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Sociolinguistic coordination devices in cross-cultural co-design interactions

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ABSTRACT

Collaborative design methods are widely regarded as effective ways to involve diverse voices in the design process. Recent design-oriented research highlights disparities in the effort and types of engagement required by different stakeholder groups participating in collaborative design activities. This work inspired us to audit our own co-design practices in a multidisciplinary digital mental health project with faith healers in Ghana. We conducted a self-assessment of contextual interviews and co-design sessions with faith healers drawing on Clark's sociolinguistic theory of common ground to identify verbal coordination practices and patterns. We offer insights about the nature of our own coordination practices as an example of the ways that attending to the trajectory of coordination throughout a collaborative design process can provide an important tool for multiple voices to contribute to complex high risk/high reward interventions. We discuss implications of this approach to self-assessment for our ongoing project and as a case study of coordination made legible to diverse stakeholders.

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1. Introduction

Collaborative design methods are widely regarded as effective means of involving diverse voices in the design process. Most approaches to co-design advocate for equitable partnerships with community members throughout the design process, from conception to conclusion of a project (Bang et al. 2016; Simonsen and Robertson 2013). Achieving this in practice can be challenging. For example, as community engaged research becomes more accepted in academia (Amidon, Moore, and Simmons 2023; Kantamneni, Winkler, and Calvert 2019), there is growing recognition that these best practices can be at odds with the expectations put on researchers to generate scholarly outputs. Further, lack of familiarity with design practice and principles can introduce barriers and obstacles across multi-disciplinary research teams, requiring additional time and effort to align and adjust expectations and evaluation criteria (Kantamneni, Winkler, and Calvert 2019). Recent research also highlights the potential *epistemic burden* of

participation for non-academic partners (Pierre et al. 2021) – the additional work required by collaborators untrained in design methods to understand the rationale and expectations of design research activities. Others have surfaced the importance of attending to relational dynamics and the mechanisms of reciprocity (Dindler and Iversen 2014; Dreessen et al. 2020) to establish and maintain equitable partnerships.

Developing the skills to understand how and when burdens and barriers might be inordinately heavy for some stakeholders can take time. As community norms are being established across project participants (including the range of researchers and community members), there is a risk that misalignments will negatively affect participation and make project outputs less relevant and valuable (Harrington, Erete, and Piper 2019; Laura Ramírez Galleguillos and Coşkun 2020; Tomasini Giannini and Mulder 2022). The process of striking a stable balance across multiple perspectives can include establishing a shared understanding of project outcomes, allocating resources in ways that are transparent and culturally sensitive, assessing the appropriateness of designs through commonly understood criteria, and building project plans that allow for equitable participation by all groups involved in a project at appropriate times (Amidon, Moore, and Simmons 2023). In practice, coordination in collaborative design projects often relies on the skills of individual researchers and the willingness of all partners to navigate social and communicative alignments. Understanding how successful collaborative design projects respond to these challenges is complicated by the fact that details on specific methods for establishing and assessing relational balance are often underspecified in reports of co-design work. Further, maintaining coordination throughout a project requires tools and methods for continual reassessment of communication and joint activities.

In this paper, we pose these potential obstacles to equitable and authentic collaboration as a mechanism of *coordination*— the process by which an ensemble of people act together to achieve a joint goal through cohesive activities (Clark 1996). We examined exchanges with community partners during the early phases of a community-engaged research project through the lens of sociolinguistic coordination (Clark 1996) to explore how, when, and if shared points of reference and alignment were established. Through our analysis, we use Clark's concepts of *joint action* and *coordination devices* to assess interactions among researchers and local stakeholders. The discussion highlights ways that surfacing mechanisms of coordination can contribute to managing expectations and refining evaluative criteria across multi-disciplinary teams, improving reciprocity, and mitigating burdens when working with stakeholders from different cultural contexts. Although here we focus our analysis on exchanges with community members, we see these issues of coordination as also applicable to ongoing coordination across the diverse members that comprise the research team, each bringing a distinct disciplinary lens, set of experiences, and assemblage of commitments.

1.1. Background

Our international, multidisciplinary team consists of researchers, physicians, technology designers, and community partners in the US and Ghana. The goal of our work is to improve mental health care in West Africa. Our project supports faith healers in Ghana's rural prayer camps who provide care to people with serious mental illnesses (SMI). In

West Africa, care for individuals with SMI is often provided by faith healers due to significant gaps in clinical behavioural health services (Arias et al. 2016; Edwards 2014; Sharma 2020). Healers, who are frequently untrained in evidence-based treatments for individuals with SMI, typically focus their care on spiritual practices and provide shelter, food, and medical care when possible (Aguwa et al. 2023; Shisana et al. 2024). Due in part to this lack of training, there is evidence of significant and widespread human rights violations related to the treatment of people with SMI, such as chaining, forced fasting, and being kept in isolation (Edwards 2014). Although the Ghanaian government outlawed these practices in 2017 (Walker and Osei 2017), they continue in the absence of alternative approaches that are safe, supportive, and therapeutic (Benyah 2022; Gyimah et al. 2022).

The overarching project includes deploying community health workers, supplying psychopharmaceuticals, and sharing mental health education through a co-designed mobile app for spiritual caregivers. Here, we focus on the preliminary phases of app development. This digital mental health intervention builds on prior work that demonstrated that delivering psychosocial educational materials via mobile devices can effectively support paraclinical care for individuals with SMI (Ben-Zeev 2017, 2018; Carter et al. 2021; Naslund, Shidhaye, and Patel 2019).

The complexity of the project requires a highly multidisciplinary team. The success of the three-prong intervention requires close relationships with community nurses and faith healers. team, composed of members from the US and Ghana, has expertise in digital mental health interventions in low-resource settings and in community mental health initiatives in West Africa, including regional prayer camps. Experiences and motivations of the group overlap and intersect across areas of psychology, psychiatry, global mental health, user-centred design, community-engaged psychosocial intervention implementation, and a better understanding of how social and cultural practices shape mental health experiences and behaviours. Individually, team members perform their work at the local, national, and global levels. It is not possible to fully capture the range of perspectives represented on this team, comprising almost a dozen experts located across the US, the UK, and Ghana. However, it is evident during weekly video conferences that there is a strong shared commitment to collaborative and community-engaged translation of evidence-based psychosocial interventions.

This commitment was present from the early days of the initiative. At the outset of our multi-year project, we engaged in preliminary fieldwork, spending 10 days visiting prayer camps, conducting interviews, and facilitating collaborative design activities with faith healers. This phase enables the team to (1) build relationships between the international team and faith healers, (2) observe rural prayer camps in eastern Ghana, and (3) gather initial requirements for a digital mental health intervention supporting faith healers. These interactions serve as the basis for the analysis offered here.

1.2. Related work

Discussions over the last decade within the collaborative design community underscore challenges of sustaining equitable engagement in culturally and socio-economically diverse settings (Awori, Ssozi, and Baguma 2022; Blomberg et al. 2014; Dearden et al. 2008; Shaw and Braa 2014; Zyl 2013). Dearden et al. set a bar

when quoting Winschiers-Theophilus: ‘True participatory design, especially in a cross-cultural context, can only be achieved if the participatory process itself is appropriated by the participants themselves’ (2008, 294). However, the form and format of collaborative design activities are often directly related to the theoretical, practical, and political values and priorities of the researchers who typically initiate and facilitate the engagement. This can get complicated when researchers come from diverse intellectual communities of practice. Motivating commitments can range from democratising technology design to making technology more inclusive. The diversity of teams can also require projects to perhaps veer from strict definitions of participatory design while still affirming principles of community-engaged research. This was true in our case.

Collaboration with colleagues, community partners and participants who are not necessarily familiar with or committed to the same critical, social, and political discourses can necessitate compromise and translation of participatory processes to more familiar practices. In fact, in recent years the participatory design community has made these practical realities explicit (Awori, Ssozi, and Baguma 2022; Blomberg et al. 2014; Shaw and Braa 2014; Zyl 2013) highlighting particular challenges of translating collaborative design commitments into meaningful participatory realities in contexts where there are ‘large cultural and socio-economic differences between practitioners and other participants’ (Dearden et al. 2008, 293). We believe this applies not just to community partners but also to diverse multidisciplinary teams such as ours.

True diversity of perspectives requires respect for context and attention to pragmatics. Dindler and Iverson emphasise the ‘significance of the personal and professional relationships that are developed during the design process and the role these may play in the success and sustainability of the designed technologies’ (2014, 41). They identified relational skills, or the ability to build strong stakeholder relationships, as key. Similarly, Dreessen et al. (2020) identify reciprocity as a core value in collaborative design methods. They explain that ‘... reciprocity occurs ... as a sort of exchange (of ideas, opinions, reflection) where all involved meet on equal grounds and validate the views and visions of others’ (Dreessen et al. 2020, 154).

Sawhney and Tran (2020), aligning with DiSalvo and others, stress that strong relationships, characterised by reciprocity, mutuality, and fair agency, differ from mere consensus. Disagreement and conflict can play a crucial role in cultivating healthy relationships. They highlight ‘the need to prepare individual practitioners to have the agency, foresight, and capacity to deal with contestation as it arises’ (Sawhney and Tran 2020, 175). Such ‘agonism’, or constructive resistance, enhances stakeholder relationships and fosters genuine collaboration (DiSalvo 2015).

Pierre et al. approach issues of reciprocity from a more political perspective, claiming that collaborative design researchers can have a tendency to undervalue the labour required of community partners to both learn about and actively engage in research paradigms that are typically unfamiliar to those outside of academia or the technology design professions. According to Pierre et al., such demands placed by researchers on community participants can relate to (1) asking participants to do unfamiliar tasks without proper training, (2) ignoring the invisible labour of marginalised individuals in

educating researchers about their perspectives, and (3) focusing on academic recognition over tangible community benefits.

They call on collaborative design researchers to consider ‘what community members are being asked to do within these research dynamics, how it serves or doesn’t serve them, and how it aligns or doesn’t align with their goals’ (Pierre et al. 2021, 3).

When co-design focuses on discrete activities rather than the embedded and sustained collaboration of traditional PD, it does not always offer opportunities for the wholesale ‘appropriation of the process’ by community members, as advocated by Winshiers-Theophilus. However, opportunities for ‘making together’ as a form of elicitation and ideation can provide a platform for building relationships with community members through a design process (Snyder et al. 2014). This is often how collaborative design principles are implemented in complex cross-disciplinary, cross-cultural projects. For example, Nägele, Ryöppy, and Wilde (2018) discuss the importance of identifying design activities and frameworks that provide all collaborators with appropriate tools for imagining speculative artefacts and practices. Their Participatory Design Fiction (PDFi) provides a framework and practical techniques that leverage ‘storytelling, sketching and design, as well as theatre methods to surface and shape preferable futures with vulnerable stakeholders’ (Nägele, Ryöppy, and Wilde 2018, 2). PDFi is an attempt to ensure that ‘speculation is inclusive’ and aligns with ‘the democratic principle that those who are most impacted by a future outcome should have a say in shaping that outcome’ (Nägele, Ryöppy, and Wilde 2018, 2). Their work with chronic pain patients shows how PDFi co-design activities can cultivate a sense of shared understanding and support agency through an imagined preferred future. Similarly, Dankl et al.’s work (Dankl, Akoglu, and Bro Egelund 2023) considers how probes, in their case regarding experiences of loneliness and social isolation, can and should be seen as dialogic tools for deepening interactions with community groups.

Collaborative design also has the potential to boost involvement without requiring extensive resources, making it well-suited for cross-cultural projects such as HCI development in Africa (Awori, Ssozi, and Baguma 2022; Peters and Chepken 2016; Sikhuphela et al. 2018). Examples include voice system infrastructure in rural South Africa (Rey-Moreno et al. 2014) and community co-design in Oshanaana, Namibia (Kapure et al. 2014). However, epistemic burden is also present in these contexts. For example, co-design with mothers and NICU staff in South Africa effectively engaged participants, although some struggled to share or critique ideas (Mburu et al. 2018). Others have focused on the ways that infrastructural constraints can influence participation (Blomberg et al. 2014; Rey-Moreno et al. 2014; Shaw and Braa 2014). Informed by broader perspectives on social justice and technology design (Costanza-Chock 2020; Irani et al. 2010), Mainsah and Morrison use the lens of post-colonial theory to examine the intersection of knowledge and power, and agency and representation, within the context of cultural complexity, intercultural encounter, and transnational exchange (Mainsah and Morrison 2014).

In our own work, we turn to sociolinguistic principles and frameworks to pragmatically examine coordination in the early phases of our collaborative project. We do this with respect for the range of commitments and perspectives held by team members and community members. Our intention is to provide a practical lens that could be adapted by design researchers can adapt to explore the dynamics of coordination, reciprocity, and

voices within their own projects. We have used a specific framing of coordination from interactional sociolinguistics to scaffold our analysis. Others could apply this approach using a range of other lenses, from those that more explicitly surface power differentials using more structural conversation analysis (Hutchby and Wooffitt 2008) to those that highlight feminist orientations to care (such as Fraser 2016).

2. Materials and methods

Early in our project, U.S.-based team members travelled to Ghana for a 10-day design field study to kick-off collaboration with local stakeholders. Study activities were approved by the Institutional Review Boards of the University of Washington and University of Ghana. Field work focused on faith healers rather than patients under their care. Ethics guidelines included not speaking directly with patients and not taking photos or videos of patients that would reveal identities (i.e. no faces or voice recording). We visited three rural prayer camps familiar to the local team members. Families bring relatives to the camps who need spiritual support or are facing mental health, disability, or substance issues. Each camp had gathering spaces, offices, dormitories, and courtyards. At each location, following local custom, researchers were introduced by colleagues known to prayer camp leadership. Members of the team, including both design and clinical researchers, were formally welcomed, introduced to leadership and staff, and oriented to facilities. Prayer camp staff were briefed about the project and provided informed consent. Camp leadership and staff informed the research team of any specific rules that needed to be followed, such as not moving about the camp unattended or avoiding specific areas where patients might be easily agitated.

2.1. Interviews

Interviews were conducted with 18 faith healers. We focused on these members of the camp communities because they would be receiving the psychosocial training, be involved with administering medication, and working with community nurses. Healers received 50 Ghanaian cedi (about USD 8.50) for their time. Questions focused on the prayer camp environment, assessment and treatment of mental health issues, roles and responsibilities of prayer camp community members, and experiences with technology and mobile devices. Interviews were audio-recorded with permission and later transcribed. One healer declined to be recorded, resulting in 17 transcripts for analysis. Interactions occurred in a combination of English and Twi (local dialect). All faith healers spoke Twi; some had proficiency in English. Real-time translations provided by local research team members were captured in audio recordings. Additional translations were added during transcript vetting.

2.2. Collaborative design activities

Collaborative design activities entailed (1) feedback on initial ideas and examples shown during interviews (three one-page transcripts), and (2) a three-hour co-design focus group with 12 previously interviewed healers from different camps (one fourteen-page transcript). Held in a local hotel, design session participants received a meal and

compensation of 100 cedi (around USD 17) per person. Session recordings were later transcribed.

The US project lead and a local team member fluent in Twi led the co-design focus group. At the start of the session, we introduced how mobile technologies are used to support mental health in the global North. Researchers shared a preliminary design concept for a mobile app that would deliver psychosocial training and educational materials to care providers in a highly visual format, using local language dialects. Session participants then responded to a series of low-fidelity prototypes created on-site during the field study, including visual design motifs and possible modes of delivery (text, animation, and video) (Figures 1 and 2).

3. Analysis

3.1. Conceptual framing

Analysis was based on Clark's sociolinguistic framework for *joint actions*— social interactions involving two or more people coordinating through language use (Clark 1996) (Table 1). Whether joint actions follow expected conversational routines (such as greetings or introductions) or are comprised of emergent turn sequences, they require a mutual basis for coordination, which Clark refers to as *common ground*. Stalnaker further defines common ground as 'a body of information that is presumed to be shared by the parties to a discourse' (Stalnaker 2014, 2).

Stalnaker's discussion of the ways that context bounds common ground introduces the idea that propositions exchanged within a shared communicative space can be mutually accepted (and meaningful) without being mutually believed (45). This is highly relevant to communication in the collaborative and participatory design space. It establishes that analysis of coordination across academic, medical, and spiritual contexts does not, and should not, be fully based on factual consensus. The calls to mind DiSalvo's argument for allowing room for agonistic interactions in the design process (DiSalvo 2015), mentioned in related works. Rather, social creation and use of alignments are less about who is correct and more about how people negotiate the creation of a mutually legible communicative space. Stalnaker's perspective on common ground has received some of the same critiques levelled at Clark's, namely that the idea of common ground is too abstract for structural and theoretical modelling of sociolinguistic principles. However, given our focus on making coordination functionally legible across diverse groups of collaborators, Clark's relatively lightweight and abstract framework provides an adequate lens for our analysis.

According to Clark, common ground has three parts:

- *Initial common ground*—the prior knowledge, beliefs, and assumptions each participant brings
- *Public events so far*—the shared experiences of participants during the conversation
- *Current state of the joint activity*—the current focus or action of coordination

Clark uses a chess game to illustrate these components. The rules of chess are the *initial common ground*. The pieces on and around the board reflect the *sequence of events that*



Figure 1. Modal variations for app media content (top: text with image; middle: comic strip; bottom, right: video).

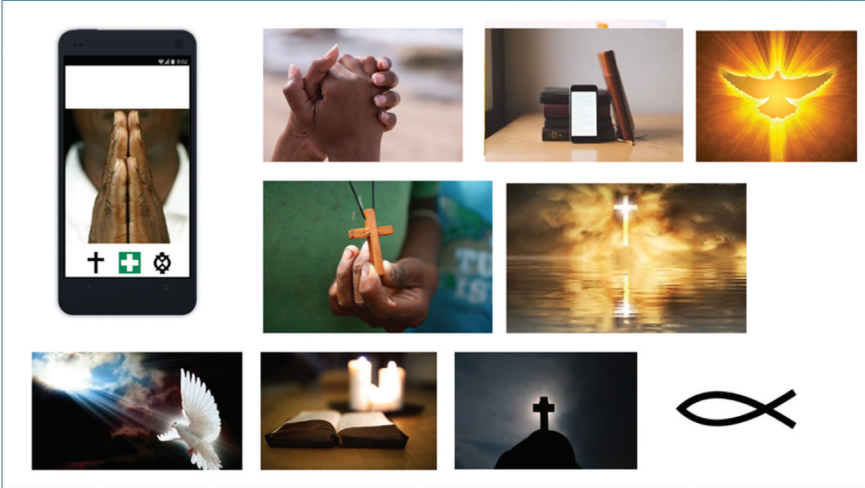
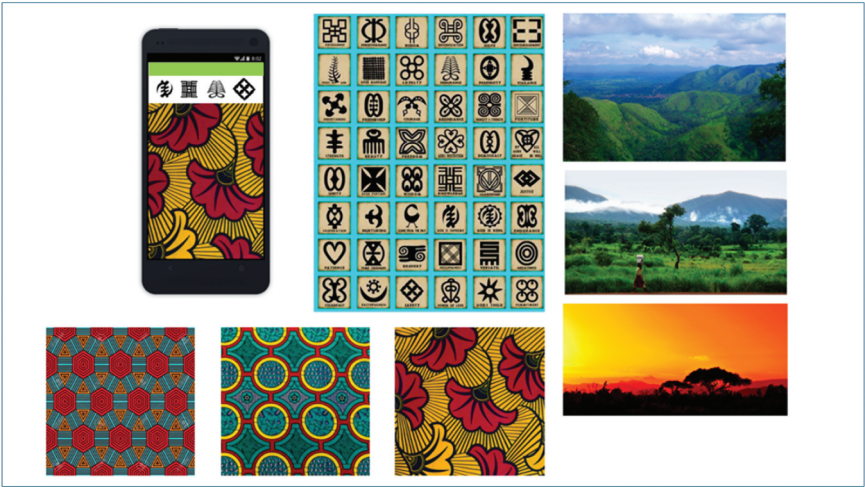
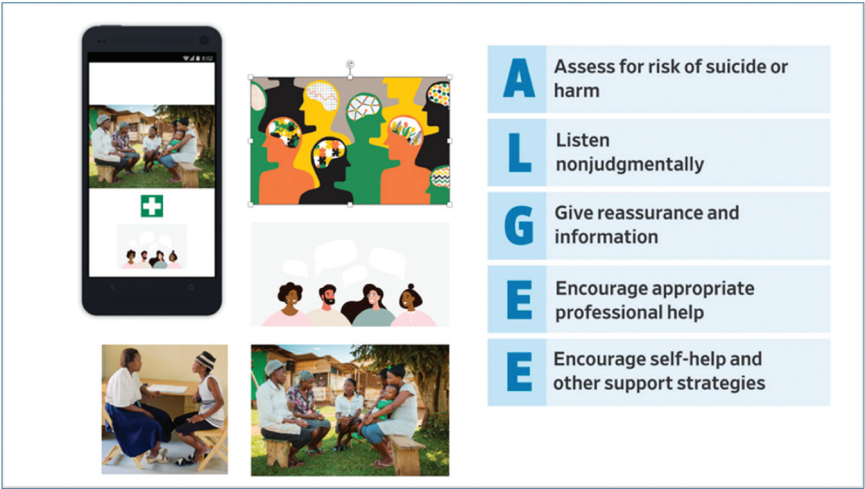


Figure 2. Visual design schemes for app look and feel (top: community health motif; middle: traditional iconography (andikra) motif; bottom: Christian faith motif).

Table 1. Attributes of joint activities (Clark 1996, 37–38).

Attribute	Description
Participants	Two or more individuals
Activity role	Informed by convention, basis for division of labour
Public goals	Social intent of the exchange (i.e. greet, reach agreement, dispute, etc.)
Private goals	Personal motivations (i.e. stance, identity,
Hierarchies	Provide contextual structure for individual activities
Procedures	Conventional and emergent patterns of interaction
Boundaries	Entry and exit jointly engineered by the participants
Dynamics	Activities unfold over time

have happened so far. And the real-time movement of a piece by a player is the *current state of the joint activity*. Common ground is built and leveraged through *coordination devices*—interactive moves used to create and maintain alignments. Coordination devices enable conversation partners to synchronise or calibrate their perspectives and experiences, providing ‘a rationale, a basis, for believing they and their partners will converge on the same joint action’ (Clark 1996, 65). As noted previously, in cases where strict adherence to the principles of participatory design is challenged by practical constraints, this approach to the functional assessment of coordination provides a pragmatic view of the state of communication alignment.

3.2. Coding

Initial codes created using Clark’s definition of coordination devices (Table 2). Three coders iteratively compared, discussed and refined codes using a subset of transcripts; the full dataset was then coded with at least two researchers coding each transcript. One primary code was assigned to each of the 724 discourse segments where coordination occurred (see Table 2 for frequencies and Table 3 for co-occurrences). Discrepancies were resolved through discussion among all three coders. Transcripts of informal design concept feedback and co-design focus groups were then analysed. The open-ended and fragmented nature of some of these exchanges made it difficult to apply the same coding scheme used for the semi-structured interviews. Instead, we identified themes related to

Table 2. Coding scheme (Clark 1996).

Code	Definition
Correspondence	Establishing functional similarity across information, conventions, or practices
Extension	Expanding on an initial mapping
Calibration	Confirming or clarifying a previous correspondence in response to concerns about alignment
Affirmation	Reinforcing correspondence through repetition, restatement, or assent
Rejection	Explicitly dismissing a misaligned attempt at coordination

Table 3. Frequency and percentage of codes.

Code	Frequency	Percentage
Rejection	27	3.73
Affirmation	96	13.26
Calibration	135	18.65
Extension	223	30.80
Correspondence	243	33.56
Total	724	100.00

the coordination work initiated during interviews, following a similar procedure to achieve consensus.

4. Results

4.1. Coordination devices

4.1.1. Correspondence

Most interviews began by asking participants to describe the afflictions (both spiritual and physical) that bring people to camps. Specifically, the analysis highlighted the process of aligning care models grounded in clinical practice, more familiar to the research team, with care practices grounded in spiritual beliefs, more typical in prayer camps. The healers explained how they assess individuals in need of help upon entering the camp, consult with senior pastors to determine the appropriate treatment, and support them through prescribed care. Sometimes, this process of identifying and establishing *correspondences* was explicit, indicated by mutual recognition of shared practices, such as providing medicine to someone with an infection. At other times, correspondences emerged more gradually, like the ongoing process of understanding how spirituality and faith influence decisions regarding handling particularly aggressive behaviour. Correspondence helped researchers understand how prayer camp staff assess ailments and plan care, highlighting fundamental concepts of care-seeking and caregiving.

4.1.2. Extension

Semi-structured interviews utilise follow-up probes to confirm understanding, leveraging mechanisms of extension. Probes prompted faith healers to clarify terms, add event details, or explain care decisions. Drawing attention to these extensions enabled us to see how interactions with healers helped us understand variations in care practices, how care choices were dependent on contextual or environmental factors, and how prayer camp staff respond when faced with uncertainty or unfamiliar ailments. Healers used extensions to focus our attention on specific parts of their work, including the physical, temporal, social, and spiritual contexts in which afflictions were classified. For example, clarifying differences between physical and spiritual afflictions was a key focus of extension activities. When P03 was asked about the percentage of people who came to their camp with serious drug or alcohol issues, the healer responded, ‘Some of them’. A follow-up question was asked: ‘Some?’ The healer elaborated, offering more context for why some people were identified as having serious drug problems versus spiritual afflictions:

Some of them are drug addicts and some of them – I don’t know how you say. It’s not drug, but we see some of them as demonic. We are a prayer camp so we do that. They go through some sort of deliverance. And we believe in that. We know the bible, Jesus did that. Where the demons were cast out.— (P03)

4.1.3. Calibration

Calibration is used to correct or reorient an interpretation. The third most common coordination activity, after correspondence and extension, was calibration, which became evident when researchers sought to grasp the nuances in faith healers’ words and when healers corrected researchers to convey the significance of spiritual

practices in caregiving. Extension focuses on identifying meaning boundaries and connections, while calibration ensures or adjusts understanding. In interviews, this included rephrasing or using examples to verify interpretation. The translator played a key role, facilitating and validating calibration between English and Twi speakers, thereby supporting grounded, real-time analytic comparison (Rohde et al. 2017).

This exchange between a researcher and prayer camp healer demonstrates how calibration was used to clarify meaning:

Researcher: So all prayer sessions end with prayers for the mentally sick people?

P05: Not all necessarily . . . There is a difference between our midnight hour program and our all-night service. The midnight hour program begins at 11 pm and ends at 1 am. I'm referring to the midnight hour prayer sessions.

4.1.4. Affirmation

Explicit *affirmation* was less common. Rather than strictly clarify meaning, researchers restated or repeated messages to anchor a connection with a healer. Researchers sometimes used simple affirmations like 'Yes, I understand', as healers described their practices. Healers, in turn, affirmed when they felt understood by researchers. Researchers also employed active listening techniques to demonstrate comprehension of the healers' words (Weger et al. 2014). They adopted vocabulary introduced by faith healers, rephrasing and adjusting questions to reflect what they were learning from the healers (Rohde et al. 2017). Echoing or mirroring is a related form of coordination (Gumperz 1982). For instance, in a conversation with P09, a researcher echoed 'so many' and used 'calm down' to describe treatment goals:

Researcher: How does medicine help people?

P09: Oh so many.

Researcher: So many, yeah.

P09: It helps them, they can sleep. Some of them, sometimes they are losing appetite.
So when you give them, they eat proper and go to sleep well. Yeah. So they will calm down.

Researcher: Calm down. How do you know someone is calming down? How do you know someone is calm?

P09: His attitude will tell that the person is changing.

4.1.5. Rejection

Rejection of proposed correspondences was the least common coordination device. Given the power dynamics between roles such as researcher and informant, visitor and host, and between the global North and South, this is not surprising. As noted above, constructively resisting misinterpretations is crucial for maintaining healthy relationships; it is also difficult to achieve in situations characterised by distinct power differentials. Rejection mainly came from faith healers, particularly when researchers' descriptions differed from the healers' experiences or prior explanations. In such cases,

the rejection was often definitive, with the healer saying something like, ‘No. That is not how it works here’. For example, P13 dismissed a speculative suggestion made by a researcher:

Researcher: Have you ever thought about ways that might happen here?

P13: I haven’t thought of anything like that.

P18 clearly stated they don’t use the internet for knowledge gaps but consult a professional instead:

Researcher: Do you sometimes want to know more about how to help individuals? So this particular person is having these signs and symptoms . . . Do you check the internet for that?

P18: No, I don’t do that. I refer to a professional. We don’t do that here. Never.

Instances of explicit rejection were relatively rare, and they often occurred in tandem with one of the four other coordination activities, with roughly equal frequency. These instances prompted reflection on how to support constructive dissent more effectively. For our project, this involved seeking input in more informal, lower-stakes contexts through interactions initiated by team members with pre-existing relationships with camp staff.

4.2. Co-occurrences of coordination activities

The three most common pairs of coordination activities in our dataset are summarised in Table 4. Longer chains of coordination activities demonstrate the nested and hierarchical discursive structures characteristic of joint actions in practice.

4.2.1. Correspondence + extension

The two codes that co-occurred most frequently were correspondence + extension, reflecting the ‘question-plus-probe’ format typical of semi-structured interview protocols. In the following example, a coordination activity related to correspondence is highlighted in **bold**. This is followed by two extensions from that initial point of coordination, both underlined.

Researcher: What . . . are important resources that help you care for people, especially with serious mental illness? For example, sanitation and clean water, the facilities, having places for people to sleep, things like that. **What do you have here and what do you think are most important?**

P10: **In terms of water, we don’t have piped in water here but in the community there is one. So patients who comes here have to go there and fetch water.**

Table 4. Co-occurrences.

Code	Calibration	Rejection	Correspondence	Extension
Rejection	22	—	—	—
Correspondence	151	20	—	—
Extension	133	17	311	—
Affirmation	96	19	101	93

Researcher: How far away is it?

P10: About 300 or 500 metres, but the most important thing is maybe someone who is sick and he or she cannot go to carry water. But apart from that, we have water in the community.

Researcher: Do you have indoor plumbing in the facilities for the people who are living here?

P10: Yes, we have rooms for them.

4.2.2. Correspondence + calibration

Correspondence also co-occurred alongside calibration with some frequency, reflecting our efforts to verify our understanding of what faith healers were explaining or describing. For example, a researcher asked about what could make the job easier. The healer responded by emphasising the importance of infrastructure, specifically appropriate facilities, linking that to an explanation for chaining people. The researcher then asked about what was currently available, based on seemingly different information gathered from another member of the prayer camp staff. The correspondence is in **bold** and the calibration is indicated in *italics*.

Researcher: **Is there anything that would make your job easier?**

P11: **So the main thing is for infrastructure. Because we don't have a place where we keep individuals in need of help, that's why we have to restrain them with chains. If we don't keep them in the chain, they are free. They're just very aggressive and some of them run . . . We need infrastructure to keep them from going . . . It's not our way to keep them in chains. But the chains help to keep them calm because they are very aggressive. But if we have structures to house them, structures that keep them in seclusion, people who are very aggressive . . .**

Researcher: *I thought that the founder said that they did have those, but the human rights people convinced them to tear them down, to not use them, basically a room where people were kept in seclusion?*

P11: *That happened a long time ago, before [I] came here. [I don't] know about that. [I] used to work in partnership with another camp that had those, but [I] really don't know.*

This exchange helped us understand chaining practices from the perspective of camp staff, a crucial moment in relationship building.

4.2.3. Extension + calibration

Another common co-occurrence was extension + calibration. By supporting associations across researchers' questions about practices like chaining and the lived experiences of prayer camp participants, these exchanges validated shared understanding and vocabulary for describing activities, especially those with stigma in Western culture. The excerpt below illustrates how this appeared in the transcripts, with extension indicated with an underline and calibration marked in *italics*:

Researcher: And how do those people look when they come, typically?

P15: So for some of them, they are unable to sit still, they just keep moving about, and some of them are very difficult. So simple things that they should understand, they won't understand. That's one aspect. So for other people, when they're brought here, they run away So I asked why would they run away, and then he said that's because the spirit, whatever spirit is possessing them and causing them to act the way they are recognised spiritual power and therefore pushes them to move away from that power and that's why they run away.

Researcher: *I want to make sure I understand two things. One is the people that come with these kinds of mental or emotional problems where they're unable to sit still or they don't understand things, in your opinion are those also problems caused by spirits?*

P15: [through interpreter] *So he explains that for one part it could be caused by the spirits because the spirits obviously recognize the glory in that person and so they notice that glory might come to disturb them or interfere with the way they are functioning now with demigods. So they cast a spell on that person so they lose that glory they have. Or, secondly, it's caused by people using hard drugs. So I ask specifically what they were on and then he said weed is marijuana and then he talks also about alcohol and casually mentions cocaine. So, for other people it's caused by another person causing you to constantly curse for doing something against them or taking something that wasn't yours. So for example if he steals from me, I can put something on you making you go mad. God's grace is sufficient for all those kinds of people coming here, they get relief.*

4.2.4. Longer chains of coordination

Co-construction of common ground occurs through cumulative coordination over time, generated not just by one or two individual communication acts but through a series of discursive moves. Our analysis of individual and paired coordination devices aims to highlight opportunities for building the common ground needed for meaningful collaboration. The instances we point out are not extraordinary. We intuitively deploy these strategies on a regular basis (Gumperz 1982); however, we are not always aware of these coordination activities. Clark's framework for describing joint actions, common ground, and coordination devices provides a tool for identifying and assessing how we actively build reciprocity and opportunities for reducing burdens. Before discussing the implications and potential benefits of considering coordination practices for co-design practitioners, we will highlight how the initial common ground established during contextual interviews influenced informal design feedback and the co-design focus group.

4.3. Informal design feedback and co-design focus group interactions

We examined how initial coordination activities laid a foundation for co-design sessions by building the three main elements of common ground: initial understanding, the shared public events leading up to the present, and the current state of the joint activity.

4.3.1. Initial common ground

Initial common ground includes the knowledge and points of reference that individuals bring into a conversation. For example, the facilitator consistently drew on prior discussions about differences between spiritual and physical afflictions to ask how content addressing each of these domains might be presented and organised within an app.

Prayer camp participants used shared reference points to give detailed explanations for their preferences:

Talking about credibility is – well, we don’t know who a credible person is. The personality, you’re going to gather people from all backgrounds . . . We don’t know their credibility. So in the app, if a narration could be given under the [video], . . . so that we know who that personality is, to give us information. For example we know you are a professor from [U.S. University], we know that’s a credible university . . . We would like a narration about the person before the [video] is applied. And I guess anybody who is level-headed will accept that information.

One faith healer asked how the digital tool could be made accessible for those with visual impairments or who are hard of hearing or deaf. This sparked an exchange about accessibility with healers pointing out the importance of supporting diverse spiritual practices, an interpretation of accessibility not typically included in Western academic frameworks:

. . . if you’re using an unadulterated bible, which encompasses all the scriptures, it would actually work . . . But if, for example, you have some scripture which is not in one bible and [is in] another bible, then that’s problematic. So it must be universal . . . [but] whatever content you’re putting in must encompass our belief system in Ghana.

4.3.2. Public events so far

After spending several days at prayer camps conducting interviews, researchers prepared highly visual low-fidelity prototypes that captured a series of potential design directions for a digital mental health tool. These images provided a visual summary of what had been learned and talked about up until that point, including (1) possible content formats (Figure 1), and (2) possible graphic design directions for how the app might look and feel (Figure 2). By representing public events so far in this way, the light-weight prototypes and design schemes contributed to common ground and further supported joint design activities.

4.3.3. Current state of the joint activity

Manipulating and iterating on initial visual prototypes constitutes a way to ‘make together’ in real time (Snyder et al. 2014). Graphic artefacts provided a shared point of reference, providing a physical form for the iterative exploration of evolving requirements and specifications. During the co-design focus groups, the low-fidelity prototypes served as prompts to engage participants in speculative design activities. A rating activity provided each healer with an opportunity to assess the ideas presented up to that point and justify their ratings, often referencing interests, values, and priorities. Insights gathered during this activity provided valuable benchmarks that informed the subsequent design of app content and interfaces.

4.3.4. Postscript

Although the team hoped it would be sooner, it was three years before U.S. researchers were able to return to Ghana, due to the pandemic. During that time, we developed culturally specific educational and training material for

behavioural interventions that could be used instead of chaining or being aggressive with patients. These were carefully reviewed and translated by Ghanian team members. Design concepts for a mobile app transitioned from the rapid mockups created during the field study to functional interactive prototypes created in Figma. Local team members showed these preliminary design and content directions to faith healers in a series of user feedback sessions held at prayer camps and conducted in local languages. We continued to iterate and refine the designs and content.

Once it was safe to travel, the entire team re-convened in [city]. We conducted another series of sessions with healers, workshopping a high-fidelity mock-up of the app, including a more developed set of content. The feedback from the faith healers gathered during this phase of design and development was mixed. We were encouraged when they told us they saw their needs and preferences reflected in graphics, architecture, and mode of deliver of content. Many explicitly said that they felt we had listened. However, there was consensus that materials were not yet adequately integrated with their spiritual practices. They felt that the tone of some content was not entirely appropriate and made them feel judged, especially the material that talked about human rights. We see this as an important agonistic moment in our process (Sawhney and Tran 2020). The healers offered suggestions for ways the content could be improved, not rejecting the intervention as a whole, but making requests for more holistic integration into their practices. We adjusted the language and tone used in materials. Local members of the research team continue to build and maintain our relationships with camp leadership and staff. Regular facilitation sessions provide opportunities to better understand camp life and how the interventions intersect with spiritual practice.

5. Discussion

Our work has significantly progressed from these early collaborative design sessions. The team, including local partners, is currently managing a 5-year, multi-site field trial of a longitudinal mental health intervention combining educational materials for faith healers, with supervised pharmacotherapy, regular visits to prayer camps by community nurses, and medical supports when needed (Albright et al. 2021; Ben-Zeev et al. 2021, 2024). The complementary goals of this intervention are to reduce human rights violations in the prayer camps (i.e. healer behavioural outcome) and to reduce psychiatric symptom severity, distress, and subjective experiences of shame in the individuals receiving care (i.e. patient experiential outcomes).

A key component of this programme is a mobile app for healers that delivers the psychosocial educational materials via animated videos and audio recordings (Ben-Zeev et al. 2024). The app also includes a lightweight tracking function to support regular patient assessments. We have continued to engage with faith healers throughout the design, optimisation, and deployment of this complex study. While pragmatic and practical limits of the large-scale deployment prevent our engagement with healers from reaching what many would consider ‘true’ participatory design, principles of collaborative, community-engaged design have guided these interactions.

The coordination analysis described here highlights the importance of finding ways to engage with all collaborators, including healers, that recognise burdens and provide

opportunities to define reciprocal benefits of involvement with the project. Importantly, these insights were not just bound to the co-design of the app. What we learned (and are continuing to learn) about the values and practices of the faith healers and their work at the camps, as well as the clinical and medical requirements of this type of ambitious intervention, continues to impact our collaborative relationships with each other and our community partners. In the words of one Ghana-based team member with a clinical background who has engaged directly with faith healers throughout the project:

My engagement with [the faith healers] has deepened significantly over time. Initially, my interactions were more observational and research-focused, but they have evolved into more relational, collaborative, and trust-based partnerships. Through this process, I have come to better understand their lived realities—their worldviews, vulnerabilities, and the structural challenges they face. I have learned that, in many ways, their experiences mirror those of formal health professionals. Many are deeply committed to their work and view it as a calling, yet they often neglect their own health and well-being in the process. Their pathways into this role are diverse. Some are driven by strong personal conviction and spiritual purpose, while others inherit the role through family lineage. There are also individuals who were once patients themselves and, having found acceptance within healing camps—sometimes in the absence of family support—transition into healer roles as a means of belonging and survival . . . this experience has taught me the importance of approaching engagement with humility, cultural sensitivity, and openness. It has reinforced the need to move beyond simplistic assumptions and to recognize faith healers as complex individuals operating within broader social, cultural, and economic systems.

Through this work, we argue for deploying tools like coordination analysis to operationalise principles of collaborative design in ways that are legible across multi-disciplinary and diverse project teams.

Participatory design is often held as the gold standard for collaborative and community-engaged technology design. PD, in its purest form, advocates for a collective and consent-driven approach to design projects, driven by the aspirations, needs, interests, and values of community members from conception to conclusion (Hansen et al. 2020). In practice, the strict level of community engagement required by some participatory design methodologies is challenging to achieve and maintain, even for those with a great deal of experience with community activism and advocacy (Harrington, Erete, and Piper 2019; Tomasini Giannini and Mulder 2022). The interests and expertise of design researchers and community groups are not always in lock step. There can be substantial competition for attention and time. And acquiring the practical and pragmatic skills of collaborative design methods can involve a fair amount of trial and error, a high-risk proposition, especially when working with conditionally vulnerable and marginalised groups. However, as evidenced by a colleague who shared their reflections on the collaborative approach taken for this project, attention to the mechanisms of coordination – a core principle of PD – can be a valuable tool even when a project is not positioned as a PD initiative.

The means of assessing coordination presented here enabled us to better understand tensions between spiritual and medical perspectives, including insights crucial for the adoption and acceptance of digital mental health tools in Ghana. Navigating these issues requires ongoing care and maintenance of relationships. The goal of the multi-pronged intervention is to reduce the use of chaining and shackling. We did not initially see chaining as a spiritual practice. However, some healers did, framing our work as an interference in their vocation. To them, *all* of their interactions with people receiving care

in the camp are fundamentally spiritual. While many of the healers we collaborated with shared our interest in change and showed openness to learning new methods, for others, the project's basic premise was initially perceived as critical and judgemental. Our coordination activities helped identify this tension, enabling us to address differences and build consensus for the intervention's nature, goals, and implementation.

As the project has progressed, we have come to deeply appreciate that the tension between spiritual and medical ways of knowing and seeing the world is a very complex dimension of the design, adoption, and acceptance of digital mental health tools in this part of West Africa. Negotiating these issues requires ongoing care and maintenance of relationships. Collaborative design activities, even when more incremental than traditional participatory design, can play an important role in this work, just as described by Dindler and Iversen (2014). Importantly, in preparing this manuscript, several researchers on our team noted the value of returning to these early conversations and thinking about how they influenced the trajectory of the project as a whole. This illustrated our premise that conducting structured self-assessments of interactions with community partners like the one we present here can be a generative act of accountability.

Our approach to collaborative design has been to take advantage of workshops involving cultural probes and speculative prototyping, involved or led by local researchers in familiar settings and conducted in local languages. These choices reduce barrier to participation, inviting partners to join (but not necessarily drive) the design process. We do not claim to completely remove the realities and risks of any social, cultural, and political power imbalances that may be embedded in the contexts in which we work. However, we are committed to working with each other and local partners, attending to our relationships, and collaborating with individuals and institutions on the front lines of caring for those with serious mental illness in prayer camps.

Our analysis suggests that a coordination threshold is essential for equitable and mutually beneficial collaborative design. Clark's conceptualisation of common ground emphasises the importance of developing three components of common ground as a foundation for social (i.e. collaborative, coordinated, cooperative, etc.) design practices: (1) a way to access and share prior knowledge, values, and perspectives, (2) a method to track or build on what has occurred during an interaction so far, and (3) a discursive space for the ongoing joint activity of social interaction. These can also serve as heuristics for crafting and implementing co-design activities in a project. Even the most modest collaborative design activity requires these three aspects of common ground.

5.1. Does your co-design project provide participants with an opportunity to share and apply their knowledge?

Healers and researchers carried distinct models of global mental health practices, psychiatric care, mental illness, caregiving, and the influence of spiritual belief systems. Our follow-up work with the healers has involved more in-depth conversations and feedback from prayer camp staff about spiritually based approaches to care for people with SMI. Some resulting iterations have focused on app content and interaction design. Other refinements have involved developing key situational awareness of how the intervention needs to be introduced and implemented in prayer camp settings.

5.2. Does your co-design project track participants' contributions and outputs, such as ideas, expertise, and feedback?

According to Clark, developing ways to represent the outputs and outcomes of coordination activities up to the present moment creates a communication space for meaningful joint action to develop over time. That shared space can be a physical record created as an activity occurs, like pieces on a game board. It can also be an artefact, such as an iterative prototype. It can also be a shared and evolving vocabulary that becomes more robust and integrated into group dynamics over time. Importantly, any representation or documentation of the collaborative outputs should be accessible to all stakeholders in terms of format, language, and functionality.

5.3. Does your co-design project provide ways to share the current state of coordination with all participants?

'Making together' requires a threshold of coordination for collaborative speculative design activities to gain footing and remain engaging, relevant, and accessible to all collaborators. Building this coordination is complex and continuous, reflecting the third dimension of Clark's concept of common ground: the need to support ongoing joint action. In our project, we returned to the faith healers with a series of increasingly refined and interactive prototypes, each incorporating feedback we had received and each accompanied by a new set of focusing questions. These ongoing conversations and interactions have shaped not only the design of the mobile app but also our collective understanding of the opportunities, benefits, challenges, and risks of digital mental health interventions within prayer camp communities.

Coordination awareness in co-design is vital for reciprocity and reducing burdens. By evaluating coordination, researchers can reflect on their practices, ensure accountability, and enhance community partnerships. In a 10-day case study, we highlight (1) coordination patterns from initial interviews, (2) their application in design feedback and co-design groups, and (3) the role of shared reference points like low fidelity prototypes in maintaining common ground. We explore using linguistic coordination analysis to evaluate reciprocity, resistance, and burdens in collaborative design, demonstrating the importance of heuristic methods for coordination assessment. Limitations of this work include (1) its post hoc nature, restricting discursive analysis, (2) the brief dataset period, offering a limited interaction snapshot at the project's start, and (3) multiple voices, yielding an aggregated view for interactional linguistic analysis. Despite these limitations, analysing initial coordination in diverse co-design teams provides valuable insights and can inform future project phases.

6. Conclusion

We do not claim that this work constitutes participatory design in a strict sense. Instead, we acknowledge that while rigorous participatory design is valuable, it is not always feasible due to material and temporal limitations, as well as political and philosophical stances among partners. In cases such as our project, we argue that the commitments and principles that characterise collaborative design can still guide work. As such, we

consider our work representative of a spectrum of collaborative design approaches that, while perhaps not technically participatory design in the purest sense, still aim to embody similar ideals and commitments – namely dedicating time, attention, and resources to working closely with and listening to community partners throughout the design process. We offer this functional analysis of coordination as an example of how these commitments can be made visible and tangible, providing important reflective evidence for a team to consider as collaborative projects unfold. We used the lens of Clark’s common ground framework, and specifically his conceptualisation of coordination devices, to anchor an analysis of our interactions with community partners within the context of establishing initial relationships in Ghana. We offer insights about the nature of our own coordination practices less as proscriptive instruction and more as an example of the ways that attending to the trajectory of coordination throughout a collaborative design process can provide an important tool for establishing space for multiple voices to contribute to complex high risk/high reward interventions.

Author contributions

CRediT: **Jaime Snyder:** Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing; **Seth M. Asafo:** Investigation, Writing – review & editing; **Dzifa A. Attah:** Investigation, Writing – review & editing; **Pamela Y. Collins:** Conceptualization, Writing – review & editing; **Angela Ofori-Atta:** Funding acquisition, Investigation, Project administration, Writing – review & editing; **Dror Ben-Zeev:** Conceptualization, Funding acquisition, Investigation, Project administration, Writing – review & editing.

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