International Journal of Science Education, Part B
Communication and Public Engagement

ISSN: 2154-8455 (Print) 2154-8463 (Online) Journal homepage: www.tandfonline.com/journals/rsed20

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To cite this article: Lowri Wilkie, Zoe Fisher, Andrew Haddon Kemp, Suzanna Charles & Jessica Fletcher (03 Oct 2025): ‘We’re not daft, we’re not stupid, we can still learn’ – the impact of informal science learning on wellbeing in acquired brain injury, International Journal of Science Education, Part B, DOI: 10.1080/21548455.2025.2556047

To link to this article: https://doi.org/10.1080/21548455.2025.2556047

INTERNATIONAL JOURNAL OF SCIENCE EDUCATION, PART B
https://doi.org/10.1080/21548455.2025.2556047

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‘We’re not daft, we’re not stupid, we can still learn’ – the impact of informal science learning on wellbeing in acquired brain injury

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ABSTRACT
Science engagement centres offer interactive, hands-on experiences that foster curiosity and public engagement with science. This pilot study explores the integration of a UK science engagement centre, Oriel Science, into social prescribing for individuals with acquired brain injury (ABI). A ten-week structured intervention was delivered through science-based workshops. Quantitative wellbeing outcome measures were combined with qualitative reflections from participants, caregivers and academic presenters. Findings showed consistent improvements in wellbeing, with participants reporting enhanced cognitive engagement, motivation and social connection. The sessions provided a stimulating environment that helped participants reconnect with cognitive skills they felt had been lost after injury. Academic presenters also found the experience unexpectedly rewarding themselves, noting strong participant engagement and a renewed sense of purpose. This is the first study to link a science engagement centre with healthcare delivery, offering science-based social prescribing as part of ABI rehabilitation. Results highlight the potential of curiosity driven learning to support recovery, promote wellbeing and strengthen scientific literacy. The study underscores the role of universities in public engagement, particularly in an age where science communication and critical thinking are vital for societal resilience.

ARTICLE HISTORY
Received 29 April 2025
Accepted 29 August 2025

KEYWORDS
Social prescribing; brain injury; science education; wellbeing; science engagement

Introduction

Acquired brain injury (ABI) is a significant public health concern due to its high incidence, the profound impact on individuals’ health and the demand placed on strained healthcare systems (Maas et al., 2022). In the UK, around 900,000 people visit Accident and Emergency for head injuries annually, with 1.3 million living with related disabilities, and traumatic brain injuries alone cost the UK an estimated £15 billion per year, about 0.8% of GDP (UK Research and Innovation, 2022). ABIs often result in significant cognitive, behavioural, emotional, social and physical challenges (Kuenemund et al., 2016). As a result, many individuals experience unemployment and

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are unable to resume hobbies and roles in their community, leading to a change in self-identity, reduced opportunity for socialisation, increased loneliness and a diminished sense of purpose (Gracey et al., 2009; Ownsworth & Haslam, 2014). Moreover, cognitive deficits such as memory impairment and executive dysfunction can lead to feelings of frustration and a perceived loss of competence, as individuals may struggle with tasks they previously managed with ease (Wilson et al., 2021). Addressing these challenges requires innovative, community-based approaches that promote social engagement, learning, and personal growth.

One such approach is social prescribing, which is defined as 'connecting citizens to community support to better manage their health and wellbeing' (Public Health Wales, 2022). This can include activities such as sport, dance, art, volunteering, and advice services for example. While museums and cultural institutions have increasingly been recognised for their role in promoting wellbeing and potential for improving public health (Camic & Chatterjee, 2013; Camic et al., 2019; Thomson et al., 2018), science engagement centres remain largely unexplored in this context. Given the potential for curiosity-driven learning to enhance psychological wellbeing and resilience (Galli et al., 2018; Sakaki et al., 2018), science engagement programmes may offer a novel avenue for social prescribing. Moreover, in the case of ABI, there may specifically be an underutilised opportunity to foster learning and reconnect individuals with cognitive skills they may feel have been lost through intellectually stimulating and socially interactive environments.

The GENIAL model of wellbeing (Kemp & Fisher, 2021, 2022; Kemp et al., 2017; Mead et al., 2021) highlights that flourishing extends beyond clinical recovery, defining wellbeing as a connection to self, others, and the planet. ABI recovery is not just about treating deficits but rebuilding identity, confidence, and purpose. Science engagement supports this by offering intellectual stimulation, social connection, and cognitive re-engagement, helping individuals rediscover abilities and reintegrate into the community. Whilst a focus on reducing symptoms and a medical model view of recovery is essential in acute stages of ABI, later in the recovery process holistic interventions are also needed to provide new possibilities, and help individuals move toward a fulfilling and connected life (Wilkie et al., 2022). By embedding science engagement within social prescribing, it supports a shift to a holistic, person-centred approach that fosters learning, growth, and independence.

Oriel Science, a science engagement centre in Swansea, UK (https://www.orielscience.co.uk/), provides interactive, hands-on experiences designed to ignite curiosity and facilitate community engagement with science. The present mixed-methods pilot study evaluates the impact of a ten-week Oriel Science intervention on the wellbeing of individuals with ABI, integrating quantitative welbeing measures with qualitative insights from both participants and presenters. To our knowledge, this study is the first to establish a collaboration between a science engagement centre and the healthcare system, enabling patients to access science-based interventions as part of their rehabilitation at no cost. Findings aim to inform the potential of science engagement as a meaningful tool within social prescribing frameworks, benefiting both individual wellbeing and broader public engagement with science.

Methodology

Participants

The evaluation included individuals across three distinct groups:

- Indivdiuals living with acquired brain injury (ABI) who participated in the intervention
- Family members or caregivers who accompanied ABI participants
- Academic staff (presenters) from the University who delivered the intervention sessions and later provided reflections on their experience of leading them.

All provided informed consent before participating in the study. ABI participants were receiving neurorehabilitation services under the Community Brain Injury Service in South Wales. They were invited to attend the intervention if they (1) met the eligibility criteria for the service and (2) were deemed by their treating clinician to potentially benefit from the group intervention. Clinicians assessed potential benefit based on whether the intervention could support participants in achieving their rehabilitation goals and their ability to engage in the intervention safely and meaningfully.

Design

The study employed a mixed-methods design that combined quantitative and qualitative approaches. Alongside validated survey measures, participants were invited to provide open-ended written reflections within the questionnaires, and a focus group was conducted to explore experiences in greater depth. The focus group included eight ABI participants and four family members, facilitated by a clinical psychologist from the Brain Injury Service. The psychologist attended only the first intervention session and had no role in subsequent delivery, ensuring participants could speak freely. In addition, five academic presenters were interviewed individually via one-to-one online Zoom interviews, guided by a structured topic guide. Both the focus group and presenter topic guides have been made available in the supplementary materials (https://osf.io/37m4u/).

Ethical considerations

Ethical approval for this study was obtained from Swansea University. Research Ethics (Approval Number: 2 2023 7921 7523). Formal ethical review by the UK National Health Service (NHS) was not required for this evaluation as per the guidance provided by the UK Health Research Authority (HRA; HRA Decision Tools). This is because such evaluations are considered to pose minimal risk. No randomisation, experimental conditions, or control groups were employed, and the intervention was not withheld from any eligible participants. Patient care remained consistent with usual treatment. All participants who attended the group also took part in the evaluation, and all provided informed consent. Participants were informed of their right to withdraw at any time without consequences. To ensure confidentiality, identifiable information was removed during data transcription.

Survey materials

Participants completed two measures adapted from the UCL Wellbeing Toolkit (Thomson et al., 2018): the *Positive Wellbeing Umbrella* (PWU), administered before and after each session, and a *Thoughts & Comments Sheet* completed at the end. The PWU is a validated visual measure of wellbeing consisting of a hexagon divided into six coloured sections, each representing a positive emotion (enthusiastic, excited, happy, inspired, active, alert). Participants rated the intensity of each emotion on a 5-point scale (1 = lowest, 5 = highest), yielding a total score out of 30. Validation work has demonstrated the PWU's construct validity (sensitivity to change in wellbeing) and convergent validity (correlation with established wellbeing scales; Thomson et al., 2018). In the present study, the PWU demonstrated acceptable internal consistency, with Cronbach's α ranging from .66 to .79 across sessions. The *Thoughts & Comments Sheet* complemented the PWU by providing open-ended 'thought bubble' prompts, encouraging participants to record personal reflections and adding qualitative depth to the wellbeing data.

Intervention

Participants attended nine weekly sessions as part of the Oriel Science intervention, held at their centrally located venue in Swansea, UK. Each session lasted approximately two hours and was designed to engage participants with interactive talks led by academics from Swansea University. The intervention aimed to enhance psychological wellbeing, encourage social interaction, and spark curiosity by introducing participants to diverse and accessible scientific topics.

Sessions followed a consistent structure: a brief introduction to the topic, an interactive activity (e.g. discussions, debates, hands-on experiments, or art-based tasks), and time for group reflection and social exchange. Although facilitators were provided with suggested timings, flexibility was encouraged to allow sessions to progress at the pace of the group. Each workshop was self-contained and did not follow on from the previous week.

(1) **Introduction**: The first session introduced participants to the project and to each other. The following nine sessions covered the following themes:
(2) **Hands-on Science!** Participants engaged with interactive experiments, exploring scientific principles of non-Newtonian fluids through simple practical exercises. They also received a tour of the venue and had time to interact with other exhibits.
(3) **Brain Waves and Meditation**: This session focused on understanding brain activity and how practices like meditation influence mental states and wellbeing. Participants discussed technology's role in health, debating whether it supports or undermines wellbeing and social connection.
(4) **Deepfakes**: A debate-based session examining the creation, implications, and possible positive uses of deepfake technology, prompting reflection on media literacy and trust.
(5) **Time, What a Concept!** Interactive talk and demonstrations on the physics of time, including how time is experienced differently under gravitational forces. Participants engaged in mini-demonstrations to bring abstract concepts to life.
(6) **Global Visual Language:** Discussion on how symbols communicate across cultures, followed by a group activity matching symbols to meanings, illustrating the need for clarity and universality in visual communication.
(7) **Blood, Blood, Glorious Blood**. Participants learned about the science of blood, and took part in a hands-on blood typing activity. Participants were tasked with identifying the blood group of a patient and determining which of three donors they could receive blood from.
(8) **Micrometeorites**. Introduced cosmic dust science and its role in understanding the universe. Participants became 'stardust hunters,' using microscopes to identify micrometeorites; one participant was so inspired they wrote a poem, now displayed at Oriel Science.
(9) **Environment and Health**. Interactive discussion on how environmental factors (e.g. green space, housing) shape health and wellbeing. Participants drew 'ideal neighbourhoods' and shared designs with the group.
(10) **Imaging Ancient Cyprus**. Participants were introduced to the Ancient Cyprus collection with a short talk on the origins of collection items. The session then progressed to an interactive discussion on why artefacts are important and how they can connect us to ancient cultures; for example imagining the life of the individual whose fingerprint is preserved in the clay model of a horse. Participants were then invited to recreate the clay model whilst considering what modern-day items they think would represent our cultural heritage to future generations.

Statistical analysis

Quantitative data were analysed using R. Due to the small sample size and lack of a control group, inferential and parametric statistical tests were not employed. Instead, descriptive statistics (means and standard deviations) and effect sizes (Cohen's d) were used to explore trends and assess the magnitude and direction of changes in wellbeing and emotional states. This analysis aligns with the exploratory nature of the study.

Qualitative analysis

Qualitative data was analysed using reflexive thematic analysis, following the six phases outlined by Braun and Clarke (2006, 2019): (1) familiarisation with the data through repeated reading, (2) initial coding of data extracts, (3) searching for themes by collating codes, (4) reviewing and refining themes, (5) defining and naming final themes, and (6) writing the findings. Author LW (PhD student and former assistant psychologist in the Brain Injury Service) conducted the thematic analysis.

In line with recommendations from Byrne (2022), coding was conducted by lead author only, then co-authors later collaborated to sense-check themes and offer alternative interpretations of the data with the aim of developing richer meanings, rather than coding consensus. Coding was conducted using ATLAS.ti, with a reflective notebook maintained throughout the process to document ongoing thoughts, interpretations, and decisions. This reflexive approach allowed for transparent engagement with the data, ensuring the findings were grounded in participants' experiences while acknowledging the researcher's active role in shaping the analysis.

Lead author positionality statement

As a PhD researcher employing thematic analysis, I recognise that my academic background and professional experience influence my understanding of wellbeing. Having grown up and lived in the area of the UK where the study took place, and with years of experience working with people with brain injuries within the same service, I have a strong understanding of participants' language, slang, cultural references, and experiences related to brain injury. This familiarity supported my ability to interpret the data with nuance. I was not involved in the delivery of the intervention or the collection of data, which allowed me to focus solely on the analysis. While my knowledge of wellbeing frameworks, including the GENIAL model, has shaped my conceptualisation of wellbeing, I made a conscious effort to remain data-driven, ensuring that participants' experiences guided the analysis and prioritising their unique perspectives over any preconceived frameworks.

Demographics

Table 1 summarises participant demographics, providing context for interpreting the wellbeing and qualitative findings.

Background participant context

During the formal interviews conducted as part of the study, participants opened by providing a brief qualitative insight into their experiences of living with ABI. Specifically, they were asked to

Table 1. Participant demographics.

Characteristic	Value
N Participants Living with ABI	11
N Family Member Participants	5
N Academic Participants	5
Age range (years)	49–71
Mean age (years)	61
Gender distribution (%)	66% Male
Time since injury (ABI participants)	1–12 years (majority >3 years)
Employment status (ABI participants)	All unemployed
Type of ABI Injury (ABI participants)	Traumatic brain injury (road traffic accidents, falls), subdural hematoma, metabolic toxic encephalopathy, ABI secondary to radiosurgery

describe how their lives had changed since their injury. These themes highlight the emotional and social challenges faced by participants, offering context for understanding the sample:

(1) Loneliness and Misunderstanding: Participants often felt isolated and misunderstood by friends.
(2) Hidden Disability: Many participants struggled with hidden disabilities despite appearing physically ‘fine’ to others.
(3) Loss of Self: A frequent theme was a lost sense of identity and direction.
(4) Feeling ‘Brain Dead’: Participants expressed feelings of ‘uselessness.’
(5) Life Disruption: ABI had a profound impact, turning their lives upside down.
(6) Identity Change After ABI: Participants experienced an identity shift following their injury, with one stating, ‘Because you’ve lost so much it’s a completely different world now. Your life before is nowhere near what it is now.’

Results

Quantitative results

As shown in Table 2, overall wellbeing scores increased across most sessions, with effect sizes ranging from medium to large (d = 0.78–3.49). The greatest improvement was observed in Session 6 (‘Blood, Blood, Glorious Blood’), whereas Session 3 (‘Deepfakes’) showed a smaller change.

Table 3 highlights which emotions shifted most strongly from pre- to post-session. Participants most frequently reported increases in feeling ‘alert’ and ‘inspired.’

Figure 1 provides a visual overview of wellbeing changes across the PWU domains. Consistent with Table 2, most sessions showed clear increases in wellbeing, with the largest gains observed in Session 6. In Session 3 (‘Deepfakes’), the change was smaller and the confidence intervals overlapped. This likely reflects topic-specific responses: for example, participants described the ‘Deepfakes’ session as both interesting and concerning, with some reporting anxiety about the implications of AI (see Table 4 for discussion).

Adherence and acceptability

Adherence to the intervention was moderate, with the number of participants (N) attending sessions ranging from 8 to 15 (M = 11.22, SD = 2.22). Across all nine sessions, 70.1% of the maximum participants (16) attended.

Qualitative findings

The qualitative analysis revealed distinct but complementary themes from two perspectives: (1) ABI participants’ and their family members’ experiences of undertaking the intervention and (2) academic presenters’ experiences of delivering it.

Table 2. Quantitative results.

Session	N	Mean (SD) overall pre	Mean (SD) overall post	Effect size	Effect size CI_Lower	Effect size CI_Upper
1	15	19.67 (3.46)	25.53 (3.72)	**1.63**	**0.77**	**2.50**
2	13	20.23 (2.28)	26.38 (3.75)	**1.98**	**0.99**	**2.97**
3	9	20.22 (2.95)	22.78 (3.56)	**0.78**	**−0.26**	**1.82**
4	10	20.30 (3.27)	26.90 (2.02)	**2.43**	**1.19**	**3.67**
5	10	19.90 (3.35)	25.90 (2.59)	**2.01**	**0.86**	**3.17**
6	12	19.33 (2.23)	27.33 (2.35)	**3.49**	**2.15**	**4.84**
7	8	19.50 (3.46)	25.88 (2.85)	**2.01**	**0.70**	**3.33**
8	11	18.82 (3.95)	25.64 (3.72)	**1.78**	**0.73**	**2.83**
9	13	20.85 (1.95)	26.69 (2.93)	**2.35**	**1.30**	**3.40**

Table 3. Mean change in emotional states from pre- to post-intervention across sessions.

Emotion	Mean change (SD)
Active	1.02 (0.85)
Alert	1.22 (0.85)
Enthusiastic	0.80 (0.80)
Excited	0.93 (0.87)
Happy	0.92 (0.83)
Inspired	1.16 (1.01)

Participant Themes:

1. Creating Psychological Safety – The importance of a supportive, understanding environment
2. Sense of Community and Belonging – Building connections and reducing isolation
3. Self-Growth and Identity – Rediscovering abilities and rebuilding sense of self
4. Charting a Path Forward – Renewed motivation and future possibilities
5. Delivery Feedback – Practical suggestions for improvement

Academic Presenter Themes:

1. Prior Expectations – Initial assumptions and concerns about the intervention
2. Adapting Delivery – Modifications made for the ABI population
3. Creating Supportive Environment – Factors that helped presenters feel confident
4. Experiencing Unexpected Fulfilment – Personal rewards from participation
5. Promoting Wellbeing Through Learning – Recognition of learning's therapeutic value
6. Bridging Academia and Community – Breaking down institutional barriers

These themes demonstrate the mutual benefits of science engagement on individual and collective wellbeing for both learners and presenters, and support the intervention's potential for implementation.

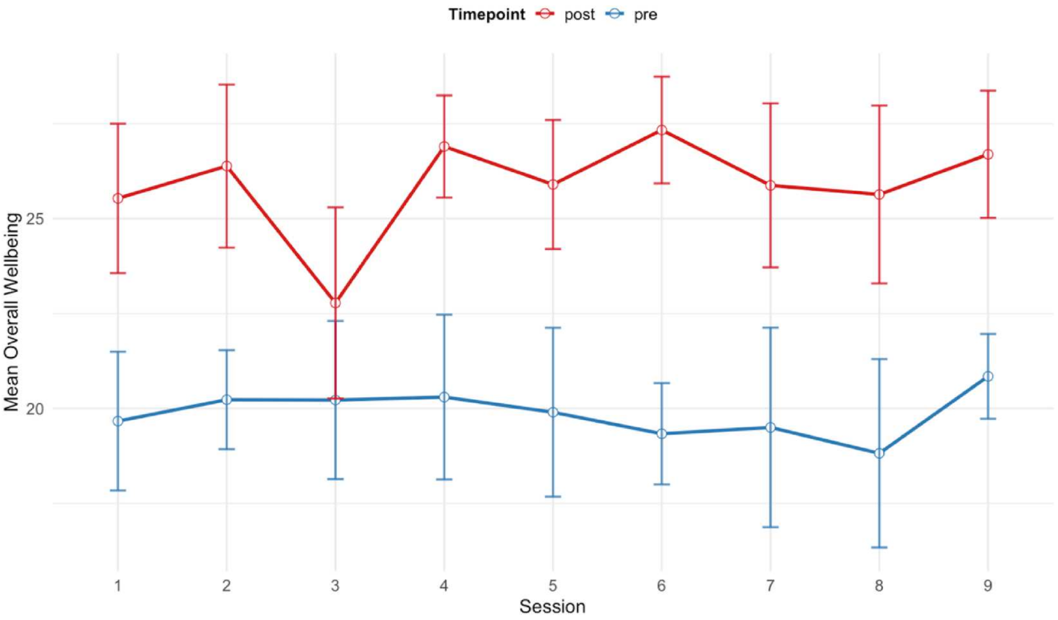

Figure 1. Mean overall wellbeing scores (Confidence Intervals as error bars) across sessions (pre- and post-intervention).

Participants' experience of undertaking the oriel science intervention

The qualitative themes presented in this analysis reflect the experiences of participants who took part in the intervention, either as individuals living with ABI or as family or caregivers supporting their rehabilitation.

Theme 1: creating psychological safety

Participants consistently emphasised the importance of a welcoming and supportive environment that allowed them to engage without fear of judgement. This sense of psychological safety was created through three key elements: an awareness of brain injury, the presence of family and friends, and supportive facilitation.

Presenters and group members demonstrated a clear understanding of ABI-related challenges, which helped participants feel comfortable expressing confusion. As P8 explained, '*we haven't felt inhibited like we weren't able to express any confusion, because there was an awareness that we may be a little bit baffled by some of the stuff sometimes*.' This shared understanding was experienced as reassuring and fostered trust, making participants feel valued.

Family and friends also contributed to this sense of safety, helping reduce anxiety about attending sessions and providing practical and emotional support. As P2 put it, '*just being able to get here … can often be a problem, and anxiety about going into something on your own, so having somebody that you know well with you is really comforting*.'

Finally, participants highlighted the supportive role of the presenters themselves. Their kindness, warmth, and attentiveness were frequently described as essential in building confidence. P8 described their approach as '*kind and considerate … absolutely spot on*,' while P6 added that '*all the presenters have been very friendly … very down to earth*.' Collectively, these qualities created an atmosphere of respect and mutual belonging that participants felt was central to their positive experience.

Theme 2: sense of community and belonging

A central outcome of the intervention was a stronger sense of belonging, which participants described through shared understanding, being treated as 'normal,' and developing a connection to the Oriel Science community.

For many, meeting others with ABI was a transformative experience that reduced isolation and fostered mutual understanding. P5 explained, '*I have met people now who have the same condition … we are all going through the same thing, and I've never met people like that anywhere else before*,' adding that '*we're all in the same boat, we don't feel embarrassed to talk to each other*.' These encounters normalised participants' experiences and created a supportive peer group.

Equally important was the way presenters treated participants as students or members of the public, not as patients. P3 emphasised, '*treat us as if we were just the same as anybody else … we were students and that's really great*.' This approach promoted dignity, inclusion, and a sense of equality within the learning environment.

Finally, participants spoke about how being welcomed into the Oriel Science community fostered pride and a lasting sense of connection. As P6 reflected, '*you get to feel part of something … I'm so proud to be part of this … You're on your own, it's dangerous to be like that, but when you've got something, this is life-saving*.' Several even expressed a desire for ongoing involvement with the university, suggesting initiatives such as a 'friends of the university' group or science cafés to maintain engagement. Such reflections illustrate not only a deep sense of belonging but also participants' enthusiasm to sustain their connection beyond the programme.

Theme 3: self-growth and identity

The sessions played a key role in helping participants reconnect with aspects of their identity that had been disrupted by brain injury, while also sparking new interests. Four interlinked areas emerged: stimulating focus, building confidence, reconnecting with the past, and realising cognitive potential.

For some, exposure to thought-provoking topics rekindled curiosity and concentration. As P2 described, '*learning a little bit more about brain waves … it was really lovely.*' Others highlighted how the group context built confidence and encouraged self-expression, with participants observing each other becoming more vocal and engaged over time. P8 commented, '*it's lovely to see how much you've come out … you seem to have come alive,*' and P3 echoed, '*you're expressing yourself … knowing what you want and like.*'

Several participants also reflected on how the academic content helped them reconnect with a sense of their former selves. P5, who had worked in academia, explained, '*before … I was an academic myself and so all that had been lost … it's nice to join in with things like this again.*' These experiences restored a sense of continuity between past and present identity.

Equally, participants described how engaging content challenged negative self-beliefs and reminded them of their ongoing capacity to learn. P2 noted, '*I had the ability to concentrate … because I really found the subject fascinating,*' while P8 emphasised, '*you feel washed up … but it's reassuring to know we're not daft, stupid … we can still learn.*'

Together, these reflections illustrate how the intervention supported participants in reshaping their self-perception, enabling them to recognise their cognitive abilities and reclaim a sense of personal growth and identity.

Theme 4: Charting a path forward

The intervention encouraged participants to look ahead with renewed energy, highlighting three areas: discovering new possibilities, sustaining group bonds, and broadening social connections.

Several described the experience as planting a seed for future learning and exploration, even without a specific goal. As P4 explained, '*it plants the seeds to allow you to expand. You don't know what you want to do but you want to do something.*' Others echoed this sense of possibility, noting that '*we can move on from here because we found interests we didn't have before*' (P1) and that the sessions had '*given us that enthusiasm*' (P5). These reflections suggest that the group fostered both confidence and curiosity, helping participants to envision next steps in their personal journeys.

Participants also stressed the importance of sustaining connections beyond the programme. One had already created a WhatsApp group to maintain contact, while others expressed interest in reunion events or future projects.

Finally, the sessions broadened participants' social interactions with family and friends, providing new topics of conversation. P1 commented, '*it broadens things for you … what else do you talk about?*' while P4 reflected, '*it's something different to talk about … otherwise you just sit in the house.*' These extended benefits illustrate the wider impact of the programme, enriching not only participants' sense of community within the group but also their engagement in everyday social life.

Theme 5: delivery feedback

Participants provided constructive feedback on how the intervention could be strengthened, focusing on adapting to preferences, improving accessibility, and expanding opportunities for engagement.

Many acknowledged that each persons' interest varied across sessions, reflecting individual differences in topic appeal. As P1 noted, '*we are all individual aren't we? … there's gotta be one that you at least … feel you fit into.*' Ideas for future iterations included recording sessions for later viewing '*I wonder if it might be possible for it to even be recorded?*' (P8) and developing an online platform to share slides, videos, and resources. The overall length of the programme was seen as appropriate, with ten weeks providing time to build connections without feeling rushed.

Participants recommended ensuring technical clarity, such as brighter projectors and larger text, as well as favouring practical, hands-on activities over lengthy theoretical segments. One participant described the ideal as '*bite-sized pieces of theory lasting no more than 15 minutes*.' Breaks were also valued, giving time both to rest and to connect informally with peers.

Finally, participants saw broader potential for the intervention, suggesting that it could be extended to other participant groups beyond ABI.

Academic presenters experience of delivering the oriel science intervention

Theme 1: prior expectations of participating in oriel science

Presenters approached the intervention with a mix of enthusiasm, uncertainty, and varying levels of familiarity with ABI. Many welcomed the chance to share their research with a non-traditional audience, describing it as '*a positive opportunity to do something*.' However, some were initially unsure whether their specialist topics would resonate, with one admitting, '*I'm assuming nobody's interested*,' before being reassured by unexpectedly positive feedback.

Experience with ABI shaped expectations. Academics with prior knowledge of ABI either professional or personal felt more confident, focusing less on adapting their perceptions and more on the value of the intervention itself. As one noted, '*It probably hasn't changed [my view] that much … but it's certainly changed my view about how useful these sorts of activities are*.'

By contrast, those with no prior experience were more nervous about pitching their content at the right level. They described going in with an open mind '*I didn't really want to take any preconceived ideas … so I tried to be quite open-minded*' and were struck by participants' positivity, with one recalling, '*when you hear the word brain injury … you think, wow, that must be horrendous. But the participants were so positive*.'

Overall, these varied expectations highlight how the project created both apprehension and anticipation, but ultimately revealed to presenters the capacity of ABI participants to engage enthusiastically with academic content.

Theme 2: adapting delivery for ABI

Presenters described how they adapted their content and delivery to meet the needs of participants with ABI, often drawing on existing materials and inclusive teaching practices. Many delivered sessions using presentations originally designed for public or student audiences, requiring few changes. As one explained, '*it wasn't … a university lecture … but a public lecture I've given many times before*,' while another admitted, '*did I change the way I delivered it … not really, no*.'

Instead, presenters relied on inclusive teaching strategies they already used in their academic roles, such as simplifying explanations, repeating key points, and using clear visuals. One noted, '*we have to follow guidelines … to support students with different learning*,' while another reflected, '*I just sort of applied those practices*.'

They also adapted to practical needs in real time, particularly during hands-on activities. For example, presenters described adjusting materials when some participants found the lighting or visual demands challenging, explaining, '*there were a couple of things I think we learnt throughout delivery … like some of the lighting was sort of aggravating for some of the participants*.'

This demonstrates how established academic practices can easily be effectively tailored to support the specific needs of ABI participants.

Theme 3: creating a supportive environment for presenters

Presenters highlighted the importance of feeling supported when working with a group of ABI participants, noting that this reassurance came both from family involvement and from guidance provided by Oriel organisers and clinicians. The presence of family members and friends gave comfort to participants and also eased pressure on presenters, who appreciated not having to manage every individual need alone. As one explained, '*each participant had someone with them … so it didn't feel like I would be walking into a room where I'd feel inadequate*,' while another added, '*it helped facilitate conversations … we only did that as a support mechanism because we didn't feel qualified*.'

Support also came from the organisational side. Presenters valued the Oriel Science team's support in preparation, feedback, and reassurance they received before sessions, which helped them to feel confident about the audience's needs. As one described, '*I was aware of the support that was available,*' while another reflected, '*it was all very gentle, and it just felt like a really positive coming together of lots of people.*'

Together, these experiences reassured presenters that they were not working in isolation, allowing them to focus more fully on delivering their material and contributing positively to the group.

Theme 4: experiencing unexpected fulfilment

Although presenters joined the project with the aim of supporting participants, many were surprised by how deeply rewarding the experience became for them personally. They were energised by the high level of participant engagement, often contrasting it with their university teaching. As one noted, '*the participants were so engaged … wanted to offer their thoughts and opinions,*' while another joked, '*even my students don't want to show up … these people, they wanted to learn.*'

This enthusiasm created a shared sense of joy and validation, with presenters describing the experience as more meaningful than anticipated. Phrases such as '*it's been such a special project … it blindsided a lot of us*' and '*I feel like I took away a lot … I shouldn't be feeling like I'm the one benefiting from this*' captured the unexpected emotional impact. For some, seeing participants respond so positively to their material reaffirmed the purpose of teaching itself: '*the teacher gets as much out of teaching as the learner, even more sometimes,*' while another explained, '*I had a kind of immediate positive confirmation that I was helping people, and that was … a wonderful thing.*'

Several also reflected on the project's personal significance against the backdrop of challenges in higher education. One presenter described it as '*kind of wonderful for our own wellbeing after a tough kind of few years in higher education,*' while another concluded, '*this is just so important to do this, and it's a joy. It really is a joy to contribute something.*'

Taken together, these reflections show how the intervention not only benefitted participants but also revitalised presenters, offering emotional fulfilment and a renewed sense of purpose in their academic work.

Theme 5: promoting wellbeing through learning

Presenters were struck by the therapeutic value of learning for participants, observing that engagement with science offered much more than intellectual stimulation. Several reflected that learning itself supported wellbeing, identity, and empowerment. As one explained, '*the fact that these particular participants felt that they were learning something more and got a sense of identity … because learning is part of who you are.*' Another added, '*it's a really powerful thing where people realise their own capabilities, feel empowered by a learning process.*'

For some presenters, this was a revelation about the wider impact of their work. One reflected, '*for me, that was like a revelation of, wow … I like science, and I like learning, and that benefits my wellbeing. But I didn't realise that could be in a way that benefits a patient group.*' This recognition reframed how they understood the role of academic engagement, highlighting its potential to support both cognitive recovery and emotional resilience for individuals with ABI.

Theme 6: bridging academia and community

The intervention also helped presenters step outside traditional academic settings, reconnecting them with community engagement and renewing their sense of purpose. Some described how academic life can feel isolating '*we sort of sit in our little ivory tower … we don't really connect as a community,*' one explained, while another added, '*our research becomes narrow … and you lose connection to the real world.*'

By contrast, working with ABI participants provided fresh perspectives and sparked new ideas. Presenters noted that they were asked questions they would never encounter at academic conferences, with one remarking, '*you don't get those questions at academic conferences,*' while another reflected, ‘*I’ve thought about my topic in a way I haven’t before*.’ These moments helped them identify gaps in their own thinking: ‘*if you engage with people, you can kind of see there’s a gap*.’

This sense of dialogue reinforced the value of meaningful exchange between science and society. For many, the project was not only about knowledge-sharing but about building more inclusive, impactful research shaped by community voices.

Integrated mixed methods findings

Table 4 presents a synthesis of quantitative outcomes with qualitative accounts from both participants and presenters. Wellbeing gains measured on the PWU were mirrored by rich narratives that explained why change occurred.

Table 4. Integrated mixed methods findings.

Quantitative results	Qualitative results	Exemplar quote
Overall wellbeing improved across sessions, with effect sizes ranging from d = 0.78–3.49.	Participants reported feeling more positive, engaged and inspired. Themes: ‘*Charting a Path Forward*’ and ‘*Self-Growth and Identity*’	*‘It’s given us that enthusiasm’‘It’s reassuring to know that we can still learn new things and be curious.’*
Session 6 (‘Blood, Blood, Glorious Blood’) had the highest wellbeing gain (from M = 19.33 to 27.33, d = 3.49).	Participants found hands-on activities engaging, with strong presenter enthusiasm.	*‘A good interactive session’‘An introduction to a topic I didn’t think I would have much interest in but it was incredible.’‘Energetic delivery of a well structured session.’*
Session 3 (‘Deepfakes’) had a lower wellbeing gain (d = 0.78).	Nearly all participants found the session helpful and interesting but some also found it anxiety-provoking given the negative implications of deepfakes and thus wanted to also have a more positive discussion.	*‘Gained insight into technology. Need some more uplifting “good news” about pros of AI & need more signposting to legitimate sources of information.’*
Strong attendance for groups (M = 11.22, 70.1% of max capacity).	*Themes = ‘Sense of Community and Belonging’ and ‘Creating Psychological Safety’* Participants valued social interaction and community, reducing feelings of isolation.	*‘I have thoroughly enjoyed it because I have met people now who have the same condition … We are all going through the same thing, and I’ve never met people like that anywhere else before’‘Lovely, again to speak to everyone in the group.’*

Three interlocking mechanisms across participant and presenters’ qualitative data were evident. First, psychological safety: participants emphasised feeling free to ask questions and express confusion without judgement, and kind, compassionate presenters while presenters highlighted the importance of feeling supported and the reassuring presence of family members and clinicians. Second, belonging: participants described the value of being ‘in the same boat’ with others who understood ABI and of being treated as students rather than patients; presenters, in turn, spoke about connecting and contributing to others beyond the ‘ivory tower’ of academia. Third, learning as wellbeing: participants linked intellectual engagement to restored focus, confidence, and identity encapsulated in the reflection that ‘*we can still learn*’ while presenters described the act of teaching as unexpectedly therapeutic and empowering for themselves, their career as well as for the group.

Discussion

This pilot study provides the first evidence of science engagement centres integrating with healthcare to support social prescribing for people living with ABI, offering free access through an organisational partnership. This collaboration marks an innovative expansion of social prescribing. The findings highlight the potential for science-based interventions to promote wellbeing, enhance cognitive engagement, and foster social connection. Quantitative data showed consistent improvements in self-reported wellbeing, while qualitative themes revealed that participants valued the intellectually stimulating and socially interactive environment. Many described a renewed sense of identity, self-efficacy, and confidence, as well as increased motivation for learning and community engagement. Importantly, the sessions fostered a sense of normality, reducing feelings of isolation by connecting participants with others who shared similar experiences.

Social prescribing and community integration

Our findings reinforce the idea that successful social prescribing requires more than simply referring patients to activities; interventions must create a sense of safety and belonging. Many individuals engaging with social prescribing, particularly those with chronic physical and mental health conditions such as ABI, experience stigma, social exclusion, and feelings of being misunderstood (Ownsworth et al., 2023). This study found that enabling participants to bring family and friends to the intervention, having presenters supported by clinicians on ABI awareness, and providing peer interactions with others facing similar challenges helped establish a psychologically safe environment that encouraged full engagement. These findings align with our previous research on Local Area Coordination (Wilkie et al., 2023), which emphasises we must go beyond 'prescribing,' and that building relationships with service users which foster trust, understanding, and safety, are ultimately what enables those individuals to integrate into social groups and independently engage in the community long-term, reducing reliance on formal services (Wilkie et al., 2023).

Learning, identity, and wellbeing

A key finding of this study was the role of learning in identity reconstruction. In line with the past literature on ABI (Gracey et al., 2009), many participants described a loss of self following their injury, often perceiving their cognitive abilities as diminished. However, through engagement with science-based learning, participants rediscovered their skills, gained confidence, and realised they were still capable of intellectual growth. These experiences align with research demonstrating that curiosity-driven learning enhances cognitive flexibility, self-efficacy, and wellbeing (Sakaki et al., 2018). Presenters reflected on participants' enthusiasm, further supporting the therapeutic power of learning on wellbeing (Watson et al., 2018).

Bridging academia and community

Beyond direct benefits to ABI participants, this study also highlights the mutual value of bridging academia, healthcare and the community. Presenters reflected on the enthusiasm and engagement of participants, describing how the programme helped them reconnect with the real-world impact of their research. Many found that engaging with ABI participants broke academic isolation, inspiring new ideas for research and highlighting gaps that traditional academic pathways may overlook. Furthermore, participants expressed enthusiasm for continued involvement with the university, suggesting that social prescribing could extend beyond the initial intervention into volunteering and outreach opportunities. Given that many individuals with ABI are unemployed, universities could expand science engagement programmes to provide structured, long-term community involvement, reinforcing the sustainability of such initiatives. Moreover, as it becomes increasingly important for universities to expand their public engagement role, they are uniquely positioned to promote scientific literacy and critical thinking, which are essential in combating misinformation (Lewandowsky et al., 2017). Integrating science engagement into healthcare services presents an exciting opportunity to support wellbeing while also addressing broader societal challenges, including misinformation and scientific literacy.

Limitations and conclusions

As a pilot study, this research was designed to explore feasibility rather than establish efficacy, meaning that findings should be interpreted with caution. The small sample size limits generalisability, and the absence of a randomised controlled trial (RCT) design means that improvements cannot be directly attributed to the intervention. However, pilot studies play a crucial role in testing the viability, engagement, and implementation of novel interventions before scaling to larger controlled trials. Despite these limitations, this study provides strong proof of concept, demonstrating that science engagement can be effectively integrated into social prescribing. The mixed-methods approach captured valuable participant experiences, laying a foundation for future controlled evaluations. Future research should focus on scalability, long-term impact, and broader applications across diverse healthcare settings.

Conclusion

This study provides preliminary evidence that science-based social prescribing can meaningfully support rehabilitation for individuals with acquired brain injury by enhancing wellbeing, stimulating cognitive engagement, and fostering social connection. The intervention enabled participants to reconnect with a sense of identity and confidence, offering a health solution that complements clinical care through an intellectually stimulating, community-based opportunity for growth. Beyond individual wellbeing outcomes, the findings also underscore the wider societal potential of science engagement: universities and science centres can act as trusted spaces where learning promotes resilience, strengthens social bonds, and helps counter the spread of misinformation. In this dual role of supporting individual recovery and advancing public education, science becomes a resource for happiness, belonging, and collective wellbeing. As one participant reflected, '*We're not daft, we're not stupid, we can still learn*.' This statement captures both the transformative impact of science engagement for ABI participants and its broader promise in building healthier, more informed, and more connected communities.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by Swansea University.

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