Stakeholder Skill Training in Participatory Health Research: Themes and Topics for Future Research

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**Abstract.** Participatory health research requires the active involvement of diverse, multidisciplinary stakeholders from patients to health professionals. These stakeholders are often required to attain new research skills to actively participate, while researchers themselves must prove equally capable of gaining new skills and knowledge from practice. Stakeholder skill training (SST) is therefore an essential component of participatory health research. Yet little consensus exists regarding how to prepare and conduct SST. We sought to explore and clarify this activity by conducting a one-day workshop involving human computer interaction (HCI) - and health researchers of many and varied experience levels. In this article, we draw on insights gained through the conversations and activities of this workshop; to briefly outline what SST currently and most often looks like, to draw readers’ attention to five key themes that were identified during this workshop, and to raise important questions for anybody preparing SST or wishing to learn more about it. This includes the value of attending to considerations spanning the ‘choice of the word training’, ‘hierarchy, power and culture’, ‘mutual learning’, ‘common language’, and ‘inclusivity’. We close the paper with suggestions for future research and collective reflection on the topic and promise of SST.

**Key words.** Stakeholder Skill Training, Participatory Research, Mutual Learning, Multidisciplinary Teams.

1. Introduction

Many different participatory health research streams (e.g., action research, participatory design, citizen science) call for the active involvement of multidisciplinary stakeholders from patients and their (informal) caregivers to healthcare professionals in research (Bradbury & Lifvergren, 2016; Clemensen et al., 2017; Wiggins & Wilbanks, 2019). This means that stakeholders who are not researchers but experts in their own right (e.g., through professional expertise and lived experience) take on roles and tasks vital to the project's success. Such a shift in responsibility can prove challenging not only for the researchers involved, who are required to hand over some of their power (Corrado et al., 2020) but for those other stakeholders who may require additional support and training to feel sufficiently empowered to confidently perform their new and more active roles. This furthermore requires researchers to learn enough about the research setting and practical processes (Barry et al., 2017). Mutual learning and stakeholder skill training (SST) are therefore essential practices in the conduct of participatory health research.

The key stakeholders of participatory health research are most commonly patients and healthcare professionals, next to the researchers commonly leading a project. However, the SST provided to these groups can prove very diverse. In addition to general research competencies, these might be, for example, leadership training (Chen et al., 2007), training in interdisciplinary work (Lepore et al., 2022) or (medical) terminology (Thompson et al., 2012) training. The acquisition of new skills might furthermore alone prove insufficient to ensure active participation from stakeholders. Confidence raising, for example, is often equally crucial, particularly when patients are involved and required to discuss with (their) healthcare professionals (Hewlett et al., 2006). For researchers on the other hand, SST is more often about preparing them to work with stakeholders and includes topics like Patient and Public Involvement (PPI) (de Wit et al., 2018).

While previously studying projects involving SST, we perceived a significant need for more precise information and instructions regarding the preparation and conduct of training [reference excluded for blinded review]. In response to this essential gap in knowledge and practice, this study aims to develop further insight into current knowledge, practice, and knowledge gaps relating to SST.

1. Study Context

The themes and topics discussed in this paper were derived from a full-day conference workshop at NordiCHI 2022. To ensure an informed basis for discussion, potential participants of this workshop were in advance asked to complete a survey detailing either their previous experience with SST (e.g., describing the content and recipients of the training) or, if they had no prior experience, explaining why they were interested in SST. Although the workshop was targeted at and advertised to a broad audience of researchers and others experienced in SST (e.g., patients and healthcare professionals), only research professionals applied to attend. Eight participants joined the session in addition to the ten organizers, for a total of 18 present on the day. The workshop was conducted in a hybrid form; some participants and organizers joined in person (n=12), and others online (n=6). This set-up was facilitated by enabling all participants to work in the same online environment, a MURAL board where each group made their notes, and a Microsoft Teams meeting where all participants joined with their cameras turned on, so that all could see each other. For group discussions, mutually exclusive in-person and online groups were devised, in order to mitigate the too often cumbersome and/or exclusory nature of mixed discussions, according to our prior experience.

The day started with a brief presentation of participants’ answers to the pre-workshop surveys, including open questions and topics for discussion as suggested by the participants. Workshop participants then split into breakout groups to discuss any gaps or incongruencies they perceived in the varied descriptions of SST gathered through these surveys and own experiences in their research. Following a plenary discussion of the outcomes of this first breakout session, the group split into another round of breakout discussions, this time working to identify facilitators and barriers of SST. Where possible, groups attempted to generate links between these facilitators and barriers (e.g., this facilitator mitigates this barrier). The day concluded with a final plenary round to discuss the outcomes from each group’s activities and any overarching open questions and recurring topics.

The discussion during this session, and our analysis of the notes made by participants during it, identified a number of open questions and key topics essential for researchers considering SST to take into account. These themes and topics for future research were inductively derived from the workshop notes by the first author and discussed amongst authors until agreement was reached. These identified key themes and topics are introduced in the following sections.

2.1 Reasons for Conducting Stakeholder Skill Training

Workshop participants’ reasons for conducting stakeholder skill training varied. Reasons commonly provided, however, included elevating understanding among research study participants and raising awareness of how participation in a study could benefit both the patient-public and the researcher. One participant added that SST is a key component of the participatory design process, and therefore critical to respectful and value-driven innovation. The survey also showed however that not everyone possessed such altruistic reasons for conducting stakeholder skills training. One person commented that training was often employed to increase compliance in relation to the use of devices, and another that it was included as a means of performing usability testing during the stakeholder skill training process. During the workshop, the point was often made that individuals are invited to take part in the co-design process to share their knowledge and expertise, and was therefore followed by questioning why they would need to be trained in research skills in particular. One reason offered by workshop participants in response was to note that other approaches, from citizen science to action research, stress stakeholders’ involvement not as participants but as co-researchers, and that offering some form of training can lower the often significant barriers to their adopting certain roles in the project (e.g., training people to perform interviews or introducing more intuitive methods, such that people can start right away).

2.2 The Structure and Content of Stakeholder Skill Training

Through participants’ comments and notes, it became evident that stakeholder skills training currently takes place during many different phases of the research and development process, from testing to development, validation, and during the first month of a pilot study. No one phase proved more popular nor prominent as the time for stakeholder skills training; the activity appearing across all stages of a project.

The methods used for SST were described as very varied, although many comprised human-centered approaches with a focus on exploratory and qualitative methods in particular. Several participants explained through the survey that they had employed stakeholder skill training as a means of educating participants on how to use a particular technology, and to share general digital skills including how to turn a system on and off, connect to the internet, access an application, and return to the home menu.

1. Identified Themes

Through our analysis of the pre-workshop survey and notes made during the often vibrant discussions part of the workshop itself, we identified five major themes and topics for future research. These span *Choice of the word ‘Training’*, *Hierarchy, Power and Culture*; *Mutual Learning*; *Common Language*; and *Inclusivity* — each of which we next describe below.

3.1 The Choice of the Word ‘Training’

The term ‘training’ is employed in many fields (e.g., in education, work organization, information technology, sports, etc.) to refer to an (often) prolonged process of learning, practicing, and acquiring certain skills. Different terminologies exist to describe such a process, depending on the precise context. In education, this process is often more commonly referred to as ‘learning’. For this workshop, the title of ‘stakeholder skill training’ was chosen — a term critically reflected upon during the workshop by participants who debated whether ‘training’ was the appropriate term. One group discussed whether training is appropriate in the context presented here or whether terms such as learning or education might be more appropriate. The group suggested alternative terms, for instance, ‘experimental learning’ or ‘experience-based coaching’. Distinct related questions were subsequently discussed, including; “Is it relevant to the training or learning process if somebody teaches specific skills, and these taught skills will be applied by all stakeholders (i.e., also the teacher)? Is the term ‘training’ more appropriate if more hands-on practices are conducted? Is there a difference between learning something collaboratively or alone? Are group dynamics essential in training (as in sports, for instance)? Is there a group goal that all participants can achieve through learned skills? Does one speak of *training* in such cases? And does one speak of *learning* (e.g., in the field of education) instead, when the teacher him- or herself does not conduct or use the skills, but only explains theoretically to the learners what needs to be done for applying these skills?”

Other topics of conversation surfaced spanned whether the appropriate terms could differ depending on the goal, content, skill or training method. Participants’ responses to the pre-workshop surveys reflected the content and goals addressed through SST in each of their contexts, although most training methods mentioned in the workshop itself took the traditional form of lectures. Considering the literature, we conclude that both terms (‘training’ and ‘learning’) are most likely appropriate in our context and that the *training* process can be understood as an umbrella concept that includes the *learning* process. In the literature, “Kirkpatrick's Model of Training” (Smidt et al., 2009) is widely employed and often referenced as the basis for such training processes. This model consists of four levels, the second of which comprises *learnin*g; “measuring what participants have learned in terms of both knowledge and/or skills” (Smidt et al., 2009).

Another relevant thread of prior research mentioned by participants focuses on the training of employees; “Training is an instrument to expand the knowledge base of the employees and allows them to transfer this on their jobs in the form of improved performance. It is generally defined as a systematic acquisition of skills, concepts or attitude that results in improved performance” (Sahni, 2020). A similar framing is expressed by Masadeh in defining ‘employee training’ as in particular “associated with on-the-job skills acquired for a particular role, while education is seen as relating to a more formal academic background” (Masadeh, 2012).

The training process itself was the source of much discussion among groups, giving rise in turn to questions including; “When does *training* even start? Is it enough to explain a method theoretically or is it necessary to teach it so that stakeholders can conduct it or even gain the ability to teach it themselves?” Within the training process, it is then necessary to ensure a common language and the everyday use of terminologies. These considerations play a crucial role in participatory health research and skill training in particular given the frequent involvement of interdisciplinary teams (e.g., consisting of different researchers, patients and/or healthcare professionals). On the one hand, a skill is taught and on the other hand, it is learned. Creating a common base for sense-making discussion through the consistent definition of interdisciplinary specificities and vocabularies is therefore essential. Every participant needs to be, and feel, able to contribute.

3.2 Hierarchy, Power and Culture

Actively involving stakeholders with different backgrounds and fields of research expertise was often described by participants as directly challenging long-established research and power dynamics. During the workshop, many different levels and challenges of power relations were discussed in the context of SST. On the one hand, power relations between trained researchers and research participants are evidently shifting when those same participants become co-researchers. In participatory research, stakeholders are furthermore attributed expert knowledge based on their experiences, which challenges the traditional knowledge hierarchy superordinating academic knowledge over other forms of knowledge. On the other hand, these precise power dynamics are often transferred to the research setting by the act of bringing together stakeholders and researchers from different fields and with varying levels of social or organizational power, including patients and healthcare professionals. As one workshop participant highlighted, power structures are inevitable, as part of human nature.

Such power imbalances were identified during workshop discussions as a critical barrier to the success of SST. Creating a safe environment and flat organizational structure were yet discussed as possible means of addressing these power dynamics. During our workshop, one group suggested that SST facilitators should be trained outsiders, not stakeholders in the project. Thus, facilitators can more effectively mediate power imbalances and cultural differences. Literature adds that setting ground rules for the session and making use of narrative methods can help create safe spaces (Egid et al., 2021). However, Roura (2021) describes how the idea of ‘safe’ spaces is not always true in reality. The early involvement of stakeholders in the research process and the equal sharing of agency concerning decision-making were also mentioned as crucial facilitators in this regard. This latter factor has previously been considered essential for meaningful stakeholder engagement in participatory health research (Cornwall, 2008). Participants furthermore commented that the research process, SST, and its content function best when adapted to the prevalent cultural and social structures on which considerations of power and hierarchy hinge.

Across the literature on participatory health research, researchers describe similar ways of counteracting power imbalances. Authors suggest in particular, among other actions, involving stakeholders from the beginning of the research process (Abma, 2019; Montoya & Kent, 2011), as a means of establishing equal partnerships through mutual learning from the beginning.

At a sufficient scale, participatory approaches can be seen as striving to equalize input in the production of knowledge. And yet, power imbalances might equally reproduce the very inequities that these approaches were initially intended to address, for example, when the most disadvantaged bear the greatest share of costs given that participating can be extremely time-consuming (Roura, 2021). It is therefore essential to examine and understand the power dynamics present within any research project, to jointly reflect on subjective perspectives, interests, and assumptions (Roura, 2021) and to address tensions directly during SST.

3.3 Mutual Learning

As previously noted, it was often emphasized during this workshop that stakeholders participate in health research in the first place precisely because they are already experts and possess valuable knowledge (e.g., of the lived experience of a specific condition). Researchers are, similarly, experts within their scientific domain (e.g., epidemiology, technology development, methodology) and yet can also learn from both stakeholders and other researchers. One of the questions put forward for discussion during the workshop via the survey asked; *“How can we facilitate mutual learning between researchers and stakeholders?”* The importance of creating a safe environment was discussed during the workshop as one means of mitigating power imbalances in support of mutual learning — as was fostering shared understanding and employing a common language, as will be discussed in greater detail in sections to follow.

The discussion engaged in by one group in particular framed the development of a joint base for sense-making discussion as a key motivation for stakeholder training. From this perspective, stakeholder training makes possible the common ground necessary for effective collaboration between stakeholders (i.e., the process) and outcomes (mutual learning). Members of this group furthermore commented that everyone needs to warm up to each other’s ways of working and that by starting in a ridiculous way (e.g., by talking about a subject nobody is an expert in), knowledge might later be unlocked. When discussing effective facilitation, reiterating that everybody is an expert was seen to be beneficial —shared leadership supporting a change in roles enabling researchers to learn as much as research participants. On the other hand, it was considered a barrier that a) everybody is an expert in their own domain, and b) that there might exist a lack of awareness of one’s own expertise. It was emphasized that we should refrain from assuming which skills others possess, and that a more effective first step is to instead *“identify what skills are at the table and then see what we can learn from each other”*. Establishing mutual learning itself as a goal was furthermore considered by participants a valuable facilitator of SST.

The importance of remaining open to learning from others is often acknowledged in the co-design literature, in the context of which, relationships that are non-paternalistic and grounded in mutual learning are required to create systems capable of producing better outcomes for the people they serve (McKercher, 2020). A recent scoping review furthermore highlighted the creation of mutual learning opportunities as the most frequently reported benefit of patient engagement in preclinical laboratory research (Fox et al., 2021).

3.4 Common Language

The task of warming up to each other’s ways of working was highlighted in the prior section as a key challenge for SST. Another issue highlighted during this workshop relates to that of employing the same vocabulary between groups. Specifically, this discussion centered around the notion that researchers may implicitly use terms that carry different meanings for other stakeholders. Typically, researchers come equipped with a considerable amount of theoretical knowledge grounded in the research literature. In contrast, stakeholders – possibly driven by intuition or experience rather than peer-reviewed research – may tend to use the very same terms to label very different “things”. Participatory health research in the arena of digital health in particular furthermore commonly involves several different academic disciplines, each of which is likely to bring with them the unique vocabularies of their own academic communities (see e.g. the varying meanings of the frequently employed term “implementation” between the health and computing science communities (Blandford et al., 2018)). Similarly, some terms may carry heterogeneous meanings even across different communities of practitioners. Lastly, cultural differences have the potential to produce severe misunderstandings even in relation to the communication of simple concepts, as noted by both the participants of this workshop and the prior research literature (Barrett & Oborn, 2010).

The above differences in disciplinary, professional, and cultural backgrounds may result in a considerable level of terminological ambiguity during training and research activities. To solve this particular problem, workshop participants suggested clarifying the meaning of key terms in advance of exercises. While there are different ways of doing so, two specific approaches were mentioned during the session: using visuals to support the understanding of key concepts, and using collaborative tools to foster interaction. As others have noted, preference might furthermore be effectively granted to the use of “lay terms” rather than the “language of research” (Sieck et al., 2017). Finally, participants suggested that when discussing technological problems, concrete and relatable examples should always be provided to render potential issues tangible even for those stakeholders with less technical backgrounds.

3.5 Inclusivity

Workshop participants noted that given the involvement of professionals and patients or end users is often desired and very valuable, attention should be given to inclusivity considerations. Participation in projects requires both knowledge and time. For some projects, stakeholders must acquire specific knowledge to join and obtain an equal voice in discussions. To ensure sufficient expertise on a specific topic – either process or content – training may be provided by the researchers or any other stakeholders. This training will however take time, which may burden stakeholders. And, there will therefore always exist a trade-off between knowledge sharing and time (Jongsma & Friesen, 2019).

Access to training demands special consideration in cases where time can prove very limited for participants, either due to symptoms relating to the condition under investigation (i.e., fatigue), the fact that research has to be engaged with in their spare time (i.e., for patients), a heavy workload (i.e., for healthcare professionals), or similar causes. In such cases, finding the right balance between providing relevant training and using more intuitive, less time-consuming methodologies requires more attention.

Inclusivity also warrants special consideration in cases where the knowledge or experience gap is substantial. For instance, people who have not previously come into contact with scientific projects or have not received higher education may feel less comfortable participating. The same goes for vulnerable groups. This requires on the one hand additional effort in the recruitment phase of projects, and on the other hand organizing the training in such a manner that participation can be easily achieved for this group. During the recruitment phase, researchers may consider using a ‘third contact’, for instance, their nurse or a neighborhood volunteer organization with whom a relationship and trust have already been substantiated. Researchers may also consider shorter and less formal, tailored, training sessions when developing such training, as time can be a scarce resource as well for many participants.

It can be necessary for some groups to ensure financial compensation for participation. For example, this can make a difference for some patients, as spending money to participate in research is not always an option.

Inclusivity will frequently remain a challenge. It is, therefore, essential to consider in advance of research which individuals or groups can contribute through their presence, and what their training needs are likely to be.

1. Practical recommendations

Based on the findings described and discussed above, we draw several recommendations that future projects can utilize in practice.

* Explore which terminology is the most appropriate and accepted by the involved stakeholders (e.g., ‘training’, ‘(collaborative) learning’)
* Co-define a common vocabulary, together with stakeholders, to get everybody on the same page in conversations. You can opt to use visuals here as well
* Create flat structures as much as possible and provide a safe environment for all stakeholders
* Reflect on (aspects of) power dynamics and hierarchies together, keeping in mind diversity factors (e.g., role, gender, abilities)
* Start by identifying which skills are already there (e.g., from lived experience), and what may still be needed
* Create opportunities for mutual instead of one directional learning instead
* Use collaborative tools for learning, to stimulate conversations and exchanges between stakeholders
* Allocate time for training according to what participants are willing and able to invest.
* Investigate the possibility to work with trusted organisations that may facilitate or mediate during the sessions, while keeping in mind that this may change the power dynamics
* Limit the burden on stakeholders as much as possible, for example by providing reimbursements, but also by making sure that all activities are strictly necessary

1. Conclusion

This paper presents key topics and themes for future research in relation to the conduct of SST in participatory health research. Our findings, derived from a workshop with 18 participants, provide an overview of what can and should be considered in the planning and conduct of SST. In this context, our findings suggest, SST is likely to function most effectively when seen and implemented as a form of mutual learning, where there is not one trainer or teacher, but where each participant is an expert in their own right, and shares this knowledge with others. The terminology of ‘training’ might in this sense prove a misnomer, and yet we can also interpret this as an activity that includes ‘learning’ aspects. While setting up and starting the training process, it is essential to identify a language mutually understood among participants and to make the session as accessible as possible for all involved. Navigating both hierarchy and power dynamics is in this regard also a critical task. We make some suggestions for addressing these issues, and yet more research into SST, specifically in relation to healthcare, is needed. Developing and sharing best practices, potentially including clear guidelines for those developing and implementing SST, would be of significant future value to the field.

## **Statements and declarations**

Competing interests

The authors declare that they have no competing interests.

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Ethical statement

According to the Dutch Medical Research Involving Human Subjects Act (WMO), no (medical) ethical approval was needed for this research. By signing up for the workshop, participants provided consent to the use of their input in (scientific) publications.

## **References**

Abma, T. A. (2019). Dialogue and deliberation: new approaches to including patients in setting health and healthcare research agendas. *Action Research*, *17*(4), 429–450.

Barrett, M., & Oborn, E. (2010). Boundary object use in cross-cultural software development teams. *Human Relations*, *63*(8), 1199–1221.

Barry, M., Doherty, K., Marcano Belisario, J., Car, J., Morrison, C., & Doherty, G. (2017). mHealth for maternal mental health: everyday wisdom in ethical design. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 2708–2756.

Blandford, A., Gibbs, J., Newhouse, N., Perski, O., Singh, A., & Murray, E. (2018). Seven lessons for interdisciplinary research on interactive digital health interventions. *Digital Health*, *4*, 2055207618770325.

Bradbury, H., & Lifvergren, S. (2016). Action research healthcare: Focus on patients, improve quality, drive down costs. *Healthcare Management Forum*, *29*(6), 269–274. https://doi.org/10.1177/0840470416658905

Chen, S., Poland, B., & Skinner, H. A. (2007). Youth voices: Evaluation of participatory action research. *The Canadian Journal of Program Evaluation*, *22*(1), 125.

Clemensen, J., Rothmann, M. J., Smith, A. C., Caffery, L. J., & Danbjorg, D. B. (2017). Participatory design methods in telemedicine research. *Journal of Telemedicine and Telecare*, *23*(9), 780–785. https://doi.org/10.1177/1357633X16686747

Cornwall, A. (2008). Unpacking ‘Participation’: models, meanings and practices. *Community Development Journal*, *43*(3), 269–283.

Corrado, A. M., Benjamin-Thomas, T. E., Mcgrath, C., Hand, C., Laliberte Rudman, D., & Heyn, P. C. (2020). Participatory Action Research with Older Adults: A Critical Interpretive Synthesis. *Gerontologist*, *60*(5), E413–E427. https://doi.org/10.1093/geront/gnz080

de Wit, M., Beurskens, A., Piškur, B., Stoffers, E., & Moser, A. (2018). Preparing researchers for patient and public involvement in scientific research: Development of a hands-on learning approach through action research. *Health Expectations*, *21*(4), 752–763. https://doi.org/10.1111/hex.12671

Egid, B. R., Roura, M., Aktar, B., Quach, J. A., Chumo, I., Dias, S., Hegel, G., Jones, L., Karuga, R., & Lar, L. (2021). ‘You want to deal with power while riding on power’: global perspectives on power in participatory health research and co-production approaches. *BMJ Global Health*, *6*(11), e006978.

Fox, G., Fergusson, D. A., Daham, Z., Youssef, M., Foster, M., Poole, E., Sharif, A., Richards, D. P., Hendrick, K., & Mendelson, A. A. (2021). Patient engagement in preclinical laboratory research: A scoping review. *EBioMedicine*, *70*, 103484.

Hewlett, S., De Wit, M., Richards, P., Quest, E., Hughes, R., Heiberg, T., & Kirwan, J. (2006). Patients and professionals as research partners: Challenges, practicalities, and benefits. *Arthritis Care and Research*, *55*(4), 676–680. https://doi.org/10.1002/art.22091

Jongsma, K., & Friesen, P. (2019). The challenge of demandingness in citizen science and participatory research. *The American Journal of Bioethics*, *19*(8), 33–35.

Lepore, D., Dolui, K., Tomashchuk, O., Shim, H., Puri, C., Li, Y., Chen, N., & Spigarelli, F. (2022). Interdisciplinary research unlocking innovative solutions in healthcare. *Technovation*, 102511.

Masadeh, M. (2012). Training, education, development and learning: what is the difference? *European Scientific Journal*, *8*(10).

McKercher, K. A. (2020).  *Beyond Sticky Notes : Co-Design for Real : Mindsets, Methods and Movements*.

Montoya, M. J., & Kent, E. E. (2011). Dialogical action: Moving from community-based to community-driven participatory research. *Qualitative Health Research*, *21*(7), 1000–1011.

Roura, M. (2021). The social ecology of power in participatory health research. *Qualitative Health Research*, *31*(4), 778–788.

Sahni, J. (2020). Managerial training effectiveness: An assessment through Kirkpatrick framework. *TEM Journal*, *9*(3), 1227.

Sieck, C. J., Hefner, J. L., & McAlearney, A. S. (2017). Finding the patient voice in research activities: perspectives of patient advisors and researchers. *J Particip Med*, *9*, 2.

Smidt, A., Balandin, S., Sigafoos, J., & Reed, V. A. (2009). The Kirkpatrick model: A useful tool for evaluating training outcomes. *Journal of Intellectual and Developmental Disability*, *34*(3), 266–274.

Thompson, J., Bissell, P., Cooper, C., Armitage, C. J., & Barber, R. (2012). Credibility and the “professionalized” lay expert: Reflections on the dilemmas and opportunities of public involvement in health research. *Health (United Kingdom)*, *16*(6), 602–618. https://doi.org/10.1177/1363459312441008

Wiggins, A., & Wilbanks, J. (2019). The Rise of Citizen Science in Health and Biomedical Research. *American Journal of Bioethics*, *19*(8), 3–14. https://doi.org/10.1080/15265161.2019.1619859