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10 Harm from known others' drinking by relationship proximity to the harmful drinker and gender: A
11 meta-analysis across ten countries

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75 **Abstract**

76 **Background:** Drinking is a common activity with friends or at home but one associated with harms
77 within both close and extended relationships. This study investigates associations between having a
78 close proximity relationship with a harmful drinker and likelihood of experiencing harms from known
79 others' drinking for men and women in ten countries.

80 **Methods:** Data about alcohol's harms to others from national/regional surveys from ten countries
81 were used. Gender-stratified random-effects meta-analysis compared the likelihood of experiencing
82 each, and at least one, of seven types of alcohol-related harm in the last 12 months, between those
83 who identified someone in close proximity to them (a partner, family member or household member)
84 and those who identified someone from an extended relationship as the most harmful drinker (MHD)
85 in their life in the last 12 months.

86 **Results:** Women were most likely to report a close male MHD while men were most likely to report
87 an extended male MHD. Relatedly, women with a close MHD were more likely than women with an
88 extended MHD to report each type of harm, and one or more harms, from others' drinking. For men,
89 having a close MHD was associated with increased odds of reporting some but not all types of harm
90 from others' drinking, and was not associated with increased odds of experiencing one or more harms.

91 **Conclusions:** The experience of harm attributable to the drinking of others differs by gender. For
92 preventing harm to women, the primary focus should be on heavy or harmful drinkers in close
93 proximity relationships; for preventing harm to men, a broader approach is needed. This and further
94 work investigating the dynamics among gender, victim-perpetrator relationships, alcohol and harm to
95 others will help to develop interventions to reduce alcohol-related harm to others which are specific to
96 the contexts within which harms occur.

97 **Key words:** alcohol, harm to others, gender, family, meta-analysis

98 **Introduction**

99 Problematic alcohol use, drinking that has potential to result in health or social problems to the
100 individual or collective (WHO, 2018), can affect others around the drinker (Room et al., 2010, Room
101 et al., 2016, Greenfield et al., 2009). While there is a significant body of research focusing on
102 understanding and treating the drinker, there is increasing interest in understanding the effect of
103 problematic alcohol use on others around the drinker (Laslett et al., 2013). People’s drinking may
104 negatively affect the health and wellbeing of others through a variety of avenues – such as physically
105 via inter-personal violence, traffic accidents and foetal alcohol syndrome, financially via alcohol-
106 related property damage, emotionally via neglect, and socially via social embarrassment (Laslett et al.,
107 2011, Rehm et al., 2009). Problematic alcohol use can harm people in close proximity to the drinker,
108 such as partners and other family or household members (Greenfield et al., 2015, Laslett et al., 2011)
109 as well as people in the drinker’s extended relationships, such as friends and co-workers, or more
110 distant relatives (Dale & Livingston, 2010; Laslett et al., 2010).

111 Being in a close relationship with someone who engages in problematic alcohol use or who’s drinking
112 has harmed others (hereinafter referred to as ‘harmful drinkers’) increases one’s risk of experiencing
113 harms from others’ drinking (Casswell et al., 2011, Karriker-Jaffe et al., 2017). Decades of research
114 have shown that problematic alcohol use is a contributing factor to violence within family and
115 intimate relationships (Leonard and Quigley, 2017) and to the severity of this violence (Foran and
116 O’Leary, 2008, Graham et al., 2011). Specific family members may be more at risk than others of
117 adverse impacts from the problematic alcohol use of people close to them, and these risks are likely to
118 differ according to the gender of the victim and the drinker (Berends et al., 2012, Berends et al.,
119 2014).

120 The role of gender in alcohol-related harms is complex. Men and women commonly drink different
121 amounts, in different settings with different people, and these drinking patterns vary greatly across
122 countries (WHO, 2014). Historically, men have drunk more than women and caused more problems
123 and harm (Nicholls, 2008, Room et al., 2011, Nicholls, 2009, Obot and Room, 2005, AIHW, 2014,
124 Wilsnack et al., 2009). The gender of the drinker and the type of drinking context is likely to affect
125 who is harmed (Crane et al., 2016, Karriker-Jaffe and Greenfield, 2014) . For instance, when men
126 drink at home they are more likely to affect family members, especially spouses and children, while if
127 they drink with other friends and work colleagues, they are more likely to affect other men, including
128 strangers and acquaintances.

129 The interplay between the gender of victims and perpetrators, and the types, severity and nature of
130 harms experienced from the drinking of people from close social relationships, and from extended
131 social relationships – that is, those who are known to the respondent that are not family members or
132 intimate partners, such as friends, distant relatives, colleagues and acquaintances – is less-
133 comprehensively researched. Some research suggests that men are more likely than women to
134 experience aggression from other men who had been drinking in bars or public places, such as

135 strangers or friends and acquaintances from their extended social relationships, whereas women are
136 more likely to experience aggression from a male that is a spouse, partner or friend (Graham and
137 Wells, 2001). Thus, physical harm from the drinking of people from close relationships and extended
138 relationships may be experienced in different contexts and severity by men and women.

139 In summary, men's and women's relationships with harmful drinkers may differ, and the frequency
140 and types of harms experienced because of the drinking of people in someone's close versus extended
141 social relationships may vary by the gender of the victim and the drinker. Thus, the risks of harm from
142 others' drinking associated with having a close proximity relationship or an extended relationship
143 with a harmful drinker are likely to differ between men and women. Investigations of how gender and
144 victim-perpetrator relationships interact and are associated with harm from others' drinking can
145 improve understandings of the specific contexts within which harm occurs, and help to develop
146 avenues to reduce alcohol-related harm to others.

147 *Aims*

148 Using data from national/regional surveys from ten countries involving experiences of alcohol's
149 harms to others, this paper examines the associations between having a most harmful drinker (MHD)
150 in one's close relationships or extended relationships and likelihood of experiencing seven different
151 types of harm from known people's drinking, and whether these associations vary for men and
152 women. We hypothesise that:

- 153 1. Women will be more likely to identify the MHD in their life as someone in a close
154 relationship than someone in an extended relationship, while the reverse will be true for men;
- 155 2. Because harmful drinkers in close proximity relationships have more opportunity to cause
156 harms to those close to them, both women and men with a MHD in a close relationship will be more
157 likely to experience at least one harm from known people's drinking than will those who only have a
158 MHD in an extended relationship;
- 159 3. However, for some harms (e.g., physical violence) which are more likely to be experienced
160 by women from a male family member or intimate partner and by men from other men, the risk
161 associated with having a close MHD will be greater for women than men.

162 **Materials and Methods**

163 *Datasets*

164 This paper utilises data collected in ten countries (listed in Table 1) which conducted cross-sectional
165 surveys measuring harm from others' drinking. The construction and management of the multi-
166 country data archive was completed as part of two large projects: the *WHO/Thai Health Collaborative*
167 *Study of Alcohol's Harms to Others* (described in detail in Callinan et al., 2016a) and the *Alcohol's*
168 *Harm to Others: Multinational Cultural Contexts and Policy Implications (GENAHTO)* project
169 (described in Greenfield et al., 2017). The country-level studies – described in detail by Callinan et al.
170 (2016a), Laslett et al. (2011), Kaplan et al. (2017) and Greenfield and Karriker-Jaffe (2015) – were
171 conducted between 2008 and 2015 and used comparable versions of the same questionnaire, except

172 for subtle alterations in item wording which were made to ensure each survey remained culturally
173 applicable and sensitive to local norms. Within-regions, random digit dialling or multi-stage sampling
174 was used in all country-level studies. Detailed methods for each of the ten countries are depicted in
175 Table 1. In this paper, the individual study samples are referred to as countries. However, it is
176 important to note that not all studies utilised a national sampling scope (see Table 1). Australia, New
177 Zealand, USA, Lao PDR, Thailand, Vietnam and Sri Lanka used a national sampling scope and drew
178 nationally representative samples. The Chilean and Indian samples were drawn from selected regions
179 and were regionally representative. Nigeria used a regional sampling scope, however random
180 selection was not followed within the household and thus may not be representative of the selected
181 regions.

182 [Table 1 here]

183 *Measures*

184 Respondents who answered ‘yes’ to a question asking whether they knew a heavy drinker (defined in
185 the questionnaire as a “problem drinker or someone who drinks large amounts of alcohol often”) that
186 had negatively affected them in the last 12 months were asked to identify, from a selection of
187 relationship categories, the person whose drinking had most negatively affected them (i.e., Most
188 Harmful Drinker – MHD) (except Indian respondents who were all asked this item and given the
189 option to select ‘not applicable’ if they had not been negatively affected). These responses were
190 categorized in terms of relationship proximity between the MHD and the respondent as “close MHD”
191 (immediate family member, other household member, or current or ex-intimate partner) or “extended
192 MHD” (non-first degree relative such as grandparent, cousin, sibling in law or distant relative; friend
193 that is not a household member; or other person such as a neighbour or co-worker). These categories
194 may not reflect the quality or intimacy of the relationship.

195 Harms from known drinkers were measured in two ways. The first asked participants if they had
196 experienced specific harms in the past 12 months, and if so, whether the drinker who harmed them
197 was a family member or friend (i.e. someone they knew). Three outcomes were included from these
198 questions:

- 199 (1) Harmed physically – “has someone who had been drinking harmed you physically?”
- 200 (2) Called names or insulted – “has someone who had been drinking called you names or
201 otherwise insulted you?”
- 202 (3) Felt threatened or afraid – “did you feel threatened or afraid because of someone's drinking at
203 home or in some other private setting?” (drinker was assumed to be a family member or friend, except
204 for USA respondents who were asked this directly)

205 Harms from known drinkers were also assessed by asking respondents first whether they had been
206 negatively affected by the drinking of someone they knew, and if so, had they experienced specific
207 harms from a heavy drinker they knew. Four additional outcomes were derived from these variables:

208 (4) Forced or pressured into sex – “were you forced or pressured into sex or something sexual
209 because of any of these people's drinking?”

210 (5) Emotionally hurt or neglected – “were you emotionally hurt or neglected because of any of
211 these people's drinking?”

212 (6) Had to leave home – “did you have to leave home to stay somewhere else because of
213 someone in the household's drinking?”

214 (7) Had less money for household expenses – “was there less money for household expenses
215 because of someone in the household's drinking?”

216 Six of the seven harm items were asked equivalently in all surveys; however, “called names or
217 insulted by a known drinker” from the Australian and New Zealand surveys could not be derived.
218 Additionally, for Australia and New Zealand, items about harms from a known drinker (questions 1,
219 3-7) were asked only about the most harmful drinker, not all heavy drinkers known to the respondent.
220 A summary variable was created (1+ harms) which was scored as “yes” if the respondent reported
221 experiencing at least one of the seven specific harms, “no” if they did not experience any of the seven
222 specific harms, and missing if they did not experience any of the harms and were missing on more
223 than one quarter of the items.

224 *Analysis*

225 Descriptive statistics were used to characterize the samples, compare the percentage of men and
226 women who experienced each of the seven different types of alcohol-related harm, and compare the
227 percentage of men and women with a close male MHD, close female MHD, extended male MHD or
228 extended female MHD.

229 Stratified bivariate logistic regression modelling and meta-analysis of individual participant data using
230 the DerSimonian-Laird method of two-stage inverse-variance random-effects method (Fisher, 2015)
231 were used to compare the relative likelihood by gender of experiencing each, and at least one
232 (generally of seven types of) harm from known people’s drinking according to the proximity of the
233 respondent’s relationship to the MHD, pooled across ten countries. Due to the differences in sampling
234 and subtle survey differences across the countries or regions (see Table 1) random effects meta-
235 analyses were conducted. The pooled estimates resulting from these analyses are interpreted as the
236 mean estimates of the true varying effects across all countries. Due to the low number of respondents
237 that reported experiencing each harm, it was not possible to conduct multivariate regression models
238 controlling for potential confounding covariates without losing a large proportion (>5%) of the
239 country samples because of inestimable regression coefficients. However, the bivariate associations
240 between the proximity of relationship to the MHD and each, and at least one harm from known
241 people’s drinking (plotted in Figure 2) were replicated using the portions of the samples with
242 sufficient data to estimate these associations after controlling for the age, level of education and
243 drinking pattern of respondents – no notable differences in the pooled effect estimates were found.

244 To investigate gender differences in the association between the proximity of relationship to the MHD
245 and harm from known people's drinking, an interaction term between gender and the proximity of
246 relationship to the MHD was fitted in logistic regression models predicting physical harm and 1+
247 harms with interaction coefficients pooled across countries via the DerSimonian-Laird method
248 described above.

249 Country-level and pooled meta-analysis estimates and accompanying I-squared statistics are presented
250 in stratified forest plots. I-squared describes the percentage of the total variability in effect sizes due to
251 true heterogeneity (between-studies variability not sampling error) – I-squared = 25%, 50%, and 75%
252 indicates low, medium, and high heterogeneity, respectively. All estimates are weighted to adjust for
253 participants' probability of being selected to participate (according to the number of eligible persons
254 present in the household) and non-response (to match the gender distribution in each country, and to
255 match the national adult population distributions of age and geographic location for Australia, age,
256 geographic location and ethnicity for New Zealand, and numerous variables for USA (Kaplan et al.,
257 2017)). All reported Ns pertain to the unweighted samples. Significant differences in odds are
258 indicated by confidence intervals of odds ratios which do not include one, and significant differences
259 in percentages between groups are indicated by confidence intervals which do not overlap. Countries
260 are arranged in tables and figures in descending order of per capita alcohol consumption according to
261 published WHO estimates (WHO, 2014). All data analysis and construction of forest plots was
262 completed using Stata version 14.0 (Stata Corp., 2015).

263 **Results**

264 The estimated percentage of respondents who experienced each and at least one of seven different
265 types of harm from known people's drinking in men and women in ten countries is depicted in Table
266 2. Combining men and women into single samples, the estimated percentage of respondents who had
267 experienced at least one of seven types of harm from known people's drinking (1+ harms) ranged
268 from 12% in New Zealand to slightly below half (44%) in Sri Lanka.

269 [Table 2 here]

270 As shown in Table 2, based on non-overlapping confidence intervals, a significantly larger percentage
271 of women than men reported 1+ harms from a known drinker in three countries (Australia, New
272 Zealand and Vietnam) while a larger percentage of men than women reported 1+ harms in one
273 country (Sri Lanka, only); for the other six countries, there was no evidence of a gender difference in
274 the percentage of respondents who experienced 1+ harms.

275 In most countries there was no statistically significant difference between the percentage of men and
276 women who had felt afraid or threatened or been physically, verbally, sexually or emotionally harmed
277 by a known person's drinking. However, the number of respondents reporting these types of harms
278 was quite low, and, in countries where a gender difference was observed, these harms were in every
279 case more prevalent among women than men.

280 Differences in the percentage of men compared to women who reported harms that specifically
281 pertained to experiences in the household were less consistent – in some countries, a greater
282 percentage of women than men reported having less money for household expenses or having to leave
283 because of a household member’s drinking, whereas in other countries the percentage of respondents
284 that experienced these harms was greater among men than women.

285 The gender of the MHD and relationship proximity of the MHD to the respondent among men and
286 women is shown in Figure 1. The majority of the MHDs reported by both men and women were male.
287 The main difference by gender is that men were consistently more likely to report that their MHD was
288 a male from an extended relationship than a close male, close female or extended female (in all
289 countries except India where men were equally likely to have a close or extended male MHD). In
290 contrast, women were more or at least equally likely to report that their MHD was a close male than a
291 close female, extended male or extended female. A detailed description of the sociodemographic and
292 drinking characteristics of respondents who had a close MHD and respondents who had an extended
293 MHD is provided in Supplementary Table S-1.

294 [Figure 1 here]

295 Figure 2 presents the estimated likelihood of experiencing each, and at least one, of seven different
296 types of harms from known people’s drinking for respondents with a close MHD compared to those
297 with an extended MHD. Pooling the estimates across ten countries, women with a close MHD were
298 significantly more likely to have experienced 1+ harms from a known drinker than women with an
299 extended MHD (Figure 2h). While there was high between-country heterogeneity in the size of the
300 effect (I-squared = 75.4%), the estimated direction of association was consistent across all countries
301 except one (Nigeria), and the confidence intervals indicated a significantly increased odds in six
302 countries.

303 Across countries, men with a close MHD were not more likely than men with an extended MHD to
304 have experienced 1+ harms at the 5% confidence level (but the difference was close to significant ($p =$
305 0.08)). Men with a close MHD were at significantly increased odds of harm compared to men with
306 extended MHDs in four countries. However, having an extended MHD was associated with a
307 significantly increased odds for men from India, and there was very high heterogeneity in the size and
308 direction of effect across countries (I-squared = 89.3%). Furthermore, pooling the estimates across
309 countries, gender was not found to interact with the association between having a close MHD versus
310 extended MHD and odds of experiencing 1+ harms from known people’s drinking (pooled interaction
311 coefficient = 1.34, 95% CI = 0.87, 2.05, $p = 0.18$, I-squared = 62.3%; results not shown).

312 Figure 2h was replicated using an outcome variable for 1+ of six harms (excluding called names or
313 insulted) and no major differences to the pooled ORs were observed (men OR = 1.56 vs. 1.66, women
314 OR = 2.30 vs. 2.14).

315 [Figure 2 here]

316 The likelihood of being physically harmed by a close MHD compared to an extended MHD is
317 presented in Figure 2a. Pooling estimates across ten countries, for women, having a close MHD,
318 rather than an extended MHD, is associated with being at three times greater odds of being physically
319 harmed by a known person's drinking in the last 12 months. The effect was fairly consistent across
320 countries – having a close MHD was associated with significantly greater odds of physical harm
321 among Nigerian, Chilean, Vietnamese and Indian women, the point estimates of women from all other
322 countries were in the same direction, and there was moderate heterogeneity in the size of the effect (I-
323 squared = 51.5%).

324 Pooling the estimates across ten countries, the proximity of men's relationship to their MHD was not
325 associated with a greater likelihood of being physically harmed because of a known person's drinking.
326 While in Vietnam men were more likely to have been physically harmed if they had a close MHD
327 than if they had an extended MHD, no significant association was consistently found in the remaining
328 nine countries (I-squared = 34.4%).

329 In terms of gender differences, there was a strong interaction effect of the gender of the respondent on
330 the association between having a close MHD versus extended MHD and odds of being physically
331 harmed by a known drinker (pooled interaction coefficient = 3.06, 95% CI = 1.78, 5.26, $p < .001$, I-
332 squared = 21.7%). Pooling the interaction effect of gender across countries, respondents with a close
333 MHD were more likely to be physically harmed by a known person's drinking if they were a woman
334 than a man, whereas respondents with an extended MHD were more likely to be physically harmed by
335 a known person's drinking if they were a man than a woman.

336 Pooled values of the estimated likelihood of experiencing each of the six other types of harm from
337 known people's drinking for respondents with a close MHD compared to those with an extended
338 MHD are depicted in Figure 2(b-g). Women were at greater odds of experiencing each of the six other
339 types of harms from known people's drinking if they had a close MHD compared to an extended
340 MHD. For men, having a close MHD was not significantly associated with greater odds of being
341 called names or insulted, threatened or made afraid, forced or pressured into sex or having to leave
342 home because of a known person's drinking. However, across countries, men were significantly more
343 likely to have been emotionally harmed or neglected and had less money for household expenses if
344 they had a close MHD. Despite this, Nigerian men were significantly less likely to have been
345 emotionally hurt or neglected, had to leave home, and had less money for household expenses, if they
346 had a close MHD versus extended MHD. In contrast, Vietnamese men were significantly more likely
347 to experience five types of harm from known people's drinking if they had a close MHD versus
348 extended MHD. For Vietnamese women, the odds associated with having a close MHD was
349 equivalent to or higher than the largest value across women in the other nine countries for all harms
350 (having to leave home was unable to be estimated for Vietnamese women).

351 Discussion

352 As hypothesized, men were consistently more likely to report that their MHD was a male in an
353 extended relationship while women were more likely to report that their MHD was a male in a close
354 relationship. This finding is consistent with previous work in Australia which found MHD's were
355 usually intimate partners and friends, and generally were males (Laslett et al., 2010).
356 Our second hypothesis was also partly supported in that, in general, those who had a close MHD were
357 more likely than those with an extended MHD to experience at least one of the seven harms.
358 However, this relationship was significant for women but not men, and was more consistent across
359 countries for women than for men – reflecting the greater likelihood that men would have an extended
360 rather than a close MHD. Men with extended MHDs were significantly more likely to experience 1+
361 harms in India.
362 Our third hypothesis was also supported in that for some harms (e.g., physical violence) which are
363 more likely to be experienced by women from a male family member or intimate partner and by men
364 from other men, the risk associated with having a close MHD will be greater for women than men,
365 and the risk associated with having an extended MHD will be greater for men than women.
366 *Associations among gender, relationship proximity to harmful drinkers and specific alcohol-related*
367 *harm from others*
368 Gender was not found to interact with the association between relationship proximity to the MHD and
369 risk of experiencing at least one of the seven harms from known people's drinking. However, having
370 a close MHD was associated with a significantly increased risk of experiencing at least one of the
371 seven harms from known people's drinking among women, but not among men. Being in close
372 proximity (vs. more distal proximity) to a MHD may increase one's exposure to the heavy/harmful
373 drinking occasions of their MHD and therefore lead to greater opportunity to be harmed by their
374 drinking. Despite this, men with an extended MHD and men with a close MHD had a similar risk of
375 experiencing at least one harm from known people's drinking. It might be that men's extended MHDs
376 are often friends, distal relatives, colleagues or acquaintances whom they drink with (and perhaps
377 frequently or heavily). Therefore, while men with extended MHDs may spend similar or less time
378 with their MHD than men with a close MHD, a relatively high proportion of this time might be spent
379 while drinking. Thus, men with close and extended MHDs may be exposed to a similar level of their
380 MHD's heavy or harmful drinking occasions. Relatedly, men may be more likely to experience
381 certain types of harms from known people's drinking according to whether they have a close or
382 extended MHD. Indeed, men with a close MHD were at significantly greater odds of financial and
383 emotional harm than men with an extended MHD, but they were equally likely to experience physical
384 harm, being called names or insulted, being threatened or afraid, forced into sex, or having to leave
385 home (harms arguably likely to have more severe negative consequences for the victim).
386 Two of the harm items (having to leave home and having less money for household expenses) refer to
387 experiences in the home, and two more (being forced or pressured into sex and emotionally hurt or
388 neglected) might be disproportionately experienced by those with an intimate partner, whether or not

389 their partner drinks heavily. Alternatively, people may feel pressured to have sex by others outside of
390 the domestic context, such as at a bar.

391 For women, the largest increased risk of harm associated with having a close MHD (vs. an extended
392 MHD) is for financial harm. To have less money for household expenses because of someone's
393 drinking requires the drinker being in the household. Those with a close MHD may be much more
394 likely to experience financial harm from a known person's drinking than those with an extended
395 MHD because respondents may share expenses with a close MHD but not with an extended MHD.
396 For women, having a close MHD (vs. an extended MHD) was associated with an increased risk of
397 being threatened or made afraid because of a known person's drinking. The elevation in risk was
398 relatively small in comparison to the risk associated with the other harms considered in this study.
399 This indicates women may experience threatening behaviour and other actions that induce fear
400 because of others' drinking in a variety of contexts. The relatively high percentage of women with a
401 close MHD that were harmed physically is important in light of the finding that women are more
402 likely than men to have a male MHD who is close.

403 Respondents with a close MHD were more likely to be physically harmed by a known person's
404 drinking if they were a woman than if they were a man, whereas respondents with an extended MHD
405 were more likely to be physically harmed if they were a man than if they were a woman. This finding
406 is consistent with Canadian men's and women's descriptions of their most recent incident of physical
407 aggression (with or without alcohol involvement) – men were more likely than women to report
408 incidents with friends rather than with an intimate partner and women were more likely to report
409 incidents with intimate partners (Graham and Wells, 2001).

410 *Cross-country variation in associations among gender, relationship proximity to harmful drinkers*
411 *and harm from known people's drinking*

412 While associations among gender, relationship proximity to harmful drinkers and alcohol-related
413 harm were relatively consistent across countries, there was some cross-country variation in effect
414 magnitude and direction. Numerous social and cultural factors may underpin the observed variation.
415 Associations among gender, relationships and harm from others' drinking may vary across countries
416 due to differing drinking norms, drinking cultures and social roles and contexts across countries
417 (Bloomfield et al., 2005, Obot and Room, 2005, Orford et al., 2005). Furthermore, while there are
418 likely some consistencies in gender-specific roles and perceptions related to drinking across countries
419 (Wilsnack et al., 2000), the extent of these differences may vary, especially given the changes in
420 women's role in western societies during the 20th century (Room, 2010, Ames and Rebhun, 1996,
421 Rotskoff, 2002).

422 Specifically, having a close MHD may be more strongly related to harms in some drinking cultures
423 than in others. In cultures where the activity of drinking is typically carried out away from home, for
424 those with a close MHD, the risk of those harms which are only experienced when in close physical
425 proximity to the MHD may tend to be lower than in cultures where drinking in the home is

426 commonplace and more time is spent with the MHD whilst they are drinking. Alcohol consumption in
427 the home is commonplace in Australia (Room, 2010, Callinan et al., 2016b) and the US (Rotskoff,
428 2002). This is in contrast to Nigeria, where, drinking has historically centred around festivals, rituals
429 and important ceremonies, and where, more-recently, daily or near daily drinking at a bar is more
430 common than at home (Ibanga et al., 2005). In India, the majority of men's drinking occasions were in
431 bars, pubs or the workplace, and men more commonly drank with friends and workmates than with a
432 spouse or family members (Benegal et al., 2005). In contrast, a slightly higher percentage of women's
433 drinking occasions were in their own home or at mealtimes than in in bars, pubs or the workplace, and
434 a similar percentage of women's drinking occasions were with a spouse or family members as with
435 friends or workmates (Benegal et al., 2005). Thus, it is to be expected to find a stronger association
436 between having a close MHD and likelihood of experiencing at least one harm from known people's
437 drinking in countries where drinking usually takes place in the home (for example, Australia and the
438 US), and that having an extended MHD is associated with risk of harm from known people's drinking
439 among Indian men but not in other cultures. Vietnamese drinking contexts may explain why having a
440 close MHD was strongly associated with harms from known people among Vietnamese women and
441 men, although literature describing Vietnamese drinking contexts and culture in particular is scarce
442 (Lincoln, 2016). Anecdotal reasoning suggests that some alcohol-related misbehaviour to others
443 within the family or domestic setting may be more forgivable than alcohol-related misbehaviour
444 outside of the household boundary. Thus, normalisation of drinking within the household may
445 underpin the strong association between having a close MHD and risk of harm from known people's
446 drinking among Vietnamese respondents.

447 More subjective experiences of harm (such as being emotionally hurt) are at least partially dependent
448 on expectations not being met and these expectations may vary systematically across cultures (Room
449 et al., 2016). It is plausible that men and women might be more or less likely to acknowledge alcohol
450 as a cause for their experiences of harm from others depending on the country and culture they live in.
451 For example, in countries where non-alcohol-related harm is common, or where heavy drinking is
452 pervasive and well accepted, people might be more likely to conclude that the individual caused the
453 harm, not their drinking. Therefore, cross-country variation in gender roles and perceptions related to
454 drinking, expectations of relationships, and rates of harm to others from all causes likely underlie
455 some of the cross-country variation in the associations investigated in this study.

456 While the primary focus of this study was to investigate associations between the proximity of
457 relationship to the MHD and harm from others' drinking by gender, the percentage of respondents
458 reporting harms appeared to vary between the samples and thus warrants further investigation.
459 Specifically, given that emotional hurt may affect wellbeing and social relationships (Mee et al.,
460 2006) and was among the most commonly reported harm in these sample, the impacts of emotional
461 harms due to others' drinking across countries warrants further investigation.

462 *Limitations*

463 As with many international studies based on survey research, the comparability of surveys across
464 countries is not perfect. In particular, Australian and New Zealand questions on harms were limited to
465 harms attributable to the respondent's MHD, while those in other countries were asked to report
466 harms from any drinkers (and then asked whether they knew the perpetrator). This may be a
467 contributing factor to the relatively low percentage of respondents that reported experiencing at least
468 one of the seven harms observed in Australia and New Zealand and should be taken into account
469 when interpreting results. While it is a limitation, it was necessary to include those countries whose
470 surveys did not have harms specifically pertaining to the MHD to enable testing of associations within
471 and across a broad range of countries and cultures.

472 Not all who said they were negatively affected by a known heavy drinker reported experiencing at
473 least one of the seven types of harm from known people's drinking included in this study (see Table
474 1). Therefore, there may be other types of harms from known people's drinking not considered in this
475 study that are related to the respondent's gender and relationship proximity to the MHD, and future
476 qualitative studies may compliment this study by building on understandings of the nature and extent
477 of harms experienced from others' drinking.

478 As demonstrated in Table 1, there are differences in administration from country to country that
479 should also be noted, primarily the method of administration, and Australia's low response rate, which
480 is common in survey research in many English-speaking countries. While we do not expect
481 differences in the method of survey administration to have significantly biased the associations
482 reported in this study, we cannot be certain that a respondent may be equally likely to accurately
483 recall particular information during a face-to-face interview versus a computer-assisted telephone
484 interview. As social and cultural conditions of countries may change over time, so too may
485 associations. Thus, the staggering of country-level studies between 2008 and 2015 is a limitation.
486 Finally, there were some differences in the exact format of questions asked, as we have tried to make
487 it clear wherever it could affect results.

488 Importantly, the results of this study describe associations between variables and do not infer that
489 causal relationships exist between proximity to a MHD and harms from known people's drinking.
490 A strength of this study is the inclusion of samples from a breadth of cultures, including countries
491 from five different continents: Africa, Asia, Australasia/Oceania, North America and South America.
492 The countries vary greatly on a number of socioeconomic measures such as age distribution, levels of
493 educational attainment, drinking patterns and national economy (Supplementary Table S-2; WHO,
494 2014, World Bank, 2018), which facilitated discussion of the influence of cultural differences on the
495 observed associations.

496 *Elucidating the findings*

497 While men and women are both more likely to report men as their MHD, this gender split obscures an
498 important distinction in the gender difference in the relationship proximity of the harmful drinker to
499 the respondent. Men were more likely to report that their MHD was a male in an extended

500 relationship while women were more likely to report that their MHD was a male in a close
501 relationship. This broad finding was reflected in the relative risk of physical harm which was more
502 likely to come from a close harmful drinker than a distal harmful drinker for women and equally
503 likely from a close or distal harmful drinker for men. In general, those who had a close MHD were
504 more likely than those with an extended MHD to experience at least one of the seven harms; however,
505 this relationship was significant for women but not men, and was more consistent across countries for
506 women than for men – reflecting the greater likelihood that men would have an extended rather than a
507 close MHD.

508 While associations among gender, relationships with harmful drinkers and alcohol-related harm
509 appeared mostly consistent across countries, some inconsistencies were observed. There are many
510 factors which may underpin these inconsistencies – such as variations in drinking contexts, gender
511 roles, relationship norms and expectations, rates of harm from all causes, tolerance or sensitivity to
512 harms and attribution of alcohol as a cause of harm.

513 *Conclusions*

514 These findings reinforce current concerns that alcohol-related harms to women stem largely from
515 male intimate partners and family members, and such harms to men result more often from male
516 friends, distal relatives and acquaintances (but also may be inflicted by family members). This broad
517 gender difference is an important public health issue across many countries and cultures. Therefore,
518 for preventing harm to women, the primary focus should be on drinkers in close relationships; for
519 preventing harm to men, an environmental prevention approach which extends to public settings is
520 needed. Further work investigating the dynamics among gender, victim-perpetrator relationships,
521 alcohol and specific harms to others should be designed to help develop interventions to reduce
522 alcohol-related harm to others which are specific to the contexts within which harm occurs.

523

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640 **Figure Legends**

641 Figure 1 title:

642 Figure 1: Percentages (stacked) among men and women that identified the most harmful drinker in
643 their life (MHD) as a close male, close female, extended male or extended female.

644 Figure 1 legend:

645 Among respondents who indicated they knew a heavy drinker that had negatively affected them;
646 Gender of MHD not asked in New Zealand survey.

647

648 Figure 2 title:

649 Figure 2: Forest plot of men's and women's likelihood (bivariate odds ratio) of experiencing each (a-
650 g), and at least one (h), of seven types of harm from known people's drinking in the last 12 months if
651 they had a close most harmful drinker (MHD) compared to an extended MHD, pooled across ten
652 countries.

653 Figure 2 legend:

654 Called names or insulted not able to be derived for Australia and New Zealand; Countries with
655 insufficient data due to zero cell counts are excluded from the applicable model(s); Weights of the
656 contribution of country-level estimates to pooled estimates are represented by the relative area of the
657 corresponding grey square.

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Tables

Table 1: Data collection methods from each of the ten country-level cross-sectional survey studies of alcohol's harms to others.

| Country | Data Collection | Sampling | | Sample, N | N Negatively affected by a known heavy drinker ^a | % At least one of seven types of harm ^b (among ^a) |
|-------------|-----------------------------|---|------------------|-----------|---|--|
| | | Scope | Response rate | | | |
| Australia | Oct 08-Dec 08 ^c | National (7 states and 2 territories) | 35% | 2,622 | 761 | 63.8 |
| New Zealand | Sep 08-Mar 09 ^c | National | 64% | 2,878 | 727 | 47.2 |
| Nigeria | Oct 12-Dec 13 ^d | Regional (3 states, 1 in North, and 2 in South) | ^e | 2,269 | 695 | 62.7 |
| Chile | Oct 12-Sep 13 ^d | Regional (7 cities & surrounding areas) | 72% | 1,461 | 496 | 51.7 |
| USA | Feb 15-Jun 15 ^e | National (50 states and Washington DC) | 60% ^f | 2,565 | 349 | 74.3 |
| Lao PDR | Oct 13 -Nov 13 ^d | National (3 regions, 3 provinces, 6 districts) | 99% | 1,212 | 158 | 76.3 |
| Thailand | Sep 12-Mar 13 ^d | National (4 regions & Bangkok, 5 provinces, 15 districts) | 94% | 1,695 | 722 | 63.2 |
| Vietnam | Dec 12-May 13 ^d | National (6 regions, 1 province per region) | 99% | 1,501 | 840 | 60.2 |
| India | Dec 13-Aug 14 ^d | Regional (4 regions in Karnataka State) | 97% | 3,396 | 1,772 | 68.4 |
| Sri Lanka | Sep 13-Feb 14 ^c | National (9 provinces, 21 districts) | 93% | 2,431 | 830 | 86.9 |

Table 2: Percentage (CI) of respondents who experienced seven different types of harm from known people's drinking in the last 12 months, in ten countries by respondents' gender.

| | N | % Harmed physically | % Called names or insulted | % Felt threatened or afraid | % Forced or pressured into sex | % Emotionally hurt or neglected | % Had to leave home | % Had less money for household expenses | % At least one harm |
|--------------------|------|---------------------|----------------------------|-----------------------------|--------------------------------|---------------------------------|---------------------|---|---------------------|
| <i>Australia</i> | | | | | | | | | |
| Men | 1084 | 1 (1, 2) | n/a | 8 (6, 10) | 0 (0, 1) | 12 (10, 14) | 1 (0, 2) | 2 (1, 3) | 15 (13, 17) |
| Women | 1538 | 2 (1, 3) | n/a | 9 (7, 10) | 1 (1, 2) | 20 (18, 23) | 2 (1, 3) | 4 (3, 5) | 22 (20, 24) |
| <i>New Zealand</i> | | | | | | | | | |
| Men | 1135 | 1 (1, 2) | n/a | 4 (3, 6) | 1 (0, 1) | 7 (5, 9) | 1 (1, 2) | 1 (1, 2) | 10 (8, 12) |
| Women | 1743 | 1 (1, 2) | n/a | 6 (5, 8) | 0 (0, 1) | 11 (10, 13) | 3 (2, 4) | 3 (2, 4) | 14 (13, 16) |
| <i>Nigeria</i> | | | | | | | | | |
| Men | 1390 | 3 (2, 4) | 11 (9, 13) | 0 (0, 1) | 1 (0, 1) | 17 (15, 20) | 5 (4, 6) | 5 (4, 7) | 23 (21, 26) |
| Women | 879 | 2 (1, 3) | 12 (10, 15) | 2 (1, 3) | 2 (1, 3) | 19 (16, 22) | 3 (2, 4) | 4 (3, 6) | 23 (20, 26) |
| <i>Chile</i> | | | | | | | | | |
| Men | 680 | 4 (2, 6) | 13 (11, 16) | 13 (11, 16) | 3 (2, 5) | 11 (9, 14) | 3 (2, 5) | 4 (2, 6) | 28 (24, 32) |
| Women | 781 | 4 (2, 5) | 13 (11, 16) | 16 (13, 19) | 3 (2, 5) | 11 (9, 14) | 4 (3, 5) | 4 (3, 6) | 26 (23, 30) |
| <i>USA</i> | | | | | | | | | |
| Men | 1078 | 1 (1, 2) | 6 (5, 8) | 4 (3, 6) | 1 (0, 2) | 8 (6, 10) | 1 (0, 2) | 1 (0, 3) | 13 (10, 16) |
| Women | 1487 | 1 (1, 2) | 8 (6, 11) | 6 (5, 8) | 1 (0, 3) | 12 (10, 15) | 1 (1, 2) | 3 (2, 4) | 17 (14, 20) |
| <i>Lao PDR</i> | | | | | | | | | |
| Men | 504 | 2 (1, 4) | 12 (9, 16) | 8 (6, 11) | 1 (1, 3) | 9 (7, 12) | 1 (1, 3) | 2 (1, 4) | 25 (21, 29) |
| Women | 708 | 2 (1, 3) | 10 (7, 12) | 6 (5, 9) | 1 (0, 2) | 8 (6, 11) | 2 (1, 4) | 2 (1, 4) | 19 (16, 23) |
| <i>Thailand</i> | | | | | | | | | |
| Men | 694 | 2 (1, 4) | 23 (20, 27) | 7 (5, 9) | 1 (0, 4) | 20 (17, 24) | 1 (0, 2) | 2 (1, 4) | 39 (35, 44) |
| Women | 1001 | 1 (1, 3) | 18 (15, 21) | 10 (8, 13) | 1 (1, 2) | 28 (25, 32) | 3 (2, 5) | 5 (4, 7) | 38 (35, 42) |

| | | | | | | | | | |
|------------------|------|-------------|-------------|-------------|----------|-------------|-------------|-------------|-------------|
| <i>Vietnam</i> | | | | | | | | | |
| Men | 753 | 4 (2, 5) | 18 (15, 21) | 8 (6, 11) | 1 (0, 2) | 21 (18, 24) | 1 (0, 2) | 3 (2, 4) | 33 (29, 36) |
| Women | 748 | 7 (5, 10) | 23 (20, 26) | 14 (12, 17) | 3 (2, 5) | 35 (32, 39) | 4 (3, 6) | 8 (6, 11) | 41 (37, 45) |
| <i>India</i> | | | | | | | | | |
| Men | 1621 | 8 (6, 9) | 17 (15, 19) | 21 (19, 23) | 4 (3, 6) | 27 (25, 29) | 15 (13, 17) | 18 (16, 20) | 42 (40, 45) |
| Women | 1775 | 11 (10, 13) | 22 (20, 24) | 23 (21, 25) | 6 (5, 7) | 28 (26, 30) | 7 (6, 9) | 14 (12, 16) | 44 (41, 46) |
| <i>Sri Lanka</i> | | | | | | | | | |
| Men | 1191 | 5 (3, 6) | 23 (20, 26) | 11 (9, 14) | 3 (2, 4) | 33 (30, 37) | 9 (7, 11) | 17 (15, 20) | 48 (45, 51) |
| Women | 1240 | 4 (3, 6) | 23 (21, 26) | 11 (9, 13) | 7 (6, 9) | 33 (30, 36) | 4 (3, 6) | 17 (15, 19) | 40 (37, 43) |

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Table Legends

Table 1 title:

Table 1: Data collection methods from each of the ten country-level cross-sectional survey studies of alcohol's harms to others.

Table 1 legend:

^a And identified the person whose drinking had harmed them the most in the last 12 months (MHD); ^b From known people's drinking; ^c Survey administered via face-to-face interview; ^d Survey administered via computer-assisted telephone interview; ^e A response rate of 99% was reported among households where someone was home; ^f Cooperation rate (Kaplan et al., 2017).

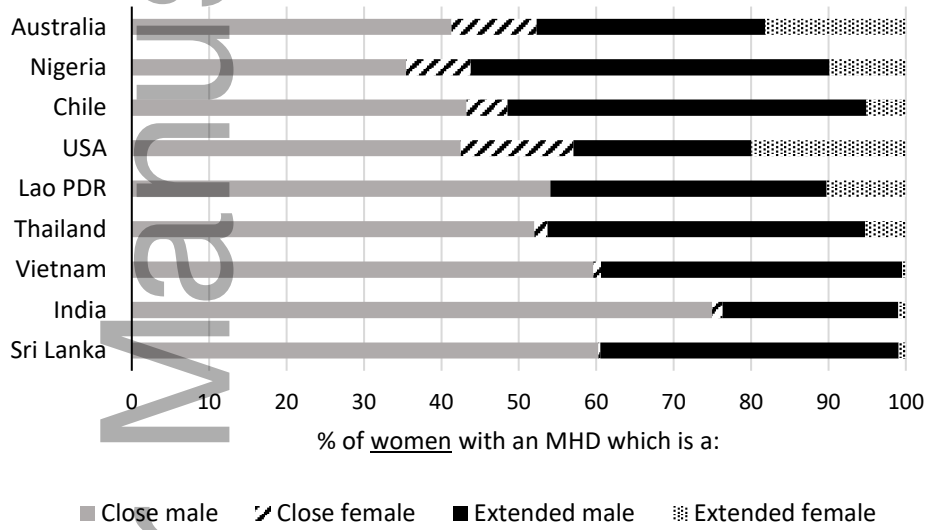
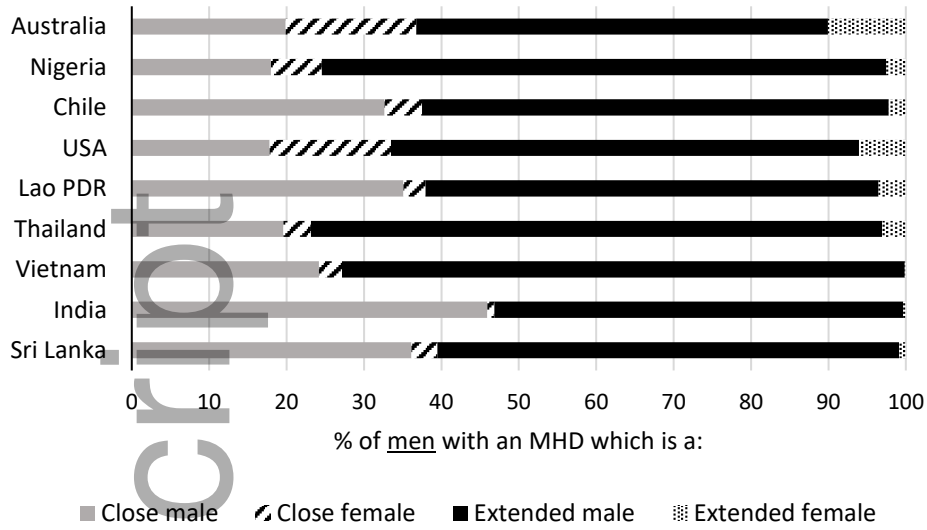
Table 2 title:

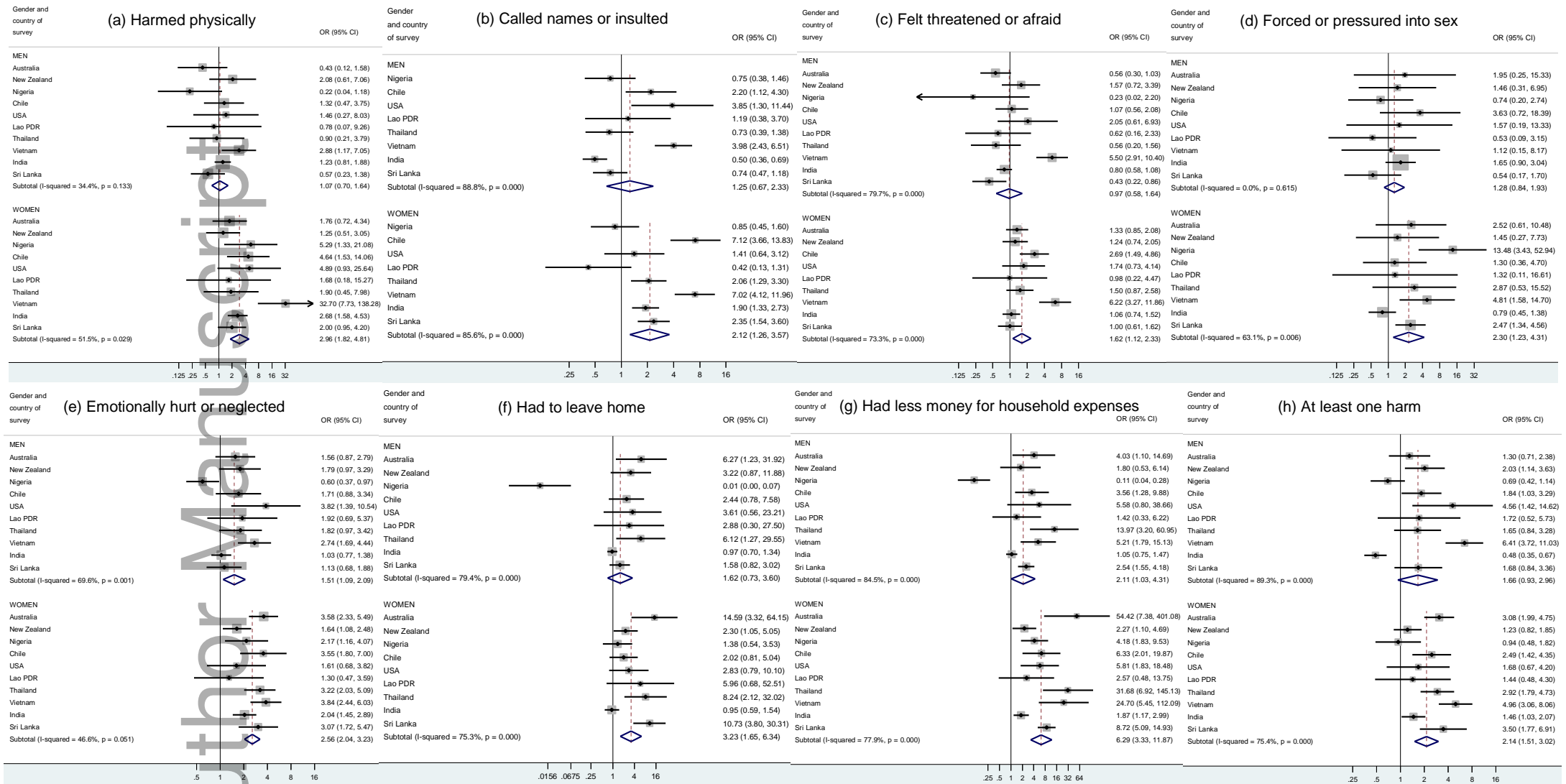
Table 2: Percentage (CI) of respondents who experienced seven different types of harm from known people's drinking in the last 12 months, in ten countries by respondents' gender.

Table 2 legend:

n/a: Equivalent variable not able to be derived.

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