

Design Innovation in Healthcare

First Joint Exhibition by the Dyson School of Design Engineering and CW+

20-21 May, 2025, Chelsea and Westminster Hospital, London, UK

Poster Catalogue

Compiled by the Dyson School of Design Engineering

About the Exhibition

The Design Innovation in Healthcare exhibition was conceived as a platform to showcase design engineering research and innovative projects from the Dyson School of Design Engineering that directly address real-world healthcare challenges. Hosted in collaboration with CW+, the official charity of Chelsea and Westminster Hospital NHS Foundation Trust, this first joint exhibition brought academic innovation into a clinical setting with the aim to bridge the gap between design innovation and real-life healthcare contexts.

Held on 20–21 May, 2025, at the Academic Atrium of Chelsea and Westminster Hospital, the exhibition sparked

meaningful conversations among clinicians, patients, designers, researchers, and the wider hospital community. Posters in the exhibition presented a diverse range of design and engineering projects, developed through interdisciplinary research and co-design with users.

Beyond showcasing work, the exhibition served as a springboard for long-term collaboration. It facilitated valuable feedback and potential collaborations among the Dyson School of Design Engineering, CW+, and the staff and communities of the Chelsea and Westminster Hospital.



Photo Credit: Marco Da Re

“This event, and more generally our collaboration with CW+, has been an excellent example of community engagement. Researchers at all stages of their careers engage with those impacted by the technologies we build, listening to needs, explain pros and cons, and co-designing solutions.”



Prof. Rafael A. Calvo
Dyson School of Design
Engineering



Dr. Celine Mougenot
Dyson School of Design
Engineering

“This exhibition highlights the value of embedding design in healthcare settings. By co-designing with patients and clinicians, we ensure innovations are inclusive, grounded in lived experiences, and positioned for real-world impact.”

“This exhibition showcased the power of bringing researchers, clinicians, and patients together and listening to lived experiences, exploring possibilities, and co-designing solutions. By embedding design into healthcare, we ensure that new technologies are inclusive, impactful, and ready to make a real difference in patient experience and wellbeing.”



Trystan Hawkins
Director of Patient Environment
CW+

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Digital Health Interventions for Hypertension Control in Low- and Middle Income Countries (LMICs) – Systematic Review

Angelina Ankah Amengu, a.amengu23@imperial.ac.uk
Supervisors: Dr. Talya Porat, Dr. Weston Baxter

Background & Motivation

Hypertension affects 32% of adults aged 25 and older in LMICs, contributing to heart disease, strokes, and kidney failure. However, only 14% of hypertensive patients have their condition controlled [1] (Figure 1). While digital health interventions (DHIs) have the potential to improve hypertension management, their adoption and effectiveness in LMICs is limited compared to HICs. Despite efforts to control hypertension in LMICs, research on the effectiveness and barriers influencing DHIs in achieving blood pressure reduction, medication adherence, and healthy lifestyle modifications remains limited [2] [3] [4], highlighting the pressing need for further exploration.

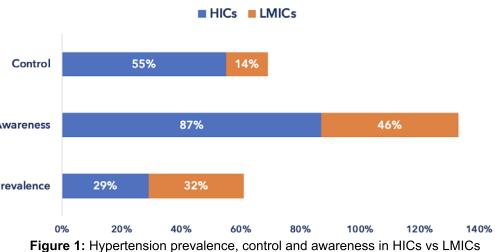


Figure 1: Hypertension prevalence, control and awareness in HICs vs LMICs

Aim & Objective

To explore the effectiveness and barriers of digital health interventions in achieving health outcomes (i.e., blood pressure control, medication adherence, and healthy lifestyle modifications) in LMICs.

Method

We conducted a systematic search of the Web of Science, PubMed, and Embase databases for articles published between January 2010 and September 2023. The results were reported in accordance with the PRISMA search process. The systematic review included 35 studies from LMICs, after the screening process.

Results

Results 1: Blood Pressure Control



Interventions for BP Control

SMS messages, alerts, reminders, telemonitoring, task shifting, and self-monitoring.



Blood Pressure Reduction 9%

of interventions decreased both systolic and diastolic blood pressure



Self-Blood Pressure Monitoring 14%

of interventions increased patients' self-efficacy and compliance towards self-blood pressure monitoring



Identified Barriers

Lack of personal home BP monitors
Lack of personalised interventions
Mobile phones shared among family

The study highlights the urgent need for research into the limited adoption of digital health interventions (DHIs) for hypertension control in LMICs.

Results 2: Medication Adherence



Interventions for Medication Adherence

SMS messages, alerts, reminders, and follow-ups, along with clinical decision support systems in titrating medications or adjusting prescriptions.



Medication Adherence 29%

of interventions increased patients' compliance with antihypertensive medication intake

Identified Barriers

Lack of availability and accessibility of antihypertensive medications, along with legal restrictions on licensed chemical sellers and community health workers

Results 3: Healthy Lifestyle Modification



Interventions for Healthy Lifestyle Modification

DASH diet; Reminders; Alerts; Follow-up; peer-counselling, and education.



Healthy Diet 23%

of interventions reduced salt/sodium intake and increased fruit and vegetable consumption among hypertensive patients



Physical Activity 17%

interventions increased physical activity among hypertensive patients.

Identified Barriers

Financial burden of cooking separate meals with little or no salt when sharing household meals

Design Recommendations



Integration of community-centred, and behaviour-centred approaches into intervention design and implementation



Personalized and gamified applications for active user engagement, tailored to diverse cultures and contexts.



Data visualization for mHealth apps using culturally relevant colours and symbols, with real-time feedback and recommendations.



Provision of incentives, such as blood pressure monitors, to participants in low-resource settings.



Cost-effective interventions tailored to diverse contexts and settings.



Research collaborations, funding, and updates on policies and regulations.

Conclusion

Effective digital health interventions (DHIs) in LMICs primarily focus on SMS, alerts, and reminders for hypertension control. However, their effectiveness is limited by inadequate resources, lack of shared decision-making, and insufficient active engagement between patients and healthcare professionals. Future interventions should incorporate advanced DHIs, along with community-centred and behaviour-centred approaches.

Bio



Angelina Ankah Amengu is a PhD student at the Dyson School of Design Engineering. Her PhD research focuses on designing novel digital health interventions for improved self-measured blood pressure (SMBP) monitoring among hypertensive patients in LMICs, using a behaviour-centred approach. Her research interests include behavioural design, participatory co-design, HCI and WSNs.

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FemGluco: Designing Discreet, Feminine Blood Glucose Monitoring Devices for Women with PCOS

Annika Gao, Christina Ingels, Lesile Zeng, Tessa Yao

Abstract

This project explores how blood glucose monitoring can be reimagined through discreet, aesthetic product design for women with polycystic ovary syndrome (PCOS). Drawing on user-centered design methods, the team developed FemGluco, a mascara-inspired, Bluetooth-enabled device for daily use.

Introduction

People with PCOS often require routine glucose monitoring to manage insulin resistance, a process traditionally associated with medicalized, stigmatizing devices. This project addressed the gap in gender-sensitive design for chronic health tools. We asked: How might we support women in managing PCOS discreetly, confidently, and elegantly in daily life? The solution repositions medical devices as lifestyle-integrated artifacts.



Methods

Desk research and user interviews explored stigma, routines, and preferences. Initial sketches explored formats such as keychains, hand creams, and tech-integrated ornaments. Concepts were scored using a weighted matrix prioritizing usability, discretion, appearance, portability, and safety. The final prototype was informed by CMF (color, material, finish) exploration and use-case simulation.

Results

The FemGluco design selected was a mascara-inspired glucose monitor with an LED ring display, Bluetooth syncing capability, and a replaceable lancet and test strip system. It integrates a Type-C charging port and a threaded plastic grip. Through aesthetic and ergonomic refinement, the product enhances discretion, ease of use, and emotional comfort. Color variations (pink-gold, white-silver) support personalisation and emotional resonance across age groups.

Discussion

Our evaluation highlighted that subtle, cosmetic-style design can significantly improve acceptance and reduce stigma. Users appreciated the reduced visibility, enhanced form factor, and familiar object association. This work contributes to the broader field of women's health and inclusive design in medical technology.



“Research Impact with highlight.”



Conclusion

FemGluco exemplifies how reframing medical devices as personal accessories may increase uptake and reduce the emotional burden of chronic health management. Through co-design and iterative prototyping, the device balances technological function with human-centered aesthetics.



Bio

Our team are four students from the Dyson School of Design Engineering, who are passionate about inclusive healthcare design, behaviour change, and embedded UX. Our interdisciplinary backgrounds span product design, digital health, and women's health advocacy.

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Exploring the Intersection of Extreme Weather and Mental Health: Toward Collaborative Climate Journaling

David Sarlos | david.sarlos@imperial.ac.uk

Advisor: Professor Rafael Calvo

Abstract

Exploring Extreme Weather Events' (EWEs) mental impacts, using Value-Sensitive Design (VSD) methods to envision a Collaborative Climate Journaling for integrated mental health support in climate adaptation.

Introduction

Extreme Weather Events (Figure 1) cause significant mental health impacts, including anxiety and depression, affecting people and communities.^{1,2} Yet emotional wellbeing remains underrepresented in many disaster response approaches. This study envisions Collaborative Climate Journaling to support resilience and advocacy for integrated mental healthcare.

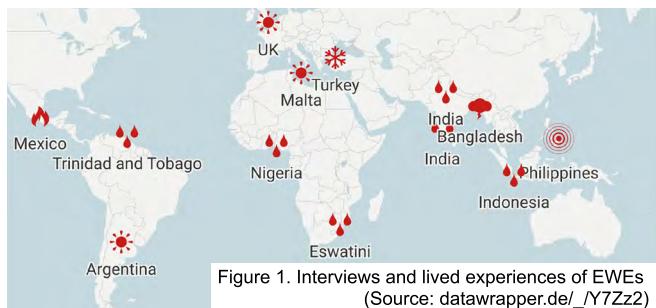


Figure 1. Interviews and lived experiences of EWEs (Source: datawrapper.de/_Y7Zz2)

Methods

Employing Value-Sensitive Design³, 14 value-oriented interviews with stakeholders (Figure 2) explored psychological impacts of Extreme Weather Events, resulting in mapped values and motivations (Figure 3). Thematic analysis and an Envisioning Cards⁴ workshop were then used to identify value tensions (Figure 4) and translate the findings into a tool concept for healthcare resilience. Sensitive approach and ethics strictly followed.

Results

The study confirms Extreme Weather Events (EWEs) severely impact mental health, causing anxiety, stress, and depression, with anticipation being "very distressing". Participants use coping strategies like community support and therapy. A key finding is the urgent need for integrated disaster response explicitly addressing mental health and involving trained professionals. Envisioning a Collaborative Climate Journaling (CCJ) tool highlighted requirements for privacy and building social fabric through collaborative storytelling, crucial for resilience in affected communities.

Discussion

The study validates the critical intersection of climate change and mental health. Integrated disaster response must explicitly address emotional wellbeing, a critical need healthcare systems can help fill. A CCJ tool could bridge personal experience and collective action and support resilience, potentially aiding recovery and informing better support mechanisms.

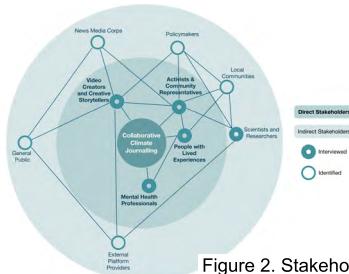


Figure 2. Stakeholder Map (Author)

“ Climate crisis recoveries demands integrated mental health support. ”

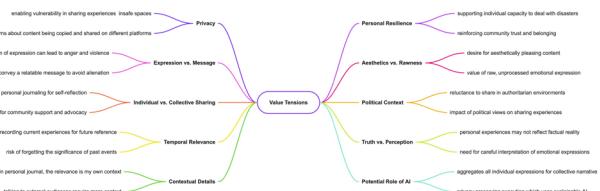
Figure 3. Core Values and Motivations (Source: Miro)



Conclusion

Extreme Weather Events significantly impact mental health, including anxiety and depression. Current response overlooks emotional wellbeing, highlighting the need for integrated support. Collaborative Climate Journaling offers a path for resilience and advocacy.

Figure 4. Value Tensions (Workshop Analysis)



Bio



David Sarlos is an MSc candidate in Design with Behaviour Science at Imperial College London. His current work with Dr Weston Baxter explores climate change's mental health impacts through Psychological Ownership, to build collective resilience.

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Context-sensitive design methods of digital health technologies for female-specific conditions

Diana Canghizer

Dr Céline Mougenot, Dr Talya Porat

Abstract

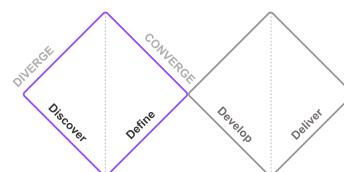
This project examines current FemTech design practices, identifying gaps in context-aware participatory approaches for co-designing with complex dimensions of women's health experiences, and mapping current design methods through a mixed methods approach. These findings will shape our intervention focused on designing and testing context-sensitive tools and methods for practitioners, aimed at supporting creating with lived realities and the development of tacit knowledge within design processes for better informed FemTech solutions.

Introduction

Digital health technologies for women's health, known as **FemTech**, have rapidly grown, spanning mobile apps, wearables, and service systems (Chaléat and Baud, 2023; Kronemyer, 2018). Even so, the current state of designing digital health poses significant **challenges in understanding context and users** (Pagliari, 2007). This is even more challenging when it comes to designing digital solutions for women's healthcare considering **intimate and stigmatised bodily experiences** from a societal and cultural point of view (Søndergaard, 2020). Recent examples highlight platforms lacking appropriate design to support sexual health advice (Rushe, 2011; Wilson et al., 2017) or promoting menstrual stigma (Homewood, 2018). While the importance of lived experience in designing women's health technologies is recognised, there is limited clarity on the specific design tools and methods used to elicit stories and tacit knowledge with lived realities often surrounded by societal and cultural stigma.

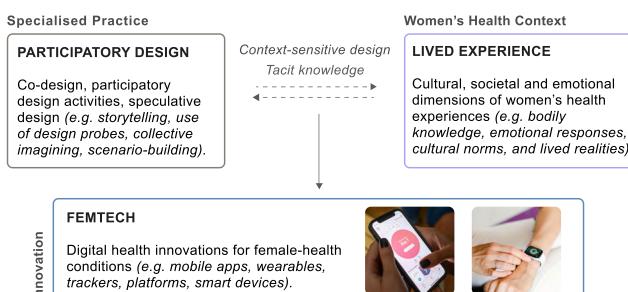


Fig 1. Herlo B. - Example of participatory design session



Facilitation, elicitation, collection, collective imagining and co-designing

Intervention focused on 'Discovery' and 'Define' impacting all phases of the Double Diamond



Research Questions

Guided by the research objective, this project is investigating three main research questions and several sub-questions defined below.

A) What are the current design practices and limitations in facilitating lived experience and context-sensitivity (CS) in the design of FemTech?

B) How can we define, design and develop CS design methods and tools to support a more informed FemTech design process?

C) How do design practitioners engage with and evaluate the proposed tools and methods in real-world design contexts of FemTech solutions?

Designing women's health tech requires navigating complex lived realities. This project is developing context-sensitive tools and methods for practitioners aimed at supporting lived experience and tacit knowledge within design processes.

Objective and Methods

The main aim of this research is to explore **how to amplify women's voices and their lived experience** in the design process of female-health digital technologies. The first phase is to investigate and map the current tools and methods, followed by a secondary phase exploring which context-sensitive tools and sensitive design methods innovation teams might need in participatory design activities to support lived experiences, collect stories, and form meaningful design insights on women's health experiences. Ultimately, producing informed design decisions based on real stories and collective imagining for the creation of **informed FemTech innovations**.

This project will follow a **Research into Design (RiD)** approach and **Design Research Methodology (DRM)** (Blessings, Chakrabarti, 2002) employing mixed methods across three main studies: Descriptive (I,II) and Prescriptive.



Expected Main Outcomes

The potential main contributions would consist in first defining the context-sensitive design framework, the development of context-sensitive design tools/ toolkit, and the validation of such interventions to better support design practitioners and innovation teams in designing more informed, inclusive, reflective, and better positioned women's health digital technologies.

Discussion

Designing for women's health involves navigating complex, often stigmatised experiences that are often challenging to articulate or elicit. The methodological approach was chosen to structure this inquiry across iterative phases, allowing for both empirical grounding and practical interventions development. Recognising the value of co-producing tacit knowledge, the current gaps emphasise context-sensitive participatory methods that can surface complex dimensions of lived realities.

Bio



Diana Canghizer is a PhD Candidate in the Collective Innovation Lab, Dyson School of Design Engineering. She is a design researcher with experience in patient-centred healthcare design, inclusive design and user experience design. Her research interests include human-computer interaction design in healthcare, women's healthcare design, AI x Humans and collective imagining.

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Designing an LLM-integrated co-design tool to help interdisciplinary teams cross knowledge boundaries in understanding healthcare design challenges

Echo Wan, Dr Celine Mougenot

“
Advancing Knowledge Transformation with LLM-Enhanced Co-Design Tool
”

Why It Matters?

Putting experts from different fields in a room doesn't guarantee integrated thinking. In interdisciplinary healthcare innovation, teams must synthesise clinical insight, user needs, tacit frontline knowledge, and emerging technologies. This diversity of knowledge introduces significant challenges in aligning understanding and objectives across team members. In particular, during the early stage of defining or redefining the design challenge (also known as problem framing in design), the lack of knowledge integration can lead to misaligned priorities, ineffective solutions, and wasted resources.

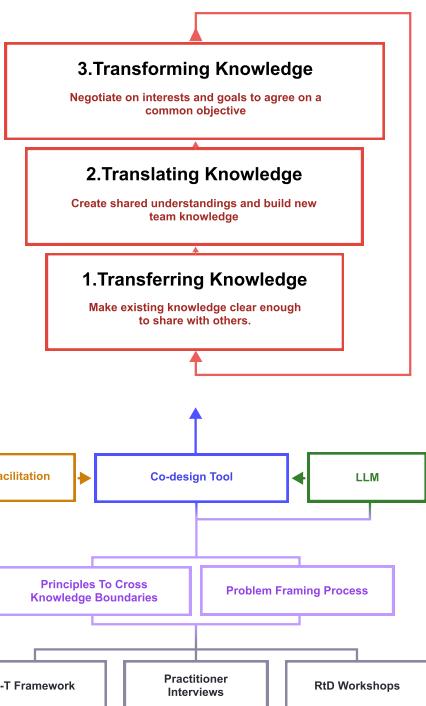
Image generated by ChatGPT 4.0



How This Research Responds

- 3-T Framework** - cross knowledge boundaries (Carlile, 2004): Transfer, Translation, and Transformation, within an iterative loop that refines over time (Figure 1).
- Co-Design Methods:** Worksheets, canvases, and prompts help externalise thinking, align perspectives, and support inclusive decisions. As boundary objects, they make knowledge visible, negotiable, and actionable across disciplines.
- Large Language Models (LLMs):** LLMs can enhance co-design by rephrasing jargon, spotting inconsistencies, and prompting reflection—lightening cognitive load and improving knowledge translation across diverse teams.

Figure 1: 4. Iterative Process



Study Aim

To understand how interdisciplinary healthcare teams currently navigate knowledge boundaries during problem framing, and to explore how an LLM-integrated co-design tool can support crossing knowledge boundaries informed by Carlile's 3T framework.

Methods

1. Semi-structured Interviews (n=50)

Interviews with interdisciplinary healthcare design team members uncovered current challenges and strategies related to knowledge boundaries, and implicit problem-framing processes.

2. Research-through-Design (RtD) Workshops (n=9)

Role-play artefacts were designed to simulate knowledge boundaries using incomplete, role-specific information from a case study. The sessions explored how teams facilitate discussions during problem framing.

Outputs

1. Principles for LLM-Enhanced Co-Design tools to cross boundaries

Grounded in Carlile's 3-T framework and informed by 50 practitioner interviews, we distilled guiding principles for embedding LLM capability into co-design tools. Together, they translate day-to-day boundary-crossing pain-points into lightweight, actionable design rules that turn static artefacts into adaptive collaboration supports.

- Instant Translation and Clarification
- Transparent Negotiation and Escalation
- Shared-Meaning Checks
- Oscillation Logging
- Assumption Surfacing
- Micro-Nudges over Full Automation
- Discrepancy Spotlighting

2. Solution-to-problem process

Although each project type poses its own challenges, all teams face a common barrier: shifting focus from existing solutions, whether half-formed ideas or fully built products, back to reframing the underlying problem. By examining strategies used across 71 interdisciplinary healthcare projects, and in-depth analysis of each stage through role-play workshops, we developed a co-evolution model that captures this cycle.

- Current Solution (a)
- Key Attribute Analysis (b)
- Solution Criteria (c₁)
- Problem Criteria (c₂)
- Expanded Requirements (d)
- Reframed Problem (e)



I'm a PhD candidate and a design strategist with experience of the end-to-end innovation process. As a part of my research, I offer free strategy workshops for innovation teams. [Connect via QR code to learn more](#)



CIL
Collective
Innovation Lab

EvoTouch

A portable mixed-mode simulator for physical examination training

Elyse Marshall, Rusne Joneikyte,
Thrishantha Nanayakkara

Background

Physical examination is an efficient diagnostic tool that, when performed well, can reduce reliance on expensive imaging, lower the risk of missed diagnoses, and accelerate patient care.

Yet it remains one of the hardest clinical skills to master with up to 40% of diagnostic errors linked to poor technique [1,2]. This is partly due to the complexity of detecting subtle signs, interpreting subjective responses, and applying nuanced clinical reasoning across a wide range of patients and conditions. Many students also lack adequate opportunities for structured, hands-on practice [1]. This leads to preventable errors, unnecessary investigations, and inefficient care delivery, especially in low-resource settings [2,3].

Proficiency in physical examination requires repeated, deliberate practice from early training onwards. Simulation offers a promising way to address this gap and improve clinical skill development [1,3].



Current simulators

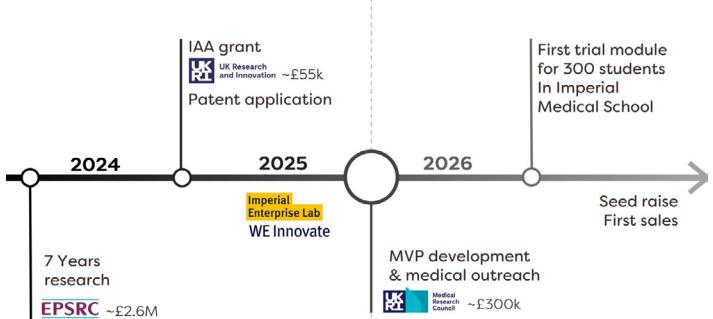
Most physical examination training relies on peers, actors, or static mannequins, which lack real pathology, tuneability and interactive feedback. VR systems lack the vital element of touch, while high-fidelity robots are costly and limited to specialist centres. EvoTouch fills this gap with a portable, accessible simulator offering realistic touch feedback, customisable scenarios, and individual performance tracking.

	Peers or actors	Mannequins	Software / VR	Mixed-mode	EvoTouch
Physical touch	✓	✓		✓	✓
Patient reactions	✓		✓	✓	✓
Adjustable illness		✓			✓
Objective feedback			✓	✓	✓
Accessible	✓	✓	✓		✓

“
Evolving touch feedback of
Virtual Patients for enhanced
clinical skill training.
”

28 student tests

31% improvement in performance



How you can help

We're seeking clinicians, educators, and simulator decision-makers to join our testing rounds from July to December 2025. If you're interested in contributing to the development of a next-generation simulation tool, contact Elyse Marshall via the QR code or email below.

Sign up to our
feedback and
testing rounds here:
elyse_marshall19@imperial.ac.uk



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Real-time Brain Injury Monitoring

Emily Yik Kwan Chan (emily.chan21@imperial.ac.uk), Elena Kourmantou, Mazdak Ghajari

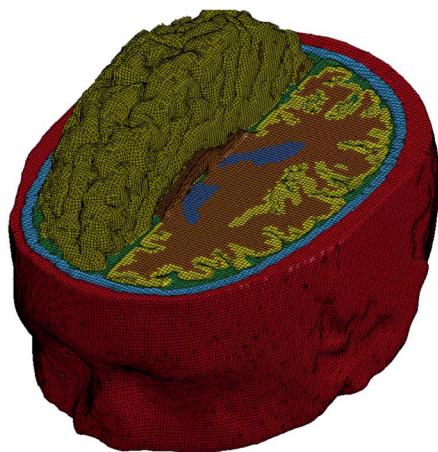
Research

Head impacts in sports can cause traumatic brain injury (TBI). **Instrumented mouthguards** (iMGs) worn by athletes capture **head kinematics** data in both linear and rotational. However, head kinematics cannot suggest brain deformation.

Finite element (FE) brain models can indicate brain deformation by estimating brain strain. However, FE simulation takes 5-6 hours on a high-performance computer, which hinders their ability to assist pitch-side decision making.

Previous research have developed machine learning deep neural networks (DNN) to predict brain strain in real time. However, these models required the entire kinematics traces as input, which is not implementable with iMG for pitch-side use as the iMG signal transmission of entire trace is not real-time.

Therefore, we developed a machine learning model using the eXtreme Gradient Boosting (XGB) algorithm to surrogate the resource-intensive FE simulation, to provide **real-time strain prediction** from head kinematics.



Real-time model features

The machine learning XGBoost model can:

- accurately estimates brain strain in critical brain regions
- predict brain strain in real-time
- be implemented with instrumented mouthguards

Imperial College Finite Element Brain Model:

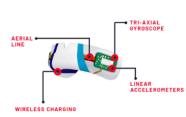
- Represents 11 tissues, including the scalp, skull, brain, meninges, subarachnoid space and ventricles
- Total 1 million hexahedral elements, average element size 1.5 mm

Deployment

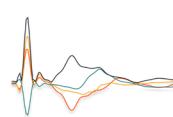
We developed a digital platform for real-time sports impact monitoring, brain strain prediction, and visualisation. Integrated with the iMG for head kinematics data, it operates on mobile devices. A companion mobile application enhances accessibility for coaches, athletes, and parents, enabling on-field simulations, near real-time pitch-side assessments, and tracking of brain exposure with safe threshold indicators.



Sporting Impacts



Instrumented Mouthguard



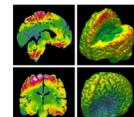
Kinematic Data



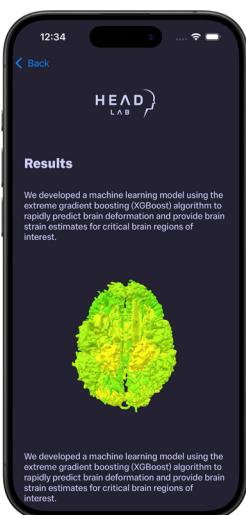
Database



XGBoost Strain Prediction



Results Visualisation

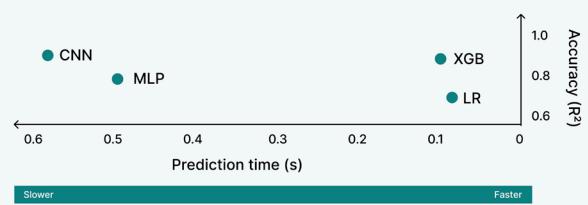


TRACE A digital platform for Traumatic Risk Assessment and Cerebral injury Evaluation

- 01 **Mouthguard capture impact**
Mouthguard is triggered to record impact kinematics.
- 02 **Impact kinematics transmission**
Impact kinematics are transmitted in real-time to the user's device.
- 03 **Real-time brain strain prediction**
Kinematics are imported to the XGBoost model to predict strain.
- 04 **Interactive visualisation**
The brain strain is illustrated in an interactive interface.
- 05 **Pitch-side assessment**
Predicted strain values are also shown to assist pitch-side head injury assessment.

Are predictions accurate enough?

Our proposed XGBoost model allows for strain calculation in regions of interest in the brain in **0.1 seconds** with an **accuracy of 0.92**.



Future steps

Committed to continuous improvement, future objectives include:

- Implementing personalised brain modelling
- Accumulative exposure history tracking

Aiming to allow coaches and team doctors to make **biomechanically informed decisions** on removal and return to play, utilising data-driven approaches for balancing brain health and performance.

Emily is a third year PhD student whose current project is focusing sports-related traumatic brain injury (TBI), using machine learning to predict TBI risks in real-time.

Elena is a first year PhD student working on biofidelic testing methods for sports' wearable devices to accurately monitor TBI risks.

Their projects are funded by Sports and Wellbeing Analytics (SWA), Cellbond & Royal Academy of Engineering Senior Research Fellowship.



Boundary Detecting Walking Stick for People Suffering from Parkinson's Disease

Amelia Gustave (amelia.gustave23@imperial.ac.uk),
Devansh Goel (devansh.goel23@imperial.ac.uk),
Lara Merican (lara.merican23@imperial.ac.uk),
Vasco de Noronha (vasco.de-noronha@imperial.ac.uk)

Abstract

The Boundary Detect Stick is an assistive mobility device designed to address gait freezing in Parkinson's disease patients. By integrating an optical sensor and tactile feedback system into a lightweight walking stick, the product detects flooring changes and sends vibrational cues to the user, helping overcome sensory overload-related freezing.

Introduction

Gait freezing is a common symptom experienced by individuals with Parkinson's disease, particularly when transitioning between flooring surfaces or entering new spaces. Sensory overload can cause the user to freeze, limiting mobility and discouraging social participation. This project aimed to design a mobility aid that directly addresses gait freezing using sensor-driven feedback, while remaining intuitive and user-friendly.



Methods

The development process began with user-centered research into the mobility challenges faced by Parkinson's patients. Through extensive interviews, observations and secondary research, key insights were developed. Using these insights and product opportunities, several concepts were ideated and shortlisted. The Boundary Detect Stick was selected and further developed. An infrared sensor is used to detect changes in surface texture or elevation while a microcontroller processes this data and activates a vibrational motor in the handle to provide immediate feedback.



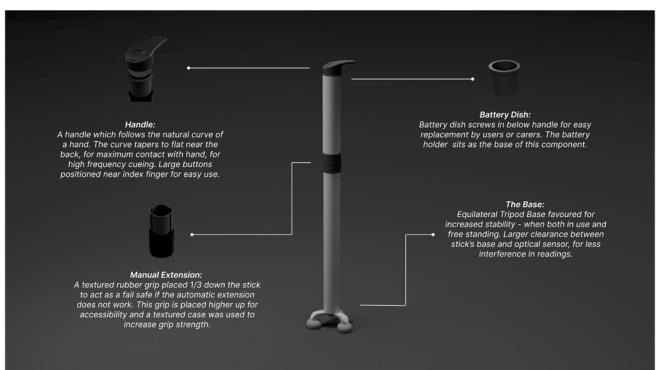
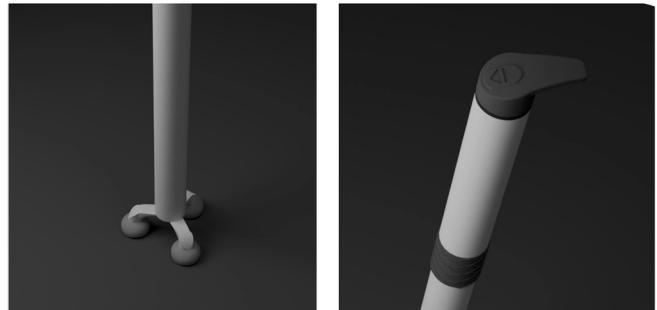
Validation

Validating the concept with target users and carers highlighted the effectiveness of vibrational feedback in reducing instances of gait freezing. The impact of the Boundary Detect Stick lies in its focus on real user needs, addressing both the physical and sensory challenges of Parkinson's mobility.

Next Steps

Our team is currently in the second phase of the project, focused on developing a physical prototype of the Boundary Detect Stick to evaluate its feasibility and viability. We will conduct multiple rounds of user testing with this prototype to gather feedback that will inform iterative improvements. Insights from users, particularly Parkinson's patients, will help assess usability, comfort, and effectiveness in real-life mobility scenarios.

Addressing Freezing of Gaits, a symptom 4 Million+ Parkinson's patients face everyday



Conclusion

The Boundary Detect Stick demonstrates how assistive technology can empower individuals with Parkinson's by directly addressing one of their most persistent challenges. Through smart sensing and intuitive feedback, the stick not only improves mobility but helps restore independence. This product has the potential to become a vital daily aid for those navigating the unpredictable nature of Parkinson's gait freezing.



Bio



We are a group of 4 second-year Design Engineering students from Dyson School of Design Engineering. We started this project as a part of our Industrial Design Engineering module, but as passionate to take it ahead and attempt to create a meaningful impact in the lives of people with Parkinson's disease.

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Lungy: Smartphone-based Spirometry & Self-Management Platform for Asthma

Dr Luke Hale, luke.hale24@imperial.ac.uk

Abstract

Respiratory disease places a huge burden on patients, NHS services and society. Lungy is designed to be a low-cost, accessible & scaleable platform that can guide and encourage self-management in respiratory disease. By using smartphone sensors and unique breath interactions, daily breathing exercise can be incentivised. Lungy has so far shown excellent usability and acceptability by asthma patients and its technology has been released in a wellness app that is freely available on the iOS App Store.

Introduction

Breathing exercises can be effective in improving quality of life and symptom control in asthma, but suffer from low adherence and compliance. Traditional lung function tests may not be accessible to all patients that need them. Lungy seeks to fill this gap by offering a easily accessible, engaging, and eco-friendly smartphone-based solution, that integrates breathing exercises whilst also capturing breathing data.

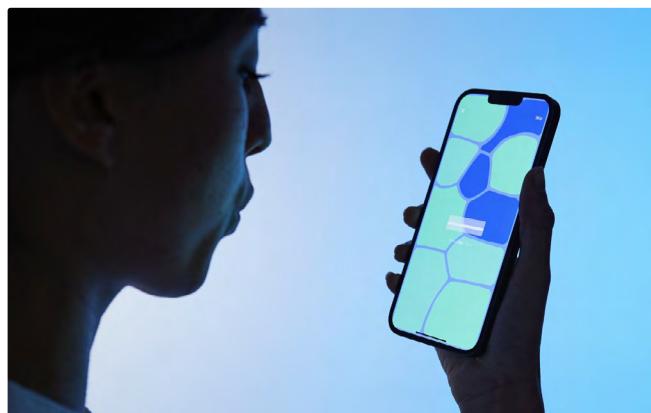


Fig 1. Lungy's breath interaction. Breathing causes interactive visuals to respond on the screen.

Methods

Lungy employs a novel, patented technology that uses the smartphone's camera and microphone to detect and measure breathing in real-time. This input drives generative audio and visuals that respond to each breath, creating an interactive user experience. Patients were recruited via Asthma + Lung UK to test the app and give feedback in observed sessions. Additionally, multimodal machine learning models were trialled on these sensor data to compare measurements taken by traditional spirometry and peak flow in healthy volunteers.



Fig 2. Lungy's user interface. Patients follow an indicator to guide their breathing pattern. Nature-inspired visuals support the interaction, here a rippling meadow.

"Lungy can **recognise** and **measure** breathing using a smartphone. It could be **low-cost** & **accessible** platform for asthma."

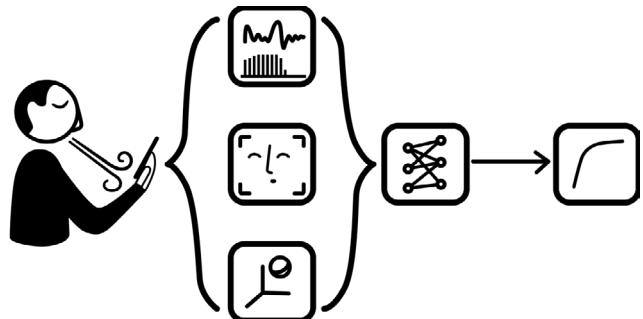


Fig 3. Rough schematic of multimodal ML model. Smartphone sensor data including microphone, facial tracking and accelerometer data are combined in the model. Inset graph: model output shows reasonable agreement with gold-standard spirometry data in healthy volunteers (+/- 10%).

Results

Users reported feeling more relaxed & focussed after breathing sessions. The multi-modal ML model combining smartphone sensor data values was +/- 10% of gold standard spirometry values in 10 healthy volunteers. Lungy's breathing technology was released as a wellness platform (lungy.app), for stress and anxiety in Dec 2022. It has more than 100k users, reporting excellent usability (4.8 star average) & accessibility. The response to Lungy's design and interaction has been very positive, with corresponding high levels of user retention (~35% at 1 week).

Discussion

The current prototype of Lungy has demonstrated the feasibility of smartphone-based breath recognition and has been positively received in user workshops and focus groups. It is very effective in incentivising breathing exercise. Measurement of lung function via a smartphone is promising, though the current study was conducted in healthy volunteers. Further studies would be required in patients with respiratory disease.

Conclusion

Lungy represents a promising development in digital health for respiratory disease management and mental well-being. By building on existing smartphone technology, it offers a potentially cost-effective, accessible, and engaging platform for breathing exercises and even lung function monitoring. Further development, regulatory approval and clinical validation are required to fully realise its potential in respiratory disease.

Bio



Luke Hale is an NHS Doctor and Royal Commission for the Exhibition of 1851 Industrial Design Fellow, studying Innovation Design Engineering at Imperial College London and RCA. He is a member of the Royal College of Surgeons and a visiting researcher at UCL Division of Division. He was awarded funding as PI from NIHR and Innovate UK to develop Lungy.

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Co-Designing Equity: Innovating with Marginalised Women through Cultural and Linguistic Sensitivity

Mabel Forward, mcf24@ic.ac.uk

Primary Supervisor: Dr. Céline Mougenot

Abstract

Early stage research looking to advance co-design methodologies to address gender inequity in healthcare, with a specific focus on cultural and linguistic inclusivity. The aim is to achieve good practice and rigorous outcomes by developing practical tools that can be used in co-production, tackling challenges including **power imbalance, representation, language difference** and **cultural complexity**.

Introduction

The healthcare system is repeatedly failing women in terms of misdiagnosis, testimonial injustice, the loss of decision-making capacity, long waiting lists, increases in emergency admissions, and worsening of symptoms and mental health (1,2). There are social, economic, and political repercussions to this that require both **systemic and speculative solutions** (3,4). Co-designing futures with women themselves is a critical step in this direction.

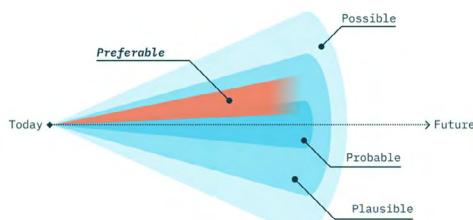


Figure 1: 'Futures cone' adapted from *Speculative Everything*, Dunne & Raby (2013), by Kiryl Kavalenka

Methods

One example of current stakeholder engagement is the collaboration between groups of women in The Black Country, spanning various ages, diverse backgrounds and experiences. Community groups have conducted internal activities to understand their citizens' needs, which has been shared between group leaders. A short ethnography of this co-design process is underway, focusing on language and metaphor use, supported by interviews with group leaders ('gatekeepers') to better understand the process.

Results

The sharing of evidence generated from internal sessions is both dependent and restricted by feelings of trust and facilitated engagement in the room. Community pressure on group leaders means the question 'What are we going to do with this information?' is particularly pervasive.

Discussion

Experiences of institutional mistrust is an active barrier to the deeper understanding and exploration of the problem space. Deep investigation is required of the environment for co-design, as well as the content itself.

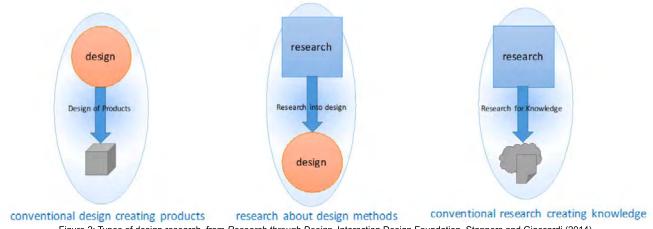


“
How can codesign methodologies be advanced to address gender and cultural inclusivity in healthcare innovation?
”



Conclusion

Using the 'Research through Design' methodology, and by integrating the arts and social sciences in the process, this research will utilise a **systems-based, intersectional approach** to better understand how knowledge is shared and solutions are formed, in the context of women's healthcare. The intended impact is to sensitively orchestrate product and service design, with the additional intention to inspire creative, speculative ideation practice.



Bio



PhD student Mabel Forward has a background in Visual Communication (ie. graphics, animation and film-making), Anthropology (study of cultures) and Innovation (design thinking and entrepreneurship). Human-centred design and an interdisciplinary approach is core to her practice.

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Design of a mHealth dementia screening tool in resource-limited settings

Marco Da Re, m.dare@imperial.ac.uk
Prof Rafael Calvo

Abstract

Dementia impacts millions worldwide, with rural regions of Latin America facing notable challenges in diagnosis and care. Digital healthcare tools, while potentially transformative, often fail in these areas due to lack of cultural integration, usability issues, and missing features, resulting in ineffective top-down solutions. This project is about designing and implementing a mobile health dementia screening system tailored for rural Peru. For 18 months, we engaged in an iterative participatory process with local community health workers and healthcare professionals across Peru. We detail how this process directly informed our design outcomes, ensuring the solution was adapted to the specific needs of the communities.

Introduction

Latin America faces a growing dementia crisis, rising from 7.8 million in 2013 to 27 million by 2050. Early diagnosis is crucial but challenging in rural areas with inadequate health systems. As part of the *IMPACT Salud* project (NIHR150287) [1], we designed and implemented a scalable, accessible diagnostic tool for use by non-healthcare professionals (e.g., community health workers) in rural Peru.

Methods

Our 18-month mixed-methods approach, guided by the Information Systems Research framework and Human-Centred Design methods [2], involved 40 community health workers, 30 healthcare professionals, and the Peruvian Ministry of Health across four diverse sites in Peru. The process included:

1. **Pre-field studies:** literature review, workshop and interviews, remote community meetings, and low-fidelity prototyping.
2. **Field studies:** ethnography, co-ideation workshops, and MVP testing in four diverse regions of Peru.
3. **Post-field design:** iterative development of a comprehensive socio-technical system based on field insights.



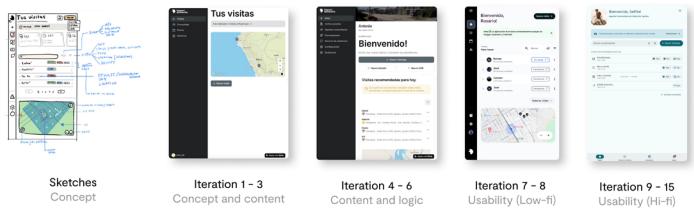
“Successfully implemented in four diverse Peruvian sites; 32,000 older adults to be screened in 2025”

Outcomes

Our design process yielded a comprehensive socio-technical system for dementia screening (detailed information available via QR code down below).

1. **An offline-first mobile app screening for community health workers** accommodating varying literacy levels, health visit management and personalisation features enhancing autonomy and competence [3].
2. **A web application for supervisors and researchers**, with team performance metrics, data visualisation and editing capabilities, user-friendly questionnaire editor for system expansion.

The cognitive and physical tests in the system are suitable for remote communities and have been previously tested in Latin America.



Impact

The project has been implemented in four sites across Peru, with plans to screen 32,000 older adults in 2025. The Peruvian Ministry of Health intends to adopt and integrate the tool, with potential scaling to Colombia and Argentina. *IMPACT Salud* aims to establish a culturally appropriate mHealth intervention model applicable to various resource-constrained settings in Latin America and globally.

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Bio



Marco is a research assistant and design lead at the Wellbeing Technologies Lab. His work focuses on community-based health, AI, and technology ethics. Marco specialises in participatory approaches with marginalised communities and the ethical implementation of technology in low-resource settings.



Knitted Soft Wearable Robotics: Assisting Activities of Daily Living (ADLs) for Ageing Populations

Mingke Wang*, m.wang23@imperial.ac.uk
Supervisor: Rebecca Stewart, r.stewart@imperial.ac.uk

"This paper presents an opportunity to bridge soft wearable robotics and textiles, offering lightweight, flexible, and ergonomic solutions for human-robot interaction."

Abstract

Compared with expensive rehabilitation therapy requiring professional care service, lightweight and home-use assistive training wearable devices help the elderly prevent decreased mobility in advance. However, much of the current research on soft wearable robots (SWRs) mainly focuses on after-injury rehabilitation and tends to prioritize functionality over user comfort and long-term engagement. This work addresses that gap by promoting a knit-integrated SWR system to offer lightweight, preventive and user-centric assistive technology for the aged population in ADLs.

Introduction

SWR is designed to be lightweight, safe, comfortable and flexible, allowing them to seamlessly integrate into daily life at a lower cost. The integration of knitted textiles into SWR has emerged as a new approach to enhance the comfort and functionality of these systems due to significant advantages such as stretchability, breathability, and adaptability for wearable applications. The ability to incorporate e-textiles—fabrics embedded with sensors, actuators, and conductive fibres—into knit-based designs enables the development of smart wearables capable of providing real-time feedback and interaction. Most current research on SWR primarily focuses on post-injury rehabilitation, often emphasizing functionality at the expense of user comfort and engagement. The knit-based SWR, in this research, is set up with the goal of restoring a more "natural" movement of biomechanical behavior and serves a role in accomplishing ADLs for assisting older adults.



Methods

We fabricated a range of knit sleeves to house the silicone actuators integrated with different knitting techniques and varying parameters such as stitch density and knitting tension.

Table 1: Experimental Parameters

Tubular Stitch Technique	Silicone Actuator (uninflated)	Knit-integrated Actuators (uninflated)	Knit-integrated Actuators (inflated)
Full Needle	1-(a)	1-(b)	1-(c)
Full Needle	2-(a)	2-(b)	2-(c)
Drop Needle	3-(a)	3-(b)	3-(c)
Drop Needle	4-(a)	4-(b)	4-(c)

Results & Discussion

(1.) Figure 1 shows that actuators with equal tension on both sides (10) exhibit less deformation, while those with differing tensions (15-20 front, 7-8 back) show greater deformation. This demonstrates that larger tension differences in double-layer knitting produce more significant actuator deformation.



Figure 1: Actuator performance under different knit tensions.



Figure 2: Comparison between full-needle (left) and drop-needle (right) knit layer.

(2.) Figure 2 demonstrates that the drop-needle technique utilizes the knit structure's pressure to achieve the desired deformation and functionality. The results show that adjusting needle numbers and layouts with tubular knitting enhances the actuator's inflation effect. Figure 3 indicates that aligning the drop-needle arrangement with the actuator's airbag density improves collaboration between the knit structure and the actuator.

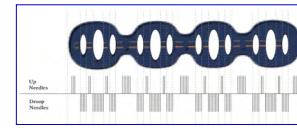


Figure 3: Silicone mold graphic (above) and the drop-needle layout diagram (below).

Conclusion

Pneumatic actuators offer adjustable force and flexibility to support or enhance muscle function during ADLs. On the social front, the development of these SWR aims to create inclusive technology that addresses the needs of older adults. It promotes social equality by focusing on usability, accessibility, and enhancing well-being. Future plans include experimenting with various actuator materials (figure 4), shapes to fit ergonomic interaction (figure 5) and a variety of knitting techniques (figure 6).



Figure 4,5 & 6: Silicone molding process (left), ergonomic interaction (middle) and knit design variations (right).

Bio

Mingke Wang, PhD student at Dyson School of Design Engineering. Gained previous academic and industrial experiences in fashion, she now focuses on interdisciplinary research in E-textiles and HCI.



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Can asking questions relieve mood disorders?: Digital phenotype platform for adolescent mental health

Minseo Cho, m.cho24@imperial.ac.uk
Prof. Rafael A. Calvo

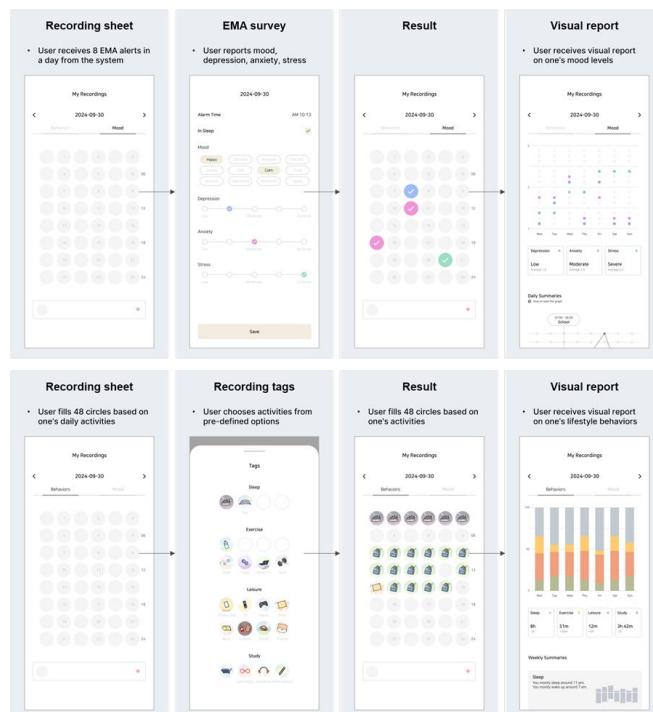
Abstract

This study is a Pre-PhD work, developing a platform that collects and tracks digital phenotypes related to the emotions and daily lives of adolescents. The study determined whether the platform positively affected mood disorder management through self-monitoring. Additionally, this study identified potential indicators to predict the development of mood disorders.

Introduction

Adolescence is the period with the highest incidence of mental disorders, half of which begin before age 18. Mental health issues during this stage of life can have extended effects into adulthood, highlighting the need for proactive interventions. Advances in technology have introduced digital phenotypes as a way to diagnose and treat mood disorders early. Despite their potential, concerns have been raised about the technical limitations of passive digital phenotypes and the limited uses of active digital phenotypes. Moreover, the effect of digital phenotype collection on managing mood disorders remains unexplored.

Methods

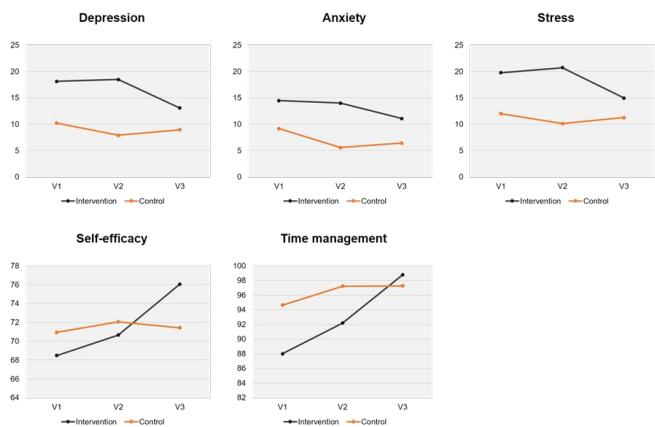


A four-week parallel, non-equivalent control group design was employed. The intervention group was instructed to install a digital phenotype collection platform on their mobile devices for 28 days. The passive control group was not required to engage in any specific task. Both groups were assessed at multiple points for mood disorders, namely depression, anxiety, and stress; self-efficacy; and time management abilities. Following the intervention, the intervention group participated in semi-structured interviews to discuss their experiences. Data was analyzed using 2x3 repeated measures ANOVAs with one between-subject factor (intervention group and control group) and one within-subject factor (pre-intervention, mid-intervention, and post-intervention).

“
Digital phenotype can help manage adolescent mood disorders with a **stronger sense of connection** through questionings.
”

Results

Total of 36 adolescents participated in the study. The digital phenotype collection platform significantly reduced adolescents' depression ($P = .044$) and stress ($P = .034$) and significantly increased their self-efficacy ($P = .002$) and time management abilities ($P < .001$). However, it did not result in significant changes in anxiety levels ($P = .113$). The correlational analysis revealed weak but statistically significant relationships between passive digital phenotypes and daily levels of depression, anxiety, and stress.



Discussion

Participants became more aware of their depression, anxiety, and stress levels by recording emotions and reflecting on their daily activities and behaviors. They identified emotional triggers from these records or recalled unrecorded daily events. This reflection helped them develop strategies to manage mood disorders, such as improving sleep or engaging in mood-boosting activities when triggers were controllable. When triggers were unknown or uncontrollable, participants used passive strategies such as distancing themselves from stressors.

Conclusion

The findings suggest that the digital phenotype collection platform can be used to understand and manage emotional disorders in adolescents. The study's high level of adherence, despite the extensive engagement required for active input, underscores the potential for using digital phenotyping in adolescent mental health care. The study contributes to a growing body of evidence supporting the use of digital phenotyping as a means of diagnosing and managing mood disorders in adolescents.

Bio



Minseo Cho is a PhD student at the Dyson School of Design Engineering. Her research interests include utilizing technology to improve mental health among adolescents. Her current research focuses on chatbot design for social prescribing to support the mental well-being for young people.

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How does value impact healthcare decision-making? — An example of antibiotic use

Rui Hu, r.hu23@imperial.ac.uk

Supervisors: Talya Porat, Céline Mougenot

Introduction

Values are redeemed as general guidance for people's lives ^{1,2}. They are deeply rooted and can impact beliefs, norms and behaviours ³. In healthcare, decisions are rarely based on clinical evidence alone, they are shaped by the values of patients, clinicians, and policy-makers. However, decision support systems often overlook these values, risking mistrust, low engagement ⁴, and ethically misaligned interventions ⁵.

In this study, the research team took the antibiotic prescription as a case to identify key stakeholder values, surface value tensions, and explore how these can be integrated into the design of interventions that are both evidence-based and value-aligned.

Identified Stakeholders and Stakeholder Map (RACI)

Seven key stakeholders were identified through a scoping literature review, varying in their proximity to antibiotic decision-making in primary care.

In this map, centred on the decisions of the key relevant stakeholders, seven different stakeholders are distributed in ellipses that are distant from the decisions. The lines with shoulders between them show the relationships between them.

Responsible - The core role who make the decision
Accountable - Leadership
Consulted - Experts to learn from
Informed - Keep in the loop

— Value impact between level
 — Value impact of outflows
 - Value impact of inward flows



Key Values of Stakeholders



1. Government

Caring for the whole country and controlling AMR.



2. Non-government Organisations

Raise public awareness of AMR.



3. Industry

Make profits; align with regulations; develop new medications.



4. Academia

Learn the mechanism of AMR and developing new medications.



5. GPs

Align with guidelines; various values; align with colleagues; trust in one's professionalism.



6. General Public

Various values; align with colleagues; trust in one's professionalism.



7. Other

Make profits; raise public awareness of AMR.

Findings

In the stakeholder map, we identified decisions made by 7 stakeholders in the antibiotic use scenario from the literature. We applied RVT to collate and visualise the underlying values driving these behaviours. Our analysis revealed that each stakeholder group holds distinct value priorities, reflecting their unique roles, responsibilities, and concerns within the healthcare system.

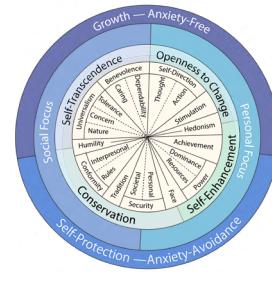
Notably, general practitioners (GPs) and members of the public—our two primary stakeholders—demonstrate significant differences in their underlying values related to antibiotic use. These contrasting value orientations highlight potential areas of tension in decision-making. The limited work in this area does not show how value conflicts affect decisions, which we would like to bridge in the next step.

“
Integrating values to support more ethical and trustworthy decisions in healthcare.”

Method

We mapped key stakeholders and their relationships through a literature review and applied Schwartz's Refined Value Theory ⁵ to classify the values of the different stakeholders.

The Refined Value Theory outlines 19 human values, divided into four dimensions—each reflecting distinct motivational goals that guide human attitudes and behaviour.



Refined Value Theory
(Schwartz, 2012)

Next Step

To explore value alignment and conflict more systematically, we will adapt the PVQ-RR questionnaire to assess value congruence. These insights will inform the design of interventions that are not only evidence-based, but also ethically grounded, context-sensitive, and rooted in human values to better support communication and decision-making in healthcare.

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Designing Sensitisation Activities for Women's Health Storytelling

Serena Sebastian, ss2321@ic.ac.uk
Supervisor: Dr Céline Mougenot

Abstract

This project presents the design of a comic making sensitisation toolkit for use in early stage women's health research. The toolkit prepares participants for generative sessions by fostering reflection and reducing social desirability bias through creative expression.

Introduction

Despite making up 51% of the population, women have long been underserved by a health system historically designed by and for men [1]. In response to these disparities, this toolkit supports more inclusive innovation in line with SDG 3 (Health), SDG 5 (Gender Equality), and the UK's Women's Health Strategy [1]. Social desirability bias can limit the authenticity of women's health narratives, reducing the depth and nuance of research insights. Addressing this bias is essential for more accurate, and impactful innovation in women's health design.



Photo by Vitaly Gariev / Unsplash

Methods

Sensitisation, as introduced by Sanders & Stappers, is a preparatory method in co-design that helps participants access and reflect on lived experiences [2]. While commonly used to warm up participants for ideation, its potential to mitigate social desirability bias remains unexplored. Existing bias-reduction strategies often rely on indirect questioning or anonymity. This project investigates creative expression, specifically comics, as a tool for sensitisation. Inspired by zine and collage-making, the comic making toolkit encourages recollection, reflection, and documentation in a nonlinear, metaphor rich format. It is designed to support more open and authentic storytelling in women's health research.

Results

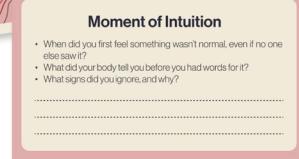
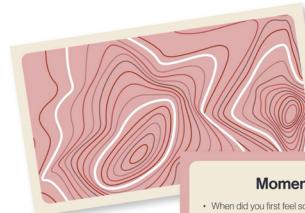
Twelve participants are engaging in group comic making workshops followed by individual interviews. The study explores how creative sensitisation influences participants' comfort, confidence, and authenticity when discussing personal health experiences.

Discussion

Initial observations suggest that comic making supports narrative confidence, helping participants express complex or stigmatised experiences more freely. The workshop format also creates a gentle entry into sensitive topics, with potential to enrich future co-design by surfacing tacit knowledge and latent needs.



Addressing Social Desirability Bias through Integrating Creative Expression Techniques



Conclusion

Creative sensitisation through comics shows promise as a method for reducing bias and deepening storytelling in women's health design. This approach may assist other domains of research also involving sensitive participants and experiences.



Bio



I'm a multidisciplinary design engineer with a focus on projects that improve lives, especially in the domains of women's health, environmental design, and behaviour change. My approach combines human-centred design with research and an entrepreneurial mindset, with which I've co-founded behaviour-shifting products.

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Pneuvo: A Reusable Breath-Based Early Detector for Infectious Respiratory Diseases

Keerthi Pradaa Balajee, kb2023@ic.ac.uk

Ying Zhang, yz12223@ic.ac.uk

Tanguy Perron, tlp19@ic.ac.uk

Gisung Han, gh523@ic.ac.uk

Supervisors: Sheraz Arif, Audrey Gaulard

Abstract

Pneuvo is a reusable breath-based early detection device for respiratory infectious diseases. Leveraging gas chromatography and disease breathprint comparison, it aims to enable accurate, asymptomatic identification of respiratory illnesses like COVID-19, Influenza and RSV — without generating single-use plastic waste.

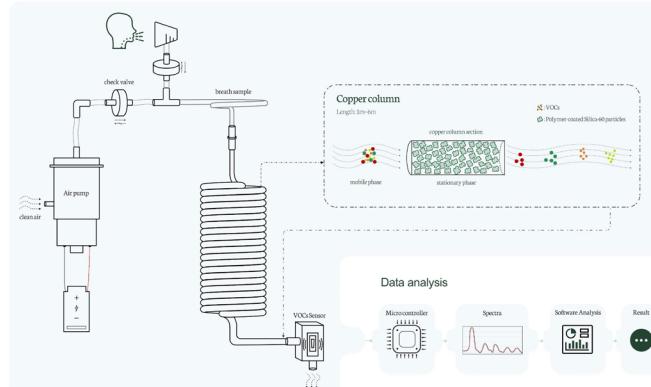
Introduction

The COVID-19 pandemic highlighted the urgent need for scalable, sustainable, and accessible testing. At its peak, over half a billion single-use test kits were discarded annually in the UK [1]. As such, Pneuvo was designed as a reusable, breath-based, testing device that enables accurate, early, and asymptomatic detection in daily life.



Methods

The technology behind Pneuvo relies on gas chromatography to identify the Volatile Organic Compounds (VOCs) present in the user's breath. This user VOC profile is then compared to existing respiratory disease "breathprints" (i.e., how they impact the VOCs present in an infected patient's breath) that have been established by existing research [2]. This process takes between 5 to 10 minutes and the user receives their test result on the device screen and via a mobile application. The device was designed with interchangeable breath pods ensuring safe use by multiple users.



Results

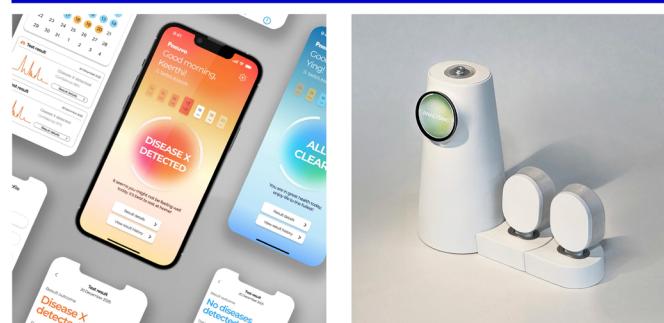
Early technology tests with our custom gas chromatograph showed promise for VOC detection but it still needs further improvement. User feedback from 60 surveys and 18 interviews drove key design improvements focusing on usability, hygiene, and habit formation.

Over half a billion test kits were used per year during COVID-19 in the UK alone—97% of which were incinerated. Pneuvo eliminates this waste entirely while providing scalable early detection of asymptomatic respiratory illnesses.

Discussion

The device shows strong potential to shift pandemic responses from a reactive mindset towards a proactive one.

Unlike swab kits, breath analysis is reusable and offers a less invasive testing experience. Through software updates for new disease breathprints, Pneuvo supports future pandemic scalability while reducing the environmental and supply chain strains of traditional testing methods.



Conclusion

The team designed and implemented both a proof-of-concept of the underlying gas chromatography technology for disease breathprint detection as well as a fully-resolved design of both the final device and companion app that enables daily shared use of the device to ensure early detection of the targeted diseases.



Bio



Brought together through the Innovation Design Engineering programme across the Royal College of Art and Imperial College London, Studio SILK was formed by a team of Engineers, Designers and Architects on the shared value of combating future-facing wicked problems using current day technologies. We strive to create impactful solutions that are a blend of design, engineering, science and art.

Our team comes from diverse cultural, academic, professional backgrounds, each bringing unique perspectives shaped by experiences across different disciplines, industries and geographies.

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YAQIN: Culturally Sensitive App for Women Needing Mental Healthcare in the UK

Yasmin Zaraket,
yasmin.zaraket21@imperial.ac.uk

Supervisor: Dr. Celine Mougenot

Abstract

Cultural and faith-based disconnects continue to limit how effectively mental health technology supports diverse users. This project explores how an AI-powered chatbot can offer faith-informed, personalised support through user reflections and journaling. Co-designed with Muslim women and therapists, the intervention bridges spiritual values with emotional wellbeing.

Introduction

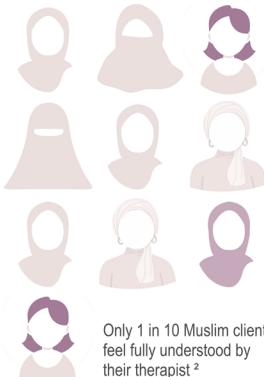
Many women struggle to access mental healthcare that recognises the full context of their lives. This includes cultural values, spiritual needs, and emotional nuance. Muslim women in the UK often report feeling unseen in counseling, with 44% of Muslims saying their faith-based concerns are overlooked in mainstream therapy.¹ This project asks: **How can a co-designed, faith- and culturally-sensitive AI tool reshape Muslim women's perception of mental healthcare in the UK?**

Three Key Barriers of Accessing Mental Healthcare for Muslim Women

1. Stigma



"People will think I'm weak or faithless"



2. Cultural Disconnect



"My therapist didn't understand my values"

3. Lack of Faith-Sensitive Care



"I wanted to talk about God but didn't know if I could"

Methods

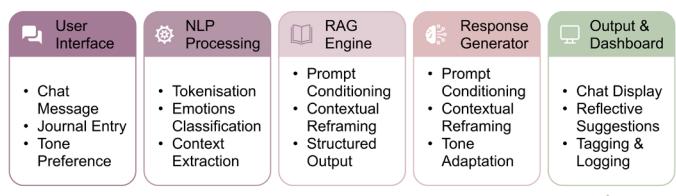
This research draws on fourteen interviews with Muslim women, therapists, and scholars, revealing themes of trust, faith sensitivity, and user autonomy. Using **Design Research Methodology (DRM)**, I designed a chatbot prototype and interface that supports natural conversation and reflective journaling, with responses grounded in Islamic teachings.

Results

Initial **interviews** and **co-design** highlighted the need for tools that support emotional distress while affirming religious values. In response, I developed **YAQIN**, an **AI chatbot** offering reflective, Islamic text-based support. The next phase will test its impact on **trust**, **relevance**, and **emotional resonance** in co-design sessions with previous interviewees.

Discussion

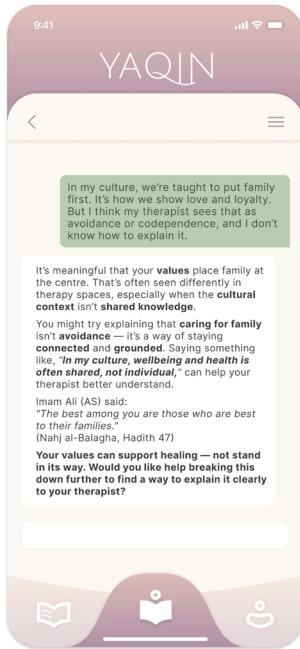
YAQIN, Arabic for **certainty**, reflects a state of spiritual **clarity** and **trust**. The chatbot uses **retrieval augmented generation (RAG)** to ground user input in a curated corpus of Islamic texts. It applies **natural language processing** to surface context-aware, faith-aligned responses. To support **ethical** use, users can **share** selected insights with their **therapist** and are encouraged to seek **professional guidance**, with therapist suggestions tailored to their needs.



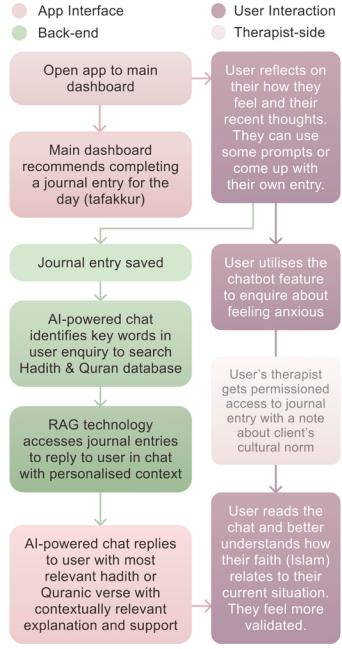
"If we can just route back to the traditional orthodoxy of the teachings and understand that there is a coherence between the mind and the body and the soul, and you can't nourish one while neglecting the others... then you'd be in a pretty good position to design effective interventions"

- A.N., Islamic Scholar & Graduate in Psychology (Interviews, March 2025)

User Interface Chat Screen



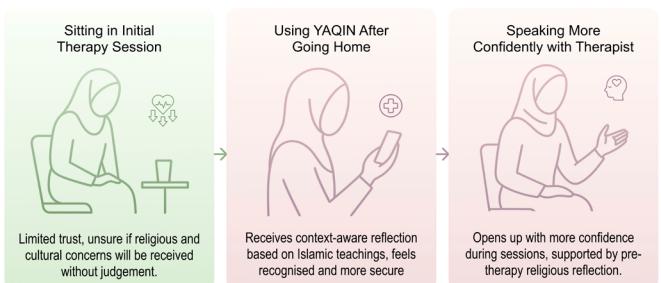
User Flow Case Study



Conclusion

This project shows that culturally sensitive mental healthcare must begin by **listening** both to people's struggles and to the **values** that shape how they heal. By embedding **Islamic frameworks** within **AI**, and grounding the design in **user reflections** and **co-creation**, **YAQIN** offers a case study **tech** becoming more attuned to what people feel and how they make **meaning** of those feelings.

User Journey (simplified)



Bio



Yasmin Zaraket is a passionate Design Engineering Master's student at Imperial College London. Her work combines human-centered design with AI and, in this project, Islamic psychology. She has experience designing AI-driven user interfaces and inclusive tech.

References

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Revolutionizing Retinal Screening for Early Detection of Diabetic Retinopathy

Yukta Pathak, yukta.pathak24@imperial.ac.uk
Dr. Sudha Gupta

Abstract

Diabetic Retinopathy (DR) affects around **95.4 million people globally** and is a leading cause of vision loss among diabetics. Early detection through regular screening is crucial, but limited access to eye care in rural India means many cases go untreated.

Introduction

Nayan is a telemedicine enabled funduscope used to examine the interior of the eye (also known as fundus) to detect for early stages of Diabetic Retinopathy. Nayan aims to make eye healthcare accessible to the rural population of India. Its compact, mobile, and lightweight attributes make it more convenient to deploy at healthcamps.



Context

Diabetic Retinopathy (DR) is a **vision-threatening complication** of diabetes that often shows no early symptoms, making timely detection difficult. It affects people aged 20 to 74 and puts all diabetic patients at risk. In rural India, limited access to screening and specialist care leads to delayed diagnoses thereby, underscoring the **need for accessible, preventive eye care solutions**.



“
Making **eye care accessible** to the underserved communities in India through **portable, equitable and accessible solutions**
”

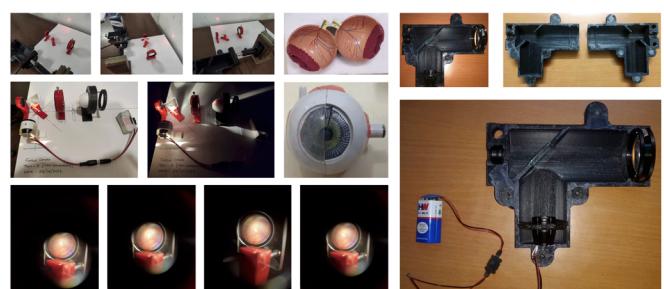
Product Development

After exploring various design forms, I proceeded to create cardboard mockups to gain a better grasp of the product's overall dimensions. This rapid prototyping exercise yielded valuable insights that guided the arrangement of the electrical & optical components.



Testing

The images captured by the device were high-resolution & glare free.



Conclusion



Bio



Yukta Pathak is an industrial designer and engineer based in London, UK. She is currently pursuing a Master's in Innovation Design Engineering, a joint programme between Imperial College London and the Royal College of Art. Her work focuses around exploring the intersection of engineering, human interaction, and healthcare technologies.

HealersRx: A Digital Wellbeing Intervention, Tailored for Healthcare Professionals

Zheyuan Zhang, zz8617@ic.ac.uk

Supervisor: Rafael A. Calvo, Céline Mougenot

Abstract

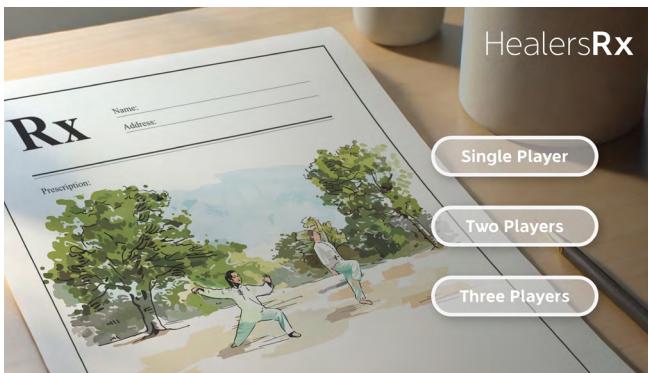
Digital mental health interventions (DMHIs) represent a promising line of research as they provide feasible, accessible and cost-effective alternatives to traditional mental health interventions. However, for healthcare professionals (HCPs), the availability of tailored DMHIs is scarce, and engagement levels are found to be low. Therefore, it is crucial to develop DMHIs that are both relevant and engaging to HCPs. We developed a digital tool to help healthcare professionals (HCPs) practice mind-body exercises such as Tai-Chi, Qigong, and breathwork. The system offers a collection of traditional practices, packaged into 5–10 minute capsules designed for daily use.

Introduction

HCPs are one of the most vulnerable groups to occupational stress and burnout, and DMHIs can be a suitable strategy to mitigate their stress and burnout [1]. However, research has shown that there is still a scarcity of DMHIs developed for HCPs [2]. Plus, off-the-shelf mental health tools like mobile apps often suffer from low engagement rates among HCPs [3,4]. Therefore, research has called for tailored DMHIs for HCPs to maximise engagement and effective relaxation.

The Design

HealersRx features a multi-layered menu that allows HCPs to select the number of participants, target body areas for relaxation, and specific modules with varying difficulty levels. During each session, HCPs receive real-time feedback on their movements and performance scores, along with a post-session summary highlighting relief outcomes, calories burned, and other potential benefits. HealersRx can be used individually or with colleagues, promoting both active mind-body engagement and positive social connection.



"A interactive, embodied and evidence-based digital wellbeing intervention, providing guidance on mind-body exercises."



Future Studies

We are planning to conduct a pilot feasibility and acceptability study with HCPs. This study will focus on testing HealersRx in the real-life clinical environment, in staff rooms or staff communal areas. Staff members participating in the study will be asked to engage with the tool for a period of 1-month. We will collect engagement data, participant feedback on the feasibility and acceptability, and the potential effectiveness of HealersRx in stress reduction and mental wellbeing. With the results of the pilot study, we plan to conduct more systematic and controlled study on the actual effectiveness of the tool in the future.



Bio



Zheyuan Zhang is a PhD student at the Dyson School of Design Engineering. His research interests include design, mental health, wellbeing, participatory research, human-computer interaction, and human motivation. His thesis is on designing and evaluating a digital mental health tool for healthcare staff in China and the UK.

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Sanctuary Moments: Interactive Wellbeing Installation for NHS Healthcare Spaces

Designer : Haoxuan Zhang
Innovation Design Engineering

Abstract

"Sanctuary Moments" is an interactive installation designed to create micro-moments of wellbeing within Chelsea and Westminster Hospital. Combining ambient lighting, gentle sound design, and responsive elements, the installation provides brief but meaningful engagement opportunities for patients, visitors, and staff. Drawing on evidence-based research in biophilic design, mindfulness, and sensory engagement, the modular system adapts to various hospital spaces, requiring no special skills or time commitment to benefit from. The project aims to reduce stress, provide restorative moments, and enhance the care environment.

Introduction

Healthcare environments can be overwhelming, with traditional hospital design often prioritizing clinical functionality over psychological wellbeing. Staff experience high rates of burnout with limited opportunities for restorative breaks, while patients and visitors navigate stressful situations in unfamiliar surroundings. This project creates accessible "sanctuary moments" throughout the hospital environment, offering brief opportunities for restoration and stress reduction without disrupting clinical operations or requiring dedicated time commitments.



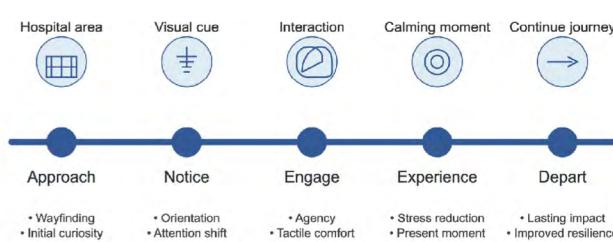
Interactive Light Canopy Concept

Methods

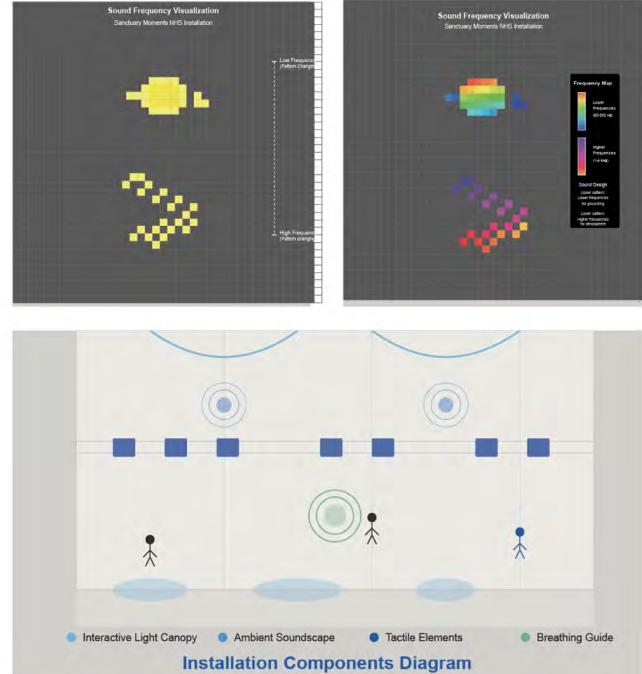
Our design approach synthesizes research from environmental psychology, mindfulness-based stress reduction, biophilic design principles, and sensory integration. The installation was conceptualized through iterative design thinking, stakeholder interviews, and evidence review. We prioritized solutions that could be implemented within existing infrastructure constraints while providing measurable wellbeing benefits. The design emphasizes modularity to adapt to various hospital contexts while maintaining consistent experience principles.

Results

The installation consists of four interconnected components: (1) An Interactive Light Canopy with nature-inspired patterns responding to movement; (2) Ambient Sound-scape with localized, directional audio creating "sound bubbles"; (3) Responsive Tactile Elements providing subtle haptic feedback and visual changes; and (4) Optional Breathing Guide Integration with subtle visual cues for calming rhythms. The modular design can be configured for corridors, waiting areas, staff spaces, or transition zones, with antimicrobial materials suitable for hospital hygiene protocols.

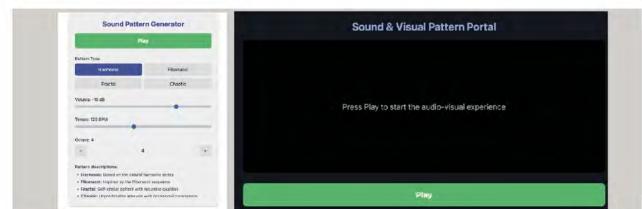


"Creating moments of calm in clinical spaces"

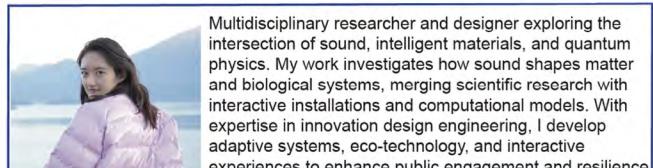


Conclusion

The "Sanctuary Moments" installation offers an innovative approach to enhancing wellbeing in healthcare environments through accessible, brief interventions integrated into existing spaces. By creating opportunities for mindful engagement without disrupting clinical workflows, the project addresses the needs of all hospital stakeholders—patients, visitors, and staff. The design balances evidence-based approaches with practical implementation considerations, creating a sustainable solution that evolves with the needs of the Chelsea and Westminster Hospital community.



Bio



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For more information or collaboration opportunities, visit:

<https://www.imperial.ac.uk/design-engineering/>

or contact:

zheyuan.zhang17@imperial.ac.uk