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Serious Game Pilot

Trial Protocol Document

Publication date: 11 October 2022

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Section

Annex

1. Overview

The purpose of this document is to set out and agree, in advance of fieldwork, the methodology and proposed analysis for the serious game pilot.

It sets out the background and purpose of the project, the fieldwork materials and research design, and the analysis methodology. The aim of setting out the methodology in advance in this document is to avoid bias in the analysis, for example by picking and choosing certain results once the data has been received.

If unforeseen issues arise during the fieldwork or analysis that mean the agreed methodology needs to be adapted, this will be clearly documented and justified later in this document.

This methodology has been agreed and signed off by the Principal lead.

2. Foreword

Ofcom has a statutory duty to promote and research media literacy, including in respect of material available on the internet. Ofcom's approach to media literacy is multi-dimensional and considers a range of aspects including how the design of services can impact on users' ability to participate fully and safely online. A key way we seek to fulfil this duty is through our *Making Sense of Media* programme, which aims to help improve the online skills, knowledge and understanding of children and adults in the UK. Ofcom was also given powers in autumn 2020 to regulate UK-established video-sharing platforms (VSPs). And in December 2020, the Government confirmed its intention to nominate Ofcom as the regulator for online safety in the UK, under the Online Safety Bill, which is currently in Parliament.

As referenced in our Roadmap to Online Safety Regulation, this report is one in a series of research studies into online safety that will inform our preparations for implementing the new online safety laws. As part of these preparations, we are building a comprehensive evidence base, bringing together internal and external data, collected using different methods, from a variety of different sources.

In this context, this programme of research further develops our understanding of online harms and how we can help to promote a safer user experience. The findings should not be considered a reflection of any policy position that Ofcom may adopt when we take up our role as the online safety regulator.

3. Background and objectives

Background

3.1 One of the measures online platforms, such as video-sharing-platforms (VSPs) take for the purposes of protecting users from harm, is to provide information and tools for users with the aim of improving their media literacy. However, Ofcom's research shows that awareness of these safety measures is low. For example, a majority (60%) of users are unaware of safety measures on the VSP sites they use.[1]

3.2 Ofcom used the COM-B[2] model, along with pre-existing research on internet users' attitudes towards online safety, to explore the behavioural barriers to user engagement with online safety information. Ofcom's research reveals that seven in ten (68%) internet users aged 13+ feel confident in their ability to stay safe online.[3] As such, we identified lack of motivation as potentially one of the biggest barriers, which can be difficult to change.

3.3 To address lack of awareness of online safety information and develop our understanding of which media literacy initiatives are effective at promoting digital skills, we will be piloting a serious game to explore the impact of this as a tool to improve knowledge and understanding of online media literacy. Serious games are *'games that do not have entertainment, enjoyment of fun as their primary purpose[4]'*. In the past few years there have been a few successful serious games in the media literacy space; for example, the Bad News Game and Go Viral!.

3.4 Online media literacy is a vast area and incorporates various topics relating to the online environment. This includes understanding how our personal data is used, how to protect our privacy online, different types of online risks, different information sources and online engagement and relationships.[5] To narrow down the media literacy topic we would test in the game, we considered a variety of metrics including:

i) policy priority level for the topic

ii) suitability to turn the topic into a game

iii) ability to evaluate the game

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[1] Ofcom, Safety measures on video-sharing platforms survey (quantitative research) 2021. Base: UK internet users 13 years old and over n=1,002

[2] The COM-B model is a model of behaviour change which identifies three factors that need to be present for any behaviour to occur: capability, opportunity and motivation. For more information please see: https://social-change.co.uk/files/02.09.19_COM-B_and_changing_behaviour_.pdf

[3] Source: Ofcom Online Experiences Tracker 2021 (6,619 online users aged 13 to 85), Q.1b: https://www.ofcom.org.uk/__data/assets/pdf_file/0019/238240/online-experiences-tracker-wave-1-data-tables.pdf

[4] Michael, D., & Chen, S. (2006). *Serious games: Games that educate, train and inform*. Boston, Mass: Thomson Course Technology.

[5] For more information about what constitutes media literacy, please see Ofcom's approach to online media literacy DCMS Online Media Literacy report

iv) ethical considerations

v) availability of benchmark measures

vi) availability of pre-existing serious games on a topic

3.5 Following this review, we chose **social media etiquette** as the topic to use in the game. The overarching theme of social media etiquette is '**think before you share'.** By this we mean, think about how others might react and feel before you post. To operationalise this, for the purpose of this pilot trial, we identified five sub-topics that sit underneath this theme:

i) **Private vs. public profiles:** understanding the impact of different privacy settings.

ii) **Personal information**: understanding the consequences of posting personal information online.

iii) **Digital footprint**: understanding that content posted has a digital footprint, even if deleted.

iv) **Asking for permission:** knowing to always ask permission before sharing photos of other people or adding other people to group chats, and that you can ask someone to remove a post about you that you'd rather was kept private.

v) **Dealing with negative comments**: understanding why it's best not to respond to negative comments online.

3.6 We will pilot our serious game among teenagers (age 13-17). We chose this age group for a variety of reasons. They are high users of social media; almost all of this age group have at least one social media profile, and more than six in ten have more than one profile on some online sites and apps.[6] As such, the learnings should be very relevant to this age group. Furthermore, previous serious games (Bad News and GO Viral) were tested and developed among young adults, so we wanted to test the format among a younger age group.

3.7 To test the effect of using a serious game to educate teenagers on this topic, we will compare it against control guidance similar to that found in social media platform's community guidelines. We will develop a platform neutral guide and ensure that the guidance document covers the same topics as the game and in a similar order, uses consistent language to convey key learnings and does not teach any more or less detail on key learnings than covered in the game. We will design the control guidance to be a single page of A4, with clear headings. This short and simple control guidance may not accurately reflect guidance currently available, however we will factor this into our analysis. We did consider alternatives to this control; no control intervention (i.e. doing nothing) and playing a non-educational game (e.g. Tetris). We decided against these alternatives as neither would test the impact of making information more engaging (i.e. a serious game vs. informative

[6] Source: Ofcom's Children and parents: media use and attitudes report 2022

text) and doing nothing would be an odd experience for participants (e.g. taking the pre-test, waiting for 5 minutes, then taking the post-test).

Objectives

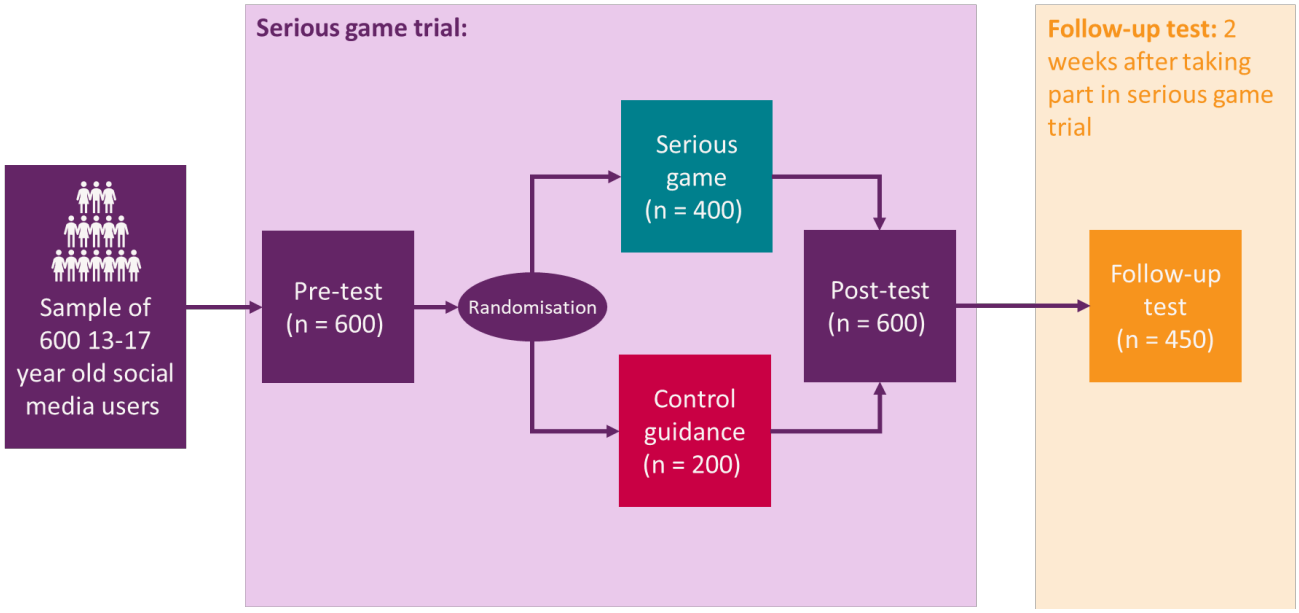
3.8 The overall objective of the pilot trial was to explore the effectiveness of a serious game as a tool to educate children about social media etiquette.

3.9 However, there were broader objectives to conducting this pilot trial which were to:

- Assess the feasibility of trialling on a larger scale in the future
- Contribute to the evidence base around the effectiveness of serious games by sharing our learnings
- Build our internal capability around approaches to evaluation
- Build our understanding of 'what works' in relation to online safety measures

4. Research design

Figure 1: Serious game pilot trial design



4.1 The serious game pilot will be run on Ofcom's online research panel, run by Yonder. Participants will be recruited from the panel and parental consent will be obtained (see request for consent in the Pre-test). Fieldwork will take place January – February 2022.

4.2 The sample will comprise c.600 13-17-year-old social media users. Respondents on the panel who do not use any social media, as determined by the pre-test, will be screened out.

4.3 The respondents will be randomly assigned into two trial arms. One arm will play the serious game, and the other will read the control guidance which is based on platform neutral community guidelines on social media etiquette topics.

4.4 The arm who plays the game will have 400 respondents, and the arm who see the control guidance will have 200 respondents. The purpose of the larger sample size in the treatment arm is to allow for more robust analysis between the 13-15 and 16-17 age groups in terms of the effect of the game. To inform sample size decisions we conducted power calculations to determine the effect size we could robustly detect with the maximum sample size of 600 split into two arms of 400 and 200. Setting the significance level to 95% and the power level to 80%, we can expect to detect small effects (Cohen's h of 0.243). This is marginally bigger than the effect we could detect if we split the sample size evenly (Cohen's h of 0.229).

4.5 The individual age groups are expected to fall out evenly across the sample, so we expect to see 80 respondents of each age play the game: 240 13–15-year-olds, and 160 16–17-year-olds. We hope to be able to, at least indicatively, determine if the game is pitched at a younger or older audience by analysing the data in this way, or

if the effect is broadly the same across ages. Yonder were unable to increase the overall sample size of 13-17 year olds, as such this approach was agreed as the next best alternative. In addition, we will be conducting a small-scale qualitative research project[7] among 13-17 year olds, to explore (amongst other things) the age range to which the game is best suited (see Follow-up qualitative research: Discussion guide).

4.6 All respondents will first take a pre-test before seeing either the game or the control guidance. The pre-test will consist of knowledge & understanding questions, designed to ascertain respondents' knowledge and understanding of social media etiquette prior to the intervention. After playing the game or reading the guidance, all respondents will take a Post-test. The pre-test will consist of knowledge & understanding and behavioural questions. These questions are designed to ascertain respondents' knowledge and understanding of and behaviour in relation to social media etiquette following the intervention.

4.7 To test the longitudinal impact of playing the serious game, all respondents will be re-contacted 2 weeks after the initial fieldwork to take a follow-up test. Yonder expect there will be some drop-off at this point as not all respondents who are re-contacted may take the follow-up test. It is estimated that typically 75% of the original sample will engage when they are re-contacted. The follow-up test will consist of mainly behavioural questions, and a couple of knowledge & questions. These questions are designed to ascertain respondents' enactment of social media etiquette behaviours in the two weeks following the intervention and retention of knowledge and understanding two weeks following the intervention.

4.8 Preliminary analysis will be conducted (prior to analysis on the outcome measures) to check the randomisation of the serious game and control groups. We will check for differences in the split of gender, age, existing privacy settings and pre-existing level of knowledge and understanding of social media etiquette (as measured by the pre-test) to ensure the groups are comparable. If any significant differences are evident, we may need to adjust our approach to analysis to ensure the comparison between trial arms reflects genuine differences in the outcome measures, as opposed to different demographics, social media privacy settings or levels of pre-existing knowledge.

[7] This will be conducted following Yonder and Ofcom's ethical and safeguarding processes, including the completion of a Data Protection and Impact Assessment (DPIA).

5. Outcome measures and analysis methodology

Introduction

5.1 This section details the outcome measures and analysis approached we will use in this trial. This serious game trial is a pilot study and is therefore small-scale and light touch by design. Progression to trial a larger-scale serious game will be, in part, dependent on the outcome of this pilot and the follow-up qualitative research.

5.2 The outcome measures we propose below are being tested as part of this pilot and are subject to change in any subsequent serious game trials conducted by Ofcom. An outcome measure is a measure which is used to assess the effect (positive, negative or no effect) of an intervention. Primary outcome measures are the outcome measure(s) of greatest importance and correspond to the primary objective of the research. In this trial, the primary outcome measure is more roust (than the secondary outcome measures) as the sample has been designed with the effect sizes of this measure in mind. Secondary outcome measures are the outcome measures of lesser importance than the primary outcome measure but still part of the analysis for evaluating the effects of the intervention. Exploratory outcome measures are more speculative outcome measures, which may not have a high likelihood of showing differences between trial groups.

Primary Outcome Measure

Level of knowledge and understanding of social media etiquette

Objective

5.3 The primary objective of this project is to understand the extent to which a serious game can improve elements of media literacy knowledge and understanding among 13-17 year olds, compared to standard guidance on these topics.

5.4 We agreed to focus the game on the media literacy topic: social media etiquette. Therefore, the primary outcome of this trial is to test the impact of the serious game vs. the control guidance on level of knowledge and understanding of social media etiquette (across the five sub-topics, see paragraph 3.5).

5.5 We will also be testing the impact of playing the game on enactment of positive social media etiquette behaviours (via the follow-up test). But, given the smaller sample size likely to be achieved for this measure (see paragraph 4.7) we decided to include this as a secondary (rather than primary) outcome measure.

Approach

5.6 To measure the primary outcome quantitively, we will calculate a score for each respondent; referred to as the 'Total score'. The Total score will be calculated using responses to the pre- and post-tests. The Total scores of the respondents who played the serious game will be tested against that of those who read the control guidance.

5.7 To calculate the Total score, respondent's pre-existing levels of knowledge and understanding of social media etiquette (measured by the pre-test) will be deducted from their levels of knowledge and understanding after completing the trial (measured by the post-test) and considered alongside responses to questions only asked in the post-test survey. Knowledge and understanding will be measured using both knowledge and understanding and attitudinal questions. The attitudinal questions we have included are designed as more subjective measures of knowledge and understanding of social media etiquette. Questions asking about behaviour will be excluded from the Total score as they do not relate to the primary outcome measure. There are no knowledge and understanding or attitudinal questions about digital footprint and asking for permission in the pre-test. This is because inclusion of these questions at this stage, would have given participants the knowledge the game was designed to teach them and influenced their responses to the post-test. The pre- and post-test questions used to calculate the Total measurement score can be found in table 1.

Table 1: Pre-test and post-test questions used to calculate Total score

Key:	Question included in calculation of Total score
	Where there is no question number in a cell, this indicates that there was no question on this topic in the pre-test.

Sub-topic area	Question type	Pre-test question[8]	Post-test question
Private vs. public profiles	Knowledge and understanding	Q5	Q1
Personal information (a & b)[9]	Attitudinal (a)	Q6a	Q2a
	Knowledge and understanding (b)	Q6b	Q2b
	Behavioural		Q3a & b
Digital footprint	Knowledge and understanding		Q4
Asking for permission	Behavioural		Q5
	Attitudinal		Q6
	Behavioural		Q7a & b
Negative comments	Behavioural		Q8a, b & c

5.8 To summarise the scoring approach for the Total score: pre-test scores will be subtracted from post-test scores. Any positive Total score denotes improvement in knowledge and understanding, a zero score denotes no improvement, and a negative score denotes deterioration in knowledge and understanding. We expect most respondents' results to be either positive or zero. However, because we are subtracting pre-test scores from post-test scores, it is possible that respondent's knowledge and understanding will deteriorate, and the scoring regime needs to account for this.

5.9 For questions only asked in the post-test, *accurate* answers relating to knowledge and understanding of social media etiquette will be assigned a positive score and *inaccurate* answers will be assigned a score of zero.

5.10 For single code questions[10], we will assign scores of 2 to a correct response and 0 to an incorrect response. For multi-code questions[11] (both closed-ended[12] and

[8] Questions 1 – 4 in the pre-test ask about current social media use and behaviour for screening purposes, and are therefore exploded from the calculation of the Total scores

[9] As there are two questions in the pre- and post-test relating to the personal information sub-topic, these are split out during the analysis into personal information (a) which refers to the attitudinal question, and personal information (b) which refers to the knowledge and understanding question

[10] A single code question is a question where only one answer can be selected from a list of possible responses.

[11] A multiple code question is a question where more than one answer can be selected from a list of possible responses.

[12] A closed-ended question is made up of pre-populated answer choices (or codes) for the respondent to choose from.

open-ended[13]), we will assign scores of 1 to each correct response, and a score of 0 to an incorrect response. There is one question where the responses are given on a scale of 1-10, for this question we will divide the score by 2. We chose these scoring approaches so to avoid giving excessive weight to topics where questions were multi-code or where responses were given on a scale of 1-10. While ideally each sub-topic would have equal weight, this is not possible due to the different question types within sub-topic (e.g. single code, multi-code and 1-10 scale). See paragraph 6.5 for more information on this.

5.11 The approach to calculating the Total score is outlined in table 2 and examples of the scores a respondent would get with each combination of pre- and post-test responses with this scoring regime is given in table 3 ('Private vs Public profiles' sub-topic has been used to illustrate this).

Table 2: Approach to calculating the Total score

Pre-test			**Post-test**		
Private vs. public profiles: knowledge of who can see posts on public profiles (single code question) Post-test score – pre-test score (maximum score 2, minimum -2)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q5	5 or 6 (correct)	2	Q1	5 or 6 (correct)	2
Q5	Not 5 or 6 (incorrect)	0	Q1	Not 5 or 6 (incorrect)	0
Personal information (a): attitudes towards sharing posts containing personal information (single code question) Post-test score – pre-test score (maximum score 2, minimum -2)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q6a	2 (correct)	2	Q2a	2 (correct)	2
Q6a	1 or 3 (incorrect)	0	Q2a	1 or 3 (incorrect)	0
Personal information (b): knowledge of reasons for not sharing posts containing personal information (pre-test: open-ended question[14], post-test: multi-code question) Post test score – Pre-test score (maximum score 4, minimum -4)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q6b	Any answer that can be coded as 1 in Q2b in post-test (correct)	1	Q2b	1 (correct)	1
Q6b	Any answer that can be coded as 2 in Q2b in post-test (correct)	1	Q2b	2 (correct)	1
Q6b	Any answer that can be coded as 3 in Q2b in post-test (correct)	1	Q2b	3 (correct)	1

[13] An open-ended question asks the respondent to feedback in their own words.

[14] The pre-test question was open-ended (rather than multi-code) to avoid giving the respondent any knowledge and understanding on this topic prior to the intervention. For information on how we coded the responses, see Verbatim coding methodology.

Q6b	Any answer that can be coded as valid other reason in Q2b in post-test (correct)	1	Q2b	Other valid reasons (correct)[15]	1
Q6b	Any answer that cannot be coded as 1, 2,3 or valid other reason in Q2b in post-test (incorrect)	0	Q2b	Any invalid reason/s (incorrect)	0
Digital footprint: knowledge of what happens when you delete a post (multi-code question) Post-test score only (maximum score 3, minimum 0)[16]					
N/A[17]			**Question**	**Answer**	**Score**
			Q4_1	a (incorrect)	0
			Q4_1	b (correct)	1
			Q4_2	a (incorrect)	0
			Q4_2	b (correct)	1
			Q4_3	a (correct)	1
			Q4_3	b (incorrect)	0
Asking for permission: likelihood of asking for a post to be removed (single score question) Post-test score only (maximum score 5, minimum 0)					
N/A [18]			Q6	Score equals answer coded (0-10)/ 2	
Total score (max 16, min -8) = private vs. public profiles score (max 2, min -2) + personal information (a) score (max 2, min -2) + personal information (b) score (max 4, min -4) + digital footprint score (max 3, min 0) + asking for permission score (max 5, min 0)					

Table 3: Total score calculation: an example

Pre-test			**Post-test**			**Post-test – Pre-test Score**
Question	**Answer**	**Pre-Test Score**	**Question**	**Answer**	**Post-test Score**	
Private vs. public profiles: knowledge of who can see posts on public profiles (single code question). Post-test score – pre-test score (maximum score 2, minimum -2)						
Q5	Not 5 or 6 (incorrect)	0	Q1	5 or 6 (correct)	2	2 – 0 = 2
Q5	Not 5 or 6 (incorrect)	0	Q1	Not 5 or 6 (incorrect)	0	0 – 0 = 0
Q5	5 or 6 (correct)	2	Q1	5 or 6 (correct)	2	2 – 2 = 0
Q5	5 or 6 (correct)	2	Q1	Not 5 or 6 (incorrect)	0	0 – 2 = -2

[15] Q2b includes an 'other' response
[16] There are multiple true/ false questions asked as part of Q4
[17] No pre-test question for digital footprint
[18] No pre-test question for Asking for permission

Statistical analysis

5.12 A null hypothesis proposes that there is **no difference** between two variables (in this case the serious game and the control groups). An alternative hypothesis is contradictory to the null hypothesis and assumes that there **is a difference**. When conducting statistical analysis (in this case, on the effect of the serious game), one starts with the null hypothesis that there will be no difference. If we fail to reject the null hypothesis, this means there is no significant difference (in this case between the serious game and control guidance). If the alternative hypothesis is accepted, this means there is a significant difference (between the serious game and control guidance). See Hypotheses section for full list of hypotheses tested in this trial.

5.13 We will use the Total scores, to test the null hypothesis[19]. We will use a Mann-Whitney U test[20] because this test accounts for the non-normal[21] spread of Total scores likely to be achieved in the research. The test will be taken at the 95% significance level. If we fail to reject the null hypothesis, this means there is no significant difference between the level of knowledge and understanding of the respondents who played the game and those who read the control guidance. We will use a two-tailed hypothesis[22] test to detect whether the Total scores of those who completed the serious game were significantly higher or significantly lower than the Total scores of those who received the control guidance. This is in contrast to a one-tailed hypothesis[23], where if we were testing whether the Total scores of the serious game group were higher than the control group, this test would not report a significant result if it turned out the Total scores of the Serious game group were, in fact, lower than the control group.

5.14 If the null hypothesis is rejected, we can accept the alternative hypothesis[24], and infer that there is a difference between the knowledge and understanding of social media etiquette of the respondents who read the control guidance, compared to those who played the game. If the Total score of those who played the game is positive *and* statistically significantly higher than those who read the control guidance, then we can infer that the serious game had a greater positive effect on

[19] Null Hypothesis: There will be no statistically significant difference in level of knowledge and understanding of social media etiquette between 13-17 year olds who play the serious game and those who read the control guidance.
[20] A Mann-Whitney U test is a non-parametric test used to test for statistically significant differences in an ordinal or non-normally distributed measures between two independent groups (i.e. data collected using an independent measures design). It tests whether observations (or, in this trial, scores) in one group tend to be larger than observations (or, in this trial, scores) in the other.
[21] Normal distributions are distributions that has most of the data in the centre, with decreasing amounts evenly distributed to the left and right. Non-normal distributions do not follow this distribution pattern.
[22] A two-tailed hypothesis is one where the alternative hypothesis tests for a significant difference in both directions, e.g. it tests whether scores from group A are significantly higher or significantly lower than scores from group B.
[23] A one-tailed hypothesis is one where the alternative hypothesis tests for a significant difference in one direction only, e.g. it only tests whether scores from group A are significantly higher than scores from group B. If scores from group A were significantly lower than scores from group B, this would not be identified as a significant result.
[24] Alternative hypothesis: There will be a statistically significant difference in level of knowledge and understanding of social media etiquette between 13-17 year olds who play the serious game and those who read the control guidance.

knowledge and understanding of those social media etiquette topics included in the calculation of the Total score. The same will apply vice versa i.e. if the Total score for the control guidance group is positive and statistically significantly higher than the serious game group.

Risks/limitations

5.15 A risk with this research is that the respondents may already have a high level of knowledge and understanding of some (or potentially all) of the topics covered in the game and the control guidance (i.e. receive a high score in the pre-test). If this is the case, there will be limited potential for them to gain a positive score for questions where the score is determined by both pre and post test questions. However, questions 4 and 6 in the post-test are not affected by pre-existing knowledge. So, in a scenario where most respondents already have high levels of knowledge and understanding, the scores from 4 and 6 will largely determine whether there are any differences between the game and the control.

5.16 A limitation of the Total score is that it comprises of three sub-topics measured as a change in scores (i.e. where there is a pre- and post-test question) and two sub-topics measured as absolute scores (where there is only a post-test question). While we can still compare Total scores between the serious game and control groups (as we are assessing both groups in the same way), this will limit our ability to comment on the mechanism for change i.e. whether any change in knowledge and understanding is a direct result of the playing the serious game and/ or reading the control guidance. However, we are measuring the amount of change in knowledge and understanding as a direct result of the intervention in our analysis of the secondary outcome measure 1 (S1), so we will be able to comment on the mechanism for change via this measure.

Secondary Outcome measures

Secondary outcome measure 1 (S1): Change in knowledge and understanding of social media etiquette

Objective

5.17 Another objective of this trial is to understand whether knowledge and understanding of social media etiquette *changes* (this could be improvement, deterioration, or no change) as a direct result of playing the serious game and reading control guidance. This outcome measure is different to the primary outcome measure, in that this analysis measures the amount of change in knowledge and understanding as a direct result of the intervention. As opposed to, the primary outcome measure which compares any improvement in the level of knowledge and understanding between trial arms.

5.18 We will also compare the *extent* of any change in knowledge and understanding between trial arms.

Approach

5.19 To measure S1 quantitatively, we will calculate a score for each respondent; referred to as the 'Change score'. The Change score will be calculated using responses to only questions asked in both the pre and post-tests and will therefore be a true measure of any change in respondent's knowledge and understanding of these aspects of social media etiquette. The pre and post-test questions used to calculate the 'Change score' can be found in table 4.

Table 4: Pre-test and post-test questions used to calculate Change score

Key:	Question included in calculation of Change score
	Where there is no question number in a cell, this indicates that there was no question on this topic in the pre-test.

Sub-topic area	Question type	Pre-test question[25]	Post-test question
Private vs. public profiles	Knowledge and understanding	Q5	Q1
Personal information (a & b)	Attitudinal (a)	Q6a	Q2a
	Knowledge and understanding (b)	Q6b	Q2b
	Behavioural		Q3a & b
Digital footprint	Knowledge and understanding		Q4
Asking for permission	Behavioural		Q5
	Attitudinal		Q6
	Behavioural		Q7a & b
Negative comments	Behavioural		Q8a, b & c

5.20 To calculate the Change score, we will take a similar approach as with the Total score (for the primary outcome measure). We will first calculate a total pre-test score and total post-test score for each respondent, although for the Change score we will use only the questions asked in both the pre and post-tests. We will then deduct respondent's pre-test score from their post-test score (post-test score – pre-test score). The approach to calculating the Change score is set out in table 5. An example of the scores a respondent would get with each combination of pre and post-test responses with this scoring regime is given in table 6 ('Private vs Public profiles' sub-topic has been used to illustrate this).

[25] Questions 1 – 4 in the pre-test ask about current social media use and behaviour for screening purposes, and are therefore exploded from the calculation of the change score.

Table 5: Approach to calculating the Change score

Pre-test			Post-test		
Private vs. public profiles: knowledge of who can see posts on public profiles (single code question) (maximum score 2, minimum -2)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q5	5 or 6 (correct)	2	Q1	5 or 6 (correct)	2
Q5	Not 5 or 6 (incorrect)	0	Q1	Not 5 or 6 (incorrect)	0
Personal information (a): attitudes towards sharing posts containing personal information (single code question) (maximum score 2, minimum -2)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q6a	2 (correct)	2	Q2a	2 (correct)	2
Q6a	1 or 3 (incorrect)	0	Q2a	1 or 3 (incorrect)	0
Personal information (b): knowledge of reasons for not sharing posts containing personal information (pre-test: open-ended question, post-test: multiple code question) (maximum score 4, minimum -4)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q6b	Any answer that can be coded as 1 in Q2b in post-test (correct)	1	Q2b	1 (correct)	1
Q6b	Any answer that can be coded as 2 in Q2b in post-test (correct)	1	Q2b	2 (correct)	1
Q6b	Any answer that can be coded as 3 in Q2b in post-test (correct)	1	Q2b	3 (correct)	1
Q6b	Any answer that can be coded as valid other reason in Q2b in post-test (correct)	1	Q2b	Other valid reasons (correct)	1
Q6b	Any answer that cannot be coded as 1, 2,3 or valid other reason in Q2b in post-test (incorrect)	0	Q2b	Any invalid reason/s (incorrect)	0
Pre-test score (max 8, min 0) = private vs. public profiles score (max 2, min -2) + personal information (a) score (max 2, min -2) + personal information (b) score (max 4, min -4)			**Post-test score** (max 8, min 0) = private vs. public profiles score (max 2, min -2) + personal information (a) score (max 2, min -2) + personal information (b) score (max 4, min -4)		
Change score (max 8, min -8) = post-test score – pre-test score					

Table 6: Calculating the Change score: an example

Pre-test			Post-test			Post-test – Pre-test Score
Question	**Answer**	**Pre-Test Score**	**Question**	**Answer**	**Post-test Score**	
Private vs. public profiles: knowledge of who can see posts on public profiles (single code question) (maximum score 2, minimum -2)						
Q5	Not 5 or 6 (incorrect)	0	Q1	5 or 6 (correct)	2	2 – 0 = 2
Q5	Not 5 or 6 (incorrect)	0	Q1	Not 5 or 6 (incorrect)	0	0 – 0 = 0
Q5	5 or 6 (correct)	2	Q1	5 or 6 (correct)	2	2 – 2 = 0
Q5	5 or 6 (correct)	2	Q1	Not 5 or 6 (incorrect)	0	0 – 2 = -2

Statistical analysis

5.21 We will use the Change score to measure any change in knowledge and understanding in the control and experimental groups separately. To do this, we will consider the testing of the serious game group before and after the intervention separately to the testing of the control group before and after the intervention as a repeated measures design[26] and use a Wilcoxon Signed Rank test[27] the two null hypotheses[28,29] that in each group the Change score is not significantly different from zero. A Wilcoxon signed rank test will be used as it is most appropriate for comparing the pre-test and post-test scores of the same respondent against each other (a repeated measures design), where scores are ordinal[30] and non-normally distributed. If we fail to reject the null hypothesis, this will indicate that there is no change in knowledge levels before and after the intervention. If one – or both – of the null hypotheses are rejected, we can accept the alternative hypotheses[31,32] and assume that there is a change in knowledge levels before and after the intervention. If the Change score/s are positive, we can infer that the serious game and/ or control guidance improved knowledge and

[26] Repeated Measures design, also known as within-groups, is an experimental design where the same participants take part in each condition of the independent variable. This means that each condition of the experiment includes the same group of participants.
[27] A Wilcoxon Signed-Rank test is used to test for significant differences in an ordinal or non-normally distributed measure in two sets of scores that come from the same respondents (i.e. data collected using a repeated measures design). It tests whether that the median difference between the two sets of scores is significantly different to zero.
[28] Null hypothesis: Those in the control guidance group will experience no change in their levels of knowledge and understanding of social media etiquette as a result of reading the control guidance.
[29] Null hypothesis: Those in the serious game group will experience no change in their levels of knowledge and understanding of social media etiquette as a result of playing the serious game.
[30] Ordinal data is a kind of categorical data with a set order or scale to it e.g. a likert scale.
[31] Alternative hypothesis: Those in the control guidance group will experience a change in their levels of knowledge and understanding of social media etiquette as a result of reading the control guidance.
[32] Alternative hypothesis: Those in the serious game group will experience a change in their levels of knowledge and understanding of social media etiquette as a result of reading the control guidance.

understanding of those social media etiquette topics included in the calculation of the Change score. Conversely, if the Change score/s are negative, we can infer that the serious game and/ or control guidance reduced knowledge and understanding of those social media etiquette topics included in the calculation of the Change score. Significant differences should be determined at the 95% significant level, however due to the more experimental nature of secondary outcome measures, if any differences are significant at the 90% level, these could be noted as potentially indicative effects.

5.22 To compare the extent of any change between the serious game and control groups, the Change scores of respondents in the control group will be compared to those of the experimental group. We will treat the comparison of the change scores of the serious game and the control group as an independent measures design[33] and use a Mann-Whitney U test to test the null hypothesis[34]. We will be using a Mann-Whitney U test, because we are comparing the Change scores of two different groups against each other (an independent measures design), in this case the scores of respondents who played the serious game against those who received the control guidance. If the null hypothesis is rejected, we can accept the alternative hypothesis[35] and assume there is a difference in the change in knowledge and understanding between those who played the serious game against those who received the control guidance. If the Change score for the serious game is positive, and higher than the Change score for the control guidance, we can infer that the serious game improved knowledge and understanding of those social media etiquette topics included in the calculation of the Change score, more than the control guidance. The same will apply vice versa i.e. if the Change score for the control guidance group is positive and statistically significantly higher than the serious game group.

Risks/ limitations

5.23 As noted above, a risk with this research is that the respondents recruited may already have good knowledge and understanding of some/all of the topics covered in the serious game and therefore won't gain much new knowledge and understanding from playing the game. High levels of pre-existing knowledge and understanding will impact the scoring approach, which discounts for pre-existing knowledge and understanding (as measured by the pre-test).

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[33] Independent measures design, also known as between-groups, is an experimental design where different participants are used in each condition of the independent variable. This means that each condition of the experiment includes a different group of participants.

[34] Null hypothesis: There will be no statistically significant difference in any change in level of knowledge and understanding of social media etiquette between 13-17 year olds who play the serious game and those who read the control guidance.

[35] Alternative hypothesis: There will be a statistically significant difference in any change in level of knowledge and understanding of social media etiquette between 13-17 year olds who play the serious game and those who read the control guidance.

5.24 Only two (private vs. public profiles and personal information) of the five sub-level social media etiquette topics are asked about in both the pre and the post-test. As such, the extent to which we can demonstrate any change in knowledge and understanding, will be limited to these two sub-topics.

Secondary outcome measure 2 (S2): Level of knowledge and understanding, by sub-level social media etiquette topic

Objective

5.25 As stated above, we agreed to focus the game on the overarching media literacy theme of social media etiquette and identified five sub-topics that sit underneath this overarching theme. These sub-topics are: private vs. public profiles, personal information, digital footprint, asking for permission and dealing with negative comments (see paragraph 3.5).

5.26 For this secondary outcome measure (S2), we want to compare the impact of the serious game vs. the control guidance, on level of knowledge and understanding for the sub-topics individually.

Approach

5.27 To evaluate this secondary outcome measure, we will calculate a score for each respondent for each individual sub-topic, using responses to the pre- and post-test questions. These individual sub-topic scores will then be compared between the serious game and control group. The questions that we will use to calculate the sub-topic scores are detailed in tables 7, 8, 9 and 10. Behavioural questions will be excluded from the scores as they do not relate to the outcome measure. In line with this, there will be no score for this outcome measure on the negative comments sub-topic, as this topic only includes behavioural questions.

Table 7: Pre-test and post-test questions used to calculate private vs. public profile sub-topic score

Key:	Question included in calculation of sub-topic score
	Where there is no question number in a cell, this indicates that there was no question on this topic in the pre-test[36]

Sub-topic area	Question type	Pre-test question	Post-test question
Private vs. public profiles	Knowledge and understanding	Q5	Q1

Table 8: Pre-test and post-test questions used to calculate personal information a and sub-topic scores

Sub-topic area	Question type	Pre-test question	Post-test question
Personal information (a & b)	Attitudinal (a)	Q6a	Q2a
	Knowledge and understanding (b)	Q6b	Q2b
	Behavioural		Q3a & b

Table 9: Pre-test and post-test questions used to calculate digital footprint sub-topic score

Sub-topic area	Question type	Pre-test question	Post-test question
Digital footprint	Knowledge and understanding		Q4

Table 10: Pre-test and post-test questions used to calculate asking for permission sub-topic score

Sub-topic area	Question type	Pre-test question	Post-test question
Asking for permission	Behavioural		Q5
	Attitudinal		Q6
	Behavioural		Q7a & b

5.28 To calculate each sub-topic scores, we will take the same approach as with the Total score (primary outcome measure) and change score (S1). Previous knowledge, or attitudes, measured in the pre-test, need to be taken into consideration. This will only be applicable to sub-topic areas with questions asked in both the pre- and post-tests (private vs. public profiles and personal

[36] Questions 1 – 4 in the pre-test ask about current social media use and behaviour for screening purposes, and are therefore excluded from the calculation of the Total score

information). For these sub-topic areas, participants score to the pre-test question, will be deducted from their score for the post-test question. For sub-topic areas where there is only a post-test question, the scoring approach will be the same as for the primary outcome measure i.e. *accurate* answers will be assigned a positive score and *inaccurate* answers will be assigned a score of zero (see paragraph 5.9). The scoring approach for the sub-topics for which we can generate scores, is detailed in tables 11, 12, 13, 14 and 15. For an example of the scores a respondent would get with each combination of pre and post-test responses with this scoring regime, see table 6.

Table 11: Approach to calculating Private vs. public profiles score

Pre-test			**Post-test**		
Private vs. public profiles: knowledge of who can see posts on public profiles (single code question)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q5	5 or 6 (correct)	2	Q1	5 or 6 (correct)	2
Q5	Not 5 or 6 (incorrect)	0	Q1	Not 5 or 6 (incorrect)	0
Private vs. public profiles score (max 2, min -2) = post-test score – pre-test score					

Table 12: Approach to calculating Personal information (a) score

Pre-test			**Post-test**		
Personal information (a): attitudes towards sharing posts containing personal information (single code question)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q6a	2 (correct)	2	Q2a	2 (correct)	2
Q6a	1 or 3 (incorrect)	0	Q2a	1 or 3 (incorrect)	0
Personal information (a) score (max 2, min -2) = post-test score – pre-test score					

Table 13: Approach to calculating Personal information (b) score

Pre-test			Post-test		
Personal information (b): knowledge of reasons for not sharing posts containing personal information (pre-test: open-ended question, post-test: multiple code question)					
Question	**Answer**	**Score**	**Question**	**Answer**	**Score**
Q6b	Any answer that can be coded as 1 in Q2b in post-test (correct)	1	Q2b	1 (correct)	1
Q6b	Any answer that can be coded as 2 in Q2b in post-test (correct)	1	Q2b	2 (correct)	1
Q6b	Any answer that can be coded as 3 in Q2b in post-test (correct)	1	Q2b	3 (correct)	1
Q6b	Any answer that can be coded as valid other reason in Q2b in post-test (correct)	1	Q2b	Other valid reasons (correct)	1
Q6b	Any answer that cannot be coded as 1, 2,3 or valid other reason in Q2b in post-test (incorrect)	0	Q2b	Any invalid reason/s (incorrect)	0
Personal information (b) (maximum score 4, minimum -4)**:** Post test score – Pre test score					

Table 14: Approach to calculating Digital footprint score

Pre-test	Post-test		
Digital footprint: knowledge of what happens when you delete a post (multiple score question)			
N/A[37]	**Question**	**Answer**	**Score**
	Q4_1	a (incorrect)	0
	Q4_1	b (correct)	1
	Q4_2	a (incorrect)	0
	Q4_2	b (correct)	1
	Q4_3	a (correct)	1
	Q4_3	b (incorrect)	0
Digital footprint (max 3, min 0): post-test score			

Table 15: Approach to calculating Asking for permission score

Pre-test	Post-test	
Asking for permission: likelihood of asking for a post to be removed (single score question)		
N/A [38]	Q6	Score equals answer coded (0-10)/ 2[39]
Asking for permission score (max 5, min 0): Post-test score		

[37] No pre-test question for digital footprint
[38] No pre-test question for Asking for permission
[39] For rationale behind this scoring approach, see paragraph 5.10.

Statistical analysis

5.29 We will test the null hypotheses[40,41,42,43,44] that there will be no statistically significant difference in sub-topic measurement scores, between respondents who play the serious game and those who read the control guidance. We will use a chi-square test[45] to compare scores across trial arms. A chi-squared test has been selected as it takes into account unequal sample sizes between trial arms (400 in experimental and 200 in control) and allows for comparison between multiple columns in a single test (e.g. for the private vs public profiles section, a respondent could end up with a score of -2, 0 or 2).

5.30 The chi-square test assesses whether the distribution of respondents across all these scores is different in the serious game group vs the control group using just one test. Alternative tests may involve comparing the proportion of respondents in the serious game and control group who got scores of -2, 0 and 2 separately, resulting in the use of 3 tests instead of 1 and increasing the likelihood of a type one error[46] due to multiple comparisons. Significant differences should be determined at the 95% significant level, however due to the more experimental nature of secondary outcome measures, if any differences are significant at the 90% level, these could be noted as potentially indicative effects.

[40] Null hypothesis: There will be no statistically significant difference in knowledge and understanding of who can see posts on public profiles, between 13-17 year olds who play the serious game and those who read the control guidance.
[41] Null hypothesis: There will be no statistically significant difference in knowledge and understanding of sharing posts containing personal information, between 13-17 year olds who play the serious game and those who read the control guidance.
[42] Null hypothesis: There will be no statistically significant difference in knowledge and understanding of reasons for not posting personal information online, between 13-17 year olds who play the serious game and those who read the control guidance.
[43] Null hypothesis: There will be no statistically significant difference in knowledge and understanding that content posted has a digital footprint, even if deleted, between 13-17 year olds who play the serious game and those who read the control guidance.
[44] Null hypothesis: There will be no statistically significant difference in knowledge and understanding of asking for permission before posting about other people on social media, between 13-17 year olds who play the serious game and those who read the control guidance.
[45] Chi-square ($\chi 2$) is used to test hypotheses about the distribution of observations across categories that are nominal (have no inherent ranking). It tests whether the observed frequencies within each categories are statistically significantly different from the frequencies within each category expected given the null hypothesis.
[46] A type 1 error is also known as a false positive and occurs when a researcher incorrectly rejects a true null hypothesis. This means that your report that your findings are significant when in fact they have occurred by chance.

5.31 If any of the null hypotheses are rejected, we can accept the relative alternative hypotheses[47,48,49,50,51] and assume that there is a difference in sub-topic measurement scores, between respondents who play the serious game and those who read the control guidance. If any of the sub-topic scores calculated using pre- and post-test questions for the game and/ or the control guidance groups are positive, this will indicate that the game and/ or guidance had a positive effect on knowledge and understanding for that particular sub-topic. Conversely, if any of these scores are negative, this will indicate the game/ guidance had a negative effect on knowledge and understanding. If a sub-topic score, calculated using pre- and post-test questions, of those who played the game is positive and statistically significantly higher than those who read the control guidance, then we can infer that the serious game had a greater positive effect on knowledge and understanding related to that sub-topic. The same will apply vice versa i.e. if the scores for those in the control group are positive and statistically significantly higher than those in the game group.

5.32 If sub-topic scores calculated using post-test question only are positive, this suggests accurate knowledge and understanding related to that sub-topic, however we cannot infer that was as a result of playing the game/ reading the guidance. If a sub-topic score, calculated using post-test questions only, of those who played the game is positive and statistically significantly higher than those who read the control guidance and pre-existing knowledge and understanding of social media etiquette was equal overall, then we can cautiously infer that the serious game had a greater positive effect on knowledge and understanding related to that sub-topic. The same will apply vice versa i.e. if the scores for those in the control group are positive and statistically significantly higher than those in the game group.

Risks/ limitations

5.33 As noted above, a risk with this research is that the respondents recruited may already have good knowledge of some (or even all) of the topics covered in the serious game and therefore won't gain much (or any) new knowledge and

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[47] Alternative hypothesis: There will be a statistically significant difference in knowledge and understanding of who can see posts on public profiles, between 13-17 year olds who play the serious game and those who read the control guidance.
[48] Alternative hypothesis: There will be a statistically significant difference in attitudes towards sharing posts containing personal information, between 13-17 year olds who play the serious game and those who read the control guidance.
[49] Alternative hypothesis: There will be a statistically significant difference in knowledge and understanding of reasons for not posting personal information online, between 13-17 year olds who play the serious game and those who read the control guidance.
[50] Alternative hypothesis: There will be a statistically significant difference in knowledge and understanding that content posted has a digital footprint, even if deleted, between 13-17 year olds who play the serious game and those who read the control guidance.
[51] Alternative hypothesis: There will be a statistically significant difference in knowledge and understanding of asking for permission before posting about other people on social media, between 13-17 year olds who play the serious game and those who read the control guidance.

understanding from playing the game. High levels of pre-existing knowledge and understanding will impact the scores for the sub-topics where there are pre-test questions; public vs. private profiles and personal information.

Secondary outcome measure 3 (S3): Retention of knowledge and understanding of social media etiquette

Objective

5.34 As part of this pilot trial, we want to compare the retention of knowledge and understanding between the serious game and the control guidance.

Approach

5.35 To test retention of knowledge and understanding, we will generate a 'Retention score' for each respondent that completed the follow-up test. This Retention score will represent the change in knowledge and understanding between the post-test and the follow-up test (conducted 2 weeks after the intervention), and the scores respondents get will be compared between trial arms. Where there are pre-test questions available, we will use these responses to discount knowledge and understanding that existed prior to the intervention. Questions about behaviour will be excluded from the analysis as they don't relate to this outcome measure. Due to the design of the study i.e. limitations on the inclusion of knowledge and understanding questions in the pre-test (as inclusion at this stage would have given away the knowledge and understanding the game/ guidance is designed to impart) and a follow-up test designed primarily to explore behaviour, the retention scores are limited to two sub-level social media etiquette topics: private vs. public profiles and digital footprint. Table 16 shows the questions in the pre-test, post-test and follow-up test that are used to calculate the Retention score.

Table 16: Pre-test questions, post-test questions and follow-up test questions used to calculate the Retention score

Key:	Question included in calculation of retention score
	Where there is no question number in a cell, this indicates that there was no question on this topic in the relevant test.

Sub-topic area	Question type	Pre-test question	Post-test question	Follow-up test question[52]
Private vs. public profiles	Knowledge and understanding	Q5	Q1	Q5
	Behavioural			Q2a & b
Personal information (a & b)	Attitudinal (a)	Q6a	Q2a	
	Knowledge and understanding (b)	Q6b	Q2b	
	Behavioural		Q3a & b	Q6a & b
	Behavioural			Q7a, b & c
Digital footprint	Knowledge and understanding		Q4	Q8
Asking for permission	Behavioural		Q5	Q9
	Attitudinal		Q6	
	Behavioural		Q7 a & b	Q10 a & b
Negative comments	Behavioural		Q8a, b & c	Q11 a, b & c

5.36 To summarise the scoring approach; where questions are asked in the pre, post and follow-up (i.e. private vs. public profiles), respondents will receive a positive score if they acquired knowledge as a result of the intervention and retained it at the follow-up (answered incorrectly in the pre-test, correctly in the post and follow-up test). They will receive a negative score if they acquired knowledge from pre to post-test, then lost it at the follow-up (answered incorrectly in the pre-test, correctly in the post but then incorrectly in the follow-up test). All other combinations of pre, post, and follow-up answers receive a score of 0. For example, in the scenario where a respondent answers the pre-test correctly, we are unable to give them a positive score even if they got the post-test and follow-up test correct as we can't attribute the knowledge and understanding to the intervention. For the same reason, we cannot give respondents a positive score if they get the post-test incorrect and the follow-up test correct (irrespective of their answer to the pre-test). Where questions are only asked in the post and follow-up

[52] Q1, 3 and 4 in the follow-up survey are questions about current social media use and habits. They were included to provide context and for additional analysis and are therefore not included in the scoring approaches and so excluded from this table.

tests (i.e. digital footprint), respondents will get a positive score if they answered correctly in both the post and follow-up tests and a negative score if they answered correctly in the post-test and incorrectly in the follow-up test. All other combinations again receive a score of 0. The scoring approach for the Retention scores, is detailed in table 17.

5.37 The Retention score is calculated differently from the Total score, Change score and Sub-topics scores. This is because this measure focuses on the retention of knowledge and understanding rather than the level of or change in knowledge. Therefore, we need to only score individuals positively if they retained knowledge they had immediately after the intervention (i.e. if they answer correctly in both pre and post-test), and negatively if they lost knowledge they had immediately after the intervention (i.e. if they answer correctly in the post-test and incorrectly in the follow-up test).

Table 17: Approach to calculating the Retention score

Pre-test		Post-test		Follow Up Test		Score
Question	**Answer**	**Question**	**Answer**	**Question**	**Answer**	
Private vs. public profiles: knowledge of who can see posts on public profiles (single code question) (max 1, min -1)						
Q5	Not 5 or 6 (incorrect)	Q1	5 or 6 (correct)	Q5	5 or 6 (correct)	1
Q5	Not 5 or 6 (incorrect)	Q1	Not 5 or 6 (incorrect)	Q5	5 or 6 (correct)	0
Q5	Not 5 or 6 (incorrect)	Q1	5 or 6 (correct)	Q5	Not 5 or 6 (incorrect)	-1
Q5	5 or 6 (correct)	Q1	5 or 6 (correct)	Q5	Not 5 or 6 (incorrect)	0
Q5	5 or 6 (correct)	Q1	Not 5 or 6 (incorrect)	Q5	Not 5 or 6 (incorrect)	0
Q5	5 or 6 (correct)	Q1	Not 5 or 6 (incorrect)	Q5	5 or 6 (correct)	0
Digital footprint: knowledge of what happens when you delete a post (multiple score question), max 3, min -3						
N/A		Q4_1	A (incorrect)	Q8_1	A (incorrect)	0
		Q4_1	A (incorrect)	Q8_1	B (correct)	0
		Q4_1	B (correct)	Q8_1	A (incorrect)	-1
		Q4_1	B (correct)	Q8_1	B (correct)	1
		Q4_2	A (incorrect	Q8_1	A (incorrect)	0
		Q4_2	A (incorrect)	Q8_1	B (correct)	0
		Q4_2	B (correct)	Q8_2	A (incorrect)	-1

	Q4_2	B (correct)	Q8_2	B (correct)	1
	Q4_3	A (correct)	Q8_3	A (correct)	1
	Q4_3	A (correct)	Q8_3	B (incorrect)	-1
	Q4_3	B (incorrect)	Q8_3	A (correct)	0
	Q4_3	B (incorrect)	Q8_3	B (incorrect)	0
Retention score (max 4, min -4): Private vs. public profiles score + digital footprint score					

Statistical analysis

5.38 A Mann-Whitney U test will be used to test the null hypothesis[53] that there is no significant difference in Retention scores between respondents who play the serious game and those who read the control guidance. This test will be used because we are comparing two independent groups on a score that is ordinal and non-normally distributed. If we fail to reject the null hypothesis, this will mean there is no different in retention of knowledge and understanding between the serious game and control groups. Significant differences should be determined at the 95% significant level, however due to the more experimental nature of secondary outcome measures, if any differences are significant at the 90% level, these could be noted as potentially indicative effects.

5.39 If the null hypothesis is rejected, we can accept the alternative hypothesis[54] and assume that there is a difference in retention of knowledge and understanding, between respondents who play the serious game and those who read the control guidance. If the Retention scores are positive, this will indicate that the game and/ or guidance had a positive effect on retention knowledge and understanding. Conversely, if the score is negative, this will indicate the game/ guidance had a negative effect on retention of knowledge and understanding. If the Retention score for the serious game is positive, and higher than the Retention score for the control guidance, we can infer that the serious game was more effective than the control guidance at supporting the retention of knowledge and understanding of those social media etiquette topics included in the calculation of the Retention score. The same will apply vice versa i.e. if the Retention score for the control guidance group is positive and statistically significantly higher than the serious game group.

[53] Null hypothesis: There will be no statistically significant difference in the retention of knowledge and understanding between 13-17 year olds who play the serious game and those who read the control guidance.
[54] Alternative hypothesis: There will be a statistically significant difference in the retention of knowledge and understanding between 13-17 year olds who play the serious game and those who read the control guidance.

Risks/ limitations

5.40 The Retention score is (in part) generated from sub-topic questions only asked in the post and follow-up tests (i.e. digital footprint) and respondents will get a positive score if they answered correctly in both the post and follow-up tests and a negative score if they answered correctly in the post-test and incorrectly in the follow-up test. As we are unable to ascertain whether knowledge and understanding existed prior to the intervention, the Retention score may be influenced by prior knowledge and understanding.

5.41 We cannot control for the experiences that children have between trial and follow-up test, which may affect their responses to the follow-up test. For example, there could be a media story relating to social media, resulting in UK-wide drive among schools to educate around staying safe on social media, which could in-turn affect follow-up test responses.

Secondary outcome measure 4 (S4): Enactment of social media etiquette behaviour(s)

Objective

5.42 For this secondary outcome measure (S4), we want to explore whether there is a difference in the enactment of positive and/ or negative social media etiquette behaviours in the 2 weeks after the intervention, between the serious game and control group.

Approach

5.43 To evaluate this secondary outcome measure, we will calculate a score for each respondent using responses to the behavioural questions in the follow-up test; referred to as the 'Behaviour score'.[55] Questions asking about knowledge and understanding will be excluded from the positive behaviour score as they do not relate to the outcome measure. The Behaviour scores will then be compared between the two trial arms. Table 18 shows the questions in the follow-up test that will be used to generate the Behaviour scores. These questions ask whether respondents have enacted any of the following behaviours since the intervention:

- reviewed of changed privacy settings on social media (Q2b)
- checked for personal or identifiable information *before* posting on social media (Q6a) AND if personal or identifiable information was identified, what action was taken (Q6b)

[55] We have included behavioural questions in the post-test (Q3a&b, Q5 and Q7a&b) which ask about social media etiquette behaviours 'ever' done. These questions are not expected to be affected by the treatments and we will not be using them in the calculation of the Behaviour score (because the post-test and follow-up test ask about enactment of behaviours over different time periods).

- checked whether previous social media posts contained personal or identifiable information (Q7a) AND IF yes, what action was taken (Q7c)
- checked with friends *before* posting pictures of them on social media (Q9)
- action taken if they saw a post of them on someone else's social media that made them feel uncomfortable (Q10b)
- action taken if saw a nasty or negative post (Q11b) OR hypothetical action taken if saw a nasty or negative post (Q11 b/c)

Table 18: Follow-up test questions used to calculate the Behaviour score

Key:	Question included in calculation of Behaviour score
	Where there is no question number in a cell, this indicates that there was no question on this topic in the relevant test.

Sub-topic area	**Question type**	**Follow-up test question**[56]
Private vs. public profiles	Knowledge and understanding	Q5
	Behavioural	Q2b[57]
Personal information[58]	Behavioural	Q6a & b
	Behavioural	Q7a & c[59]
Digital footprint	Knowledge and understanding	Q8
Asking for permission	Behavioural	Q9
	Behavioural	Q10b[60]
Negative comments	Behavioural	Q11b & c[61]

5.44 To summarise the scoring approach: positive social media etiquette behaviours will be assigned a positive score, negative behaviours a negative score and neutral behaviours/ can't remember/ no relevant behaviour enacted will be assigned a score of zero. Where questions are single code[62], the score for a positive behaviour is 2, the score for a somewhat positive behaviour[63] is 1, a neutral/ can't remember/ no behaviour enacted score will be 0 and a negative behaviour -2. Where questions

[56] Q1, 3 and 4 in the follow-up survey are questions about current social media use and habits. They were included to provide context and for additional analysis and are therefore not included in the scoring approaches and so excluded from this table.
[57] Q2a excluded from analysis as it asks about current status of privacy settings for context, not as a measure of enactment of a positive social media etiquette behaviour
[58] The questions in the follow-up test are different to those in the pre- test and post-test. As such, the personal information sub-topic is not split into personal information a & b for the purposes of calculating the behaviour score.
[59] Q7b excluded from analysis as it's a filter question
[60] Q10a excluded from analysis as it's a filter question
[61] Q11a excluded from analysis as it's a filter question
[62] A single code question is a question where only one answer can be selected from a list of possible responses.
[63] For example, if a respondent said they 'sometimes' or 'mostly' enacted a positive behaviour (as opposed to always).

are multicode[64], the score for one or more positive behaviours is 2, a neutral/ can't remember/ no behaviour enacted score will be 0 and a negative behaviour -2.

5.45 This approach differs to the other scoring regimes (where responses to multi-code questions are assigned a score of 1/ -1 for each correct/ incorrect response). This approach has been chosen because it ensures we give equal weight to each behavioural question regardless of whether the responses are multi- or single coded, and equal weight to the different, mutually exclusive positive behaviours that could be enacted. For example (in answering Q6b), if a respondent answered that they did not share a post online after identifying it contained personal information, they would be assigned the same positive score as someone who instead shared the post but adapted it and/ or shared with a limited group of people[65] i.e. a maximum of 2 points is available regardless of whether the respondent enacts one mutually exclusive positive behaviour or, one or more non-mutually exclusive positive behaviours. This approach means that respondents who enact two or more non-mutually exclusive positive behaviours (e.g. adapt the post before sharing AND share with a limited group of people) are assigned the same score as someone who enacts just one of these behaviours, however overall this approach was deemed to be preferable for the reasons stated above.

5.46 An alternative to the chosen approach, would be to score responses to multi-code questions as we have done for the other scoring regimes (where responses to multi-code questions are assigned additively i.e. a score of 1/ -1 for each correct/ incorrect response). This would mean that respondents who enacted two or more mutually exclusive positive behaviours are assigned a higher score than those who enact just one positive behaviours. However, this would also mean that a respondent who enacted one positive behaviour that was mutually exclusive to the other positive behaviours, would be assigned a lower score than someone who enacted two positive behaviours that were not mutually exclusive. For example (in answering Q6b), if a respondent answered that they did not share a post online after identifying it contained personal information, they would be assigned a lower positive score (score = 1) than someone who instead shared the post but adapted it AND shared with a limited group of people (score = 2). We didn't think this was the right approach as we wanted to keep the scoring regime as simple as possible, given this is a pilot trial and this is a secondary outcome measure. As such, we opted for a simple measure of behaviour change as we did not make a judgement call about which behaviours are better or worse (e.g. when answering Q6b, we did not want to make a judgement call about whether enacting the two behaviours of adapting the post and sharing with a limited group of people, is preferable to enacting one behaviour of not sharing the post). However, we recognise that there

[64] A multiple code question is a question where more than one answer can be selected from a list of possible responses.
[65] Not sharing the post online is a mutually exclusive answer code as a respondent can't do this AND share the post but adapt it/ share with a limited group of people.

are advantages to the alternative approach (as detailed above). The approach to calculating the Behaviour score is outlined in table 19.

Table 19: Approach to calculating the Behaviour score

Follow-up test		
Question and answer code	**Answer**	**Score**
Private vs. public profiles: reviewed or changed privacy settings on social media since intervention (single code question) (max 2, min -2)		
Q2b_1	Yes, reviewed my privacy settings but didn't change them	2
Q2b_2	Yes, reviewed my privacy settings and changed them	2
Q2b_3	No, didn't review or change my privacy settings	-2
Q2b_4	I don't know/Can't remember	0
Personal Information: checked for personal or identifiable information *before* posting on social media, since intervention (single code) (max 2, min -2)		
Q6a_1	Yes, always	2
Q6a_2	Yes, sometimes	1
Q6a_3	No, not at all	-2
Q6a_4	I have not posted anything in the last 2 weeks	0
Personal Information: action taken after identifying personally identifiable information in a social media post *before* posting it (asked of those who code 1 or 2 at Q6a) (multi code) (max 2, min -2)		
Q6b_1	Decided not to post it	2[66]
Q6b_2	Adapted the post before sharing it	
Q6b_4	Shared the post with a limited group of people	
Q6b _3	Nothing – posted as usual	-2
One or more of Q6b_1, Q6b_2, Q6b_4 AND Q6b_3		0
Did not code 1 or 2 at Q6a (were not asked this question)		0
Personal Information: checked whether previous posts contained personal or identifiable information since intervention (single code) (max 2, min -2)		
Q7a_1	Yes	2
Q7a_2	No	-2
Personal Information: action taken after identifying post with personal or identifiable information (multi code) (max 2, min -2)		
Q7c_1	Left the post(s) online	-2
Q7c_2	Deleted the post from my account	2
Q7c_3	Changed the privacy settings on the post	
Q7c_4	I don't know/ can't remember	0
Asking for permission: checked with friends *before* posting pictures or videos of them on social media, in the 2 weeks since the intervention (single code) (max 2, min -2)		
Q9_1	Yes, on every post	2
Q9_2	Yes, on most posts	1
Q9_3	Yes, on some posts	1
Q9_4	No	-2

[66] Maximum of 2 points available regardless of how many positive behaviours a respondent claims to have enacted.

Q9_5	I have not posted anything in the last 2 weeks	0
Asking for permission: Action taken if saw a post of them on someone else's social media that made them feel uncomfortable (multicode for answers 2, 3 and 4, code 1 which is exclusive) (max 2, min -2)		
Q10b_1	Nothing, kept scrolling	2
Q10b_2	Asked the person who posted to remove the post	
Q10b_4	Something else [write in][67]	
Q10b_3	Commented on the post	-2
Negative comments: action taken if saw a nasty or negative post since intervention (Q11b) OR hypothetical action if saw a nasty or negative post (Q11c) (multicode for answers 2, 3 and 4, code 1 which is exclusive) (max 2, min -2)		
Q11b/c_1	Do nothing, keep scrolling	2
Q11b/c_3	Unfollow or blocked the account that posted the nasty comment	
Q11b/c_4	Something else [write in][68]	
Q11b/c_2	Reply back to the comment	-2
Positive behaviour score (max 16, min -16) = Q2b + Q6a + Q6b + Q7a + Q7c +Q9 + Q10b + Q11b/c		

Statistical analysis

5.47 We will use a Mann-Whitney U test to test the null hypothesis[69]. This test will be used because we are comparing two independent groups on a score that is ordinal and non-normally distributed. If the null hypothesis is rejected, we can accept the alternative hypothesis[70] and assume that there is a difference between the social media etiquette behaviours enacted by respondents who read the control guidance, compared to those who played the game. Significant differences should be determined at the 95% significant level, however due to the more experimental nature of secondary outcome measures, if any differences are significant at the 90% level, these could be noted as potentially indicative effects.

5.48 If the behaviour scores for the game and/ or the control guidance groups are positive, this will indicate that after exposure to the game and/ or guidance, respondents enacted positive social media etiquette behaviour(s). Conversely, if scores are negative, this will indicate that after exposure to the game/ guidance, respondents enacted negative social media etiquette behaviour(s). If the behaviour score of those who played the game is positive and statistically significantly higher than those who read the control guidance, then we can infer that; respondents who played the serious game enacted more positive social media etiquette

[67] Score of 1 assigned to verbatim answers that could be deemed as positive behaviours only. See Verbatim coding methodology.
[68] Score of 1 assigned to verbatim answers that could be deemed as positive behaviours only. See Verbatim coding methodology.
[69] Null hypothesis: There will be no statistically significant difference in the enactment of social media etiquette behaviour(s) in the two weeks following the trial, between 13-17 year olds who play the serious game and those who read the control guidance.
[70] Alternative hypothesis: There will a statistically significant difference in the enactment of social media etiquette behaviour(s) in the two weeks following the trial, between 13-17 year olds who play the serious game and those who read the control guidance.

behaviours (included in the calculation of the Behaviour score) than those who received the control guidance and vice versa.

Potential further analysis

Impact on knowledge and understanding of social media etiquette, by gender and/ or age

5.49 If sample sizes allow, we would be interested in exploring the impact of gender and/ or age on knowledge and understanding of social media etiquette between the serious game and control guidance.

5.50 To explore the interaction effect of gender and/ or age, the Total score (calculated in the same way as table 2) could be compared between gender, using an appropriate statistical test. This approach would avoid a large number of multiple comparisons, which would lead to a much higher risk of type I error[71] as the number of comparisons would be very large if each question and answer was tested against trial arm and gender.

[71] A type I error occurs when we incorrectly reject the null hypothesis. For example, we find a significant effect when there are none present.

6. Deviations from proposed methodology and lessons learned

Deviations from proposed methodology

6.1 In paragraph 4.22, we set out that we would use chi-square tests to analyse the sub-topic scores. We did use chi-squared tests, however some of the scores could not reasonably be considered nominal, therefore we used Mann-Whitney U tests in addition to Chi-squared tests. Mann-Whitney U tests were used as some of the data is ordinal[72] (i.e. a score of 2 is better than a score of 0). Statistical differences will be reported if one or both tests find a significant difference.

6.2 Following analysis and interpretation of the results, we changed the secondary outcome measure 3 (retention of knowledge and understanding of social media etiquette) from a secondary to an exploratory outcome measure. This was because of the limitations associated with this measure. The first limitation is that the extent to which we can demonstrate any retention of knowledge and understanding, is limited to two (of the five) sub-topics only. The Retention score is calculated based on questions to two sub-topics (private vs. public profiles and digital footprint). This is because, we chose to focus questions in the follow-up test on behaviour (rather than knowledge and understanding) to gain more insight into the impact of the serious game on behaviour. The second limitation is that the Retention score may (in part) reflect the retention of pre-existing knowledge and understanding (rather than knowledge and understanding gained as a result of the playing the game/ reading the control guidance). This is due to the methodological limitations around what we could include at the pre-test stage without giving participants the knowledge and understanding the serious game and guidance was designed to impart. Which meant that for one of the sub-topics (digital footprint) used to calculate the Retention score, the questions on this topic were only asked in the post and follow-up tests (i.e. not asked in the pre-test). As such, we are unable to ascertain whether the knowledge and understanding of this sub-topic existed prior to the intervention.

6.3 During this pilot, we tested many hypotheses (see Hypotheses section) in order to fully explore the outcome measures. However, the more hypotheses that are tested, the higher the risk of a type 1 error (a type 1 error is also known as a 'false positive', where a result is found to be significant when it has in fact occurred by chance). To account for this, we separated the different analyses conducted on our results into 'families', based on the aims of the analyses and the data used (see Multiple Comparisons Corrections: Analysis 'Families' and significance levels), and then applied Bonferroni correction to each family. When conducting multiple

[73] An alpha level is the probability of rejecting the null hypothesis when the null hypothesis is true. In this trial, alpha, or significance level, is set to 0.05 (5%) but we also tested for indicative findings at the 0.1 (10% level).

analyses, Bonferroni correction involves dividing the alpha level[73] (0.05 or 0.1) for these analyses by the number of analyses conducted.

Lessons learned

6.4 **Timing of finalising and peer reviewing the protocol document.** It is best practice to develop the fieldwork materials alongside the protocol document and to finalise the protocol prior to recruiting participants and running the trial.[74] In order to meet pre-agreed fieldwork timings, we finalised the fieldwork materials before finalising the protocol document. This meant some of the scoring regimes were limited by the questions included in the fieldwork materials (see limitations sections above for more detail). If we were to run future similar trials, we would develop the scoring regimes and fieldwork materials in parallel and seek external peer review of our methodology and analysis, as set out in this protocol document, ahead of running the trial.

6.5 **Use consistent question types in the pre-test and post-test (where possible).** We were unable to assign equal weighting to the sub-topics in the scoring regime for the primary and secondary outcome measures. This was because we used different question types (e.g. single-code, multi-code). If we were to conduct the trial again, we would use consistent question types, where possible, to standardise the scores for each sub-topic.

6.6 **Using dummy data to develop the scoring regimes**. It is best practice to finalise the protocol document ahead of recruitment of participants[75]. As this was a pilot trial, we established what analysis was possible and made adjustments to the protocol document based on actual data. If we were to conduct the trial again, we would use dummy data to allow us to develop a scoring regime, and finalise the protocol document, ahead of the recruitment of participants.

[73] An alpha level is the probability of rejecting the null hypothesis when the null hypothesis is true. In this trial, alpha, or significance level, is set to 0.05 (5%) but we also tested for indicative findings at the 0.1 (10% level).
[74] See SPRINT statement and CONSORT guidance
[75] See SPRINT statement and CONSORT guidance

A1. Pre-test

Note: answers to knowledge and understanding questions highlighted in green are the correct answer, where there is one.

INTRODUCTION

Today we are looking for teenagers aged 13-17 to take part in this survey. The survey is asking about their views on sharing content on social media. The purpose of the research is to improve understanding on how to engage with teenagers to help educate them on how to use social media safely and responsibly.

Participation is voluntary and your child does not need to take part.

If there is more than one child in your household aged 13-17 please select one child to take part in this survey.

Are you happy for a child in your household aged 13-17 to take part in this survey?

SINGLE CODE
1. Yes
2. No THANK & CLOSE

Please now ask your child to take the survey from here and for them to tick the box below once ready.
ADD TICKBOX FOR CHILD TO CONFIRM THEY ARE TAKING PART

ASK ALL
S1. Are you...?
SINGLE CODE
1. Male
2. Female
3. Non-binary (A term used to describe people who feel their gender cannot be defined within the margins of gender binary i.e. male or female)
4. Prefer to use another term (please state)
5. Prefer not to say

ASK ALL
S2. Please enter your age in the box below.
OPEN
SCREEN OUT IF NOT 13-17

Thank you for taking part in the survey, we're now going to ask you some questions about your use of social media.

SECTION 1 – PRE-GAME

ASK ALL
Q1. On average how often, if ever, do you use each of the following social media sites?
TOP BREAK
a. More than once a day
b. Once a day

c. Once every few days
d. Once to a few times a month
e. Less than once a month
f. Never

DOWN BREAK – RANDOMISE BUT KEEP 1 & 2 TOGETHER – REVEAL ONE AT A TIME, ADD ICONS FOR EACH

1. YouTube
2. YouTube Kids
3. Facebook
4. Instagram
5. Snapchat
6. TikTok
7. Twitter
8. Twitch

SCREEN OUT IF NEVER IS SELECTED FOR ALL SOCIAL MEDIA SITES

ASK ALL
Q2. Which of these applies to the privacy settings on your social media accounts?
SINGLE CODE

1. All of my social media accounts are private
2. Some of my social media accounts are private, and some are public
3. All of my social media accounts are public
4. I don't know

ASK ALL
Q3. Thinking about all your social media accounts, on average how often, if ever, do you post to any of these? This could be in the form of a photo, video, status update or story etc.
SINGLE CODE

1. More than once a day
2. Once a day
3. Once every few days
4. Once to a few times a month
5. Less than once a month
6. Never

ASK ALL
Q4. And again, thinking about all your social media accounts, on average how often, if ever, do you like, comment, or share posts or content on social media? SINGLE CODE

1. More than once a day
2. Once a day
3. Once every few days
4. Once to a few times a month
5. Less than once a month
6. Never

ASK ALL
Q5. If you set your social media account to public, who would be able to see a photo you post?
SINGLE CODE – ROTATE

1. Only people with access to that social media platform
2. Only my friends on that social media platform
3. Only my friends and their friends on that social media platform
4. Anyone with any social media account
5. Anyone with access to the internet
6. Anyone in the world
7. Don't know

ASK ALL
SHOW IMAGE – PAGE 3 OF THE ATTACED FILE – TRIMMED TO JUST IMAGE ON PHONE SCREEN
Q6a. Do you think it is ok for people to post pictures like this of their friends?
SINGLE CODE

1. Yes
2. No
3. Don't know

ASK IF CODE 2 AT Q6A
Q6b. Why do you think this?
OPEN[76]

[76] Open-ended response could be a correct or incorrect.

A2. Serious game

Link to the serious game: https://populuslive.online-host.solutions/ASP/P019714Cog2/login.asp?u3=Game (Please note, no data will be collected from players).

SECTION 2 – GAME

SAMPLE TO BE SPLIT INTO 2 CELLS OF 400/200 RESPONDENTS
CELL 1 (400) SEES SERIOUS GAME TRIAL
CELL 2 (200) SEES CONTROL GUIDANCE

INTRO TEXT: We'd now like you to play a game.
SHOW IMAGE PAGE 1 OF THE ATTACHED

ASK ALL
SHOW IMAGES
Q11. Welcome to *Day in the Life*! You'll be following one of these three characters and their friend Sam through their interactions on social media and offline in a day.
Whose day would you like to see unfold?
[CHARACTER IMAGES PROVIDED]
SINGLE CODE

1. Alex
2. Zainab
3. George

ASK ALL
SHOW IMAGE – PAGE 2/11/20 OF THE ATTACHED FILE
Q12. On the way to school SHOW CHARACTER SELECTED AT Q11 and Sam post a photo to SHOW CHARACTER SELECTED AT Q11's social media account. Look at the photo and click on anything you think might allow strangers to identify and find Sam in real life.
HEATMAP – IMAGE PAGE 3/12/21 OF ATTACHED FILE – TRIMMED TO SMARTPHONE ONLY

ASK ALL
Did you spot all 5 things that might allow strangers to identify and find Sam in real life?
SHOW MARKED UP IMAGE – PAGE 4/13/22 OF THE ATTACHED FILE
Q13. Because SHOW CHARACTER SELECTED AT Q11's social media account has been set to **public** this means that anyone with internet access might see this post. The post includes identifiable information like the name of Sam's school, their street name and house number. This means that strangers may be able to identify and find Sam in real life.

NEW SCREEN
SHOW CHARACTER SELECTED AT Q11 realises the mistake when a friend points it out and removes the post immediately to prevent anyone else from seeing it.

SHOW IMAGE – PAGE 5 OF THE ATTACHED FILE

Later SHOW CHARACTER SELECTED AT Q11 posts a funny video of Sam on their social media story during break time. SHOW CHARACTER SELECTED AT Q11 story is set to 'share with everyone' to increase views across all social media. Scroll down to see snippets of the video.

SHOW 3 CARTOON STRIP IMAGES PAGES 7-9/16-18/25-27 OF ATTACHED FILE

What might have happened to the video? You can select more than one answer.

MULTICODE – RANDOMISE

1. Shared on other social media accounts (e.g. Snap, Insta and Facebook)
2. Screenshots taken or screen recorded and shared by email or WhatsApp
3. Shown to people without access to social media via a smartphone
4. Something else [WRITE IN]

Did you know that any of those things might have happened?

SHOW CODES WITH ALL TICKED

SHOW TO ALL

Once you post something online you no longer have control over it. Even if you post it privately people can take screen shots or screen recordings and share it on other social media sites or even by email. That's why it's best to carefully consider before posting if there will be any consequences, and who you should share it with.

NEW SCREEN
ASK ALL

Q14. SHOW CHARACTER SELECTED AT Q11's post was shared on Facebook and sent to the school office email. Both the Head Teacher and Sam's parents saw the video. Sam was punished by the school and grounded with restricted access to their mobile phone.

SHOW CHARACTER SELECTED AT Q11's's parents were also called in by the Head Teacher to talk about the situation and SHOW CHARACTER SELECTED AT Q11was also grounded. Why might this be? Please select all that apply.

MULTICODE – RANDOMISE

1. SHOW CHARACTER SELECTED AT Q11 was using their phone in school
2. SHOW CHARACTER SELECTED AT Q11 had posted the video without Sam's permission
3. SHOW CHARACTER SELECTED AT Q11 had posted personally identifiable information online
4. Sam was swearing at the teacher
5. SHOW CHARACTER SELECTED AT Q11's teacher had not given their permission to be filmed or have a video of them posted online

NEW SCREEN

Using a mobile phone in school and swearing at a teacher are reasons you might get in trouble, but did you also think about the online safety issues?

SHOW CODES 2,3,5, FROM ABOVE WITH GREEN TICKS

To stay safe online you **shouldn't post anything with personal information** like the name of a school and you should always **have permission from the person or people within the post** - before sharing online.

This **also applies to you**, if someone posts something about you which makes you feel uncomfortable you should ask them to remove the post.

Always consider the impact of what you post online; there might be unexpected consequences.

ASK ALL

Q15.SHOW CHARACTER SELECTED AT Q11 deleted the video and apologised to Sam. But which of the following is true?
SINGLE CODE

1. The video is no longer on social media but there could be copies online
2. The video is no longer online so no-one else can see it

Did you answer correctly? Here's the correct response: SHOW CODES ABOVE WITH 1. TICKED

Everything posted online has a 'digital footprint' that you can't always control. Once you post something publicly, you lose control of it, and even if you delete it, there may be copies available elsewhere.

ASK ALL
Q16.

Later that evening, SHOW CHARACTER SELECTED AT Q11 is browsing social media and notices this nasty comment on a photo of another friend:
SHOW IMAGE – ALTERNATE CHARACTER TO ONE CHOSEN:
ZAINAB – ALEX (page 10)
ALEX – GEORGE (page 19)
GEORGE - ZAINAB (page 28)
Which of these actions should SHOW CHARACTER SELECTED AT Q11 take? Please select all that apply.
MULT CODE – RANDOMISE

1. Nothing, keep scrolling EXCLUSIVE
2. Reply back to the comment sticking up for the friend
3. Reply back to the comment with a nasty remark about the person who posted the comment
4. Message the friend to check they're OK
5. Comment on the friend's account complimenting them
6. Tell the friend to unfollow or block the account that posted the nasty comment
7. Something else [WRITE IN]
8. Don't know EXCLUSIVE

ASK ALL
Q17. SHOW CHARACTER SELECTED AT Q11 was annoyed at the account and wanted to tell them how they felt, so decided to reply to the comment telling them that it's rude to be mean to people like that. What do you think this did to the attention the post got?
SINGLE CODE

1. Stayed the same
2. Increased a little
3. Increase a lot

BI-POLAR SLIDING SCALE = STAYED THE SAME; RIGHT = INCREASED A LOT

CLOSING TEXT

While it might be tempting to reply to negative posts and stand up for yourself or your friends, this could increase the amount of attention the original negative post receives.

To avoid this it might be better to take one of the following actions instead.
SHOW ONLY CODES 1 AND 4,5,6 FROM Q16 WITH GREEN TICK

CLOSING TEXT

SHOW CHARACTER SELECTED AT Q11 didn't realise this and the nasty comment went viral with lots of other people also making nasty comments.

It is best not to interact with mean comments online as more people may see them. You could be kind to your friend by checking in on them or posting something positive separately.

You can **un-follow** or **block** accounts sending you negative messages and you can **report** potentially harmful posts that you see to the social media site and speak to an adult you trust.
[Character] learned a lot about how to stay safe online, including how important it is to **THINK BEFORE YOU POST**.

[GAME GROUP ONLY: Thank you for completing the game! SHOW IMAGE PAGE 1 OF THE ATTACHED – CROPPED TO SHOW CHARACTERS ONLY]

A3. Control guidance

Introduction

Thank you for completing the first section of the survey. Now we would like you to read through some information. NEW SCREEN

Guidance for staying safe on social media

Access to personal information

You are in control of the information you share on social media. Posts that contain personal or identifiable information about you or the people you post about could lead to strangers being able to identify and find you or these people in real life.

Examples of personal information include (but are not limited to): street names, house numbers, school name and logo on uniforms or bags.

Private or public posts

If your social media accounts are public this can increase the number of people that view your posts. Public posts can be viewed by anyone with internet access, even if they don't use the social media site.

Once something has been posted online you no longer have control over it, you don't know who might see it, particularly if you have posted it publicly.

Deleting posts

Deleting a post will remove it from your account and may reduce the number of people who see it, but it may not be completely removed from the internet.

Anyone can take a screenshot or screen recording of your posts. They can be shared and copied onto other social media sites like Snap, Insta or Facebook, sent by email or even shown on a smartphone screen. You can only remove the copy that you posted.

Asking for permission

You should always have the permission of the person/people included in your posts before sharing. There are many reasons why people may not want a photo or video of themselves posted online including (but not limited to) the post containing personal or identifiable information about them.

If a friend or connection has posted something about you that you would like to be kept private, contact them and ask to remove the post.

Negative comments

If you respond to a negative comment online, it is likely that you will increase the number of people who see the original negative comment. You can unfollow or block communication from an account if you receive negative comments from them.

If you see posts that are potentially harmful you can report these to the social media site and should speak to an adult that you trust.

A4. Post-test

Note: answers to knowledge and understanding questions highlighted in green are the correct answer, where there is one

NEW SCREEN

Finally, we would like to ask you some additional questions about your use of social media.

This is not a test. Please answer these questions honestly, all answers will be kept strictly confidential.

ASK ALL
Q1. If you set your social media account to public, who would be able to see a photo you post?
SINGLE CODE – ROTATE

1. Only people with access to that social media platform
2. Only my friends on that social media platform
3. Only my friends and their friends on that social media platform
4. Anyone with any social media account
5. Anyone with access to the internet
6. Anyone in the world
7. Don't know

ASK ALL
SHOW IMAGE – PAGE 3 OF ATTACHED FILE
Q2a. Since we last asked, what do you think about this picture now? Do you think it is ok for people to post pictures like this of their friends?
SINGLE CODE

1. Yes
2. No
3. Don't know

ASK IF CODE 2 AT Q2A
SHOW IMAGE – PAGE 3 OF ATTACHED FILE
Q2b. Why not?
MULTI CODE – RANDOMISE

1. Shows personal information
2. Person could be identified and found
3. Post is public so strangers could see this
4. Other (specify)[77]

ASK ALL
Q3A. Have you ever checked for personal or identifiable information in any of your posts before posting them?
SINGLE CODE

1. Yes, always
2. Yes, sometimes
3. No, not at all

[77] Open ended response could be correct or incorrect.

ASK IF CODE 1 OR 2 AT Q3A

Q3B. And which of the following have you done as a result?

MULTIPLE CODE – RANDOMISE

1. Decided not to post it
2. Adapted the post before sharing
3. Nothing – posted as usual
4. Shared the post with a limited group of people

ASK ALL

Q4. Are the following statements true or false?

TOP BREAK

a. True
b. False

DOWN BREAK – REVEAL ONE AT A TIME

1. Deleting posts will stop anyone from seeing the posts [false]
2. Deleted posts are still available online for people to find [false]
3. Copies of deleted posts can still be shared [true]

ASK ALL

Q5. Have you ever checked with friends before posting pictures or videos of them on social media?

SINGLE CODE

1. Yes, on every post
2. Yes, on most posts
3. Yes, on some posts
4. No

ASK ALL

Q6. Now, thinking about if you saw a photo or video of you on social media that made you feel uncomfortable, how likely are you to ask the person who posted to remove the post?

SLIDING SCALE 0-10

1. Not at all likely
10. Very likely

ASK ALL

Q7A. Has anyone you know ever posted a photo or video of you to social media that has made you feel uncomfortable?

SINGLE CODE

1. Yes
2. No
3. Don't know

ASK IF CODE 1 AT Q7A

Q7B. And what did you do about the post?

MULTICODE

1. Nothing, kept scrolling EXCLUSIVE
2. Asked the person who posted to remove the post
3. Commented on the post
4. Something else [WRITE IN]

ASK ALL

Q8a. Have you ever seen a nasty or negative post, or a post about something you disagree with?

SINGLE CODE

1. Yes
2. No

ASK IF CODE 1 AT Q8

Q8b. And how did you respond to the post?

MULTICODE

5. Nothing, kept scrolling EXCLUSIVE
6. Replied back to the comment
7. Unfollowed or blocked the account that posted the nasty comment
8. Something else [WRITE IN]

ASK IF CODE 2 AT Q8

Q8c. If you did see one, what would you be most likely to do?

MULTICODE

1. Do nothing, keep scrolling EXCLUSIVE
2. Reply back to the comment
3. Unfollow or block the account that posted the nasty comment
4. Something else [WRITE IN]

A5. Follow-up test

INTRODUCTION

As a reminder of the previous research, we were looking for teenagers aged 13-17 to take part. The survey asked about their views on sharing content on social media [GAME GROUP ONLY: and also involved the 'Day in the Life' game which consisted of questions asking about social media use]. The purpose of the research is to improve understanding on how to engage with teenagers to help educate them on how to use social media safely and responsibly.

Participation is still voluntary, and your child does not need to take part.

If you have more than one child aged 13-17, please ensure the child who completed the last survey also completes this survey.

Are you happy for your child to take part in this survey?

SINGLE CODE

1. Yes
2. No THANK & CLOSE

Please now ask your child to take the survey from here and for them to tick the box below once ready.
ADD TICKBOX FOR CHILD TO CONFIRM THEY ARE TAKING PART.
Thank you for taking part in the survey, we're now going to ask you some questions about your use of social media.

As a reminder, this is not a test. Please answer these questions honestly, all answers will be kept strictly confidential.

ASK ALL
Q1. On average how often, if ever, do you use each of the following social media sites?
TOP BREAK

a. More than once a day
b. Once a day
c. Once every few days
d. Once to a few times a month
e. Less than once a month
f. Never

DOWN BREAK – RANDOMISE BUT KEEP 1 & 2 TOGETHER – REVEAL ONE AT A TIME, ADD ICONS FOR EACH

1. YouTube
2. YouTube Kids
3. Facebook
4. Instagram
5. Snapchat
6. TikTok
7. Twitter
8. Twitch

SCREEN OUT IF NEVER IS SELECTED FOR ALL SOCIAL MEDIA SITES

ASK ALL
Q2a. Which of these applies to the privacy settings on your social media accounts?
SINGLE CODE

1. All of my social media accounts are private
2. Some of my social media accounts are private, and some are public
3. All of my social media accounts are public
4. I don't know

ASK ALL
Q2b. Have you reviewed or changed any of your privacy settings as a result of [GAME GROUP ONLY: playing the "Day in the Life" game] [CONTROL GROUP ONLY: participating in the research] 2 weeks ago?

SINGLE CODE

1. Yes, reviewed my privacy settings but didn't change them
2. Yes, reviewed my privacy settings and changed them
3. No, didn't review or change my privacy settings
4. I don't know/Can't remember

ASK ALL
Q3. Thinking about all your social media accounts, on average how often, if ever, do you post to any of these? This could be in the form of a photo, video, status update or story etc.
SINGLE CODE

1. More than once a day
2. Once a day
3. Once every few days
4. Once to a few times a month
5. Less than once a month
6. Never

ASK ALL
Q4. And again, thinking about all your social media accounts, on average how often, if ever, do you like, comment, or share posts or content on social media?
SINGLE CODE

1. More than once a day
2. Once a day
3. Once every few days
4. Once to a few times a month
5. Less than once a month
6. Never

ASK ALL
Q5. If you set your social media account to public, who would be able to see a photo you post?
SINGLE CODE – ROTATE

1. Only people with access to that social media platform
2. Only my friends on that social media platform
3. Only my friends and their friends on that social media platform
4. Anyone with any social media account

5. Anyone with access to the internet
6. Anyone in the world
7. I don't know

ASK ALL
Q6A. Since [GAME GROUP ONLY: playing the "Day in the Life" game] [CONTROL GROUP ONLY: participating in the research] 2 weeks ago, have you checked for personal or identifiable information in any of your posts before posting them?
SINGLE CODE
1. Yes, always
2. Yes, sometimes
3. No, not at all
4. I have not posted anything in the past 2 weeks

ASK IF CODE 1 OR 2 AT Q6A
Q6B. And which of the following did you do as a result?

MULTIPLE CODE – RANDOMISE
1. Decided not to post it
2. Adapted the post before sharing
3. Nothing – posted as usual
4. Shared the post with a limited group of people

ASK ALL
Q7A. Since [GAME GROUP ONLY: playing the "Day in the Life" game] [CONTROL GROUP ONLY: participating in the research] 2 weeks ago, have you checked whether any of your content that had already been posted contained personal or identifiable information?
SINGLE CODE
1. Yes
2. No

ASK IF CODE 1 AT Q7A
Q7B: And did you find any posts that contained personal or identifiable information?
1. Yes
2. No

ASK IF CODE 1 AT Q7B
Q7C. And which, if any, of the following describes what happened? MULTIPLE CODE – RANDOMISE
1. Left the post(s) online
2. Deleted the post(s) from my account
3. Changed the privacy settings on the post(s)
4. I don't know/Can't remember

ASK ALL
Q8. Are the following statements true or false?
TOP BREAK
a. True
b. False

DOWN BREAK – REVEAL ONE AT A TIME
1. Deleting posts will stop anyone from seeing the posts
2. Deleted posts are still available online for people to find

3. Copies of deleted posts can still be shared

ASK ALL
Q9. Since [GAME GROUP ONLY: playing the "Day in the Life" game] [CONTROL GROUP ONLY: participating in the research] 2 weeks ago, have you checked with friends before posting pictures or videos of them on social media?
SINGLE CODE
1. Yes, on every post
2. Yes, on most posts
3. Yes, on some posts
4. No
5. I have not posted anything in the past 2 weeks

ASK ALL
Q10A. Since [GAME GROUP ONLY: playing the "Day in the Life" game] [CONTROL GROUP ONLY: participating in the research] 2 weeks ago, have you seen any posts of you on someone else's social media that made you feel uncomfortable?
SINGLE CODE
1. Yes
2. No
3. Don't know

ASK IF CODE 1 AT Q10A
Q10B. And what did you do about the post(s)?
MULTICODE
1. Nothing, kept scrolling EXCLUSIVE
2. Asked the person who posted to remove the post
3. Commented on the post
4. Something else [WRITE IN]

ASK ALL
Q11A. Since [GAME GROUP ONLY: playing the "Day in the Life" game] [CONTROL GROUP ONLY: participating in the research] 2 weeks ago, have you seen a nasty or negative post, or a post about something you disagree with?

SINGLE CODE
1. Yes
2. No

ASK IF CODE 1 AT Q11A
Q11B. And how did you respond to the post?
MULTICODE
1. Nothing, kept scrolling EXCLUSIVE
2. Replied back to the comment
3. Unfollowed or blocked the account that posted the nasty comment
4. Something else [WRITE IN]

ASK IF CODE 2 AT Q11A
Q11C If you did see one, what would you be most likely to do?
MULTICODE

1. Do nothing, keep scrolling EXCLUSIVE
2. Reply back to the comment
3. Unfollow or block the account that posted the nasty comment
4. Something else [WRITE IN]

A6. Follow-up qualitative research: Discussion guide

Research Objectives:

- To gain an in depth understanding of the stated learnings / attitudes towards social media etiquette and overall experience of 13-15 and 16-17 year olds after completing the serious game

Specifically;

- Stated learnings immediately after having completed the game
- Attitudes towards specific learning areas in relation to social media etiquette (access to personal information, private vs. public posts, deleting posts, asking for permission, negative comments)
- Overall experience of the game
- Future areas for similar gamified learning opportunities
- Explore if age (13 – 15 vs. 16-17) and gender are factors that impact stated learnings, attitudes and experience of playing the game

The approach:

30-minute qual in-depth interviews (x20) following completion of game

How this guide will be used:

This guide covers topics and areas of exploration to answer the research questions and moderators will use these to structure the conversation, rather than reading questions as a script. While making sure to cover all topic areas, moderators will adapt to participants' comments and will probe further on interesting responses. Not everyone will be asked all questions or be asked questions in the exact order that they appear in for this document. In particular, given the age of the audience in this research, not every participant may be able to reflect with equal depth and nuance on all of the questions raised.

Serious Game: Follow-up qualitative discussion guide

Introduction (2-3 minutes)

Welcome and thank you so much for agreeing to take part in this research session.

- Moderator to introduce themselves, their role and to clarify Yonder's role as an independent research organisation.
- Highlight that Yonder adheres to the MRS Code of Conduct, and that the session will be recorded (video and audio) for research purposes. If they are uncomfortable with a video recording they can also turn their video off and continue the interview with audio only. Their personal data will be stored securely and deleted after 6 months.

- All information is treated with confidentiality and reporting is all anonymous
- Tell the participant that the session is recorded for internal quality and analysis purposes and gain their consent for the recording being started. Then verbally confirm that the recording has started.
- The research session will last for max. 30 mins
- Explain the moderator has had no part in creating the game, and we are here to find out if and how we can make it better. So please give honest feedback as we are wanting to hear your thoughts and understand how the game can be improved.
- Remind the participant that every part of the interview is voluntary, they don't have to answer any question that they might feel uncomfortable with and that they are able to terminate the session at any point. In this case all data related to them will be deleted after the session ends.
- Moderator to thank respondent on completing the game

Moderator to start by telling the respondent a bit about her/himself – then ask the respondent to introduce themselves.

Current behaviour towards social media etiquette (2-3 minutes)

Aim: Icebreaker with the respondent to build rapport but also gain understanding of social media etiquette awareness before playing the game

- To start with, which social media platforms do you regularly use?
    - *(Instagram, Facebook, TikTok etc.)*
        - And which of these is your favourite? Which do you use most often?
    - Do you know what privacy settings you have on your social media accounts? Why?
        - PROBE: Public vs. private.

Serious game – unprompted learnings (5 minutes)

Aim: Uncover stated learnings and probe on change in behaviour resulting from playing the game across teaching elements

- What did you learn from playing the game?
    - What are the key things that you remember? What stuck with you?

- Overall, what do you think is the most important thing you learnt from playing the game?
    - Why do you consider this to be the most important?

- How much of the information in the game was new to you?
    - **If not new information:** Where did you first learn this information?

Serious game – detailed learnings (10 minutes)

Now I would like to know a little more about what you thought about some of the information in the game.

Access to personal information (understanding the consequences of posting personal information online)

- If you were posting a photo or video on social media, what – if anything - would you look out for before sharing?
    - IF NOTHING: Why is this?
      THEN ASK: What about checking for personal information (e.g. name, address, school).
- Would playing the game make you more or less likely to check for personal information before posting on social media in the future?
    - Why / why not?
    - Did you learn anything new about this from the game?
    - Did any piece of information stand out to you in particular?
        - PROBE: Posts that contain personal or identifiable information about you or the people you post about could lead to strangers being able to identify and find you or these people in real life.
    - Has playing the game made you think about any of your recent posts?
        - Are you likely to do anything about these posts as a result of playing the game? What exactly?
            - PROBE: Delete post, review privacy settings on post.

Private or public posts (understand the impact of different privacy settings)

- What do you know about different privacy settings on social media?
    - Did you learn anything new about this from playing the game? Did any piece of information stand out to you in particular?
        - PROBE: Public posts can be viewed by anyone with internet access, even if they don't use the social media site.
            - Why might this be the case? *(Moderator to establish if respondent understands)*
            - Did you know this before playing the game?
- Would playing the game make you change your privacy settings on social media?
    - Why/ Why not?
    - Moderator to recap on their current privacy settings if helpful (e.g. if different across apps)

Deleting posts (Understand that content posted has a digital footprint, even if deleted)

- What do you know about what happens to a social media post after it's deleted?
    - Did you learn anything new about this from playing the game? Did any piece of information stand out to you in particular?
        - PROBE: Deleting a post will remove it from your account but it may not be completely removed from the internet as anyone could have taken a screenshot or recording.
            - What do you think are the potential issues and risks associated with this?
- Would playing the game make you more or less likely to think about whether to post publicly? Why/ why not?
    - **If respondent doesn't post publicly:** Would playing the game make you more or less likely to stop and think before you post? Why/ why not?

Asking for permission (Understand that you should have permission from the people / person within a post before sharing on social media)

- What do you know about asking for permission before posting pictures or videos including other people on social media?
    - How do you feel about asking people for permission before sharing a post that they are in?
    - How important do you think this is?
    - What might happen if you don't do this?
    - Do you feel differently about asking people for permission since playing the game?
    - Do you think playing the game would make you more/ less likely to ask for permission before sharing posts including other people?
    - Did you learn anything new about this from playing the game?
- Are there any times when you might *not* ask a person's permission before sharing a post they are in?
        - Explore reasons why not.

- If a friend or connection has posted something about you that you don't want on social media, would you contact them and ask them to remove the post?
    - Are there any times when you might *not* ask someone to remove a post that you are in and don't want on social media? Explore reasons for why….

Negative comments (Understand how to respond to negative comments)

- What do you know about how to respond to negative comments on social media?
    - Has this changed since playing the game?
    - Did you learn anything new about this from playing the game?
    - Did any piece of information stand out to you in particular?
- Do you think playing the game, will make you react differently to negative comments you might see in the future? In what way? If not, why not?
    - PROBE: If you respond to a negative comment online, it is likely that you will increase the number of people who see the original negative comment. You can unfollow or block communication from an account if you receive negative comments from them.

Overall experience (5 mins)

Aim: Understand user experience in terms of how enjoyable game was to play, and how relevant they consider it to be for their age group

- Overall, how did you find playing the game?
    - *Allow spontaneous response, then probe:*
        - What makes you say this?
        - What did you think of the characters? Which one did they choose?
        - The way information was presented e.g. the words and design?
        - What did you think of the topic i.e. how to stay safe on social media? PROBE: Interesting/ boring/ useful/ knew it already
        - The length of the game?
        - How easy was it to play?
    - *Only if time:*
        - Being honest, how enjoyable was the game to play?
        - What, if anything, did you like most about the game?
        - What, if anything, did you dislike most about the game?
        - How would you change the game to make it more enjoyable for you personally?
- If you had to guess, who do you think this game is targeted at? Why is that?
    - Probe on age group
    - Probe on gender
    - How would you change the game to make it more appropriate for people your age?
        - *If time permits, probe on which game elements in particular are more or least age appropriate*
- If the game popped up on your social media feed, how likely would you be to play the game?
    - What factors might make you more likely to click on the game?
        - *Allow spontaneous response, if struggling probe:*
        - Competing against friends?
        - Promoted by a social media influencer?

- Thinking about online awareness and safety generally – so not just social media – everything to do with being online. What other things do you think it is important that people your age, or even younger, learn about?
    - Would a game like this be useful for any of these areas?
    - *Allow spontaneous reaction, then give examples (tailor examples based on respondent age)*
        - **How to spot** fake news or online scams e.g. trying to access your personal information (perhaps also explain fraud – i.e. a crime where someone makes an unfair or unlawful gain by tricking someone else, e.g someone pretending to be a person in need online and asking for money).
        - **How to identify** different types of online advertising – for example when celebrities are being paid to wear things.
        - **How or when to report** nasty/ upsetting things online- anything else?

Summary and close (2 mins)

Aim: Wrap up the session and offer the respondent opportunity to express any final views

- Do you have any final thoughts that you would like to share before we end the session?
- Moderator to explain that if this research has raised any topics of concern and the respondent would like to seek further support, then we can email some links to further support.
- Moderator to offer to send the links to the respondent immediately after the interview has completed.

A7. Verbatim coding methodology

A7.1 This section sets out how we coded verbatim answers to:

i) Q6b in the pre-test

ii) 10b, 11b and 11c in the follow-up test

Approach to verbatim coding for Q6b in the pre-test

A7.2 To allocate scores to respondent's answers, as per the scoring regime in table 2, the verbatim answers to question 6b in the pre-test were coded into the equivalent answer codes for question 2b in the post-test.

A7.3 This was done via a mixture of python code to allocate phrases with specific key words to the codes, and a manual check of the output file in excel to sense check the answers against the codes in question 2b of the post-test.

A7.4 For the Python code, the key words used for each answer code were as follows:

a) Code 1: "shows personal information" –

- Priva
- Personal
- Detail
- School
- House
- Address
- Uniform
- Name
- Street

b) Code 2: "person could be identified and found" –

- Ident
- Find
- Found
- Live
- Where
- Location
- Trace

c) Code 3: "post is public so strangers could see this" –

- Public
- Stranger

d) Code 4: "other"

- Permission
- Consent

- Child
- Sensitive
- Risk
- Safe
- Danger

A7.5 To help manually sense-check the coded answers, the total codes assigned to each respondent were summed in an output file, and scores were checked for being too generous or too strict. For example, some phrases had key words from multiple lists in them, when if you read the answer it only applied to one of the codes. On the other hand, some phrases might not have had any key words in them, but did refer to one of the answer codes when read. In these instances the codes were manually edited.

A7.6 This exercise highlighted that there was a lot of conceptual overlap between the answer codes to question 2b in the post-test, and so a learning for next time would be to keep the concepts/ topics in the answer codes more separate. For example, there is considerable overlap between the topics covered in code 1 and code 2 around revealing personal information online, and revealing your identify and location online.

Approach to verbatim coding for 10b, 11b and 11c in the follow-up test

A7.7 Additionally, verbatim responses to the' other' section were coded to allocate credit for positive behaviour reported in addition to the prespecified answer codes of questions 10c, 11b and 11c of the follow-up test. This was done in the same way as specified previously, with answers only being given credit if they included a keyword deemed to indicate that the answer depicted positive behaviour.

A7.8 As questions 10b, 11b and 11c were about similar topics, the same key words were used for each one. For the Python code, these key words were as follows:

- Report
- told
- dm
- inform
- spoke
- tell
- message

A8. Hypotheses

PRIMARY OUTCOME MEASURE: Level of knowledge and understanding of social media etiquette

A8.1 Null hypothesis: There will be no statistically significant difference in level of knowledge and understanding of social media etiquette between 13-17 year olds who play the serious game and those who read the control guidance.

A8.2 Alternative hypothesis: There will be a statistically significant difference in level of knowledge and understanding of social media etiquette between 13-17 year olds who play the serious game and those who read the control guidance.

SECONDARY OUTCOME MEASURE 1 (S1): Change in knowledge and understanding of social media etiquette, as a direct result of the intervention

Change in knowledge and understanding as a result of reading the control guidance:

A8.3 Null hypothesis: Those in the control guidance group will experience no change in their levels of knowledge and understanding of social media etiquette as a result of reading the control guidance.

A8.4 Alternative hypothesis: Those in the control guidance group will experience a change in their levels of knowledge and understanding of social media etiquette as a result of reading the control guidance.

Change in knowledge and understanding as a result of playing the serious game:

A8.5 Null hypothesis: Those in the serious game group will experience no change in their levels of knowledge and understanding of social media etiquette as a result of playing the serious game.

A8.6 Alternative hypothesis: Those in the serious game group will experience a change in their levels of knowledge and understanding of social media etiquette as a result of playing the serious game.

Comparing any change in knowledge and understanding between the serious game and the control guidance:

A8.7 Null hypothesis: There will be no statistically significant difference in any change in level of knowledge and understanding of social media etiquette between 13-17 year olds who play the serious game and those who read the control guidance.

A8.8 Alternative hypothesis: There will be a statistically significant difference in any change in level of knowledge and understanding of social media etiquette between 13-17 year olds who play the serious game and those who read the control guidance.

SECONDARY OUTCOME MEASURE 2 (S2): Level of knowledge and understanding, by sub-level social media etiquette topics

Private vs. public profiles:

A8.9 Null hypothesis: There will be no statistically significant difference in knowledge and understanding of who can see posts on public profiles, between 13-17 year olds who play the serious game and those who read the control guidance.

A8.10 Alternative hypothesis: There will be a statistically significant difference in knowledge and understanding of who can see posts on public profiles, between 13-17 year olds who play the serious game and those who read the control guidance.

Personal information (a): attitudes towards sharing posts containing personal information

A8.11 Null hypothesis: There will be no statistically significant difference in attitudes towards sharing posts containing personal information, between 13-17 year olds who play the serious game and those who read the control guidance.

A8.12 Alternative hypothesis: There will be a statistically significant difference in attitudes towards sharing posts containing personal information, between 13-17 year olds who play the serious game and those who read the control guidance.

Personal information (b): knowledge of reasons for not sharing posts containing personal information

A8.13 Null hypothesis: There will be no statistically significant difference in knowledge and understanding of reasons for not posting personal information online, among 13-17 year olds who play the serious game and those who read the control guidance.

A8.14 Alternative hypothesis: There will be a statistically significant difference in knowledge and understanding of reasons for not posting personal information online, between 13-17 year olds who play the serious game and those who read the control guidance.

Digital footprint

A8.15 Null hypothesis: There will be no statistically significant difference in knowledge and understanding that content posted has a digital footprint, even if deleted, between 13-17 year olds who play the serious game and those that read the control guidance.

A8.16 Alternative hypothesis: There will be a statistically significant difference in knowledge and understanding that content posted has a digital footprint, even if deleted, between 13-17 year olds who play the serious game and those who read the control guidance.

Asking for permission

A8.17 Null hypothesis: There will be no statistically significant difference in knowledge and understanding of asking for permission before posting about other people on social media,

between 13-17 year olds who play the serious game and those who read the control guidance.

A8.18 Alternative hypothesis: There will be a statistically significant difference in knowledge and understanding of asking for permission before posting about other people on social media, between 13-17 year olds who play the serious game and those who read the control guidance.

SECONDARY OUTCOME MEASURE 3 (S3): Retention of knowledge and understanding

A8.19 Null hypothesis: There will be no statistically significant difference in the retention of knowledge and understanding between 13-17 year olds who play the serious game and those who read the control guidance.

A8.20 Alternative hypothesis: There will be a statistically significant difference in the retention of knowledge and understanding between 13-17 year olds who play the serious game and those who read the control guidance.

SECONDARY OUTCOME MEASURE 4 (S4): Enactment of social media etiquette behaviour(s)

A8.21 Null hypothesis: There will be no statistically significant difference in the enactment of social media etiquette behaviour(s) in the two weeks following the trial, between 13-17 year olds who play the serious game and those who read the control guidance.

A8.22 Alternative hypothesis: There will be a statistically significant difference in the enactment of social media etiquette behaviour(s), between 13-17 year olds who play the serious game and those who read the control guidance.

A9. Multiple Comparisons Corrections: Analysis 'Families' and significance levels

Family description	Analyses included	Alpha value for 0.05 level of significance	Alpha value for 0.1 indicative level of significance
Main Survey Sample Analysis – investigation into whether the randomisation of the sample into the serious game and control group had not resulted in any inadvertent bias	1. Gender x Trial Arm 2. Age x Trial Arm 3. Existing privacy settings x Trial Arm 4. Pretest score x Trial Arm	= 0.05/4 = 0.0125	= 0.1/4 = 0.025
Validation of measures – indicative assessment of whether PreTest scores vary significantly across preliminary social media privacy settings. Used to assess whether PreTest scores are sensitive to differences in behaviour	1. PreTest Score: All accounts private vs Some Private Some Public 2. PreTest Score: All accounts Private vs All Public/Don't know 3. PreTest Score: Some private some public vs All Public/Don't Know	= 0.05/3= 0.0167	= 0.1/4 = 0.0333
Main Survey Outcome Measures – tests that have looked at scores calculated from variables in the Pre and Post test and assessed for differences either within or between trial arms	1. Total Score x Trial Arm 2. Serious Game: Total Score x Gender 3. Serious Game: Total Score x Age 4. Serious Game: Change Score 5. Control Guidance Group: Change Score 6. Change Score x Trial Arm 7. Post Test Scores x Trial Arm	= 0.05/7 = 0.007143	= 0.1/7 = 0.0143

Levels of knowledge and understanding by sub level media etiquette topics – assessment of the individual sub level topics by trial arms	1. Private vs Public Information x Trial Arm Chi Square 2. Private vs Public Information x Trial Arm MWU 3. Personal Info (A) x Trial Arm Chi Square 4. Personal Info (A) x Trial Arm MWU 5. Personal Info (B) x Trial Arm Chi Square 6. Personal Info (B) x Trial Arm MWU 7. Digital Footprint x Trial Arm Chi Square 8. Digital Footprint x Trial Arm MWU 9. Asking for Permission x Trial Arm MWU	= 0.05/9 = 0.005556	= 0.1/9 = 0.0111
Follow Up Survey Sample Analysis - Assessment of whether there had been biased attrition from the main survey to follow up test, meaning the sample composition across the trial arms was no longer equal	1. Gender x Trial Arm 2. Age x Trial Arm 3. Existing Privacy settings x Trial Arm 4. PreTest Score x Trial Arm	= 0.05/4 = 0.0125	= 0.1/4 = 0.025
Follow Up Survey Outcome Measures – tests that have looked at differences between scores calculated using questions included in the Follow Up Survey and have looked for differences between the trial arms	1. Retention Score x Trial Arm 2. Behaviour Change Score x Trial Arm	= 0.05/2 = 0.025	= 0.1/2 = 0.05

A10. Glossary of Terms

Alpha level: the probability of rejecting the null hypothesis when the null hypothesis is true. In this trial, alpha, or significance level, is set to 0.05 (5%) but we also tested for indicative findings at the 0.1 (10% level).

Chi-Square Test: a Chi-square ($\chi 2$) is used to test hypotheses about the distribution of observations across categories that are nominal (have no inherent ranking). It tests whether the observed frequencies within each categories are statistically significantly different from the frequencies within each category expected given the null hypothesis.

Closed-ended question: a closed-ended question is made up of pre-populated answer choices (or codes) for the respondent to choose from.

COM-B Model: the COM-B model is a model of behaviour change which identifies three factors that need to be present for any behaviour to occur capability, opportunity and motivation. For more information, please see https//social-change.co.uk/files/02.09.19_COM-B_and_changing_behaviour_.pdf

Independent measures design: an independent measures design, also known as between-groups, is an experimental design where different participants are used in each condition of the independent variable. This means that each condition of the experiment includes a different group of participants.

Mann Whitney U test: a Mann-Whitney U test is a non-parametric test used to test for statistically significant differences in an ordinal or non-normally distributed measures between two independent groups (i.e. data collected using an independent measures design). It tests whether observations (or, in this trial, scores) in one group tend to be larger than observations (or, in this trial, scores) in the other.

Multiple code question: a question where more than one answer can be selected from a list of possible responses.

Normal distribution: a distribution that has most of the data in the centre, with decreasing amounts evenly distributed to the left and right. Non-normal distributions do not follow this distribution pattern.

One-tailed hypothesis: a hypothesis where the alternative hypothesis tests for a significant difference in one direction only, e.g. it only tests whether scores from group A are significantly higher than scores from group B. If scores from group A were significantly lower than scores from group B, this would not be identified as a significant result.

Open-ended question: an open-ended question asks the respondent to feedback in their own words.

Ordinal data: a kind of categorical data with a set order or scale to it e.g. a likert scale.

Repeated measures design: an experimental design where the same participants take part in each condition of the independent variable. This means that each condition of the experiment includes the same group of participants. Also known as a within-groups design.

Single code question: a question where only one answer can be selected from a list of possible responses.

Type 1 error: occurs when a researcher incorrectly rejects a true null hypothesis. This means that your report that your findings are significant when in fact they have occurred by chance. Also known as a false positive.

Two-tailed hypothesis: a hypothesis where the alternative hypothesis tests for a significant difference in both directions, e.g. it tests whether scores from group A are significantly higher or significantly lower than scores from group B.

Wilcoxon signed-rank test: used to test for significant differences in an ordinal or non-normally distributed measure in two sets of scores that come from the same respondents (i.e. data collected using a repeated measures design). It tests whether that the median difference between the two sets of scores is significantly different to zero.