline participation reported by gender in table for individual studies	Consistently/Mostly/Sometimes/Rarely/Never
M. Intervention effects reported by gender for individual studies in the study table or narrative?	No/Table/Narrative/Both
N. Quality of data reported for intervention effects by gender for individual studies	None (if qualitative only) Poor (if very basic quantitative e.g. before and after measures given only) Good (if quantitative with effect size or p value or confidence interval) Variable (if different quality of reporting across different studies within the review)
O. Notes	

Table 3: Policy areas and reviews included

Policy Area	Types or examples of interventions included:	Reviews
1. Alcohol server setting	Drinking environment interventions including server training, warning labels etc.	(47–52)
2. Sales Availability	Restricting opening hours/days, outlet density, legal drinking age, monopolies.	(53–56,58–60,62)
3. Illicit Alcohol	Any interventions to tackle illicit alcohol.	(63)
4. Taxation/Pricing	Changing tax or price of alcohol.	(46,60,64,65)
5. Mass media/promotion	Advertising, mass media, promotion, counter-advertising, social marketing.	(43,46,60,90–93)
6. Drink-driving	Increased police patrols, sobriety checkpoints, blood alcohol limits etc.	(35,36,66,67,90,94–100)
7. School	Pre-school/school setting interventions e.g. education, life skills etc.	(37,38,40,98,101–113)
8. Higher education	e.g. regulation, media campaigns, social norms, multicomponent interventions.	(42,44,114–116)
9. Family and community	e.g. mailed literature, community wide campaigns.	(39,40,68,69)
10. Workplace	e.g. mandatory testing, staff training, mail-outs, peer-referral programmes.	(41,45,70,71)

Table 4: Review-level reporting of gender by policy area

	Data Extraction Item [Reference Letter from Table 2 where applicable]					
	Number of reviews	Number of reviews with gender focus/Number of reviews with post-hoc analysis by gender [D, E]	Number of reviews which pooled data by gender [H, I, J, K]	Frequency of baseline participation reported by gender for individual studies (number of reviews) [L]	Number of reviews with intervention effects reported by gender in table only/in narrative only/in both table and narrative [M]	Quality of data reported for gender intervention effects where reported (number of reviews) [N]
1. Alcohol server setting	6	0/0	0	Never (6)	1/0/0	Poor (1)
2. Sales Availability	8	0/0	0	Never (8)	0/1/4	Poor (2) Good (1) Variable (2)
3. Illicit Alcohol	1	0/0	0	Never (1)	0/0/0	
4. Taxation/Pricing	4	0/0	0	Rarely (1) Never (3)	1/1/2	Good (1) Variable (3)
5. Mass media/promotion	7	0/1	1	Sometimes (1) Never (6)	0/0/4	Poor (1) Good (1) Variable (2)
6. Drink-driving	12	2/0	0*	Never (12)	3/0/2	Poor (3) Good (2)
7. School	17	2/0	0*	Consistently (2) Never (15)	4/0/5	Poor (1) Good (8)
8. Higher education	5	1/0	1	Consistently (1) Never (4)	0/0/0	
9. Family and community	4	2/0	0*	Consistently (1) Never (3)	0/1/2	Poor (1) Good (2)
10. Workplace	4	1/0	0*	Consistently (1) Sometimes (1) Never (2)	0/1/1	Poor (1) Variable (1)
Totals for unique reviews**	63	8/1	2	Consistently (5) Sometimes (2) Rarely (1) Never (56) ^λ	8/4/17	Poor (10) Good (14) Variable (5)

**In the Type 3 reviews which planned to focus on gender, subgroup analysis by gender was not possible due to lack of suitable data.*

*** The totals are sometimes different to the sum of the data in columns as some reviews covered more than one policy area.*

^λ n=64 because the frequency of reporting was rated differently for two policy areas within the same review.