

CoDesign of a digital intervention for parents with bipolar disorder informed by integrated knowledge translation principles

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Abstract

Objectives: To provide detailed information on the codesign of a digital intervention to support parents with bipolar disorder (BD) who have young children. Each step of this process is reported, as well as a detailed description of the final version of the intervention in line with the TIDieR framework.

Methods: Clinical experience and lived experience experts participated in online workshops, meetings, and remote feedback requests, informed by Integrated Knowledge Translation (IKT) principles. The IKT research group responded to each phase of recommendations from the knowledge users.

Results: Five clinical experience experts and six lived experience experts engaged with the codesign process. Their recommendations for principles, content, look, and feel, and functionality of the digital intervention were structured over five iterative phases. This led to a final implemented design that was identified by the clinical and lived experience experts (referred to together as the knowledge users group) as genuinely reflecting their input.

Conclusions: The IKT principles offer an accessible structure for engaging with clinical and lived experience experts throughout a codesign process, in this case for a digital intervention for parents with BD. The resulting intervention is described in detail for transparency to aid further evaluation and development and to help other teams planning codesign approaches to intervention development.

KEYWORDS

bipolar disorder, codesign, digital intervention, parenting

1 | INTRODUCTION

1.1 | Background on bipolar disorder (BD) and parenting

A fundamental challenge for individuals living with BD is coping with instability of mood, activity, and social rhythms.¹ Many individuals with BD are parents. Parents with BD report difficulties in providing consistent parenting often linked to their experiences of fluctuating mood.^{2,3} They also indicate a strong desire for additional support in parenting and to be the best parents they can for their children.⁴ However, despite this, many have high rates of parenting stress and low levels of parenting competence and confidence.^{3,5} In addition many parents with BD have experienced divorce and are in blended families which can in some cases amplify these challenges despite strong desire to cope well as a parent.^{6,7} Linked to these difficulties, children of parents with BD have elevated rates of anxiety and depression.^{8,9}

There is a clear need for effective support, with the potential to benefit both parents and children. A key intervention recommended for families is Family Focused Therapy (FFT).¹⁰ This adopts a behavioural family management approach with three main elements, namely, psychoeducation about BD, communication enhancement training and problem solving skills training. FFT has been shown to be effective in improving relapse rates and time to relapse in individuals with BD and symptomatic individuals at risk for BD.^{10,11} It does not however specifically target the needs of parents with BD. Ideally such an intervention would target parents of young children before child difficulties have crystallised and the development of formal precursors to BD itself.^{8,9} Parenting programmes, in general, reduce child behaviour problems, including ADHD, conduct disorder and antisocial behaviour¹² and symptoms of emotional problems (i.e. anxiety and depression).^{13,14} They typically foster adaptive parenting through information and support based on social learning and cognitive behavioural principles.¹⁵ A systematic review¹⁶ of online parenting interventions for addressing emotional problems indicates benefits for parental depression anxiety and distress—as well as improvements in child and adolescent emotional problems with more benefit for longer interventions. A WHO review of digital and in person parenting interventions reported positive outcomes in general but also specific negative effects with respect to experiences of intrusion and loss of privacy and independence for some parents mandated to attend.¹⁷ Qualitative work in the development of IBPI highlighted the importance of providing realistic coping models of parenting for parents with BD who can easily feel stigmatised by role models who appear to be different from them.⁵

Parents with BD therefore need interventions tailored to their specific concerns^{18,19} and typically do not access generic parenting support due to stigma and fear of losing child custody.²⁰ Despite this, parents with BD want tailored parenting self-management interventions, especially flexible digital support which can be accessed confidentially whenever and wherever they wish.⁴ For parents with

BD, such a programme would need to support them with living with BD as well as providing parenting support linked to the specific challenges, they and their children experience.^{21,22} There have, to date, been no definitive trials of digital support for parenting in BD. This is a significant omission given the potential for such an approach to improve outcomes in both parent and child with the possibility of also mitigating future risk for the child in line with developing preventative approaches.²³

1.2 | Background on what is being upgraded and integrated knowledge translation approach

This paper reports on the co-development of a tailored online intervention for parents with BD living with children aged between 4 and 10 years for evaluation in a UK national definitive clinical and cost effectiveness trial (NIHR 131483—Health Technology Assessment grant). The Integrated Bipolar Parenting Intervention (IBPI) is a standalone online self-management intervention to support parents with BD to improve the behavioural and emotional wellbeing of their children. IBPI targets young children who have parents with BD but does not select on specific mood diagnoses of children in this group in contrast to FFT. The aim is to improve emotional and behavioural wellbeing in these children and in parallel to help parents with BD to improve their parenting confidence and competence and potentially improve their own mood outcomes. As such FFT and IBPI represent complementary interventions with different priorities focusing on different stages in the developmental pathway for BD.

In the first study of IBPI, parents with BD were provided with a 10-week self-directed written Triple P course on managing child behaviour²⁴ as well as web-based information in written video and audio format that provided additional support as parents as worked through the self-help workbook.²⁵ In addition, a BD specific tip sheet, developed for the study, provided parents with guidance on how parents might detect and cope with ups and downs of their own mood. Although this small RCT ($N=39$) indicated improvements in child behaviour problems and reduction of problematic parenting at 10 weeks there was no follow-up period and feedback was that the intervention lacked interactivity and was too limited on BD relevant information.²¹ The next version of IBPI included eight digital modules offering self-management support for parents with BD with BD specific information and strategies. These were developed with PPI input. This was provided along with an eight module Triple P online intervention delivering general parenting information. Both elements provided information and opportunities for reflection through interactive and multimedia features, including video clips, collaborative exercises and self-evaluation. The study was designed to evaluate the feasibility and acceptability of this type of fully online intervention and possible signals of effect. An RCT of $n=97$ parents demonstrated feasibility, acceptability and safety.⁵ There were also signals of benefits in child emotional and behavioural wellbeing, parenting confidence, parenting stress, and parenting skills. However, web use data indicated relatively low levels of uptake and

particularly low levels for the linked parenting modules. Qualitative feedback and PPI work indicated the need to address a range of issues for a version of IBPI to be investigated in the ongoing definitive clinical trial. In particular, the current collaborative work was required to address issues raised in qualitative interviews with participants after this study to ensure full integration of information on parenting and living well with BD, more comprehensive coverage of key parent concerns and updating the look and functionality of the intervention so that it can be accessed through PC and mobile devices. In integrating the parenting and BD aspects of the intervention it was necessary to ensure that all examples were BD specific as in the early version the yoked parenting guidance had parenting examples that were more general. Although these were presented in a constructive and non-judgemental tone the participants saw them as a negative and potentially stigmatising feature of the earlier version.

A crucial element of developing an effective, acceptable, and accessible intervention is ensuring such development is conducted in partnership with experts by experience.²⁶ The principle of partnership between consumers and practitioners of research is advocated by national policy in the UK and internationally.²⁷ A number of recent studies have reported benefits from involvement of consumers in online and in person intervention development in BD including a greater sense that such interventions were designed specifically for people with BD and targeted towards their priorities.^{28–32} There is also increasing interest in finding ways to characterise the impact of such collaboration. The GRIPP2 framework³³ has highlighted the importance of systematic reporting in this area but does not directly address systematic approaches to how best to conduct such collaborative work. In addition, it is important to recognise that the stakeholders in online interventions for BD are not just the service users about also those who might be responsible for wider carer delivery. The Integrated Knowledge Transfer (IKT) approach offers potential benefits with respect to both of these issues. It refers to an approach in which researchers and consumers/stakeholders in health care work together for their mutual benefit to support innovations in health care including new and more effective interventions.^{34–36} The intention of the IKT approach is to generate practical and useful outputs that are tailored to the needs of individuals with the relevant condition and likely to have real world impact. The complexity of interventions in health and mental health mean they particularly need to be developed through structured engagement of individuals with a range of skills and experience to produce relevant effective and acceptable innovations in care. This is reflected in evidence for improved clinical outcomes in health and mental health where IKT approaches have been used.^{37,38}

As noted above, the challenges of parents with BD are complex and any successful intervention needs to be multifaceted making intervention development with an IKT approach particularly appropriate here. The upgrade of the IBPI intervention is also intended to be consistent with MRC complex intervention guidance³⁹ and the Treatment Template for Intervention Description and Replication (TIDieR).⁴⁰

This paper reports on the codesign of IBPI in collaboration between clinicians, service users, IT experts, and researchers to create an intervention that is tailored, acceptable and implementation ready on completion of the subsequent trial. The detail of this crucial aspect of intervention development and evaluation is a key addition to study protocol papers and trial outcome papers. We will first describe the steps taken to update and codevelop the intervention. We will then describe the intervention in detail in line with TIDieR criteria. It is hoped that this will be of interest to other research teams developing and evaluating digital interventions in mental health. The IBPI trial currently evaluating this intervention is comparing the clinical and cost effectiveness of IBPI plus treatment as usual (TAU) with TAU plus a resource information website for parents with BD of an index child aged 4–10 on child emotional and behavioural outcomes at 24 weeks follow-up as primary outcome. The secondary outcomes are parenting, mood and family functioning at 24 and 48 weeks follow-up and child emotional and behavioural outcomes at 48 weeks follow-up.

2 | MATERIALS AND METHODS

2.1 | Study design

Pragmatic iterative IKT informed design to co-create an IBPI as part of a randomised controlled clinical and cost effectiveness trial. Engagement of the knowledge users group was by a mixture of online workshop discussion, meetings, and remote feedback by email. The refresh of IBPI took place between April and October 2022. Based on lived experience expert feedback, we did not record sessions verbatim, but extensive notes were taken, and meetings had at least two core research team members to cover facilitation and note taking. The key phases of the research are illustrated in Figure 1.

2.2 | Participants and recruitment

Two groups (Knowledge Users Group and IKT Research Group) participated in the codesign of IBPI.

The Knowledge Users Group consisted of clinical and lived experience experts. Clinical experts were recruited through the NHS and universities. Lived experience experts were recruited through multiple routes: Spectrum Connect, a database of people interested in the research conducted by The Spectrum Centre at Lancaster University; Bipolar UK; and Lancashire & South Cumbria NHS Foundation Trust.

The IKT Research Group consisted of IT experts (IT Partnering and Innovation team; ITPI) and researchers. Both groups and their responsibilities are summarised in Table 1.

Support was offered to the Knowledge Users Group in multiple ways to ensure they were able to provide valuable contributions to the study. All members of both groups were given a thorough introduction into what their involvement would entail, how often

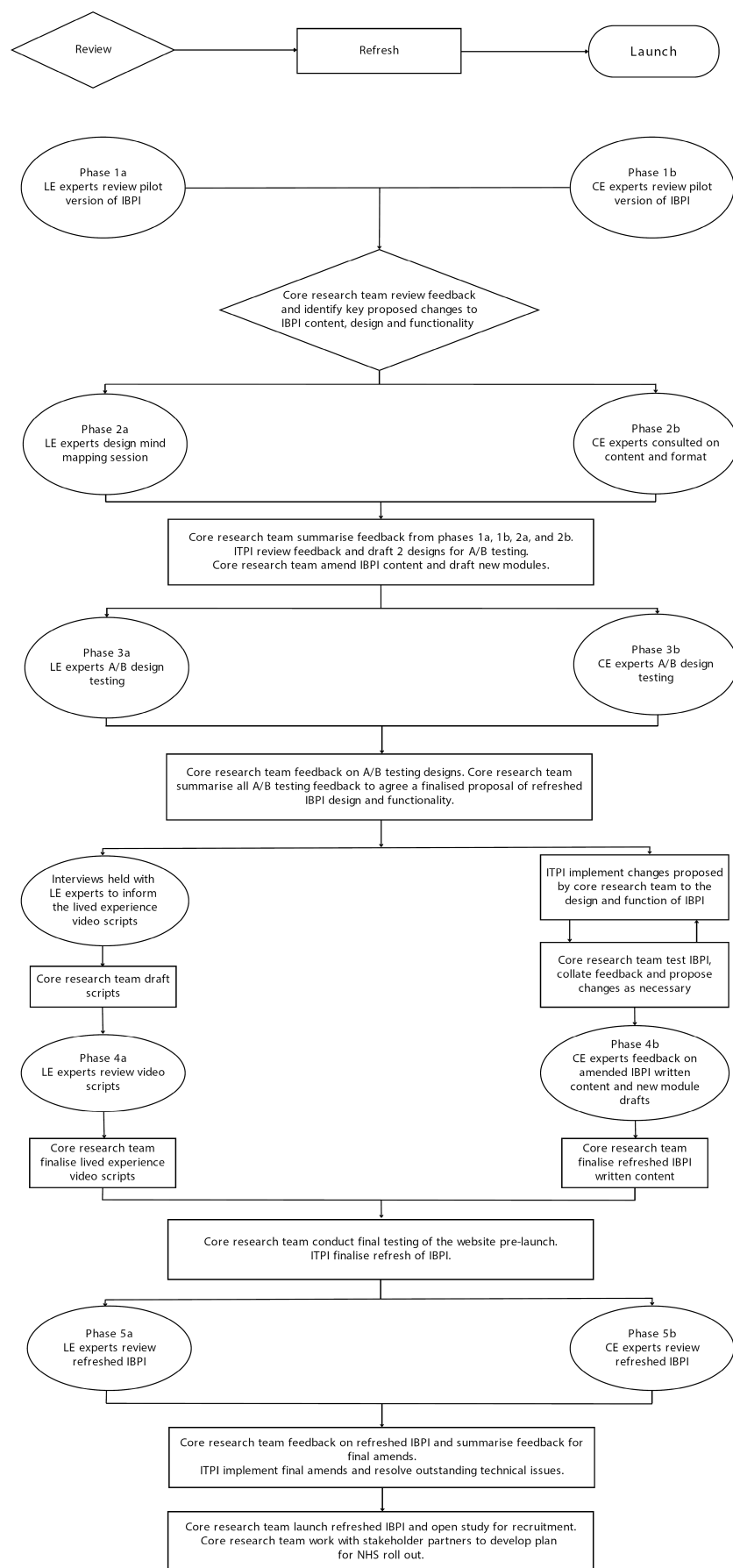


FIGURE 1 IBPI Review and Refresh Flowchart. CE, Clinical experience, ITPI, IT partnering and innovation team, IBPI, integrated bipolar parenting intervention, LE, Lived experience.

TABLE 1 Summary of codesign groups, members and roles.

Members	Responsibilities
Knowledge Users Group	
Lived experience experts	Engage with online workshop discussions, meetings, and remote feedback surveys to provide recommendations on the refresh of IBPI
Six people with lived experience of bipolar and parenting	
Clinical experience experts	
Five clinical experts in bipolar and parenting	
IKT Research Group	
Lancaster University IT Partnering and Innovation team (ITPI)	Create design options and iterations of the IBPI intervention
Two IT experts (BG, AW)	
Core research team	Set up and facilitate the IKT process in order to action the recommendations of the knowledge users group in partnership with ITPI
Four researchers (SJ, LC, SF, CL)	

meetings would occur, payment, and who to speak with if any issues arose. All the lived experience expert meetings were facilitated by both a research expert and a researcher with lived experience to ensure all members were fully supported. All users were also provided with contact details of the trial team who could offer support in between meetings if required.

2.3 | Intervention

2.3.1 | IBPI

IBPI is a standalone online self-management intervention to support parents with BD to improve the behavioural and emotional wellbeing of their children. Earlier versions of IBPI have been created in partnership with lived experience experts and tested in a proof of principle study²¹ and a previous feasibility RCT.⁵ The programme theory for IBPI is based on an integration of:

1. The mid-range theories used to inform the initial IBPI development, including cognitive social learning theory^{41,42} and cognitive behavioural theory.⁴³
2. Qualitative feedback from participants in our pilot study⁵ about what changed for them. Both of which have informed adaptations for the definitive trial.

Our programme theory proposes that IBPI improves outcomes via three key mechanisms providing:

1. A normalising explanation of BD mood experiences and parenting, which engages parents, makes them feel less alone, and challenges commonly held beliefs that their difficulties are a result of fundamental personal flaws that cannot be changed.
2. A working model to understand the links between mood, parenting, and child behaviour, which provides a rationale for engaging in behaviour change strategies.

3. Specific strategies within a framework of positive parenting to encourage participants to build confidence in experimenting with new ways of parenting and mood management.

The current work was required to address issues indicated in the Introduction including the importance of full integration of tailored information on parenting and living well with BD. PPI guidance on the original development of IBPI highlighted users wanted a simple accessible intervention with a clear structure that could be used flexibly and confidentially with options for some personalisation. Users wanted information that they could relate to, including realistic coping models for BD and parenting, with examples and videos from parents with similar experiences. Parents also wanted modules to be relatively brief so they can complete them in the limited free time they have. The main trial is intended to evaluate an online application that supports parents with BD in BD self-management and parentings skills, delivered using service user co-produced text, videos and self-reflective exercises on living with BD and optimising parenting as a parent with BD to improve the behavioural and emotional outcomes of their child. Consistent with the intervention principles approach any improvements to intervention functionality will not change these elements.^{44,45}

2.4 | Procedures

2.4.1 | Codesign methods

Figure 1 indicates each phase of the refresh process for the knowledge users group and the IKT research group. Lived experience experts included individuals with experience of BD and parenting including people who might be likely to use the intervention. Clinical experts included individuals involved in the original development of IBPI and new experts brought in for the current study also with expertise in BD and parenting. Lived experience and clinical experience groups met separately in parallel at each phase consistent with PPI guidance.

Six two hour workshops were held with the lived experience experts (Orientation meeting, two workshops for phase 1 and one for each of phases 2–4). There were additional individual interviews to create scripts for lived experience videos in IBPI, as well as a remote review and sign off of the final version of the IBPI intervention. Meetings were facilitated by CL, a service user researcher who is PPI lead for the IBPI study. An initial orientation meeting provided participants with information in general about the purpose of the IBPI study as a whole and the codesign process for the refresh of the intervention. There was also practical information on potential timing and location of meetings (online) and practical arrangements for payment for people's time. This was intended to ensure all lived experience experts were fully informed about the background to the work and the intended purpose of the intervention to maximise their ability to contribute effectively throughout the codesign process. For each meeting, multiple timeslots were proposed so the meeting could be held with the highest number of experts in attendance. At each stage, researchers provided an update on how feedback from prior meetings had been implemented.

During phase 4 there were individual interview meetings with lived experience experts to develop scripts for lived experience videos. The interviews covered a range of topics relevant to the planned modules of the refreshed IBPI intervention (day to day parenting experiences and challenges, impact of BD on self, parenting and relationships, experiences of trying to be consistent and boundaried with child, sleep issues and coping (parents and/or child), anxiety and coping (parent and/or child), mood management and finding a balance in life between parenting and other priorities including self-care).

The clinical experience experts were engaged through a combination of structured remote feedback and digital Teams meetings across the same period as the lived experience experts. An orientation meeting as above provided information on refresh plans and timings of each phase. Phases 2 and 4 involved two 1 online meetings, all phases collecting structured remote feedback.

The first phase of this process was a review of the pilot version of IBPI (coproduced for the previous feasibility study⁵) to obtain views on what to retain, remove and amend from the knowledge users group. Feedback was collected around the extent to which this version looked able to deliver the support indicated in the IBPI logic model and how it could be improved. During this phase, two additional modules were proposed by clinical experts: sleep issues and coping (parents and/or child), anxiety and coping (parent and/or child). These ideas were shared with the lived experience experts, who agreed these topics would contribute additional beneficial support for families.

In phase 2, knowledge users provided their thoughts on what an intervention that “supports parents with BD in BD self-management and parentings skills, delivered using service user co-produced text, video and self-reflective exercises on living with BD and optimising parenting as a parent with BD to improve the behavioural and emotional outcomes of their child” should look like. This was to ensure

that recommendations were not constrained by the elements of the original IBPI pilot intervention. The knowledge users provided suggestions around intervention flow, ease of access, goal setting and reflection and take away summaries.

In phase 3 knowledge users provided feedback on two design options for the upgraded intervention developed by the IKT research group (see Figures 2 and 3). Both designs included the same content and functionality but were presented in very different ways. Design A utilised a simple, clear design with muted colours, and was in keeping with designs typically used in clinical healthcare websites/applications. Design B was more colourful with a character/avatar as a recurring motif, and was created to be engaging, friendly and light hearted. Starkly different designs were purposefully created to elicit opinions on what was most important to both groups. The lived experience experts reviewed the designs first. When the clinical experts reviewed the designs, key feedback from the lived experience group was also shared so clinicians could consider those recommendations when developing their own responses. In phase 4 the lived experience experts also participated in interviews around their personal parenting experiences which were used to create draft composite scripts for the refreshed videos for the intervention.

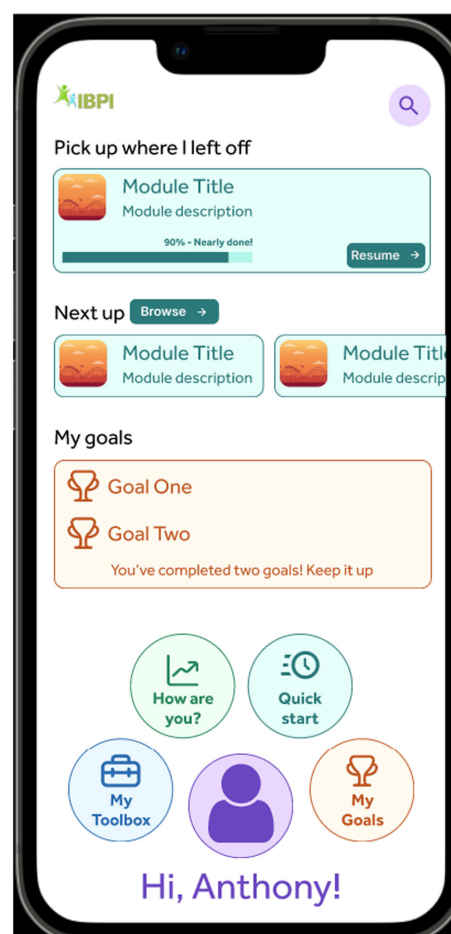


FIGURE 2 Phase 3 IBPI Homepage Design A (Mobile Version Layout).

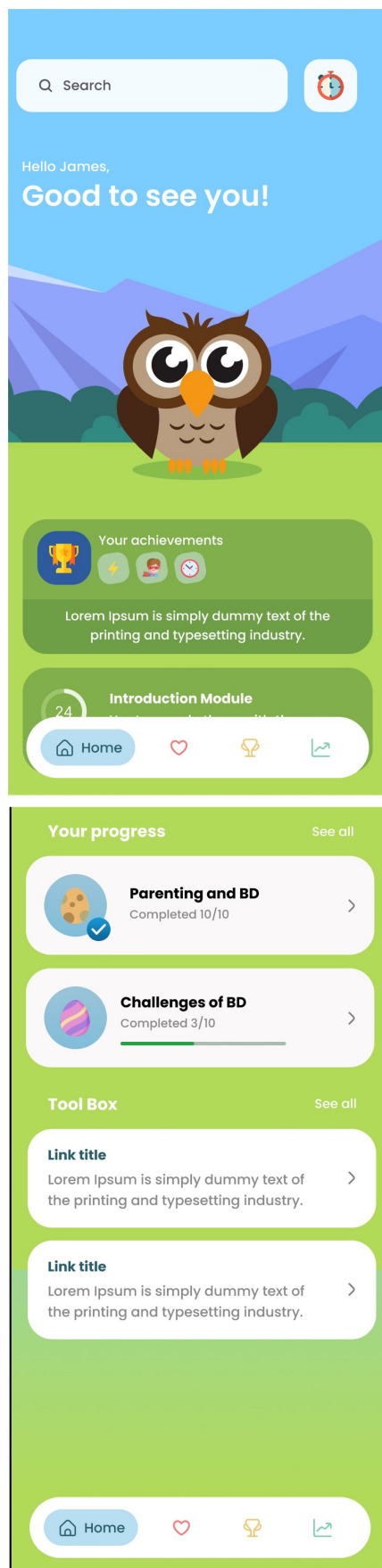


FIGURE 3 Phase 3 IBPI Homepage Design B (Mobile Version Layout).

In this phase the clinical experience experts provided feedback on updated module text content informed by phases 1–3.

In phase 5 the knowledge group reviewed the upgraded IBPI (see Figure 4) and feedback was grouped around site flow, navigation, functionality, learning content, site guidance, other thoughts and overall comments. Feedback was collected via a Microsoft Forms questionnaire covering onboarding, site navigation and features, organisation of content, accessibility, any omissions or additional comments. A combination of free text and rating items were included, the latter informed by lived experience expert feedback. This information was consolidated to create the final version of the intervention for launch during the trial.

Lived experience focus groups had a lived experience facilitator with additional support from a researcher who captured lived experience experts' comments, feedback and decisions. A researcher also recorded recommendations from separate clinical experience expert meetings and collated responses to remote feedback requests. This information was tabulated from each meeting and used to create a task list for the core research team to create the next phase of the refresh codesign.

Across all phases, feedback from both groups was minuted during meetings or collected by excel/MS Forms if content was reviewed outside of meetings. The trial team collated feedback from both groups into one document at each phase and reviewed all feedback together. This feedback was then reviewed again in meetings with ITPI where ideas were assessed for feasibility. Aside from the instances mentioned above, the two groups did not routinely see each other's feedback. This was to ensure that we were able to collect unbiased thoughts based on each group's unique expertise. If the suggestions weren't possible, then alternative ideas were considered that met the same or similar aims. If conflicting suggestions were made, these were reviewed by the trial team and ITPI to either decide on which recommendation best suited the needs of the population, or to find a compromise. Both groups were kept informed if key recommendations weren't possible to implement, or if compromises/changes had to be made.

2.5 | Analysis

Key data regarding content and functionality for each phase was summarised by the core research team. This was tabulated in Table 2 presented below.

3 | RESULTS

3.1 | Participants

The knowledge users group included male and female members as well as people from a range of ethnic backgrounds. Ethnic diversity was primarily present in the lived experience experts, whilst clinical experience experts were all of white ethnic background.

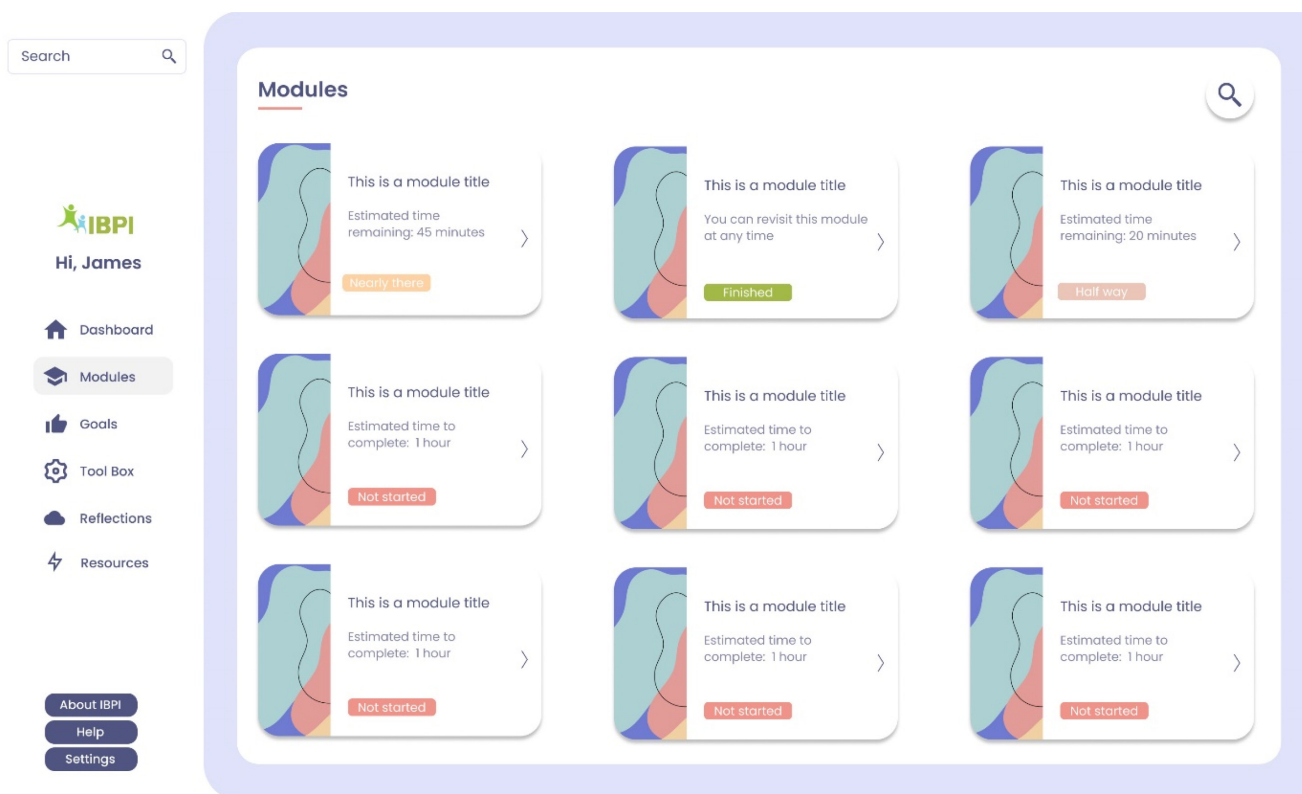


FIGURE 4 Phase 5 IBPI Homepage Design (Desktop Version Layout).

3.2 | Intervention review and update (See Table 2)

From Phase 1, as Table 2 shows, there was feedback around the functionality, design, content and diversity of the intervention. The core research group developed actions from this to address clinical and lived experience expert recommendations including around simplification, personalisation, content updating and increasing diversity in tests and video in partnership with our technical team ITPI.

From phase 2 key recommendations here included ensuring consistent logical structure with clear instructions and access to additional resources. It was also highlighted that the intervention needed to be self-paced and accessible on any common platform, have space where reflection and goals are encouraged and saveable, and that supportive take away summaries were needed for each module.

Feedback from phase 3 was that Design A (Figure 2) was found to be clear but too clinical and needing additional colour contrast and personalisation/reflection options. Design B (see Figure 3) in contrast was seen as engaging but potentially divisive, as the gamification options and the imagery could be viewed as patronising to some users. Overall guidance to the IKT research group was to combine the functionality of design A with aspects of the engaging feel on Design B, whilst removing potential contentious aspects (see Figure 4).

Feedback on the scripts for phase 4 from the lived experience experts was that they were authentic and that it was important to retain this in the filmed version, with actors from diverse communities to create a fair representation of what families in the UK are like. This involved different family dynamics (single parents, heterosexual parents, homosexual parents), as well as different ethnicities and religions. To create a realistic visual representation of family homes, the backdrops for the videos included items such as toys on the floor and washing up by the sink, so the videos felt relatable.

With respect to module content, clinical experience expert recommendations were to provide actionable suggestions to each module and to provide more guidance on use of the mood monitoring.

Feedback on the upgraded intervention in phase 5 was that site flow was good, as was site navigation. Knowledge users found the site worked well on mobile and PC and that learning content was appropriate and accessible. Site guidance feedback indicated the need for a clear onboarding text and video guide, clearer instruction on how to save goals, links and highlighted text, and to provide a means for people for feedback on any technical issues. Other thoughts indicated some minor textual errors and requirement to offer larger navigation buttons as well as corrections of some estimated timings for module sections. Additional bullet points, colours and talk aloud option were suggested. Overall opinion was positive, and that the final product genuinely reflected input across previous phases.

TABLE 2 Knowledge user group recommendations and core research team response for each stage.

Phase	Knowledge users group input	IKT research group actions
1	Review of pilot version of IBPI	
Functionality	Improve interactivity including variety and number of self-reflection exercises, personalisation options, include more actionable tips, goal setting and saveable reflections relevant across child age range, add in progress indicators.	Develop new self-reflection exercises and personalised goal setting. Personalise home page to user's name. Plan to add more actionable tips.
Design	Make design more user friendly, including clearer mood tracking guidance and refresh videos and guidance on self-reflection tasks, refer to your child throughout, same format across modules	Design a toolkit to house valued information and resources. Consistent design, refresh mood tracker and videos.
Content	Reduce amount of text but retain non-judgemental optimistic tone. Ensure information is actionable, Add introductory guidance videos per module. Add in more current examples of prominent figures with bipolar. Add modules on sleep and anxiety, integrate examples of common child emotional and behavioural problems across modules. Add advice on what to do if you decide to explain bipolar to your children.	Minimise and simplify text, add recap, top tips and resources sections to ensure actionable information. Refresh guidance videos. Add child examples and additional modules, update prominent figures list, include options for discussing bipolar with child.
Diversity	Improve diversity and age range in lived experience videos and text	Recruit actors for videos across different ethnicities, ages and sexual orientations. Work with PPI group to update text and videos with authentic range of examples.
2	Format, design and content options for IBPI refresh	
Simplicity and flow	Site overall and each module should have a consistent and sequential logical layout. Explicitly tell ppts what they need to do at every stage. Show users how much they have completed at the beginning of each log in. Provide resource directory per module. Add click to read more function to reduce text heaviness	Improve onboarding process that walks users through how to use all aspects of IBPI during first log in. Prioritize simplicity and clarity in IBPI design. Order modules so they flow together in a logical sequence. Add information icon per page and FAQs. Show module progress.
Ease of access	Make access simple and quick on mobile and PC. Ensure users aware modules can be completed at their own pace so not overwhelmed.	Make accessible on all platforms, prioritise easy access including password save options. Include self-paced completion in onboarding information.
Goal setting and reflection	Encourage goal setting and goal reflection, have place where there can be saved.	Highlight goal setting and review functions in onboarding and home page. Ensure module progress indicators clear and prominent. Use actionable summaries to facilitate goal review.
Take away summaries	Promote de-catastrophising approach throughout IBPI by providing key take home bits. Include general tips for difficult parenting situations.	Focus on constructive, normalising, practical tone throughout. Include sections for each module with clear actionable tips for parenting in general as well as bipolar specific.
3	Evaluation of Design options A and B	
Design option A	Good functionality but too clinical. Colour contrasts for colour blindness and dark mode option for people with eye strain/dyslexia. Provide access to reflections without having to re-read module. Allow pseudonyms as well as name options.	Retain functionality features, make more engaging and less clinical, include better colour contrast and black mode option.
Design option B	More engaging, good for visual learning, less clinical. Gamification divided opinion, might be seen as patronising to some users. Owl and beach imagery not relevant and might be off-putting. Trophy icons might be negatively viewed by some users.	Retain simple fun colour scheme. Remove imagery and gamification. Removed trophy icons and replaced with green tick and positive message.

(Continues)

TABLE 2 (Continued)

Phase	Knowledge users group input	IKT research group actions
Overall group perspective	Combine functionality of option A with look and feel of design B minus gamification and images.	Adapt version A with improved look and feel, better colour contrast, more visual learning options and less clinical feel, drawing on the strengths of version B.
4	Feedback on lived experience video scripts and new site content	
Feedback	Scripts read as authentic and reflect real service user examples in anonymised form.	Retain authenticity in script. Core team present at recordings as well to monitor this.
Formatting suggestions	Ensure clear structure for each character including character outline and keep phrasing for each scene.	Amend script structure for consistency. Highlight key phrases for each scene as actors otherwise improvising based on guidance.
Costing and filming	Cast actors from diverse ethnicities and sexualities. Include IBPI logo in each video. Have actors face camera.	Work with film company to ensure diversity in recruitment IBPI logo added to videos when recorded. Actors to face camera but not stare down lens.
New content	Clear actionable examples and approaches for parent and child for anxiety and depression. Ensure takeaways and top tips don't overlap. Retain mood tracker but advise people to stop if ruminating and allow personalisation of labels for what they chose to track.	Amend sleep and anxiety text to include examples and actions. Revise takeaways and top tips to ensure distinct in each module. Add additional advice to mood tracker and add user personalisation options.
5	Evaluation of IBPI refreshed in line with previous phases	
Site flow	Clear, well laid out, logical flow, easier to use than other support sites.	Retain site flow as reviewed.
Navigation	No issues, easy to navigate within and between modules.	Retain navigation as reviewed.
Functionality on mobile	Works well and feels secure on phone, would use earphones if using real aloud in public.	Retain mobile design.
Learning content	Well-constructed and user friendly, good feel, transcripts and videos match.	Retain module content as reviewed.
Site guidance	Need how to video explaining everything on the site as part of onboarding. Tone of video should be informative but encouraging. Explain how to save things to toolbox. Consider a comments box so people can indicate if anything missing.	Create comprehensive onboarding video that is encouraging and not overwhelming. Expand FAQs to also cover all IBPI functions. Include onboarding video in introductory email. Comments box not feasible so added option to report issue on FAQs page.
Other thoughts	Introductory email could be clearer on login instructions. Some typos/grammatical errors in text. Control buttons could be bigger Reflections very sometimes too big for the screen. Some timings were inaccurate. Drop downs work well, breaks up text, still useful to also break up text with bullet points. Add more colours to background to make more engaging Add talk aloud option. Remove reference to 'learning' as didactic.	Improve clarity of introductory email. Address any textual errors. Increase control button size. Address reflection formatting issues. Corrected estimated completion times. More colours added to background and imagery. Talk aloud actioned. References to learn and learning removed. Retain dropdown menus. Add further bullet points and more paragraph breaks.
Overall	Job well done, clearly improved based on what we said, just a few tweaks above and then ready, check all resource links work.	Complete tweaks as indicated.

3.3 | Finalisation of IBPI intervention including full intervention specification

Following the final phase with the knowledge user group the IKT research group worked together to create a final version of IBPI incorporating knowledge user final recommendations (Figure 5). To aid openness and transparency the detail of the intervention was specified using the TIDieR framework and is provided in Table 3.

4 | DISCUSSION

The intention of this paper was to report the codesign of a novel digital intervention to support parents with BD with children aged 4–10. Drawing on IKT principles we worked with clinical and lived experience experts across five phases to identify and implement key recommendations for the format, content and functionality of the online parenting intervention. The main changes made in upgrading

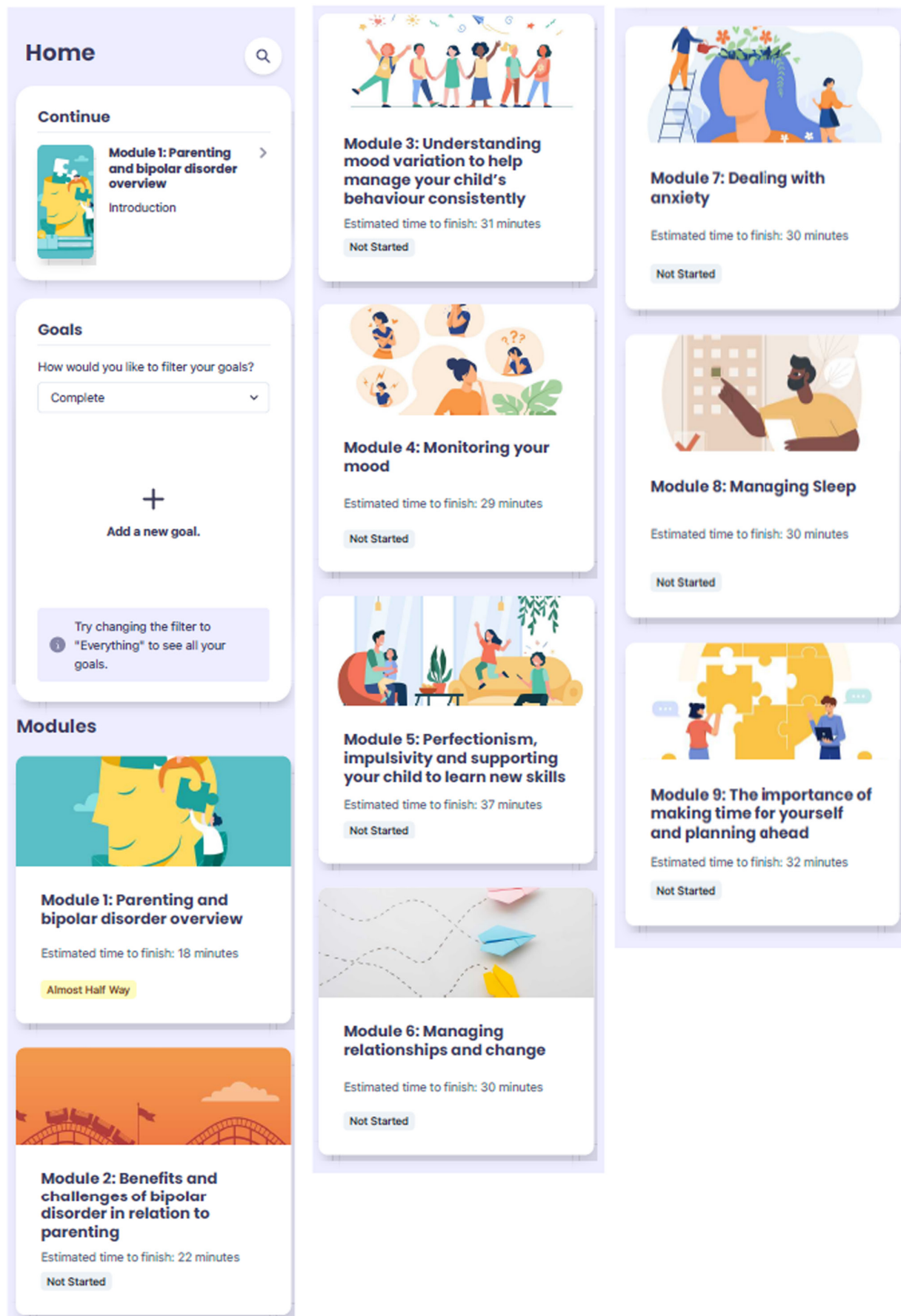


FIGURE 5 Launched IBPI Homepage Design (Mobile Version Layout).

TABLE 3 The TIDieR (template for intervention description and replication) checklist.

Item number	Item
1	Brief name Integrated Bipolar Parenting Intervention (IBPI)
2	Why The programme theory for IBPI is based on an integration of: - The mid-range theories used to inform the initial IBPI development, including cognitive social learning theory^{23,24} and cognitive behavioural theory²⁵ - Qualitative feedback from participants in our pilot study¹⁹ about what changed for them, both of which have informed adaptations for the definitive trial Our programme theory proposes that IBPI should improve outcomes via 3 key mechanisms providing: 1. A normalising explanation of bipolar mood experiences and parenting, which engages parents, makes them feel less alone, and challenges commonly held beliefs that their difficulties are a result of fundamental personal flaws that cannot be changed 2. A working model to understand the links between mood, parenting and child behaviour, which provides a rationale for engaging in behaviour change strategies Specific strategies within a framework of positive parenting to encourage participants to build confidence in experimenting with new ways of parenting and mood management
3	What Materials: IBPI has 9 information modules. Each module will have information and advice for parents on each topic, as well as interactive and multimedia features including video clips, interactive exercises, and self-evaluation exercises. The site will have a normalising, self-regulating focus to avoid stigmatising or blaming participants. Based on our feasibility trial, each module is expected to take around 30min for participants to complete and they are expected to access one module per week. The IBPI will be accessible to participants in the IBPI arm of the trial 24h a day, 7 days a week, as a website or an app from desktops, laptops, mobile phones, and tablets. Each module below contains accessible text, video material illustrating module content from a lived experience perspective, reflection exercises to embed learning, tips summaries and information on additional resources. All content is intended to be constructive and non-stigmatising. Each module includes consideration of the positive and negative impact bipolar can have on parenting integrated with information on helpful parenting principles for each issue covered. The order of the modules is indicated by home page, but participants are free to complete the modules in different orders if they chose to do so. The titles for each section are as follows • Parenting and bipolar disorder overview • Benefits and challenges of bipolar in relation to parenting • Understanding mood variation to help manage your child's behaviour consistently • Monitoring your mood • Perfectionism, impulsivity and supporting your child to learn new skills • Managing relationships and change • Dealing with anxiety • Managing Sleep • The importance of making time for yourself and planning ahead
4	Procedures Potential participants will register their interest via the embedded Microsoft Forms link. On the registration form, they will be asked to enter their contact details (phone number, email address, and postal address). This information will be stored to allow a member of the research team to contact them directly to answer any questions they may have about the study, to arrange their initial screening interview, and for later contact about follow up assessments. Following eligibility screening and baseline assessments participants in the IBPI arm are sent a link to access and log into the IBPI intervention. The site has a home page with access to a Goal setting section as well as all nine modules, a toolbox for saving information they highlight in each module or that they 'favourite' by clicking a heart icon on each section or resources they have found useful from the resources section. There is also a link to all the reflections from each module. The home page has a link to FAQs and participants to customise the home page to change the welcome message from 'Hi there' to 'Hi <name>' Module 1 Parenting and bipolar disorder overview Text on exploring bipolar and parenting with bipolar Video of parents' experiences of bipolar and parenting Guided text reflection on their experience of bipolar and a myth busting quiz on bipolar and parenting Top tips on being a good parent Brief module recap Resources – links to relevant documents and websites in UK and abroad Module 2 Benefits and challenges of bipolar disorder in relation to parenting Introduction video Text on benefits and challenges of bipolar and parenting Video of two parents experience of benefits and challenges of bipolar and explaining it to others Guided text reflection on What is good about my parenting? and "Parenting challenges" free text boxes for each and indicate for each item whether they think it is bipolar related or not Top tips on benefits and challenges Brief module recap Resources—links to relevant documents and websites in UK and abroad Module 3 Understanding mood variation to help manage your child's behaviour consistently Introduction video Text on Dealing with mood variation and being consistent in parenting Video of a parent discussing mood changes and a parent discussing discipline and setting limits Self-reflection exercise—Responses to Positive Affect Questionnaire—each item rated "almost never" "sometimes" "often" "almost always"—participant can then select personalised feedback on mood response style based on their responses. Top tips on mood managements and providing consistent clear parenting. Brief module recap Resources—links to relevant documents and websites in UK and abroad Module 4 Monitoring your mood Introduction video Text on why monitor mood and how it can help Video of parent experience of understanding mood variation and use of mood trackers Guided text reflection on 'what it is helpful to do and what is helpful to stop doing when feeling low and what it is helpful to do and what is helpful to stop doing when feeling elated Instructions for accessing mood tracker section of the intervention and 'how to' instructions Top tips Brief module recap Further resources Module 5 Perfectionism, impulsivity and supporting your child to learn new skill Introduction video

TABLE 3 (Continued)

Item number	Item
	Text on why monitor mood and how it can help
	Video of parent experience of understanding mood variation and use of mood trackers
	Guided text reflection on 'what it is helpful to do and what is helpful to stop doing when feeling low and what it is helpful to do and what is helpful to stop doing when feeling elated
	Instructions for accessing mood tracker section of the intervention and 'how to' instructions
	Top tips
	Brief module recap
	Further resources
	Module 6 Managing relationships and change
	Introduction video
	Text on building strong support networks and planning ahead
	Video of parent experience of managing relationships and support
	Guided text reflection on participants' experiences of supportive and unsupportive relationships exploring options to increase the former and decrease the latter
	Questionnaire of parental attributions for child experiences with personalised feedback on parenting styles and suggestions for alternatives
	Instructions for accessing mood tracker section of the intervention and 'how to' instructions
	Top tips
	Brief module recap
	Further resources
	Module 7 Dealing with anxiety
	Introduction video
	Text overview on anxiety and dealing with this in parents and children
	Video of parents' experiences of their own anxiety and anxiety in their child
	Guided text reflection on participant's experience of anxiety in themselves and/or their child including open text spaces to consider what makes this better or worse and how they will use the information in the module to help in the future
	Top tips
	Brief module recap
	Further resources
	Module 8 Managing sleep
	Introduction video
	Text overview on sleep challenges and dealing with these in parents and children.
	Video of parents' experiences of their own sleep issues and managing sleep in their child
	Guided text reflection on participants experiences of sleep issues in themselves and/or their child including open text spaces to consider what makes this better or worse and how they will use the information in the module to help in the future
	Top tips
	Brief module recap
	Further resources
	Module 9 The importance of making time for yourself and planning ahead
	Introduction video
	Text overview on making time for yourself and planning to make parenting enjoyable.
	Video of parents' experiences of managing routines and making times for themselves.
	Guided text reflection on using learning from the modules to develop a "parenting well with bipolar plan" including how to be a consistent realistic parent, how to manage mood, how to manage sleep and anxiety issues, people who can support and help and how to ensure some recreational time to recharge
	Top tips
	Brief module recap
	Further resources
5	Who provided
	Assessments and access to IBPI provided by IKT research team.
	IBPI site support also provided by IKT research team

TABLE 3 (Continued)

Item number	Item
6	How
	IBPI is a digital intervention accessed individually by participants through PC, mobile or tablet. It can be accessed at any time during the duration of the participants involvement with the study
7	Where
	IBPI can be accessed wherever the participants choses subject to access to an internet/4g connection. The lived experience experts indicated some strongly preferred PC access at home whilst others preferred accessing on the move using mobile
8	When and how much
	Participants have access to the IBPI site throughout their participation in the study. They can access modules as frequently as they like during that period. There is an indicated logical order for module completion (1-9) but this is optional
9	Tailoring
	The text and videos are the same for all participants. Self-reflection exercises are completed by each individual and can be saved as the participant progresses across modules. All the participant's self-reflections are collated in a Reflections section accessible through the IBPI menu. They can also like and save specific pages (favourites) and highlight specific sections of text (highlights) and particular resources they want to focus on. These are all collected in an individual toolkit accessible to the participant through the IBPI menu
10	Modifications
	The intervention was upgraded as described in this paper to future-proof it, fully integrated parenting and bipolar elements, improve videos and self-reflection exercises, make available on mobile as well as PC, add additional modules on sleep and anxiety and improve diversity. All conducted in advance of the current evaluation trial.
11	How well
	Planned: Information is collected on access to IBPI, which modules and pages are accessed, how often and for how long
	Actual: This is ongoing

the intervention from the version used in the feasibility trial were to provide a more interactive personalised experience for users, with more concrete guidance on actionable tips for each module as well as additional resources and reflection material. The constructive non-judgemental tone of the intervention was retained but with additional modules on anxiety and sleep problems and full integration of parenting and BD self-management content (which had been more separate in the feasibility study). The intervention now works on both PC and mobile with a simple clean design which includes a range of options for visual learners and volume of text kept to minimum. All changes were driven by the recommendations of the knowledge user group and checked by this group prior to full implementation. Feedback from the knowledge users on the final version was that it was significantly improved from the feasibility trial version and clearly reflected their input.

As Hoffman and colleagues⁴⁰ have highlighted, lack of detailed description of interventions mean it is not possible for research to replicate or systematically adapt them for other groups or purposes

and it is also problematic for implementation in clinical practice. In response to this Leary and colleagues combined their description of IKT development of a telehealth intervention for food addiction (FA) with a full TIDieR specification of the intervention that emerged from the codesign work.⁴⁶ The authors stated that their work was the first published report using IKT to refresh an intervention for FA. Similarly, this is to our knowledge, the first report of using these principles to codesign a psychological intervention for parents in BD including full TIDieR specification.

The refreshed IBPI intervention has nine brief integrated modules each combining overview and lived experience videos on each topic combined with text information, tailored reflection exercises and actionable top tips and module summaries. The look and feel of the site is purposely designed to be clear, accessible and non-intimidating for parents who are already juggling a range of challenges managing their BD and parenting responsibilities. Consistent with knowledge users' expert guidance, the tone throughout the intervention is intended to be balanced and non-judgemental. Lived experience videos are used to illustrate key points for each module drawing on a group of families incorporating heterosexual and same sex partnerships, single parents and families of different ethnic background. The purpose of the intervention is to be a free to access, confidential support for parents living with BD. This is the first step in providing accessible, engaging and tailored support for parents with BD and their young children. The aim is to support both healthy parenting and child development, and perhaps mitigate the risk in these familial at risk offspring. This is an important area in which additional intervention research is required including investigation of more intensive live therapist delivered support options for parents with more complex intractable difficulties.

The IKT framework was a useful one for structuring the active engagement of clinical and lived experience experts throughout the whole refresh process. The clinical experience experts included researchers and clinicians with specialist knowledge of BD and parenting. Drawing together the input of both sets of experts within the knowledge users group has led to an intervention likely to be acceptable to both services and service users at implementation should it prove effective. This is crucial given the importance of improving care in this area and to avoid the fate of many digital interventions which are researched but then not implemented in practice.⁴⁷

4.1 | Strengths and limitations

A strength of the approach described here is that there has been knowledge user expert codesign input throughout the process. This built on clinical and lived experience expert guidance which informed the original versions of the IBPI intervention. By combining the IKT framework and the TIDieR approach it has been possible to describe both the redesign process and its outcome in a systematic manner to aid transparency and future evaluation

and replication efforts. It is recognised that this approach focused on expertise in a specific country, the UK, and that therefore future applications of the IBPI approach in other countries would potentially benefit from exploring the need for country specific versions. As the codesign process was part of the grant to conduct a definitive national RCT there were time and resource constraints on the number of design and development iterations that were possible. There was no live in person face to face engagement with the knowledge users group. Working remotely allowed involvement from people across the country but it is possible that this format meant that more subtle feedback such as non-verbal cues were missed and informal comments that might emerge during face-to-face meeting breaks were not picked up. On the other hand, the online systems allowed people to contribute both orally and by posting comments which some participants less familiar with formal meeting formats found helpful.

5 | CONCLUSION

This paper takes a structured approach to describing the detail of a codesign process to create an integrated digital intervention tailored for parents living with BD who have young children. It shows the value of engaging actively with clinical and lived experience experts to develop an intervention acceptable to parents with BD designed to be rapidly implemented if effective. The use of the IKT framework and TIDieR checklist has supported a detailed description of each phase of intervention development as well as of the resulting intervention. This is, to the best of our knowledge, the first time these tools have been reported in relation to the codesign of digital intervention for parents with BD. It is hoped that this is useful to researchers interested in the topic and to people developing codesign approaches to new digital intervention development in mental health more broadly.

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CONFLICT OF INTEREST STATEMENT

No conflicts of interests were reported for this work.

DATA AVAILABILITY STATEMENT

No data are available.

ETHICS STATEMENT

This project describes a codesign process which involved PPI (Patient and Public Involvement in research) rather than 'research participation'. As such formal ethical approvals were not required, however all contributors were provided with full information

about the purpose and process and made an active choice to be involved.

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