

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**

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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 priority¹. Whilst the UK under-18 conception rate has reduced by 40.8%
66 since 1969², 45.2% of 16-19 year old pregnancies are still unplanned³. Sexually
67 transmitted infections (STIs) also continue to increase and young people aged 16-24
68 years are at most risk of infection⁴. Teenage Pregnancy (TP) and STI reduction
69 therefore remain part of the UK Government's public health strategy^{5,6} to ameliorate
70 the associated negative social and health implications⁷⁻¹¹, 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 people¹². 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 pregnancy³ and non-consensual
77 activity¹³. However, recent assessments¹⁴ 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 behaviour¹⁵⁻¹⁷ 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 Behaviour¹⁸ (TPB) has shown particular utility in predicting safer sex behaviours^{19,20},
86 including in adolescent samples²¹. 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 question²². Within teen sexual behaviour, the complex interplay of social
94 factors²³, situational influences^{24,25} and biases in adolescent cognition²⁶ challenges the
95 applicability of such rational approaches. The inclusion of more socially reactive paths
96 such as those posited in the Prototype Willingness model²⁷ (PWM) have been
97 empirically supported in a range of risk behaviours^{28,29} including engaging in safe
98 sex^{30,31}. 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 TPB³²⁻³⁴. 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 behaviour³⁵, beyond simply contributing to the attitude construct to which it is closely
106 aligned³⁶. 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 taking³⁷, 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)³⁸ 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 vital³⁹ 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 TPB⁴⁰
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

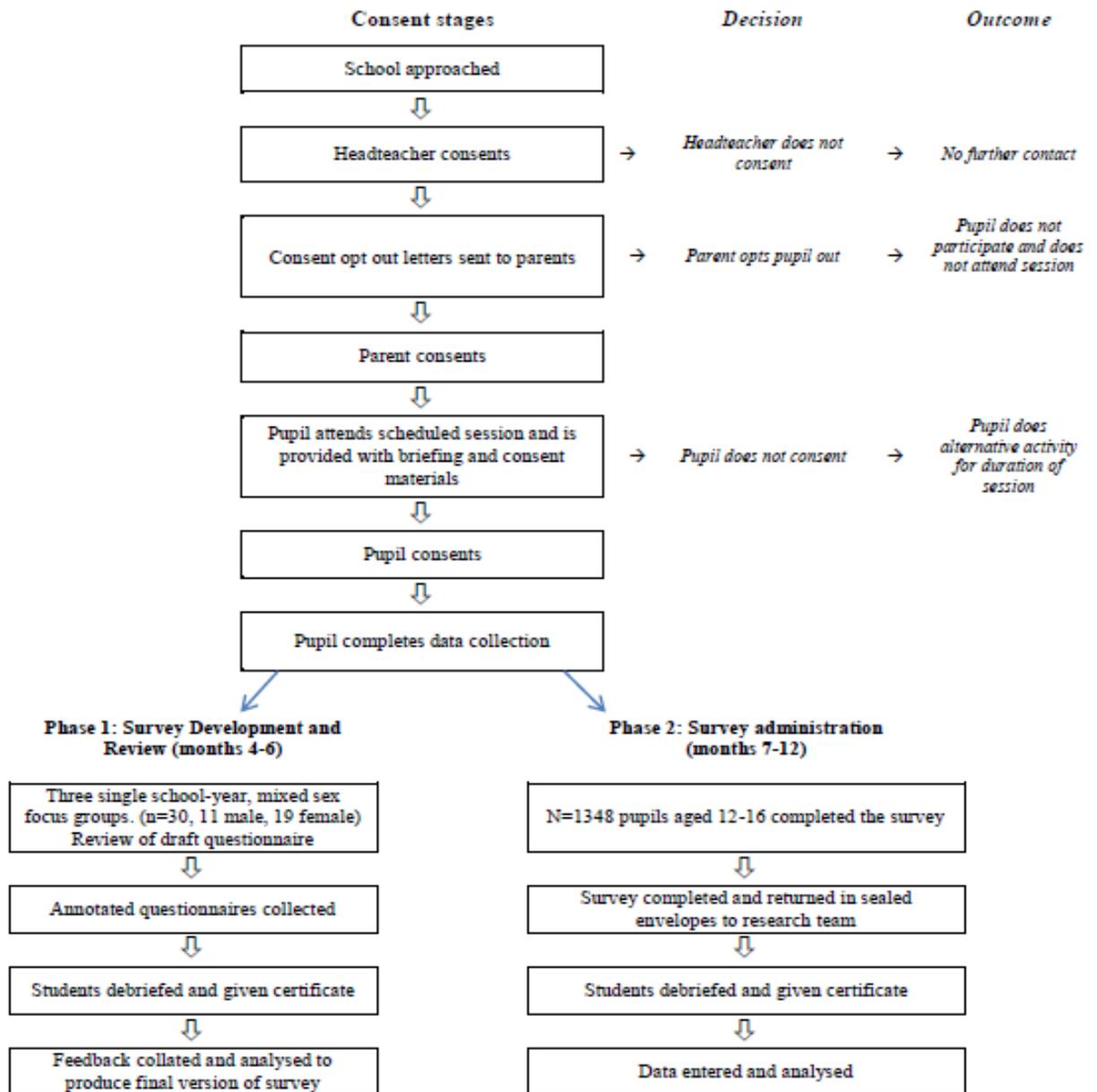
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143 **Consent process**

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^{41, 42}. 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 α 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 R² and F statistic measures of model fit. Regressions were then run with reduced
 284 samples.⁴³ 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 ²	0.36	0.18	0.23
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 $r(1272)=.625, p<.001$.

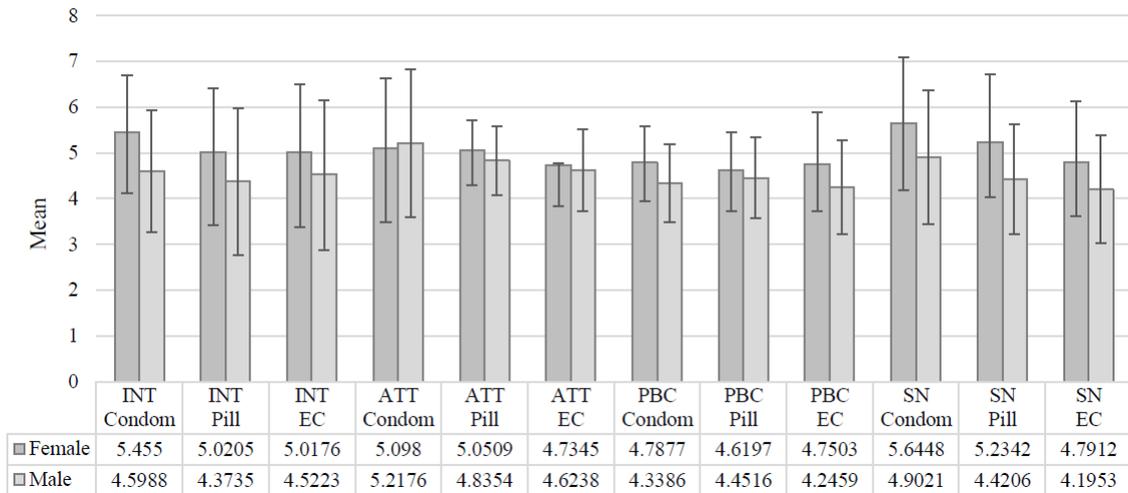
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313 **Analysis of determinants by gender**

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 $m = 8.93, sd = 2.24; t(1250) = 5.190, p < .001$).

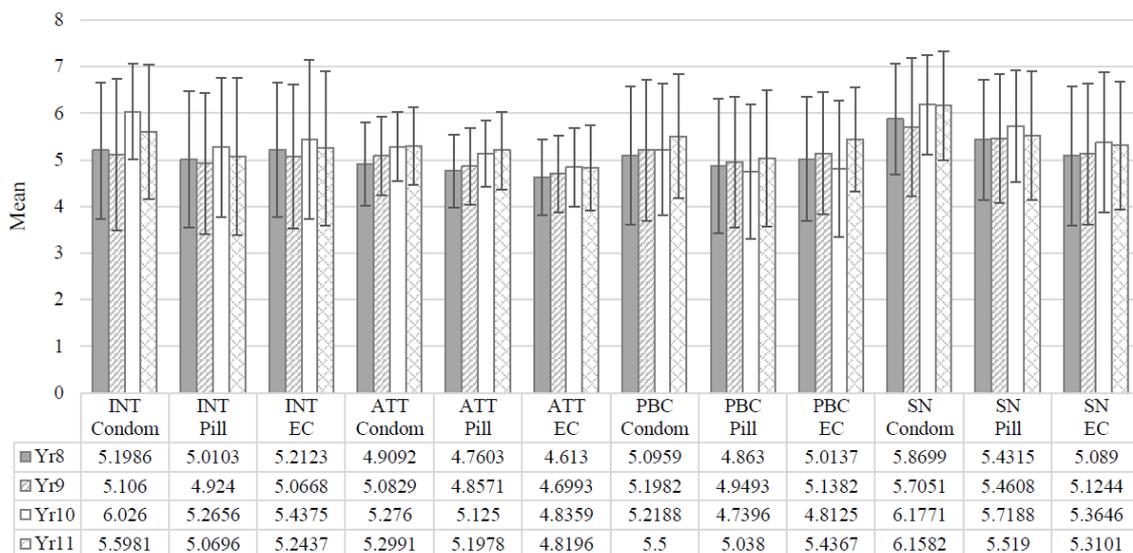
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345 **Analysis of determinants by school year**

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 TPB⁴⁰.

411

412 Scores for all variables were highest in relation to condoms (followed by pill and EC),
413 corresponding with evidence on adolescent contraceptive preferences³⁸. Results
414 support existing literature that attitude^{20, 44-48}, SN^{21, 44, 45, 47, 49} and PBC^{25, 46} 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)⁵⁰, control
418 beliefs understandably elicit a strong effect²⁵. 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 TPB⁵¹, 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 expectations⁵², 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 invulnerability⁵³, 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 census⁵⁴, 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 pattern⁵⁵ 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 Mapping⁵⁶, the
517 most effective provision would be a combination of the evidence base for differing
518 determinants, proven techniques for changing socio-cognitive variables^{57, 58}, 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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