

# Developing the evidence- base for gender- and age-relevant school sex education: Questionnaire findings from an adolescent sample using an augmented theory of planned behaviour

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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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25

26 **ABSTRACT**

27

28 **Background**

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

35

36 **Methods**

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

43

44 **Results**

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

50

51 **Conclusion**

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

57

58 **KEYWORDS**

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

60

61

62 **BACKGROUND**

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

71

72 School based sex education remains the primary source of contraceptive and sexual  
73 health information for many young people<sup>12</sup>. Evidence suggests a positive relationship  
74 between school sex education and delay of sexual debut, likelihood of protected sex

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

82

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

100 Evidence also suggests that PWM can add to the predictive power of the TPB<sup>32-34</sup>.  
101 Likewise, anticipated regret - which taps into future concerns about consequences of  
102 *not* performing a behaviour - has been shown to have a direct and independent  
103 influence on risk behaviour<sup>35</sup>, beyond simply contributing to the attitude construct to  
104 which it is closely aligned<sup>36</sup>. Extending an individual's time perspective and focusing  
105 on affective sequelae has been demonstrated to have an inhibiting effect on sexual risk  
106 taking<sup>37</sup>.

107

108 With adolescents favouring effortful contraceptives - condoms, the pill and to a lesser  
109 extent emergency contraception (EC)<sup>38</sup> - safe sex is dependent upon diligent, effective  
110 action. Understanding determinants of such behaviour ahead of widespread sexual  
111 debut is vital<sup>39</sup> to optimise the impact of education. Such actions necessarily differ by  
112 gender and are dependent upon sufficient knowledge and understanding. As school  
113 sex education is frequently taught within school year groups, educators thus face  
114 substantive challenges in delivering individualised content in this context and require a  
115 sufficient and robust evidence base to do so.

116

117 However at present it is unclear (i) which determinants most strongly predict condom,  
118 contraceptive pill and EC intention, and (ii) how sex education should be tailored  
119 accordingly for boys and girls in school-year group settings. This study therefore  
120 extends the TPB<sup>40</sup> with PWM, AR and knowledge variables to explore comparative  
121 contraceptive intentions and assess the influence of gender and school year. The  
122 sample is drawn from UK school years 8 (12-13 year olds) to year 11 (aged 15-16).

123 The research questions are:

124

- 125 1) What are the salient and comparative determinants of condom, contraceptive  
126 pill and EC intentions?  
127 2) To what extent are intentions for each method correlated?  
128 3) How do determinants differ by gender and school year?  
129 4) How may sex education need to be tailored to accommodate gender and year  
130 group differences and enhance sexual health?

131

## 132 **METHOD**

133 This study involved two phases:

- 134 1. Survey development and review
- 135 2. Survey administration

136

### 137 **Consent process**

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

141

142 **INSERT FIGURE 1 HERE**

143

### 144 **Phase 1: Survey development and review**

145 A draft questionnaire was produced based on published literature and best practice for  
146 TPB survey development<sup>41, 42</sup>. This was reviewed by thirty school pupils (11 male, 11  
147 female) in year-specific groups (years 9-11) from two local secondary schools to assess  
148 survey item appropriateness and response elicitation effectiveness. Pupils commented  
149 verbally and annotated a printed copy of the survey. Feedback from each group was

150 collated and analysed to inform the development of the final questionnaire. Pilot  
151 testing highlighted a series of revisions needed, including simplifying language such as  
152 replacing ‘*intend*’ with ‘*plan*’ and ‘*want*’ to improve comprehension of intention  
153 measures. A final version of the survey was produced for phase 2.

154

## 155 **Phase 2: Survey administration**

### 156 **Participants**

157 Power calculations (using G Power 3.0.10, holding  $\alpha$  at .05, with power at .95, and  
158 taking account of the number of predictor variables) determined that a final sample of  
159 863 participants was required to detect a small effect in the data. Three schools with  
160 similar profiles of (average) academic attainment, and truancy were recruited,  
161 consisting of one mixed comprehensive and two single sex schools (one male one  
162 female) resulting in a total of 1348 pupils.

163

### 164 **Measures**

165 All data were (re)coded so that higher scores reflect more positive/self-protective  
166 responses.

167

### 168 ***TPB variables***

169 All TPB variables were measured in relation to condom behaviour (“use condoms  
170 every time I have sex”), contraceptive pill use (“take / rely on my girlfriend to take the  
171 contraceptive pill regularly to prevent pregnancy”) and use of EC (“take / rely on my  
172 girlfriend to take emergency contraception (‘morning after pill’) after unprotected sex  
173 to prevent pregnancy”).

174



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

180

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

187

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

192

193 Perceived behavioural control (PBC) for each contraceptive was measured respectively  
194 by responses to the items “I am confident that I can use a condom every time I have  
195 sex”, “I am confident that I/my partner could remember to take the contraceptive pill at  
196 the same time each day” and “I am confident that I/my partner could take the  
197 emergency contraceptive pill after unprotected sex”. Responses to all items were on 7-  
198 point Likert scales ranging from “*strongly disagree*” to “*strongly agree*”.

199

200 ***Prototype Willingness variables***

201 Prototype evaluation (PE) was assessed by rating a series of descriptors (careless,  
202 immature, confused, intelligent, brave, self-confident, popular, cool, lucky,  
203 sophisticated) on how well they described a teenage girl who got pregnant. Responses  
204 were given on 5 point unipolar scales from “not at all” to “very much”. Positive  
205 descriptors were reverse scored so higher scores reflect *unfavourable* opinions and a  
206 mean overall score was calculated.

207

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

212

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

214

215 ***Anticipated regret***

216 Anticipated regret was measured by two separate items: Anticipated regret for  
217 unprotected sex (AR-UPS) was assessed by response to the question “If you had sex  
218 and did not use contraception, how much do you think you would regret it the next  
219 day?”. Anticipated regret for a resultant pregnancy (AR-Preg) was assessed by  
220 response to the item “If you had sex and did not use contraception, how much do you  
221 think you would regret it if you then found out that you or your partner were  
222 pregnant?”. Responses to both were on 5 point scales (“*not at all*” to “*completely*  
223 *regret*”).

224

225 **Knowledge**

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

231

232 **Procedure**

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

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

241

242 **Analysis**

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

246

247 **RESULTS**

248 **Descriptive analysis**

249 The sample was predominantly female (66.7%), White British (81.1%) and in years 8  
250 to 11. Most (68.5%) lived in a two-parent household with employed parents (84.6%).  
251 Many respondents had either already experienced good SR communication with  
252 parents (23.5%) or expected they would if they attempted to talk (41.2%). Table 1  
253 provides further demographic data.

254

255 **INSERT TABLE 1 HERE**

256

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

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

261 Prototype evaluation scores were only marginally above the scale midpoint (3.56),  
262 showing a small tendency towards viewing pregnant teens unfavourably. In contrast,  
263 mean scores for prototype similarity were much higher than the 7-point scale midpoint  
264 showing participants judge themselves as largely dissimilar from pregnant teens (mean  
265 5.15).

266

267 **Regression analysis**

268 Multivariate linear regression analysis was employed to build three models (condom,  
269 EC and pill). These explored the relationship between explanatory variables (ATT,  
270 PBC, SN, AR-UPS, AR-preg, prototype evaluation, prototype similarity, prototype  
271 interaction, gender, school year) and intention to use each contraception. First, a full

272 specification regression model was built for each of the three dependent variables.  
273 Both the significant and insignificant variables were reported along with the Adjusted  
274  $R^2$  and F statistic measures of model fit. Regressions were then run with reduced  
275 samples.<sup>43</sup> A stepwise procedure was employed to identify the final models (see table  
276 2).

277

278 **INSERT TABLE 2 HERE**

279

280 Attitude was a significant predictor of intention for all contraceptive types. Gender also  
281 significantly predicted intention for all contraceptive types, as did AR-UPS. Neither  
282 prototype evaluation nor knowledge significantly predicted intention for any  
283 contraceptive type.

284

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

288

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

295

296 For EC intentions, SN, AR-UPS and AR-Pregnancy significantly added to the  
297 predictive model and predicted 23% of the variance.

298

### 299 **Correlation between intentions**

300 Analysis showed significant correlations between intentions to use all contraceptive  
301 types; Condoms and pill,  $r(1275)=.405$ ,  $p<.001$ ; Condoms and EC,  $r(1272)=.360$ ,  
302  $p<.001$ ; Pill and EC,  $r(1272)=.625$ ,  $p<.001$ .

303

### 304 **Analysis of determinants by gender**

305 Mean scores for all items except condom attitudes were higher in females. Figure 2  
306 shows the mean and standard deviation scores for all TPB items by gender.

307

308 **INSERT FIGURE 2 HERE**

309

310 Independent t-tests were used to compare determinants by gender. There was a  
311 significant effect for gender on intention to use all three contraceptives;  
312 condoms,  $t(1295) = 8.967$ ,  $p<.001$ ; Pill,  $t(1277)= 5.789$ ,  $p<.001$ ; EC,  $t(1276) = 4.634$ ,  
313  $p<.001$ .

314

315 T-tests also showed significant gender differences in attitudes to condoms;  $t(1223)=$ -  
316  $2.178$ ,  $p=.030$ ). Condom use attitudes were more positive in boys. Attitudes to the Pill  
317 also differed significantly by gender;  $t(1166)=3.905$ ,  $p<.001$  with pill use attitudes  
318 more positive in girls. No significant differences were found for EC.

319 Gender differences in PBC were found for condoms ( $t(1205) = 3.850, p < .001$ ) and EC  
320 ( $t(1189) = 4.561, p < .001$ ), with scores higher for females for both. No significant  
321 differences were found for Pill.

322

323 Gender differences in SN were found for condoms ( $t(1215) = 6.816, p < .001$ ), Pill  
324 ( $t(1217) = 7.867, p < .001$ ) and EC ( $t(1215) = 5.432, p < .001$ ). Mean SN scores were higher  
325 in females for all types.

326

327 Gender differences were also found in prototype evaluation ( $t(1167) = 3.905, p < .001$ ),  
328 prototype similarity ( $t(1316) = 8.108, p < .001$ ), prototype interaction ( $t(1146) = 7.305,$   
329  $p = 0.000$ ), AR-UPS ( $t(10680) = 7.389, p < .001$ ) and AR-Preg ( $t(1146) = 7.305, p < .001$ ).

330 Mean scores for all were higher in females. Mean knowledge scores were significantly  
331 higher in girls ( $M = 9.6521, SD = 2.33913$ ) compared to boys ( $M = 8.9282, SD = 2.23824$ ),  
332  $t(1250) = 5.190, p < .001$ .

333

### 334 **Analysis of determinants by school year**

335 Figure 3 shows the mean and standard deviation scores for all TPB items by school  
336 year.

337

338 **INSERT FIGURE 3 HERE**

339

### 340 ***Intention***

341 ANOVA results showed that only intention to use condoms differed significantly by  
342 school year,  $F(3, 1292) = 9.672, p < .001$ . Pill and EC intentions did not significantly  
343 differ. Post hoc analysis indicated that condom intention differed between years 8 and

344 10 ( $p=.002$ ), and year 9 and 11 ( $p=.002$ ) rather than between sequential years. Intention  
345 for all contraceptives was highest in year 10.

346

### 347 *Attitude*

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

355

### 356 *PBC*

357 PBC differed significantly by school year for all contraceptives: condoms,  
358  $F(3,1202)=16.108$ ,  $p<.001$ ; Pill,  $F(3,1190)=11.396$ ,  $p<.001$ ; EC,  $F(3,1186)=22.582$ ,  
359  $p<.001$ . For Pill and EC, PBC differed between years 10 and 11 ( $p<.05$ ) and for all  
360 types scores differed significantly between years 9 and 10. PBC was highest for all  
361 contraceptives in year 11, and EC and Pill scores lowest in year 10.

362

### 363 *Subjective norms*

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

368



369 Prototype similarity differed significantly by school year,  $F(3,1313)=4.223$ ,  $p=.006$ .

370 Similarity ratings differed between years 8 and 9 ( $p>.01$ ) with highest ratings in the

371 former and lowest in the latter. Prototype evaluation did not significantly differ by

372 school year.

373

374 Anticipated regret for both unprotected sex and pregnancy differed significantly by

375 school year: AR-UPS,  $F(3,1065)=5.573$ ,  $p=.001$ ; AR-Preg,  $F(3,1064)=6.951$ ,  $p<.001$ .

376 Scores were highest for both in year 10 differed significantly between years 9 to 10

377 ( $p<.005$ ). For AR-UPS scores also significantly differed between years 10 and 11

378 ( $p<.05$ ).

379

380 *Gender and school year differences in knowledge*

381 ANOVA showed knowledge was significantly higher in progressive years,

382  $F(3,1247)=39.388$ ,  $p<.001$ . Mean knowledge scores were higher for girls throughout,

383 with the male-female difference increasing over time

384

## 385 **DISCUSSION**

386 To our knowledge this is the first study to comparatively assess 12 to 16 year-

387 olds' intentions to use three contraceptive types, using an extended

388 TPB. The three models successfully predicted 36%, 18% and 23% of variance in

389 intention to use condoms, pill and EC respectively. Although there are strong

390 correlations between intentions for each contraceptive method, our results

391 show three distinct predictive models, with only gender, attitude and anticipated regret

392 for non-use of contraception common to all three. Results suggest there is scope to

393 increase intention towards each contraceptive by targeting their respective

394 determinants within school sex education. These findings offer evidence for enhancing  
395 sexual health through tailored sex education, and support arguments for extending  
396 rather than retiring the TPB<sup>40</sup>.

397

398 Scores for all variables were highest in relation to condoms (followed by pill and EC),  
399 corresponding with evidence on adolescent contraceptive preferences<sup>38</sup>. Results  
400 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  
401 significant influences on contraceptive intention. With condoms arguably the most  
402 behaviourally complex of the three methods, requiring both preparatory action (access  
403 and carrying) and situation-specific interaction (negotiation and correct use)<sup>50</sup>, control  
404 beliefs understandably elicit a strong effect<sup>25</sup>. In contrast perceived control is a weak  
405 or null predictor of pill and EC intention respectively. Instead, normative influences  
406 emerge as an important correlate of pill and EC intention, suggesting that for female-  
407 specific contraceptives, motivation is influenced by what they believe important people  
408 in their lives think they should do. Strengthening normative beliefs amongst girls may  
409 therefore be particularly useful for enhancing contraceptive intentions and use.

410

411 In line with Ajzen's espousal of evidenced extensions to the TPB<sup>51</sup>, the additional  
412 predictive power of prototype willingness items suggests these tap into attributes of  
413 normative beliefs beyond standard measures of subjective norms. Overall however  
414 neither perceived dissimilarity to teenagers who get pregnant nor unfavourable  
415 judgements alone were sufficient to prompt intention to use condoms. Furthermore in  
416 contrast to expectations<sup>52</sup>, for pill intentions there is a small but significant negative  
417 relationship between intention and the specific measure of prototype similarity.

418 Judging oneself as similar - rather than dissimilar - to a typical teenager who gets

419 pregnant (or gets a girl pregnant) is related to increased motivation to take the pill. A  
420 stronger sense of similarity may be a proxy assessment of likely risk of pregnancy  
421 triggering a stronger protective response of intention to take the pill. There may  
422 therefore be merit in increasing perceived similarity to pregnant teens and an  
423 understanding of risk to trigger protective intentions.

424

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

432

433 Whilst results suggest a linear increase in knowledge and stepwise changes in PBC and  
434 SN in later school years, overall there is a more disjointed progression in contraceptive  
435 intention. Furthermore, with school year significant only for condoms, increasing age  
436 is not automatically matched by incremental improvements in contraceptive intent. The  
437 most conspicuous deviation from linearity is the prominence of year 10 (ages 14-15  
438 years) across scores. Intention and SN for all contraceptive types peak at this point,  
439 with a similar pattern for anticipated regret. This suggests a qualitative difference in  
440 adolescents' consideration of contraception in year 10, not consistently maintained into  
441 year 11. Conversely PBC drops in year 10, suggesting that at this age stronger norms  
442 and social reference are coupled with a reduced sense of personal efficacy.

443 Interventions to improve confidence may therefore be particularly valuable at this  
444 stage.

445

#### 446 **Limitations**

447 Despite a large sample size, the cross sectional approach precludes conclusions of the  
448 progressive nature of change across school years. Whilst such developments are  
449 implied by the data, further longitudinal data is required for firmer conclusions about  
450 the nature of maturing cognitions. Similarly the higher proportion of females in the  
451 sample requires caution in drawing concrete gender comparisons, albeit the large  
452 sample size ameliorates this caveat to a large extent. Additional future research needs  
453 to assess the hypothesis that year 10 is a tipping point for adolescent cognitions about  
454 contraception use. Likewise, despite anonymous questionnaires, the sensitivity of the  
455 topic may have influenced adolescent willingness to provide fully admissive self-  
456 reports, not least due to the illegality of sex under the age of 16. The predominantly  
457 White British sample may have limited generalisability across cultures, especially for  
458 those with different norms for contraceptive use in adolescence. Finally, with intention  
459 (not behaviour) the outcome measure of this research further exploration is needed to  
460 understand how the patterns identified here translate into contraceptive action and  
461 ultimately safe sex outcomes.

462

#### 463 **Conclusions**

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

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

470

### 471 **Implications for sexual health**

472 This research highlights several implications for improving sexual health through more  
473 effective and tailored school sex education. First, with knowledge alone insufficient to  
474 prompt intention, it is essential that education addresses the identified socio-cognitive  
475 factors which are amenable to change. More specifically lesson content should  
476 incorporate messages designed to (i) enhance overall contraceptive attitudes through  
477 strengthening positive beliefs (and/or reducing negative beliefs), (ii) improve perceived  
478 control for condoms and the Pill and (iii) prompt positive norms and social  
479 comparisons for the Pill. Second, boys must be supported to build stronger intentions  
480 towards contraception, even those forms for which they do not have primary control  
481 such that these behaviours can be reinforced within relationships. Third, with year 10  
482 emerging as such a significant stage, efforts should be focused on strengthening  
483 cognitions at this point and reinforcing control beliefs to maintain this effect into future  
484 years.

485

486 Whilst contraceptive intention generally increases with age, education must start early  
487 enough to establish positive attitude, control and normative foundations ahead of  
488 sexual debut. Fourth, with clear models emerging for each contraceptive type,  
489 interventions must draw on established techniques and taxonomies for modifying  
490 determinants. In accordance with best practice such as Intervention Mapping<sup>54</sup>, the  
491 most effective provision would be a combination of the evidence base for differing  
492 determinants, proven techniques for changing socio-cognitive variables<sup>55, 56</sup>, and

493 educator experience in delivering learning. Through this integrated approach, young  
494 people can be better equipped to develop strong intentions to use contraception,  
495 underpinning subsequent positive choices and positive sexual health. Strategic  
496 commitment will be needed to resource such approaches and enable integration into an  
497 already pressured curriculum.

498

#### 499 **Conflicts of interest**

500 The authors have no conflicts of interest.

501

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505

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