Short Take

Short Take: Designing a Multinational Smartphone App Survey during COVID-19: Rewards, Risks, and Recommendations

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Abstract

Cost-effective and user-friendly, mobile phone-assisted methods have remained underutilized in qualitative social science research. The scarce methodological guidance, together with recruitment and ethical challenges, has arguably stifled advancements in this area. COVID-19 exposed the need to better equip researchers with the expertise and tools to conduct remote research effectively. In 2020, we designed and launched a smartphone survey application to collect real-time data from children's sector professionals across the globe regarding best practices in, and challenges to, responding to the pandemic. In this short article, we reflect on the efficiency, quality, and acceptability afforded by the smartphone app survey, and outline recommendations for enhancing rigor and feasibility. We also present data snippets illustrating the positive impact of participation on respondents—a seldom-documented aspect of app-based research. Altogether, we advocate a flexible,

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pragmatic, and user-centered study and app design that aligns with respondents' specific, situational needs, and preferences.

Introduction

The COVID-19 pandemic has amplified the interest in remote data collection methods, including mobile phone-assisted research (Hensen et al. 2021; Rahman et al. 2021; Tiersma et al. 2022). Blurring geographical boundaries, such methodologies proffer efficiency, convenience, privacy, and customizability (Braun et al. 2021). Those affordances are particularly suitable for research in low- and middle-income countries (LMICs) and remote settings, and research with hard-to-reach groups (Davidson et al. 2021; Rahman et al. 2021; Tiersma et al. 2022). Collecting rapid qualitative data during COVID-19 has been important for guiding policy and practice (Vindrola-Padros et al. 2020). There has been markedly less focus in the methodological literature on remote surveys with predominantly open-ended questions (OEQ; Tiersma et al. 2022), and yet the inclusion of OEQ presents distinct design, respondent management, and analytic challenges (Fielding et al. 2013).

This article discusses a smartphone app-based methodology for gathering in-the-moment quantitative and qualitative data across countries, in the last quarter of 2020.

Project Background and Study Design Overview

The multinational "COVID 4P Log for Children's Wellbeing" project was a response to the destabilization of children's sectors and support systems brought about by COVID-19, and the urgent informational gaps as to how professionals were responding to this crisis. In the last quarter of 2020, a smartphone app hosting an eight-week survey was designed and launched across 29 countries, in collaboration with international partner organizations (Advisory Group). The survey gathered 3,339 responses from 247 respondents—frontline providers, managers, policymakers, and other children's sector professionals—across 22 countries and five continents. The survey was structured into eight broad topics relevant to children's well-being, (including protection from violence; access to basic necessities; access to justice; alternative care; socio-emotional well-being; and participation). Each week, the app was updated with daily questions for that week's given topic, and the app gave daily (but customizable) reminders. An average of three questions were sent per day. Respondents could skip any question and withdraw any time, with their existing responses being kept. Questions from previous weeks remained in a "calendar" function and could be revisited at a later time. The eight-week survey contained 177 items (61%—OEQ; 39%—close-ended

questions). The survey was available in English only. No financial or other material incentives were provided. Respondents did receive a Certificate of Completion via the app. Altogether, the study had a flexible, pragmatic, and user-centered design that aligned with the specific, situational needs of our target population (see Davidson et al. 2021; Davidson et al. 2023; Karadzhov et al. 2023).

Methodological Reflections on Process and Outcomes

Choosing a Mobile Research Platform: A Cost–Benefit Analysis

Encouragingly, there has been a recent increase in publications evaluating the contributions of smartphone app-based methodologies to qualitative enquiry (e.g., Barriage and Hicks 2020; Dawson 2020; Do and Yamagata-Lynch 2017; Karadzhov 2021). However, the pros and cons of building a social sciences research app have been rarely explored (see Frąckowiak et al. (2022) and Kruyen (2020), for exceptions). While commercial mobile research platforms exist, including some specializing in qualitative research, they can be expensive, difficult-to-customize, and based outside Europe—creating potential cross-border data transfer issues (Barriage and Hicks 2020; Kruyen 2020). Furthermore, many of those apps have likely been untested in many LMICs. Therefore, developing an app "from scratch" was deemed the more suitable option for our multinational study (see Table 1).

### Optimizing the Mobile Phone Survey Design

Overall, the app and survey design proved to be *efficient*—taking only four months to develop, and *acceptable*—gathering a large number of responses from more than 20 countries. Nevertheless, we identified several areas for optimizing survey design, particularly data quality and respondent engagement and retention (see Table 1).

Anticipate, Manage, and Minimize Attrition. The response rate declined dramatically after the second week (see Figure 1). We next offer potential explanations and countermeasures.

The high number of OEQ (61%) increased the burden of participation. It also remains likely that respondents—who represented various countries, sectors, and roles—selectively responded to questions and topics most aligned with their remit. This may account for the high non-response rates in the latter weeks (see Figure 1). A countermeasure would be to offer respondents a "menu" of all survey topics at the start, and allow them to select the most relevant ones (increased personalization; see Table 1).

Table 1. Advantages and Disadvantages of Designing a Custom Smartphone Survey App, and Suggestions for Improvement.

Advantages of a Custom-Built App	Disadvantages of a Custom-Built App	Suggested Improvements
Cost-efficient (compared to commercial research platforms)	Requires time and a multidisciplinary team to develop	Pre-test appropriate survey length and frequency
Usability across continents	Requires outsourcing app development and visual design to an external company or a freelance developer. This can increase cost, the time required, and data protection concerns	Provide frequent (e.g., weekly) updates with summaries of data and/or perspective pieces to foster learning, engagement, and a sense of community
Compatibility with Android and iOS	Requires registration and management on app stores; may not be able to use institutional account for research apps	Build in basic social features such as a forum to foster community and provide access to support or information from other respondents
Usability with no or limited Internet connection	Non-immediacy of raw data access:	Increase personalization: Provide a dedicated tab with a list of all survey topics to allow quick and easy access to most relevant questions
Customization of content (e.g., amending questions) as well as structure (e.g., the user journey) and function (e.g., adding a calendar and a certificate of completion)	• Requires a data manager and ancillary software to extract and manage data	
Anonymous data collection (i.e., no email addresses or phone numbers were collected)	• Inability to share a user-friendly data dashboard with stakeholders swiftly	Incorporate anonymous respondent IDs to enable follow-up on unclear or fruitful responses, and/or validate preliminary findings, via notifications to request additional input
Hosted in-house: GDPR-compliant; no cross-border data transfer	Limited response modalities (text and voice-to-text)	
Allows for collaborative development with non-academic stakeholders.	Other capability limitations (e.g., inability for in-app probing).	Follow-up with non-responders or dropouts by sending out reminders and an automated exit question on reasons for non-participation.
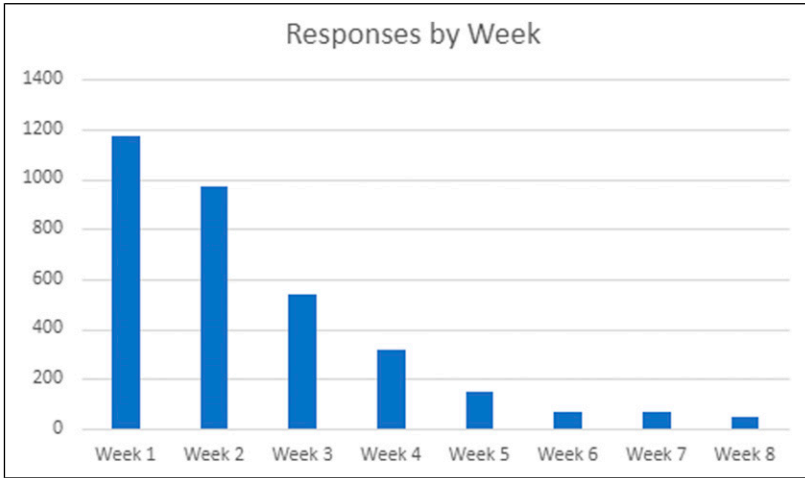
Figure 1. Number of responses per week.

It remains unclear whether the daily reminders were effective as respondents could turn them off. This lack of information as to how respondents interacted with app functionalities remains a limitation. Attrition and non-engagement should be analyzed methodically (Houtgraaf et al. 2022). A feasible tactic would be sending out an exit question to explore reasons for non-participation automatically triggered by a period of non-activity (Tiersma et al. 2022). Alternatively, our project partners could have disseminated informal surveys exploring what prevented eligible professionals from participating.

Crucially, the anonymous data collection precluded many evidence-based response maximization strategies (e.g., pre-contacting potential respondents, and/or sending out email invitations or reminders; Tiersma et al. 2022; Wu et al. 2022).

Leverage the App as a Knowledge-sharing and Community-building Platform. Table 1 features strategies for improving long-term engagement and fostering a community such as issuing research summary updates and/or perspective pieces from stakeholders to stimulate respondents to revisit the app and derive informational value and a sense of solidarity (see also Table 2; Teague et al. 2018; Wilke et al. 2017). Although we disseminated rapid learning reports to stakeholders (see https://inspiringchildrensfutures.org/covid-learning-reports), we could not contact respondents due to anonymity.

Relatedly, increasing researcher presence and building a supportive community via the app would have allowed us to survey children directly,

Table 2. Exemplary Responses Regarding the Impact of the Smartphone App and the Study on Respondents.

Reflection and insight:

"*It helps me to rethink some of ideas and some questions showed me new perspective to my work.*" (Service manager, NGO, Republic of Montenegro)

"*It's created more of an awareness in that one is now thinking more about what is out there and what have all contributions been* […].*"* (Direct service provider, NGO, South Africa)

"*A lot of impacts because i learned more through responding to questions, contributing my thoughts. It has motivated my mind and memory too.*" (Direct service provider, NGO, Kenya)

"*It compels me to stop and reflect.*" (Policymaker, civil society organization, the Philippines)

Knowledge-sharing, a sense of fulfillment and solidarity:

"*It was great to keep in touch and reflect. I wish we could get an idea of other people's responses.*" (Direct service provider, NGO, Israel)

"*It's uplifting to know that I share the same struggles as others in this work throughout the world.*" (Service manager, government, the USA)

"*It is good to see that it is a united effort to fight the pandemic and to get knowledge on how the world respond to it* […] *It encouraged me to do more and celebrate our success.*" (Direct service provider, NGO, South Africa)

Improved well-being:

"*Psychologically, it has improved my wellbeing.*" (Direct service provider, NGO, Kenya)

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provided reasonable safeguards were in place, and feed back their views to sector professionals to foster inclusion, empathy, and knowledge-sharing.

Enable Real-time Probing and Follow-up. The feasibility of real-time probing should be explored in future smartphone app surveys. For example, anonymous respondent IDs attached to each response could be used to send targeted follow-up in-app prompts requesting more detail. To test the feasibility and utility of this function, it could be piloted with a small cohort of volunteer respondents during the first week, and the approach iterated (question wording, frequency, what responses are followed-up, etc.) as needed to balance respondent workload, availability, and data richness. This could be implemented randomly or purposively—the latter entailing the selection of a few "critical" or "extreme" cases for in-depth in-app interviewing (Kauffman and Peil 2020). This would exemplify a *nested sampling design*, whereby a sub-sample of "key informants" is selected to provide additional detail (Onwuegbuzie and Leech 2007).

Evaluating Acceptability and Impact on Respondents

While attrition rates provide a quantitative (proxy) indicator of acceptability, qualitative data regarding the user experience should also be collected (Twis et al. 2020). This can help understand reasons for retention. Respondents were asked a set of questions about their app experience in Weeks 2, 4, 6, and 8 (see Appendix). Although the number of responses was modest (primarily due to attrition observed post-Week 1), the responses indicated positive experiences and effects (see Table 2).

Thirty (79%) of the 38 respondents who completed this question stated their overall experience with taking part in the study was "positive" or "very positive," compared to eight (21%) who replied with "neutral." When asked how easy it was to use the app, 29 (81%) responded with "easy" or "very easy"; five (14%)—"neutral"; and two (6%)—"hard." Finally, 21 (57%) reported *not* having experienced difficulties while using the app, compared to 15 (41%)—"yes"; and one (3%)—"don't know." Examples of technical issues commonly reported are the lack of confirmation for successfully submitted responses; repetitive questions; difficulties using the voice-to-text functionality; and difficulties with the calendar navigation.

It must be noted, however, that those responses are non-representative of the sample due to the aforementioned attrition observed post-Week 1. Selection bias cannot be ruled out—respondents who enjoyed the app more were more likely to remain engaged in the latter weeks and provide positive feedback. This reinforces the need to survey dropouts and non-responders (Table 1).

Concluding Reflections and Recommendations

We urge researchers engaging in remote, app-based research to practice an ethic of care, and balance research risks and potential benefits to respondents (Crivello and Favara 2021). Our app signposted respondents to in-country well-being support. We also recommend that surveys include questions on the impact of study participation on respondents, particularly when conducting research on sensitive topics or during emergencies. The positive respondent feedback reinforces the importance of maximizing the beneficial psychological, socio-emotional, and educational impact of remote research on practitioner populations, particularly those operating in high-stress environments (see Table 2).

Despite the aforementioned methodological limitations and practical constraints, the project generated rich and actionable findings into a rapidly evolving emergency—demonstrating the utility of rapid collaborative qualitative research (Chan et al. 2022; Davidson et al. 2023). Our experience resonates with Firchow and Mac Ginty's (2020) call for a pragmatic approach

to implementing "*good enough*" methodologies—allowing for pragmatism and agility while meeting the minimum criteria for scientific rigor "*when operating in suboptimal contexts for research*" (p. 135).

Appendix

App Interface: The COVID 4P Log for Children's Well-being

Loading Screen:

App Onboarding:

Main App Screens:

Exemplary Survey Items across the Eight-week Schedule

Survey Item	Question Type	Week and Investigative Stream
What have you, your team, or your organization done well, in your support of children's well-being during COVID19?	Open	Week 1: Learning from the pandemic so far
What has been the biggest challenge to supporting children's well-being during COVID19 so far?	Open	Week 1: Learning from the pandemic so far

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Survey Item	Question Type	Week and Investigative Stream
Were any of the challenges (that you described earlier this week) a breach of children's human rights? [Y/N/ Don't know/Not applicable]	Select	Week 1: Learning from the pandemic so far
Which age group(s) are most challenging to protect? Select all that apply. [LIST: 0–2-year-olds; 3–7-year-olds; 8–12-year-olds; 13–17 year-olds; 18–24-year-olds; Don't know; Not applicable]	Multiselect	Week 2: Protection: Ending violence against children
Please tell us about the most effective responses you know about in your sector to ensure children have access to their basic needs (food, education, and health care) during COVID19. Please provide an example, if you can.	Open	Week 3: Provision: Access to food, health, and education
If the children you work with have faced increased social isolation, how has this affected their social and emotional wellbeing? [Scale: Very negatively, Negatively, No impact, Positively, very positively, Not applicable]	Select	Week 5: Prevention: Children's social and emotional well-being
Please share information about any processes or mechanisms that capture how COVID-related policies are impacting on children, either positively or negatively? How were children's views taken into account?	Open	Week 7: Children's participation
Have you been concerned about children's experiences online during COVID19? [Y/N/Don't know/Not applicable]	Select	Week 7: Children's participation

App Evaluation Survey Items

Evaluation Item	Question Type	Week
We'd like to ask you about your thoughts and experiences while using this app so far. Your feedback is really valuable to ensure this study is as informative and useful as possible. How would you describe your overall experience of taking part in this study so far? [Very positive, Positive, Neutral, Negative, very negative].	Select	Week 2
Please tell us why.	Open	
How easy is it to use the app? [SCALE: Very easy, easy, Neutral, hard, very hard]	Select	
Have you encountered any difficulties or challenges when using the app? [Y/N/Don't know]	Select	
If so, please tell us more.	Open	Week 4
We'd like to ask you about your thoughts and experiences while using this app so far. Your feedback is really valuable to ensure this study is as informative and useful as possible. Has taking part in this study had an impact on your work? [Y/N/Don't know]	Select	
Please tell us more.	Open	
Has taking part in this study had an impact on your wellbeing? [Y/N/Don't know]	Select	
Please tell us more.	Open	
What has been motivating you to continue taking part in this project?	Open	Week 6
Please tell us about anything that the project could have done to provide more value to you, or to keep you even more engaged?	Open	
Could similar apps provide a benefit to other aspects of your work? [Y/N/Don't know]	Select	
Please tell us more.	Open	

(continued)

(continued)

Evaluation Item	Question Type	Week
We'd like to ask you about your thoughts and experiences while using this app. Your feedback is really valuable to ensure this study is as informative and useful as possible. Has taking part in this study had an impact on your work? [Y/N/Don't know]	Select	Week 8
Please tell us more.	Open	
Has taking part in this study had an impact on your wellbeing? [Y/N/Don't know]	Select	
Please tell us more.	Open	
If you could, would you want to keep using an app of this sort as an ongoing part of your day-to-day work? [Y/N/Don't know]	Select	
Please tell us why.	Open	
Allow us all to express our deepest gratitude to you for contributing right up to this final day. We are learning from, and will be sharing, your insights. If there is anything else you'd like to tell us about children during COVID19 that we haven't asked you about, please do share this with us now. We wish you strength in your important work going forward. Please email us at covid19-log4p-project@strath. ac.uk so that we can keep you updated with project!	Open	

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