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Editorial

To new beginnings

February 2024 Editorial

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Welcome to the first issue of the European Health Psychologist in 2024! This issue not only marks the start of a new year of exciting health psychology research but also marks a new beginning for the European Health Psychologist. After almost four years of service Ângela Rodrigues stepped down as editor-in-chief and we – Filipa Teixeira and Thomas Gültzow – are honored to be selected as the new editors-in-chief. We sincerely thank Ângela for her exceptional leadership over the years. Her invaluable contributions have helped make the European Health Psychologist the great magazine it is today!

We would also like to take this opportunity to introduce ourselves:

Filipa Teixeira is a researcher in the SEURO project at Trinity College Dublin. She has worked on several internationally funded research projects related to chronic pain, obesity, HIV, adverse life experiences and academic burnout. But her greatest enthusiasm lies in researching the needs, burden and quality of life of informal carers of people with (multiple) chronic conditions, the community reintegration of former carers, and the implementation of digital health strategies to promote the support and well-being of these vulnerable groups. In essence, she is interested in giving voice to these crucial elements of the care process as one of the avenues to promote and advance patient-centred and integrated care. For the past four years, she has been one of the Associate Editors of EHP, which not only motivated her to apply for the current role but also fuelled her desire to continue to be an active member of the society.

Thomas Gültzow works as assistant professor societal transition & behaviour change at the Open University of the Netherlands. He is a passionate researcher in the field of behaviour and decision making, specialising in informed decision making, behaviour change, and the influence of digital communication and interventions. His focus spans a variety of topics, ranging from sexual and reproductive health to the disclosure of mental health issues and climate change. In essence, anything related to behaviour and decision making, as well as its support, captures his interest. Additionally, he is a strong advocate for social justice, aiming to ensure that everyone is visible in research. He actively works to integrate these principles into our research to promote an inclusive approach. Furthermore, he presently serves as the chair of the EHPS special interest group dedicated to Digital Health & Computer-Tailoring.

We are dedicated to building upon the exceptional work accomplished thus far and striving for continuous improvement. In this inaugural issue of 2024, we are pleased to present four insightful articles:

Ahmadyar and colleagues describe their insights and highlights from the 2023 CREATE Workshop and the EHPS conference.

Crutzen and colleagues outline a range of problematic practices in health psychology research and introduce several innovative approaches that have the potential to reshape paradigms, sparking methodological and theoretical innovation.

And speaking of innovative approaches, **Laban and colleagues** describe how social robots can be

used within the field of health psychology, offering unique opportunities that may positively impact human well-being in several areas. .

Last but not least, **Howells and colleagues** discuss how an online approach to citizen science can revolutionise clinical trials, using as an example The Rapid Eczema Trials project.

Enjoy reading this edition and feel free to reach out to us at our new email address (ehp@ehps.net) if you would like to be featured in upcoming issues!

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Report

Insights and Highlights from the 2023 CREATE Workshop and EHPS Conference

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Introduction

The 37th annual conference of the European Health Psychology Society (EHPS) took place in the vibrant city of Bremen, Germany, featuring an exceptional scientific programme complemented by a multitude of engaging social activities. As four early career researchers, we are grateful to the Collaborative Research and Training in the EHPS (CREATE) network for awarding us the CREATE grant, which not only facilitated our attendance at the EHPS Conference but also enabled our participation in the CREATE early career researcher Workshop.

Particularly noteworthy is the choice of topic for this year's CREATE Workshop by Prof. Dr. Laura König (University of Bayreuth, Germany) and Dr. Heide Busse (BIPS Bremen, Germany): science communication, a crucial skill in today's rapidly evolving world of research and public engagement. We found the workshop to be engaging and insightful, and were very impressed with the workshop structure and knowledge transfer which included a visit to the science museum to explore science communication in action! The workshop also offered a unique funding and mentoring opportunity by the EHPS UN committee exclusive to CREATE attendees to support us with initiating our own science communication project. This was a great way to put everything we learned about science communication into practice following the end of the workshop.

The conference itself was an enriching experience allowing us to deepen our understanding of health psychology, enhance our research skills and connect with the global health psychology community. We reflect on key aspects of the conference below.

Scientific program

The scientific program provided lots of different opportunities to learn about current research through various engaging formats, namely: Oral sessions, symposia, roundtables, posters, state-of-the-art presentations, flashlight talks and keynotes. Below, we delve deeper into two of our favourite formats: flashlight talks and keynote presentations.

Flashlight talks

The introduction of 'flashlight talks' to this year's conference programme was a welcomed and innovative addition. This format provided an excellent opportunity for early career researchers to share their research findings in a concise and impactful manner. The topics picked up on the conference's theme of health psychology's aim for equity, inclusiveness, and transformation. The strict time limit of 5 minutes forced presenters to distil their research into its most essential components, promoting clarity and brevity. Here, we provide examples of the flashlight sessions we attended.

In the session 'Ensuring Inclusiveness in Managing Diseases' (Chair: Maria Blöchl), five presenters spoke about different ways to ensure that our research captures the experiences of those involved and the target group we want to describe. The presenters gave insights into their research on what measures were best when we want to understand treatment burden, what participants saw as the greatest challenges they face with either an illness or caregiving to their children, and what their viewpoints were on screening uptake. Lastly, lessons learned from a dyadic online panel study were presented, with a representative, diverse sample of participants being much harder to achieve than anticipated.

In just 5 minutes, six presenters in the session 'Transforming Healthcare Systems' (Chair: Daniella Watson) were able to convey rich information about their on-going studies. The aim of this parallel session was to look into ways of integrating health psychology techniques into regular medical practice, and presenters elaborated on attempts they had made to understand how clinicians and practitioners felt, or were able to do so through their interventions. It was fascinating getting to catch a glimpse into different countries' medical systems and the unique challenges each of us face as health psychologists working with fellow healthcare professionals.

In the session titled 'Digital Interventions to Promote Health' (Chair: Maya Braun), six insightful talks provided a comprehensive view of how digital interventions and systems are being leveraged across various aspects of healthcare, from setting health goals and tracking physical activity to supporting patients with complex health conditions and enhancing medication adherence. These talks showcased the potential of digital technologies in advancing healthcare and improving health outcomes through various innovative approaches and angles.

As early career researchers, we found the 'flashlight talks' particularly compelling as the sessions highlighted the excellent work done by early career researchers in Health Psychology and provided a great opportunity to network all in one place. We hope to see 'flashlight talks' incorporated into future conferences!

Keynotes

In the afternoons, the main lecture hall was tightly packed for the keynote lectures. In addition to their special expertise in individual health behaviours, all three speakers extended their focus from the individual to the (global, societal, or social) environment that it is formed in.

Professor Cornelia Betsch's (University of Erfurt, Germany) keynote lecture highlighted the role health psychology research can play in the important challenge to transform planetary health. She gave insights into real-life experiences during the COVID-19 pandemic as a researcher and health communication advisor for governments and international institutions. Professor Betsch conveyed to the listeners the important findings of her research on vaccination and mask wearing, and how during the course of the pandemic, these received added meaning as social signals. She also described the importance of timing and delivery when communicating with politicians, and the general public in an emerging global health crisis.

The keynote presented by Professor Jutta Mata (University of Mannheim, Germany) was especially compelling, emphasising the pivotal role of social context in eating behaviours. The keynote underscored the pressing challenges of unbalanced nutrition and related diseases in industrialised societies, highlighting the limitations of individualised dietary interventions. Professor Mata advocated for a social approach to promoting healthier eating and sustainability, suggesting that health psychology should harness the power of social factors to drive lasting change in eating behaviours and address broader societal issues.

In a culmination of a significant proportion of the research presented over the first few days of the conference, Professor Urte Scholz's (University of Zurich, Switzerland) keynote lecture on the role of social relationships in health behaviour change brought together the ideas of health interventions and our being social creatures. Professor Scholz raised the need to differentiate types of dyadic interventions depending on the level of involvement of the dyad partner (individual, parallel, cross-over, joint; Scholz et al., 2020). She proposed how we as researchers could use similar naming styles to better communicate and integrate our ideas on effective dyadic behaviour change interventions.

For us as early career researchers, the keynotes demonstrated how a research idea can be approached through different research projects spanning several years from a variety of different angles, an advanced stage that we, as emerging researchers, have yet to reach. Also, the lectures inspired new and exciting ideas for further research into behaviour change interventions, and what to consider when delivering our findings back into society. From a listener's perspective, it appears that we are not alone as researchers in the endeavour to understand and transform health, with many colleagues striving towards that goal in a collaborative way. For us, the keynotes thus rendered the idea of pursuing relevant and extensive ideas less daunting and more accessible.

Networking

The EHPS Conference not only offered multiple networking opportunities, but also demonstrated its commitment to fostering connections and knowledge exchange.

Starting the conference with the CREATE Workshop gave us the chance to meet other early career researchers in a smaller group, making it less intimidating. During coffee breaks, lunches and workshop dinner we were able to have informal conversations about our projects, challenges, goals, and even personal experiences. These conversations fostered a sense of comfort that contributed to a supportive atmosphere throughout the entire conference.

In addition to the captivating workshops and informative sessions, the events that took place alongside the conference also left a lasting impression. The 'Meet the Experts' sessions, where early career researchers had the opportunity to engage with keynote speakers in an informal setting, were an appreciated opportunity as these small-group discussions facilitated insightful conversations and opened doors to collaboration. The 'Challenge Night' was another highlight, as seasoned researchers candidly shared their most amusing or challenging mishaps and lessons learned in research, creating an atmosphere of shared experiences and laughter. For anyone who was unable to hear the lessons learned in the crowded pub: a collection of recommendations to circumvent the pitfalls of academia life can be found in the 'Survival Guide for Early Career Researchers' (Kwasnicka & Lai, 2022).

All of these events allowed us to connect with other researchers, exchange insights with peers, and cultivate both professional and personal relationships that we believe will have a lasting impact on our careers and research endeavours.

Conclusions

We left the conference with renewed enthusiasm for our research and a sense of belonging within the health psychology community. This experience has undoubtedly left an indelible mark on our academic and professional journeys, and we look forward to applying the knowledge and insights gained to our future work in the field. By facilitating our attendance at both the CREATE workshop and the EHPS conference, the CREATE

grant has truly opened doors for us, and for this, we are immensely grateful.

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Original Article

Transforming paradigms: problematic practices and innovative approaches

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The dominant approaches in health psychology have remained stagnant for decades (Chevance et al., 2021). Quantitative studies often employ variations on linear models, rarely questioning underlying assumptions and their implications. Qualitative studies, too, have seen little methodological progress, often applying a variation of coding the data in hierarchical code structures and describing the identified patterns. This methodological stagnation ultimately hinders scientific progress (Cartwright, 2021). This was the point of departure for a symposium we organized at the 37th Annual Conference of the European Health Psychology Society in Bremen, Germany. In that symposium, we addressed a selection of problematic practices in health psychology research and introduced a number of innovative approaches that hold the potential to transform paradigms and stimulate methodological and theoretical innovation.

The aim of this article is twofold. First, to provide a brief overview of the content of our symposium. Next to the slides being publicly available (Crutzen et al., 2023), this contributes to the legacy of the symposium beyond the conference. Second, to provide those interested with more details on and links to tools in order to put these innovative approaches into practice.

The regression trap

The first contribution focused on explaining why regression analyses, despite being commonly used for this purpose, are not suitable for selecting determinants to target in behavior change interventions (Crutzen & Peters, 2023). The meaning of regression coefficients is commonly explained as expressing the association between a determinant and a target behavior 'holding all other predictors constant.' As there is ubiquitous overlap between determinants, this often boils down to 'neglecting a part of the psyche.' This is because overlap manifests in correlations between determinants, which distorts the interpretation of regression coefficients. In practice, this results in interventions targeting determinants that are less relevant and, thereby, have less impact on behavior change. In earlier work, we have described Confidence Interval-Based Estimation of Relevance (CIBER) as an innovative approach to select determinants and circumvent the regression trap (Crutzen et al., 2017). The R package 'behaviorchange' contains two functions ('CIBER' and 'binaryCIBER') to apply this approach. While this approach is used (e.g., Vervoort et al., 2020), it does not solve two common problems in determinant studies. First, not being able to draw causal conclusions concerning determinants. This problem, however, cannot be solved during analyses, but needs to be addressed during study design (see fifth contribution). Second, only under very strict conditions, which are hardly obtained in

psychological processes, can a generalization be made from a structure of interindividual variation to the analogous structure of intraindividual variation (Molenaar, 2004). Hence, it is warranted to focus more on within-person effects in longitudinal models of change (see third contribution).

Knowing what we're talking about

Where the first contribution discussed the problems plaguing the typical application of a common statistical technique, the second contribution dove a bit deeper and addressed more fundamental issues. Starting from psychology's replication crisis, the measurement crisis and then theory crisis were identified as underlying causes, manifesting in the jingle-jangle jungle at the construct definition level as well the measurement level. A lack of conceptual clarification is at the core of both, and the exceedingly brief construct definitions that are common in (health) psychology inevitably require researchers to elaborate definitions before being able to study those constructs. However, the elaborated versions typically remain unshared. This results in substantial hidden heterogeneity in construct definitions as they actually inform our research (and interventions). This heterogeneity in itself is desirable and contributes to scientific progress - but its hidden nature is very problematic.

Hence, a conceptual tool to facilitate explication of construct definitions: Decentralized Construct Taxonomies (DCTs; see Peters & Crutzen, 2024) was introduced that can make heterogeneity visible. A DCT is specified with a construct definition as well as corresponding instructions that prescribe how to measure the construct (for primary quantitative research), how to classify existing measurement instruments as measuring the construct (for evidence syntheses), how to code qualitative data as pertaining to the construct, and how to elicit qualitative data. This conceptual tool was implemented in a series of technical tools. These consist of a psychological construct repository, PsyCoRe.one; a mechanism for designating a Unique Construct Identifier (a UCID) to a DCT specification; and a way to enable efficient reference to the construct by appending the identifier to a URL, similar to how DOIs operate (e.g.https://psycore.one/expAttitude_expectation_73dnt5z1). Through their unique identifiers, these DCT specifications lend themselves to easy adaptation or re-use, thereby facilitating epistemic iteration (i.e. alternating innovations in theory and measurement). Finally, a number of approaches to developing such DCT specifications were discussed.

The role of formal, dynamical systems modeling in improving the precision of health psychology theories

The third contribution zoomed in on the theory crisis specifically and suggested a path forwards. Arguably, psychology's theory crisis is fuelled by two key issues: the dominance of narrative theories (i.e., verbal descriptions of explanatory frameworks for when and why psychological phenomena of interest arise; Guest & Martin, 2021) and the overreliance on between-group, static (i.e., atemporal), and linear effects modeling to study health psychology phenomena of interest (Chevance et al., 2021). Such narrative theories typically beg more questions than they can help answer and a growing body of evidence – e.g., from studies harnessing repeated, technology-enabled measurements in people's daily lives – indicates that many of the phenomena that are of central interest to health psychologists (e.g., health behaviors) are dynamically fluctuating over time in a non-linear fashion, and that these patterns look different for different individuals (i.e., they are

idiosyncratic; Chevance et al., 2021).

Formal, dynamical systems modeling was introduced as a method capable of addressing both of these issues. Formal modeling involves the translation of a theory's structure into a series of mathematical equations or other types of formalism (e.g., propositional logic, agent rules). Typically, computer simulations are used to check the model's adequacy (e.g., "Can the model produce the phenomena of interest and if so, under what assumptions?") before fitting the model to real-world data. The addition of a dynamical systems lens to the formal modeling process is arguably necessary for tackling the second issue above. An overview of the Theory Construction Methodology (Borsboom et al., 2021) was provided as a guiding framework for how to apply these methods in practice (going from abstract to more concrete steps), along with an example of the steps taken to develop a formal, dynamical systems model of lapse incidence in smokers attempting to stop as part of project 'COMPLAPSE' (https://www.olgaperski.com/research/complapse). Since formal modeling is relatively new to health psychologists, a scoping review is currently in progress, which aims to summarize the methodological steps taken by researchers when formalizing health psychology theories (Perski et al., 2023). This will be used to propose a set of 'best practice' recommendations for researchers interested in applying formal modeling in their future work.

Taking time into account in qualitative research

The fourth contribution took the same critical perspective and extended it to qualitative research. Qualitative research, like quantitative research, typically only interrogates atemporal patterns in codes. This precludes studying processes unfolding over time (such as psychological processes), whereas ideally, methods leverage within-case analyses effectively, and offer procedures for aggregation over multiple research units as required. Qualitative/Unified Exploration of State Transitions (QUEST) is such a tool, visualizing Markovian models of transitions between states or steps in a process that are encoded in the data. Markovian models visualize the probability of a unit of analysis transitioning from one state to another, which can be computed for a single participant or a group. Computations for QUEST are based on a state transition network where frequencies of transitions from a state to itself and other states constitute the total transition counts for each state. Then, an adjacency matrix is created for every unit of analysis (e.g., participant) and aggregated across units (e.g., summed). This cumulative, asymmetric matrix is then parsed by a network visualizer, where nodes represent states, and edges transition probabilities. QUEST visualizes transition probabilities between unique pairs of states (e.g., from State A to State B), making it a potent tool in discovering patterns within data (Zörg et al., 2023). Aggregation across units (e.g., multiple participants) raises interesting questions about combining idiosyncratic representations of state transitions, such as what exactly the aggregate represents and in which instances such aggregation is meaningful. QUEST is a novel piece of functionality within the R package {rock}, which implements the Reproducible Open Coding Kit (ROCK), a standard for working with qualitative data (Zörg & Peters, 2023). The package {rock} and more information about the standard, including step-by-step guides on employing the R package, can be found at https://rock.science, and a tutorial for QUEST will be available at https://rock.science/posts/2023-09-quest.html.

Embracing causal thinking

The fifth contribution argued that the main aim of research within the field of health psychology is

to inform policies and practices to alter people's behavior. Knowledge about the factors that are causally affecting behavior are therefore crucial. Randomized Controlled Trials are considered the gold standard to infer causality, but often they are unethical or unfeasible to conduct. As a result, we need to turn to quasi-experimental or observational studies. Early on in our scientific training we learn that we cannot draw causal conclusions from these designs and we therefore avoid using causal language. Nevertheless, we still often (implicitly) draw causal conclusions (e.g. by making recommendations for policy). Refraining from causal language and more importantly causal thinking is potentially harmful and may lead to biased results and wrong conclusions, because the methods used to estimate causal effects are not the same as those used to estimate associations (Hernán, 2018).

Directed Acyclic Graphs (DAGs) provide the necessary tools for articulating the assumptions on which causal interpretations of statistical associations rely and provide a clear basis for constructive discussion among researchers. DAGs are schematic representations, developed based on domain knowledge, about the hypothesized causal relationships between the involved variables and can be used to identify confounders, mediators and colliders (Greenland et al., 1999; Pearl, 2009). Although DAGs are increasingly used by epidemiologists, they remain relatively rare within applied health sciences (Tennant et al., 2021). Lack of knowledge of how to best develop DAGs has been suggested as one of the main reasons the uptake of DAGs is limited (Barnard-Mayers et al., 2021). Recently, we conducted a scoping review in which we aimed to provide an overview of the guidelines and recommendations for developing DAGs (Poppe et al., submitted). Based on this overview we created six guiding steps to consider when creating a DAG: (1) start as early as possible (ideally before designing the study); (2) clearly specify your research question (with clear construct definitions for your exposure and outcome, see second contribution); (3) add common causes (or confounders); (4) consider taking selection bias into account; (5) consider taking measurement bias into account; (6) use DAGs to inform your study design and data-analysis. A useful tool to start creating your own DAG is 'dagitty', that can be used in a browser-based environment (https://www.dagitty.net) as well as with an R package (Textor et al., 2016). Once you have created a DAG it is highly recommended to include it in your paper, so that you are transparent about your assumptions.

In sum, although methodological stagnation was the point of departure, the symposium was hopeful in paving the way for scientific progress. With this article, we hope to contribute to furnishing health psychology with the conceptual and operational tools to establish this progress.

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Original Article

Social Robots for Health Psychology: A New Frontier for Improving Human Health and Well-Being

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The idea of social robots, autonomous machines that interact and communicate with humans or other agents by following social behaviours and rules relevant to their role (Breazeal, 2003), has been prominent in post-modern science fiction literature, art, and cinema for decades. In industrial contexts, we are already familiar with robots that are not particularly social but are instead designed for industrial work like moving and assembling materials. However, the depictions of social robots in science fiction, communicating with us, acting as our companions, and assisting with our daily lives, have fuelled people's imagination about the capabilities these machines might have in the future. Accordingly, social robots are gradually but steadily moving from our books and screens and into different social settings such as commerce and services, health care, education, and even people's households. These robotic agents can take on various forms and shapes and are increasingly being deployed across various health and well-being settings, as their abilities to function autonomously or semi-autonomously in physical and social spaces alongside humans are continually improving (Henschel et al., 2021).

Due to social robots' social features (i.e., communicating verbally and nonverbally with and around humans; Cross & Ramsey, 2021; Hortensius & Cross, 2018), and animate qualities (i.e., embodying animated visual features such as human-like or animal-like design or movements; Cross et al., 2016), these artificial agents hold potential to simulate social behaviour and trigger emotions and feelings from human users (Laban et al., 2021; Laban, Kappas, et al., 2022a; Laban, Morrison, et al., 2022, 2023). Moreover, social robots are being equipped with technologies such as sensors, cameras, microphones, and processors that facilitate the high-fidelity collection of human data, like position, gaze, speech, emotions, and feelings, as well as support real-time analysis of human interaction behaviour (see Spitale & Gunes, 2022). Therefore, as the field of health psychology aims to understand the interplay of psychological, social, behavioural, biological and cultural factors on human health and well-being (Morrison & Bennett, 2022), *human—robot interaction* (HRI) research provides unique opportunities for studying how social robots may positively impact human well-being in different areas (Laban, Ben-Zion, et al., 2022; Robinson et al., 2019). In this piece, we address several avenues for the introduction of social robots in health psychology settings, such as emotion regulation and support, as tools for health monitoring and clinical management, to encourage people to adopt healthy habits and to assist with physical therapy and rehabilitation.

Supporting Emotional Health via Interpersonal Communication

Interpersonal communication behaviours like self-disclosure and social sharing can support

emotional health by providing and receiving support, improving mood, creating an environment for expressing feelings and regulating emotions (Coan, 2012; Rimé, 2009; Zaki & Williams, 2013). However, people tend to react to their communication partner's expression and might suppress their communication with others when those seem uninterested or unapproachable, or when perceiving them as judgmental, negative, or threatening (Rosenfeld, 1979). This is especially noticeable when sharing sensitive information (Lee & Renzetti, 1990), as people are often worried about shame and stigma (Smart & Wegner, 2000). Accordingly, people engage in self-disclosure with social robots as they induce a higher sense of anonymity (Pickard et al., 2016) while maintaining rapport in their interactions (Gratch & Lucas, 2021; Laban et al., 2021) and offering the positive effects of engaging in these behaviours with reduced social tensions. Therefore, we see promising performance of robots in socio-emotional settings such as care and education (Henschel et al., 2021), supporting people via companionship (e.g., Chen et al., 2020), coaching (e.g., Bodala et al., 2021), counselling (e.g., Utami et al., 2017), and as platforms for people to share about their lives and worries (e.g., Akiyoshi et al., 2021; Laban et al., 2023; Laban, Kappas, et al., 2022a).

In a long-term experiment performed by our research team, 39 participants from the general population based in the UK conversed with the social robot Pepper (SoftBank Robotics, see figure 1A) twice a week for 5 weeks (10 sessions in total), disclosing to the robot about general everyday experiences. We found that participants self-disclosed more to the robot (in terms of disclosure duration in seconds, and number of words) as the sessions progressed, perceiving the robot to be more socially competent and comforting over time. The repeated interactions also led to improved mood (after each session, and over time) and decreased feelings of loneliness (Laban, Kappas, et al., 2022a, 2022b). We replicated this study with a sample of informal caregivers (Laban, Morrison, et al., 2022, 2023), who often experience high levels of emotional distress (Revenson et al., 2016). Our findings replicated the previous results (Laban, Kappas, et al., 2022a, 2022b) and showed that caregiver participants felt less lonely and stressed, were more accepting of their caregiving situation, positively reappraised their caregiving situation and experienced reduced feelings of blame towards others (Laban, Morrison, et al., 2023). In addition, we found that experiencing higher rates of negative emotions (e.g., lower mood, feelings of loneliness and stress) as well as reporting higher levels of introversion is associated with higher rates of self-disclosure towards the robot (Laban, Kappas, et al., 2023). These results demonstrate that people can establish meaningful relationships with social robots and highlight the value of social robot-led interventions with individuals living with considerably difficult life situations. Social robots could potentially elicit rich interactions with individuals in need (due to stress, experiencing negative emotions, or going through difficult life situations) over time, acquire relevant information from their disclosures, and support their emotional well-being.

Using Interactions with Robots for Monitoring Symptoms

Our results (Laban, 2022) provide important evidence concerning the potential of social robots to collect health-related data in care recipients' environments, monitor and report symptoms, and offer early intervention. The use of social robots with enhanced mobility and verbal capabilities can further support the collection of health data (e.g., via analysing users' facial expressions, voice, content, and variety of physiological information; see review Spitale & Gunes, 2022) in public healthcare environments such as hospitals and nursing homes. Human resources in healthcare

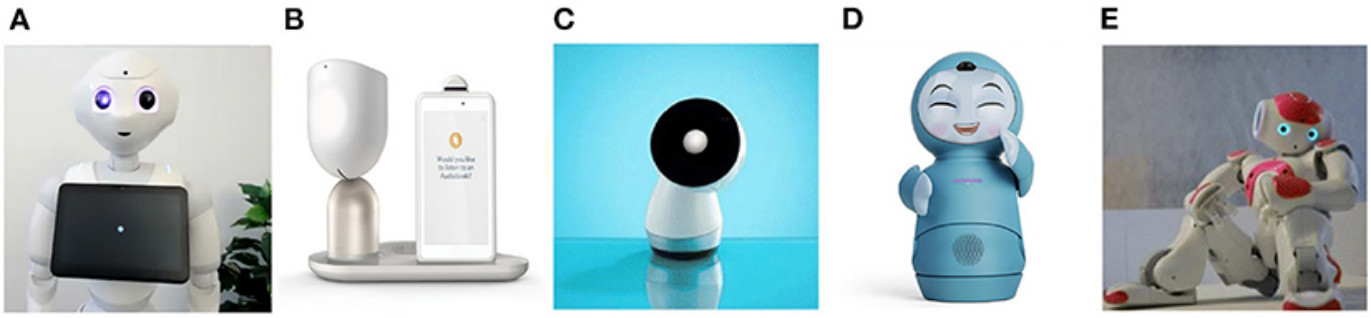

Figure 1. Figure from (Laban, Ben-Zion, et al., 2022) includes examples of several social robotics platforms that are heavily used in research and/or have enjoyed commercial success and are discussed in this paper. (A) Pepper, a humanoid by SoftBank Robotics. (B) ElliQ, a household robot by Intuition Robotics. (C) Jibo, a personal home assistant robot by NTT Disruption. (D) Moxi, an animated household robot by Embodied. (E) Nao, a humanoid robot and Pepper's little sibling by SoftBank Robotics.

environments are limited and people working in these contexts experience high rates of burnout due to unsustainably high workloads (Moukarzel et al., 2019). We have previously argued that such workers would benefit from delegating simple tasks to robotic agents (see Laban, Ben-Zion, et al., 2022). Previous research and ecologically valid studies have provided evidence for the efficacy of social robots in autonomous health data acquisition among hospitalized patients in various settings, including hospitals, homes, schools, and nursing homes (e.g., Boumans et al., 2019). In more personal settings, small, stable home-based social robots like ElliQ (Intuition Robotics, See Figure 1B), Moxi (Embodied, See Figure 1D), and Jibo (NTT Disruption, See Figure 1C) can be placed in patients' homes to monitor their symptoms and health condition. These robots are easy to operate and can elicit meaningful responses from humans in relevant settings, identify symptoms and react accordingly. For example, the social robot Jibo was used as a positive psychology coach to enhance the mental health of students residing on campus, resulting in improved well-being, boosted mood and increased motivation to improve their own mental health (Jeong et al., 2022).

Social Robots Delivering Behavioural Change Interventions

Beyond providing emotional support and monitoring symptoms, social robots show potential for supporting humans in adopting health habits through behavioural change interventions. These interventions can be for building habits over time, but also for sustaining habitual behaviour. For example, a study by Robinson et al. (2020a) showed that the Nao robot (SoftBank Robotics, See Figure 1E) can effectively deliver a behavioural intervention to reduce high-calorie snack consumption, resulting in a 50% reduction in snack episodes and a 4.4 kg weight loss after two weeks. Participants also reported increased confidence and positive emotions. The qualitative data from this study indicated that participants valued the robot's interactivity and sociability (Robinson & Kavanagh, 2021). The authors also reported successful testing of a similar intervention with a small group of diabetes patients (Robinson et al., 2020a).

Research has demonstrated that children can also effectively benefit from behavioural change interventions utilizing robots. For instance, a study conducted in primary school settings found that the use of a social robot led to an 80% success rate

in achieving weekly personal health goals, such as increasing physical activity and keeping a healthy diet (Triantafyllidis et al., 2022). In fact, healthy habits formed in childhood can have a long-lasting impact on a person's health and well-being, making it crucial to promote them in children (Curtis et al., 2011). However, socioeconomic, and cultural barriers (e.g., limited access to care services and educational opportunities, in addition to encountering language barriers) can make it difficult to introduce different health practices in rural areas and among indigenous communities (Hernández et al., 2017). Social robots have the potential to establish a common way of communicating or interacting with people by employing universal signals such as expressions, repetitions, and sounds, even when there may be language barriers or differences in cultural understanding. These robotic agents serve as mediators, bridging gaps in understanding and promoting positive engagement with individuals in underprivileged or culturally diverse communities. They are designed to be accessible and tailored to each user, simplifying the introduction and encouragement of healthy habits and practices. The results of a study in rural India, which used a social robot to encourage hand washing among school children, showed a 40% increase in hand washing with soap and improved handwashing technique in real-world settings (Deshmukh et al., 2019). These findings demonstrate the effectiveness of social robots in promoting healthy habits among children from impoverished backgrounds by overcoming socio-economic and cultural barriers. In times of crisis, such as a global pandemic, social robots can play an important role in promoting healthy habits and reducing the spread of infectious diseases. A trial using the robot "WallBo" showed an 86.25% compliance rate for handwashing and a 35% improvement in knowledge about hand hygiene (Deshmukh et al., 2021). These findings suggest that social robots have the potential to deliver autonomous behavioural change interventions and may overcome limitations in human-led interventions, such as social desirability biases.

Social Robots for Physical Therapy and Rehabilitation

Finally, social robots equipped with greater degrees of movement can demonstrate complex physical movements to aid in rehabilitation, increase physical fitness, and assist individuals with injury and illness (Langer & Levy-Tzedek, 2021). Feingold-Polak and Levi-Tzedek (2020) provided evidence in support of a long-term upper limb rehabilitation intervention facilitated by the humanoid social robot, Pepper (SoftBank Robotics), for post-stroke patients in a rehabilitation centre. Both clinicians and patients in the study found the intervention to be engaging, motivating, and most importantly, effective in meeting the needs of upper limb rehabilitation. Engaging with stakeholders, including patients, caregivers, clinicians, and families, is crucial when studying and testing social robots for rehabilitation and physical support, as each population requires specialized care. Recent focus groups with stroke patients and their caregivers (Dembovski et al., 2022) as well as clinicians treating Parkinson's disease (Bar-On et al., 2021) have yielded interesting insights, demonstrating the potential value and utility of embodied social robots for enhancing physical capacity in individuals across the lifespan.

Conclusions

Social robots have been found to be useful and engaging tools for monitoring people's health, and hold the potential to support human psychosocial, emotional, and physical functions. The public health crisis experienced in the last few years due

to the Coronavirus pandemic has highlighted the importance and urgency of embodied technological solutions that can alleviate emotional distress caused by factors such as loneliness, stress, and negative mood. These technologies could potentially serve as companions to individuals, but also facilitate social and emotional connections with others and help them to overcome their social and emotional barriers. Despite the potential benefits, more research is needed to ensure that social robots interact with humans ethically and responsibly (Lee et al., 2022). Furthermore, the potential benefits of social robotic interventions in various health and care-related settings warrant further validation and comparison to other home-based interventions such as telemedicine, community-based physiotherapy, self-monitoring tools, and social work. It is also essential to thoroughly evaluate the costs associated with utilizing social robots in this capacity. Therefore, we call on health psychology researchers to join in investigations exploring the roles and applications of social robots in supporting and maintaining human health and well-being.

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Original Article

Can an online approach to citizen science revolutionise clinical trials?

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The problem with traditional clinical trials

Clinical trials are often regarded as the cornerstone of evidence-based research (Sackett and Cook, 1994). They are the 'gold standard' for evaluating new treatments and approaches in healthcare and the methodology is becoming increasingly sophisticated (Bhatt, 2010). They form the basis of systematic reviews that provide the evidence that clinicians, policymakers, and guideline developers look to when implementing changes in clinical practice. Trials have changed the landscape of healthcare. However, there are still some major challenges with the way clinical trials are currently conducted, which we will highlight with some examples from our research of eczema (syn. atopic dermatitis).

Firstly, high-quality later phase clinical trials can be expensive and time-consuming to conduct. It can take years for a large pragmatic clinical trial to be funded and delivered - typically costing over one million British pounds in the UK, and costs are rising (National Institute for Health and Care Excellence, 2019). As an example of how high quality trials take a long time to complete, the results of an eczema prevention trial that started in 2014 were published 8 years later (Chalmers et al., 2020). Costs, capacity, and time issues mean there are questions of importance to patients, carers and clinicians that will not be prioritised for high quality research, creating a bottleneck of evidence generation.

Secondly, research questions for clinical trials do not always address what matters most to patients. This might occur for a multitude of reasons, such as financial incentives and goals of organisations, or limited resources available to investigate certain topics. However, one of the reasons could be because patients are not involved in designing and leading the research, and patient and research priorities do not always align. For example, our team noticed that from a priority setting exercise for eczema research over 10 years ago, the shared priorities between patients and healthcare professionals and those of healthcare professionals have mostly been addressed, but the patient priorities remain relatively under-researched (Batchelor et al., 2013). Table 1 shows these patient priorities.

Thirdly, findings from clinical trials are not always integrated into clinical practice, indicating issues around implementation (Ashrafzadeh et al., 2020, May et al., 2009). For example, there is

Table 1
Patient priorities from the James Lind Alliance Priority Setting Partnership (Batchelor et al., 2013).

• What is the best psychological treatment for itching/scratching in eczema?
• What is the best way for people with eczema to wash: frequency of washing, water temperature, bath vs. shower?
• What are the best and safest natural products to apply to the skin for eczema?
• How much does avoidance of irritants and allergens help people with eczema?
• What is the role of diet in treating eczema: exclusion diets and nutritional supplements?

evidence from clinical trials dating back to the 1990s that once a day topical corticosteroid use is as effective as twice a day use, however this finding has yet to be implemented as a recommendation in UK eczema guidelines and become standardised within practice (Lax et al., 2022).

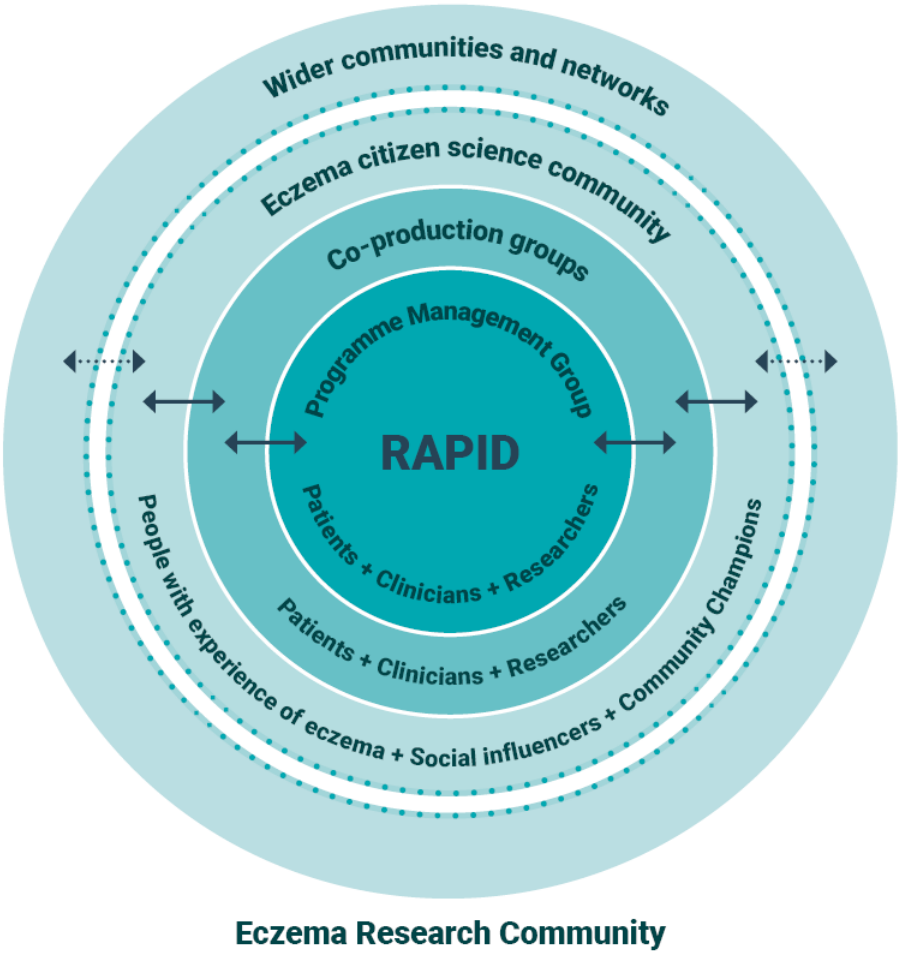
A new citizen science approach: Rapid Eczema Trials

The Rapid Eczema Trials project wants to deliver a paradigm shift in clinical trial design. Our aim is to deliver efficient and meaningful trials that improve the lives of people living with eczema by placing people living with eczema at the centre of research as well as creating an efficient model of delivery. Three workstreams all put "citizen scientists" (members of the public) at the centre. Citizen science can be varied in its definition, and models for how citizen science can be used in health research vary (Borda et al., 2019, Heigl et al., 2019, Robinson et al., 2018), but our working definition is 'a scientific method of working with members of the public to define, address and share answers to questions that are important to them'. There are various levels at which citizen scientists can be involved in the project (Figure 1).

Workstream 1 focuses on developing a "Eczema Citizen Science Community" of people living with eczema, carers, researchers and healthcare professionals from all areas across the UK. We hope that thousands of people will join the community. The community have options for how they input to the research design. All receive a regular newsletter from the study team with relevant updates and opportunities to get involved. Some opt in to participate in remote consultation exercises, such as online surveys or discussion groups. Those who want to be more involved can join a co-production group. The co-production groups are where members of the public, healthcare professionals and researchers work together to prioritise and formulate the research questions, design trial interventions (what approach is going to be tested out in the trial), establish control groups (what approach the intervention will be tested against), and design the trial features (e.g., eligibility criteria, length of trial, outcome measures). Additionally, the community will also have the opportunity to take part in the clinical trials. We have a payments policy where different levels of involvement allow for different levels of reimbursement informed by national guidelines (National Institute for Health and Care Excellence, 2022).

Workstream 2 delivers the online eczema trials

Figure 1. The Rapid Eczema Trials ecosystem



that have been designed by the co-production groups. The aim is to produce a minimum of three completed trials within the five-year funded research programme. To enhance efficiency, we will use a master protocol, and follow some key principles, so that the main processes are shared across all trials while allowing for specific design decisions to be tailored to each research question. By harnessing the power of the "Eczema Citizen Science Community" developed in workstream 1, and utilising online methods, we anticipate that recruitment will be more efficient compared to 'traditional' clinical trials. The trial will be delivered entirely remotely, thus reducing site-based costs and burden of follow up visits to clinics. We will be trialling new online methodologies for assessing eczema severity developed at Imperial College London (https://fundingawards.nihr.ac.uk/award/NIHR204505). Using a machine learning (artificial intelligence) tool, we plan to analyse photographs that participants take of their own eczema.

Workstream 3 accelerates uptake of new knowledge. People with eczema often lack information about their eczema, and the information they do receive is often conflicting (Santer et al., 2015, Teasdale et al., 2017). The Rapid Eczema Trials project aims to ensure that the evidence generated as part of the research programme reaches the people that need this

information. Knowledge mobilisation is about 'moving knowledge to where it can be most useful' (Ward, 2017). To accomplish this, a knowledge mobilisation co-production group comprising members of the public with experience of eczema alongside healthcare professionals and researchers will be established. Their collective effort will span throughout the programme to design ways to get eczema evidence and knowledge about research to the people who need it in a way that is helpful for them. The programme will also work with 'community champions' who will go into their communities to find out their needs. This workstream will also include a process evaluation guided by the '10 principles of Citizen Science' and the 'Open Framework for Evaluating Citizen Science' (Robinson et al., 2018, Kieslinger et al., 2018). We will use demographic data to assess the reach of diversity in the community. We will collect qualitative data to explore how they benefit from taking part.

Pushing the boundaries of research

In many ways, Rapid Eczema Trials is not using new approaches, but pushing the boundaries of patient involvement and trial efficiencies.

Patient involvement: Involving patients in setting research priorities and designing trials is not a new concept (Partridge and Scadding, 2004, Petit-Zeman et al., 2010, Batchelor et al., 2013, Williams et al., 2022). Rapid Eczema Trials wants to build on this involvement by creating a 'citizen science' eczema community. The hope is that this community acts as an engine for generating knowledge via trials by supporting the design and development, spreading the word to support recruitment, taking part in trials, and supporting the dissemination and mobilisation of knowledge.

Trial efficiencies: Trials have been using online methods for several years. In terms of eczema research, recent trials have demonstrated the successful delivery of fully online trials (Santer et al., 2022, Baker et al., 2022, Baker et al., 2023). Rapid Eczema Trials seeks to build on these efficiencies to deliver multiple trials using a master protocol and standardised templates for study materials. The hope is that this approach creates efficiencies in the trial lifecycle, ultimately facilitating a more streamlined and efficient delivery of clinical trials.

Why is this relevant to health psychology?

Many of the research questions we will answer in the Rapid Eczema Trials are likely to have a psychological component to them. For instance, the top patient priority from the eczema priority setting exercise was "What is the best psychological treatment for itching/scratching in eczema?"(Batchelor et al., 2013). Clinical trials are an important method for testing health psychology interventions (Marks and Yardley, 2004). Evidence also suggests online intervention effects are comparable to face-to-face interventions and usually more cost effective and scalable (Andersson, 2018). New methodologies that allow for rapid set up and delivery of psychological interventions are needed.

What next

Does this streamlined approach to designing, delivering, and disseminating trials by harnessing the power of citizen science make efficiencies in research? Does it produce useful, meaningful trials? Does it create evidence that will reach the people who need it? We hope to find out as we embrace citizen science and new methodologies in the Rapid Eczema Trials project. We hope to make our materials widely available, so others can design

their own rapid trials.

To follow the work of the Rapid Eczema Trials project, visit https://rapideczematrials.org/

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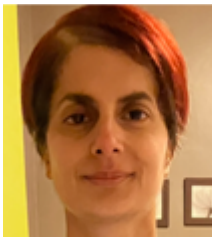

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