Journal Pre-proof

Investigating the effect of providing monetary incentives to participants on completion rates of referred co-respondents: An embedded randomized controlled trial

Abby Dunn, James Alvarez, Amy Arbon, Stephen Bremner, Chloe Elsby-Pearson, Richard Emsley, Christopher Jones, Peter Lawrence, Kathryn J. Lester, Natalie Morson, Nicky Perry, Julia Simner, Abi Thomson, Sam Cartwright-Hatton

Please cite this article as: A. Dunn, J. Alvarez, A. Arbon, S. Bremner, C. Elsby-Pearson, R. Emsley, C. Jones, P. Lawrence, K.J. Lester, N. Morson, N. Perry, J. Simner, A. Thomson, S. Cartwright-Hatton, Investigating the effect of providing monetary incentives to participants on completion rates of referred co-respondents: An embedded randomized controlled trial, *Contemporary Clinical Trials Communications* (2024), doi: https://doi.org/10.1016/j.conctc.2024.101267.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.
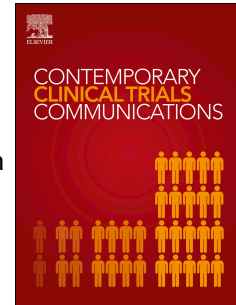
1 **Investigating the effect of providing monetary incentives to participants on completion rates of**
2 **referred co-respondents: An embedded randomized controlled trial.**

3

4 Abby Dunn*[1], James Alvarez[1], Amy Arbon[2], Stephen Bremner[3], Chloe Elsby-Pearson[1], Richard Emsley[4],
5 Christopher Jones[3], Peter Lawrence[5], Kathryn J Lester[1], Natalie Morson[1], Nicky Perry[3], Julia Simner[1],
6 Abi Thomson[1], Sam Cartwright-Hatton[1]
7

8 [1]University of Sussex, Falmer, United Kingdom
9 [2]University Hospitals Sussex NHS Foundation Trust, Brighton, United Kingdom
10 [3]Brighton and Sussex Medical School, Brighton, United Kingdom
11 [4]King's College London, London, United Kingdom
12 [5]University of Southampton, Southampton, United Kingdom
13
14 *Corresponding author information: Abby Dunn, University of Surrey, Guildford, United Kingdom,
15 GU2 7XH, (e-mail: a.dunn@surrey.ac.uk).
16

17

18 Abstract

19 Background

20 The use of a second informant (co-respondent) is a common method of identifying potential bias in

21 outcome data (e.g., parent-report child outcomes). There is, however, limited evidence regarding

22 methods of increasing response rates from co-respondents. The use of financial incentives is

23 associated with higher levels of engagement and follow-up data collection in online surveys. This

24 study investigated whether financial incentives paid to index participants in an online trial of a

25 parenting-focused intervention, would lead to higher levels of co-respondent data collection.

26 Methods

27 A study within a trial (SWAT) using a parallel group RCT design. Participants in the host study (an RCT

28 of an online intervention) were randomised into one of two SWAT arms: received/did not receive a

29 £15 voucher when referred co-respondent completed baseline measures. Primary outcome was

30 completion (No/Yes) of Spence Children's Anxiety Scale (SCAS or SCAS-Pre) at baseline. Additional

31 analysis explored impact of incentives on data quality.

32 Results

1

33 Intention to treat analysis of 899 parents (183 co-respondents) in the no-incentive arm, and 911

34 parents (199 co-respondents) in incentive arm. Nomination of co-respondents was similar between

35 incentive arms. The RR for the incentive arm compared to the no incentive arm was 1.13 (95% CI:

36 0.91 to 1.41, p=0.264) indicating that incentives did not impact completion of outcomes by consented

37 co-respondents. There were no indications of different data quality between arms.

38 ## Discussion

39 The finding that payment of financial incentives to index participant does not lead to greater levels of

40 co-respondent outcome completion suggests that careful consideration should be made before

41 allocating resources in this way in future trials.

42 ## Trial Registration

43 The host study was registered at Study Record | ClinicalTrials.gov and the SWAT study was registered

44 in the SWAT Store | The Northern Ireland Network for Trials Methodology Research (qub.ac.uk):

45 SWAT number 143: Filetoupload,1099612,en.pdf (qub.ac.uk)

46

47 ## Keywords

48 Incentives, trial design, RCT, SWAT, co-respondent

49

50 ## Funding Sources

51 This work was supported by Kavli Foundation (grant 38/19).

52 ## Conflict of interest statement

53 Conflicts of Interest: SC-H designed the digital intervention and funded its development.

54

55

56

57

58 **1. INTRODUCTION**

59 Parent-report measures are a widely used method of gathering data on child outcomes. However, it

60 is a form of data collection with high potential for bias: for example, parents who are themselves

61 anxious report higher levels of fear in their children compared with observer reports[1]. One method

62 of identifying potential bias in parent-report measures is to use multiple informants. Gathering a

63 second set of ratings, for example from the child, a teacher, or another familiar adult, allows the

64 data to be triangulated[2]–[4].

65 In our Parenting with Anxiety study (PWA https://www.researchprotocols.org/2022/11/e40707), we

66 decided to seek child outcome data from second informants. In this study, parents with self-

67 identified elevated levels of anxiety participated in a randomised controlled trial of a preventative

68 online parenting intervention designed to reduce the likelihood of their children developing anxiety.

69 The primary trial outcome was children's anxiety symptoms and, given the ages of the children (as

70 young as two years), the index parent (will from this be point referred to as 'parent') was responsible

71 for reporting on this. However, we were concerned that parents' high levels of anxiety might bias

72 their responses to our child anxiety outcome measures. Hence, we invited parents to nominate an

73 adult who was familiar with their child to complete an additional child anxiety questionnaire.

74 However, the success of this approach was dependent on a) the index parent's willingness to

75 identify and invite a co-respondent and b) the co-respondent's willingness to accept the invitation

76 and complete the measures.

77 The use of financial incentives to facilitate recruitment and retention of *index* participants in

78 research studies (i.e., direct recruitment of a participant, not via a third party) has been evaluated

79 extensively: financial incentivisation can take various forms including voucher and cash payments

80 and lotteries through which the incentives are randomly allocated to a proportion of participants

81 (see Parkinson for overview of literature[5]. A 2014 Cochrane review of strategies to improve

82 retention in randomised controlled trials (RCTs) identified 38 trials and found that both the offer and

3

83   provision of financial incentives, compared with other methods (i.e. amendment to questionnaire

84   design), was associated with more questionnaire completion including for electronic

85   questionnaires[6]. A follow-up review in 2023 found the evidence on the effect of monetary

86   incentives was inconclusive, with indications that payment increased retention compared with no

87   incentive and that higher value incentives may be more effective. However, the authors highlighted

88   that they had low confidence in the effect sizes for these findings due to issues around design and

89   other variables[7]. A meta-analysis of the use of incentives to promote health survey responses

90   generated similar findings, with financial incentives more likely to generate responses than other

91   such as charity donation[8]. Looking specifically at online trials, in an RCT of an online parenting

92   course for parents of young anxious children, the offer of being entered into a prize draw to receive

93   a £30 voucher was associated with an 11% increase in follow-up data collection in both the

94   intervention and control arms[9]. Investigating the effects of different values and delivery methods,

95   Khadjesari and colleagues determined that offering to give participants a £10 voucher when they

96   completed their 12-month follow-up questionnaires led to a 9% greater response rate compared

97   with an un-incentivised control, but that offering a £5 voucher did not have an equivalent effect[10].

98   There is no research, to our knowledge, that has explored the recruitment and retention of co-

99   respondents into randomised controlled trials. Evidence relating to methods that might improve

100   recruitment and retention of co-respondents in other designs is sparse. In a study on financial

101   incentives for snowball sampling for a large online questionnaire, which involved an index

102   participant sending on an invitation to complete the survey to members of their online social

103   network, a fixed incentive of $0.17 was associated with a 100-times greater number of surveys

104   shared compared with a higher financial value lottery incentive (1% chance of winning $17)[11].

105   However, when index participants selected a reward for their own survey completion, the lottery

106   was substantially more popular. Within the digital marketing domain, referral is a common method

107   to attain customers. In a large field experiment conducted on customers of an online shopping

108   platform, which provided cashback on purchases, higher value financial incentives led to higher

4

109   levels of new customer referrals, new member sign-ups and new buyers. Furthermore, the referral

110   rate was higher when the referring individual was aware that their remuneration was higher than

111   the one offered to the recipient[12].

112   The current study was designed in response to the lack of literature on maximising co-respondent

113   data collection in RCTs. The literature on trial retention and questionnaire completion indicated that

114   financial incentives were a plausible method to increase referrals and co-respondent responses. We

115   used an embedded Study Within a Trial (SWAT) design to investigate the effect of incentivising index

116   participants on data collection from a second informant. At the start of the trial, all index

117   participants were invited to nominate someone to provide data on their child. A randomised half of

118   these index participants did so with the expectation that they would receive a £15 voucher should

119   their co-respondent complete our measures. We anticipated that the incentive arm, compared to

120   the control arm, would nominate more co-respondents because incentives are associated with

121   greater levels of participant engagement and because incentive arm participants might also be more

122   inclined to '*nudge'* the co-respondent to complete measures (given that their own remuneration

123   was contingent upon the co-respondent completing these). We also planned to measure whether

124   and differences between arm were maintained at six-month follow-up and to evaluate whether the

125   payment of incentives had any impact on data quality.

126   Given the nested nature of the study within a trial (SWAT) design, and the need to ensure that the

127   SWAT did not negatively impact data collection for the main study, we offered all co-respondents a

128   £10 voucher on completion of their measures at each time point (this was in addition to the

129   payment to the person who referred them). Given that the evidence suggests more nominations

130   when the nominator is paid more than the nominee, we decided that the payments to the

131   nominator (£15) should be more than to the nominated person (£10).

132   We hypothesised that payments to index participants would lead to the following, compared to the

133   control arm:

5

134   ●   higher rates of completion of co-respondent baseline measures in the incentive arm.

135   ●   higher rates of completion of co-respondent six-month follow-up measures in the incentive

136   arm.

137   ●   higher rates of nomination of a co-respondent in the incentive arm.

138   ●   higher rates of consented co-respondents in the incentive arm.

139   We also planned an exploratory investigation into whether payment had an effect on the quality

140   of data returned by co-respondents.

141

142   **2. METHODS**

143   **2.1 Aim and Design**

144 This study within a trial (SWAT) used an embedded parallel group RCT design to investigate the impact

145 of paying host trial index participants on the nomination and subsequent engagement of co-

146 respondents. The SWAT was embedded within an RCT of an online intervention designed to limit the

147 impact of parental anxiety on child outcomes[13]. Host trial participants (parents) were asked to

148 nominate a co-respondent who would themselves participate in the study by completing a set of

149 measures on child anxiety. This paper is reported in accordance with guidelines for reporting

150 embedded recruitment trials based on the Consolidated Standards for Reporting Trials (CONSORT)

151 statement 2010 (for CONSORT checklist see supplementary material)[14].

152   **2.2 Participants**

153 A sample size of 1754 participants was calculated to provide 90% power for the main objective in the

154 host trial. All participants in the host trial were included in the SWAT. Eligibility criteria for the host

155 trial participants were that they were anxious adults (aged 16 and above) who had children aged 2

6

156 to 11 years. Full host trial recruitment procedures can be found in the trial protocol

157 (https://www.sciencedirect.com/science/article/pii/S2451865423000364).

158 In the SWAT, index participants (parents) were randomised 1:1 to payment and non-payment arms.

159 The sample size for this SWAT was expected to equal the sample size that was calculated to provide

160 adequate power for the key objective of the host of the trial (N = 1754). The expectation was for a

161 co-respondent baseline questionnaire response rate of 65% (n= 570) where the incentive was

162 offered and 55% (n = 482) in the non-incentivised arm. With 1754 participants, we would have >95%

163 power to detect this 10% difference between arms. Eligibility criteria for co-respondents were that

164 they were aged over 16 and knew the child well enough to answer a brief questionnaire about the

165 child's feelings and behaviours. Index participants were advised that co-respondents could be family

166 members, friends, or any other relationship, but, for ethical reasons, could not be individuals with

167 whom the participant had a monetised relationship (e.g., babysitter).

168 **2.3 Interventions**

169 The host study was a community recruited online study for which all study activities took place on a

170 secure online platform. Participants self-referred into the host study and all participants were given

171 the option to nominate a co-respondent. All host study index participants were randomised into one

172 of two SWAT arms (1:1 ratio) where they either received or did not receive a £15 voucher when a

173 referred co-respondent completed the baseline assessment measures. This randomisation was done

174 without their knowledge. All co-respondents received a £10 voucher on completion of measures at

175 baseline and six-month follow-up. Participant activities took place as follows:

176 i. Index participant received summary information.

177 ii. Index participant screened against inclusion/exclusion criteria.

178 iii. Those meeting inclusion criteria received detailed information about the host study and

179 gave consent online.

7

180   iv.   Index participant randomised into one of two SWAT arms: Incentive or No Incentive.

181   v.   Index participants asked to provide details of a co-respondent who was then contacted by

182   email. An index participant could also choose not to refer or to make a referral later.

183   vi.   Index participant completed baseline measures.

184   vii.   Index participant randomised into Intervention/Control arm of main trial (Parenting with

185   Anxiety).

186   viii.   Forty-eight hours after index participant had completed measures, the nominated co-

187   respondent was emailed information about the host study and, if willing, gave consent

188   online.

189   ix.   Co-respondent completed baseline measures.

190   x.   Host participant paid, if they were in the Incentive arm of SWAT.

191   xi.   Six months post consent, host participant and co-respondent invited to complete follow-up

192   measures.

193 **2.4 Outcomes**

194 Outcome measures were administered online at baseline (T1) and 6-months post consent (T2). For

195 host trial participants, the measures specified below were part of a larger battery of assessments

196 (these are listed in full in the main trial protocol[13]). The measures completed by co-respondents

197 were determined by their relationship to the index child: All co-respondents completed the Spence

198 Children's Anxiety Scale (SCAS or Preschool SCAS (SCAS-Pre) according to the child's age)[15],[16].

199 These parallel instruments are used widely in clinical research as an assessment of child anxiety

200 symptoms, are acceptable to parents and have good reliability and validity. Only co-respondents with

201 parental responsibility (co-parents) also completed the SCARED-A, a 71-item assessment of adult

202 anxiety symptoms, which is strongly correlated with the ADIS-IV-L diagnostic interview schedule, and

203 the CPBQ, which measures anxiogenic parenting behaviours[17]–[19]. Co-respondents without

204 parental responsibility completed the Generalised Anxiety Disorder Assessment (GAD-7) a seven-item

205 screening measure for anxiety disorder which was administered instead of the SCARED-A to reduce

206 response burden[20].

207

208 **2.4.1 Primary outcome**

209 The primary outcome for the SWAT was completion (No/Yes) of the Spence Children's Anxiety Scale

210 (SCAS or SCAS-Pre), the primary outcome measure in the host trial. For the purposes of analysis,

211 completion was defined as being able to calculate a score for SCAS or SCAS-Pre where calculation

212 was contingent on being able to calculate a score for all subscales (each required >80% items).

213

214 **2.4.2 Secondary outcomes**

215 Secondary SWAT outcomes were:

216 ● co-respondent nomination by host trial participants (as measured by host trial participant

217 provision of co-respondent email address)

218 ● co-respondent consent.

219 ● data quality

220 ○ concordance between measures (intraclass correlations and bias/agreement

221 between host-trial participant and co-respondent)

222 ○ time taken to complete the SCAS/SCAS-Pre.

223 **2.5 Randomisation**

224 Block randomisation, in blocs of 4, 8, 12, 16 and 20, occurred simultaneously with (but independently

225 of) randomisation in the host study, so that host trial participants were allocated to one of four groups

226 (Host Intervention arm and SWAT Incentive arm; Host Intervention arm and SWAT No Incentive arm;

227 Host Control arm and SWAT Incentive arm; Host Control arm and SWAT No Incentive arm). Host trial

228   participants were aware of their SWAT condition (i.e., whether they would be paid for nomination or

229   not) prior to nominating a co-respondent but were unaware there was an alternative condition.

230   Participants were made aware of this passive deception in a debrief letter issued once data collection

231   had finished.

232   **2.6 Approvals**

233   Ethical approval has been obtained for both the host study, and this SWAT from the Sponsor's Cross

234   Schools Ethics Committee (C-REC). The host study was registered at Study Record | ClinicalTrials.gov

235   and the SWAT study was registered in the SWAT Store | The Northern Ireland Network for Trials

236   Methodology Research (qub.ac.uk): SWAT number 143: Filetoupload,1099612,en.pdf (qub.ac.uk)

237

238   **2.7 Statistical methods**

239   Analyses were conducted in Stata 17.0 following intention to treat (ITT) principles[21]. We calculated

240   standardised z-scores to allow for variation in item number, response scales and scoring between

241   the SCAS and SCAS-Pre. For purposes of analysis, we defined completion as non-missing data for at

242   least 80% of the primary outcome (SCAS or SCAS-Pre.), with "Prefer not to answer" responses set as

243   missing. Nominated, consented and completed co-respondents are summarised at baseline and six-

244   month follow-up in Figure 1.

245   We planned to model completion of co-respondent outcomes at baseline and 6-months using

246   multivariable log-binomial regression models fitted for the primary outcome (completion) with a

247   random effect for participant, and SWAT trial arm and time point (baseline/m6) as fixed effects.

248   However, these models failed to converge. Instead, we fitted a Poisson model with robust standard

249   errors to estimate the risk ratio and estimate its 95% CI[22]. We used a mixed effects logistic

250   regression model to estimate the odds ratio, which is reported with 95% confidence intervals.

251   Data from co-respondents was modelled using log-binomial and logistic regression models. We

252   assessed data quality with intraclass correlations calculated for parent and co-parent outcomes and

253   using Bland-Altman plots which summarised and graphically displayed agreement between parent

254   and co-respondents. We also calculated median time taken per question on the SCAS and SCAS-Pre

255   scales and compared them by incentive arm. An interim data quality assessment was carried out

256   once 170 participants had been randomised and then repeated as part of the final analysis.

257

258   **3. RESULTS**

259   **3.1 Interim analysis**

260   We conducted an interim analysis to assess whether host study data quality was being compromised

261   by inclusion of the SWAT, and the SWAT would have been terminated if this was found to be the

262   case. We investigated the data quality after 170 co-respondents (co-parents=126; other co-

263   respondents=44) had been randomised (No incentive group=89; Incentive group=81). The analysis

264   found adequate data quality across SWAT arms - similar levels of data completion between the

265   SWAT trial arms (incentive/no-incentive) and no obvious differences in questionnaire completion

266   times or variability of outcomes scores. Bland-Altman plots showed bias on the SCAS-P/Preschool-

267   SCAS with co-respondents scoring higher (more child anxiety symptoms) than host trial participants

268   however the amount of bias was similar in the two SWAT trial arms. Therefore, the SWAT was

269   continued.

270   **3.2 Main analysis**

271   **3.2.1 Participants**

272   Recruitment into the SWAT ran from February 2021 to September 2022 at which point the host trial

273   recruitment target had been met. Follow-up data was required from parents and co-respondents six-

274   months post consent. Of 1811 host trial participants (parents), 900 were allocated to the no-

11

275   incentive arm and 911 to the incentive arm. In total, 397 index parents nominated a co-respondent.

276   Fifteen nominated co-respondents were ineligible or did not consent. One index parent withdrew

277   their data from analysis, with the result that 899 parents and 183 co-respondents in the no-incentive

278   arm, and 911 parents and 199 co-respondents in the incentive arm were subject to the final ITT

279   analysis. The full participant flow is described in Figure 1.

280

281
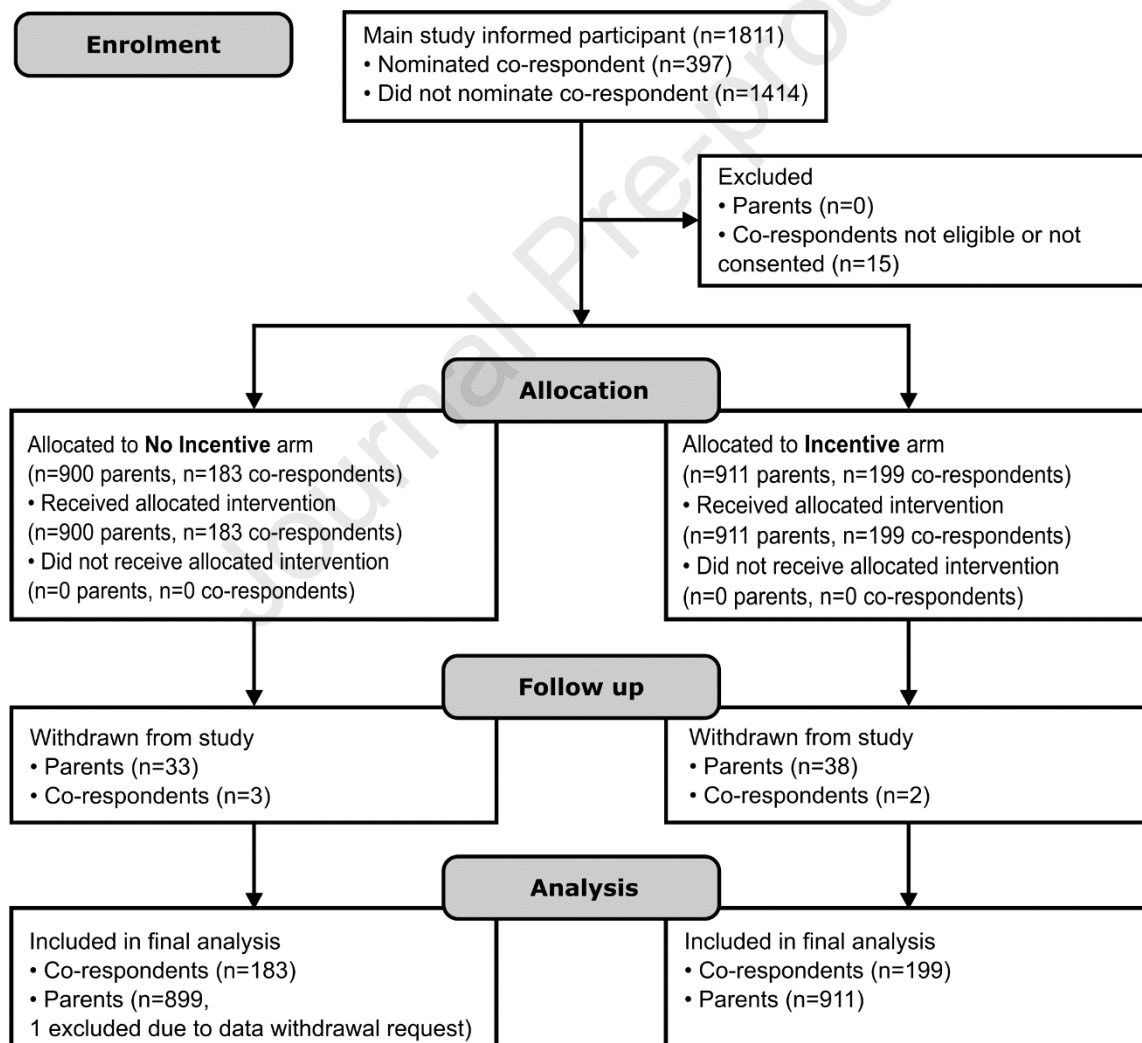
282

283   **Figure 1**: SWAT CONSORT flow diagram.

12

284   Most co-respondents were co-parents to the index child (Overall: n=288(75.4%); No incentive:

285   n=134(73.2%); Incentive: n=154(77.4%). Baseline demographics and clinical characteristics can be

286   found in Table 1.

287

288

289

	No incentive arm (n=183)			Incentive arm (n=199)			Overall (n=382)		
	Median	**IQR**	**n**	**Median**	**IQR**	**n**	**Median**	**IQR**	**n**
Age	41.0	37.0 to 49.0	183	40.0	36.0 to 47.0	196	41.0	36.0 to 47.0	379
	n	**%**		**n**	**%**		**n**	**%**	
Gender									
Male	122	67.4		139	70.6		261	69.0	
Female	59	32.6		56	28.4		115	30.4	
I prefer not to say	0	0.0		2	1.0		2	0.5	
Total	181	100.0		197	100.0		378	100.0	
Ethnicity									
English / Welsh / Scottish / Northern Irish / British	157	86.7		165	84.2		322	85.4	
Irish	2	1.1		0	0.0		2	0.5	
Any other White background	14	7.7		16	8.2		30	8.0	
White and Black Caribbean	1	0.6		1	0.5		2	0.5	
White and Black African	0	0.0		1	0.5		1	0.3	
White and Asian	1	0.6		1	0.5		2	0.5	
Any other Mixed / Multiple ethnic background	2	1.1		2	1.0		4	1.1	
Indian	1	0.6		1	0.5		2	0.5	
Chinese	0	0.0		2	1.0		2	0.5	
Any other Asian background	0	0.0		1	0.5		1	0.3	
African	1	0.6		0	0.0		1	0.3	
Caribbean	0	0.0		1	0.5		1	0.3	
Any other Black / African / Caribbean background	1	0.6		2	1.0		3	0.8	
Arab	1	0.6		1	0.5		2	0.5	
Any other ethnic group	0	0.0		2	1.0		2	0.5	
Total	181	100.0		196	100.0		377	100.0	
Financial status									
Comfortable	81	44.8		104	53.1		185	49.1	

13

Managing	90	49.7	78	39.8	168	44.6
Struggling	10	5.5	14	7.1	24	6.4
Total	181	100.0	196	100.0	377	100.0
Education						
Left school before 16	5	2.8	4	2.0	9	2.4
Left school at 16	13	7.2	20	10.2	33	8.8
Left school 17/18	16	8.8	18	9.2	34	9.0
Completed college	28	15.5	40	20.4	68	18.0
Completed university	119	65.7	114	58.2	233	61.8
Total	181	100.0	196	100.0	377	100.0
Co-respondent relationship to child						
Parent	134	73.2	154	77.4	288	75.4
Grandparent	31	16.9	20	10.1	51	13.4
Other relation	7	3.8	15	7.5	22	5.8
Friend	6	3.3	4	2.0	10	2.6
Other	5	2.7	6	3.0	11	2.9
Total	183	100.0	199	100.0	382	100.0

290   **TABLE 1.** Demographic and clinical characteristics of co-respondents

291

292

293

294 **3.2.2 Primary outcome: Co-respondent completion of Spence Children's Anxiety Scale (SCAS/SCAS-**

295 **P)**

296 The models for the primary outcome were fitted for 1810 consented participants of the main study,

297 382 of whom had consented co-respondents able to complete measures at baseline and six-month

298 follow-up, In the no incentive arm 169/899 (18.8%) completed outcomes at baseline compared to

299 194/911 (21.3%) in the incentive arm. At six-month follow-up 148/899 (16.5%) in the no incentive

300 arm completed outcomes, compared to 163/911 (17.9%) in the incentive arm. The RR for the

301 incentive arm compared to the no incentive arm was 1.13 (95% CI: 0.91 to 1.41, p=0.264) and the OR

302 was 1.90 (95% CI: 0.83 to 4.34, p=0.127), indicating that incentives did not impact completion of

303 outcomes by consented co-respondents.

304 Completion of measures within arms was slightly higher at T1 than T2, with the trend similar across

305 arms (as percentage of parents in study, no incentive: 19.6% (176/899) at T1 and 16.8% (151/899) at

306 T2, incentive: 21.5% (196/911) at T1 and 17.9% (163/911) at T2; as percentage of co-respondents

307 consented, no incentive: 92.3% (169/183) at T1 and 80.9% (148/183) at T2, incentive: 97.5%

308 (194/199) at T1 and 81.9% (163/199) at T2).

309 **3.2.3 Secondary outcomes**

310 **3.2.3.1 Co-respondent nomination and consent**

311 Nomination of co-respondents was similar between incentive arms (no incentive: 21.0% (189/899),

312 incentive: 22.8% (208/911)). The RR for the incentive arm compared to the no incentive arm was

313 1.09 (95% CI: 0.91 to 1.29, p=0.353) and the OR was 1.11 (95% CI: 0.89 to 1.39, p=0.353), indicating

314 that incentives did not impact nomination of co-respondents by index parents.

315 Consent of co-respondents was also similar in both arms (as percentage of parents in study, no

316 incentive: 20.4% (183/899), incentive: 21.8% (199/911); as percentage of co-respondents

15

317   nominated, no incentive: 96.8% (183/189), incentive: 95.7% (199/208)). The RR for the incentive arm

318   compared to the no incentive arm was 1.07 (95% CI: 0.90 to 1.28, p=0.438) and the OR was 1.09

319   (95% CI: 0.87 to 1.37, p=0.438), indicating that incentives did not impact the consent of co-

320   respondents.

321   **3.3 Data quality**

322   There were no indications of different data quality between arms, based on agreement and bias

323   summarised by ICCs and Bland-Altman plots. Time taken by all co-respondents per question on

324   SCAS/SCAS-P was similar between arms at each time point, and similar overall across time points.

325   Tables and figures reporting data quality analysis are presented in supplementary materials.

326   **3.4 Harms**

327   No harms were recorded in either trial arm nor in the host trial.

328

329   **4.   Discussion**

330   The current study was designed to examine whether paying randomized controlled trial participants,

331   compared to not paying them, would increase the likelihood of them nominating a secondary co-

332   respondent, and of that co-respondent providing data. The results indicate that paying host trial

333   participants has no detectable effect on the nomination, consent or data completion of co-

334   respondents. However, the study demonstrated that incentivising trial participants in this manner,

335   had no impact (beneficial *or* detrimental) on the quality of data provided by nominated co-

336   respondents. Given the paucity of research in this area of trial design, these findings provide a

337   valuable signal which can be developed in future research with the potential to inform incentive

338   allocation in randomised controlled trials (RCTs).

339   Given the literature which indicates that financial incentives are the most effective way of promoting

340   data completion and retention in research studies, it is surprising that payment did not result in

341   elevated co-respondent referral or data completion[6], [8]. The lack of difference between arms may

342   be explained by the lack of control referring participants had over the outcome (co-respondent data

343   completion) upon which their own payment was contingent. While research into incentivised

344   referral schemes outside randomised controlled trials designs suggests that incentives are associated

16

345   with increased referral rates, these studies largely used designs where participants could make

346   multiple referrals, and where payment was made when the referral was made (e.g.,[12],[23]). Within

347   the current study, referees could refer only one co-respondent. Furthermore, payment was

348   contingent on two factors, one fully within their own control, referring the co-respondent *and* one

349   outside their control, the co-respondent completing measures. This 'both/and' requirement may

350   have limited the motivational impact of the incentive on the index participant. Drawing upon the

351   behavioural economics literature around mechanisms of action (MA), the process through which a

352   behaviour occurs, this uncertainty may have been associated with reduced belief about the

353   likelihood of consequences of an occurrence. In doing so, it suppressed the willingness of a

354   participant to take the requested action (See Schenk 2023 for ontology of MoAs[24]). Given extant

355   findings that a minimum monetary threshold must be met for incentives to affect co-respondent

356   completion rates, it is also possible that the incentive offered within this trial was insufficient[6],[25].

357   A larger incentive might have galvanised more index participants to refer and potentially to

358   encourage them to remind co-respondents to complete data.

359   As outlined above, there is negligible research into referral incentives within clinical mental health

360   trials. The literature focused on referrals is largely focused on referral into activities for which the

361   participant has limited personal investment (e.g. online surveys and shopping)[12]. In contrast,

362   participants in the Parenting with Anxiety study were involved in research related to their own

363   mental health difficulties and their children's mental health and were requesting a co-respondent to

364   answer questions about their child's mental health. How the participant felt the referral scheme

365   would reflect on them to people they invited, was the biggest factor predicting the success of a

366   referral reward programmes within the banking sector. In the cross-sectional study which integrated

367   routinely recorded data banking with supplementary attitudinal questionnaires, this metaperception

368   along with perceived attractiveness of the reward fully mediated the effects of incentives on referral

369   likelihood[23]. In the case of the current study, the association with mental health may have had a

370   suppressive effect on the index participants willingness to refer a co-respondent. Furthermore, the

371   highly personal nature of this participation may have limited the impact of the incentive – if a

372   participant felt willing and motivated to invite a second respondent they would do so with or

373   without the offer of payment. Models of motivation which incorporate the interplay of intrinsic and

17

374 extrinsic motivation indicate that co-respondent referral within this context is associated with

375 activation of the intrinsic motivation system, in particular the 'purpose' component through which

376 motivation is attached to performing an action which has wider societal benefits (e.g., [26], [27].

377 Financial incentives, which seek to engage extrinsic motivation, have limited impact where

378 individuals already have high levels of intrinsic motivation to perform a task. Indeed, in some cases

379 payment can reduce intrinsic motivation and overall task performance[28], [29]. Thus, it is possible

380 that the similarity between co-respondent referral rates across the two arms of the current study

381 reflects the proportion of individuals within each arm who had high levels of intrinsic motivation to

382 carry out the task. Research on the use of incentives in population surveys found that actions

383 targeting intrinsic motivation (e.g., redesigning the questionnaire to stress the voluntary nature of

384 participation) are most effective in improving response rates, however these can be difficult to

385 engineer[30]Furthermore, while intrinsic motivation can be increased through extrinsic rewards,

386 these must be offered directly after the task is completed, a condition not met within the current

387 study[31].

388 The current study does not offer evidence that financial incentives offered to a participant increase

389 co-respondent data collection. This runs counter to our hypotheses and the wider literature and

390 should be accounted for in the design of future mental health RCTs, where operating under

391 assumptions about the effectiveness of incentives may lead to poor allocation of resources.

392 Research that uses larger monetary incentives, and / or that rewards on the point of referral rather

393 than after co-respondent data completion, would be useful extensions of the work and of potential

394 benefit in future study design. Alongside this, investigation into participant motivation in nominating

395 a co-respondent would enable future trial designs to more effectively engage with and activate the

396 relevant motivational system.

397 **4.1 Strengths and Limitations**

18

398   Using a nested study within a trial (SWAT) was an effective method of delivering a large study with

399   minimal cost or respondent burden. The aim of the SWAT was a further understanding of the effect

400   of participant payment on the capture of second informant data within an RCT. With a large sample

401   size, it effectively demonstrated that a small payment is an ineffective way of obtaining more co-

402   respondent data. However, it also demonstrated that such payment has no impact on the quality of

403   data returned by co-respondents. As discussed, this has the potential to have practical utility for

404   future researchers seeking to incorporate second informant data. However, given the importance of

405   data collection in RCTs, we would advise caution until these findings have been replicated in

406   subsequent research. There would also be considerable value in identifying the possible interaction

407   between incentivisation and other features which may impact on data collection and retention such

408   as trial design and follow-up duration (see Gaunt 2023 for review[32]).

409   While the study is both novel and useful there are some limitations that could be addressed in future

410   research. The host trial 'Parenting with Anxiety' was an online study for which the participants were

411   parents who self-identified as high in anxiety. These features may limit the generalisability of the

412   findings in particular with regard to the potential impact of the mental health of the participants on

413   their willingness to refer. It is also possible that there may be a differential impact of payment on

414   referral activities in face-to-face clinical mental health trials.

415   The sample for the Parenting with Anxiety SWAT study was large as clinical RCTs go. It was, however,

416   considerably less than was anticipated in the original SWAT design.Fewer participants in the host

417   trial referred a co-respondent than was expected and it would be of clear benefit to understand why

418   referral rates were lower than predicted.

419

19

424   their participation and gratefully acknowledge NIHR BioResource centres, NHS Trusts, and staff for

425   their contribution.

426

427   **6. References**

428   [1]   C. E. Durbin and S. Wilson, "Convergent Validity of and Bias in Maternal
429   Reports of Child Emotion," 2011, doi: 10.1037/a0026607.

430   [2]   E. Romano, K. Weegar, L. Babchishin, and M. Saini, "Cross-informant
431   agreement on mental health outcomes in children with maltreatment histories:
432   A systematic review," *Psychol Violence*, vol. 8, no. 1, pp. 19–30, 2018, doi:
433   10.1037/VIO0000086.

434   [3]   A. De Los Reyes *et al.*, "The validity of the multi-informant approach to
435   assessing child and adolescent mental health," *Psychol Bull*, vol. 141, no. 4, pp.
436   858–900, Jul. 2015, doi: 10.1037/A0038498.

437   [4]   A. L. Murray, L. G. Speyer, H. A. Hall, S. Valdebenito, and C. Hughes, "Teacher
438   Versus Parent Informant Measurement Invariance of the Strengths and
439   Difficulties Questionnaire," *J Pediatr Psychol*, vol. 46, no. 10, pp. 1249–1257,
440   2021, doi: 10.1093/jpepsy/jsab062.

441   [5]   B. Parkinson *et al.*, "Designing and using incentives to support recruitment and
442   retention in clinical trials: A scoping review and a checklist for design," *Trials*,
443   vol. 20, no. 1. BioMed Central Ltd., Nov. 09, 2019. doi: 10.1186/s13063-019-
444   3710-z.

445   [6]   V. C. Brueton *et al.*, "Strategies to improve retention in randomised trials: a
446   Cochrane systematic review and meta-analysis," *BMJ Open*, vol. 4, p. 3821,
447   2014, doi: 10.1136/bmjopen-2013.

448   [7]   K. Gillies *et al.*, "Strategies to improve retention in randomised trials,"
449   *Cochrane Database of Systematic Reviews*, vol. 2021, no. 3, Mar. 2021, doi:
450   10.1002/14651858.MR000032.pub3.

451   [8]   M. C. David and R. S. Ware, "Meta-analysis of randomized controlled trials
452   supports the use of incentives for inducing response to electronic health
453   surveys," *J Clin Epidemiol*, vol. 67, no. 11, pp. 1210–1221, Nov. 2014, doi:
454   10.1016/J.JCLINEPI.2014.08.001.

455   [9]   A. J. Morgan, R. M. Rapee, and J. K. Bayer, "Increasing response rates to follow-
456   up questionnaires in health intervention research: Randomized controlled trial
457   of a gift card prize incentive," *Clinical Trials*, vol. 14, no. 4, pp. 381–386, 2017,
458   doi: 10.1177/1740774517703320.

459   [10]   Z. Khadjesari *et al.*, "Impact and costs of incentives to reduce attrition in online
460   trials: Two randomized controlled trials," *J Med Internet Res*, vol. 13, no. 1, p.
461   e1523, Mar. 2011, doi: 10.2196/jmir.1523.

20

[11] V. C. E. and T. William. Aditya, "Increasing the Reach of Snowball Sampling: The Impact of Fixed Versus Lottery Incentives.," in *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing.*, Web., 2015, pp. 1359–1363.

[12] J. Ahrens, J. R. Coyle, and M. A. Strahilevitz, "Electronic word of mouth: The effects of incentives on e-referrals by senders and receivers," *Eur J Mark*, vol. 47, no. 7, pp. 1034–1051, Jul. 2013, doi: 10.1108/03090561311324192.

[13] A. Dunn *et al.*, "Investigating the effect of providing monetary incentives to participants on completion rates of referred co-respondents: An embedded randomized controlled trial. Study within a trial (SWAT) protocol," *Contemp Clin Trials Commun*, vol. 32, Apr. 2023, doi: 10.1016/j.conctc.2023.101090.

[14] K. F. Schulz, D. G. Altman, and D. Moher, "CONSORT 2010 statement: Updated guidelines for reporting parallel group randomized trials," *Ann Intern Med*, vol. 152, no. 11, pp. 726–732, Jun. 2010, doi: 10.7326/0003-4819-152-11-201006010-00232.

[15] S. H. Spence, "A measure of anxiety symptoms among children," *Behaviour Research and Therapy*, vol. 36, no. 5, pp. 545–566, May 1998, doi: 10.1016/S0005-7967(98)00034-5.

[16] S. H. Spence, R. Rapee, C. McDonald, and M. Ingram, "The structure of anxiety symptoms among preschoolers," *Behaviour Research and Therapy*, vol. 39, no. 11, pp. 1293–1316, Nov. 2001, doi: 10.1016/S0005-7967(00)00098-X.

[17] B. VanSteensel and S. M. Bögels, "An adult version of the Screen for Child Anxiety Related Emotional Disorders (SCARED-A)," *Netherlands Journal of Ps*, vol. 68, pp. 81–87, 2014.

[18] M. Majdandžić, W. de Vente, and S. M. Bögels, "Challenging Parenting Behavior from Infancy to Toddlerhood: Etiology, Measurement, and Differences between Fathers and Mothers," *Infancy*, vol. 21, no. 4, pp. 423–452, 2016, doi: 10.1111/infa.12125.

[19] M. Majdandžić *et al.*, "The Structure of Challenging Parenting Behavior and Associations With Anxiety in Dutch and Australian Children," *https://doi.org/10.1080/15374416.2017.1381915*, vol. 47, no. 2, pp. 282–295, Mar. 2017, doi: 10.1080/15374416.2017.1381915.

[20] R. L. Spitzer, K. Kroenke, J. B. W. Williams, and B. Löwe, "A brief measure for assessing generalized anxiety disorder: the GAD-7," *Arch Intern Med*, vol. 166, no. 10, pp. 1092–1097, May 2006, doi: 10.1001/ARCHINTE.166.10.1092.

[21] StataCorp, "Stata Statistical Software: Release 17." College Station, TX, StataCorp LLC, 2021.

[22] G. Zou, "A Modified Poisson Regression Approach to Prospective Studies with Binary Data," *Am J Epidemiol*, vol. 159, no. 7, pp. 702–706, Apr. 2004, doi: 10.1093/aje/kwh090.

502 [23] J. Wirtz, C. Tang, and D. Georgi, "Successful referral behavior in referral reward
503 programs," *Journal of Service Management*, vol. 30, no. 1, pp. 48–74, Feb.
504 2019, doi: 10.1108/JOSM-04-2018-0111.

505 [24] P. M. Schenk *et al.*, "An ontology of mechanisms of action in behaviour change
506 interventions," *Wellcome Open Res*, vol. 8, p. 337, Aug. 2023, doi:
507 10.12688/wellcomeopenres.19489.1.

508 [25] P. J. Edwards *et al.*, "Methods to increase response to postal and electronic
509 questionnaires (Review)," *Cochrane Libr*, vol. 3, no. 3, 2009, doi:
510 10.1002/14651858.MR000008.pub4.www.cochranelibrary.com.

511 [26] R. M. Ryan and E. L. Deci, "Self-determination theory and the facilitation of
512 intrinsic motivation, social development, and well-being," *American
513 Psychologist*, vol. 55, no. 1, pp. 68–78, 2000, doi: 10.1037/0003-066X.55.1.68.

514 [27] R. J. Vallerand, "Toward A Hierarchical Model of Intrinsic and Extrinsic
515 Motivation," *Adv Exp Soc Psychol*, vol. 29, no. C, pp. 271–360, Jan. 1997, doi:
516 10.1016/S0065-2601(08)60019-2.

517 [28] M. Promberger and T. M. Marteau, "When do financial incentives reduce
518 intrinsic motivation? Comparing behaviors studied in psychological and
519 economic literatures," *Health Psychology*, vol. 32, no. 9, pp. 950–957, 2013,
520 doi: 10.1037/a0032727.

521 [29] R. D. Pritchard, K. M. Campbell, and D. J. Campbell, "Effects of extrinsic
522 financial rewards on intrinsic motivation.," *Journal of Applied Psychology*, vol.
523 62, no. 1, pp. 9–15, Feb. 1977, doi: 10.1037/0021-9010.62.1.9.

524 [30] M. Wenemark, A. Persson, H. Noorlind Brage, T. Svensson, and M. Kristenson,
525 "Applying Motivation Theory to Achieve Increased Response Rates,
526 Respondent Satisfaction and Data Quality."

527 [31] Y. Liu, Y. Yang, X. Bai, Y. Chen, and L. Mo, "Do Immediate External Rewards
528 Really Enhance Intrinsic Motivation?," *Front Psychol*, vol. 13, p. 853879, May
529 2022, doi: 10.3389/FPSYG.2022.853879/BIBTEX.

530 [32] D. M. Gaunt, C. Papastavrou Brooks, H. Pedder, E. Crawley, J. Horwood, and C.
531 Metcalfe, "Participant retention in paediatric randomised controlled trials
532 published in six major journals 2015–2019: systematic review and meta-
533 analysis," *Trials*, vol. 24, no. 1. BioMed Central Ltd, Dec. 01, 2023. doi:
534 10.1186/s13063-023-07333-w.

535

536

Highlights

Co-respondents are a common method of collecting data on child outcomes.

There is little evidence on how to promote data collection from co-respondents

Payment is associated with increased referral and response rates in online surveys

We found that paying participants did not lead to increased data collection from co-respondents

Paying participants did not have an impact on data quality

Declaration of interests

☐ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☒ The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Conflicts of Interest: SC-H designed the digital intervention and funded its development.