



## Synopsis

# A digital intervention to improve mental health and interpersonal resilience for young people who have experienced online sexual abuse: the i-Minds non-randomised feasibility clinical trial and nested qualitative study

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## Abstract

**Background:** No evidence-based support for young people who have experienced technology-assisted sexual abuse exists. The project's aims were to develop a digital intervention that improves mentalisation (the ability to understand the minds of oneself and others that underlies behaviour) to reduce the risk for revictimisation and future harm and improve young people's resilience.

**Objectives:** To co-design a mentalisation-based digital intervention; determine its feasibility, acceptability, safety and usability; and determine how to best integrate this into practice.

**Methods:** A mixed-methods, non-randomised study in young people aged 12–18 years exposed to technology-assisted sexual abuse across two United Kingdom sites. We adapted an existing mentalisation-based therapy manual and co-designed a digital health intervention (app) using participatory methods. Recommendations from our pre-trial qualitative work with healthcare professionals supporting young people with technology-assisted sexual abuse and lived experience consultation informed app development and trial procedures. The primary outcome was the feasibility and acceptability of delivering the digital intervention measured against relevant fields of the Consolidated Standards of Reporting Trials statement for feasibility studies. Intervention safety was reported against an adverse events procedure. Usability was guided by the framework for analysing and measuring usage and engagement data in digital interventions. Acceptability was examined using qualitative methods. The planned sample size of the feasibility clinical trial was 60 young people.

**Results:** Between May 2022 and March 2023, 147 young people were screened for eligibility for the feasibility clinical trial; 72 referrals were made and 43 young people were allocated to receive the intervention. We found that it was possible to recruit and retain participants to this trial. Quantitative and qualitative data showed that the i-Minds app was safe, acceptable and associated with promising signals of efficacy on valuable outcomes post treatment, including technology-assisted-sexual-abuse-related post-traumatic symptoms, resilience, internalising symptoms and reflective functioning. Most participants accessed or completed app modules. User feedback indicated that participants had a positive experience using the app, positively increasing their knowledge/understanding of their own mental health and their motivation to address their mental health difficulties. Practitioners identified the barriers to implementing i-Minds into routine practice as not being involved in its design at the outset, possible impact on workload and whether digital health interventions might replace routine care. Facilitators included the distinct nature and specificity of the i-Minds app for the target group and its ability to support young people on service waiting lists.

**Limitations:** There was limited ethnic diversity in the samples, reflecting potential selection bias at the referral point. Sexual orientation is not reported in the trial. The trial lacked randomisation and a control group, limiting interpretation of post-treatment improvements.

**Conclusions:** A mentalisation-based digital intervention is feasible, acceptable and safe. A larger-scale evaluation appears warranted. Further service improvements are required for routine assessment and support for young people experiencing technology-assisted sexual abuse.

**Future work:** Further questions could be explored, including evaluating training materials for online harms, developing guidelines assessing for and responding to online harms, validated measures to assess for online harms, understanding further where digital health interventions fit along the clinical care pathway, recruiting a more diverse sample, and further differentiating the forms of online harms and their consequences.

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This report details the work undertaken to establish the feasibility, acceptability, safety, usability and factors affecting implementation of a co-designed mentalisation-based digital health intervention (DHI). The DHI is designed for young people (YP) aged 12–18 years who have experienced technology-assisted sexual abuse (TASA) to reduce the risk of revictimisation and future harm and make YP more resilient and able to manage distress that might result from TASA experiences. It arose from a call commissioned by the National Institute for Health and Care Research (NIHR) on online sexual abuse based on a research recommendation in the National Institute for Health and Care Excellence highlighting there were no evidence-based interventions for improving the mental health and well-being of YP exposed to online sexual abuse.

## Introduction

### *Rationale for research and background*

We presented the rationale for the programme of work in a protocol paper<sup>1</sup> highlighting the urgent need to develop a co-designed, evidence-based intervention to support YP exposed to TASA, including understanding the perceived needs and wants of YP and healthcare professionals (HCPs) (from the perspective of HCPs) and factors affecting implementation of DHIs. Using the internet is a routine part of daily life for YP, but it can place them at risk for various forms of risk. Technology-assisted

sexual abuse can occur through any device connected to the internet and across multiple platforms and applications. YP can be coerced into sharing sexual images of themselves, taking part in sexual activities via webcam or smartphone, or 'sexting' – having sexual conversations by text – and these behaviours bring unique social and psychological harms.<sup>2,3</sup> Multiple factors are likely involved in vulnerability to being exposed to TASA. Our theoretical framework was based around YPs' ability to accurately estimate others' intentions and motivations ('mentalising') when engaging in online spaces. The usual assumptions based on verbal and non-verbal cues in real-life interactions are more opaque when communication takes place online, thereby compromising YPs' mentalising capacity, their evaluation of risk and assumed trust.<sup>4</sup> Dramatic expansion of digital health tools for YP represented an acceptable way to engage with and support YP, unconstrained by location and time, to allow access to intervention strategies when traditional means of support are not available.

### *Objectives and methods for data collection and analysis*

Full details of the proposed programme of work and analysis plan for the feasibility clinical trial were published as a protocol.<sup>1</sup> It was pre-specified that findings from quantitative and qualitative data collected across the two workstreams would be divided into discrete publications. There were six underpinning objectives organised in two workstreams, grouped as follows: (1) adaptation and

digital translation needs; and (2) evaluation needs (Table 1, Figure 1).

### Summary of results

Papers 1 and 2 (Objective 1): *The experiences of practitioners working with young people exposed to online sexual abuse.*<sup>9</sup>

*What are practitioners' views of how digital health interventions may play a role in online child sexual abuse service delivery?*<sup>10</sup>

The results of the qualitative interviews with HCP described in Objective 1 have been published.<sup>9,10</sup> Findings from these qualitative interviews revealed a distinct set of themes in relation to HCP understanding of TASA and their views around how digital tools can be used in the clinical service setting to support YP who have experienced TASA. As such, these findings were written up separately to ensure sufficient voice was given to the data. Qualitative interviews using a semistructured topic guide were carried out with 25 practitioners

TABLE 1 Programme objectives and methods for data collection and analysis

| Objective no.  | Objective name   | Method for data collection and analysis   | Linked paper  |
|--|--|---|---|
| <b>Adaptation and digital translation (workstream 1)</b> |  |   |   |
| Obj. 1   | Identify perceived user wants and needs, including factors improving the uptake and accessibility of i-Minds. <i>What are practitioners' views of how digital health interventions may play a role in service delivery?</i>              | Qualitative interviews with HCPs (including child and adolescent and specialist mental health workers) working with YP with lived experience of TASA, analysed using reflexive thematic analysis  | Quayle E, Schwannauer M, Varese F, Cartwright K, Hewins W, Chan C, <i>et al.</i> The experiences of practitioners working with young people exposed to online sexual abuse. <i>Front Psychiatry</i> 2023;14:1089888. <a href="https://doi.org/10.3389/fpsyt.2023.1089888">https://doi.org/10.3389/fpsyt.2023.1089888</a><br>Quayle E, Schwannauer M, Varese F, Cartwright K, Hewins W, Chan C, <i>et al.</i> What are practitioners' views of how digital health interventions may play a role in online child sexual abuse service delivery?. <i>Front Digit Health</i> 6:1325385. <a href="https://doi.org/10.3389/fdgth.2024.1325385">https://doi.org/10.3389/fdgth.2024.1325385</a> |
| Obj. 2   | Adapt a mentalisation-based manual through consultation with YP who have experienced TASA, HCPs and advisory groups to determine the essential and desirable features of the intervention that would encourage uptake and use in the NHS | Review, extract and integrate knowledge from the TASA literature and findings from primary qualitative interviews carried out in workstream 1, with key principles and techniques from the mentalisation-based intervention manual developed by Griffiths and colleagues <sup>5</sup> and via a series of focus groups with YP with lived experience of TASA, a national multidisciplinary stakeholder advisory group, and safeguarding leads to identify users' perceived wants and needs for an intervention of this nature                                 | Bucci S, Varese F, Quayle E, Cartwright K, Machin M, Whelan P, <i>et al.</i> A digital intervention to improve mental health and interpersonal resilience in young people who have experienced technology-assisted sexual abuse: protocol for a nonrandomized feasibility clinical trial and nested qualitative study. <i>JMIR Res Protoc</i> 2023;12:e40539 <a href="#">Appendix 1 of this report</a>  |
| Obj. 3   | Technical development of the digital intervention  | Transfer the adapted mentalisation-based content into a fully functioning, secure app founded on an existing digital platform developed for YP with severe mental health problems <sup>6</sup> using the following methods: (1) iterative Agile development process, Scrum; <sup>7</sup> (2) four creative participatory design <sup>8</sup> workshops with YP and members of the clinical and software teams and (3) usability testing via Think Aloud usability sessions to ensure software defects are fixed and the app is functional prior to deployment | Bucci S, Varese F, Quayle E, Cartwright K, Machin M, Whelan P, <i>et al.</i> A digital intervention to improve mental health and interpersonal resilience in young people who have experienced technology-assisted sexual abuse: protocol for a nonrandomized feasibility clinical trial and nested qualitative study. <i>JMIR Res Protoc</i> 2023;12:e40539 <a href="#">Appendix 1 of this report</a>  |
| <b>Evaluation (workstream 2)</b>                         |  |   |   |
| Obj. 4   | Feasibility clinical trial evaluation  | Non-randomised feasibility clinical trial with a 6-week intervention exposure window and baseline and post-treatment assessments  | Bucci S, Varese F, Quayle E, Cartwright K, Larkin A, Cindy Chan, Chitsabesan P, <i>et al.</i> A digital intervention to improve mental health and interpersonal resilience in young people who have experienced Technology-Assisted Sexual Abuse: a feasibility clinical trial. <i>medRxiv</i> 2025.06.27.25330408. <a href="https://doi.org/10.1101/2025.06.27.25330408">https://doi.org/10.1101/2025.06.27.25330408</a>   |

continued

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TABLE 1 Programme objectives and methods for data collection and analysis (continued)

| Objective no. | Objective name  | Method for data collection and analysis   | Linked paper   |
|---------------|---|---|--|
| Obj. 5        | Determine acceptability of the i-Minds app and study procedures   | Qualitative interviews with YP who took part in the trial, analysed using reflexive thematic analysis and coded using the acceptability of healthcare interventions theoretical framework | Quayle E, Larkin A, Schwannauer M, Varese F, Cartwright K, Chitsabesan P, <i>et al.</i> Experiences of a digital health intervention for young people exposed to technology assisted sexual abuse: a qualitative study. <i>BMC Psychiatry</i> 2024;24:237(2024). <a href="https://doi.org/10.1186/s12888-024-05605-6">https://doi.org/10.1186/s12888-024-05605-6</a> |
| Obj. 6        | Identify key barriers and facilitators (and unintended consequences) to using and integrating i-Minds into existing care pathways | Qualitative interviews with HCPs who referred to the trial, analysed according to a Normalisation Process Theory framework  | Quayle E, Schwannauer M, Varese F, Allsopp K, Cartwright K, Chan, C., Chitsabesan P, <i>et al.</i> Implementation of a digital health intervention for young people exposed to Technology Assisted Sexual Abuse. <i>Child Abuse Neglect</i> 2024;154:106883. <a href="https://doi.org/10.1016/j.chiabu.2024.106883">https://doi.org/10.1016/j.chiabu.2024.106883</a> |

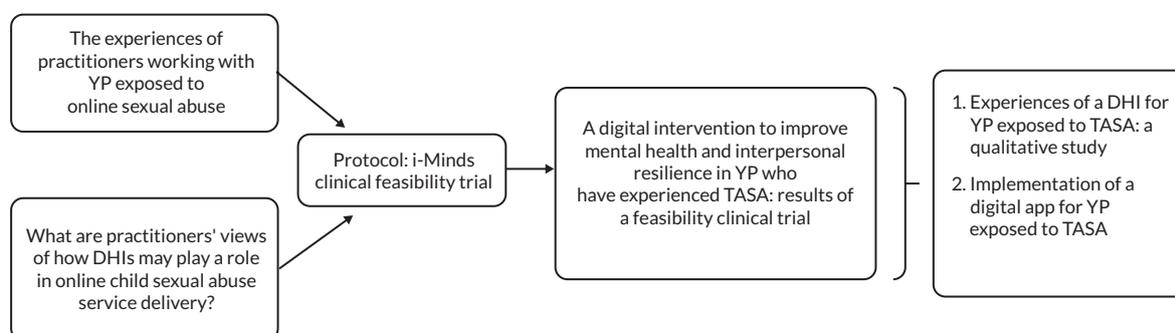


FIGURE 1 Flow of studies through the project.

(including psychiatrists, clinical psychologists, nurses, sexual assault specialist counsellors) working in services offering clinical support to YP who reported TASA-related distress across the two recruitment sites (Manchester/Edinburgh). Findings from paper 1 revealed 3 themes and 10 subthemes. The three overarching themes were: (1) the breadth of the problem; (2) working with TASA and (3) the emotionally charged nature of TASA. Differences in how HCP recognised TASA were apparent across interviewees. While practitioners were generally aware that sexual images, in particular, self-produced sexual images, were taken by and shared between YP and these resulted in harm and distress for some (especially when shared non-consensually), interviewees reflected on the fact that clinical pathways generally do not exist to support these YP with targeted, bespoke interventions, and support and training to support practitioners themselves is not available. Furthermore, questions related to TASA are not currently specific in initial assessment or referral forms; rather, practitioners' rely on YP disclosing TASA. A general gap in practitioners' understanding about the role technology plays in YP's lives, in terms of social interactions and the potential for online harms, was also apparent.

Findings from paper 2 revealed three themes and nine subthemes. The three overarching themes were: (1) feeling a little bit lost; (2) seeing potential problems and (3) knowing what works. Practitioners could see the relevance of using digital tools to support YP in general and how it may be a preferred medium through which to support YP with mental health difficulties and for helping to keep YP safe online, specifically for YP with TASA experiences. Interviewees could see the potential value these tools could have to manage waiting lists and complement services' existing treatment offer. However, concerns were raised around the impact digital tools will have on staff workloads, safety around content related to TASA when delivered via an app, data protection, and the apparent missing nature of the therapeutic relationship formed between a clinician and a YP, especially a vulnerable YP.

Taken together, digital tools were viewed by practitioners as a relevant and acceptable means of supporting YP in mental health service delivery with some (not insurmountable) concerns noted. There is a clear need for further training for practitioners in assessing and treating YP who experience TASA and a more nuanced understanding of how TASA fits along the clinical care pathway.

*Paper 3 (Objectives 2 and 3): A digital intervention to improve mental health and interpersonal resilience in young people who have experienced technology-assisted sexual abuse: protocol for a nonrandomized feasibility clinical trial and nested qualitative study.*<sup>1</sup>

Full details of the proposed feasibility trial and analysis plan to evaluate the mentalisation-based DHI developed as part of this award was published in *JMIR Research Protocols*.<sup>1</sup> In addition to describing the design, methods and procedures used to examine the acceptability, feasibility and safety of the i-Minds app (i.e. Objective 4; see the 'Paper 4' section below), the trial protocol<sup>1</sup> and outcome paper (*in preparation*, Paper 4) describe the mentalisation-based intervention that was adapted in the early phases of this programme, and the co-designed digital platform (i.e. the outputs of Objective 2 and Objective 3, respectively). Additional information about the i-Minds intervention is summarised in [Appendix 1](#). Further information about how the lived experience advisory group (LEAG) impacted and influenced the app and study development is summarised in [Appendix 2](#).

In brief, the i-Minds app was developed as a modular intervention, designed to be available to study participants over a 6-week intervention window. In line with UK Government User Research guidelines, we held four participatory design workshops with multiple stakeholders, including YP of a similar age range of the prospective target group, as well as NHS clinicians and third-sector professionals with expertise in supporting YP who have experienced TASA. The participatory design workshops ensured that both prospective users and other key stakeholders played an active role in guiding design decisions and the app's functionality. The 'clinical content' of the app was developed by clinical co-applicants (Bucci, Varese, Schwannauer, Quayle), with further support from a consultant clinical psychologist (Selby). The starting point for the development of the app content was adapting a mentalisation-based manual developed by members of our team<sup>9</sup> and the creation of novel content to ensure the intervention was grounded on the experience of TASA and other potentially distressing online harms and digital interactions. The development of the app functionality (led by co-applicant Machin) was grounded in the existing Actissist app,<sup>11</sup> developed for YP with severe mental health problems.

The content of the i-Minds app was organised into four modules (summarised in [Appendix 1](#), [Tables 3](#) and [4](#)): (1) a mentalisation module (mandatory module before other app features are accessed to maximise participant's initial understanding of mentalisation, its role in navigating

offline and online interpersonal interactions, as well as in the promotion of psychological well-being); (2) a psychoeducation module (covering a range of educational material on technology use and navigating relationships and sexual experiences); (3) an emotional and mental health module (covering educational material and practical exercises grounded on mentalisation-based principles applied to a wide range of mental health topics, including anxiety, low mood, self-harm, positive relationships and resilience) and (4) a trauma module (focused on psychological and emotional consequences of trauma, including recognising and responding to 'triggers', addressing and improving feelings of guilt and shame, and reducing maladaptive avoidance). Throughout the modules, there were links to other areas of the app within each core topic area, to maximise interactivity and user experience. A multimedia repository of additional resources was also available (e.g. a diary to record progress and insights related to app material/content, videos explaining concepts addressed in core modules, further support resources/organisations for support, soothing images to view, grounding and other distress tolerance exercises). Following lived experience group feedback, topics were visually represented through a tree motif to promote engagement. See [Appendix 1](#), [Figures 2](#) and [3](#) for screenshots of the i-Minds app.

The app was available on both iOS and Android operating systems. To promote engagement, once downloaded on the user phone, the app triggered a daily prompt in the form of a standard app notification, with a further notification 3 hours later when the initial prompt did not result in the use of the app. Users could also self-initiate using the app at any time. At 12 p.m., after each 7-day period, an additional weekly prompt was sent, inviting users to reflect on content they accessed in the previous week. The app stopped working after the 6-week intervention window.

Safeguarding and risk protocols and procedures were developed alongside the app development with key stakeholders to ensure the safety of study participants and researchers throughout the trial period.

*Paper 4 (Objective 4): A digital intervention to improve mental health and interpersonal resilience in young people who have experienced technology-assisted sexual abuse: results of a feasibility clinical trial* (Bucci et al., under review, *Child and Adolescent Mental Health*; Bucci et al., under review, *BMJ Mental Health*).

The results of the i-Minds feasibility trial have been submitted for publication. In this non-randomised, single-arm trial carried out across NHS services in England

and Scotland and one national e-therapy provider, we tested the feasibility, acceptability and safety of the mentalisation-based DHI for YP who have experienced TASA, developed in earlier stages of the award (i.e. see Objective 4). The trial was pre-registered with the International Standard Randomised Controlled Trial Number registry as ISRCTN16262847. Participants aged 12–18 years were recruited across Child and Adolescent Mental Health Services (CAMHS) at two sites (Greater Manchester and Edinburgh) and a Sexual Assault Referral Centre (SARC) (Manchester). Following the collection of baseline data, participants were allocated to receive the i-Minds intervention for 6 weeks, either using their own mobile device or a study handset provided by the research team. To describe the characteristics of the recruited sample, at baseline we collected detailed demographic, clinical and technology use information, including information on frequency of exposure to a range of online harms. To examine the 'potential for efficacy' of the i-Minds app on relevant clinical outcomes, a set of brief self-report measures was administered at baseline and after the 6-week intervention window. These included tools assessing: (1) mentalisation ability (the Reflective Functioning Questionnaire for Youths<sup>12</sup>), (2) post-traumatic symptoms related to TASA experiences (the Child Revised Impact of Events Scale<sup>13</sup>), (3) internalising symptoms (the Revised Child Anxiety and Depression Scale 25-item version<sup>14</sup>), (4) resilience (the Connor-Davidson Resilience Scale 10-item version<sup>15</sup>), (5) emotional regulation difficulties (the Difficulties in Emotion Regulation Scale-Short Form<sup>16</sup>) and (6) interpersonal sensitivity (the Interpersonal Sensitivity Measure<sup>17</sup>). Detailed acceptability and user satisfaction data were also collected at the post-treatment follow-up assessment, using an adapted version of the user version of the Mobile Adherence Rating Scale.<sup>18</sup> Throughout the trial, feasibility data were collected in relation to participant recruitment, participant retention and the extent to which YP engaged in the i-Minds intervention, and safety information related to using the i-Minds app and/or our trial procedures (i.e. adverse events).

Between May 2022 and March 2023, 46 participants were recruited, and 43 participants were allocated to receive the i-Minds app. Most participants accessed the i-Minds app using their own phone; 9% of the sample required a study handset to access the intervention.

Quantitative data on adoption, uptake and use were aligned with the analyzing and measuring usage and engagement data framework for analysing and measuring usage and engagement data in digital interventions.<sup>19</sup> Of the 41 YP onboarded to the app, 95% (39/41) users completed the mandatory mentalisation module.

For the remaining three modules, the trauma module had the highest completion (46%, 19/41), followed by the psychoeducation and emotional and mental health modules (39%, 16/41 completed each module). Additionally, 32%, 44% and 34% users accessed (but did not complete) the trauma, psychoeducation and emotional and mental health modules, respectively. Median duration of app engagement was 33 days. Eighty-six per cent of the participants attended the planned post-treatment follow-up assessments. Analyses of pre-post change scores (and their associated 95% confidence interval) and participant-level Reliable Change Index<sup>20</sup> analyses found promising signals of post-treatment improvement in TASA-related post-traumatic symptoms, resilience, internalising symptoms and, to a lesser extent, mentalisation skills. User feedback indicated that participants generally had a positive experience of using the app, positively impacting their knowledge/understanding of their own mental health and their motivation to address their mental health difficulties. There were no adverse events related to the intervention or trial procedures. The findings suggest that it is possible to recruit and retain participants for a trial of a digitally delivered intervention for TASA, and that the i-Minds app was safe, acceptable and associated with promising signals of efficacy on valuable outcomes. A large-scale efficacy trial therefore appears viable and warranted to confirm and extend the findings of this feasibility trial.

*Paper 5 (Objective 5): Experiences of a digital health intervention for young people exposed to technology assisted sexual abuse: a qualitative study.*<sup>21</sup>

The results of the qualitative exit interviews with YP to determine acceptability of the i-Minds app and study procedures are published in *BMC Psychiatry*. We approached participants who did/did not complete the feasibility clinical trial according to a sampling framework that aimed to reflect the demographics, experiences of TASA and levels of engagement with the i-Minds app. Semistructured interviews informed by a topic guide were conducted with 15 YP (identified 22 women, 1 man, 3 non-binary or not stated) who used the i-Minds app as part of the feasibility clinical trial described in Objective 4. Participants were asked about how usable and acceptable the i-Minds app was, the benefits and problems in using the app and its impact on their life, the barriers and facilitators to using the i-Minds app, and improvements that can be made. Findings were mapped according to the acceptability of healthcare interventions theoretical framework.<sup>22</sup> Interviewees found the i-Minds app to be acceptable. Many aspects of the app were seen as enjoyable and useful in helping YP understand their experience of TASA, manage associated feelings and change behaviour. The app was seen as usable and easy

to navigate without the support of the research team or their supporting clinician, but for some, the app content was too text-heavy, and suggestions were made to include more video and interactive content in future versions. Furthermore, aspects of the content of the app were found to be emotionally distressing at times; however, this was transient, and YP reflected on the fact that this was a necessary part of processing their experience of TASA. Some YP explained that using the app influenced and changed both their online and offline behaviours. YP particularly welcomed the personalisation and interactive features included in the app and appreciated the financial reimbursement for study participation.

To our knowledge, this is the first acceptability study of a DHI developed to support YP who report distress associated with TASA. We identified potential barriers for implementation, such as the timing of access to the i-Minds app in relation to TASA (e.g. YP suggested that although the content was relevant to their experience, it would have been helpful to have access to this content closer to the time of the TASA exposure), and what features increased the likelihood of it being used by YP. YP also described developing a sense of connection with the app and felt that they missed it at the end of the study, reflecting the concept of the digital therapeutic alliance.<sup>23</sup>

*Paper 6 (Objective 6): Implementation of a digital app for young people exposed to technology-assisted sexual abuse.*<sup>24</sup>

The results of the qualitative exit interviews with HCP to identify the key barriers and facilitators (and unintended consequences) to using and integrating i-Minds into existing care pathways are published in *Child Abuse & Neglect*.<sup>21</sup> All staff (e.g. psychiatrists, clinical psychologists, nurses, sexual assault specialist counsellors) who had referred YP to participate in the study were invited to take part. A Normalisation Process Theory coding framework informed by a topic guide was used to inform the questions in semistructured interviews. Interviews were conducted with 12 HCPs who referred to the i-Minds feasibility clinical trial described in Objective 4 ( $n = 10$ , Edinburgh;  $n = 10$ ,  $n = 2$ , Manchester; 10 women, 2 men). HCPs could see the value of a DHI like i-Minds over and above both existing interventions used in child and adolescent services and other DHIs offered to YP. Concerns HCP may have had about a DHI for TASA were generally allayed at the end of the study; however, concerns around safety in relation to triggering distress or the device being used inappropriately, as well as using the app in the absence of the support or involvement of a HCP, were noted. As reflected in the findings described against Objective 1, further training and organisational support on TASA is

urgently needed. Practitioner concerns about potential risks and DHIs being used as stand-alone treatment (without practitioner support) may be potential barriers to implementing DHIs into routine clinical practice. Integrating an app like i-Minds into routine service delivery must involve HCP and service managers from the outset, with organisational buy-in a necessity to ensure its success.

### Research papers synthesised in the synopsis

- **Paper 1:** Quayle E, Schwannauer M, Varese F, Cartwright K, Hewins W, Chan C, *et al.* The experiences of practitioners working with young people exposed to online sexual abuse. *Front Psychiatry* 2023;**14**:1089888.
- **Paper 2:** Qualitative 2: Quayle E, Schwannauer M, Varese F, Cartwright K, Hewins W, Chan C, *et al.* What are practitioners' views of how digital health interventions may play a role in online child sexual abuse service delivery? *Front Digit Health* 2024;**6**:1325385.
- **Paper 3:** Bucci S, Varese F, Quayle E, Cartwright K, Machin M, Whelan P, *et al.* A digital intervention to improve mental health and interpersonal resilience in young people who have experienced technology-assisted sexual abuse: protocol for a nonrandomized feasibility clinical trial and nested qualitative study. *JMIR Res Protoc* 2023;**12**:e40539.
- **Paper 4:** Bucci S, Varese F, Quayle E, Cartwright K, Chitsabesan P, Green V, *et al.* A digital intervention to improve mental health and interpersonal resilience in young people who have experienced technology-assisted sexual abuse: results of a feasibility clinical trial. *Under review, Child and Adolescent Mental Health*.
- **Paper 5:** Quayle E, Schwannauer M, Varese F, Cartwright K, Hewins W, Chan C, *et al.* Experiences of a digital health intervention for young people exposed to technology assisted sexual abuse: a qualitative study. *BMC Psychiatry* 2024;**24**:237.
- **Paper 6:** Quayle E, Schwannauer M, Varese F, Cartwright K, Hewins W, Chan C, *et al.* Implementation of a digital app for young people exposed to Technology Assisted Sexual Abuse. *Child Abuse Negl* 2024;**154**:106883.

## Discussion/interpretation

### Principal findings and achievements per project outcome

The principal aims of workstream 1 of the project was to identify users perceived wants and needs for a DHI

by asking for practitioners who support YP who have experienced TASA how DHIs may play a role in TASA delivery, and to adapt a mentalisation-based manual. Interviews with HCP who work to support YP who have experienced TASA highlighted that HCP recognise TASA to be a problem for YP, but there are no established referral pathways, informative training and assessment tools available to clinicians to assess for and specifically support YP who report distress associated with TASA.

Findings from the non-randomised, mixed-methods feasibility clinical trial (workstream 2) showed that it is possible to recruit and retain participants for a digital intervention trial of TASA. Quantitative and qualitative data showed that the i-Minds app was safe, acceptable and associated with promising signals of efficacy on valuable outcomes post treatment, including TASA-related post-traumatic symptoms, resilience, internalising symptoms and reflective functioning. Most participants accessed or completed the app modules. User feedback indicated that participants generally had a positive experience using the app, positively increasing their knowledge/understanding of their own mental health and their motivation to address their mental health difficulties. Disclosure of online harms is relatively low, and the multiple barriers to seeking and receiving help from clinical services means only a small proportion of YP may have taken part in the i-Minds feasibility clinical trial. Practitioners identified barriers to implementing i-Minds into routine practice, including not feeling involved in its design at the outset, possible impact on workload and concerns around DHIs potentially replacing routine care. Facilitators included the distinct nature and specificity of the i-Minds app for the target group and its ability to support YP on service waiting lists.

The feasibility trial supports the 'potential for efficacy' of the i-Minds app as a potentially valuable intervention for this target group. As the app content was underpinned by mentalisation-based principles and content, the app might exert its potential effect on improving YP's mentalisation skills. That is, the interactive nature of the scenarios included in the app and content might have helped YP reflect on their own thoughts, feelings and intentions and those of others, and perhaps facilitate a more flexible, less concrete way of thinking about situations. In turn, this might have helped YP be more open to thinking that their view of the world is not necessarily the only truth, thereby improving their ability to mentalise about others' states of minds and intentions. Furthermore, we have seen initial signals that YP's level of uncertainty about their own and other's mental state has decreased somewhat, demonstrating a greater awareness of the mismatch between their own and

others' expectations and intentions, whereas less change was observed in relation to the certainty of mental states, perhaps indicating that the intervention was less able to increase confidence in their own recognition of mental states. Indeed, it is possible that the intervention might help YP be more open to considering that others might have different intentions to those assumed, recognising that we cannot fully understand others' states or intentions (e.g. in the context of TASA, believing without consideration that someone requesting a nude image may have multiple intentions in how they may use this image). This is supported by the open feedback we observed in responses on the user version of the Mobile Application Rating Scale measure, where some participants found it helpful that the app invited them to put themselves 'in another's shoes' (i.e. to encourage mentalisation), which perhaps helped them further process their personal experiences of TASA. Another interpretation, and one offered by our lived experience group members, is that the effect might be driven by the non-shaming, destigmatising stance we worked hard to reflect in the app content, as well as the more generic psychoeducational content of the intervention, which may have helped YP to engage more readily and openly with difficulties arising from their TASA experiences. Of course, as highlighted by the clinical members of our research team, one cannot ignore the fact that participants in the feasibility clinical trial were registered with mental health services, and this might account for the observed improvements on clinical measures. A large-scale efficacy trial is warranted to confirm and extend these findings.

The six objectives described across the programme of work were achieved to time and budget. Qualitative work with HCP working with YP who experience TASA identified key issues to consider in both the development of the content, functionality, the look-and-feel of the app, safeguarding procedures and broader trial procedures, resulting in the data being described in two publications in peer-reviewed journals (Objective 1). Our Agile development process for app development, coupled with participatory design workshops and beta testing conducted with our advisory groups, enabled the end-users of i-Minds to influence the design and functionality of the app, and facilitated the adaptation of a mentalisation-based manual into a usable and engaging DHI. This approach supports close collaboration between our digital health software and clinical teams, which relied on regular delivery of working software to the clinical team such that changing requirements could be incorporated throughout app development. By working together in an iterative fashion, underpinned by Team Science principles, our multidisciplinary team was able to learn together

and optimise platform functionality, with designers responsible for pointing out technical options, and users providing information about their needs, practices and how they anticipate they will use the DHI. Our teams worked together successfully through this process to produce a usable and enjoyable intervention that clinicians reported was appropriate and relevant for the YP that they work with. Qualitative interviews with YP who used the i-Minds app in the feasibility clinical trial and HCP who referred YP to the i-Minds trial enabled us to determine the acceptability of the app, our study procedures, and to identify key barriers and facilitators (and unintended consequences) to using and integrating i-Minds into existing care pathways (Objectives 5 and 6). HCPs were broadly positive about the app and could clearly differentiate how i-Minds differed from existing treatment offers and other apps they recommended to YP. HCPs rarely inquire about YP's online interactions, the potential of online harms, and experiences of TASA more specifically. The i-Minds trial itself raised HCP awareness of the prevalence and potential negative sequelae of TASA, which resulted in some immediate changes in their practice (e.g. adding an item to initial assessment forms at service intake about online interactions and TASA). HCPs could see the value of using DHIs when waiting lists were long, so long as safeguarding concerns could be managed. HCPs felt confident in the app providing appropriate information and strategies, but there were concerns about HCP needing to provide technical support to YP using the app and concerns that greater awareness of TASA may increase their overall workload.

Given the current state of evidence about how YP (and adults) embed technology within their routine activities, it would be naive to assume that increased engagement with technology is not going to be associated with increase harms, particularly where YP are exploring their sexuality/relationships. It is imperative we not only respond to the problems that are already evidenced, but that our technology and methods continue to evolve to meet the expanding problem of online harms.

### **Strengths of the study in relation to broader literature**

There were four key strengths to this programme of work that are not reflected in the broader TASA or DHI fields of research.

The first strength is the mixed-methods approach we took to investigate our six objectives. To our knowledge, there are no theory-informed, co-designed, evidence-based interventions (either digital or in-person) to support YP with TASA. This is the first clinical trial worldwide to evaluate

an intervention to support the mental health and well-being of this group, and more specifically a mentalisation-based DHI for this target population; therefore, there is no comparative research. As mentioned elsewhere in this report, the feasibility clinical trial has kickstarted building an evidence base evaluating psychological interventions specifically co-designed by, and developed for, this vulnerable group of YP.

The second strength is the extensive qualitative work conducted across all phases of the project, with findings used to inform both app development and our trial procedures. As highlighted in the introduction sections of our threaded qualitative papers, at present, there is little qualitative work or guidelines about users perceived wants and needs from interventions for TASA, and how HCP can respond to help-seeking YP. Where work has been carried out, research questions have largely focused on identifying risk rather than understanding the experiences of YP and the needs and wants from both victims and HCP supporting young victims following exposure to TASA.

The third strength is our stakeholder representation across the programme of work and how input and feedback from these groups contributed to developing the content and functionality of the app and our trial procedures. DHIs are recognised as promising tools for extending and scaling up access to health care. Coproduction with people with lived experience and stakeholders has been positioned as the gold standard for improving uptake, engagement, and healthcare outcomes. However, DHIs are rarely coproduced with end-users throughout all stages of design, development and evaluation, with several challenges reported,<sup>25</sup> one of which includes misalignment between researchers' aims and users' needs.<sup>26</sup> Involving three patient and public involvement (PPI) groups (lived experience members, professionals, national stakeholders) ensured that the work carried out across the two workstreams was relevant to our various stakeholder groups. Given the complex intervention tested in the trial and the disruptive nature of digital tools, efforts to include people with lived experience across all phases of work is crucial, but often infrequently carried out. Therefore, we believe our ethos of co-design and lived experience involvement was a notable strength.

The fourth strength is our theory-based approach to intervention development, which captures a key proposed mechanism, mentalisation, as our intervention treatment target. A potential barrier to the implementation of DHIs is the race to develop digital technologies for healthcare without consideration of theory.<sup>27</sup> Without a clear mechanism of action, findings from feasibility or efficacy

trials are limited to outcomes-based results without understanding how and why an intervention might work.

### **Take-home messages**

- Co-designing DHIs with relevant stakeholders results in engaging and relevant interventions.
- HCPs need clear guidance about how to inquire about YP's online interactions, the potential for online harms and different forms of TASA.
- DHIs are relevant, safe and have the potential to bring clinical benefit to YP who have experienced TASA.
- Further research around where DHIs for YP who experience TASA fit along the clinical care pathway is needed.
- A larger-scale evaluation of the i-Minds DHI with a diverse sample of participants appears warranted.
- Further service improvements are required for routine assessment and support for YP experiencing TASA.
- Differentiating the forms of online harms and the consequences that follow is needed so that YP can better navigate and personalise the content of the i-Minds app and HCP can better understand the nature of TASA experiences and offer targeted interventions strategies.

### **Challenges faced and limitations**

The main challenge faced during the feasibility clinical trial related to participant recruitment. Our target sample  $N$  was 60; however, this was not based on any prior evidence of recruitment of YP to similar trials or interventions given no evidence-based interventions exist for YP exposed to TASA. On reflection, perhaps our target of 60 YP was overly ambitious, and a recruitment target of 40 over a 10-month recruitment window is a more realistic recruitment rate. Recruitment at one of the sites was much smoother than at the other site. Researchers were able to embed themselves more closely in the clinical teams at one site, which we believe significantly helped this site's recruitment rate. Staff working in CAMHS at one of our sites told us that a combination of staff vacancies and the clinical complexity of YP on their caseloads meant that they had reduced capacity to support research studies. Referrals from the e-therapy provider we worked with were lower than expected; YP accessing this service reported to clinicians that privacy and confidentiality concerns were the main barrier to trial participation because these potential participants were asked to provide their username to the research team so that, in the event risk was identified, this could be passed onto the provider so that their risk and safeguarding protocols could be initiated. Future research aiming to recruit YP with experience of TASA needs to consider systemic and individual barriers to disclosure,

and the high threshold for admittance to CAMHS services, into recruitment targets.

### **Engagement with partners and stakeholders**

We sought contributions from academic, NHS (England NHS Trusts and Scottish Health Board child and adolescent clinicians and safeguard leads), law enforcement [e.g. Health and Justice team, NHS England; National Crime Agency - Child Exploitation and Online Protection (NCA-CEOP) command] and voluntary sector collaborators (e.g. 42nd Street youth charity), as well as representatives from big tech giants such as Meta and TikTok, who were largely represented on our national stakeholder advisory committee (NSAC) and Parents and Professional Advisory Group (PPAG) advisory committees. The project was embedded in the NIHR Applied Research Collaboration – Greater Manchester (NIHR ARC-GM) and the Complex Trauma and Resilience Research Unit (C-TRU), Greater Manchester Mental Health NHS Foundation at the Manchester site, and the Centre for Developmental Child Psychology at the Edinburgh site.

See [Impact and learning](#) for further details summarising the impact of this award.

## **Patient and public involvement**

### **Aim**

The aim of PPI was to ensure that lived experience and relevant stakeholder voices were at the forefront of all aspects of the research. Involving three PPI groups (members with lived experience, parents and professionals, national stakeholders, see [Appendix 2, Figure 4](#)) ensured that the research would be of direct benefit to people with lived experience of TASA, their carers, and HCPs and agencies who support them.

### **Methods**

We worked with PPI representatives from grant preparation, development of information and study materials, ethical considerations, adapting our mentalisation-based manual and development of app content and its design, through to troubleshooting recruitment challenges, interpretation of data and dissemination. A representative from our PPI partner, the Marie Collins Foundation, was a co-applicant on the grant and attended our regular Project Management Group meeting, where decisions about the research were made. All PPI group meetings were held online leveraging interactive whiteboard platforms to facilitate discussion. We also received written feedback

via e-mail or direct mark-up of documents related study and intervention content from members.

### **Results of patient and public involvement input**

The LEAG comprised seven members with lived experience of TASA aged 18–30 years. Thirteen online LEAG meetings were held between June 2021 and July 2023 (ranging from 1 to 2.5 hours). Examples of how the LEAG shaped the research included: (1) advising the team on the recruitment strategy and troubleshooting recruitment challenges; (2) developing accessible formats for sharing study results with YP people (and identifying those at high risk and in most need), including the use of video summaries and short, animated information video's explaining more complex topics using inclusive language; (3) practical advice for encouraging diversity in research participation; (4) using a tree motif (and other personalisation features) to reflect the user journey and growth through the app; (5) reviewing and advising on the phrasing and language used across the different components of the app and in clinical case examples included in the app content; and (6) providing blog posts to support recruitment/study website. Further details of the impact made by the LEAG can be found in [Appendix 2, Table 5](#).

Further specific input and guidance was provided by the parents/professionals (PPAG) and a NSAC (see [Appendix 2, Figure 4](#)). For example, to increase TASA literacy among clinicians and raise awareness of TASA to improve study referrals, these groups recommended that clinical team presentations and recruitment materials included more specific explanations of what is meant by TASA, such as example scenarios and explicit definition of terms associated with TASA. Meetings were held quarterly over the life of the project for each group, online.

### **Discussion of patient and public involvement input**

Patient and public involvement has been an essential guiding force throughout the project. Lived experience members said they enjoyed being involved in all aspects of the project, felt their involvement was meaningful and impactful, and highlighted that their involvement in i-Minds meant they could help others who might be at risk or have been directly affected by TASA. No negative effects were identified by PPI members. Members of the research team reflected on how PPI involvement was particularly needed to address some of the recruitment challenges we encountered and in ensuring app content felt safe, relevant and meaningful. Lived experience members reminded the team about the value and importance of the work and provided the motivation and

drive to push through challenges the study team faced along the way.

### **Reflections and critical perspective**

Our seven LEAG members had varied perspectives about TASA. These views ranged from those with direct experience of TASA to those who work to safeguard online platforms and protect YP from online harms. However, lived experience membership was neither ethnically nor gender diverse (i.e. White British women). Although this reflects the demographics of our participants, we acknowledge that more sex, gender, ability and ethnic diversity could have been beneficial. A challenge was recruiting parents/carers to our advisory group (only one member); this was a limitation to our PPI group composition. A further challenge was retaining consistent membership across groups throughout the life of the project. One learning point for future work is to develop creative ways to communicate with members between planned group meetings to maintain engagement over the life of the project, and to produce a timeline of PPI involvement at critical stages of the project so that members can benefit from an 'involvement roadmap'. The involvement of the Marie Collins Foundation, a national flagship charity for supporting YP who have experienced TASA, was instrumental in raising awareness of the research, delivering training to clinicians, and facilitating and supporting PPI members with lived experience. Similar partnerships with key third-sector organisations are therefore likely to benefit future applied research into interventions for TASA.

### **Equality, diversity and inclusion**

While most YP who participated in the trial identified as women (69.8%) and from a White British background (95.3%), a notable percentage of participants identified as non-binary or third gender or preferred not to disclose their gender identity (16.3%), and 20.9% of the sample identified being a gender that did not match their sex assigned at birth. To investigate the relative homogeneity of our sample, we reviewed gender and ethnicity from census data for the two geographic recruitment areas. However, it became apparent that census data were not a useful comparator because these data are reported by adults of the house at the time who may not be best placed to accurately record the correct gender identity of children or young adults. NHS Business Intelligence data for NHS mental health services in Greater Manchester was subsequently reviewed to compare ethnicity data, as this directly related to the participant pool that the study recruited from in one site. Approximately 80% of

service users registered with CAMHS were White British, which also reflects the ethnicity composition of service user registered in CAMHS in Edinburgh, suggesting that the ethnicity of participants recruited into our trial were representative of the services we recruited from, though these data are clearly not representative of the broader population. Furthermore, while current prevalence rates for TASA indicate that women/girls are more at risk for TASA, some reports show that YP from ethnic minority groups and of different sexual orientations have greater risk of TASA.<sup>28</sup> Future studies may therefore benefit from the inclusion of innovative strategies and equality, diversity and inclusion (EDI)-specific workstreams to further engage YP from ethnic and sexual minority groups, to increase the potential broader representativeness and generalisability of the study findings and the potential value of digital interventions like i-Minds among a more diverse range of users.

It should be noted that this study recruited primarily from NHS CAMHS services. By definition, the i-Minds trial's sample therefore comprised YP that had been identified as requiring input from specialist NHS services due to significant mental health problems. We note that previous research has highlighted that black and minority ethnic people are less likely to be referred to specialist mental health support nationally, and this includes CAMHS provision, where YP from a range of minority backgrounds may be under-represented compared to actual population need. In future studies, the involvement of a more diverse sample of YP affected by TASA could be achieved by extending recruitment to social care and educational settings, rather than restricting study participation solely to NHS services, where under-representation of minority communities remains an endemic problem. Furthermore, previous research has found that NHS services do not have a clinical pathway for YP who have experienced TASA, or routine and/or standardise assessment practices to detect TASA among CAMHS service users.<sup>29</sup> This is consistent with informal feedback received from CAMHS teams involved in this research, which highlighted that many YP who had experienced various forms of TASA, including those from ethnically and culturally diverse communities that are under-represented in CAMHS, may be supported by social care services (e.g. complex safeguarding teams) rather than specialist mental health teams. A future trial may therefore achieve a more successful recruitment performance, both in terms of overall numbers and levels of diversity, if recruitment is extended to these settings.

Due to funding and time constraints, written and visual materials (study-facing materials; assessment measures; app content) were only available in English. We recognise

that this might have been a barrier to participation for different community groups. However, we ensured where possible images reflected the diversity of the YP community and conducted language checks with YP at both the upper and lower age limits of our age inclusion range to ensure content was relevant and applicable. Furthermore, we offered participants the choice of completing assessments both online (with the support of a researcher) and in-person. We noticed that the completion rate of measures where researcher support was given was higher; however, we recommend providing participants with choice in how they complete measures to ensure inclusivity.

We planned to conduct analyses in the feasibility clinical trial on specific subgroups of YP who took part in the study. However, given the homogeneity of the group recruited, this was not possible and is something that needs consideration in a future trial.

The research was underpinned by a Team Science approach. The team included a mix of clinically trained academics; research assistants; a service user researcher; software engineers; UX designer, an expert in participatory design methods; and stakeholder members. A Team Science approach was vital to ensure effective working between different team members who often had different skill sets. Senior members of our multidisciplinary team met regularly to reflect on and ensure a cohesive and supportive culture within the team. The chief investigator is a woman, and the gender of research team members was evenly split at all seniority levels. Most research team members were white; two members were from a minority ethnic background. All PPI members were White British women, which, while reflective of the sample population, does not reflect the wider population. Junior researchers were trained in all study procedures and received weekly supervision to ensure the protocol was delivered to the highest standard and continuing professional development (CPD) time to support their development and ongoing training and learning needs. Flexible working by junior researchers when this was requested was also considered.

## Impact and learning

### *What difference has already been made?*

The i-Minds trial is the first example of applied clinical research in TASA. As a result of recruiting both HCP who support YP with TASA and help-seeking YP from specialist services across Manchester and Edinburgh and a national e-therapy provider, we have raised significant awareness of the issue of online harms and TASA. When

we started presenting the study to clinical teams across recruitment sites, it became apparent that clinicians had limited awareness and understanding of TASA, a finding reflected objectively in a recent Freedom of Information request study members of the project team recently conducted.<sup>29</sup> We quickly implemented training, delivered in partnership with our PPI collaborator the Marie Collins Foundation, about differentiating the forms of TASA, prevalence and the differential impact of online harms compared to contact abuse. We delivered eight CPD sessions to clinical staff over the recruitment period, and 32 clinicians attended a webinar cohosted by the Marie Collins Foundation. Evaluation of this webinar showed that attendees reported feeling 'more confident' in recognising and asking YP about TASA because of attending the session. As evidence of real-world impact, one CAMHS service in Greater Manchester added a specific item to their initial assessment referral form on online harms and TASA specifically. Similarly, a CAMHS in Edinburgh added a question about interaction with the online world in their initial assessment form, as clinicians realised this was not explicitly considered on their intake assessment form. At the end of the feasibility clinical trial, clinicians who referred YP to the trial reported that their views about DHIs changed; while many were initially hesitant about the value of a DHI for this client group, YP themselves voicing the utility and relevance of the i-Minds app to their keyworker meant clinicians developed a greater understanding of the value of a DHI to support YP both in general and specifically who report distress associated with TASA.

### **What longer-term impact might there be?**

The principal longer-term impact of the present work rests on the viability of progressing to a larger-scale evaluation of the i-Minds intervention and linked worked to further raise awareness on TASA within the NHS and social care workforce and create an evidence-based TASA detection, monitoring and support pathways integrated within existing health and well-being services for YP.

Our findings showed that YP who have experienced TASA found the i-Minds DHI safe, acceptable and relevant to their difficulties. Further work is needed to fully evaluate the effectiveness of this specific form of support for YP affected by TASA and investigate how best to integrate DHIs for YP exposed to TASA into routine care pathways. Longer-term impact may be maximised by extending access to the i-Minds app to settings other than NHS CAMHS and ensure earlier access for YP before they may present with difficulties so severe to require tertiary-level mental health service support. The i-Minds app could be further developed to be available to affected YP in

primary settings such as schools, further education and social services. Clinicians reported that the i-Minds app could also be used as a psychoeducation resource to be used between, and outside of, therapy sessions and when YP might be on long waiting lists for therapy in secondary mental health services. The i-Minds app content, or parent/professional educational material informed by the i-Minds app content, could also provide an important resource for clinicians and parents to empower, educate and support them to have conversations with YP about their interactions online.

### **Lessons learnt for future research**

Clinicians expressed several concerns about this topic that should be considered in future research. Consideration must be given to how a study like i-Minds is positioned in both public, service and patient-facing materials and where research of this kind is best placed to be conducted (e.g. tertiary services vs. community services vs. peer working vs. education sector). Simply positioning a DHI like i-Minds in secondary or tertiary care CAMHS alone prevents supporting a potentially much wider population of vulnerable YP distressed by TASA experiences.

It was crucial to involve practitioners in developing the intervention and study procedures from the outset. Practitioners fed back that potentially disruptive interventions like i-Minds need to be developed together with, rather than being done to, clinicians, given the potential impact DHIs can have on clinician workloads and service systems. Including practitioners early in the research journey was also important for building trust and confidence in the research team, which was essential given the nature of the topic and concerns staff expressed about referring YP to the i-Minds trial. Giving clinicians access to the app from the outset, delivering regular awareness raising workshops on the broad topic of online harms as well as the specific elements/impact of TASA, and the applicability of digital approaches to support YP were essential in developing and maintaining referral links and timely feedback loops where risk issues were identified in the trial.

Noting the higher percentage of YP who identified as a gender different to their sex at birth, our YP sample was predominantly White British women. Now that we have demonstrated acceptability and safety of an intervention of this nature among YP accessing specialist clinical services, it is important that future studies take i-Minds out of specialist services and into the wider community to understand how TASA impacts the broader population and how an intervention like i-Minds works with a diverse sample. Men are less likely to report TASA but still have

needs associated with TASA experiences. Furthermore, complexity around disclosure, shame and stigma in minority groups requires careful consideration but should not be avoided. For example, clinicians might reframe from addressing certain 'taboo' topics such as sexual experiences when children and their family members are from particular minority groups. Research on how TASA disclosure may be negatively affected by cultural norms within specific ethnic, cultural and/or religious groups is, as yet, scarce. However, it is likely factors known to hinder disclosure and support seeking for childhood sexual abuse survivors from minority backgrounds more generally, such as shame for seeking extra-familial support,<sup>30</sup> are likely to play a role in TASA abuse also. Future research may therefore benefit from the inclusion of EDI-specific workstreams to address the potential additional challenges resulting from the intersection of sex, gender, sexual orientation, ethnicity and culture. Also, recruiting from more ethnically diverse areas of the country and partnering with mental health charities working with ethnic minority groups may help ensure a more diverse study sample is recruited.

Finally, the anonymous nature of the e-therapy provider that comprised one of our routes for referral represented a challenge in recruiting from this provider. Potential participants from this referral pathway reported loss of anonymity and privacy as a barrier to taking part in the feasibility clinical trial. Future research should be tailored to this platform from the outset and issues around anonymity require early consideration and thoughtful management.

### **Related work**

Practitioners expressed interest in the topic after we presented the study to clinical teams to establish referral pathways. While this did not always lead directly to referrals or successful recruitment to the study, it did raise awareness of the topic and practitioners' interest and curiosity in understanding how TASA might impact a YP's emotional and mental health. As a result, with our PPI partner the Marie Collins Foundation, we hosted a series of webinar and CPD sessions, which were well attended by frontline practitioners and service managers.

Awareness of the study both nationally and internationally resulted in invited talks from study members by conference organisers about how YP who have experienced TASA can be supported using mentalisation and digital-based approaches (see [Award publications](#) and [Additional outputs](#) for specific examples). Furthermore, over the course of the award, the research team has engaged in further research activities, not directly funded by the NIHR but aligned with the TASA-focus of this Health and Social Care Delivery Research project. These include research

outputs that we have already published in peer-reviewed journals: a Freedom of Information (FOI) study to map TASA assessment practices and policies across CAMHS and SARC services in England;<sup>29</sup> the first systematic review examining the mental health and social sequelae of specific forms of TSA in YP;<sup>31</sup> a qualitative study examining the longer-term mental health and well-being impacts of TASA among young adults who experience TASA as children,<sup>32</sup> and other pending reports that we hope will facilitate further future applied research on how to best address the support needs of TASA survivors.

### **What difference has been made already, including collaborations and future work?**

We developed an animation in the form of a video explaining mentalisation-based approaches that is freely available on YouTube (YouTube, LLC, San Bruno, CA, USA), and has been used by clinicians and trainers and was also embedded in the i-Minds app.

We impacted on existing services through two CAMHS services adding an item asking specifically about online harms and TASA on intake assessment forms, reflecting direct and immediate real-world impact our study had in raising awareness about online activities YP engage in and the potential harms it might bring.

We have also increased awareness in our study localities of TASA and the importance of understating how digital technology is used by YP through the CPD training we delivered and by expanding and joining up services with agencies such as the Marie Collins foundation and Stop it Now YP's services.

Through our stakeholder partnership working with big tech companies, we saw increased engagement in terms of how industry may use some of the findings from the i-Minds study and potentially some of its content to provide a resource for YP who have experienced distressing events on their platform.

We have contributed to a nascent evidence base by giving voice to YP's experience of TASA through our qualitative publications and by kickstarting the initial evidence base for a co-designed, theory-informed intervention to support vulnerable YP who have experienced online harms. Furthermore, by sharing our protocols and qualitative topic guides (and others study materials), our work and its dissemination has influenced the development in other countries such as Chile of parallel research with practitioners to explore knowledge about TASA and the role that DHIs may play in its management.

### **Dissemination to ensure the outcomes of the research are taken forward for implementation by key stakeholders, partners and target audiences/groups**

An extensive number of partners and stakeholders were involved in the development and delivery of this project. Our pre-planned dissemination strategy included various outlets to promote the findings of the work, including: developing a project-specific website, an engaging animation, promoting the study and the work on social media platforms, raising awareness at practitioner and public forums, and contributing to events, conferences and network meetings, hosting PPI engagement activities across the study sites leveraging our extensive stakeholder contacts, and where possible contributing to government and policy development.

A full list of conferences, meetings and other ways we have disseminated our work is summarised in [Award publications](#) and [Additional outputs](#). The study animation can be found here: [www.youtube.com/watch?v=RT9nV-P7Ea4](http://www.youtube.com/watch?v=RT9nV-P7Ea4). The project website can be found here: <https://sites.manchester.ac.uk/iminds/>. We discovered early in the feasibility clinical trial that HCP lacked nuanced understanding of TASA and the impact it has on YP, including the unique harms TASA can bring around permanence of the production of images and subsequent sequelae. Members of the team developed and delivered multiple CPD education sessions via webinars, some of which were co-facilitated with our PPI partner, to upskill and educate clinicians about TASA and its impact and harms for YP. We hope to continue to develop this training material and make it more broadly available to stakeholders for use in their practice and to ensure the issue of TASA is continually raised and routine inquiry about TASA-related experiences becomes part of routine assessment.

Aspects of the programme of work have already been disseminated via conference presentations largely given by co-applicant Quayle, who has been invited to speak about the topic at several national and international conferences, as well as Home Office and Scottish Government meetings and the Police Scotland Specialist Crime Division Online Child Sexual Abuse and Exploitation Group. As mentioned above, through sharing our protocols, qualitative topic guides and others study materials, our work has influenced further research on supporting YP who have experienced TASA in other countries such as Chile. We also plan to present findings from the programme of work at relevant conferences and meetings. Findings from the programme of work have been shared with local recruitment sites and stakeholder groups. Our published papers provide a rich analysis of the mixed-methods programme of work.

Commissioning an intervention such as i-Minds is premature, but, following future efficacy evaluations, our aspiration is to influence commissioners to establish clearer training and guidance around working with YP who experience TASA and to work towards commissioning evidence-based interventions such as i-Minds. However, we note that members of our team have also contributed to the 2023 Online Safety Bill and are part of the wider discussions with OfCom (Ofcom, London) about its implementation.

Our PPI partner, the Marie Collins Foundation, is the leading national charity provider in the field – they continue to draw on study materials and disseminate findings from the feasibility clinical trial and qualitative work with their vast stakeholder network and directly to victims of TASA that they support. There are also ongoing discussions via our link with tech giants such as Meta and TikTok to continue to explore how a DHI like i-Minds fits in wider social media platform offers and how the content may be promoted on their platforms.

### **Implications for decision-makers**

The i-Minds research project has shown that development of interventions, assessments and clinical pathways for YP who have experienced TASA should be a priority for decision-makers working in child and adolescent mental health.

Our qualitative interviews with HCP working with children and YP, as well as our interactions with clinical teams, revealed that training in the areas of TASA (e.g. differentiation of harms, language to support line of inquiry) and the increasingly online world of children and YP more generally is urgently needed. Clinicians working with children and YP also told us that clearer pathways and interagency working is needed. Therefore, decision-makers in child and adolescent services should consider developing or commissioning training for staff and interagency working in this area so that clinicians can feel confident in how to manage, and what will happen following, a disclosure of online sexual harm.

Our feasibility clinical trial has shown that the i-Minds DHI is feasible, safe and acceptable (e.g. the content was congruent with YP's experiences) to a vulnerable young group of people who have experienced TASA. Decision-makers should support the implementation of DHIs like i-Minds early in the pathway of care for YP while ensuring that tertiary-level services are available to support TASA sequelae that are more severe, thereby facilitating interagency working.

## Research recommendations

We identified the following questions for future research.

### *Further efficacy testing of digital health interventions for technology-assisted sexual abuse-exposed young people*

The principal research recommendation arising from our feasibility work is that a fully powered randomised controlled trial (RCT) of i-Minds (or similar DHIs for this target group) should be conducted to examine the efficacy of the i-Minds intervention. Based on our feasibility findings, core considerations for developing the design parameters of a future efficacy trial are summarised in [Table 2](#).

The future efficacy trial may also include a mechanistic evaluation (e.g. to evaluate whether the intervention exerts its therapeutic benefit via mechanistic variables purportedly targeted by this mentalisation-based intervention vs. more generic mechanisms of actions, such as normalisation of TASA-related distress) and EDI-specific workstreams to both promote trial involvement from a wider range of minoritised groups, and improve the generalisability of the trial findings to YP across multiple contexts and populations.

### *Development and evaluation of technology-assisted sexual abuse-focused training programmes for the technology-assisted sexual abuse workforce*

There is a clear need to raise awareness of online harms more broadly with clinicians working in clinical services. We

identified a clear training need around providing clinicians with a nuanced understanding of the different types of TASA and their psychosocial impact on YP (including how it is both similar to, and distinct from, offline harms). Clinicians would also benefit from support around the language to use when inquiring about online harms, and how to respond sensitively to disclosure of TASA in ways that are genuinely therapeutic for YP. Research could be conducted in collaboration with health education partners to develop state-of-the-art training materials on TASA (e.g. potentially coproduced with YP with lived experience of TASA and third-sector experts like the Marie Collins Foundation), evaluating impact of training on both staff knowledge and confidence and objective indicators of change in staff behaviours (e.g. number of YP accessing the service that have been actively asked questions about/ screened for TASA).

### *Assessment and measurement development*

Current psychometric approaches and measurement tools regarding trauma and its post-traumatic impact lack specific items that examine both the prevalence and impact of online harms, including TASA. There is a need to provide clinicians, services and researchers/ evaluators with validated tools and ways to measure the prevalence and impact of (differentiated) online harms in individual clinical settings as well as at a broader population level.

### *Implementation research*

Understanding the barriers and facilitators (and unintended consequences) of delivering DHIs in routine

**TABLE 2** Key considerations for the development of a future trial of the i-Minds intervention expressed in PICOS format

| PICOS                    | Trialists should consider...  |
|--------------------------|---|
| Participants and setting | ... expanding the participant pool beyond YP aged 12–18 supported by NHS CAMHS and SARC services, that is, including YP identified in social care and educational settings, to maximise successful recruitment performance and sample diversity   |
| Intervention             | ... delivering and evaluating the DHI over a 6-week intervention window as a minimum. Further development of the app functionality and content should be considered to maximise app engagement (e.g. further gamification and personalisation) and its fit with particular user groups we aim to reach (e.g. issues specific to minoritised groups)   |
| Comparator               | ... the lack of standard evidence-based intervention or treatment pathways for TASA and associated distress, precluding the viability of having a TASA-specific comparator treatment. Consideration should be also given to the likely highly heterogeneous forms of support that participants may access as part of 'routine care' in the absence of a standard treatment pathway  |
| Outcome                  | ... selecting primary outcomes that are specific to TASA and valued by the target group, and may be plausibly ameliorated by a digitally mediated intervention (e.g. TASA sequelae such as shame or post-traumatic symptoms brought about by TASA experiences)  |
| Study design             | ... utilising a RCT design to suitably control for bias, but also accounting for remaining uncertainties (e.g. the likely levels of participant retention in a control arm; participants' willingness to be randomised to different trial arms). A range of design solutions could be explored, for example, use of waiting-list control comparators or trial designs involving the experimentally staged introduction of the intervention to all participants (e.g. stepped wedge designs) |

clinical CAMHS services. Participant feedback clearly indicated that i-Minds would be perceived as more helpful if it was available at the point closer to exposure to harm, rather than towards the end of a help-seeking journey and within specialist service provision. Further implementation research may play a crucial role in ensuring the ability of successfully embedding DHIs for supporting TASA survivors as well as YP with an ongoing vulnerability for TASA victimisation and revictimisation within the broad health and social care system. Implementation work early in treatment delivery also helps researchers and services understand where a DHI like i-Minds best fits along the help-seeking pathway (e.g. alongside current trauma-informed models of care vs. outside clinical service setting, such as educational sector/social care setting/online spaces).

## Conclusions

A DHI underpinned by mentalisation principles is feasible, acceptable and safe to YP who have experienced TASA-related distress and is associated with promising signals of efficacy on valuable outcomes post treatment, including TASA-related post-traumatic symptoms, resilience, internalising symptoms and reflective functioning. User feedback indicated that participants generally had a positive experience using the app, positively impacting their knowledge/understanding of their own mental health and their motivation to address their mental health difficulties. A larger-scale evaluation appears warranted. Further service improvements are required for routine assessment and support for YP experiencing TASA. Several learnings from this programme of work will be taken forward into future research.

## Additional information

### CRedit contribution statement

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### Patient data statement

This work uses data provided by patients and collected by the NHS as part of their care and support. Using patient data is vital to improve health and care for everyone. There is huge potential to make better use of information from people's patient records, to understand more about disease, develop new treatments, monitor safety, and plan NHS services. Patient data should be kept safe and secure, to protect everyone's privacy, and it's important that there are safeguards to make sure that they are stored and used responsibly. Everyone should be able to find out about how patient data are used. #datasaveslives You can find out more about the background to this citation here: <https://understandingpatientdata.org.uk/data-citation>.

### Data-sharing statement

All data requests should be submitted to the corresponding author for consideration. Access to anonymised data may be granted following review.

### Ethics statement

The feasibility clinical trial was approved by the West of Scotland Research Ethics Committee 4 (21/WS/0160) on 16 November 2021. The workstream 1 qualitative study was approved by the West of Scotland Research Ethics Committee 4 (22/WS/0083) on 30 April 2021.

### Information governance statement

Greater Manchester Mental Health NHS Foundation Trust (GMMH; the sponsor of this research) is committed to handling all personal information in line with the UK Data Protection Act

(2018) and the General Data Protection Regulation (EU GDPR) 2016/679. Under the Data Protection legislation, GMMH is the Data Controller, and you can find out more about how we handle personal data, including how to exercise your individual rights and the contact details for our Data Protection Officer here: [www.gmmh.nhs.uk/privacy-notices/](http://www.gmmh.nhs.uk/privacy-notices/)

### Disclosure of interests

**Full disclosure of interests:** Completed ICMJE forms for all authors, including all related interests, are available in the toolkit on the NIHR Journals Library report publication page at <https://doi.org/10.3310/THAL8732>.

**Primary conflicts of interest:** Unrelated to this project, Sandra Bucci and Pauline Whelan are co-founders of CareLoop Health Ltd, a University of Manchester start-up to develop and market digital solutions for mental health problems, currently in schizophrenia and postnatal depression. Sandra Bucci reports an NIHR Research Professorship and is Chair of a NIHR-funded project Trial Steering Committee and NIHR-funded Data Monitoring and Ethics Committee and Wellcome Trust fellowship committee. Filippo Varese reports a NIHR Advanced Fellowship. Ethel Quayle has advisory roles for Police Scotland Prevent MA OCSAE, is a member of the Home Office TCSA stakeholder group, and Childlight Global Safety Child Institute. Prathiba Chitsabesan is National Clinical Director for Children and Young People's Mental Health, NHS England. Victoria Green sits on the Steering Board for Dragon S and Dragon S+ Projects with Swansea University, developing tools to prevent online grooming. John Norrie has membership on NIHR HTA and EME Boards and Committees. Pauline Whelan is a director of Prism Life Ltd, a small consultancy company, a representative on the NIHR MH Translational Research Collaboration, and codirects a research unit at Greater Manchester Mental Health NHS Foundation Trust.

### Department of Health and Social Care Disclaimer

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This synopsis was published based on current knowledge at the time and date of publication. NIHR is committed to being inclusive and will continually monitor best practice and guidance in relation to terminology and language to ensure that we remain relevant to our stakeholders.

### Study registration

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### Award publications

This synopsis provided an overview of the research award *i-Minds: A digital intervention to improve mental health and interpersonal resilience for young people who have experienced online sexual abuse - a non-randomised feasibility study with a mixed-methods design*. Other articles published as part of this thread are:

Quayle E, Schwannauer M, Varese F, Cartwright K, Hewins W, Chan C, *et al.* The experiences of practitioners working with young people exposed to online sexual abuse. *Front Psychiatry* 2023;14:089888. <https://doi.org/10.3389/fpsy.2023.1089888>

Quayle E, Schwannauer M, Varese F, Cartwright K, Hewins W, Chan C, *et al.* What are practitioners' views of how digital health interventions may play a role in online child sexual abuse service delivery? *Front Digit Health* 2024;6:1325385. <https://doi.org/10.3389/fdgth.2024.1325385>

Quayle E, Schwannauer M, Varese F, Allsopp K, Cartwright K, Chan C, *et al.* Implementation of a digital health intervention for young people exposed to Technology Assisted Sexual Abuse. *Child Abuse Negl* 2024;154:106883. <https://doi.org/10.1016/j.chiabu.2024.106883>

Quayle E, Larkin A, Schwannauer M, Varese F, Cartwright K, Chitsabesan P, *et al.* Experiences of a digital health intervention for young people exposed to technology assisted sexual abuse: a qualitative study. *BMC Psychiatry* 2024;24:237. <https://doi.org/10.1186/s12888-024-05605-6>

Bucci S, Zhang X, Dabrowska K, Larkin A, Quayle E, Schwannauer M, *et al.* User engagement in a digital health intervention designed for young people who have experienced technology-assisted sexual abuse (i-Minds trial). *Internet Interv* 2025;41:100858. <https://doi.org/10.1016/j.invent.2025.100858>

For more information about this research please view the award page (<https://fundingawards.nihr.ac.uk/award/NIHR131848>).

## Additional outputs

### Peer-reviewed publications

Bucci S, Varese F, Quayle E, Cartwright K, Machin M, Whelan P, *et al.* A digital intervention to improve mental health and interpersonal resilience in young people who have experienced technology-assisted sexual abuse: protocol for a nonrandomized feasibility clinical trial and nested qualitative study. *JMIR Res Protoc* 2023;12:e40539.

### Preprint

Bucci S, Varese F, Quayle E, Cartwright K, Larkin A, Cindy Chan, Chitsabesan P, *et al.* A digital intervention to improve mental health and interpersonal resilience in young people who have experienced Technology-Assisted Sexual Abuse: a feasibility clinical trial. *medRxiv* 2025.06.27.25330408. <https://doi.org/10.1101/2025.06.27.25330408>

### Conference presentations

- *St Mary's Sexual Assault Referral Centre Annual Conference*. Protecting children in the digital age. Manchester, April 2023.
  - Title of talk: *i-Minds: digital intervention for young people who have experienced online sexual abuse*.
- *International Child Protection Conference*. University of Valparaiso, Chile. January 2023.
  - Title of talk: *Responding to technology-facilitated child sexual abuse: a victim focus*.
- *European Sexual Medicine Network Conference*. Ljubljana, March 2023.
  - *Practitioners' understanding of technology-assisted child sexual abuse*.
- *European Forensic Science Conference*. University of Mainz, September 2023.
  - Title of talk: *Technology-facilitated sexual crimes against children: offenders, victims and environment*.
- *Marie Collins Foundation Annual Conference*. From discovery to recovery. London, October 2022.
  - Title of talk: *i-Minds: digital intervention for young people who have experienced online sexual abuse*.

- *International Child Protection Conference*. University of Val Paraiso, Chile, January 2022.

- *Title of talk: Online sex offending and risk of harm: a global perspective*.

- *St Mary's Sexual Assault Referral Centre Annual Conference*. Manchester, May 2022.

- *Responding to technology-facilitated child sexual abuse: a victim focus*.

- *Sexuality Conference*, University of Porto, 21 September 2022:200 (in-person).

- *Title of talk: Self-Produced Sexual Images by Children: Sexting, Coercion and Children's Rights*.

- *European Sexual Medicine Network Conference* (symposium). Salzburg, October 2021.

- *Title of talk: A victim response to TASA*.

- *Kempe International Virtual Conference: A Call to Action to Change Child Welfare*, October 2023.

- *Title of talk: Technology-facilitated sexual crimes against children: the challenges of self-produced images*.

- *University of Sheffield Child Protection Conference: October 2022*.

- *Title of talk: Technology-enabled child sexual abuse*.

## Continuing professional development sessions

Marie Collins Foundation Webinar: Technology assisted abuse – recognising it and talking about it with children and young people. 16 September 2022 and 28 February 2023.

Technology Facilitated Sexual Abuse – CPD sessions delivered by i-Minds research team:

- Bolton Child and Adolescent Mental Health Team, Manchester, 6 July 2022.

- Sexual Assault Referral Centre, Manchester, 10 August 2022.

- Pennine Care NHS Foundation Trust, Manchester, 10 August 2022.

- Kooth e-therapy provider (Online), 11 January 2023.

- Central Manchester Child and Adolescent Mental Health Team, Manchester, 12 January 2023.

- Pennine Care NHS Foundation Trust Child and Adolescent Mental Health Teams, Manchester, 21 February 2023.

## i-Minds website

<https://sites.manchester.ac.uk/iminds/>

## i-Minds animation (YouTube)

[www.youtube.com/watch?v=RT9nV-P7Ea4](https://www.youtube.com/watch?v=RT9nV-P7Ea4)

## About this synopsis

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## List of abbreviations

|        |   |
|--------|---|
| CAMHS  | Child and Adolescent Mental Health Services               |
| CPD    | continuing professional development                       |
| DHI    | digital health intervention                               |
| EDI    | equality, diversity and inclusion                         |
| HCP    | healthcare professional                                   |
| ISRCTN | International Standard Randomised Controlled Trial Number |
| LEAG   | lived experience advisory group                           |
| NIHR   | National Institute for Health and Care Research           |

|      |   |
|------|---|
| NSAC | National Stakeholder Advisory Committee |
| PPAG | Parents and Professional Advisory Group |
| PPI  | patient and public involvement          |
| RCT  | randomised controlled trial             |
| TASA | technology-assisted sexual abuse        |
| YP   | young people                            |

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## Appendix 1 Additional information about the i-Minds intervention

### i-Minds app content and structure

i-Minds is a multimedia, interactive app consisting of a core mentalisation module and three further modules, and 13 submodules, available over 6 weeks. The platform is designed to support help-seeking YP-OSA (i.e. those already under the care of services or an e-therapy provider) better mentalise in the online environment. The app is intended to be used as a stand-alone platform (i.e. unsupported by a clinician/family member/trusted other). In addition to module content, participants can access a repository of multimedia material designed to support learning and promote engagement, including: videos embedded throughout the platform (e.g. [www.youtube.com/watch?v=RT9nV-P7Ea4](https://www.youtube.com/watch?v=RT9nV-P7Ea4); see Bucci et al., paper 4; <https://sites.manchester.ac.uk/iminds/>), audio exercises, a diary function; links to podcasts, blog posts, other useful links; real-life stories of recovery; emergency and safeguarding contacts; relaxing/breathing/mindfulness exercises (in both audio and video format), infographics on online safety, soothing images, inspiring quotes, to name a few.

The content included in the i-Minds app aims to

- introduce the concept of mentalisation and relate it to scenarios that YP found distressing

- encourage emotional and cognitive literacy in interpersonal interactions
- encourage reflection on interpersonal relationship patterns and their development
- explore how these concepts affect emotional expression, behaviour and mental health
- target 'hyper-mentalising' (a common tendency in adolescence to overattribute or make assumptions about others beyond the observable information that may justify these).

Participants are required to work through the mentalisation module, which is core to the theoretical orientation of the intervention, before they can access the other three modules. This module includes a 'What is mentalizing' animation. Hereafter, all modules and features are available. There are no limits to how often or when a participant can use the app (i.e. no restrictions) during the 6-week intervention window. That is, we do not limit how people interact with the platform, and interaction is not conditional on a participant's response to screening items.

Following PPI feedback, the i-Minds app is built around a tree metaphor. Modules are represented through branches of a tree, and submodules are represented by smaller tree branches. As a user works through a submodule, a leaf is added to the tree and begins to flourish as a user works through the content (the branches are bare to start with). The aim is to have a flourishing tree by the end of the 6 weeks. We include a 'progress ring' around each module/

submodule, which indicates to the user how far they have progressed through each one.

After app configuration, participants are taken to a 'Welcome' page, which includes a video introducing them to the i-Minds app and tips on how they might use the app. The i-Minds modules are represented as circles with their associated module name. Tapping on a topic area opens an introduction screen. Users click through a series of screens to work through content. The flow of each module follows this broad pattern:

1. text explaining the concept with scrolling functionality
2. video explaining the text – either link to external video or recorded video from the team further explaining the concept
3. example (interactive) of the concept we are illustrating (e.g. watching a video, following a text message exchange between a perpetrator/victim)
4. text to further extend concept
5. video (either recorded by the team or external link) to extend the concept further

6. 'Try it out' exercise, inviting the young person to reflect on the content and apply it to their own experience.

## Guiding principles

Our guiding principles when developing the app and its content were as follows:

- Modules and content need to be able to stand alone, be self-explanatory, accessible enough for a young person to complete on their own, and content does not raise more questions than answers.
- Comfort and engaging space to learn and to express self.
- Pose questions and challenges and think about own experiences.
- Create scenarios that YP identify with to provide to explore their own feelings in relation to scenarios.

**TABLE 3** Content of i-Minds app modules

| Module                                       | Sub-module                      | Description   |
|--|---------------------------------|---|
| <b>Module 1: Tech, relationships and me</b>  |                                 |   |
|  | Your rights                     | <ul style="list-style-type: none"> <li>• Explanation of your right to relationships, privacy and safety</li> <li>• Link to videos</li> <li>• Quiz checking out key concepts</li> <li>• Explanation of digital rights</li> <li>• Links to videos on digital rights</li> </ul>  |
|  | Sexual experiences going wrong? | <ul style="list-style-type: none"> <li>• Explanation of how sexual experiences online can go wrong</li> <li>• Link to National Society for the Prevention of Cruelty to Children (NSPCC) video</li> <li>• Effects of these experiences</li> <li>• Link to video about mental health</li> </ul>  |
|  | Online relationships            | <ul style="list-style-type: none"> <li>• Link to video of YP talking about the relationship challenges they face online</li> </ul>  |
|  | Being with others can be risky  | <ul style="list-style-type: none"> <li>• Explanation normalising need for relationships and connection</li> <li>• Link to video about sharing nude images</li> <li>• Exercise inviting users to think about how a person is thinking and feeling during a vignette</li> <li>• Suggested scripts for saying no to sharing images</li> <li>• Link to video from Childnet</li> </ul> |
|  | Me, others and social media     | <ul style="list-style-type: none"> <li>• Explanation of the impact of comparing self to others on social media</li> <li>• Link to video by Dove</li> <li>• Link to video by Childnet on male perspectives</li> <li>• Exercise encouraging mentalisation</li> <li>• Video about online relationships</li> </ul>  |
| <b>Module 2: Emotional and mental health</b> |                                 |   |
|  | My feelings and me              | <ul style="list-style-type: none"> <li>• Information on emotions</li> <li>• Video about feelings</li> <li>• Exercise encouraging mentalisation around feelings/emotions</li> <li>• Video about recognising others feelings</li> </ul>   |

continued

TABLE 3 Content of i-Minds app modules (continued)

| Module  | Sub-module                                     | Description  |
|---|--|--|
|   | Feeling anxious or worried                     | <ul style="list-style-type: none"> <li>Information about anxiety</li> <li>Video about anxiety</li> <li>Exercise introducing feelings thermometer</li> <li>Exercise encouraging reflection on body sensations, thoughts, and feelings</li> <li>Video on what to do to help anxiety</li> </ul>   |
|   | Self-harm and self-destructive behaviour       | <ul style="list-style-type: none"> <li>Information on self-harm and overwhelming feelings</li> <li>Video explaining self-harm urges</li> <li>Exercise encouraging mentalisation through a vignette</li> <li>Video from <i>The Great Gatsby</i> showing overwhelming feelings with invited reflection</li> </ul>  |
|   | Positive relationships and trusting others     | <ul style="list-style-type: none"> <li>Information on healthy and unhealthy relationships</li> <li>Video link to the film <i>Inside Out</i></li> <li>Information on patterns of relating</li> <li>Video illustrating relationship patterns</li> <li>Exercise encouraging mentalisation through perspective taking</li> <li>Video showing development of grooming relationships online</li> </ul> |
|   | Developing resilience                          | <ul style="list-style-type: none"> <li>Normalisation of experiences of stress</li> <li>Video about effects of stress</li> <li>Exercise encouraging mentalisation through perspective taking</li> <li>Video on link between strong feelings and how we act</li> </ul>   |
| <b>Module 3: Dealing with the past (trauma)</b> |  |  |
|   | Triggers                                       | <ul style="list-style-type: none"> <li>Education about triggers</li> <li>Video explaining triggers</li> <li>Exercise encouraging mentalisation through perspective taking</li> <li>Quiz checking out key concepts</li> <li>Video about how to cope with triggers</li> </ul>  |
|   | Understanding and working with guilt and shame | <ul style="list-style-type: none"> <li>Information and normalisation of trauma responses</li> <li>Video explaining why we might feel guilt and shame</li> <li>Exercise encouraging mentalisation through perspective taking</li> <li>Video about neurobiology</li> </ul>   |
|   | Avoidance                                      | <ul style="list-style-type: none"> <li>Explanation on how avoidance develops</li> <li>Video about avoidance</li> <li>Exercise developing a fear ladder for a vignette</li> <li>Video about reducing avoidance</li> </ul>   |

TABLE 4 Content of i-Minds multimedia resource area

| App area      | Description   | Example   |
|---------------|---|---|
| Video library | A collection of the videos from the app module areas  | <a href="http://www.youtube.com/watch?v=pZwvrxVavnQ">www.youtube.com/watch?v=pZwvrxVavnQ</a> (accessed 26 January 2025).  |
| Be inspired   | A selection of inspirational quotes, selected by LEAG members   | <i>Promise me you'll always remember – you're braver than you believe, and stronger than you seem, and smarter than you think.</i> Christopher Robin from Winnie the Pooh   |
| Do something  | Get active  | <i>Walk the dog</i>   |
|               | Taking time out   | <i>Think of things that make you feel relaxed. Maybe your favourite film, colour, place, animal, person, season, music</i>  |
|               | Connecting with others  | <i>Talk to someone you trust and feel safe around</i>   |
| Soothe me     | Relaxation, mindfulness, breathing practice, grounding exercises, soothing images, selection of soothing activities | <i>Make a self-soothe box:</i> <a href="http://www.youngminds.org.uk/young-person/blog/how-to-make-a-self-soothe-box/">www.youngminds.org.uk/young-person/blog/how-to-make-a-self-soothe-box/</a> (accessed 26 January 2025).   |
| Useful links  | Links to relevant external organisations and charities  | <i>Marie Collins Foundation supports children and young people who have experienced technology-facilitated (online) sexual abuse. They support young people to live safe and fulfilling lives, free from fear and positive about their future,</i> <a href="http://www.mariecollinsfoundation.org.uk/">www.mariecollinsfoundation.org.uk/</a> (accessed 26 January 2025). |

TABLE 4 Content of i-Minds multimedia resource area (continued)

| App area                             | Description  | Example   |
|--------------------------------------|--|---|
| Diary to record thoughts or feelings | Diary entries consist of an emoji to indicate feeling from very unhappy to very happy and a text entry of a maximum of 200 words |   |
| Help area                            | Emergency contacts/helplines   | ChildLine online or call them on 0800 1111. If you are worried about online sexual abuse or the way someone has been communicating with you online, you can contact them online, or on the phone, anytime |
| Trusted others                       | Add a list of people they can reach out to if they feel upset  |   |

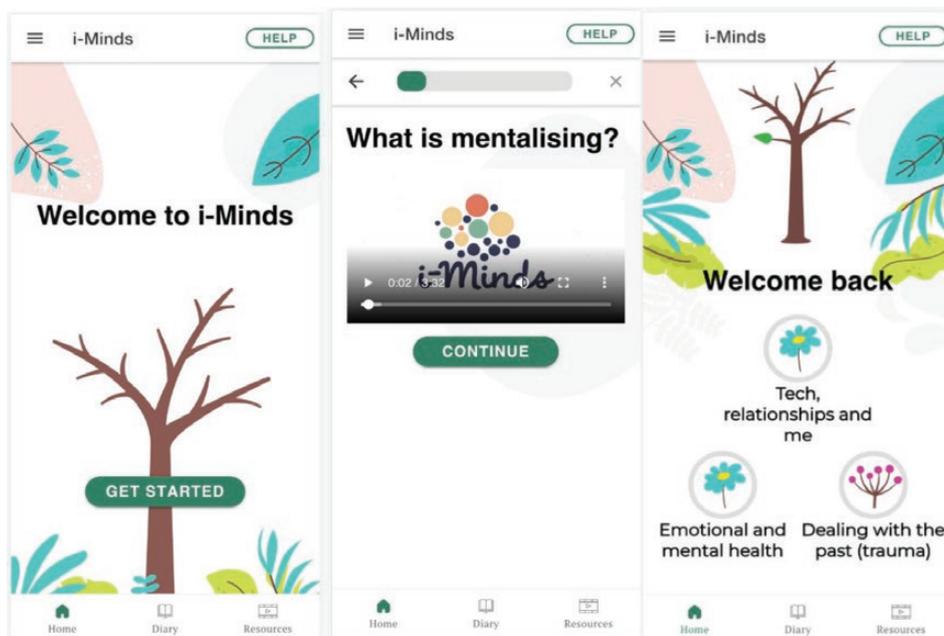


FIGURE 2 Screenshots of the i-Minds app.

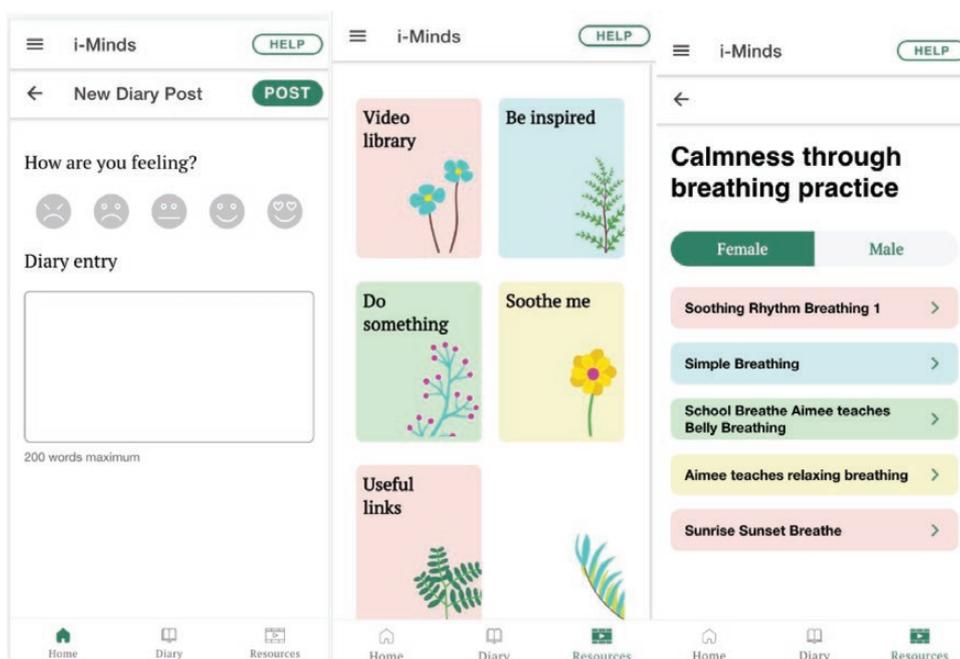


FIGURE 3 Screenshots of the i-Minds app.

## Appendix 2 Patient and public involvement and engagement

| Lived experience advisory group (LEAG)  | Parents and Professional Advisory Group (PPAG)  | National Stakeholders Advisory Committee (NSAC)  |
|---|---|--|
| <ul style="list-style-type: none"> <li>Comprised 7 women aged 18–30 who had personal experience of TASA.</li> <li>13 online meetings held between June 2021 and July 2023; 9 of these meetings focused on the co-design of the intervention.</li> <li>Meetings ranged from 1 to 2.5 hours in duration.</li> </ul> | <ul style="list-style-type: none"> <li>Comprised approx. 6 professionals from the NHS and third sector   voluntary services with direct experience of working with YP who have experienced TASA and 1 parent.</li> <li>Meetings held quarterly throughout the life of the project.</li> </ul> | <ul style="list-style-type: none"> <li>Comprised approx. 8 representatives from voluntary/third sector services, law enforcement/ child protective services, social media providers and academics.</li> <li>Meetings held quarterly throughout the life of the project.</li> </ul> |

**FIGURE 4** Description of the PPI groups in the i-Minds project.

**TABLE 5** Further information about how the LEAG contributed to app development

| Area of the app                          | Examples of input from the LEAG   |
|--|---|
| App content and structure                | <p>The LEAG selected the botanical theme of the app and tree structure for moving through the app</p> <p>The LEAG suggested that the tree begin bare and grow leaves as the young person moves through the app, symbolising hope and growth</p>   |
| Introduction and home screen             | <p>The LEAG suggested to add videos to the app to explain key concepts, and make the content more engaging, easier to understand, and more inclusive for different learning styles and needs</p> <p>The LEAG also helped develop the explanation of ‘mentalising’</p>   |
| Resources and help area                  | <p>The LEAG felt it was important to include personal stories of recovery to show YP that: (i) they are not alone, and that other people have had these experiences (normalising information); and (ii) life does go on after these experiences and offer hope that things can get better</p> <p>The LEAG group suggested including inspiring quotes, as they had found these helpful and motivating in difficult times. LEAG members submitted quotes they found helpful and inspiring at low moments, which were included in the app</p> <p>The LEAG suggested including coping strategy suggestions/activities people could engage in during times of distress; they reflected on the challenge of thinking of strategies that may help during dark moments and having these easily available in the app would be a welcome addition</p> <p>The LEAG supported the idea to include a soothing images section (e.g. animal images, soothing landscape scenes) to the app to help ground YP manage when they feel distressed</p> |
| Useful links                             | <p>The LEAG supported the idea of including an area in the app where they could easily link to external sites for support in various ways, as sometimes it can be hard to find practical advice about how to manage in difficult situations. For example, how to report unwanted sexual experiences to the police, how sexual content can be removed online, what to expect from court proceedings, help lines and so forth</p>   |
| Help area (emergency and crisis numbers) | <p>The LEAG felt it was important to safeguard YP who were using the i-Minds app. They felt that, as we are not monitoring the content the young person engaged with in the app (e.g. the diary function), linking to support if a young person was in crisis or felt the need to talk to someone was important</p>   |

**TABLE 5** Further information about how the LEAG contributed to app development (*continued*)

| Area of the app                             | Examples of input from the LEAG  |
|---|--|
| Other app functions the LEAG contributed to | <p>Add a help button on every page of the app for quick access to the help section of the app. This would remind YP that if they do feel distressed, they are able to stop at any point and directly link to support</p> <p>Include the diary function in the app so that participants have a private space where they can express themselves. The LEAG felt it was important for YP to be able to track their mood while using the app</p> <p>Include a progress bar as a participant worked through the app so that participants can see how far they are through a section of the app to decide if they want a break or continue</p> <p>The LEAG reviewed the wording, language and content of all app modules and resource areas to ensure language and content did not give a victim-blaming or shaming message or include content that was confusing or inaccessible</p> |