

1 **Developing the evidence-base for gender and age-relevant school sex education;**  
2 **questionnaire findings from an adolescent sample using an augmented Theory of**  
3 **Planned Behaviour**

4

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27 **ABSTRACT**

28

29 **Background**

30 Positive adolescent sexual health is supported by effective school based sex education.  
31 Methods to promote positive sexual health need to reflect determinants of  
32 contraception intention, which must include understanding gender and age (year group)  
33 differences. To date, there has been limited theory-based exploration of these  
34 determinants in school-age participants, placing limitations on sexual health educators  
35 to tailor learning most effectively.

36

37 **Methods**

38 Cross sectional survey data was collected from UK school pupils (N = 1378) aged 12-  
39 16 years. Measures included Theory of Planned Behaviour, Prototype Willingness,  
40 anticipated regret and knowledge items. Linear regression determined significant  
41 predictors of intention to use condoms, the oral contraceptive pill and emergency  
42 contraception (EC). *t*-tests and ANOVAs were used to assess differences by gender  
43 and school year.

44

45 **Results**

46 Three distinct predictive models emerged for condom, pill and EC, predicting 36%,  
47 18% and 23% variance respectively. Attitude, gender and anticipated regret for  
48 unprotected sex significantly predicted intention for all types ( $p < .001$ ). The influence  
49 of other explanatory variables differed by contraceptive. Girls scored higher on all  
50 variables except condom intention, and intention scores peaked in year 10.

51

52 **Conclusion**

53 Condoms, pill and EC intention have different predictive profiles, with girls more  
54 strongly motivated and year 10 a crucial stage for intention. Social comparisons and  
55 control beliefs exert differential effects across contraceptive types whilst attitudes and  
56 anticipated regret are consistently strong influences. Findings suggest clear scope for  
57 supporting sexual health and wellbeing through modified school sex education.

58

59 **KEYWORDS**

60 Adolescence, sexual health, sex education, theory, intervention, contraception

61

62

63 **BACKGROUND**

64 Internationally, reducing rates of adolescent conception and childbearing is a major  
65 public health priority<sup>1</sup>. Whilst the UK under-18 conception rate has reduced by 40.8%  
66 since 1969<sup>2</sup>, 45.2% of 16-19 year old pregnancies are still unplanned<sup>3</sup>. Sexually  
67 transmitted infections (STIs) also continue to increase and young people aged 16-24  
68 years are at most risk of infection<sup>4</sup>. Teenage Pregnancy (TP) and STI reduction  
69 therefore remain part of the UK Government's public health strategy<sup>5,6</sup> to ameliorate  
70 the associated negative social and health implications<sup>7-11</sup>, presenting clear opportunities  
71 for promoting behaviour change.

72

73 School based sex education remains the primary source of contraceptive and sexual  
74 health information for many young people<sup>12</sup>. Evidence suggests a positive relationship

75 between school sex education and delay of sexual debut, likelihood of protected sex  
76 and – for females – lower likelihood of unplanned pregnancy<sup>3</sup> and non-consensual  
77 activity<sup>13</sup>. However, recent assessments<sup>14</sup> have criticised the quality and effectiveness  
78 of sex education, identifying the need for improvement in more than one third of UK  
79 schools. With abstinence-only sex education programmes proving ineffective, arguably  
80 successful provision requires comprehensive, theory and evidence-based approaches  
81 addressing the complexity of sexual behaviour<sup>15-17</sup> and taking account of important  
82 determinants of contraceptive use.

83

84 Within a large body of health behaviour frameworks, the Theory of Planned  
85 Behaviour<sup>18</sup> (TPB) has shown particular utility in predicting safer sex behaviours<sup>19,20</sup>,  
86 including in adolescent samples<sup>21</sup>. Briefly, the theory proposes that intention is the  
87 primary mediator of behaviour, which itself is determined by attitudes (ATT; beliefs  
88 about the merits of a specified action), subjective norms (SN; perceptions about what  
89 important others think you should do) and perceived behavioural control (PBC;  
90 appraisal of ones' own ability to act). PBC may also exert direct influence on  
91 behaviour to the extent that perceptions about control reflect actual control and bypass  
92 intentions. However in recent years the utility of the TPB in its standard form has been  
93 called into question<sup>22</sup>. Within teen sexual behaviour, the complex interplay of social  
94 factors<sup>23</sup>, situational influences<sup>24,25</sup> and biases in adolescent cognition<sup>26</sup> challenges the  
95 applicability of such rational approaches. The inclusion of more socially reactive paths  
96 such as those posited in the Prototype Willingness model<sup>27</sup> (PWM) have been  
97 empirically supported in a range of risk behaviours<sup>28,29</sup> including engaging in safe  
98 sex<sup>30,31</sup>. In PWM, likelihood of action is influenced by (i) favourability of judgements  
99 about those who engage in a specific behaviour (*prototype evaluation*), (ii) degree of

100 perceived likeness to such individuals (*prototype similarity*) and (iii) the combination  
101 of these factors (*prototype interaction*). Evidence also suggests that PWM can add to  
102 the predictive power of the TPB<sup>32-34</sup>. Likewise, anticipated regret (AR) - which taps  
103 into future concerns about consequences of either performing or *not* performing a  
104 behaviour - has been shown to have a direct and independent influence on risk  
105 behaviour<sup>35</sup>, beyond simply contributing to the attitude construct to which it is closely  
106 aligned<sup>36</sup>. Extending an individual's time perspective (anticipation) and focusing on  
107 affective sequelae (regret) has been demonstrated to have an inhibiting effect on sexual  
108 risk taking<sup>37</sup>, and thus suggest that AR may offer an appropriate augmentation of the  
109 TPB.

110

111 Within a range of contraceptive options – including long acting reversible  
112 contraceptives such as the implant or injection – adolescents opt for condoms, the  
113 contraceptive pill (hereon referred to as ‘pill’) and the emergency contraceptive pill  
114 (EC)<sup>38</sup> most frequently. Safe sex thus depends on adolescents' ability to use  
115 contraception which is more personally *effortful* in nature. Understanding  
116 determinants of such behaviour ahead of widespread sexual debut is vital<sup>39</sup> to optimise  
117 the impact of education. Such actions necessarily differ by gender and are dependent  
118 upon sufficient knowledge and understanding. As school sex education is frequently  
119 taught within school year groups, educators thus face substantive challenges in  
120 delivering individualised content in this context, and require a sufficient and robust  
121 evidence base to do so.

122

123 However, at present it is unclear (i) which determinants most strongly predict condom,  
124 pill and EC intention, and (ii) how sex education should be tailored accordingly for

125 boys and girls in school-year group settings. This study therefore extends the TPB<sup>40</sup>  
126 with PWM, AR and knowledge about contraception and sexual health to explore  
127 comparative contraceptive intentions and assess the influence of gender and school  
128 year. The sample is drawn from UK school years 8 (12-13 year olds) to year 11 (aged  
129 15-16). The research questions are:

130

- 131 1) What are the salient and comparative determinants of condom, pill and EC  
132 intentions?
- 133 2) To what extent are intentions for each method correlated?
- 134 3) How do determinants differ by gender and school year?
- 135 4) How may sex education need to be tailored to accommodate gender and year  
136 group differences and enhance sexual health?

137

## 138 **METHOD**

139 This study involved two phases:

- 140 1. Survey development and review
- 141 2. Survey administration

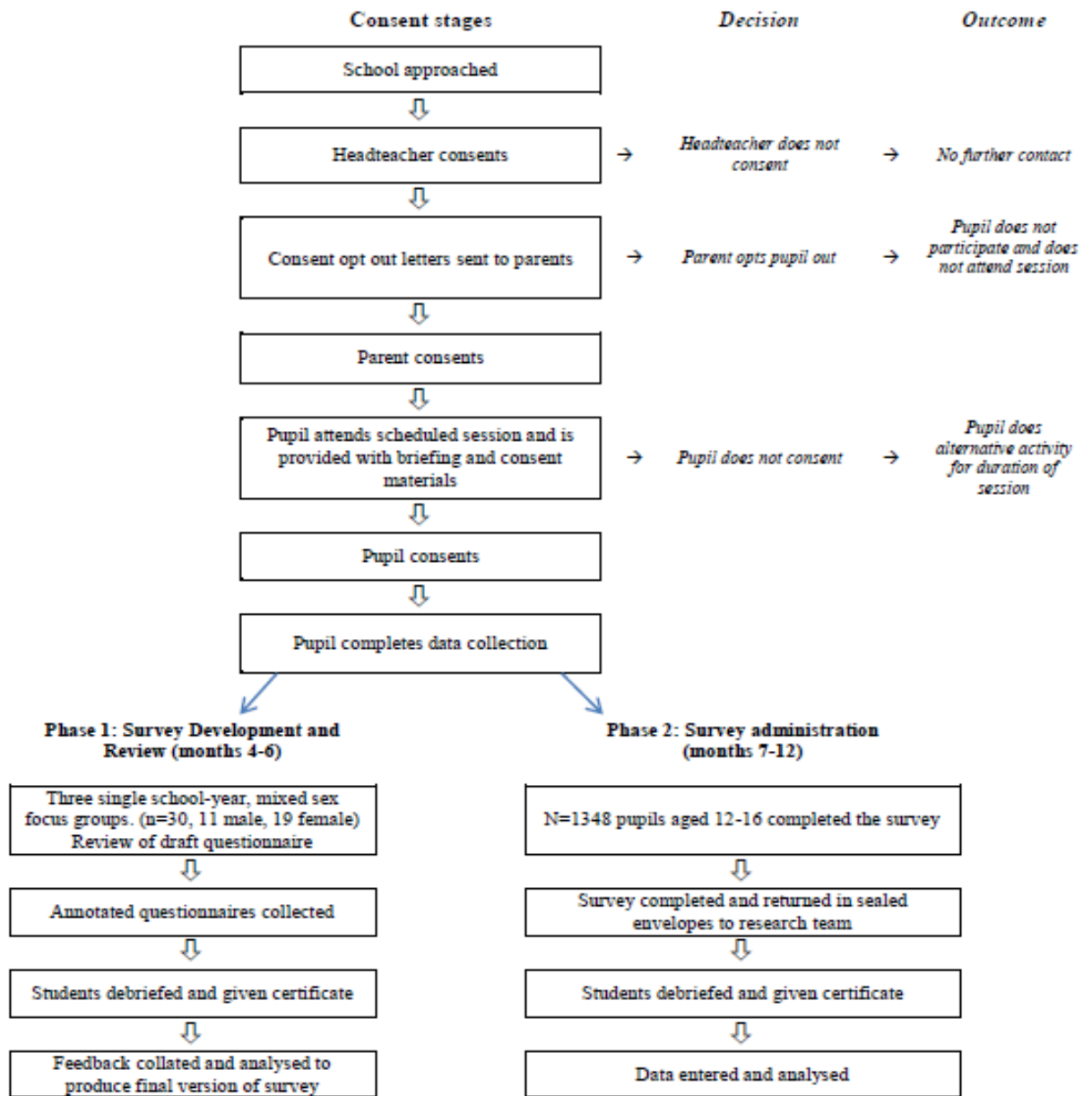
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### 143 **Consent process**

144 This study was approved by Coventry University Ethics Committee. Consent in each  
145 phase followed the same process and is summarised alongside data collection  
146 processes in Figure 1.

147

**Figure 1: Summary of Consent and Data Collection Processes for Each Phase.**



148

149 **Phase 1: Survey development and review**

150 A draft questionnaire was produced based on published literature and best practice for  
 151 TPB survey development<sup>41, 42</sup>. This was reviewed by thirty school pupils (15 male, 15  
 152 female) from two local secondary schools to assess survey item appropriateness and

153 response elicitation effectiveness. Year specific focus groups, each consisting of only  
154 year 9, 10 or 11 pupils were run, with male and female students split equally (5 males  
155 and 5 females) between them. Pupils commented verbally and annotated a printed  
156 copy of the survey. Feedback from each group was collated and analysed to inform the  
157 development of the final questionnaire. Pilot testing highlighted a series of revisions  
158 needed, including simplifying language such as replacing ‘*intend*’ with ‘*plan*’ and  
159 ‘*want*’ to improve comprehension of intention measures. A final version of the survey  
160 was produced for phase 2.

161

## 162 **Phase 2: Survey administration**

### 163 **Participants**

164 Power calculations (using G Power 3.0.10, holding  $\alpha$  at .05, with power at .95, and  
165 taking account of the number of predictor variables) determined that a final sample of  
166 863 participants was required to detect a small effect in the data. Three schools,  
167 consisting of one mixed comprehensive and two single sex schools (one male one  
168 female) and with similar profiles of ethnicity and (average) academic attainment were  
169 recruited, This resulted in a total of 1348 pupils participating.

170

### 171 **Measures**

172 All items were presented with female/male specific variants where appropriate. Data  
173 were (re)coded so that higher scores reflect more positive/self-protective responses.

174

### 175 ***TPB variables***

176 All TPB variables were measured in relation to condom behaviour (“use condoms  
177 every time I have sex”), pill use (“take / rely on my girlfriend to take the contraceptive



178 pill regularly to prevent pregnancy”) and use of EC (“take / rely on my girlfriend to  
179 take emergency contraception (‘morning after pill’) after unprotected sex to prevent  
180 pregnancy”).

181

182 Intention (INT) for each contraceptive was constructed from the mean of two items: “I  
183 plan to [behaviour]” and “I want to [behaviour]”. Responses to all items were on 7-  
184 point Likert scales ranging from “*strongly disagree*” to “*strongly agree*”. Cronbach’s  
185 alpha scores showed good internal consistency for condoms ( $\alpha=.901$ ), pill ( $\alpha=.703$ ) and  
186 EC ( $\alpha=.893$ ).

187

188 Attitude (ATT) for each contraceptive was constructed from the mean of four 7-point  
189 bipolar scales using the endpoints (i)“good” to “bad”, (ii)“pleasant” to “unpleasant”,  
190 (iii) “enjoyable” to “unenjoyable” and (iv) “silly to sensible”). The format for each  
191 item was “How [endpoints] do you think it would be for you to use [contraception]?”  
192 Cronbach’s alpha scores showed satisfactory internal consistency for condoms  
193 ( $\alpha=.636$ ), pill ( $\alpha=.622$ ) and EC ( $\alpha=.567$ ).

194

195 Subjective norms (SN) for each contraceptive were measured by responses to the item  
196 “Overall, how much do you think people would approve or disapprove of you using  
197 [contraception]”. Responses were given on 7 point scales (“*strongly disapprove*” to  
198 “*strongly approve*”).

199

200 Perceived behavioural control (PBC) for each contraceptive was measured respectively  
201 by responses to the items “I am confident that I can use a condom every time I have  
202 sex”, “I am confident that I/my partner could remember to take the contraceptive pill at

203 the same time each day” and “I am confident that I/my partner could take the  
204 emergency contraceptive pill after unprotected sex”. Responses to all items were on 7-  
205 point Likert scales ranging from “*strongly disagree*” to “*strongly agree*”.

206

### 207 ***Prototype Willingness variables***

208 Prototype evaluation (PE) was assessed with the question “How much do each of the  
209 following words describe the type of teenage girl who gets pregnant/teenage boy who  
210 gets a girl pregnant?” (answered by girls and boys respectively). This was followed by  
211 a series of descriptors (careless, immature, confused, intelligent, brave, self-confident,  
212 popular, cool, lucky, sophisticated). Respondents provided ratings on 5 point unipolar  
213 scales from “not at all” to “very much”. Positive descriptors were reverse scored so  
214 higher scores reflect *unfavourable* opinions and a mean overall score was calculated.

215

216 Prototype similarity (PS) was assessed by the response to the item ‘In general, how  
217 similar are you to the type of girl who gets pregnant / boy who gets a girl pregnant?’ on  
218 a 7-point unipolar scale (“*very similar*” to “*not at all similar to me*”). Higher scores  
219 indicated perceived *dissimilarity* to pregnant teens.

220

221 Prototype interaction (PI) was constructed from the product of PE and PS.

222

### 223 ***Anticipated regret***

224 Anticipated regret was measured by two separate items: Anticipated regret for  
225 unprotected sex (AR-UPS) was assessed by response to the question “If you had sex  
226 and did not use contraception, how much do you think you would regret it the next  
227 day?”. Anticipated regret for a resultant pregnancy (AR-Preg) was assessed by

228 response to the item “If you had sex and did not use contraception, how much do you  
229 think you would regret it if you then found out that you or your partner were  
230 pregnant?” Responses to both were on 5 point scales (“*not at all*” to “*completely*  
231 *regret*”).

232

### 233 **Knowledge**

234 Knowledge was measured by summing the total number of correct answers to 14  
235 questions on contraceptive use (e.g. “How long after unprotected sex is the emergency  
236 contraceptive pill effective?”), STIs (e.g. “Which of the following do you think are  
237 possible consequences of getting a sexually transmitted infection”) and general sexual  
238 risk (e.g “True or false - Sperm can be released from the penis before ejaculation?”)

239

### 240 **Procedure**

241 All schools opted for paper (vs. web) administration. Following headteacher approval,  
242 parents were sent opt-out consent letters. No students were withdrawn. Researchers  
243 attended specified classes, briefed pupils verbally and in writing and obtained informed  
244 consent. Those choosing not to participate were given an alternative activity.

245 Completed questionnaires were placed in sealed envelopes and data was processed in  
246 accordance with the Data Protection Act 1998. Data from paper questionnaires were  
247 hand entered into a statistical database (SPSS 20) and screened to ensure all points  
248 were correctly entered.

249

250 **Analysis**

251 Following descriptive analysis, multiple linear regression was conducted to assess  
252 predictive models of intention for each contraceptive type. *t*-tests were applied to  
253 assess variable differences by gender, and ANOVAs for differences by school year.

254

255 **RESULTS**

256 **Descriptive analysis**

257 Table 1 provides full demographic details of the sample. Most respondents were  
258 female (66.7%), White British (81.1%), lived in two-parent households (68.5%) and  
259 had received sex education at school (90.5%)

260

261 **Table 1: Respondent Characteristics**

262

Characteristic	Response	Freq	%
Gender	Male	448	33.2
	Female	899	66.7
School year	8	324	18.8
	9	396	22.9
	10	244	14.1
	11	382	22.1
Ethnicity	White British	1093	81.1
	Pakistani (Asian / British Asian)	90	6.7
	Indian (Asian / British Asian)	29	2.2
	Mixed heritage	26	1.9
	Other	22	1.6
	Asian other / Asian mixed	19	1.4
	African (Black / Black British)	16	1.2
	Caribbean (Black / Black British)	15	1.1

	Black other / Black mixed	11	0.8
	White other	11	0.8
	Bangladeshi (Asian / British Asian)	5	0.4
Household	Single parent	413	30.6
	Dual parent	923	68.5
Had sex	Yes	1220	90.5
education at	No	64	4.7
school	Don't know	56	4.2

263

264

265

266 Mean scores for all TPB items were at least 1.5 points above the scale mid-point of 3,  
267 showing total INT (4.94), ATT (4.91), SN (5.03) and PBC (4.79) were positive.

268 Mean anticipated regret scores were higher than the 5 point scale midpoint for both  
269 items, with AR-UPS slightly above (3.70) and AR-Preg over one point higher (4.06).

270 Prototype evaluation scores were only marginally above the scale midpoint (3.56),  
271 showing a small tendency towards viewing pregnant teens unfavourably. In contrast,  
272 mean scores for prototype similarity were much higher than the 7-point scale midpoint  
273 showing participants judge themselves as largely dissimilar from pregnant teens (mean  
274 5.15).

275

## 276 **Regression analysis**

277 Multivariate linear regression analysis was employed to build three models (condom,  
278 EC and pill). These explored the relationship between explanatory variables (ATT,  
279 PBC, SN, AR-UPS, AR-Preg, prototype evaluation, prototype similarity, prototype  
280 interaction, gender, school year) and intention to use each contraception. First, a full  
281 specification regression model was built for each of the three dependent variables.

282 Both the significant and insignificant variables were reported along with the Adjusted  
 283 R<sup>2</sup> and F statistic measures of model fit. Regressions were then run with reduced  
 284 samples.<sup>43</sup> A stepwise procedure was employed to identify the final models (see table  
 285 2).

**Table 2: Final Stepwise Regression Models for Condom, Pill and EC intention**

	CONDOM	PILL	EC
ATT	0.413 (6.23)**	0.454 (6.48)**	0.524 (7.25)**
PBC	0.212 (5.48)**	0.089 (2.09)*	
SN		0.169 (3.79)**	0.187 (4.46)**
Gender	0.757 (6.52)**	0.345 (2.48)*	0.371 (2.51)*
Year 11	0.214 (2.04)*		
Year 10	0.400 (3.48)**		
Prototype Interaction	0.020 (2.91)**	0.024 (2.37)*	
Prototype Similarity		-0.265 (2.07)*	
AR (UPS)	0.316 (7.06)**	0.151 (2.87)**	0.177 (2.86)**
AR (Pregnancy)			0.175 (2.79)**
Constant	-0.156 (0.47)	0.995 (1.93)	0.086 (0.22)
R <sup>2</sup>	<b>0.36</b>	<b>0.18</b>	<b>0.23</b>
N	792	735	669

\*Significant at .05  
 \*\*Significant at .01

286  
 287 Attitude was a significant predictor of intention for all contraceptive types. Gender also  
 288 significantly predicted intention for all contraceptive types, as did AR-UPS. Neither  
 289 prototype evaluation nor knowledge significantly predicted intention for any  
 290 contraceptive type.

291

292 For condoms, PBC, Prototype Interaction, AR-UPS and higher school years further  
293 significantly predicted intention. Taken together these determinants predicted 36%  
294 variance in condom intention.

295

296 For the pill, both PBC and SN added significantly to prediction of intention, with SN  
297 providing the greater effect of the pair. Prototype Interaction had a significant effect at  
298 the same order of magnitude as for condoms. AR-UPS added to the predictive model  
299 (at around half the magnitude for condoms), with Prototype Similarity contributing in a  
300 negative direction. In total, the significant determinants predicted 18% variance in pill  
301 intention.

302

303 For EC intentions, SN, AR-UPS and AR-Preg significantly added to the predictive  
304 model and predicted 23% of the variance.

305

### 306 **Correlation between intentions**

307 A Pearson product-moment correlation coefficient was computed to assess the  
308 relationship between intentions for all contraceptive types. Analysis showed  
309 significant correlations between intentions for all pairs; Condoms and pill,  
310  $r(1275)=.405, p<.001$ ; Condoms and EC,  $r(1272)=.360, p<.001$ ; pill and EC,  
311  $r(1272)=.625, p<.001$ .

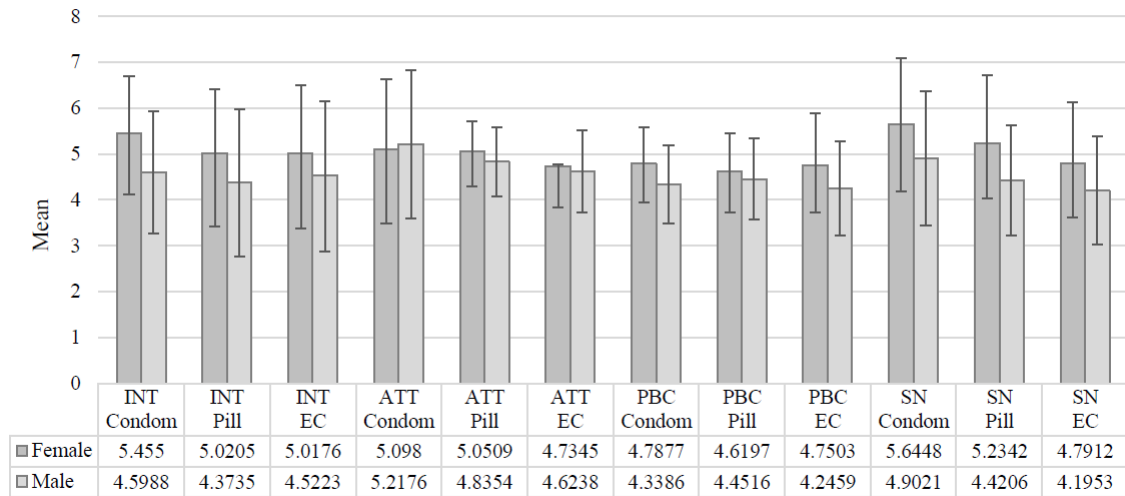
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### 313 **Analysis of determinants by gender**

314 Mean scores for all items - except condom attitudes - were more positive in females.  
315 Figure 2 provides mean and standard deviation scores for all TPB items by gender.

316

**Figure 2: TPB Variable Means and Standard Deviations by Gender**



317

318 Independent t-tests were used to compare determinants by gender. Results showed a  
 319 significant effect for gender on intention to use all three contraceptives with females  
 320 scoring more highly throughout: condoms,  $t(1295) = 8.967, p < .001$ ; pill,  $t(1277) =$   
 321  $5.789, p < .001$ ; EC,  $t(1276) = 4.634, p < .001$ .

322

323 T-tests also showed significant gender differences in attitudes to condoms, with  
 324 attitudes more positive in boys;  $t(1223) = -2.178, p = .030$ . Attitudes to the pill also  
 325 differed significantly by gender;  $t(1166) = 3.905, p < .001$  with pill use attitudes more  
 326 positive in girls. No significant attitude differences were found by gender for EC.

327

328 Gender differences in PBC were found for condoms ( $t(1205) = 3.850, p < .001$ ) and EC  
 329 ( $t(1189) = 4.561, p < .001$ ), with scores higher for females for both. No significant  
 330 differences were found for pill attitudes by gender.

331



332 Gender differences in SN were found for condoms ( $t(1215) = 6.816, p < .001$ ), pill  
 333 ( $t(1217) = 7.867, p < .001$ ) and EC ( $t(1215) = 5.432, p < .001$ ). Mean SN scores were higher  
 334 in females for all contraceptive types.

335

336 Gender differences were also found in all other variables, with mean scores higher in  
 337 females throughout: prototype evaluation (female  $m = 3.6, sd = .513$ ; male  $m = 3.47,$   
 338  $sd = .622; t(1167) = 3.905, p < .001$ ), prototype similarity (female  $m = 5.41, sd = 1.57$ ; male  
 339  $m = 4.64, sd = 1.68; t(1316) = 8.108, p < .001$ ), prototype interaction (female  $m = 19.65,$   
 340  $sd = 6.82$ ; male  $m = 3.87, sd = 1.13947; t(1146) = 7.305, p = .000$ ), AR-UPS (female  
 341  $m = 3.87, sd = 1.14$ ; male  $m = 3.27, sd = 1.33; t(1068) = 7.389, p < .001$ ), AR-Preg (female  
 342  $m = 4.21, sd = 1.08$ ; male  $m = 3.69, sd = 1.35; t(1146) = 7.305, p < .001$ ) and knowledge  
 343 (female  $m = 9.65, sd = 2.34$ ; male  $m = 8.93, sd = 2.24; t(1250) = 5.190, p < .001$ ).

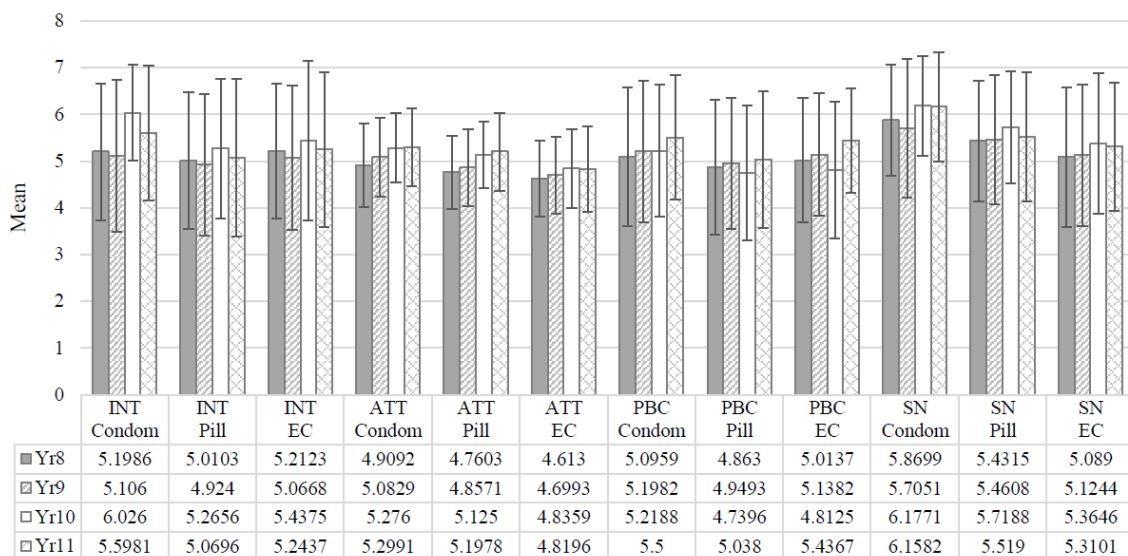
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345 **Analysis of determinants by school year**

346 Figure 3 provides mean and standard deviation scores for all TPB items by school year.

347

**Figure 3: TPB Variable Means and Standard Deviations by School Year**



348

349 ***Intention***

350 ANOVA results showed that only intention to use condoms differed significantly by  
351 school year,  $F(3,1292)=9.672$ ,  $p<.001$ . Pill and EC intentions did not significantly  
352 differ. Post hoc analysis indicated that condom intention differed between years 8 and  
353 10 ( $p=.002$ ), and year 9 and 11 ( $p=.002$ ) rather than between sequential years. Intention  
354 for all contraceptives was highest in year 10.

355

356 ***Attitude***

357 Attitudes for all contraceptives differed significantly by school year: condoms,  
358  $F(3,1220)=9.415$ ,  $p<.001$ ; pill,  $F(3, 1163)=19.610$ ,  $p<.001$ ; EC,  $F(3, 1037)=5.797$ ,  
359  $p=.001$ . There was a linear upwards trend, with attitudes becoming more positive in  
360 higher years for all contraceptives, with only EC intentions highest in year 10. Post hoc  
361 tests showed that condom attitudes differed between 8 and 10 ( $p=.01$ ) and 9 and 11  
362 ( $p=.013$ ). Pill attitudes differed significantly between years 10 and 11 ( $p=.045$ ) and EC  
363 between years 8 and 9 ( $p=.027$ ).

364

365 ***Perceived Behavioural Control***

366 PBC differed significantly by school year for all contraceptives: condoms,  
367  $F(3,1202)=16.108$ ,  $p<.001$ ; pill,  $F(3,1190)=11.396$ ,  $p<.001$ ; EC,  $F(3,1186)=22.582$ ,  
368  $p<.001$ . For pill and EC, PBC differed between years 10 and 11 ( $p<.05$ ) and for all  
369 types scores differed significantly between years 9 and 10. PBC was highest for all  
370 contraceptives in year 11 and EC and pill scores lowest in year 10.

371

372 ***Subjective norms***

373 SN for each contraceptive differed significantly by school year: condoms,  
374  $F(3,1212)=7.892$ ,  $p<.001$ ; pill,  $F(3,1214)=10.311$ ,  $p<.001$ ; EC,  $F(3,1212)=7.957$ ,  
375  $p<.001$ . For each type, SN differed significantly between years 9 and 10 ( $p<.01$ ), with  
376 SN scores highest in year 10.

377

378 Prototype similarity differed significantly by school year (year 8  $m=5.62$ ,  $sd=1.5$ ; year  
379 9  $m=5.18$ ,  $sd=1.47$ ; year 10  $m=5.34$ ,  $sd=1.58$ ; year 11  $m=5.24$ ,  $sd=1.61$ ;  
380  $F(3,1313)=4.223$ ,  $p=.006$ . Similarity ratings differed significantly between years 8 and  
381 9 ( $p>.01$ ) with highest ratings in the former and lowest in the latter. Prototype  
382 evaluation did not significantly differ by school year.

383

384 Anticipated regret for both unprotected sex and pregnancy differed significantly by  
385 school year: AR-UPS (year 8  $m=3.70$ ,  $sd=1.21$ ; year 9  $m=3.63$ ,  $sd=1.18$ ; year 10  
386  $m=4.02$ ,  $sd=.99$ ; year 11  $m=3.82$ ,  $sd=1.15$ ;  $F(3,1065)=5.573$ ,  $p=.001$ ), AR-Preg (year  
387 8  $m=4.04$ ,  $sd=1.11$ ; year 9  $m=3.99$ ,  $sd=1.15$ ; year 10  $m=4.37$ ,  $sd=.99$ ; year 11  $m=4.24$ ,  
388  $sd=1.06$ ;  $F(3,1064)=6.951$ ,  $p<.001$ ). Scores for both AR-UPS and AR-Preg differed  
389 significantly between years 9 to 10 ( $p<.005$ ) and were highest in year 10. For AR-UPS  
390 scores also significantly differed between years 10 and 11 ( $p<.05$ ).

391

### 392 ***Gender and school year differences in knowledge***

393 ANOVA showed knowledge was significantly higher in progressive years (year 8  
394  $m=8.54$ ,  $sd=2.16$ ; year 9  $m=8.95$ ,  $sd=2.45$ ; year 10  $m=9.92$ ,  $sd=2.45$ ; year 11  $m=10.21$ ,  
395  $sd=2.12$ ;  $F(3,1247)=39.388$ ,  $p<.001$ ). Mean knowledge scores were higher for girls  
396 throughout, with the male-female difference broadly increasing over time (female  
397 means higher by 0.23, 0.36, 1.19 and 1.17 in years 8-11 respectively)

398

399 **DISCUSSION**

400 To our knowledge this is the first study to comparatively assess 12 to 16 year-  
401 olds' intentions to use three contraceptive types, using an extended  
402 TPB. The three models successfully predicted 36%, 18% and 23% of variance in  
403 intention to use condoms, pill and EC respectively. Although there are strong  
404 correlations between intentions for each contraceptive method, our results  
405 show three distinct predictive models, with only gender, attitude and anticipated regret  
406 for non-use of contraception common to all three. Results suggest there is scope to  
407 increase intention towards each contraceptive by targeting their respective  
408 determinants within school sex education. These findings offer evidence for enhancing  
409 sexual health through tailored sex education, and support arguments for extending  
410 rather than retiring the TPB<sup>40</sup>.

411

412 Scores for all variables were highest in relation to condoms (followed by pill and EC),  
413 corresponding with evidence on adolescent contraceptive preferences<sup>38</sup>. Results  
414 support existing literature that attitude<sup>20, 44-48</sup>, SN<sup>21, 44, 45, 47, 49</sup> and PBC<sup>25, 46</sup> are  
415 significant influences on contraceptive intention. With condoms arguably the most  
416 behaviourally complex of the three methods, requiring both preparatory action (access  
417 and carrying) and situation-specific interaction (negotiation and correct use)<sup>50</sup>, control  
418 beliefs understandably elicit a strong effect<sup>25</sup>. In contrast, perceived control is a weak  
419 or null predictor of pill and EC intention respectively. Instead, normative influences  
420 emerge as an important correlate of pill and EC intention, suggesting that for female-  
421 specific contraceptives, motivation is influenced by what they believe important people

422 in their lives think they should do. Strengthening normative beliefs amongst girls may  
423 therefore be particularly useful for enhancing contraceptive intentions and use.

424

425 In line with Ajzen's espousal of evidenced extensions to the TPB<sup>51</sup>, the additional  
426 predictive power of prototype willingness items suggests these tap into attributes of  
427 normative beliefs beyond standard measures of subjective norms. Overall however  
428 neither perceived dissimilarity to teenagers who get pregnant/teenage boys who get  
429 girls pregnant nor unfavourable judgements alone were sufficient to prompt intention  
430 to use condoms. Furthermore in contrast to expectations<sup>52</sup>, for pill intentions there is a  
431 small but significant negative relationship between intention and the specific measure  
432 of prototype similarity. Judging oneself as similar - rather than dissimilar - to a typical  
433 teenager who gets pregnant (or gets a girl pregnant) is related to increased motivation  
434 to take the pill. A stronger sense of similarity may be a proxy assessment of likely risk  
435 of pregnancy triggering a stronger protective response of intention to take the pill.  
436 There may therefore be merit in increasing perceived similarity to pregnant teens and  
437 an understanding of risk to trigger protective intentions.

438

439 Whilst anticipated regret for unprotected sex underpinned intention for all  
440 contraceptives, regret for pregnancy was uniquely predictive of EC intentions. A likely  
441 explanation is that with adolescent thinking biased towards optimism and  
442 invulnerability<sup>53</sup>, severe consequences may be deemed unlikely until such time as they  
443 become a viable possibility. Thus, whilst there is general value in eliciting feelings of  
444 regret for unsafe sex, it may also be advisable to draw distal (pregnancy) outcomes  
445 more closely into adolescent consciousness to promote preventive action.

446

447 Whilst results suggest a linear increase in knowledge and stepwise changes in PBC and  
448 SN in later school years, overall there is a more disjointed progression in contraceptive  
449 intention. Furthermore, with school year significant only for condoms, increasing age  
450 is not automatically matched by incremental improvements in contraceptive intent. The  
451 most conspicuous deviation from linearity is the prominence of year 10 (ages 14-15  
452 years) across scores. Intention and SN for all contraceptive types peak at this point,  
453 with a similar pattern for anticipated regret. This suggests a qualitative difference in  
454 adolescents' consideration of contraception in year 10, not consistently maintained into  
455 year 11. Conversely PBC drops in year 10, suggesting that at this age stronger norms  
456 and social reference are coupled with a reduced sense of personal efficacy.  
457 Interventions to improve confidence may therefore be particularly valuable at this  
458 stage.

459

#### 460 **Limitations**

461 A key limitation of this study for guiding sex education content is that it focuses solely  
462 on heterosexual sex and contraceptive use. The work extends from a longer standing  
463 body of work to support the Teenage Pregnancy Strategy, resulting in a comparative  
464 focus on the three most common adolescent contraceptive choices. As two of these are  
465 used for pregnancy prevention only – and are thus heterosexual –this has the effect of  
466 leaving non-heterosexual sexual health largely unaddressed. The predominantly White  
467 British sample may limit generalisability across cultures, especially for those with  
468 different norms for adolescent contraception. However, our sample was broadly  
469 representative of ethnic diversity within the UK: White British in our survey  
470 constituted 81.8% of the sample (compared to 86% in the 2011 UK census<sup>54</sup>, Asian  
471 constituted 10.7% (vs. 7.5%), Black 3.3% (identical to the UK profile), Other 1.6% (vs

472 1%) and Mixed 1.9% (vs. 2.2%). The sample also mirrors the national pattern<sup>55</sup> of  
473 children living in dual parent (approximately two thirds) or lone parent (one third)  
474 households. Thus, whilst the England-specific sample may limit generalisability for  
475 international curriculum development, it appears suitably representative to draw  
476 national (UK) conclusions and offer insights beyond. The higher proportion of females  
477 in the sample requires caution in drawing concrete gender comparisons, albeit the large  
478 sample size ameliorates this concern. Future research needs to address four main  
479 issues. Firstly, we firmly advocate the need for improved understanding and support  
480 for the sexual health of LGBTQ young people, extending beyond simple comparisons  
481 of primary contraceptive options. Secondly, despite a large sample size, this cross-  
482 sectional approach precludes conclusions of the progressive nature of change across  
483 school years. Whilst such developments are implied by the data, further longitudinal  
484 data is required for firmer conclusions about the nature of maturing cognitions.  
485 Thirdly, with intention (not behaviour) the outcome measure of this research, there is  
486 need to understand how patterns identified here translate into contraceptive action and  
487 ultimately safe sex outcomes. Finally, further research must examine the emerging  
488 hypothesis that year 10 is a tipping point for adolescent cognitions about contraception  
489 use.

490

## 491 **Conclusions**

492 This study shows three specific profiles for condoms, pill and EC intention, with girls  
493 more strongly motivated and year 10 a crucial stage for cognitive engagement.  
494 Attitudes and anticipated regret for having unprotected sex are consistently strong  
495 influences on intention, whilst social comparisons and control beliefs exert discrete

496 effects for different contraceptives. There is clear scope and benefit in modifying  
497 school sex education delivery accordingly to enhance adolescent sexual health.

498

#### 499 **Implications for sexual health**

500 This research highlights several implications for improving sexual health through more  
501 effective and tailored school sex education. First, with knowledge alone insufficient to  
502 prompt intention, it is essential that education addresses the identified socio-cognitive  
503 factors which are amenable to change. More specifically lesson content should  
504 incorporate messages designed to (i) enhance overall contraceptive attitudes through  
505 strengthening positive beliefs (and/or reducing negative beliefs), (ii) improve perceived  
506 control for condoms and the pill and (iii) prompt positive norms and social  
507 comparisons for the pill. Second, boys must be supported to build stronger intentions  
508 towards contraception, even those forms for which they do not have primary control  
509 such that these behaviours can be reinforced within relationships. Third, with year 10  
510 emerging as such a significant stage, efforts should be focused on strengthening  
511 cognitions at this point and reinforcing control beliefs to maintain this effect into future  
512 years. Whilst contraceptive intention generally increases with age, education must start  
513 early enough to establish positive attitude, control and normative foundations ahead of  
514 sexual debut. Fourth, with clear models emerging for each contraceptive type,  
515 interventions must draw on established techniques and taxonomies for modifying  
516 determinants. In accordance with best practice such as Intervention Mapping<sup>56</sup>, the  
517 most effective provision would be a combination of the evidence base for differing  
518 determinants, proven techniques for changing socio-cognitive variables<sup>57, 58</sup>, and  
519 educator experience in delivering learning. Through this integrated approach, young  
520 people can be better equipped to develop strong intentions to use contraception,



521 underpinning subsequent positive choices and positive sexual health. Strategic  
522 commitment will be needed to resource such approaches, reflect non-heterosexual  
523 activity, and enable integration into an already pressured curriculum.

524

#### 525 **Conflicts of interest**

526 The authors have no conflicts of interest.

527

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531

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