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1 *Article*

2 # Attitudes and delivering brief interventions for heavy
3 drinking in primary health care: analyses from the
4 ODHIN five country cluster randomized factorial
5 trial

6 **Peter Anderson[1, 2,*], Eileen Kaner[1], Myrna Keurhorst[3,4], Preben Bendtsen[5], Ben van Steenkiste[2],**
7 **Jillian Reynolds[6], Lidia Segura[7], Marcin Wojnar[8], Karolina Kłoda[9], Kathryn Parkinson[1], Colin**
8 **Drummond[10, 11], Katarzyna Okulicz-Kozaryn[12], Artur Mierzecki[9], Miranda Laurant[3,13], Dorothy**
9 **Newbury-Birch[14], Antoni Gual[6]**

10 [1] Institute of Health and Society, Newcastle University, Newcastle, England; peteranderson.mail@gmail.com;
11 eileen.kaner@newcastle.ac.uk; kathryn.parkinson@newcastle.ac.uk
12 [2] Department of Family Medicine, Maastricht University, Maastricht, the Netherlands;
13 peteranderson.mail@gmail.com; ben.vansteenkiste@maastrichtuniversity.nl
14 [3] Radboud university medical center, Radboud Institute for Health Sciences, Scientific Institute for Quality of
15 Healthcare (IQ healthcare), Nijmegen, the Netherlands; myrna.keurhorst@radboudumc.nl;
16 Miranda.Laurant@radboudumc.nl
17 [4] Saxion University of Applied Sciences, Centre for Nursing Research, Deventer/Enschede, the Netherlands;
18 myrna.keurhorst@radboudumc.nl
19 [5] Department of Medical Specialist and Department of Medicine and Health, Linköping University, Motala,
20 Sweden; preben.bendtsen@liu.se
21 [6] Psychiatry Dept., Neurosciences Institute, Hospital Clínic, IDIBAPS, Barcelona, Spain; TGUAL@clinic.cat;
22 jillianmreynolds@yahoo.com
23 [7] Program on Substance Abuse, Public Health Agency, Government of Catalonia, Barcelona, Spain;
24 lidia.segura@gencat.cat
25 [8] Department of Psychiatry, Medical University of Warsaw, Warsaw, Poland; marcin.wojnar@wum.edu.pl
26 [9] Independent Laboratory of Family Physician Education, Pomeranian Medical University, Szczecin, Poland;
27 wikarla@gazeta.pl; roklr@sci.pam.szczecin.pl
28 [10] National Addiction Centre, Institute of Psychiatry, King's College London, London, England;
29 colin.drummond@kcl.ac.uk
30 [11] National Institute for Health Research Biomedical Research Centre for Mental Health, South;
31 colin.drummond@kcl.ac.uk London and Maudsley NHS Foundation Trust, London, England.
32 [12] State Agency for Prevention of Alcohol-Related Problems, Warsaw, Poland.
33 [13] HAN University of Applied Sciences, Faculty of Health and Social Studies, Nijmegen, the Netherlands;
34 Miranda.Laurant@radboudumc.nl
35 [14] Health and Social Care Institute, Teesside University, Middlesbrough, UK; d.newbury-birch@tees.ac.uk
36 ***** Correspondence: peteranderson.mail@gmail.com; Tel: +34 618075217

39 Abstract: In this paper, we test path models that study the interrelations between primary health
40 care provider attitudes towards working with drinkers, their screening and brief advice activity,
41 and their receipt of training & support and financial reimbursement. Study participants were 756
42 primary health care providers from 120 primary health care units (PHCU) in different locations
43 throughout Catalonia, England, Netherlands, Poland and Sweden. Our interventions were training
44 & support and financial reimbursement to providers. Our design was a randomized factorial trial
45 with baseline measurement period, 12-week implementation period, and nine-month follow-up
46 measurement period. Our outcome measures were: attitudes of individual providers in working
47 with drinkers as measured by the Short Alcohol and Alcohol Problems Perception Questionnaire;
48 and, the proportion of consulting adult patients (age 18+ years) who screened positive and were
49 given advice to reduce their alcohol consumption (intervention activity). We found that more

positive attitudes were associated with higher intervention activity, and higher intervention activity was associated with more positive attitudes. Training & support was associated with both positive changes in attitudes and higher intervention activity. Financial reimbursement was associated with more positive attitudes through its impact on higher intervention activity. We conclude that to improve primary health care providers screening and brief advice activity for heavy drinking requires a combination of training & support and on the job experience of actually delivering screening and brief advice activity.

Keywords: Primary health care; heavy drinking; screening and brief advice; training and support; financial reimbursement; role security; therapeutic commitment; Short Alcohol and Alcohol Problems Perception Questionnaire.

1. Introduction

Primary health care providers find screening and giving brief advice for heavy drinking a difficult business [1-3]. This can be changed with professional and organizational-based interventions [4, 5]. During the 1970s, the Maudsley Alcohol Pilot Project was set up in the United Kingdom to make practical recommendations for an improved local response to dealing with drinking problems [6]. The project, which subsequently informed the United Kingdom's Royal College of General Practitioners' report on alcohol [7], was premised on the view that to respond to drinking problems adequately, primary health care providers need to be involved.

The Maudsley Alcohol Pilot Project used the Alcohol and Alcohol Problems Perception Questionnaire (AAPPQ) as a theoretical basis to understand why community agents have difficulty with alcohol problems, and as a basis to monitor improvement [8, 9]. In the AAPPQ, for which a shortened version is available [10,11], role security measures role adequacy, for example "*I feel I can appropriately advise my patients about drinking and its effects*"; and role legitimacy, for example, "*I feel I have the right to ask patients questions about their drinking when* necessary". Role insecurity is expressed at the emotional level as therapeutic commitment which measures motivation, for example "*pessimism is the most realistic attitude to take toward drinkers*"; task specific self-esteem, for example "*all in all I am inclined to feel I am a failure with drinkers*"; and work satisfaction, for example "*in general, it is rewarding to work with drinkers*".

The Maudsley Alcohol Pilot Project found that primary health care provides failed to recognize and respond to drinking problems because they felt anxieties about their role adequacy through not having the information and skills necessary to recognize and respond to drinkers; and because they felt anxieties about their role legitimacy through being uncertain as to whether or indeed how far drinking problems came within their responsibilities. The project proposed that the key to increasing on-the-job experience and effectiveness was to provide education and training to primary health care providers along with supporting brief advice activity, such as referral opportunities, to improve their role security and therapeutic commitment, which, in turn, would lead to more brief advice activity.

Although there have been a number of international studies examining providers' attitudes in this field [12-16], as far as we are aware, there have been no published studies with repeated attitude measures that have further examined the original model of the Maudsley Alcohol Pilot Project. The European ODHIN project reported in this paper allows the opportunity to do so. ODHIN collected data on provider's role security and therapeutic commitment, and on their screening and brief advice activity at three separate time points over a nine-month period, including measurements at baseline, during a 12-week implementation period and at nine month's follow-up. ODHIN also collected data enabling an assessment of the impact of training & support and of financial reimbursement on providers' attitudes and on their screening and brief advice activity.

In this current paper, we test path models illustrated in Figures 1 and 2. We aim to demonstrate the importance of on-the-job experience, through improving role security and therapeutic commitment,

99　　in leading to more screening and brief advice activity. We also aim to test whether or not financial
100　　reimbursement has an enduring effect beyond the time of reimbursement, through its initial impact
101　　in improving on-the-job experience.
102

103　　　　In Figure 1, we hypothesized that training & support would be associated with improved
104　　12-week role security and therapeutic commitment (line A); that training & support would directly
105　　(line B) and indirectly (lines A and C), be associated with increased 12-week screening and advice
106　　activity, hereafter termed intervention activity. In turn, we hypothesized that increased 12-week
107　　intervention activity would be associated with further improvement in role security and therapeutic
108　　commitment (line D), which should subsequently be associated with more 9-month intervention
109　　activity (line E). In addition, we hypothesized that training & support would be preferentially
110　　associated with increased 9-month intervention activity in those with higher 9-month role security
111　　and therapeutic commitment, line F.
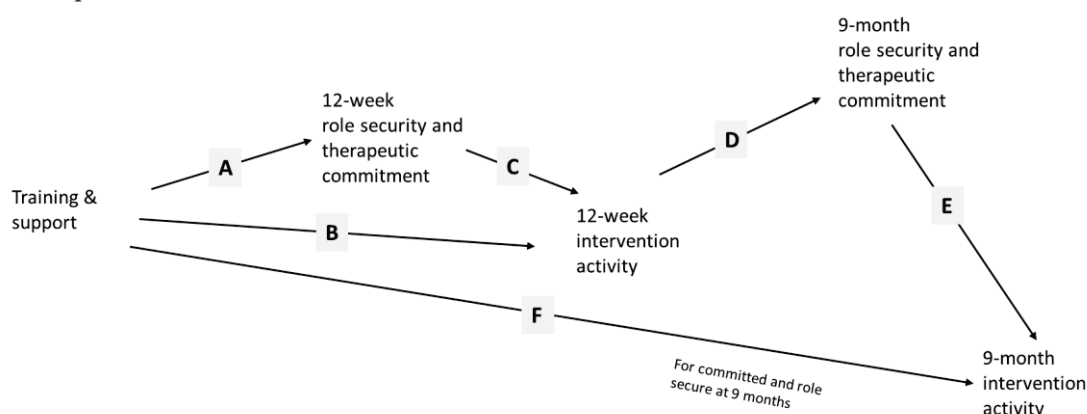
112

113　　　　**Figure 1.** Hypothesized path model for training & support.

114　　　　Our model should further imply, as in Figure 2, that, whilst financial reimbursement should
115　　have no direct relationship with role security and therapeutic commitment, it should be associated
116　　with increased role security and therapeutic commitment indirectly through its impact on
117　　intervention activity (lines A, B, C and D). Improved role security and therapeutic commitment
118　　should then be associated with future intervention activity (line E). Similar to training & support,
119　　financial reimbursement should be preferentially associated with increased 9-month intervention
120　　activity in those with higher 9-month role security and therapeutic commitment, line F.
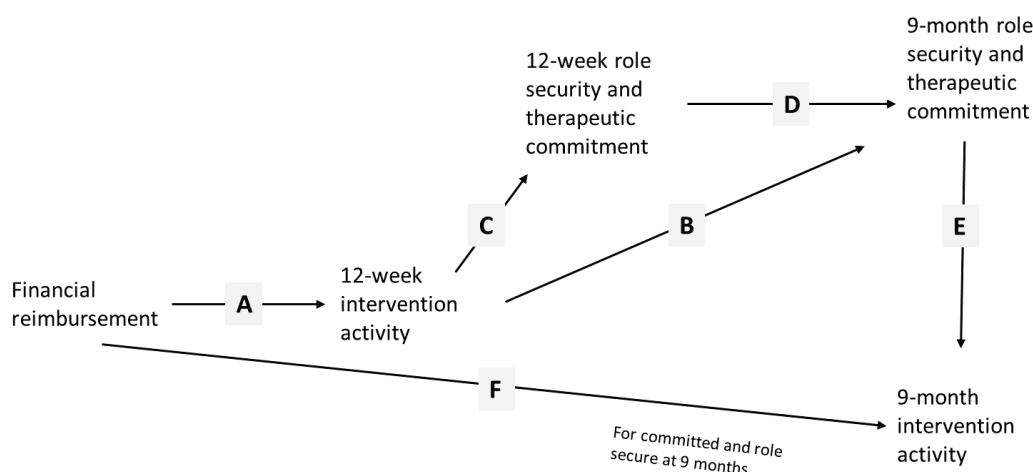
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122　　　　**Figure 2.** Hypothesized path model for financial reimbursement

123   **2. Methods**

124   Details of the trial protocol [17] and the main results of the ODHIN study [5] have been
125   published. In a cluster randomized 2x2x2 factorial trial, data from primary health care units (PHCU)
126   in Catalonia, England, the Netherlands, Poland and Sweden were combined to examine the effect of
127   training & support, financial reimbursement and referral opportunities to an internet-based advice
128   programme (eBI) on the proportion of consulting adult patients given an intervention (screening and
129   advice to screen positives) for heavy drinking, operationalized by AUDIT-C [18].

130

131   *2.1. Participants*

132   PHCUs with approximately 5,000-20,000 registered patients were the unit of randomization
133   and implementation. PHCUs who agreed to participate in the study were volunteers drawn from
134   administrative or academic registries of PHCUs at national or regional levels. Eligible providers in
135   each PHCU included any fully trained full or part-time medical practitioner, nurse or PHCU
136   assistant with a permanent appointment working in the PHCU and involved in medical and/or
137   preventive care. Providers are the unit of analysis in this paper.

138   *2.2. Implementation strategies*

139   PHCUs were randomized to one of the following eight groups: 1. Control; 2. Training &
140   support (TS); 3. Financial reimbursement (FR); 4. Electronic Brief Intervention (e-BI); 5. Training &
141   support and financial reimbursement; 6. Training & support and eBI; 7. Financial reimbursement
142   and eBI; and, 8. Training & support, financial reimbursement and eBI. In this paper, we only
143   consider training & support and financial reimbursement, since these were the two implementation
144   strategies, rather than electronic brief intervention, that led to an increase in screening and brief
145   advice activity [5].
146   PHCUs were asked to screen all adult patients (aged 18 years) for heavy drinking who
147   consulted the PHCU for whatever reason, using a paper version of AUDIT-C, except in Catalonia,
148   where a computerized version was used. Screen positives were defined in Catalonia and England as
149   men and women who scored ≥5 on AUDIT-C, and in Poland, Netherlands and Sweden as men who
150   scored ≥5 and women who scored ≥4 on AUDIT-C. PHCU were asked to deliver brief alcohol advice
151   of 5-15 minutes' duration to screen positives patients.

152   *2.3. Outcomes*

153   Role security and therapeutic commitment of the participating providers were measured using
154   the short version of the Alcohol and Alcohol Problems Perception questionnaire (SAAPPQ) [10,11].
155   Measurements took place during the 4-week baseline period, towards the end of the 12-week
156   implementation period, and during the 4-week follow-up period at nine months. The questionnaire
157   comprised 10 statements, which addressed five sub-scales: (i) role adequacy; (ii) role legitimacy; (iii)
158   motivation; (iv) task specific self-esteem; and, (v) work satisfaction. Responses to the statements
159   were scored from 1 (strongly disagree) to 7 (strongly agree). Scores on the subscales 'role adequacy'
160   and 'role legitimacy' were added to form an index of 'role security' [10], with a total score ranging
161   from 4 to 28. The subscales relating to 'self-esteem', 'motivation' and 'work satisfaction' were added
162   to form an index of 'therapeutic commitment' [10], with a score ranging from 6 to 42. Individual
163   missing values for any of the items in a domain were assigned the mean value of the remaining
164   items of the domain before summation. For certain analyses, providers were split into those with
165   baseline scores below and above the mean for role security (mean value 20.98; 45.3% below the
166   mean), and therapeutic commitment (mean value 27.21; 53.6% below the mean); for other analyses,
167   providers were also split into those with 9-month scores below and above the mean for role security
168   (mean value 21.56; 45.8% below the mean), and therapeutic commitment (mean value 27.44; 52.7%
169   below the mean). Providers with scores below the mean are called 'role insecure' and
170   'uncommitted'; above the mean are called 'role secure' and 'committed'.

171   Screening and brief advice activity was measured at three time points: during the 4-week
172   baseline period, during the 12-week implementation period (when the intervention strategies were
173   actively applied), and during the 4-week follow-up period that occurred at nine months, six months
174   after the end of the 12-week implementation period. For each of the measurement periods, the
175   outcome is the proportion of consulting adult patients given an intervention (screening and advice
176   to screen positives; hereafter termed proportion intervened, defined as the number of AUDIT-C
177   positive patients that received one or more of oral advice, an advice leaflet, referral to the eBI
178   programme, or referral for advice to another provider in or outside the PHCU, divided by the total
179   number of adult consultations of the participating provider. For certain analyses, providers were
180   split into those who, at baseline, did not intervene with any patients (52.3% of sample) and those
181   who, at baseline, intervened with one or more patients. Providers who intervened with no patients
182   at baseline are called 'zero intervenors'; providers who intervened with at least one patient at
183   baseline are called greater than zero intervenors, 'GT zero intervenors'..

2.4. Randomization and blinding

185   Randomization took place after formal agreement of the PHCU to take part in the trial. The
186   PHCUs were randomly allocated to one of the eight groups by the ODHIN coordinating centre,
187   using computerized randomization, stratified by country, ensuring 15 PHCUs per group (three per
188   group per country).

2.5. Sample size

190   It was estimated that 56 PHCUs (seven per each of eight allocation groups) with a minimum of
191   1,000 adult patients consulting per month would be needed for an 80% chance of detecting an
192   increase in the proportion of consulting adult patients given an intervention from 4% to at least 6%
193   alpha = 0.05). In calculating our sample size, we used an estimate of ICC of 0.029 across primary
194   care interventions [19], based on one PHCU study of implementation of alcohol screening and
195   advice [20]. Sample size estimation was conducted using STATA 12. As country was used as
196   stratification criteria, each country included a minimum of 24 PHCU.
197

2.6. Statistical methods

199   Two sets of dependent variables were analysed. The first set were scores for role security and
200   therapeutic commitment per provider; in these analyses, the independent variables were exposure
201   to two of the implementation strategies (training & support and financial reimbursement), and the
202   proportion of patients intervened. The second set of dependent variables were proportion pf
203   patients intervened at different time periods; in these analyses, the independent variables were
204   exposure to two of the implementation strategies (training & support and financial reimbursement),
205   and scores for role security and therapeutic commitment per provider. For all follow-up data,
206   values at previous time points were incorporated as co-variates in the models.
207

208   Distributional assumptions of the outcome variables were assessed and natural log transformations
209   were undertaken for the proportion of patients intervened. As this approach creates some issues
210   with outcomes with a zero value, 0.001 was added to each proportion prior to logging.
211

212   The study was conceived and analysed as a factorial design, in which (-1,1) coding was used for the
213   factors, (in this case training & support and financial reimbursement) resulting in regression
214   coefficients having half the effects. In presenting the results, the estimates for training & support

215 and for financial reimbursement have been doubled. The factorial design is based on the premise
216 that the effect of, for example, training & support instead of no training & support can not only be
217 estimated from TS vs control, but also from TS+FR vs FR, TS+eBI vs eBI, and TS+FR+eBI v FR+eBI,
218 giving a pooled estimate with more precision (for definition of abbreviations, see section,
219 implementation strategies). The two factors for the interventions were coded as follows:
220 TS=-1 for control, FR, e-BI, FR+e-BI; and, +1 for TS, TS+FR, TS+e-BI , TS+FR+e-BI; and
221 FR=-1 for control, TS, e-BI, TS+e-BI; and, +1 for FR, FR +TS, FR+e-BI, FR+TS+e-BI.
222   . Unstandardized estimates are presented throughout, as there are problems in standardizing
223 the factors, which, in a factorial design are analysed as continuous variables with a value of either
224 -1.0 or 1.0. A generalised linear model was used employing a multi-level approach using country
225 and PHCU with random intercepts and slopes. Analysis was conducted using IBM SPSS V22,
226 procedure MIXED.

3. Results

228   Of the 746 providers at baseline, 408 providers (55%) were doctors, 562 (75%) were women, and
229 the mean age was 46.8 years (SD=9.3).

3.1. Role security

231 Figure 3 shows that previous role security was associated with future role security (lines A, B, and
232 C), and that the previous proportion of patients intervened was associated with the future
233 proportion intervened (lines D, E, and F).

234

235   Training & support was associated with increased 12-week role security (line G) for those who
236 were role insecure at baseline, for whom role security was one point higher (20.0) with training &
237 support, than without (19.0).
238 Training & support was directly associated with a higher proportion of patients intervened at 12
239 weeks (line H) for those who were role insecure at baseline, for whom the proportion was 26/1000
240 with training & support, compared to 15/1000 without; and for those who had intervened with at
241 least one patient at baseline, for whom the proportion at 12 weeks was 28/1000 with training &
242 support, compared to 19/1000 without. Training & support was indirectly associated with a higher
243 proportion of patients intervened at 12 weeks (lines G and I), for line I for those who were role
244 secure at baseline and for those who had intervened with at least one patient at baseline, for whom,
245 in both cases, there was an increase in the proportion of patients intervened at 12 weeks of 1/1000
246 for every one-point increase in role security.

247
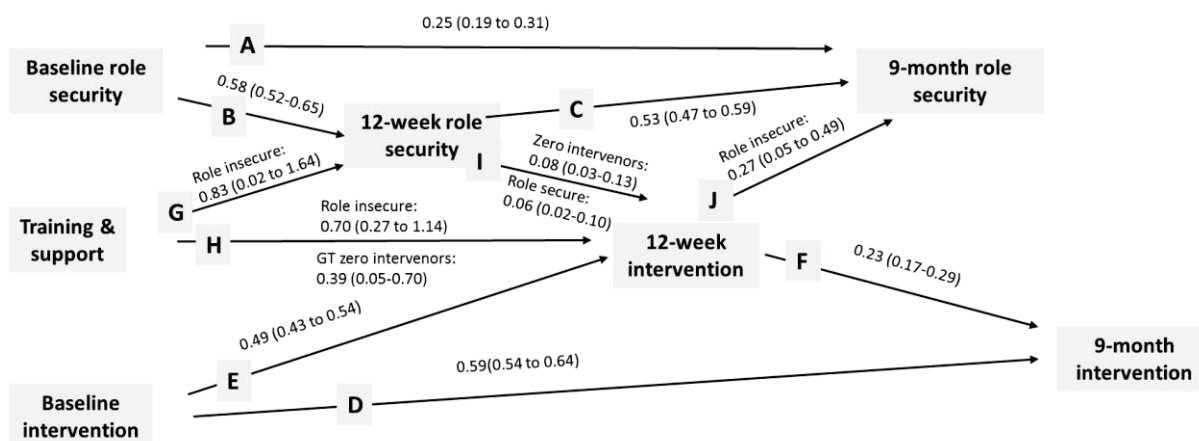
249   **Figure 3** Unstandardized estimates (95% Confidence Intervals) for interrelationships between role
250   security and the proportion of patients intervened. [Estimates for impact of Training &
251   support have been doubled – see statistical methods]..

252 The proportion of patients intervened at 12 weeks was associated with a future increase in role
253 security (line J) for those who were role insecure at baseline, for whom role security increased by
254 one point for every 1/100 increase in the proportion intervened at 12 weeks. Role security at
255 9-month follow-up was not associated with an increase in the proportion of patients intervened at 9
256 months.

257

258 There was no association between training & support and the proportion of patients intervened at 9
259 months for those with high 9-month role security (hypothesized line F in Figure 1).

260 *3.2. Therapeutic Commitment*

261 Figure 4 shows that previous therapeutic commitment was associated with future therapeutic
262 commitment (lines A, B, and C), and that the previous proportion of patients intervened was
263 associated with the future proportion intervened (lines D, E, and F).

264

265 Training & support was associated with increased 12-week therapeutic commitment (line G) for
266 those who were uncommitted at baseline, for whom therapeutic commitment was 1.5 points higher
267 (26.0) with training & support than without (24.5); it was also the case for those who had intervened
268 with at least one patient at baseline, for whom, also, therapeutic commitment was 1.5 points higher
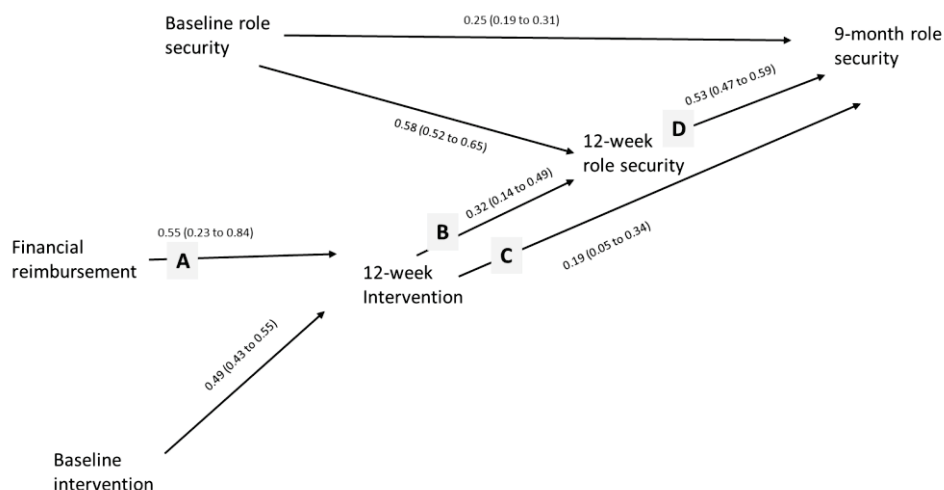269 (28.0) with training & support than without (26.5).

270   .
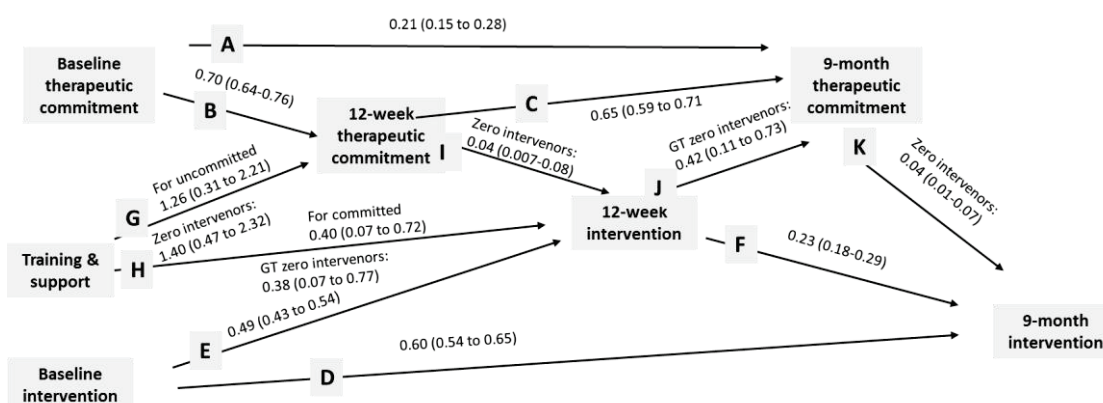
271
272   **Figure 4** Unstandardized estimates (95% Confidence Intervals) for interrelationships between
273   therapeutic commitment and proportion of patients intervened. [Estimates for impact of
274   Training & support have been doubled – see statistical methods]..

275 Training & support was directly associated with a higher proportion of patients intervened at 12
276 weeks (line H) for those who were committed at baseline, for whom the proportion was 18/1000
277 with training & support, compared to 13/1000 without; and for those who had intervened with at
278 least one patient at baseline, for whom the proportion at 12 weeks was 28/1000 with training &
279 support, compared to 19/1000 without. Training & support was indirectly associated with a higher
280 proportion of patients intervened at 12 weeks (lines G and I), for line I for those who had
281 intervened with at least one patient at baseline, for whom there was an increase in the proportion of
282 patients intervened at 12 weeks of 2/1000 for every one-point increase in therapeutic commitment.
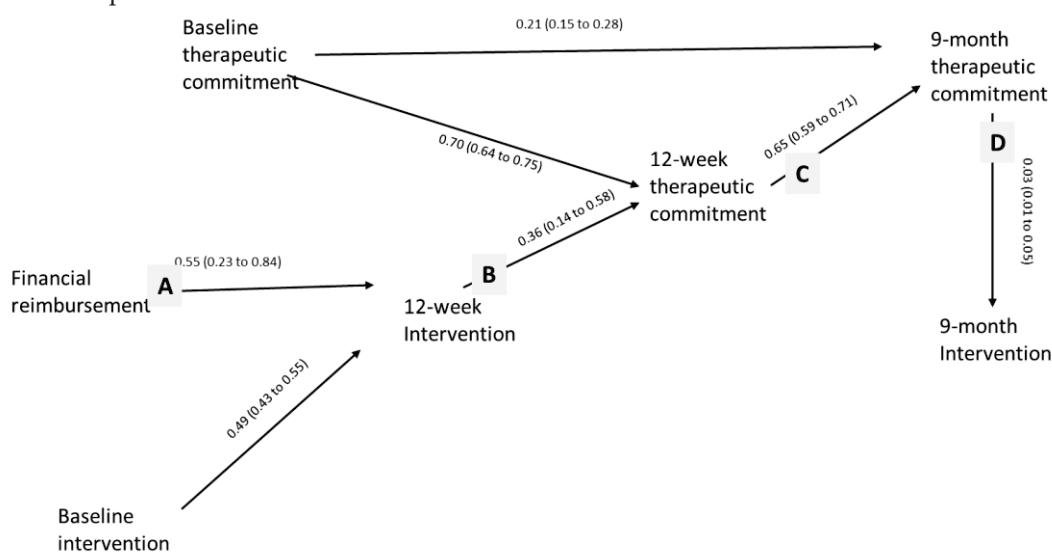
3.3. Financial reimbursement

Financial reimbursement was associated indirectly with increased 12-week and 9-month role security, Figure 5 (lines A, B, C, and D). Nine-month role security was not associated with the proportion of patients intervened at 9 months. There was no association between financial reimbursement and the proportion of patients intervened at 9 months for those with high 9-month role security (hypothesized line F in Figure 2).

Figure 5 Unstandardized estimates (95% Confidence Intervals) for interrelationships between role security and financial reimbursement. [Estimates for impact of Financial Reimbursement have been doubled – see statistical methods].].

Financial reimbursement was associated indirectly with increased 12-week therapeutic commitment, Figure 6 (lines A and B). Twelve-week therapeutic commitment was associated with increased 9-month therapeutic commitment (line C), which, in turn, was associated with a higher proportion of patients intervened at 9 months (line D). As predicted by the hypothesized path model of Figure 2 (line F), financial reimbursement was directly associated with a higher proportion of patients intervened at 9 months for committed (estimate = 0.26, 95% CI= 0.008 to 0.52) but not for uncommitted providers at 9 months.

Figure 6 Unstandardized estimates (95% Confidence Intervals) for interrelationships between therapeutic commitment and financial reimbursement. [Estimates for impact of Financial Reimbursement have been doubled – see statistical methods].

304 **4. Discussion**

305 Systematic reviews and meta-analyses have concluded a positive impact of primary health care
306 based screening and brief advice programmes in reducing heavy drinking [21-23]. Modelling
307 studies have suggested that were these programmes widely implemented, considerable population
308 health gain could be achieved [24]. The public health problem is one of failure to achieve
309 widespread take-up of screening and brief advice programmes [25]. In ODHIN, we found that only
310 5.9% of eligible patients consulting their primary health-care provider during a 4-week baseline
311 measurement period were screened for their alcohol consumption [5]. ODHIN demonstrated that
312 up to four hours training and support to primary health care providers and financial
313 reimbursement delivered during a 12-week implementation period resulted in a higher proportion
314 of heavy drinkers given a brief intervention (screened and advice given to screen positives) to
315 reduce their drinking [5]. The ratio of the logged proportion given an intervention during the
316 12-week implementation period was 1.61 (95% CI 1.24 to 2.10) in PHCU that received training &
317 support versus PHCU that did not receive training & support; for financial reimbursement, the
318 ratio was 2.00 (95% CI 1.49 to 2.47). This present paper has examined the extent to which on-the-job
319 experience, through improving role security and therapeutic commitment leads to more screening
320 and brief advice activity. The paper also examined whether or not financial reimbursement had an
321 enduring effect beyond the time of reimbursement, through its short-term impact in improving
322 on-the-job experience.

323 We report associations over time between: primary health care providers' attitudes to
324 managing heavy drinking patients; their exposure to factors aimed at increasing their screening and
325 brief advice activity for heavy drinking; and changes in the proportion of providers' adult patients
326 who were screened and offered advice to reduce their heavy drinking. Inevitably, if associations are
327 found, they may operate in two directions. For example, if increases in the proportion of patients
328 screened and advised are found (independent variable) to be associated with increases in positive
329 attitudes (dependent variable), we are likely to find an association between increases in positive
330 attitudes (independent variable) and increases in the proportion of patients screened and advised
331 (dependent variable), which we do. However, because we repeated measures over time, we are able
332 to tease out some of the likely directions of the relationships.

333 Our findings are in line with the model put forward by the Maudsley Alcohol Pilot Project [6].
334 Through direct and indirect (via changes in attitudes) paths, training & support was associated with
335 improved screening and brief advice activity during the 12-week implementation period.
336 Twelve-week screening and advice activity was associated with future role security and therapeutic
337 commitment. Nine-month therapeutic commitment, but not role security, was associated with
338 increased nine-month screening and advice activity. The model is further corroborated by the
339 demonstration that, whilst financial reimbursement was not directly associated with improvements
340 in role security and therapeutic commitment, through its association with increased 12-week
341 screening and advice activity, it was indirectly associated with improved future role security and
342 therapeutic commitment.

343 A criticism of pay for performance is that changed behaviour is unlikely to persist once the
344 incentive is removed. However, our findings suggest that it could be possible for financial
345 reimbursement to have an impact beyond removal of the incentive. Financial reimbursement was
346 associated with increased screening and brief advice activity, which in turn was associated with
347 improved role security and therapeutic commitment, with increased therapeutic commitment, in
348 turn, associated with increased screening and brief advice activity beyond the duration of the
349 reimbursement. Thus, financial incentives can open the door to positive changes in practitioners'
350 screening and advice activity, which then are likely to be reinforced by day-today repetition
351 (familiarity) and embedding of the action in routine practice behaviour. Future withdrawal of pay

352 for performance schemes, thus, may not extinguish the desired practitioner behaviour. Financial
353 reimbursement may be more useful, though, if it encourages embedding approaches (such as
354 templates or registers), as occurs in the quality and outcomes framework, part of the General
355 Medical Services contract for general practices in England [26].

356 **5. Conclusions**

357 Our findings suggest that to improve primary health care providers' screening and brief advice
358 activity for heavy drinking, two actions are needed: first, the provision of training and support to
359 all providers, irrespective of initial levels of role security and therapeutic commitment, and
360 irrespective of initial screening and brief advice activity; and, second, on-the-job experience, by
361 actually delivering screening and brief advice activity. Screening and brief advice activity may be
362 further enhanced when embedded within wider policy and community actions [24, 27].

363

381 **Author Contributions:** All authors jointly conceived and designed the experiments; all authors except PA
382 undertook the study and collected the data. PA analyzed the data. PA drafted the paper. All authors read and
383 approved the paper.

384 **Conflicts of Interest:** The authors declare no conflict of interest.
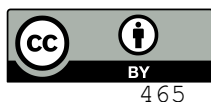
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