

1           **Determinants of satisfaction with information and additional information-seeking**  
2                           **behaviour for the pertussis vaccination given during pregnancy**

3   **Abstract**

4   **Objectives:** Information search and processing is critical to the vaccine decision-making  
5 process. However, the role of drivers of information satisfaction and search is not fully  
6 understood. Here, we investigated the predictive potential of psychosocial characteristics  
7 related to satisfaction with information and additional information-seeking about the pertussis  
8 vaccine currently recommended during pregnancy.

9   **Design:** Cross-sectional online questionnaire study.

10 **Methods:** A UK based sample of 314 women who had given birth during the previous six  
11 months was recruited to participate. The questionnaire included measures of the psycho-  
12 social predictors: *trust, coping strategies, attitude towards vaccine information-seeking*  
13 *behaviour* and *risk perception of vaccination during pregnancy*, and measures of two  
14 outcome variables: *satisfaction with information* received from a health care professional and  
15 whether participants engaged in *vaccine information-seeking behaviour*.

16 **Results:** Trust in health care professionals, a perceived behavioural control of own vaccine  
17 information-seeking behaviour, and an engaged problem-focused strategy for coping with  
18 stress were significant predictors of satisfaction with official information given by a health  
19 care professional. 40% of women sought out additional information about vaccination  
20 however, none of the psychosocial factors measured significantly predicted the behaviour.

21 **Conclusions:** We found that high trust in health care professionals, a perceived ability to  
22 seek out accurate information about vaccines and actively focusing on problems as a means  
23 of coping with stress, drives satisfaction in official vaccine information. We also developed  
24 measures of these variables that could be used in further research.

25

26 *Keywords:* Information-seeking behaviour; Decision making; Vaccine Hesitancy; Trust;

27 Coping strategies; Psychosocial

28

29 Determinants of satisfaction with information and additional information-seeking behaviour  
30 for the pertussis vaccination given during pregnancy

### 31 **Introduction**

32 When making a decision about vaccination, parents frequently prefer, trust and use health  
33 care professionals as a source of information (1–8). Occasionally, due to unsatisfied  
34 information needs, additional sources of information are actively sought out (9,10). This  
35 seeking can take place across numerous sources (3,7) and, for some individuals, can be an  
36 extensive process (11) that is highly influential in their final decision (12). When vaccine  
37 information-seeking behaviour occurs, information from sources is assessed, trusted, and  
38 perceived as influential to varying degrees across different individual decision makers (3,13–  
39 16). Although vaccine information-seeking behaviour is present in individuals who both  
40 accept and refuse vaccination (4,17,18), the behaviour poses a potential risk factor for  
41 exposure to information that is misleading and unduly critical of vaccination (19–21). This  
42 information can be influential in the forming of knowledge, attitude towards, and final uptake  
43 of a vaccination (22–25)

### 44 **The pertussis vaccination program**

45 As a relatively recent addition to the UK immunisation schedule (26), the pertussis vaccine  
46 for pregnant women may be particularly vulnerable to misleading information (27).

47 Previous research involving pregnant and recently pregnant women demonstrates a strong  
48 willingness to vaccinate against pertussis during pregnancy (28), which the most recent  
49 reported uptake of the vaccine reflects (29). However, a number of attitudinal and systems  
50 barriers prevent some individuals from taking the vaccine – information needs are one such  
51 cited barrier (28,30,31).

### 52 **Vaccine information-seeking behaviour during pregnancy**

53 Information-seeking behaviour for a wide range of health related reasons is common during  
54 pregnancy (32–38). In relation to vaccine specific information-seeking behaviour in  
55 pregnancy, Bodeker, Walter, Reiter & Wichmann (39) found that 40.5% of women in their  
56 study actively sought out information about the influenza vaccine given during pregnancy.  
57 Women that sought advice from their health care professional were significantly more likely  
58 to vaccinate than those who sort information elsewhere. Thirty-five percent reported a need  
59 for further information, primarily for vaccine side-effects whether for themselves or their  
60 unborn child (39). A similar result was reported in a survey related to the 2009/10 pandemic  
61 influenza vaccination (14) whereby the targeted at risk group, pregnant women, were found  
62 to use their health care professional as a source of information about the disease at a rate  
63 higher than that the general public.

#### 64 **Theoretical framework**

65 Within the discipline of information science, Krikelas suggests that information needs occur  
66 when there is a perceived gap between currently held information and the level of  
67 information that an individual feels they need in order to confidently make an informed  
68 decision (9).

69 A health care professional will often offer patients additional information to help inform them  
70 during an upcoming health care decision. Satisfaction with such information forms a key role  
71 within Wilson's model of information behaviour (40). If the given information does not  
72 significantly fill a person's unique information needs, information-seeking behaviour may  
73 occur. A successful information-seeking process is defined as leading to information being  
74 gathered and evaluated for use. Satisfaction or non-satisfaction with this new information  
75 gathered then serves to update the level of information need and amount of subsequent  
76 information-seeking behaviour (40).

77 Unmet information needs related to vaccination can often be stressful for a decision maker  
78 (10,27). Therefore, the process of information-seeking is often mentioned in terms of a  
79 coping strategy whereby individuals who hold an “*engaged coping strategy*” will aim to  
80 reduce psychological stress caused by uncertainty through an active process of seeking  
81 information (41).

82 Our view of vaccine information-seeking behaviour is that of an active process performed by  
83 an individual. As such, we take the behaviour to be a reasoned action that a person  
84 consciously performs as a means of satisfying unmet information needs. In this way we draw  
85 upon the model of risk information-seeking by Griffin, Dunwoody and Neuwirth (42) in  
86 which factors such as risk perception, beliefs, about information-seeking, and self-efficacy  
87 related to information gathering are important predictors of information sufficiency  
88 (satisfaction) and subsequent information-seeking behaviour.

89 This study aims to investigate to what degree the factors mentioned first, predicts levels of  
90 satisfaction with official information about the pertussis vaccination and second, predict  
91 vaccine information-seeking behaviour during pregnancy. In addition, tools to measure the  
92 concept more effectively were developed for future research use (further details related to this  
93 can be found in the supplemental materials).

94 *Hypothesis 1: We hypothesise that trust in health care professionals, trust in the health care*  
95 *system, psychosocial determinates of vaccine information-seeking behaviour, risk*  
96 *perception of vaccination during pregnancy, and an engaged coping strategy will*  
97 *significantly predict satisfaction with information.*

98 *Hypothesis 2: We hypothesise that trust in health care professionals, trust in the health care*  
99 *system, risk perception of vaccination during pregnancy, psychosocial determinates*  
100 *of vaccine information-seeking behaviour, engaged coping strategy, and satisfaction*

101 *with information* will significantly predict the occurrence of *vaccine information-*  
102 *seeking behaviour*.

103 **Methods**

104 **Participants and Design**

105 To be eligible to participate in the study women had to meet three inclusion criteria, these  
106 were (i) to have given birth within the last six months of starting the survey, (ii) to have spent  
107 the majority of their pregnancy within England or Wales and (iii) class themselves as fluent  
108 in English. To recruit the participants, we contacted public baby and toddler groups (typically  
109 groups that organise events for 0-4 year olds) across England and Wales and asked the  
110 coordinators to forward an invitation email to group members for participation. Coordinators  
111 of 3,248 groups were contacted, 312 of which forwarded the invitation either in the form of a  
112 printed flyer or electronically through social media or e-mail. Further snowball sampling  
113 occurred through a request to pass on the participation link to interested parties once the  
114 survey had been completed. A total of 719 participants followed the link provided to start the  
115 survey between October 2016 and April 2017, when the survey was closed as we reached our  
116 goal of over 350 fully completed responses. Of the 719 participants, 149 were excluded  
117 automatically due to not fulfilling one of the three inclusion criteria, 211 dropped out before  
118 full completion of the survey and 45 were excluded because they reported on the survey that  
119 they were unaware of the pertussis vaccination program during pregnancy; thus, 314 women  
120 were included in the subsequent analyses (this process of exclusion and dropout is illustrated  
121 in Figure 1).

122 **[Figure 1]**

123 The sample of participants who fully completed the survey (N=314) had an age range of  
124 between 18 and 46 with the mean age of 32.2 years (*SD* = 4.6 years). For 42.8% the recent

125 birth was their first pregnancy. The majority of participants were white British (87%) and the  
126 sample was geographically diverse across England with no one outward geographical code  
127 (first three of four digits of postcode) representing more than 2.7% of the sample.

128 The study involved a cross-sectional, self-reported questionnaire (see supplemental materials  
129 for full survey) designed to be taken online.

### 130 **Procedure and Measures**

131 After providing informed consent, participants answered a range of questions related to  
132 socio-demographic factors such as age, location, ethnicity, and number of previous  
133 pregnancies that reached the third trimester. The questionnaire that followed contained a  
134 range of psychometric measures. The following subheadings outline the included scales and  
135 measures. These were presented to participants in the same fixed order as presented here. On  
136 completion, all participants received a full debriefing of the study and were provided with an  
137 open text box for any further comments they would like to make.

#### 138 **Trust in health care professionals and trust in the health care system**

139 To measure trust in an individual's primary health care professional we adopted The Wake  
140 Forest Scale of Physician Trust (43) with the sole substitution of *health care professional* for  
141 *physician*. The scale consists of ten statements related to trust in primary health care  
142 professionals (e.g., "*Your health care professional did whatever it took to get you all the care*  
143 *you needed during your pregnancy*") that are assessed on a five-point Likert scale ranging  
144 from strongly disagree (1) to strongly agree (5). The scale has good internal consistency  
145 (Cronbach's  $\alpha = .94$ ) and the final score was expressed as an average of all items with the  
146 higher number indicating more trust.

147 To measure trust in the wider health care system we used The Health Care System Distrust  
148 Scale (44). The scale consists of nine statements related to trust in the health care system

149 (e.g., “*The health care system does its best to make patients’ health better*”) that are assessed  
150 on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). This scale  
151 also has good internal consistency (Cronbach’s  $\alpha = .84$ ). The final score was expressed as a  
152 summation index and for ease of understanding reverse coded to indicate trust in the health  
153 care system (rather than distrust).

#### 154 **Coping strategies**

155 The Short-Form Coping Strategies Inventory (45) involves a participant first recalling and  
156 describing a recent event (within the last month) that they found particularly stressful. The  
157 participant then responds to 32 items related to how they coped with the previously described  
158 stressor (e.g., “*I tackled the problem head on*”) that are assessed on a five-point Likert scale  
159 ranging from strongly disagree (1) to strongly agree (5).

160 The scale consists of first-order and second-order subscales. For the purpose of this study the  
161 first order scale of *disengaged* and two second order subscales of *emotion-focused engaged*  
162 and *problem-focused engaged* were used for testing the aforementioned hypotheses. The  
163 subscales had good internal consistency (*problem-focused engaged* Cronbach’s  $\alpha = .808$ ,  
164 *emotion-focused engaged* Cronbach’s  $\alpha = .89$ , and *disengaged* Cronbach’s  $\alpha = .83$ ) and the  
165 final score for each was expressed as a summation index with the higher number indicating a  
166 greater propensity to adopt that coping strategy.

#### 167 **Psychosocial determinants of vaccine information-seeking behaviour**

168 The Psychosocial Determinants of Vaccine Information-Seeking Behaviour Scale is an  
169 adapted version of a similar scale originally outlined in Harmsen et al. (46). Its original Dutch  
170 context (information-seeking related to the Dutch National Immunisation Program) was  
171 adapted to that of general vaccination. The scale measures beliefs about information-seeking,  
172 perceived social norms to information-seeking and perceived self-efficacy when seeking



173 information. The scale draws on the model of risk information-seeking behaviour by Griffin,  
174 Dunwoody and Neuwirth (42) and on a theory of planned behaviour approach to behavioural  
175 intention (47). The scale has 16 statements (e.g., “*My friends think I should look for*  
176 *additional information when making a vaccination decision*”) that participants rated on a  
177 seven-point Likert scale ranging from Totally Disagree (1) to Totally Agree (7). A four-factor  
178 model is proposed whereby the final score is expressed as an average of all items within the  
179 factor with the higher number indicating higher likelihood of behavioural intention. A full  
180 account of the scales development using principal components analysis can be found in the  
181 supplemental materials.

## 182 **Risk perception of vaccination during pregnancy**

183 The Risk Perception of Vaccination during Pregnancy Scale is a custom-made scale for use in  
184 this project tailored to measure risk perception. It has its bases in the severity and  
185 susceptibility elements of the Health Belief Model. This theoretical underpinning of a scale  
186 has been used in previous studies such as Henninger and colleagues (48), and Wallace and  
187 colleagues(49), this scale however captures attitude towards vaccination during pregnancy  
188 and the perceived susceptibility and severity for both pertussis as a disease and the pertussis  
189 vaccine offered during pregnancy. The scale consists of 10 statements (e.g., “*The whooping*  
190 *cough vaccine during pregnancy is likely to cause painful side effects*”) that are assessed on a  
191 five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The scale had  
192 questionable internal consistency (Cronbach  $\alpha = .61$ ). The final score was expressed as a  
193 subtraction of the vaccine related items from the disease related items with a lower value  
194 indicating a more negative perception of risk related to the pertussis vaccinations given  
195 during pregnancy.

## 196 **Satisfaction with information**

197 This short scale, constructed for use in this study, asks participants to rate information based  
198 on perceived amount, clarity, and accuracy. The scale consists of three statements related to  
199 satisfaction (e.g., “*How satisfied were you with the clarity of the information given to you by*  
200 *your health care professional(s)?*”) that are assessed on a seven-point Likert scale between  
201 highly dissatisfied (1) to highly satisfied (7). The scale has good internal consistency  
202 (Cronbach’s  $\alpha = .91$ ) and the final score was expressed as an average of all items with higher  
203 number indicating higher satisfaction with information.

#### 204 **Vaccine information-seeking behaviour**

205 For the purposes of this study the variable of *vaccine information-seeking behaviour* was  
206 quantified as a binary yes/no for the question (“*Did you seek out or research additional*  
207 *information about the whooping cough vaccine or whooping cough as a disease to help you*  
208 *make your decision? This could be from searching on the internet, talking to a friend or*  
209 *family member, reading pregnancy books, talking to other health professionals or anything*  
210 *else that would have aided you in your decision*”). An option of cannot remember was  
211 included whereby individuals who selected this option were excluded from analysis.

#### 212 **Statistical analyses**

213 Statistical analyses were carried out using SPSS v.24 for Windows. All measures were  
214 treated as continuous variables apart from *vaccine information-seeking behaviour* which was  
215 treated as nominal.

#### 216 ***Regression models***

217 Two regressions analyses were conducted to assess the predictive ability of the listed  
218 variables on *satisfaction with information*, and *vaccine information-seeking behaviour*.

#### 219 ***Regression model one***

220 A multiple linear regression with the predictor variables of *coping strategy, trust in health*  
221 *care professional, trust in health care system, risk perception of vaccination during*  
222 *pregnancy, and psychosocial determinates of Vaccine information-seeking behaviour* was  
223 used to predict the variable *satisfaction with information*.

224 *Regression model two*

225 A logistic regression with the predictor variables of *coping strategy, trust in health care*  
226 *professional, trust in health care system, risk perception of vaccination during pregnancy,*  
227 *psychosocial determinates of vaccine information-seeking behaviour and satisfaction with*  
228 *information* was used to predict the variable *vaccine information-seeking behaviour*.

229 **Results**

230 **Predicting Information Satisfaction**

231 We observed several weak to moderate correlations between *trust in health care professional,*  
232 *trust in health care system, problem-focused engaged coping strategy, perceived behaviour*  
233 *control of vaccine information-seeking behaviour, risk perception of vaccination during*  
234 *pregnancy, and satisfaction with information* (see Table 1). While significant correlations  
235 were found between variables included in the regression model the IVF statistics  
236 demonstrated low multicollinearity, with none of the values exceeding an IVF of 2.0.

237 **[Table 1]**

238 In a regression model the variables significantly predicted *satisfaction with information*  $F(10,$   
239  $185) = 9.436, p < .001$ . This successfully accounted for 33.8% of the variance. We found  
240 three significant predictors of *satisfaction with information* (see Table 2): a *problem-focused*  
241 *engaged coping strategy, trust in health care professional, and perceived behavioural control*  
242 *of vaccine information-seeking behaviour*. These variables remained significant after a

243 Bonferroni correction for multiple comparisons. A higher rating on all three variables  
244 predicted a higher likelihood that the respondent would report being satisfied with the  
245 information presented to them by their health care professional.

246 **[Table 2]**

### 247 **Predicting Information-Seeking Behaviour**

248 We observed several weak to moderate correlations between *trust in health care professional*,  
249 all four subscales of the Psychosocial Determinants of Vaccine Information-Seeking  
250 Behaviour Scale, and *satisfaction with information* (see Table 3). While significant  
251 correlations were found between variables included in the regression model the VIF statistics  
252 demonstrated low multicollinearity, whereby none of the values exceeded a VIF of 2.0.

253 **[Table 3]**

254 Model two was found to be significant,  $\chi^2(11) = 47.690, p < .001$ . This predicted 30.2% of  
255 the variance in *vaccine information-seeking behaviour*. Initially the variables of *satisfaction*  
256 *with information* and the attitude and beliefs component of the *psychosocial determinates to*  
257 *vaccine information-seeking behaviour* scale were found to be significant within the model,  
258 however after the Bonferroni correction for multiple comparisons this significance was lost.  
259 The Hosmer and Lemeshow test demonstrates the data violates parametric assumptions for  
260 the model,  $\chi^2(8) = 16.564, p = .035$ . Seventy-six percent of those who did not seek extra  
261 information were predicted by the model. Fifty-nine percent of those who did seek  
262 information were predicted. Overall 69.7% of individuals' vaccine information-seeking  
263 behaviour were correctly predicted by the model.

264 **[Table 4]**

265 We conducted a post-hoc backwards stepwise logistic regression to further explore the  
266 predictors in the model. From this, it was evident that the removal of the risk perception  
267 variable had no effect on the variance explained by the model. Furthermore, removing the  
268 variables injunctive norms towards vaccine information-seeking behaviour, trust in health  
269 care professionals and trust in the health care system together reduce the variance explained  
270 by only 0.8%. Therefore the following model (see Table 5), with seven variables, would  
271 appear to be the most economical when predicting vaccine information-seeking behaviour.

272 **[Table 5]**

273 This model was found to be significant,  $\chi^2(7) = 46.582, p < .001$  and predicted 29.6% of the  
274 variance in *vaccine information-seeking behaviour*. The variables of *satisfaction with*  
275 *information* and the attitude and beliefs component of the *psychosocial determinates to*  
276 *vaccine information-seeking behaviour* scale were now found to be significant within the  
277 model. The Hosmer and Lemeshow test demonstrates the data did not violate parametric  
278 assumptions for the model,  $\chi^2(8) = 8.994, p = .343$ .

279 **Further Notable Findings and Exploratory Analyses**

280 Ninety-five percent of the sample had been vaccinated against pertussis during their recent  
281 pregnancy, with 95.8% receiving the vaccine between week 17 and week 36 of their  
282 pregnancy (see Table 6). Fifty-two percent of the sample reported becoming aware of the  
283 vaccination during their most recent pregnancy with midwives being found to be both the  
284 means that an individual first heard about the vaccination program (77.4%) and the health  
285 care professional to give the mother the most encouragement to vaccinate (91.4%).

286 **[Table 6]**

287 Further exploratory analysis of the results given by the Psychosocial Determinate of Vaccine  
288 Information-Seeking Behaviour Scale demonstrated a significant difference across the

289 subscales with the social (injunctive) norms to seeking information about vaccination  
290 constantly rated as lower than the other factors  $F(3,1086) = 377.5 p < .001$ .  
291 For the individuals who reported seeking additional information to aid in their decision  
292 making process 88.1% indicated using online sources (with 41.7% citing only web 1.0 and  
293 0.07% citing only the use of web 2.0 and 39.4% using both), 42.5% talked to friends or  
294 family members and 7.1% sought out an additional health care professional (see Table 7). For  
295 those women who did search for additional information, time spent searching for information  
296 varied from 8 minutes to 11 hours (mean= 2 hours 31 minutes).

297 **[Table 7]**

## 298 **Discussion**

299 Our findings indicate that seeking out further information in relation to the vaccines offered  
300 during pregnancy is a widely performed behaviour. We found that those women who trusted  
301 their health care professionals more, those who adopted a problem-focused engaged *strategy*  
302 when coping with stressful events and those who perceived higher behavioural control related  
303 to their own vaccine information-seeking behaviour, reported more satisfaction with the  
304 information received from their health care professional. This confirms our first hypothesis.  
305 Higher ratings in the three variables were found to relate to higher ratings of *satisfaction with*  
306 *information*.

307 When investigating hypothesis 2 the data used in logistic regression model did not meet  
308 parametric assumption and to predict vaccine information-seeking behaviour and no single  
309 individual measure within the module reached significance.

310 These findings, particularly those related to hypothesis 1, indicate that when official  
311 information is given to aid in the decision-making process it is often perceived in relation to a  
312 range of additional personality and social factors and not solely evaluated on its own intrinsic

313 merit. The fact that *trust in health care professional* was found to be significant in the model,  
314 whereas *trust in the health care system* was not, gives evidence to Yaqub and colleagues (16)  
315 notion that social context predominantly shapes how information is interpreted and used. The  
316 importance of *perceived behavioural control of vaccine information-seeking behaviour* and  
317 *problem-focused engaged coping strategy* also adds to our understanding. Both of the  
318 constructs place factual information at the centre: (1) a problem-focused coping strategy is  
319 primarily related to cognitive and behavioural strategies to proactively change a stressful  
320 situation (45) and (2) behaviour control is the belief that a person is able to seek out and  
321 accurately assess information when needed (47). Therefore, individuals who value factual  
322 information (over, for example, emotional or social information) are likely to be more  
323 satisfied with official written information being supplied by their health care professional.

324 It is noteworthy that the three coping strategy subscale did not play more of a sizable role in  
325 predicting vaccine information-seeking behaviour. From the theoretical framework outlined  
326 in the introduction we predicted that an engaged coping *strategy* would facilitate vaccine  
327 information-seeking behaviour whereas a disengaged coping *strategy* would inhibit it.

328 Additional exploratory analysis of the Psychosocial Determinants of Vaccine Information-  
329 Seeking Behaviour Scale may indicate why this was the case. Although women in our study  
330 reported a desire to undertake searching (*Factor 1*) and feel that they had the necessary skills  
331 to do so (*Factor 4*) there were hints towards a possible social norm against the behaviour  
332 (*Factor 3*). Frequently, the items that asked whether the respondent thought that their health  
333 care professional or friends and family felt that they should seek additional information about  
334 vaccinations were rated as *disagree* or *strongly disagree*. Due to the Coping Strategy Scale  
335 being related to a general stress-causing event rather than medically specific, nuance such as  
336 the existence of a specific social norm such as those related to information-seeking may have  
337 been lost.

338 From the evidence we present here it is possible to say that for official sources of information  
339 to be seen in a positive light a relationship between the mother and her health care  
340 professional must be based on a solid foundation of trust. Furthermore, different individuals  
341 will place different levels of importance on the information given during the vaccine decision  
342 making process with those that value, and feel particularly skilled with, factual information  
343 reacting more positively towards factual information based communications. These findings  
344 also perhaps bring in to question the level of real world applicability of purely information  
345 based interventions (50). Without suitable attention also being paid to the social and personal  
346 context in which this information is presented it is possible that the contents of the  
347 communicated information may go largely ignored.

#### 348 **Limitations**

349 The theoretical framework allowed us to study many of the relevant factors in vaccine  
350 information-seeking behaviour, however it is possible that some concepts relevant to  
351 information search behaviour (e.g., *need for cognition*) were neglected by the model.  
352 Furthermore, caution also must be applied when interpreting these results given the self-  
353 selecting nature of our sample. The sample was predominantly vaccinated against pertussis  
354 during their pregnancy (95% in our sample compared to a 70% average across England (29)),  
355 however the fact that information-seeking still occurred within a sizable minority is  
356 noteworthy, as it actively contradicts a possible social norm against such behaviour.  
357 Furthermore, due to the Psychosocial Determinate of Vaccine Information-Seeking  
358 Behaviour Scale being validated on the decision related to the pertussis vaccine during  
359 pregnancy caution should be applied when using the scale to investigate attitudes related to  
360 vaccine information-seeking in other contexts.

#### 361 **Conclusion**



362 This research indicates the complicated dynamic that exists between factual information and  
363 the context in which it is presented. In the case of vaccination during pregnancy, it is evident  
364 that trust held by a mother for her health care professional is of utmost importance if the  
365 mother is to feel satisfied with the information about vaccination that is presented to her.

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### 372 **Ethical approval**

373 Ethical approval was received from the London School of Hygiene & Tropical Medicine  
374 ethics committee on 13/10/2016.

### 375 **Conflict of interest**

376 All authors have no conflicts of interest.

### 377 **Authors' contributions**

378 RC, PP and MS conceived the experimental design, analysed, and interpreted the data. RC  
379 collected the data and wrote the manuscript. PP and MS revised the manuscript. All authors  
380 approved the final draft of the manuscript and meet the ICMJE criteria for authorship.

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542



544 **Table 1**

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Trust in health care system	-										
2. Trust in health care professional	.507*	-									
3. Disengaged coping style	.048	.019	-								
4. Problem engaged coping style	.184	.043	-.191	-							
5. Emotion engaged coping style	.080	.100	.071	.318*	-						
6. Psychosocial determinants of VISB factor 1: Attitudes and beliefs	-.067	-.063	.075	.105	.024	-					
7. Psychosocial determinants of VISB factor 2: Descriptive norms	.093	.014	.145	.135	.047	.514*	-				
8. Psychosocial determinants of VISB factor 3: Injunctive norms	.039	.071	-.028	.024	-.048	.390*	.327*	-			
9. Psychosocial determinants of VISB factor 4: Perceived behavioural control	.235*	.118	.076	.165*	.122	.348*	.177	.081	-		
10. Risk Perception of vaccination during pregnancy	.286*	.192	-.053	-.060	.026	-.063	.010	.020	.161	-	
11. Satisfaction with information	.370*	.401*	.080	.208*	.081	.018	.107	.084	.279*	.252*	-

545 *Zero order correlations among variables in model 1 (N=207)*

546 \*p<.0045 (as corrected for multiple hypothesis testing)

547 Vaccine information-seeking behaviour (VISB)

548

549

550 **Table 2**551 *Psychosocial predictors of the satisfaction with vaccine information (multiple regression analysis)*

Variable	<i>B</i>	<i>t</i>	<i>p</i>	<i>VIF</i>
Constant	0.601			
Trust in health care system	0.013	0.779	.437	1.581
Trust in health care professional	0.467	4.698	< .001	1.383
Disengaged coping style	0.011	1.647	.101	1.118
Problem engaged coping style	0.042	3.163	.002	1.283
Emotion engaged coping style	-0.010	-0.884	.378	1.161
Psychosocial determinants of VISB	-0.091	-1.202	.231	1.700
factor 1: Attitudes and beliefs				
Psychosocial determinants of VISB	0.034	0.607	.544	1.450
factor 2: Descriptive norms				

Psychosocial determinants of VISB	0.056	0.929	.354	1.250
factor 3: Injunctive norms				
Psychosocial determinants of VISB	0.240	2.923	.004	1.289
factor 4: Perceived behavioural control				
Risk Perception of vaccination during pregnancy	0.234	2.778	.006	1.138

---

552 Alpha was  $p < .005$  as adjusted for multiple comparisons

553 Unstandardized Beta coefficient  $B$

554 Variance inflation factor (VIF)

555 Vaccine information-seeking behaviour (VISB)

556

557

558 **Table 3**

559 *Zero order correlations among variables in model 2 (N=300)*

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Trust in health care system	-											
2. Trust in health care professional	.551*	-										
3. Disengaged coping style	.042	-.034	-									
4. Problem engaged coping style	.210	.071	-.218*	-								
5. Emotion engaged coping style	.051	.116	-.778	.298*	-							
6. Psychosocial determinants of VISB factor 1: Attitudes and beliefs	-.115	-.119	.107	.093	-.006	-						
7. Psychosocial determinants of VISB factor 2: Descriptive norms	.002	-.029	.109	.078	.063	.584*	-					
8. Psychosocial determinants of VISB factor 3: Injunctive norms	-.069	-.027	.026	.034	-.075	.436*	.381*	-				
9. Psychosocial determinants of VISB factor 4: Perceived behavioural control	.207*	.121	.054	.160	.069	.311*	.185	.102	-			

10. Risk Perception of vaccination during pregnancy	.300*	.230*	-.105	-.080	.050	-.141*	.041	-.065	.158	-		
11. Satisfaction with information	.373*	.397*	.064	.221*	.109	.017	.104	.090	.270*	.256*	-	
12. Vaccine information seeking behaviour <sup>†</sup>	-.080	-.148	.083	.028	-.065	.402*	.279*	.178	.129	-.053	-.145	-

560 \*p<.0041 (as corrected for multiple hypothesis testing), <sup>†</sup> Point-biserial correlations ( $r_{pb}$ )

561 Vaccine information-seeking behaviour (VISB)

562

563

564 **Table 4**

565 *Psychosocial predictors of vaccine information seeking behaviour (logistic regression analysis)*

Variable	<i>B</i>	<i>Odds ratio</i>	<i>p</i>	<i>VIF</i>
Constant	-5.050			
Trust in health care system	.033	1.033	.421	1.631
Trust in health care professional	-.161	.852	.520	1.595
Disengaged coping style	.025	1.025	.120	1.137

Problem engaged coping style	.051	1.052	.111	1.385
Emotion engaged coping style	-.046	.955	.070	1.172
Psychosocial determinants of VISB	.556	1.743	.007	1.746
factor 1: Attitudes and beliefs				
Psychosocial determinants of VISB	.244	1.276	.075	1.483
factor 2: Descriptive norms				
Psychosocial determinants of VISB	.074	1.076	.587	1.252
factor 3: Injunctive norms				
Psychosocial determinants of VISB	.240	1.272	.264	1.58
factor 4: Perceived behavioural control				
Risk Perception of vaccination during pregnancy	-.058	.944	.774	1.215
Satisfaction with information given	-.493	.611	.005	1.519

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566 Alpha was  $p < .0045$  as adjusted for multiple comparisons

567 Unstandardized Beta coefficient  $B$

568 Variance inflation factor (VIF)

569 Vaccine information-seeking behaviour (VISB)

570

571

572 **Table 4**

573 *Psychosocial predictors of vaccine information seeking behaviour (logistic regression analysis)*

Variable	<i>B</i>	<i>Odds ratio</i>	<i>p</i>	<i>VIF</i>
Constant	-4.657			
Disengaged coping style	.025	1.026	.105	1.102
Problem engaged coping style	.057	1.058	.060	1.264
Emotion engaged coping style	-.048	.953	.057	1.144
Psychosocial determinants of VISB	.550	1.732	.005	1.502
factor 1: Attitudes and beliefs				
Psychosocial determinants of VISB	.263	1.301	.048	1.398
factor 2: Descriptive norms				



Psychosocial determinants of VISB	.263	1.301	.206	1.286
factor 4: Perceived behavioural control				
Satisfaction with information given	-.500	.607	.002	1.181

574 Alpha was  $p < .007$  as adjusted for multiple comparisons

575 Variance inflation factor (VIF)

576 Unstandardized Beta coefficient *B*

577 Vaccine information-seeking behaviour (VISB)

578

579

580 **Table 5**

581 *General pertussis vaccine single item questions summary*

Questions	Number	%
Did you receive the whooping cough vaccine during your last pregnancy?		

Yes	297	94.9
-----	-----	------

No	16	5.1
----	----	-----

When did you become aware that the whooping cough vaccine is recommended for pregnant women?

Before last pregnancy	144	45.9
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During last pregnancy	165	52.5
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Cannot remember	5	1.6
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Approximately how many weeks pregnant were you when you had the whooping cough vaccination?

<17 Weeks	7	2.4
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Between 17 and 26 Weeks	109	37
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Between 27 and 36 Weeks	173	58.8
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>36 Weeks	5	1.7
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How did you first become aware about the whooping cough vaccination given during pregnancy?

Leaflet with an appointment letter	16	5.1
During a meeting with a midwife	243	77.4
During a meeting with an obstetrician	4	1.3
During a meeting with a GP	6	1.9
During a meeting with a health visitor	2	0.6
During a meeting with a nurse	1	0.3
Public Health Campaign	3	1.0
Media (TV, Newspaper)	2	0.6
Friend or family member	16	5.1
Do not remember	4	1.3
Other	17	5.4

Out of the health care professionals you saw during your pregnancy which (if any) gave you

the most encouragement to receive the whooping

cough vaccine?

Midwives	287	91.4
Obstetrician	2	0.6
GP	10	3.2
Health Visitor	2	0.6
Nurse	8	2.5
Pharmacist	1	0.3
Consultant	4	1.3

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582

583 **Table 7**

584 *Vaccine information seeking behaviour single item questions*

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<i>Questions</i>	<i>Number</i>	<i>%</i>
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Did you seek out or research additional information		
about the whooping cough vaccine or whooping cough		
as a disease to help you make your decision?		
No	177	56.9
Yes	123	39.5
Cannot remember	11	3.5
If yes, where did you go for this additional information?		
The internet (articles and news) e.g. NHS Choice, Net doctor	103	81.1
The internet (Forums and discussion with other women) e.g. Mumsnet, Netmums, Facebook, Twitter	59	46.5
Friends and family members	54	42.5
Parenting and pregnancy books and magazines	17	13.4
Another NHS health care professional	7	7.1
A complementary/alternative health care professional	5	3.9
A private health care professional	3	2.4

e-books	1	0.8
Religious leaders	0	0
Other	6	4.7

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585

586

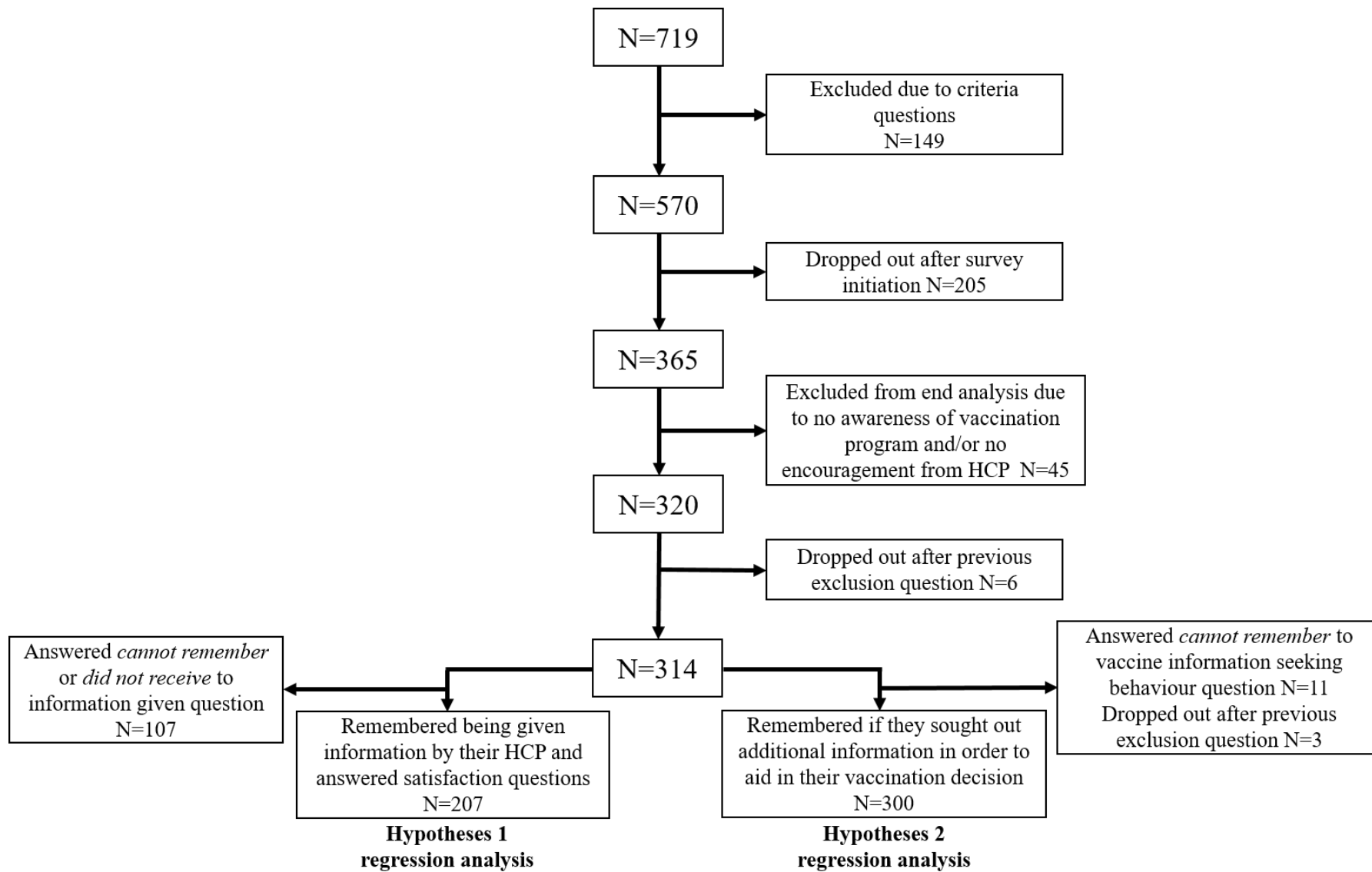


Fig. 1. Flowchart of participant exclusion and drop out