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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 underutilised 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 rigour 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, pragmatic and user-centred 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; Tiersma et al., 2022; Rahman et al., 2021). Blurring geographical boundaries, such methodologies proffer efficiency, convenience, privacy and customisability (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 (Rahman et al., 2021; Davidson 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 destabilisation 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 organisations (Advisory Group). The survey gathered 3339 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 wellbeing (incl. 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 customisable) reminders. An average of three questions were sent per day. Respondents could skip any question and withdrawn 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-centred design that aligned with the specific, situational needs of our target population (See Davidson et al., 2021; Karadzhov et al., 2023; Davidson 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. Karadzhov, 2021; Barriage & Hicks, 2020; Dawson, 2020; Do & Yamagata-Lynch, 2017). 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 specialising in qualitative research, they can be expensive, difficult-to-customise and based outside Europe - creating potential cross-border data transfer issues (Kruyen, 2020; Barriage & Hicks, 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).

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); Usability across continents; Compatibility with Android and iOS; Usability with no or limited Internet connection; Customisation 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); Anonymous data collection (i.e. no email addresses or phone numbers were collected); Hosted in-house: GDPR-compliant; no cross-border data transfer; Allows for collaborative development with non-academic stakeholders.	Requires time and a multidisciplinary team to develop; 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; Requires registration and management on app stores; may not be able to use institutional account for research apps; Non-immediacy of raw data access: ● Requires a data manager and ancillary software to extract and manage data; ● Inability to share a user-friendly data dashboard with stakeholders swiftly; Limited response modalities (text and voice-to-text); Other capability limitations (e.g. inability for in-app probing).	Pre-test survey appropriate survey length and frequency; Provide frequent (e.g. weekly) updates with summaries of data and/or perspective pieces to foster learning, engagement and a sense of community; Build in basic social features such as a forum to foster community and provide access to support or information from other respondents; Increase personalisation: provide a dedicated tab with list of all survey topics to allow quick and easy access to most relevant questions; Incorporate anonymous respondent IDs to enable follow-up on unclear or fruitful responses, and/or validate preliminary findings, via notifications to request additional input;

		Follow-up with non-responders or dropouts by sending out reminders and an automated exit question on reasons for non-participation.

Optimising 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 optimising survey design, particularly data quality and respondent engagement and retention (See 'Table 1').

Anticipate, Manage and Minimise Attrition

The response rate declined dramatically after the second week (See 'Figure 1'). We next offer potential explanations and countermeasures.

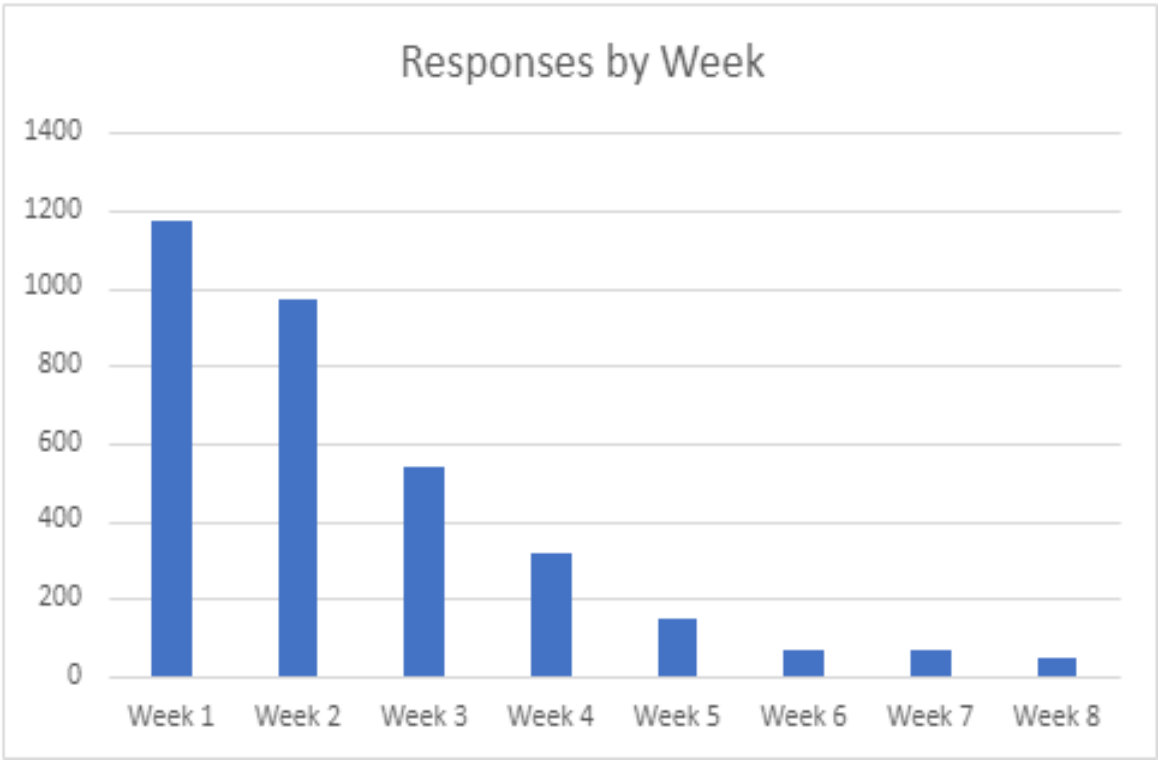

Figure 1. *Number of responses per week*

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 personalisation; See 'Table 1').

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 analysed 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 pre-specific 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 maximisation strategies (for example, pre-contacting potential respondents, and/or sending out email invitations or reminders; Wu et al., 2022; Tiersma 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, 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 & Peil, 2020). This would exemplify a *nested sampling design*, whereby a representative sub-sample of 'key informants' are selected to provide additional detail (Onwuegbuzie & 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').

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 organisation, the Philippines) Knowledge-sharing, a sense of fulfilment 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)

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 practise an ethic of care, and balance research risks and potential benefits to respondents (Crivello & 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 maximising the beneficial psychological, socio-emotional and educational impact of remote research with practitioner populations, particularly those operating in high-stress environments (See 'Table2').

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 (Davidson et al., 2023; Chan et al., 2022). Our experience resonates with Finchow 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 rigour '*when operating in suboptimal contexts for research*' (p. 135).

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