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1 **Searching and synthesising ‘grey literature’ and ‘grey information’ in public health: critical**  
2 **reflections on three case-studies**

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16

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**18 Abstract***19 Background*

20 Grey literature includes a range of documents not controlled by commercial publishing  
21 organisations. This means that grey literature can be difficult to search and retrieve for evidence  
22 synthesis. Much knowledge and evidence in public health, and other fields, accumulates from  
23 innovation in practice. This knowledge may not even be of sufficient formality to meet the definition  
24 of grey literature. We term this knowledge 'grey information'. Grey information may be even harder  
25 to search for and retrieve than grey literature.

*26 Methods*

27 On three previous occasions, we have attempted to systematically search for and synthesise public  
28 health grey literature and information – both to summarise the extent and nature of particular  
29 classes of interventions, and to synthesise results of evaluations. Here we briefly describe these  
30 three 'case-studies' but focus on our post-hoc critical reflections on searching for and synthesising  
31 grey literature and information garnered from our experiences of these 'case-studies'. We believe  
32 these reflections will be useful to future researchers working in this area.

*33 Results*

34 Issues discussed include: search methods; searching efficiency; replicability of searches; data  
35 management; data extraction; assessing study 'quality'; data synthesis; time and resources; and  
36 differentiating evidence synthesis from primary research.

*37 Conclusion*

38 Information on applied public health research questions relating to the nature and range of public  
39 health interventions, as well as many evaluations of these interventions, may be predominantly, or  
40 only, held in grey literature and grey information. Evidence syntheses on these topics needs,  
41 therefore, to embrace grey literature and information. Many typical systematic review methods for

42 searching, appraising, managing and synthesising the evidence base can be adapted for use with  
43 grey literature and information. Evidence synthesisers should carefully consider the opportunities  
44 and problems offered by including grey literature and information. Enhanced incentives for accurate  
45 recording and further methodological developments in retrieval will facilitate future syntheses of  
46 grey literature and information.

47

48 **Keywords:** Grey literature; Grey information; Systematic review; Evidence synthesis; Public Health;  
49 Interventions

**50 Background**

51 Public health researchers may want to include 'grey literature' in evidence syntheses for at least  
52 three reasons. Firstly, including grey literature can reduce the impact of publication bias as studies  
53 with null findings are less likely to be published in peer-reviewed journals.[1] Secondly, grey  
54 literature can provide useful contextual information on how, why and in whom complex public  
55 health interventions are effective.[2-6] Finally, syntheses of grey literature can help applied  
56 researchers and practitioners understand what interventions exist for a particular problem, the full  
57 range of evaluations (if any) that have been conducted, and where further intervention  
58 development and evaluation is needed.

59 Numerous definitions of grey literature exist. These tend to focus on the fact that it is not controlled  
60 by commercial organisations, making it difficult to search for and retrieve.[7-9] One common  
61 definition restricts grey literature to literature "protected by intellectual property rights, of sufficient  
62 quality to be collected and preserved by library holdings or institutional repositories".[10] Other  
63 definitions are more inclusive and propose that, given the growth of new forms of media, grey  
64 literature should not be restricted to written 'literature'.[4]

65 Much knowledge and evidence in applied settings, such as public health practice, accumulates from  
66 innovation in practice.[7] This may include the rationale for why new approaches were tried; what  
67 changes, if any, were made to previous approaches and why; what was done and how; and what  
68 happened. In some cases this may be accompanied by more formal process evaluation and, most  
69 rarely, outcome evaluation.[11] Interventions and evaluations that were primarily conducted as part  
70 of, or to inform, practice may be particularly unlikely to be described in peer-reviewed publications,  
71 or even formally documented in reports available to others in electronic or hard copy. Information  
72 on these activities may, instead, be stored in more private, or informal spaces such as meeting  
73 notes, emails, or even just in people's memories. This information is likely to be of insufficient  
74 formality to meet the definition of grey literature. We term this 'grey information'.

75 The phrase 'grey information' has been used previously to extend the concept of grey literature to a  
76 wider range of sources,[12] but it is not widely used and we are not aware of a previously stated  
77 clear definition. The term 'grey data'[13] has also been used specifically to describe user-generated  
78 web content – something that we feel is more formal and public than 'grey information', but less  
79 formal than 'grey literature'. **Table 1** describes defining aspects and examples of the three terms:  
80 grey literature, grey data, and grey information.

81 [Insert Table 1 about here]

82 Systematically identifying grey literature and grey data is not a straightforward task.[5, 7-9, 13, 14]  
83 Systematically identifying 'grey information' is likely to be even more challenging. A number of case-  
84 studies have been published describing procedures for searching and retrieving 'grey literature' in  
85 public health contexts.[14, 15] These tend to adopt relatively similar approaches including searching  
86 databases of peer-reviewed and grey literature; conducting structured searches of relevant websites  
87 and search engines; and contacting relevant experts.[5, 8, 9, 14]

88 On three occasions, various authors of this article have attempted to systematically search for and  
89 synthesise public health grey literature and information. Here we briefly describe our experiences of  
90 these three case-studies and then critically reflect on these. 'Critical reflection' is a concept most  
91 often associated with adult learning and professional development. Although poorly and diversely  
92 defined, critical reflection is generally associated with post-hoc examination of experiences in an  
93 attempt to improve future practice.[16, 17] Our aim was to provide insights on searching for and  
94 synthesising grey literature and information that may be useful for future researchers.

95 **Methods: Three case-studies of searching for and synthesising grey literature and grey**  
96 **information**

97 The aims, methods, results and conclusions of our three case-studies are summarised in **Table 2**.

98 [Insert Table 2 about here]

99 *Review 1: The health, social and financial impacts of welfare rights advice delivered in healthcare*  
100 *settings*[18]

101 Our first review included grey literature alongside peer-reviewed literature in a systematic review of  
102 the health, social and financial impacts of welfare rights advice delivered in healthcare settings.[18]

103 In part, this systematic review was conducted in preparation for an application for funding for a  
104 randomised controlled trial of the impacts welfare rights advice on health in older people.[19, 20]

105 Thus, we were interested both in the extent and findings of other research. We conducted a  
106 quantitative synthesis of the average financial impacts of welfare right advice, and a narrative  
107 synthesis of other quantitative and qualitative findings.

108 As expected, less than half of the evaluations of welfare rights advice included in the review were  
109 published in peer-reviewed journals. The remainder were published in reports published by delivery  
110 organisations, universities, other research organisations, and service and research funders.

111 *Review 2: Adult cooking skills interventions in England*[21]

112 Our second attempt to review grey literature explored the nature, content and range, but not  
113 effects, of interventions seeking to enhance adult cooking skills delivered in England.[21] Our  
114 intention was to identify the most sustainable and theoretically promising of these to take forward  
115 for more formal evaluation. Similar to other reviews,[22] our synthesis focused on categorising  
116 interventions according to delivery setting and training model, and summarising: the training  
117 delivered, throughput, setup and running costs, funding, and behaviour change techniques used.[23]

118 This review focused entirely on grey literature and information and did not include any searching for  
119 peer-reviewed literature. A scoping review of peer-reviewed outcome evaluations of adult cooking  
120 skills interventions was conducted in parallel.[24]

121 *Review 3: Interventions promoting healthier ready-to-eat meals (to eat in, to take away, or to be*  
122 *delivered) sold by specific food outlets in England [11]*

123 Finally, we recently completed a review of interventions aiming to promote healthier ready-to-eat  
124 meals (to eat in, to take away, or to be delivered) sold by food outlets in England.[11] This explored  
125 the nature and range of interventions implemented, and summarised evaluation findings. We used a  
126 narrative approach to evidence synthesis, characterising interventions, identifying issues of design  
127 and delivery, and summarising evaluation findings on process, acceptability, cost, and impact. Our  
128 intention in this case was to use the findings to inform development and evaluation of new  
129 interventions based on the most promising features of previous ones.

130 Whilst this review did include searches of peer-reviewed literature, these only identified one  
131 included study – although two other relevant peer-reviewed papers were identified using other  
132 methods. As in Review 2, a linked review of peer-reviewed evidence was conducted in parallel.[25]

### 133 **Results and Discussion: Critical reflections**

134 Whilst there is much useful guidance available on evidence synthesis in general,[26-28] and  
135 searching for and synthesising grey literature in particular,[5, 8, 9, 14, 29-31] one size rarely fits all.  
136 Throughout, and in common with best research practice, our methods were guided by our aims.

#### 137 *Searching*

138 In evidence syntheses, the sensitivity, specificity and type of information retrieved by searches is  
139 highly dependent on the search strategy used. As described above and in Table 2, we used a variety  
140 of different methods to search for information across all three reviews. We reflect on some of the  
141 issues raised below and summarise some of our conclusions in **Table 3**.



142 [Insert Table 3 about here]

143 Search methods

144 In all three cases, and as recommended by others,[5, 8, 9, 14, 29-31] we used a wide variety of  
145 methods to search for relevant grey literature and information. Across our three examples we  
146 searched trial databases (e.g. www.isrctn.com), grey literature databases (e.g. www.opengrey.eu),  
147 websites of relevant organisations (e.g. charities with an interest in social inclusion in Review 1), and  
148 a popular internet search engine (i.e. www.google.co.uk).

149 We also contacted those working in the areas we were interested in. We sent both personalised  
150 requests to key informants, as well as more generic requests to professional organisations and  
151 groups, using a variety of methods. In Reviews 1 and 3, researchers working in relevant fields were  
152 contacted via email and requests for information were sent to relevant email lists, posted on online  
153 bulletin boards, and published in the 'professional press' (e.g. newsletters of professional  
154 organisations). In Reviews 2 and 3 we also attempted to contact relevant individuals working in all  
155 local public health departments in England. In Review 3, we incorporated social media into our  
156 search strategy.

157 Review 1 was conducted in 2005 when social media and social networks were less well established  
158 than they are now. To target large networks of professionals in this case we published requests for  
159 help in the 'professional press'. By the time Review 3 was conducted, in 2014, social media had  
160 become an important space for professional networking. We posted numerous Tweets requesting  
161 relevant information and asking those who saw them to repost (i.e. 'retweet') them to their own  
162 networks – in order to increase the potential number of people who saw these requests. Many of  
163 these tweets tagged (i.e. '@mentioned') relevant professional organisations. We are not aware of  
164 previous reviewers using social media to identify grey (or peer-reviewed) literature or information.

165 This transition in methods from Review 1-3 over just less than a decade reflects how information  
166 storage and sharing has changed over this time in the UK. At the same time, information storage and  
167 sharing patterns may vary internationally. Search methods need to adapt to local and international  
168 trends in information systems and researchers should be flexible to this.

#### 169 Searching efficiency

170 As with 'typical' systematic reviews,[32, 33] our searching sacrificed specificity for sensitivity.  
171 Searches yielded many results that did not meet our inclusion criteria. The resource and scientific  
172 implications of the trade-off between search specificity and sensitivity have been widely discussed in  
173 the systematic review literature.[34, 35]

174 Previous case studies have described very different 'hit' rates associated with different grey  
175 literature search strategies. In a review of interventions to promote walking and cycling, requests for  
176 help emailed to key informants added little to database searching.[36] Whereas, in a review of  
177 behaviour change interventions published only in grey literature, 70% of items included in the final  
178 synthesis came from key informants.[5] Similarly, we found that different methods for locating  
179 information were differentially effective across our three reviews. In Review 1, generic requests sent  
180 to email lists and published in the professional press were particularly useful. On a number of  
181 occasions these requests were passed through a number of people before someone responded with  
182 relevant information – further adding to the time taken to conduct searching that is discussed  
183 below. Perhaps similarly, in Review 3, Twitter requests were particularly valuable. These were widely  
184 retweeted, vastly increasing the pool of potential viewers, but this appeared to be a much quicker  
185 process than cascading of email requests and requests in the professional press.

186 The efficiency of different search methods are, at least partly, dependent on the quality of the  
187 search strategy used. Simple comparisons, such as those described above, are not necessarily fair.  
188 Nor is it clear if the differences in efficiency are predictable. If the efficiency of different approaches  
189 to searching could be predicted in advance, this could help reviewers to focus their resources.

190 Our resources were most limited in Review 2, and it became evident early in searching that we  
191 would not be able to complete a comprehensive search for all adult cooking skills interventions in  
192 England. We made a pragmatic decision to focus instead on identifying intervention types – based  
193 on delivery context and training model. As others have done,[14] we borrowed the concept of ‘data  
194 saturation’ from qualitative research, and stopped searching when we felt we were not identifying  
195 any new intervention types. We felt that sacrificing sensitivity in this case did not compromise our  
196 ability to meet our aims.

#### 197 Using others to target searching

198 In Reviews 2 and 3 we attempted to ask all local public health departments in England what relevant  
199 projects they were aware of. We are not aware of any peer reviewed publications which report the  
200 efforts of other evidence synthesisers, or indeed primary researchers, who have attempted to  
201 systematically contact all local public health departments across one country in this way. That said,  
202 we recognise that the gathering of data on the activity and type of public health interventions  
203 conducted at various geographic levels is a relatively common activity. To facilitate this, we  
204 identified named individuals and contact email addresses for those with relevant roles using internet  
205 searches and telephone calls. This was a time consuming task in itself. The requests for information  
206 we sent specifically asked recipients to pass our enquiries on to those they felt were best placed to  
207 respond. As with other email requests (see above) there were examples where messages had been  
208 passed through a number of individuals before someone responded.

#### 209 Replicability of searches

210 Whilst in all cases we had clear plans describing what we felt were comprehensive, systematic and  
211 replicable approaches to information searching, it is hard to claim that these led to replicable results.  
212 Certainly it would be possible for future investigators to replicate our search methods, but it is  
213 unlikely that these would lead to the same results on replication, as would be expected when using  
214 electronic databases. On two different occasions, different people would be likely to see calls for

215 information on social networks or in the professional press. Even if the same people did see requests  
216 for help on different occasions, many other contextual factors may influence how likely they were to  
217 respond or pass them on to those most likely to be able to respond.

218 As time passes and grey literature and information becomes lost or forgotten, potential  
219 respondents' ability to provide usable information may also decline. Whilst contacting both those  
220 currently and previously in posts as key informants may, theoretically, reduce this problem, it may  
221 not be practically possible. Others have highlighted the problem of replicability in relation to  
222 internet searching, particularly using search engines such as [www.google.com](http://www.google.com) which returns results  
223 based on, amongst other things, recent popularity.[8, 9]

224 The conclusion that searching for grey literature and information can be systematic, but not  
225 necessarily replicable, reinforces the importance of using many overlapping searching approaches.  
226 This maximises the chances that any particular piece of relevant information will be found.

#### 227 Developing the 'best' search methods

228 Whilst our search methods were similar to, and built on, those described by others as well as on  
229 'best practice' guidance[5, 8, 9, 14, 29-31] it is difficult to be sure what the 'best' search methods for  
230 retrieving grey literature and information are. Whilst it is possible to validate search approaches in  
231 peer-reviewed literature against a 'gold standard' of hand searching,[32, 33] no similar gold standard  
232 exists for grey literature and information: there is no definitive repository against which other search  
233 methods can be compared. This makes it difficult to ever be sure that all relevant information has  
234 been found, or validate new search methods.

#### 235 *Data management*

236 In all three reviews we found data management to be challenging. Technology now allows fairly  
237 straightforward integration of academic databases and reference management software – both of  
238 which facilitate information organisation and record keeping. Such workflows are not well

239 developed for grey literature and information. Developing clear filing and recording systems, using  
240 simple spreadsheets, helped us to keep track of where and how information had been identified.

241 However, we found it harder to capture other aspects of our searches. For example, whilst tools like  
242 NCapture allow social media content to be imported in NVivo for qualitative analysis, they do not  
243 necessarily provide a useful facility for capturing how many people (and who) 'retweeted' a  
244 particular Tweet. It is even harder to capture when requests for information are circulated using  
245 more private methods such as email. For these reasons, we are not able to provide accurate  
246 estimates of how many people saw our requests for information.

#### 247 *Data extraction*

248 In all three reviews, we developed and used data extraction forms to record information. In Review  
249 1 we adopted a similar approach to data extraction used in many 'typical' systematic reviews – if  
250 information was not provided in the written report we obtained, we assumed this information was  
251 missing. However, systematic review guidance encourages reviewers to attempt to minimise missing  
252 data by contacting authors of original papers.[26] We adopted an approach much more similar to  
253 this in Reviews 2 and 3. In fact, many data extraction forms in these reviews were completed during  
254 telephone calls or following email conversations with key informants. To maximise accuracy, in  
255 Review 3 we asked informants to check electronic versions of completed data extraction forms. As  
256 there is often little or no documentary evidence to refer back to, ensuring data extraction forms are  
257 as accurate and complete as possible is particularly important in reviews of grey literature and  
258 information. This reflects and reinforces the fact that much information on interventions in public  
259 health practice is not well documented and can be 'temporary': once the relevant individuals move  
260 to new posts, and interventions recede into the past, individual and institutional memories are likely  
261 to fade. This further contributes to the limited replicability of this sort of grey information searching.

262 Despite the efforts we made in Reviews 2 and 3 to speak with those directly responsible for  
263 intervention design and delivery, we were often not able to obtain the information we intended to

264 capture. For example, of 102 interventions identified in Review 3, we were not able to obtain any  
265 information beyond a programme name in 27 cases. In most, if not all, cases, our failure to obtain  
266 information appeared to be because such information was not documented, or easily obtainable.  
267 For example, many of the costs of public health interventions in everyday practice are unclear even  
268 to those responsible for them. Whilst the cost of additional staff may be explicit, costs for office  
269 space for those staff might be absorbed by organisations and so be much more implicit.

270 The problem of limited data availability is common to all types of evidence synthesis, but others  
271 have noted it as a particular problem when synthesising grey literature.[7, 14] When attempting to  
272 synthesise the extent of public health practice it may be important to be aware of the types of  
273 information that are and are not important to practitioners and easy for them to record, and hence  
274 are likely to be documented. For example, service throughput appears to be much more likely to be  
275 documented than outcomes of interventions.[11, 18]

#### 276 *Risk of bias and value of information*

277 The risk of bias of any piece of information is dependent, in part, on the question it is being used to  
278 answer. In Review 2, and part of Review 3, our aims were to describe the nature and range of  
279 particular classes of interventions. The risk of bias of individual pieces of grey literature and  
280 information in this case is likely to be low – there is little reason why such information would be  
281 misrecorded. In contrast, in Review 1 and part of Review 3, we aimed to synthesise evaluation  
282 findings. The risk of bias of grey literature and information in this case may be likely to be higher.  
283 Indeed, in Reviews 1 and 3, we described some aspects of evaluation methods relating to risk of  
284 bias. In both cases, we concluded that the majority of studies were methodologically weak and at  
285 high risk of bias.

286 Evaluations found in grey literature and information may be at high risk of bias for a number of  
287 reasons. In public health practice, evaluations are often conducted by the same practitioners who  
288 developed and delivered an intervention. This results in an inherent conflict of interest which may

289 increase risk of bias. In public health practice, resources for evaluation are often limited, limiting the  
290 scope of what is possible.[37] Furthermore, the interest of funders and practitioners is often on  
291 throughput rather than outcomes,[38] limiting the scope of what is necessary. Whilst many  
292 evaluations included in our reviews were at high risk of bias in terms of conclusions about effects on  
293 outcomes, they may well have been fit for the purpose for which they were conducted.

294 Methods for assessing risk of bias in controlled trials are well established,[39, 40] and tools for other  
295 types of study are becoming available.[41-43] However, these approaches may be too narrow in  
296 perspective for grey literature and information. Realist synthesis takes a researcher-driven 'value of  
297 information' approach to assessing studies, rather than the more familiar protocol-driven risk of bias  
298 approach used in 'typical' systematic reviews. In the value of information paradigm, individual  
299 studies are included if the information they provide is considered relevant and rigorous enough to  
300 help contribute to answering the research question.[6, 44, 45] Whilst this requires researchers to  
301 make judgements about what is 'relevant and rigorous enough', it may result in inclusion of more  
302 potentially useful grey literature and information than stricter approaches which exclude studies  
303 based on risk of bias assessments.

#### 304 *Data synthesis*

305 Many approaches to data synthesis in the context of systematic reviewing and evidence synthesis  
306 have now been described and these are not limited to quantitative meta-analysis.[26, 46] Although  
307 we performed a quantitative synthesis in Review 1, this focused on the economic benefits of welfare  
308 rights advice to recipients (which could be summarised in £/week). We were not able to summarise  
309 health and social implications so simply and used narrative syntheses for these.

310 In Review 3, in an attempt to capture all the data available to us, we adopted a three tiered  
311 approach to synthesis. First, we listed all relevant interventions that we found (n=102; tier 1).  
312 Second, for those interventions for which we had further information on content and delivery, we  
313 summarised this using a standard template (n=75; tier 2). Finally, we summarised the results of any

314 evaluations of included interventions (n=30; tier 3). Interventions in each tier were nested within  
315 each other such that all interventions were included in the Tier 1 synthesis, but only a sub-set of  
316 these were included in Tier 2, and only a sub-set of those in Tier 2 were included in the Tier 3.

317 These differences in synthesis approach reflect both the contrasting aims of different reviews, and  
318 how flexible and responsive researchers should be to the realities of data availability within grey  
319 literature and grey information.

#### 320 *Time and resources*

321 Systematic reviews can be time and resource intensive. In 'typical' systematic reviews, preliminary  
322 scoping reviews can help reviewers estimate the size of a full review and resources required.[47]

323 'Rapid reviews' of peer review literature offer the hope and potential for conducting much quicker  
324 evidence syntheses that arrive at the same conclusions as full reviews.[48-50] Unfortunately there is  
325 no clear equivalent of scoping or rapid reviews in relation to grey literature and information. As  
326 others have noted, searching for less formally archived information is, almost by nature, time  
327 consuming and inefficient.[5, 8, 51]

328 Encouraging public health practitioners to deposit intervention documents and information in online  
329 repositories (e.g. [www.ncdlinks.org](http://www.ncdlinks.org)) could enable more efficient information retrieval on current  
330 and recent practice.[7] But the utility of such databases relies heavily on their coverage, and  
331 previous attempts to ensure high coverage have been varying in their success.[52] With few obvious  
332 current incentives for busy practitioners to deposit information in these repositories, it is not  
333 necessarily clear how they could be made more useful. Further attention could be given to  
334 developing such incentives. In addition, developing better searching and retrieval methods should  
335 also facilitate syntheses of grey literature and information, particularly using more sophisticated  
336 methods for internet searching such as text analytics or data mining.[7, 53] However, if grey  
337 information is not recorded in a searchable way (e.g. is retained only on private networks or in



338 memory), this is also only a partial solution. Action is required to improve both information  
339 deposition and information retrieval.

#### 340 *Differentiating evidence synthesis from primary research*

341 Although we approached and considered all three of our case-studies as evidence syntheses, they  
342 could be considered as verging on primary research. This is particularly the case for Reviews 2 and 3  
343 where we made attempts to contact all local authorities in England and collect unpublished  
344 information via telephone or email interviews with key informants. Contacting authors is  
345 encouraged in 'typical' systematic reviews, particularly to collect information that may be  
346 incompletely recorded in published outputs.[26] This type of contact is not routinely considered  
347 primary research, as the contact is limited to clarifying or augmenting existing published information  
348 – rather than collecting entirely new data. However, in many cases in Reviews 2 and 3 no published  
349 information was available to clarify or augment meaning that these reviews could, perhaps, be  
350 considered as collecting new data.

351 This grey area between evidence synthesis and primary research is particularly important in terms of  
352 research ethics. In general, research ethics committee review is not required for evidence syntheses  
353 projects because they do not involve research participants.[54] In line with this, we did not obtain  
354 research ethics committee review for any of the case-studies described. It is not clear at what point  
355 'key informants' become 'research participants' and hence when the type of evidence synthesis we  
356 conducted in Reviews 2 and 3 becomes primary research that does require research ethics  
357 committee review. Further consideration, and clarification, of this issue by research ethics  
358 organisations would be helpful. In the meantime, and as has been previously proposed, it may be  
359 judicious for researchers proposing to conduct this type of work to at least discuss it informally with  
360 their local research ethics committee before proceeding.[55]

**361 Conclusion**

362 We propose the term 'grey information' to capture a wide range of documented and undocumented  
363 information that may be excluded by common definitions of 'grey literature'. Information on applied  
364 public health research questions relating to the nature and range of public health interventions, and  
365 many evaluations of these interventions, may be predominantly, or only, held in grey literature and  
366 grey information. Evidence syntheses on these topics needs, therefore, to embrace grey literature  
367 and information. Many standard systematic review methods for searching, appraising, managing and  
368 synthesising the evidence base can be adapted for use with grey literature and information.  
369 Evidence synthesisers should carefully consider the opportunities and problems offered by including  
370 grey literature and information. Further action to improve both information deposition and retrieval  
371 would facilitate more efficient and complete syntheses of grey literature and information.

372

**373 Declarations***374 Ethics approval & consent to participate*

375 This is not a primary piece of research, no participants were recruited and ethical approval was not  
376 required.

*377 Consent for publication*

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*379 Availability of data and materials*

380 This manuscript does not refer to any new data. Of the three case-studies that form the focus for the  
381 discussion, two have either been previously published and are now in the public domain[18, 21] and  
382 one is under review.[11]

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384 The authors declare no competing interests.

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407 authors) conducted Case Study 3. [11] FHB, CS, HJM, JA, VAS, MW and ALA contributed to the  
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565

566 **Table 1: defining aspects and examples of 'grey literature', 'grey data', and 'grey information'**

Term	Defining aspect	Examples
Grey literature[7-9]	Not controlled by commercial publishing organisations	Internal reports Working papers Newsletters
Grey data[13]	User-generated, web-based	Tweets Blogs Facebook status updates
Grey information	Informally published or not published at all	Meeting notes Emails Personal memories

567

568 **Table 2: summary of aims, methods and results of three case-studies of searching for and synthesising grey literature and grey information**

	Review 1, 2006[18]	Review 2, 2011[21]	Review 3, 2016[11]
Aims	“To answer the question: what are the health, social and financial impacts of welfare rights advice delivered in healthcare settings?”	“Identify the range of existing adult cooking skills interventions that are presently implemented in England which meet key criteria...Make a judgement on the suitability of each identified intervention for rigorous outcome evaluation.”	“To systematically identify interventions to promote healthier ready-to-eat meals sold by specific food outlets in England. To describe the type of interventions, and summarise information on their content and delivery. To summarise information from [any] evaluations.”
Inclusion criteria	Evaluations of welfare rights advice in a healthcare setting in terms of health, social or financial outcomes. No exclusions based on: outcomes study design study population place of publication language of publication	Interventions that meet all the criteria: aim to develop basic kitchen & cooking skills target adults aged 16 years or over target non-professional cooks use a written curriculum involve interaction between tutor & participant involve more than one session run on a not-for-profit basis	Interventions that meet all the criteria: in specific food outlets openly accessible to the general public selling ready-to-eat meals and beverages as their main business for profit No exclusions based on: place of publication/reporting of information methodological quality
Search methods	Searches of: databases of peer-reviewed & grey literature relevant journals an internet search engine relevant funder & third sector websites references & citations of included studies publications of authors of included studies Targetted requests sent via email to those with publications in the field General requests: sent to relevant email distributions lists posted on online bulletin boards published in ‘trade press’	Searches of: an internet search engine relevant funder & third sector websites Targetted requests sent via email to: all Primary Care Trusts (PCTs) in England all local authorities (LA) in England all regional obesity leads in England regional voluntary sector network organisations	Searches of: databases of peer-reviewed & grey literature research & trial databases an internet search engine relevant funder & third sector websites media database Targetted requests sent via email to: all local authorities in England those with publications in the field General requests: sent to relevant professionals orgs via Twitter sent to relevant email distributions lists posted on online bulletin boards

	Review 1, 2006[18]	Review 2, 2011[21]	Review 3, 2016[11]
			published in 'trade press'
Type of literature & information included	Peer-reviewed literature Grey literature	Grey literature Grey information	Peer-reviewed literature Grey literature Grey information
Synthesis method	Narrative, with quantitative synthesis of mean financial benefit per client	Narrative, with "theory mapping" of interventions to identify the key behaviour change theories used	Narrative synthesis
Studies/interventions included (n)	55	14	102 (30 of which included an evaluation)
Conclusions	"Welfare rights advice services can go some way to resolving under claiming. However, there is currently little evidence of adequate robustness and quality to indicate that such services lead to health improvements."	"We recommend that an outcome evaluation, involving a randomised controlled trial (RCT), a process, and an economic evaluation, is conducted...preceded by feasibility work. "Jamie's Ministry of Food is the only single intervention identified that could fulfil the sample size requirements. However...this intervention may not make best use of behaviour change theory. A number of smaller interventions make good use of theory [but] would [not] fulfil the sample size requirements. "We recommend either or both of: <i>Jamie's Ministry of Food</i> is approached to discuss their willingness to develop their programme, with a view to taking part in an RCT. Or, a number of existing local interventions, which make good use of theory, are approached to discuss if their programmes could be harmonised, with a view to taking part in an RCT."	"The best available evidence suggests that food outlet proprietors are generally positive about implementing these interventions, particularly when they are cost neutral and use a 'health-by-stealth' approach. Little robust evidence is available on the effectiveness of these approaches and further research is needed to generate this evidence. Opportunities for working upstream with suppliers, and in co-participation with consumers, when developing interventions should be explored."

570 **Table 3: characteristics of different approaches to searching for grey literature and grey information**

Search method	Specific to grey literature?	Likely to find grey literature?	Specific to grey information?	Likely to find grey information?	Likely to be replicable?	Results likely to be up to date?	Easy for recipients to share?	Easy for recipients to ignore?
Searches of:								
databases of peer-reviewed literature	No	No	No	No	Yes	Yes	NA	NA
databases of grey literature	Yes	Yes	No	No	Yes	Yes	NA	NA
databases of media reporting	No	Yes	No	No	Yes	Yes	NA	NA
relevant peer-reviewed journals	No	No	No	No	Yes	Yes	NA	NA
internet search engines	No	Yes	No	No	Possibly	Yes	NA	NA
reference & citations of included studies	No	No	No	No	Yes	Yes	NA	NA
other publications of authors of included studies	No	No	No	No	Yes	Yes	NA	NA
relevant funder & third sector websites	No	Yes	No	No	Possibly	Possibly	NA	NA
General requests for information sent to email lists, online boards, published in 'professional press' & distributed via Twitter	No	Yes	No	Yes	Possibly	Yes	Yes	Yes
Targetted requests sent via email to named contacts	No	Yes	No	Yes	Possibly	Yes	Yes	Possibly

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