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RESEARCH ARTICLE

Establishing the feasibility of a large scale RCT of Positive Behavioural and Active Support (PBAS): a digital technology for supported living services in learning disability

[version 1; peer review: awaiting peer review]

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Abstract

Background

PBAS (Positive Behavioural and Active Support) is a digital translation of the Active Support (AS) model. AS improves quality of life by increasing activity engagement in adults with learning disabilities. This study addressed uncertainties in services so that a future trial of the PBAS app could be undertaken. The objectives were to investigate service willingness to adopt PBAS and to participate in a trial, to co-produce an evaluation package that is acceptable to staff and service users, to determine the comparator by providing an overview of systems currently used in services, and to design an economic evaluation for any Randomised Controlled Trial (RCT).

Methods

A service provider survey was conducted to ascertain willingness to adopt the PBAS app and participate in an RCT and to discover how activities are currently recorded. Follow-up interviews were conducted to explore facilitators and barriers. Service users and support staff views were sought to inform the design of an evaluation package. A scoping review of generic health-related Quality of Life (QoL) outcome measures was conducted.

Results

There was a willingness to adopt the PBAS app (45%) and participate in a future RCT (76%). Concerns were expressed about integration with existing systems, difficulties in use, costs, and demands on staff. Costs were identified as the major barrier to trial participation along with staff resistance to technology. Direct observation in people's homes was considered acceptable by service users and staff. A suitable SCR-QoL measure (ASCOT) was identified, and a method for costing the application and existing recording systems was devised.

Conclusions

There was support for a trial. However, the PBAS application was discontinued. The literature on technological innovation suggests that the abandonment of new technologies with failed attempts is typical. These patterns are replicated in the health and social care sectors and may even be intensified.

Introduction

People with intellectual disabilities living in small community homes rely on staff to create and support opportunities for them to do everyday activities themselves. Opportunities may be missed, however, when staff do the everyday activities for people they support rather than with them. This can lead to excessive passivity, limited autonomy, compromised independence, and a feeling of low self-worth. Active Support was designed specifically to help staff maximize the opportunities for the people they support to participate in the ordinary activities of everyday life when at home and in the community, such as personal care, running the home, leisure and recreation. Implementing Active Support requires initial training and onsite support from supervisors. Staff learn to plan, implement and record the opportunities they create. Despite evidence of its effectiveness, the uptake in services has been limited, and there are difficulties associated with its implementation.

PBAS (Positive Behavioural and Active Support) is a digital translation of Active Support. It is a web-based app that provides for person-centred activity planning and monitoring and skills teaching, along with a variety of ancillary functions such as behavioural assessment, communication and reporting, and medication charts. The core aims in digitising Active Support were to make it more appealing and easier for services to implement. A preliminary evaluation of PBAS by the developers suggested the app might be able to do this, but that there were uncertainties in services that would have to be considered before a future trial of PBAS could be undertaken. This paper describes the findings from interviews and surveys conducted with people using and providing services, and a review of tools for an economic evaluation. The aims were to:

investigate service willingness to adopt PBAS and to take part in a trial,

A team of five researchers, four service provider leaders and workers, a commissioner, and two experts by experience with support produced this work. We conducted a service provider survey to assess service willingness to adopt the PBAS app and to take part in an RCT, and to find out how current practice on planning and recording activities as a comparison. We conducted follow-up interviews to explore what works and where there are barriers. We conducted interviews and focus group meetings with people using services and their support staff to inform the design of an evaluation package that could be used in a future Randomised Controlled Trail. We completed a scoping review of generic health-related Quality of Life outcome measures for the purpose of economic evaluation.

Almost half of survey respondents said they were willing to adopt the PBAS app (45%). Three-quarters said (76%) they would take part in a future Randomised Controlled Trial. Respondents told us they were concerned about the integration of PBAS with other digital systems. They were also worried about how difficult the app might be for staff to use, what it would cost, and what extra demands there would be on staff time. The major barriers to trial participation were costs and staff resistance to technology. People using services and staff said direct observation in people's homes would be acceptable. A suitable SCR-QoL measure (ASCOT) was found, and a method for costing the application and existing recording systems was devised.

Overall, we found there was support in services for a future Randomised Controlled Trial. However, the PBAS app was later withdrawn on economic grounds. Writing on technological innovation suggests that the abandonment of modern technologies with failed attempts is typical. These patterns are plain in health and social care sectors.

Keywords
Active Support, Positive Behavioural Support, Digital Technologies, Randomised Controlled Trials, Learning Disabilities, Supported Living.

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Introduction

Approximately 2.6% of the adult population in the UK has a learning disability (LD) (Hatton *et al.*, 2016); there are 930,400 adults in England, of whom 129,000 receive social care support. Approximately 15,000 people with LD are known to services in Wales. Residential care and supported living represent the two highest costs of social care spending for adults with LD at £1.7 billion, and £933 million, respectively. Local Authority (LA) social care spending for adults with LD represents 39% of the total spending, and it is the second highest cost after older people's services (National Audit Office, 2017). Despite the high costs, the quality of care varies. One of the major challenges is the adoption of care practices that promote good quality of life (QoL) for people with LD. Activity engagement is a core indicator of QoL among individuals with LD. In the early phase of deinstitutionalization, data suggest a wide variation in activity engagement (between 8% and 74% of time; Hatton & Emerson, 1996). These figures have failed to improve with the development of residential care. Recent data indicate that adults with LD spend less than 50% of their days engaged in meaningful activities (Qian *et al.*, 2015). A similar picture is evident for other aspects of QoL such as low levels of community participation, low levels of choice and independence, and poorer well-being (Grey *et al.*, 2018; Stancliffe *et al.*, 2011; Verdonschot *et al.*, 2012). Repeated exposure to abuse in LD services (Winterbourne, Whorton Hall, and Hesley) highlights that services still fail to adopt service models that promote activity engagement and a good QoL for people with LD.

This paper discusses a feasibility study that aims to build an evidence base for a digital technology called Positive Behaviour and Active Support (PBAS). PBAS is the digital translation of an evidence-based model of care called Active Support. Active Support is a care model that promotes QoL by increasing activity engagement with appropriate support from the staff. Active Support promotes social interaction, skill acquisition, and community involvement while also reducing the risk of challenging behavior. The core principle of Active Support is that people with LD have the right to live a socially valued life like any other person, including being treated as an individual, having access to activities, being part of the community, and having good relationships with others (Jones *et al.*, 2009). The premise of AS is that every person with LD should engage in activities in and out of their house throughout the day, with support from staff. For this, staff need to support people to engage in activities (active support) rather than conduct activities for them (hotel model of care). Thus, staff behaviour change is the main mechanism of change in AS.

It has been shown that AS leads to increased levels of engagement in social and non-social activities in and out of the house and improved quality of staff support (Flynn *et al.*, 2018; Toogood *et al.*, 2016; Totsika *et al.*, 2008). Increased activity levels are associated with improved QoL (Simões & Santos, 2016), lower levels of challenging behaviour (Bowring *et al.*, 2017), depression (Jahoda *et al.*, 2017), and, in the longer term, may also contribute to the development of adaptive skills (Mansell *et al.*, 2002). The Active Support model of care is fully manualized (Jones *et al.*, 2009; Toogood, 2010). To implement Active Support, staff need to be trained in a group workshop (1–2 days) and then have a 1:1 tutorial in their place of work. Implementation is supported by several paper-based systems, including Activity and Support Plans (daily diaries for mapping each resident's activities and staff support), participation records (a system for tracking activity engagement for each resident), task analysis for key activities (a step-by-step guide for activities the person needs support with), and opportunity and teaching plans (descriptions of activities the person is currently learning).

Despite the evidence for its effectiveness, Active Support has had limited uptake in UK services, and limited success has been achieved in different countries (Qian *et al.*, 2019). Patient and Public Involvement (PPI) consultations with staff and residents identified factors thought to contribute to poor implementation: reliance on outdated paper-and-pen technologies, low accessibility of existing manuals, high reliance on expensive and scarce external trainers to train staff, incompatibility between staff training requirements and services' current financial operational models (it is no longer viable to send an entire team out for training), no support for implementation beyond the initial staff training, and no mechanism to mitigate staff turnover (which results in services trying to implement Active Support with untrained staff). Further PPI consultations indicated that despite implementation issues, residents with LD valued activity engagement, especially community activities, and the experience of positive social interactions. Staff value and want training on how to support service users to engage in activities. Altogether, PPI consultation findings provided strong support for further development of Active Support but identified a significant mismatch between a model developed by experts 30 years ago and the realities of service provision in the 21st century.

In response to these findings, an independent provider organization (Special Needs Care, SNC) developed a tablet-based app (PBAS) to translate Active Support into a digital tool. The PBAS app included both training and implementation materials for Active Support. A service that starts using PBAS requires training on how to prepare and use the app. They then needed to start using the app to guide and document daily implementation. Similar to Active Support, PBAS is a multi-feature product that includes skills teaching, behavioural assessment, online reporting, and e-learning, in addition to daily activities and support plans. The app runs on all devices and operating systems when an internet connection is available. One device was required per setting for up to five people. Once enabled, service users and staff can access the app several times per day using touch controls. Features such as activity planning and skills teaching are activated from the dashboard, and staff update digital participation records via the screen. Learning goals are set weekly, taught, and monitored daily.

Features added following testing and feedback from users include medication administration management and visual multimedia feedback. A minimum viable product (MVP) built on the concept of supporting personal routines was field-tested and evaluated in eight supported living services (Toogood *et al.*, 2020). Activity engagement and community involvement increased following the intervention, suggesting that the mechanism of change in the digital PBAS is the same as that of Active Support (Toogood *et al.*, 2020). Whether PBAS adoption leads to effective changes in services and in people with LD remains to be demonstrated. PBAS is currently being used in SNC and is gradually being used by several other LD service providers.

Before an effectiveness and cost-effectiveness evaluation of PBAS can be undertaken, a number of key uncertainties need to be addressed, which are the focus of the present feasibility study. One of these was the willingness of services to adopt the PBAS app as part of their regular service provision and their willingness to participate in a future randomized controlled trial (RCT). Currently, service providers have a range of applications that they use for some areas of their activity; for example, apps to monitor medication use and methods (electronic or paper) to monitor challenging behaviour incidents. Services do not typically keep track of what activities people perform on an hourly basis or what staff support is available, although electronic systems of staff allocation on a shift basis are typically used. Equally, services have access to some service data but not to continuous real-time data. Services may be reluctant to adopt a new app that captures some of the information they already have systems for. Services may be reluctant to invest in training to use a new application if they have already invested in other applications. Therefore, the first step in designing a large-scale RCT is to investigate the willingness of service providers to adopt the PBAS app as well as their willingness to be randomized.

The objectives of the feasibility study then were as follows:

Research Objective 1 (RO1): To determine the feasibility of recruiting service providers in a future large-scale RCT by investigating their willingness to adopt the PBAS app as part of their regular service provision and their willingness to be randomized in an intervention trial.

Research Objective 2 (RO2): To co-produce an evaluation package that is acceptable to staff and service users, that is, to work alongside service users with LD and staff to determine the most acceptable way to capture the primary outcome in any future RCT (engagement in activities of daily living typically measured via real-time observation by independent researchers), their views on how much change in activity engagement they would like to see, and the most efficient/acceptable outcome package for measuring secondary outcomes in a future RCT.

Research Objective 3 (RO3): To describe the comparator for any future RCT by providing a comprehensive description of current practice in relation to systems/apps used by LD service providers (i.e., Treatment as Usual-TAU) and to explore how services plan and monitor opportunities for activity and social engagement, skills teaching, and behaviour change.

Research Objective 4 (RO4): To design a comprehensive and bespoke economic evaluation for an RCT, including an assessment of the most appropriate generic health-related QoL outcome measure for evaluating cost-effectiveness in this population (for example, validated generic QoL measures such as the EQ-5D are not available for people with LD (Russell *et al.*, 2018).

Methods

Patient and Public Involvement

Two people with learning disabilities and lived experience of using supported living services were recruited from England and Wales, and each served as a paid member of the research team from the commencement of the project until its end. One-to-one support was provided to each person on an hour-by-hour basis. Reasonable adjustments were made to meeting schedules, protocols, and communication.

The two experts shared their thoughts, experiences, and insights in discussions regarding the research questions. They contributed significantly to the design of the interview and survey questions, and to the analysis of the survey data. Experienced researchers led discussions across the entire team on the choice of outcome measures. The experts significantly contributed to recruiting the focus group and service-user interviews. Both experts participated in the team discussions on dissemination. One of the experts presented a poster at a national researcher-only conference.

Overview

To address the four research objectives (ROs) as outlined above, a mixed-methods approach was adopted with data gathered from relevant stakeholders, including providers of supported living services, commissioners of services, and those residing in supported living settings. To address RO1 and RO3, an online survey of supported living providers consisting of two questionnaires was designed and administered. This was supplemented with semi-structured follow-up interviews. The commissioner's perspective was obtained through semi-structured interviews. Regarding RO2, focus groups and individual interviews were conducted with the users of supported living services and their support workers. A desk-based review of the salient literature was conducted to address RO4.

Research Objectives 1 and 3

The aim of RO1 was to determine the feasibility of recruiting service providers in any future RCT by investigating the willingness of supported living providers to adopt the PBAS app as part of their regular service provision as well as their willingness to be randomized in a future trial of the intervention. RO3 was used to obtain a comprehensive description of Treatment as Usual (TAU) in terms of the recording systems currently in use in services and the activities captured by these systems. Data were gathered via a two-part survey of supported living provider organizations and a series of follow-up semi-structured interviews.

Survey of supported living provider organisations

Two questionnaires were developed for the study. The first explored the willingness of services to adopt the PBAS app as part of their regular service provision as well as their willingness to participate in future RCT. The questionnaire comprised two sections. The first gathered demographic information pertaining to respondent organizations. The second assessed interest in the adoption of the PBAS app and willingness to participate in future RCT. These two questions used a 5-point Likert scale, with responses ranging from 'strong likelihood' to 'no likelihood.' Both questions were followed up with a further question aimed at identifying the factors that would have the most influence on decisions regarding the adoption of the app/participation in any future RCT. Finally, the questionnaire also included free-text options to explore barriers and facilitators for (a) adopting PBAS in services and (b) participating in an RCT. Respondents were invited to participate in a follow-up interview (see below) and a link to the second questionnaire was provided.

The second questionnaire aimed to describe 'treatment as usual' (TAU) in terms of the recording systems currently in use in services, whether digital (apps or software) or paper based. Respondents were asked if they recorded their service user activity, staff allocation, medication use, challenging behaviour incidents, monitoring of related interventions, skill development goals for service users, monitoring of concomitant interventions, and other quality of life outcomes for service users (e.g., community participation). For each of these questions, when a participant indicated the use of a digital system (app or software), they were asked about (a) the ease of use of each technology and (b) the perceived extent of implementation. The latter was defined in terms of the average frequency of use by a staff member on both a daily and weekly basis. These questions were asked to assess whether such a methodology could be utilized in a future RCT to cost the use of PBAS compared to TAU systems (RO4). The questionnaire also provided free text space for any other comments that the respondents wished to provide regarding apps/software or paper-based systems used in services.

Both questionnaires were administered online via the Qualtrics platform, with links to each sent via email to the potential respondents.

The survey sample

At the project outset, it was noted that no single list of all LD service providers (or, more specifically, providers of supported living for adults with LD) in the UK currently exists; thus, the total number of LD service providers is unknown. While local authorities are supposed to provide a list of all social care providers under their local offer, it was found that such information was not publicly available for all the 323 LAs in England and Wales. Where such information was provided, it was not always easy to locate, and when found, lists had to be analysed for relevant information (i.e., finding providers of SL for adults with LD, as opposed to other services for other client categories). Thus, the first step was the compilation of such a list, focusing on provider organizations that met the inclusion criteria. The latter was that the organization operates in England and/or Wales, provides supported living services to adults with moderate to severe LD, and that supported living providers had at least two settings. Daytime services and colleges, treatment units and hospitals, and individuals with learning disabilities living at home with their family or in shared life schemes were excluded. CQC-registered services that provided nursing support were excluded.

The process of composing the list involved extensive web searches, screening of local authority lists (eliminating providers that did not meet the inclusion criteria), use of lists from membership organizations, and deployment of personal networks to identify potentially relevant participants. Separate lists of relevant providers were drawn for each of the nine English and four Welsh regions. In total, the contact details of 620 providers were derived and included in the regional lists, and each of these was invited via email (see below) to participate in the survey. It should be noted that because the total number of providers across England and Wales is unknown, it was not possible to estimate the representativeness of the sample of listed providers. It was hoped that at least 30 out of 620 providers would submit a response, as it was determined that this number would allow for the estimation of descriptive statistics.

Invitations to participate, along with a participant information sheet, were sent via email with a message containing the links to the two questionnaires. Follow-up emails were sent every two weeks for two months and then every three weeks later (the survey was open for 24 weeks in total). Sixty-seven respondents (11% of the invitees) followed the link and answered Questionnaire 1. Of these, 47 (7.5%) provided at least one answer. The survey completion criterion for inclusion in the analysis was that respondents answered each of the questions on organizational demographics (five items). Thus, 40 respondents met the criteria for Questionnaire 1 and were included in this analysis. Thirty-five participants answered the question of interest in adopting the PBAS, 30 answered the question of interest in RCT participation, and 29 answered both questions.

For Questionnaire 2, 30 respondents opened the link and visited the questionnaire. Of these, 25 completed at least one question and met the criteria for inclusion in the analysis.

Both questionnaires were completed anonymously, and no personally identifiable data were collected. Thus, the survey did not collect information on the names of the organizations. Information regarding organizations was collected in grouped form (grouped number of staff working in organization to determine size of organization), name of country (England, Wales, Scotland, NI) where the organization provides supported living services, and the name of the region (nine regions in England and four in Wales) where the organization is based and operating.

Data from both questionnaires were analyzed using descriptive statistics (frequencies and percentages). Open-text questions were analyzed via thematic analysis and used to supplement the qualitative data gathered via follow-up interviews (see below).

Finally, Questionnaire 1 ended with a request that respondents contact the study's research team if they are willing to participate in a follow-up semi-structured interview. As no personally identifiable data could be collected from respondents, the onus had to be placed on respondents to actively follow up on their interview participation. Thus, while 22 respondents affirmed that they would be interested in doing so, only four initiated contact with the research team and participated in the interviews.

Qualitative interviews with supported living services providers

Seven interviews were conducted with senior managers and practitioners working within provider organizations. Four participants were recruited from the survey, and an additional three were recruited via personal contacts/networks, that is, purposive sampling was utilized.

Qualitative interviews were arranged to capture in-depth information about barriers and facilitators of technology adoption, RCT participation, and pathways to decision-making in service provider organizations. The interviews were semi-structured in order to explore the survey themes in more detail. The first set of questions focused on gathering information about the recording system(s) in use (digital, paper, and/or hybrid) and the activities recorded in the organization. Participants were also asked about the effectiveness and ease of use of the organization's recording systems. The next set of questions focused on the willingness to adopt PBAS within services, perceived barriers to adoption, and questions regarding the general drivers of new technology investments and organizational processes, including decision-making regarding technology purchases and implementation. The final set of questions explored organizational participation in research projects, decision-making processes around such participation, and the potential willingness to participate in any future RCT. Barriers and facilitators of participation were examined in detail. Barriers were defined as factors that prevent something from starting, impeding, or interrupting the implementation process. Facilitators were defined as factors that had a positive effect on processes and made them easier. These factors motivate, sustain, and enhance implementation. Each interview lasted for approximately one hour and was conducted online. Interviews were recorded with participant consent, fully transcribed following completion, and summarized. Key themes were compiled.

Qualitative interviews with commissioners of supported living services

Thirty-five commissioners of services for people with learning disabilities were invited to participate in online interviews. We aimed to interview ten commissioners; two were completed. The interviews were semi-structured and comprised of open-ended questions. The question schedule was designed to encourage discussion around the organizational structure/arrangements for commissioning within a specific authority, how supported living services for adults with LD are commissioned (including how providers are selected), how quality is defined and monitored, the outcomes sought and how these are monitored, and whether activity engagement is specifically sought. The interviews were conducted online and lasted for approximately one hour and 15 min. The interviews were transcribed following completion and summarized. Personal identifiable data were not stored and were omitted from the transcripts and summaries. The recordings were destroyed following the transcription. Thematic analysis was applied to the data.

Research objective 2

Research Objective 2 aimed to co-produce an evaluation package to be used in any future RCT that would be acceptable to staff and service users. Three focus groups and ten individual interviews were conducted with 19 adults with a learning disability who resided in a supported living. The interviews gathered data on service users' perspectives of supported living and activity engagement.

Extensive preparation was undertaken for these interviews, and there was a strong emphasis on co-production, as participation in the project would be both meaningful and enjoyable. Questions and topic guides were developed using inputs from coresearcher experts with lived experience. Three organizations that provide SL services to adults with LD were contacted, with requests made for people to become involved by either being interviewed or being part of a focus group discussion. Service providers were asked to share information with people with a range of communication styles and severities of learning disabilities to ensure wide representation.

Seven interviews were held in people's homes, with the remaining three taking place at the offices of one organization. The communication style of the participants varied, with one participant speaking both English and Welsh languages interchangeably, one using verbal speech interspersed with Makaton signs, and one engaging non-verbally, communicating using pictures and symbols with assistance from support staff who were familiar with his style of communication.

Support staff members were present in the focus groups and interviews to assist the residents. Transcripts from interviews and focus groups were shared with staff and residents to check clarity and consistency and to provide people with an opportunity to add more information if they wanted. As with all the data gathered under the auspices of this study, no personal information was collected during the interviews or focus groups. If names were mentioned by participants during the context of an interview referring to someone else, these were omitted from the transcript and generic descriptors were used in their place ('staff,' 'service user,' 'manager').

The data were analysed using rapid analysis involving researchers and experts by experience working together. A bespoke summary sheet was prepared, which facilitated the subsequent thematic analysis.

Research objective 4

RO4 addressed two important components of the economic evaluation of PBAS in a future RCT:

1) to review a range of potentially suitable measures that could be used in a future cost-effectiveness analysis.
2) To assess the feasibility of using the PBAS app compared to existing systems (treatment as usual; TAU), adopting a health and social care perspective.

A scoping literature review was conducted to identify generic health-related Quality of Life (HRQoL) measures used in RCTs of LD populations. New instruments that focus on mental rather than physical health, as well as those that provide measurements of social care-related QoL, were reviewed. A narrative review summarizing these findings was compiled. This review evaluated the suitability of each relevant instrument for use in a future RCT.

In the second component of this research, we developed questions about the service use of PBAS and TAU as part of Questionnaire 2 (see Addressing ROs 1 and 3: The Survey of Supported Living Providers above). Respondents were asked to provide data on the frequency of use of digital systems (i.e., the amount and intensity of support staff use). This was operationalized by asking about the average time spent using the system by one member of the staff on both a daily and a weekly basis.

Results

Research objectives 1 and 3

Research objective 1

Background: Demographics

Respondents held a variety of posts, with the majority held by Directors/Director Founders (n = 14), followed by those employed as Service Managers (n = 12). Regarding the location of respondents' Head Offices, Table 2 shows the vast majority were located in England (n = 40; 85%), with the remainder based in Wales (n = 7; 15%). There was a good spread of responses across the English and Welsh regions.

Table 1. Regional Location of Respondents' Head Office (England) (n = 40).

Region of HO Location - England	N (%)
North East England	4 (10%)
North West England	6 (15%)
Yorkshire and Humber	3 (8%)
West Midlands	3 (8%)
East Midlands	3 (8%)
South West	6 (15%)
South East	3 (8%)
East of England	5 (13%)
London	7 (18)

Table 2. Regional Location of Respondents' Head Office: Wales (n = 7).

Region of HO Location – Wales	N (%)
North Wales	3 (43%)
South West Wales	2 (29%)
South East Wales	2 (29%)

As to the where respondents' organisations operate their services, most respondents identified that these operate services within one region, but across a number of locations therein (51%). Of the six respondents reporting that their organization operates nationally, three operated across England and Wales, whereas the other three operated across England only. For those operating within one region (n = 22), the East of England generated the most responses (n = 4), followed by the South-West (n = 3) and the South-East (n = 3).

Regarding the number of staff, most respondents reported working within medium size organizations (i.e., employing between 101 and 249 staff) and large organizations (i.e., over 250 staff) (n = 29), with 18 respondents stating that their organization employs over 250 staff and 11 reporting that their organization employs between 101 and 249 staff. Regarding the number of people supported by the respondents' services, 40 answered this question. The average number of supported persons was 145 (a minimum of three persons and a maximum of 500).

Addressing Research Objective 1: Willingness to adopt the PBAS app and the barriers/facilitators impacting any such decision

Eighty-seven percent of respondents answered this question (n = 35). Their responses are listed in Table 3.

Thus, of those who answered the question, most responses were split as being unsure (40%) about whether they would adopt the app, with 34% reporting it 'likely' (34%). 11% deemed it 'highly likely.' Thus, 44% of those who answered positively responded to the question. If those who did not answer are included, 35% were unsure; 30% deem it 'likely' whilst 10% stated adoption as 'highly likely.'

Table 3. Percentage of respondents who were potentially willing to adopt PBAS for the planning and monitoring of daily activities in supported living settings (N = 35).

	Respondent willingness to adopt PBAS for the planning and monitoring of daily activities
1. Highly unlikely	1 (3%)
2. Unlikely	4 (11%)
3. Unsure	14 (40%)
4. Likely	12 (34%)
5. Highly likely	4 (11%)
6. No answer	-

Respondents were asked about the most significant factors that might impact their decision to adopt the app and new technology in general. Figure 1 summarised their responses. Thirty-one respondents (77.5%) answered this question (Table 1 and Table 4). Herein, the factors rated as having the most significance by most respondents were compatibility with existing systems (n = 30): 65% of all respondents identified this factor as being of 'much importance' whilst 32% rated it as being of 'some importance. Ease of use was the next most significant factor (n = 29), with 67% of all respondents identifying this as being of 'much importance' and 23% reporting it as being of 'some importance.' The cost of purchasing the app was as follows (n = 27): 32% of the respondents reported this as being of 'much importance' whilst 55% identified it as being of 'some importance.' The cost of maintaining the app was deemed of equal significance to purchase costs (n = 27); by 32% of respondents as being of great importance and by 52% as being of 'some importance.' The app's helpfulness in meeting CQC/CiW reporting and targets was also identified as significant (n = 26): 45% deeming it to be of 'some importance' and 39% of 'much importance.' Demand for staff time for training (n = 25) and demand for staff time using an app (n = 24) were each identified as being of importance. In summary, the potential lack of compatibility with extant systems, ease of use, cost, and demands on staff time for both the training and actual use of new systems were identified as potential barriers to the adoption of any new technology and/or system.

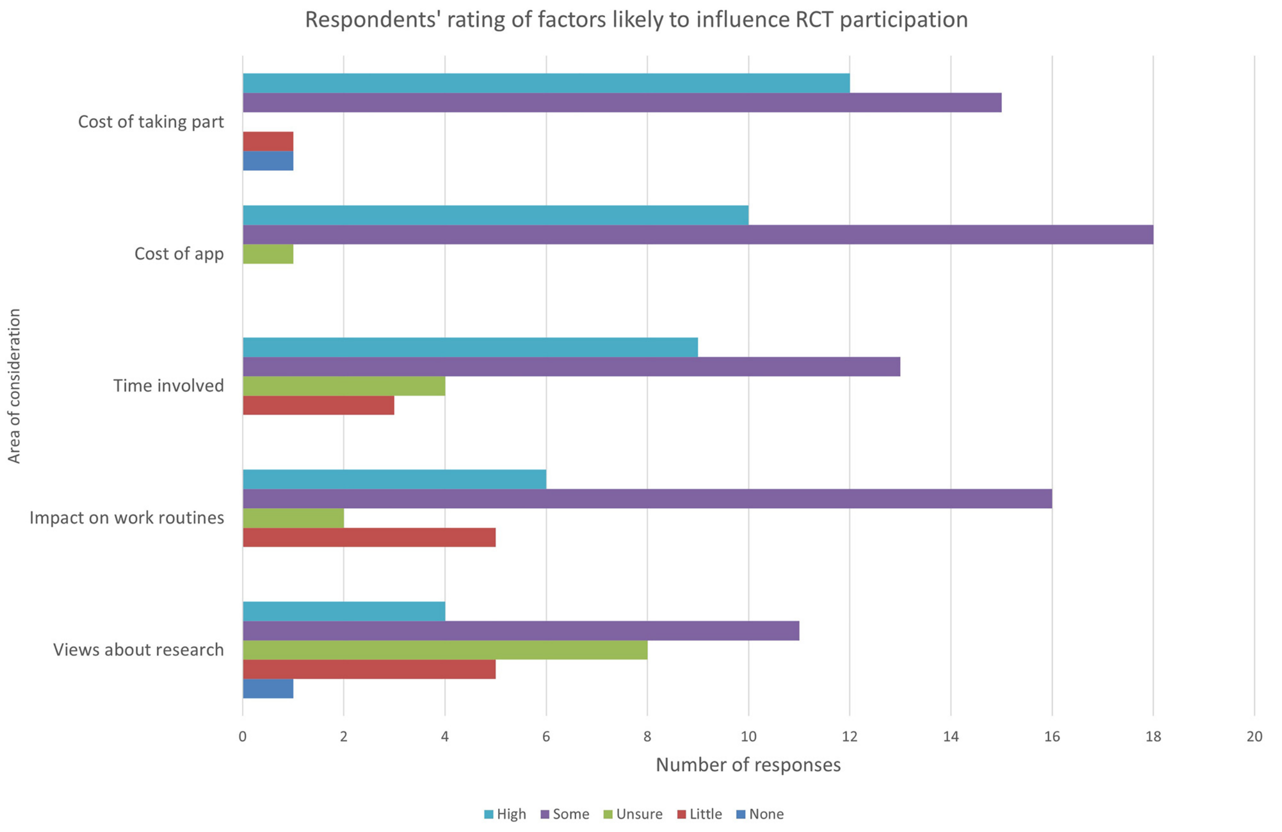

Figure 1. Factors influencing likelihood of adoption.

Table 4. **Factors affecting decision making as to app adoption (n = 31).**

Factor	No importance N (%)	Little Importance N (%)	Unsure N (%)	Some Importance N (%)	Much Importance N (%)
Cost of Purchasing App	-	-	4 (13%)	17 (55%)	10 (32%)
Staff Willingness	1 (3%)	9 (29%)	7 (23%)	12 (39%)	2 (6%)
Management (HQ) Willingness	1 (3%)	4 (13%)	6 (19%)	15 (48%)	5 (16%)
Cost of maintaining the app	-	-	4 (13%)	16 (52%)	11 (35%)
Compatibility with existing systems in use; either paper-based or digital	-	-	1 (3%)	10 (32%)	20 (65%)
Ease of use of the app	-	1 (3%)	2 (6%)	7 (23%)	21 (68%)
Whether the app will help with CQC/CiW reporting and targets	-	2 (6%)	3 (10%)	14 (45%)	12 (39%)
Fit with existing ways of working	1 (3%)	-	8 (26%)	12 (39%)	10 (32%)
Demands on staff time for training	-	2 (6%)	4 (13%)	16 (52%)	9 (29%)
Demands on staff time in using the app	-	1 (3%)	6 (19%)	13 (42%)	11 (35%)
Capacity for taking on something new	1 (3%)	8 (26%)	10 (32%)	8 (26%)	4 (13%)

Qualitative Insights – Free Text and Interview Data

The questionnaire also provided an open-text space for respondents to elaborate on the preceding answers as factors affecting decision making. Thirteen respondents participated in this part of the study. Semi-structured follow-up interviews with senior managers from supported living services provided rich insights into organizational interest in adopting PBAS as well as into potential barriers and facilitators. These findings reinforce the questionnaire findings and provide data that enable deeper insights.

Facilitators

Specific features and functions of the app were identified as being of interest and drawing toward adoption, that is, facilitators.

> *'Interested if the app – which seems to be able to record daily diary records, medication, as well as everything else – could genuinely replace the digital social care record system we already have in place.'*

Six of the seven interviewees identified that their organization still used a paper-based sheet to record medication; thus, the app's function was deemed to be very attractive. For example,

> *The medication function sounds really good. Not many of the systems do that. Everything else, I think we have and monitor … we have an integrated system for those. Medication is probably the main thing that's standing out.*

The function that received the most interest in both the open-text answers and the interviews was the app's Active Support feature. This interest in the Active Support function of the PBAS app was strongly emphasized in the follow-up interviews, with five of the seven interviewees identifying this as a major attraction of the app:

> *'The app sounds very beneficial in supporting Active Support and specifically skills teaching.'*
>
> *I think that Active Support is the bit which gets lost under PBS and that AS/skills development is the thing that is lacking in staff knowledge and across social care/supported living generally. Skills development and teaching is essential for any empowering model of care, and I think this is what particularly appeals about PBAS. The iplanit function for this is limited, … I have to identify overall outcomes, break these down into numerous steps, with a different recording for each one. Steps then have to be translated into support for tasks for staff. The current system means that reporting on progress means pulling off different records for each step and then collating all the info. In sum, 'a better template for this is how we're going to support the person to learn a particular skill and then how we're going to reduce that support… to be able to do that more quickly and in a more streamlined way this is the bit that appeals to me.'*
>
> *I think that using the PBAS app would develop staff understanding of Active Support and help them as skills developers, something which is difficult to impart to staff. Skills teaching is a really hard skill to learn and there's not much out there on it for direct support staff. You can*

> *get the Active Support training but it's the actual doing of it, the learning and the observations of that … it's missing, and we could do with extra support.'*

> *Everything about this, the activity planning, the visual stuff, the active support structure. This last in particular ... we understand people are allowed to say no to doing things and we promote choice and respect, but we also try to promote potential so to encourage people to do whatever they want to do. Having structure and a timeline will be an interesting one; you don't want people to be pushed into doing things to meet deadlines. However, structured frameworks help staff to understand better things like a seven-week backward training and is there enough support for the person. The colour coded monitoring about implementation will be a big help with that.*

Interviewees articulated that they felt that they had been working on providing positive behavioural support for some time and that they had been successful in implementing this. The embedding of Active Support was seen as an important next step and a logical progression. The PBAS app offers a structured digital framework for Active Support, and this feature is considered appealing by participants.

Other features of the app which were identified as being attractive were the app's facility for creating personalized profiles for service users, 'with all the relevant information being stored in one place.'

Another participant similarly stressed this feature:

> *What appeals is that it sounds like a streamlined system, that is accessible, with all the information about a service user held in one place. It sounds easy to use and the hand-held device is also a draw…. So, accessibility and all the important information being held in one place would mean a lot of time would be saved.*

Finally, a number of interviewees referred to the app's capacity to identify outcomes and provide an evidence base for their achievement, which could be useful for discussions with commissioners.

> *I think the app would facilitate the setting of more person-centred outcomes. This means from a commissioning point of view, there would be evidence about meaningful achievement for the person supported, not just measuring hours of support provided, counting of incidents etc.*

Barriers

Regarding potential barriers, the interview participants were unanimous in their identification of costs as a potential barrier. For example:

> *Cost is probably the biggest factor – what's the added value of adopting? Do the benefits for people supported outweigh the costs?*

> *The major consideration would be cost. This would be the main thing influencing any decision. Seeing a cost-benefit analysis would be hugely beneficial ... we would want some kind of quantification of cost against time saved. Some calculation of tangible measures, such as use of the app would save us x amount of hours.*

> *Cost is of importance of course but when we finally find the right product, this will be less important if the benefits are what we hope for.*

> *I ... like the system very much. However, we have several systems within the company and getting board approval for more cost can be difficult.*

Staff issues regarding resistance to using new technology and/or difficulties in learning to use new systems were also identified as key factors by the four interview participants:

> *We do monitor staff access/log in to the system and we will follow up if we can see that staff are using the system. This still happens, even though we have invested so much in an ongoing training system.*

> *Staff would need to clearly understand the benefits, as it's their workload on a day-to-day basis and they have just been engaged in learning about and using our new digital record system. They need to be involved in the process of this ie what we want to try and why we want to try it. These are the benefits for you and the people you're supporting and get them invested into that. Otherwise, they might turn round and say, 'you've just got us to use the new system and now you want us to learn something else?'*

This is of interest as 'staff willingness' was not one of the most significant factors to emerge from the questionnaire data.

The ease of use and compatibility with existing systems were reemphasised in both the interview and questionnaire data, partly in conjunction with the staff issues identified:

> *The app would have to be integrated with our existing system, IPlanIT, otherwise this would mean asking staff to use too many systems, which runs the risk of them not using any!*

> '*It would be important to us that the app worked alongside the current procedures and digital systems we currently have in place. Through developing our internal digital systems, we have recognised how important ease of use is for our frontline staff and this would be something we would need to consider.'*

> *'To adopt a new app, it would need to be compatible and not double cost for duplicate information.'*

> *We use Google infrastructure for managing support plans and recordings and are invested in calendar-based tools to support this - a separate system would ideally link with this or be good enough to use independently."*

Finally, several questionnaire respondents and all of the interviewees said that more information would be needed to make a decision regarding adoption; that is, they need to know more about what the app offers and how simple it is to use:

> *'We would like to see what PBAS actually offers and how simple it is to use.'*
>
> *We're always interested in trying out new things but need to understand more about the process.'*
>
> *The app sounds like a great idea. In our services, we currently use an online system called iPlanIt for planning and implementing PBS and Active Support. This has a number of shortcomings but works somewhat effectively. For our services to take on a new system, we would need to see that it is better than the system we currently use.'*

Interview participants were also asked about the factors driving decisions regarding the exploration and implementation of any new technology in their organizations as well as about organizational decision-making pathways pertaining to new technology. Regarding the first of these, interviewees spoke of the CQC's drive for digitalization, acting as a major impetus. Two organizations received local authority funding for a new IT system that had been directly borne out of the 'CQC' (White Paper) policy. All interviewees saw themselves as innovators in the sector and as being at the forefront of new developments and indeed as driving change.

> *We like to be at the front of everything. Our MD loves to be able to say, 'we're doing this and we're doing that.' We like to see what's out there and be a sector lead. We're always evolving.'*
>
> *There is a continuous improvement ethos in the organisation. It's about exploring … learning... if there is a better way to be doing things, is there a better system that the one we have at the moment? You don't always know that the way you're doing things is the best way – until you try something new.*
>
> *Our organisation is very person centred and we're always checking to see what we're doing is working and that we are improving peoples' lives. If something isn't working or there is a better way to do it, then we will look at it. So we quite regularly re-evaluate what we're doing and why; asking if it's doing what we need it to do and even if it is, we kind of have that 'so what' approach. It's not working, so what are you going to do about it or it's working really well and that's great but so what? What are you going to do to take it to the next level?'*

The interviewees contextualized this organizational emphasis on innovation and improvement as part of a desire to lead sectoral change/improvement.

> *Part of it is about helping the sector. Part of our mission statement is to change services for the good. So it's about social justice, not just social care.*
>
> *It's about being at the forefront of trialling new things. We like to be involved in helping the sector, identifying new ways of working. We regularly participate in sectoral initiatives and we sit on a range of forums eg the Adult LD Partnership Boards across all the areas we're in, provider forums with other local social care providers, CQC registered managers meetings…. I'd go to the opening of an envelope! We're always keen to be involved in sectoral events and activities, highlighting what we're doing and promoting new and innovative practice.*

This combination of external and internal drivers meant that new technology was part of participant organizations' strategic agendas, an item for discussion at board-level meetings. While specific organizational structures and decision-making fora varied with regard to meeting frequencies, board composition, etc., all participants spoke of technological developments being at the forefront of organizational strategy. For example:

> *We have just created a digital strategy plan ...it's a separate plan for the first time. It was previously part of our business plans and the Five Year Strategy, but this year, a separate plan has been created as the senior management team realised that there were so many technology-related aspects and actions, it needed a distinctive focus....*

Addressing Research Objective 1: Willingness to participate in a future evaluation study/RCT and the barriers/facilitators impacting any such decision

Respondents were asked to identify how likely it would be that their organization would participate in an RCT to test PBAS, on a scale of 1 to 5, where 1 is 'highly unlikely' and 5 is 'highly likely.' A total of 30 responses were received. Table 5 depicts the responses, pointing to a strong likelihood of participation in an RCT with 43% of those answering the question indicating it 'likely' and 33%, 'highly likely.'

When asked about the factors that would influence decisions regarding participation in the RCT, respondents (n = 29), the following figure, and table outline the findings (Figure 2 and Table 6).

Table 5. Respondent Likelihood of Organisational Participation in a RCT for Testing PBAS (N = 30).

	N (%)
1. Highly unlikely	-
2. Unlikely	3 (10%)
3. Unsure	4 (13%)
4. Likely	13 (43%)
5. Highly likely	10 (33%)

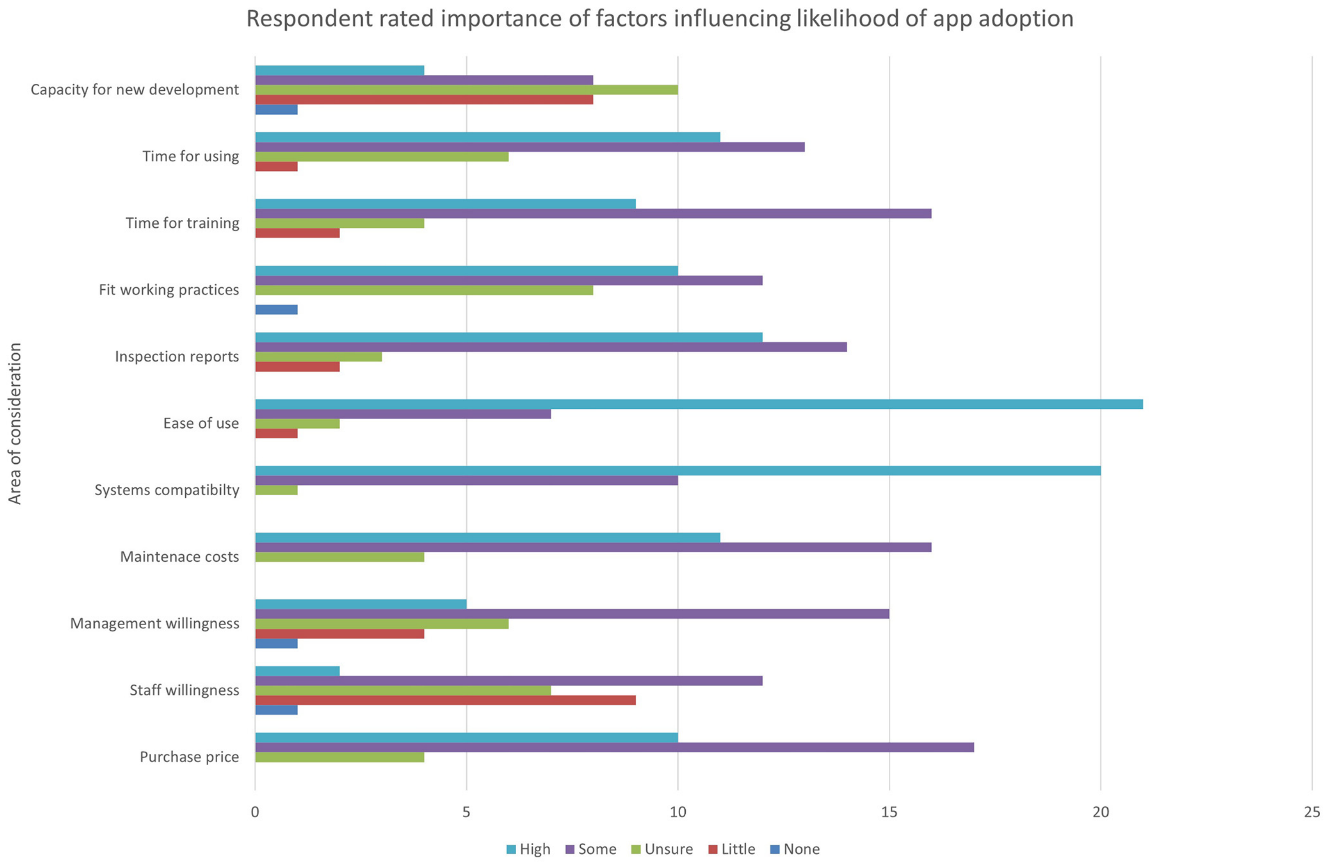

Figure 2. **Respondents' ratings of factors likely to influence RCT participation.**

Table 6. **Factors influencing decisions to participate in any RCT (N = 29).**

Factor	No importance N (%)	Little Importance N (%)	Unsure N (%)	Some Importance N (%)	Much Importance N (%)
Cost to the organisation from taking part in research	1 (3%)	1 (3%)	-	15 (52%)	12 (41%)
Cost to the organisation in adopting PBAS	-	-	1 (3%)	18 (62%)	10 (35%)
Time involved in taking part in research	-	3 (10%)	4 (14%)	13 (45%)	9 (31%)
Impact on work routines	-	5 (17%)	2 (7%)	16 (55%)	6 (21%)
Staff and colleagues; views re research	1 (3%)	5 (17%)	8 (28%)	11 (38%)	4 (14%)

Respondents identified cost as the most significant consideration in relation to participating in any RCT. Cost to the organization in taking part in research was identified as being of 'some' or 'much importance' by twenty-seven respondents, with 52% of all respondents here (n =15) deeming it to be of some importance and 41% (n = 11) of much importance. The cost of adopting PBAS was identified as important by 28 respondents, with 62% of the respondents deeming it of some importance and 34% deeming it of much importance. The impact on work routines was also ranked highly with twenty-two respondents identifying it as important, and the same number also rated the time involved in taking part as being of some or much importance.

The open-text and interview questions allowed for further exploration of barriers and facilitators of participation in research projects as well as with specific regard to any RCT. Regarding barriers, cost has emerged as a potentially significant factor.

> *The organisation is committed to taking part in research and also in embracing technology and innovation in social care. Our experiences are that the cost is a factor, as a charity we do not have big budgets for better ways to do things and local authority/ICB's do not fund as part of care package.*
>
> *We would like to take part in the RCT at no huge cost to the company.*
>
> *Funding is squeezed, like many other sectors, so cost is very important.*

The time involved in gathering data and participating in the study was also identified as a potential barrier.

> '*We would want to know upfront exactly what would be required... what would be needed in terms of time.'*

And:

> *If we could have a breakdown of what's required per staff member in terms of time expected, then that would help us decide.'*

And:

> *The time taken away from usual tasks and activity is also key as we have stretched resources.*

Others spoke of how they had experienced staff resistance to the implementation of technology/new digital systems in the past and therefore emphasized that getting staff buy-in would be essential. This would be significantly aided by a robust training package (see *Facilitators).*

Facilitators

An emergent facilitator that was strongly emphasized in both the interviews and questionnaire free-text answers was that trial participation – and the running of the app in one residence as compared to a control setting – would allow the organization to test out the app and have a trial run before any decision to roll out to the wider organization. Participation in any RCT would also provide a trial period for the organization. For example:

> *Our CEO is very keen for the organization to be included in the trial. Initially, we're keen to participate in the trial and see how it goes; we can explore whether PBAS is better than our current system; does it allow for the gathering of more, higher quality data than the current system? Being in the trial will give us exactly that – an effective trial to see if it works for us.*
>
> *The trial would be great. We're really keen to find new tech that works for us and everything about this app appeals. The trial would allow us to test if it works for us, to try it out, iron out any issues … I like the idea of using it on one or a small number of residences during the trial before any attempt around a wider roll-out.*
>
> *I manage a service in one part of the country. Many of us do work independently on some projects with others being standardised across the country. If I were to decide to pilot this in my own service, it would not necessarily impact the rest of the organisation.*
>
> *I quite like the idea of trialling the system in one location – it's what we did with the digital system we are currently implementing.*
>
> *We would prefer to trial in some services therefore the impact to the organisation would be significantly minimised but would still provide us with the necessary feedback.*

Regarding the other facilitators, all interviewees stated that they would like more information about trial participation. Moreover, there was consensus that the use of the app was free for the duration of the trial. For example,

> *We wouldn't want to pay for the app for the duration of the trial at least. If we continued with it after the trial, we would of course sign up for the contract. But payment for the app during the trial would be a barrier.*

Interviewees also stressed that there would need to be training for staff in the use of the app, and that they would like ongoing support. They also stated that they would need information on how training and support would be delivered and would need more information in advance.

> *A robust training package and support for app use. We would need clarity as to how training will be delivered and how staff will be supported in using the app.*

This was important because some organizations have identified staff resistance to new technologies.

> *We do have some staff who are quite reluctant to change existing modes of working, particularly in relation to the use of technology. They've been with us for years and are excellent at their jobs, but they're just not 'tech-savvy.' They would need support with the app, or it will be doomed to failure. We would need to be able to support staff; if they can see clear benefits to using the app and taking part in the trial, that would help with getting 'buy-in.'*

Strong emphasis was placed on having more information in advance. This extended to having clarity as to anticipated organizational benefits/benefits for staff, as well as clarity over requirements for staff during trial participation and what the observation periods would look like. The following quote provides the summation.

> *We are always keen to explore new ideas but will need more information on what is required.*

In line with this, all interviewees spoke of the need to know more about observation periods during the trial so that any impact on services and activities could be minimized. Sensitivity to service users' needs and wishes was emphasized as being of great significance.

> *Observation would not be an issue, but we would require some notice and time to plan in advance, so that there would be no impact on a person's activities or appointments. We would need some time in advance to speak with the persons supported and explain what the observation is for and also what would be involved. This would also be essential.*

Participation in Research in General and Decision-Making around This

Finally, interviewees were asked about their participation in research projects and how decisions regarding such participation were made. All but one of the interviewees said that their organization took part in research projects on a regular basis. Such participation was located within the organizational drive for improvement and innovation, as such participation would be assessed based on whether the organization would benefit, but a broader desire to drive sectoral improvements was also stressed. Interviewees spoke of not actively seeking research projects, but they responded to approaches made by researchers. In all cases, the participants spoke of the need for board approval for research participation. Research proposals were discussed in senior management meetings prior to the decision to participate.

Research Objective 2

This objective focused on producing evidence to underpin the co-production of an evaluation package acceptable to staff and service users.

Outcome measures for proposed RCT

The consensus from the focus groups and individual interviews was that being active inside and outside the house was very important to people. Having staff assistance for activities was seen as important for being able to do (more) activities, and as a source of help and support. Interviewees stated that they valued research that shed light on people's lives and activities within supported living services.

The acceptability of direct observation

The process of direct observation was explained by the researcher and support workers, and all participants agreed to someone coming to their home and observing what happened on a day-to-day basis. Thus, the participants said that they thought direct observation would be an acceptable procedure.

However, for some, the initial response was framed by the current researcher as being that person.

> Adult Participant 1: *"Yes, **you** can come and see what we do, you'd be very welcome."*
>
> Adult participant 2: *"When will you come again?"*
>
> Adult Participant 3: *"You can come any time you want-just let the staff know that you'll be coming."*

This highlights the importance of building a relationship with people prior to carrying out research

Current levels of activity engagement and views on how much activity is desirable

Item (c) formed the largest part of the interview content, with people sharing their daily and weekly routines. People engage in a range of activities both inside and outside of their homes. However, the focus of people's conversations and answers to open-ended questions tended to be on activities external to the home. When prompted, people would discuss what they did in the home, with chores such as cooking, cleaning and washing, and leisure, watching TV and listening to music being amongst the main activities.

Not everyone in the focus groups or interviews had 24-hour support (either shared or on a 1:1 basis); therefore, there was a variation between the amount of activity people in supported living were engaged in, particularly when it came to activities outside the house. In terms of making a difference in their lives, the support staff noted that additional staff hours (for some, but not all, participants) would make a difference in opportunities to engage in activities, particularly those located in the community.

For some people, a specific 1:1 staff hour facilitated activities outside the home, as one support worker noted:

> *"Your support here is in the evening…. Tuesday, Wednesday, Thursday from 5:00 till half nine, she has somebody come in. Yeah, just to do her one to one. We usually go out but we didn't go out last night. Just stayed in".*

When two or more people shared a house, it was difficult to ascertain the 'share' of staff hours, and it appeared that staff would support more than one person to shop, cook, and clean simultaneously, whereas some people had support with personal care and individualized activities. For some participants, there appeared to be some flexibility between staff hours, with weekly 1:1 hours being 'banked' to facilitate a longer trip or overnight activity.

When asked 'in an ideal world,' if there were any activities people would like to participate in, responses were muted and tended to focus on the availability of staff to facilitate activities external to the home. For one participant (living in a rural location) it appeared that suitable local activities did not exist.

> Support Worker: *"Yes, we've been looking for a bingo club-the nearest one is in XX (mentions name of town) but we have to go in a taxi and by the time you have bought the tickets it's going to be about 60 or 70 quid yeah".*
>
> Adult participants: *"Yeah. And we're looking for karaoke as well".*
>
> Support Worker: *"Well, we're still looking for you to try and find somewhere more local."*

Interestingly, none of the participants referred to wanting to do more activities at home, with some stating that they did not enjoy household tasks and preferred other tenants or support staff to take over. For other participants, support staff noted a difference in expectations between people who had recently moved into the accommodation after living at home supported by family and those who had lived in the supported accommodation for some time.

> Support Worker: *"Well, our ethos is for people to be independent, well as much as they can be-when you moved in 'Mary' you expected us to do everything for you didn't you?"*
>
> Adult participant ['Mary'] (laughs): *"Yes just like my Mum and Dad did".*

Research Objective 3

RO3 focused on understanding Treatment as Usual (TAU) in terms of the recording systems that service providers already have in place – whether digital, paper-based, or hybrid – and the activities that they currently record. The data collection methods were Questionnaire 2 and follow-up interviews with service providers.

There were 25 responses to Questionnaire 2. It should be noted that the participating organizations also answered Questionnaire 1, but a smaller number answered Questionnaire 2. Furthermore, the respondents who answered the questionnaire also differed in some cases; more Registered Managers, as opposed to senior directors, completed Questionnaire 2 (24%). In addition, 40% of the respondents were employed in specialist advisory roles such as PBS leads or psychologists. Most respondents worked in larger organizations with more than 20 settings (36%). 88% of the respondents worked in organizations based in England (there was a good regional mix), and 12% worked in Wales.

It should be noted that none of the service providers used a fully digital system for all areas of activity; most activities were recorded via digital systems, but these were supplemented with paper-based records for some activities, particularly for medication (56% using a paper-based system, which affirms earlier findings (see above).

This was corroborated by the interviews; only one of the seven interviewees reported using a digital medication system. In this context, five of the seven interviewees utilized a care sector-specific system (iPlanIt [2], Nourish [1], Zuri [1], and OneTouch [1]), whereas the remaining two used generic systems (modified Sharepoint and Excel/NextSteps for the other). This was not strictly related to organizational size; the organization using Zuri was a small organization, while the organization utilizing Excel was of medium size.

Interviewees explained that using a digital system for medication is associated with risks. For example:

> *It's on Zuri but it's a system function that we don't use, at the moment. It's never looked robust enough, to be honest, so we stick with the paper-based MAR sheets. That's no disrespect to the system but we use MAR sheets … we've got a good system going. It's something that we haven't explored really, computerised MAR sheets. The system we've got works. Another factor is error. If you have a paper MAR sheet and there's an error on it, you either hide it or you don't, but you can see if it's been covered up and you can go in and check. But with a computerised system, you wouldn't see if*

Table 7. **TAU: Systems in Place and Activities Recorded.**

Total N=25	Paper-based (formal) recording system N (%)	Paper-based (informal) recording system N (%)	Digital recording system N (%)	There is no recording system for this activity N (%)	Missing N (%)
Care plan (N=15)	7 (28%)	-	18 (72%)	-	-
Daily Activity Plans (n=12)	3 (12%)	1 (4%)	18 (72%)	-	3 (12%)
Weekly activity plans (n=22)	3 (12%)	4 (16%)	13 (52%)	-	3%
Staff allocation for each activity (22)	3 (14%)	4 (16%)	14 (56%)	1 (4%)	3 (12%)
Medication (N=22)	14 (56%)	1 (4%)	7 (28%)	-	3 (12%)
Challenging behaviour incidents (18)	6 (24%)	-	16 (64%)	-	3 (12%)
Challenging behaviour interventions (22)	9 (36%)	-	13 (52%)	-	3 (12%)
Learning new skills (22)	5 (20%)	3 (12%)	12 (48%)	2 (8%)	3 (12%)
Community presence (21)	5 (20%)	-	16 (64%)	-	4 (16%)

> *it's been changed or covered. I'm sure it's safe but we have some serious meds for some of the guys and it needs to be checked and we need to be sure it's being done properly. It's not something that we wouldn't explore in the future though.*

And:

> *We still use paper-based MAR sheets. I think this is one of the things that people think will be most risky to do if you have IPlanIt but it has the most benefits if you do it right. And it is something that we want to move to eventually but we're not quite there yet.*

Table 7 shows that 36% of organisations were using a paper-based system for the recording of challenging behaviour interventions. Also noteworthy is the data relating to learning of new skills. This has the second lowest use of digital system (48%), with only medication use being lower (28%). This activity also had the highest figure for there being no recording system in place, neither digital nor paper-based (8%). This can be seen as aligned with findings from Questionnaire 1 and the interviews, as to Active Support and skills teaching being an area which services wish to develop.

Activity planning was performed using paper-based (16% of service providers) or digital systems (72%). There was no geographical variation as no areas in England were more likely to use paper-based systems (χ^2 = 6., p=0.436). Large providers (with 20+ settings) reported using both paper-based (n=3) and digital systems (n=4), whereas all smaller providers reported using only digital systems for activity planning. The interview data indicated the use of hybrid systems for activity planning, as illustrated by the following quotes:

> *IplanIt has the functionality to do activity plans but we find that still do printed out activity planners because it is more person-centred for some of the people that we support. Some people still like that visual aspect – 'I can see what I'm doing' – so people do have Velcro-activity planning board, they can pick out activities that they want to do for that day.*

Interview data also revealed that staff allocation/rota planning was usually performed on a separate HR-based system (or Excel sheet), even where care software was in place (the Nourish system was the exception here).

Respondents were also asked about the ease of use of the existing systems (where they reported having a digital system) for each activity recorded. Table 8 presents the results of this study.

As shown in Table 8, most respondents found their (digital) systems easy to use, with only 8% reporting that the systems were difficult to use. This number increased when the activity recorded was learning new skills (service users) (20%) and challenging behaviour incidents (16%).

The interviewees reported that their digital systems were easy to use, and that they used care sector-specific software. However, this was a result of a lot of initial work (and often, ongoing modification) to tailor the system to the organization's specific needs. For example:

> *The system is very new and we are still working through it. It has taken a lot of time to set it up. This was difficult and time-consuming... we were still modifying it at the same time as navigating the system. We've had to modify and tailor the system to what we actually want here. However, now that set-up is done, the system is effective and easy to use. So from the export point of view, for example, the digital system means much greater ease in exporting info and generating reports than manually going through peoples' written notes.*
>
> *We've worked really hard on getting the system to do what we want it to do. We worked with the CEO of the company that built it and every time we went in, they said just tell us what you want and we'll build it. It's*

Table 8. Ease of Use of Existing Systems (N =25).

	Difficult N (%)	Mostly easy N (%)	Entirely easy N (%)	Missing N (%)
Care plans for each service user	3 (12%)	13 (52%)	5 (20%)	4 (16%)
Daily activity plans	2 (8%)	9 (36%)	10 (40%)	4 (16%)
Weekly activity plans	2 (8%)	11 (44%)	7 (23%)	5 (20%)
Medication use	2 (8%)	13 (52%)	6 (24%)	4 (16%)
Challenging behaviour incidents	4 (16%)	11 (44%)	6 (24%)	4 (16%)
Challenging behaviour interventions	3 (12%)	14 (56%)	4 (16%)	4 (16%)
Learning new skills	5 (20%)	9 (36%)	7 (28%)	4 (16%)
Community presence	2 (8%)	10 (40%)	9 (36%)	4 (16%)

> *taken a good three or four years to set up properly but we always go on the last person through the door so if the last person in the door can understand it, then we're there. We've got that. It really does work; we work really well with systems. Simplicity is the key to it; the easier it is, the more time can be spent actually supporting people. We're constantly reviewing it and constantly trying to make it better; there's been a lot of hard work to get to this point.*

This finding was reflected in the number of open-text answers to the questionnaire.

> *The digital system we use is initially time consuming to set up, but then works quickly and efficiently, with real time data on activities and support being provided.*
>
> *We use a digital system which is quite good but still need lots of development to give us what we need*
>
> *We use a system that was primarily designed for education settings and have had modifications made to the system to work across all of our services - Residential, Respite, Day Opps and Supported Living.*

Research Objective 4

The RO4 reviewed a range of potentially suitable measures for future cost-effectiveness analyses. This review highlighted the lack of an appropriate preference-based, generic health-related QoL measure for the LD population (Benedetto *et al.*, 2023; Russell *et al.*, 2018). However, as the PBAS intervention does not clearly impact physical health, such measures would not be suitable, even if they were available. The review considered contemporary HRQL measures, such as the ReQol-UI (Keetharuth *et al.*, 2021) and EQ-HWB (Brazier *et al.*, 2022; Mukaria *et al.*, 2023; Peasgood *et al.*, 2021), which place a greater focus on improvements in mental health. However, these measures were also a poor match for PBAS evaluation because of their inability to capture the benefits of the PBAS intervention (HRQoL-IDD), the lack of self-reported and proxy versions (ReQoL-UI), and an early stage of development (EQ-HWB). Given that PBAS focuses on QoL as the main indirect impact, this review covered social care-related QoL measures and found that the Social Care Related Quality of Life (SCRQoL) questionnaire – the ASCOT measures – was a potentially appropriate measure to capture the benefits of the PBAS intervention. The ASCOT is a suite of tools designed to measure the QoL domains most affected by social care, that is, SCRQoL. There are versions for service users and informal caregivers that enable the collection of information from people with LD who may not be able to self-report. The SCRQoL considers control over daily life, personal cleanliness and comfort, food and drink, personal safety, social participation and involvement, occupation, accommodation, cleanliness and comfort, and dignity. While more geared towards the social care of older people, such a measure would provide a closer match to a PBAS evaluation in terms of the longer-term outcomes (QoL rather than physical or mental health) and setting (social care rather than health services research).

RO4 also assessed the feasibility of using the PBAS app compared to existing systems (treatment as usual; TAU), adopting a health and social care perspective. Data were gathered in Questionnaire 2 regarding the amount and intensity of support staff use of digital systems on both daily and weekly bases. Table 9 presents the results for daily use, and Table 10 shows weekly use.

The findings suggest that this method of data collection was easy for the participants to complete, and there were no missing data. The findings supported the feasibility of using a similar approach in a future RCT for costing PBAS and any other digital system (i.e., TAU) service use.

Discussion

This study assessed the feasibility of proceeding with a future RCT that would evaluate the effectiveness of the PBAS app compared to existing systems. Each aspect of the data

Table 9. Frequency of daily use of digital systems.

	Half an hour	One hour	Two hours	Three hours	Four or more hours	Missing
Care plan (N=18)	5 (28%)	4 (22%)	5 (28%)	2 (11%)	2(11%)	-
Daily Activity Plans (n=18)	8 (44%)	6 (33%)	2(11%)	1 (6%)	1 (6%)	-
Weekly activity plans (n=13)	6 (46%)	3 (23%)	3 (23%)	-	1 (8%))	-
Staff allocation for each activity (n=14)	4 (29%)	3 (21%)	5 (36%)	1 (7%)	1 (7%)	-
Medication (7)	2 (29%)	2 (29%)	1 (14%)	2 (29%)	-	-
CB (n=16)	11 (70%)	1 (6%)	3 (19%)	1 (6%)		-
CB intervention (13)	8 (62%)	3 (23%)	2 (15%)	-	-	-
Learning new skills (n=12)	7 (58%)	2 (17%)	2 (17%)	-	1 (8%)	-
Community presence (n=16)	10 (63%)	3 (19%)	3 (19%)	-	-	-

Table 10. Frequency of weekly use of digital systems.

	One day	Two days	Three days	Four days	Five days	Six days	Seven days	Missing
Care plan (N=18)	1 (6%)				1 (6%)		16 (89%)	-
Daily Activity Plans (n=18)							18 (100%)	-
Weekly activity plans (n=13)	2 (15%)						11 (85%)	-
Staff allocation for each activity (14)	1 (7%)	1 (7%)					12 (86%)	-
Medication (7)							7 (100%)	-
CB (n=16)incidents	3 (19%)	1 (6%)		1 (6%)			11 (69%)	-
CB intervention N=13	1 (8%)	2 (17%)		1 (8%)			8 (67%)	1
Learning new skills (n=12)		2 (17%)		2 (17%)			8 (67%)	-
Community presence (n=16)		1 (6%)		1 (6%)	1 (6%)	1 (6%)	12 (75%)	-

gathered was favourable, indicating the feasibility of future trials. The surveyed and interviewed providers of supported living expressed interest in both adopting the app and participating in future trials. The Active Support and medication recording functions of the app were particularly well received and favorably rated by the participants. Moreover, providers articulated their interest in trial participation around this, providing them with the opportunity to try out the technology in one of their settings prior to any organization-wide rollout. This is perceived as a major benefit. Service users and support staff conveyed that observation in people's homes would be acceptable, and suggested other ways that could augment data collection processes (e.g., the use of photos and discussions with family members and friends as ways of eliciting more information). Moreover, the scoping review identified a potentially suitable SCR-QoL measure (ASCOT) and devised a methodology for costing apps and existing recording systems. Overall, the data provide positive support for future trials.

Based on this, a protocol for future RCT was developed. Importantly, however, the organization that developed and licenced PBAS decided not to continue with the technology. Such a decision is perhaps unsurprising when located in the wider context of promising technological innovations all too frequently being abandoned or non-adopted by firms, with failed attempts to scale up locally, diffuse more widely and distantly, or even sustain an innovation at the organizational level over the long term, being all too typical of the innovation landscape (Greenhalgh *et al.*, 2017). These general patterns of abandonment, short product lifecycles, and failure to scale-up/diffuse widely identified in the innovation diffusion literature and often explained regarding barriers and facilitators, are replicated in the health and social care sectors, and indeed may be intensified therein (Flessa & Hubner, 2021).

These problems of abandonment, scale-up, and diffusion essentially mean that technological innovations typically have short product lifecycles and often become obsolete very quickly. This causes further difficulties, given the pressing need to establish robust evidence regarding the effectiveness of interventions within the fields of health and social care. RCT designs dominate health research; it is axiomatic that such designs, while methodologically robust, are costly and time-consuming to design, fund, and implement, taking an average of six years from start to finish (Baker *et al.*, 2014). This means that a fundamental tension exists between the potential brevity of an innovation and the length of time needed to build an evidence base for effectiveness, in contrast to the short timeframes that abound in the frequently changing arena of technological innovations. This makes it increasingly difficult for researchers to evaluate interventions before such technologies become outdated or obsolete (Baker *et al.*, 2014; Mummah *et al.*, 2016).

Ethics approval and consent

Data collection followed the ethical principles of the Declaration of Helsinki for research involving human participants. The Health Research Authority (HRA) decision-making tool indicated that the feasibility study was extended PPI and did not constitute research. However, as the project involved adults with a learning disability, the opinion was sought of the Research Integrity Governance and Ethics Team (RIGE) and the Research Ethics Committee (REC) at Cardiff University's School of Medicine. RIGE and the REC (3rd January 2024) confirmed that the feasibility study was designed as an extended Patient and Public Involvement (PPI) consultation, which was conducted to support the development of the protocol of a future study. As such, they advised that there was no need for further ethical review.

The GDPR (https://www.legislation.gov.uk/eur/2016/679) requires informed consent is obtained to process personal data. Written consent was not sought because no personal data were collected.

Specifically,

- Signed consent was not sought prior to participation in the survey, as participation was anonymous and no personal data were collected.
- Signed consent was not sought for interviews with service providers or commissioners because participation was anonymous and no personal information was collected.
- Signed consent was not sought for participation in focus groups or interviews involving staff in services and adults with a learning disability, because no personal information was recorded about the interviews and focus groups or the name of their service provider in the interview file.

All participants were provided with information about the study prior to their involvement, and consent was obtained through participation, while assent was also checked verbally prior to the interviews and focus groups. All data gathered, stored, analysed, and reported were anonymous, and all participants were informed that neither they nor their organizations would be identifiable from their contributions.

Data availability

Underlying data

Open Science Framework: Establishing the feasibility of a large-scale RCT of Positive Behavioural and Active Support (PBAS): A digital technology for supported living services in learning disability. https://doi.org/10.17605/OSF.IO/RWE23 (Toogood *et al.*, 2025)

This project contains the following underlying data:

- Data file 1. (Commissioner interview)
- Data file 2. (Service user focus group transcripts)
- Data file 3. (Service provider interviews)
- Data file 4. (Service user interviews)

Data are available under licence CC0.1.0 Universal.

Extended data

Open Science Framework: Establishing the feasibility of a large-scale RCT of Positive Behavioural and Active Support (PBAS): A digital technology for supported living services in learning disability. https://doi.org/10.17605/OSF.IO/RWE23 (Toogood *et al.*, 2025)

This project contains the following underlying data:

- ○ Folder 1 Focus group
- ○ Folder 2 Interview and Survey
- ○ Folder 3 Participant Information Sheets

Data are available under licence CC0.1.0 Universal.

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