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The importance of how research participants think they are perceived: results from an electronic monitoring study of antiretroviral therapy in Uganda

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ABSTRACT

Novel monitoring technologies in HIV research, such as electronic adherence monitors (EAMs), have changed the nature of researcher-participant interactions. Yet little is known about how EAMs and the resulting interaction between researchers and participants affect research participation and the data gathered. We interviewed participants and research assistants (RAs) in an observational cohort study involving EAMs for HIV antiretroviral therapy (ART) in Uganda. We qualitatively explored interviewees' views about ethical issues surrounding EAMs and assessed data with conventional and directed content analysis. Participants valued their relationships with RAs and were preoccupied with RAs' perceptions of them. Participants were pleased when the EAM revealed regular adherence, and annoyed when it revealed non-adherence that contradicted self-reported pill-taking behavior. For many, the desire to maintain a good impression incentivized adherence. But some sought to creatively conceal non-adherence, or refused to use the EAM to avoid revealing non-adherence to RAs. These findings show that participants' perceptions of the study staff's perceptions of them affected the experience of being monitored, study participation, and ultimately the data gathered in the study. Investigators in monitoring-based research should be aware that social interactions between participants and study staff could affect both the practical and ethical conduct of that research.

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Social desirability bias; HIV/AIDS; adherence; privacy; trust; human subjects research

Introduction

The conduct of a longitudinal behavioral research study is often a story of interpersonal interactions between researchers (typically research assistants – RAs) and study participants. An expanding anthropological literature examining medical field studies has begun to shed light on the RA-participant interaction, particularly in resource-limited settings (RLS) (Geissler, Kelly, Imoukhuede, & Pool, 2008; Gouda, Kelly-Hanku, Wilson, Maraga, & Riley, 2016; Kamuya et al., 2013; Kingori, 2013; Reynolds, Mangesho, Lemnge, Vestergaard, & Chandler, 2013). Many studies of antiretroviral adherence now use electronic adherence monitors (EAMs), which record when bottles are opened for presumed pill-taking (Haberer et al., 2013; Hinkin et al., 2007). Some of these devices report on participants' adherence behavior in real time. EAMs have yielded important insights about the relationship between adherence patterns and viral suppression and resistance (Arnsten et al., 2002; Bangsberg et al., 2000; Cate, Bhattacharya, Clark, Holland, & Broadway, 2013; Oyugi et al., 2007; Parienti et al., 2008; Pavlik, Greisinger, Pool, Haidet, & Hyman, 2009), and EAM-based intervention strategies have shown promise for improving ART adherence in clinical settings (Haberer et al., 2016; Langebeek & Nieuwkerk, 2015; Orrell et al., 2015; Sabin et al., 2015). However, use of EAMs raises ethical questions that hinge upon frequent interactions between participants and study staff that occur in many EAM-based ART adherence studies (Campbell, Eyal, Musiimenta, & Haberer, 2015). To understand researcher-participant interactions in the setting of EAM, we conducted a qualitative investigation of individuals living with HIV in rural Uganda who were enrolled in a longitudinal, observational study of ART involving EAM. This paper characterizes how EAM affects how research participants think that they are perceived by researchers (which we term participants' "second-order perceptions").

Methods

Our methods have been described in detail elsewhere (Campbell et al., 2018). In brief, from August 2014–June 2015 we interviewed participants in the Uganda

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AIDS Rural Treatment Outcomes (UARTO) study, a longitudinal antiretroviral adherence monitoring study who did ($n = 40$) and did not ($n = 20$) use a real-time EAM (Wisepill, Wisepill Technologies, South Africa). We also interviewed UARTO research assistants ($n = 6$). Interviewes explored experiences using the EAM and ethical and social questions related to EAM use. We employed directed and inductive content analysis to analyze interviews. Participants also completed demographic questionnaires.

Results

Table 1 summarizes participant characteristics.

The importance of relationships with RAs

The frequent interactions that participants had with RAs led to relationships that were often profound and emotionally supportive (Table 1, Quotes 1 and 2). RAs also described how they valued these relationships (Table 2, Quote 3), while noting that close relationships helped facilitate study procedures and daily adherence.

The importance of being perceived as adherent

Participants felt that adherence was an important component of maintaining strong relationships with RAs. When asked whether they would tell their RAs if they had been non-adherent, UARTO participants (both EAM users and EAM non-users) expressed concerns that non-adherence would (1) undermine the RAs' hard work of helping the participant achieve good health, (2) indicate carelessness on the part of the participant, or (3) indicate to the RAs' supervisors that the RAs were not working effectively (Table 2, Quote 4–6).

Adherence monitoring and perceptions of trust

Participants' desire to maintain their RA's perception that they were adherent affected how they felt about the ability of EAMs to reveal their level of adherence. Proving regular adherence through the EAM was felt to build RAs' trust that participants were taking their medications, an idea recognized even by EAM non-users (Table 2, Quote 7). Conversely, when the device contradicted participants' self-reported adherence, annoyance with researchers sometimes followed. In these instances, participants felt that researchers' reliance on the device's adherence report indicated distrust towards them (Table 2, Quote 8). According to one RA, this perception of distrust may affect study retention (Table 2, Quote 9).

The effects of monitoring on adherence

Participants frequently cited EAMs as proof that that RAs "cared about" them and their adherence; this second-order perception of being cared for, and the desire to maintain it, often prompted adherence (Table 2, Quote 10). In contrast, many participants explained that monitoring induced them to adhere in order to avoid the ill effects of revealing non-adherence to RAs. For instance, revealing non-adherence via the EAM

Table 1. Participant characteristics.

UARTO participants	EAM users ($n = 40$)	EAM non-users ($n = 20$)	p-value (difference between EAM users and non-users)
Age (median, [IQR])	41 [35–46]	45 [42–50]	**0.03**
Female (%)	70	65	0.77
Literate (%)	90	85	0.68
Education level (n [%])			0.77
Never attended school	4 [10]	2 [10]	
Primary	23 [57.5]	11 [55]	
O-Level*	9 [22.5]	3 [15]	
A-Level*	1 [2.5]	3 [15]	
University/vocational	5 [12.5]	1 [5]	
Post-graduate	0 [0]	0 [0]	
Socioeconomic status			
Earns a salary? (n [%])	8 [20%]	5 [25%]	0.74
Monthly salary (median [IQR]) (USD)†	$65 [$44–$130]	$116 [$87–$116]	0.42
Monthly non-salaried income (median [IQR]) (USD)†	$12 [$4–$36]	$63 [$24–$81]	**0.04**
Monthly household expenditures (median [IQR]) (USD)†	$75 [$39–$148]	$87 [$22–$171]	0.67
Time from UARTO enrollment to interview (years, mean [SD])	5.48 [2.69]	7.98 [1.11]	**<0.0001**
UARTO RA's	$n = 6$		
Age (median, [IQR])	36 [34–38]		
Female (n [%])	4 [66]		

Abbreviations: UARTO – Uganda AIDS Rural Treatment Outcomes study; EAM – electronic adherence monitor; IQR – interquartile range; USD – United States Dollar; SD – standard deviation; RA – research assistant.
*In the Ugandan education system, A-Level is approximately equivalent to American high school. O-Level is two-year, post-secondary, pre-university schooling.
†Monetary conversion calculated at 1 US Dollar = 3445 Ugandan Shillings (as of January 12, 2015).

Table 2. Representative quotes.

	Quote	Participant
Profound relationships with RAs		
Quote 1	I: Please tell me about your relationship with your RA. R: Our relationship is good and I like all my RAs. Even when the study had just started I had an RA who helped me a lot when I had stigma and stress … I used to come here [the ISS clinic] crying but she would handle me like a baby and by the time I went back I would be fine.	Male EAM user, age 60
Quote 2	I: Please tell me about your interaction with your RA. R: She is like a sister to me. I like her advice and we are friends.	Female EAM non-user, age 42
Quote 3	I: Why do you think they [participants] have chosen you to share their problems [with]? R: I think it's the way you deal with them: you put yourself in their shoes. If you are that person and you are seeking care, maybe you have so many questions which nobody can answer. You have nobody you can sit down and tell this, my goat was stolen, and all that … actually one friend of mine … he asked me, "what are you doing with these people [research participants]?" I told him "we are here chatting; these are my friends."	RA
Importance of being perceived as adherent		
Quote 4	I: What if the researchers get to know about you missing your drugs, how would you feel? R: I might get scared that I have disappointed those who care about me … You know, when someone is doing their best to help you, you should not let them down. You should do what they tell you to do. It can even spoil my relationship with her [RA].	Female EAM user, age 62
Quote 5	I: What about your RA, can you tell her in case you miss your medication? R: I cannot tell her surely … She can think that you are a careless person and she can lose morale in helping you.	Male EAM user, age 64
Quote 6	I: What if the researchers get to know about you missing your drugs, how would you feel? R: I would feel bad because I would know that they will not be happy with me because they also have supervisors who will blame them thinking that they did not do well their work … So if I miss, I wouldn't let my researchers know because it discourages them.	Female EAM non-user, age 32
Adherence monitoring and perceptions of trust		
Quote 7	R: I think [RAs] can trust us more if they know that we take our drugs well and even I think that is why they gave out [the wireless EAM]: to be able to know the truth. Without monitoring of course they trust you less.	Female EAM non-user, age 53
Quote 8	R: They came and drew my blood about three times thinking that I was not taking my drugs, and yet I was taking them. I told them but they did not believe me. This totally disturbed me. You know I told them the truth but they did not believe me.	Female EAM user, age 45
Quote 9	R: [As a consequence of device malfunction leading to a blood draw] someone is going to lose trust in you and it might be hard to regain it however much you try … You will have … people lost to follow-up.	RA
The effects of monitoring on adherence		
Quote 10	R: [The wireless EAM] is so important to me because the fact that I have it and am in the study. I feel like when I open it and it shows the researchers there. I feel like they care about me because they follow me up to see how I take my medication. And so knowing that they are following me up in a way has trained my mind never to forget because I do not want to let down their efforts of giving me the device and following me up.	Female EAM user, age 46
Quote 11	R: Researchers will know that you did not take [ART] and they will know that you are using the drugs badly and it may not help your life … They told us that these drugs make the virus go to sleep and when you keep skipping or taking at a wrong time the virus will not go to sleep. I: So according to you what do you think the device does? R: I see the biggest use is that it helps take our drugs and it helps us to keep our drugs well … Just because it sends a message to the researchers helps us to take our drugs because even if you may be lazy to take you remember that you have that device that will send the message … It's like you feel ashamed that someone is helping you to give you a free service and if you fail to take it, it will be a big shame.	Male EAM user, age 60
Quote 12	R: … whenever I would be somewhere [away from the device] I would call my wife to open it and remove for me my drugs so that the signal can go, and then I would come later and I take my drugs. But later I realized that I was cheating myself so I repented of that and now I take my drugs well … I was doing that so as to impress the people from the research … I thought their research would not go on well if there are people who do not take drugs in time and I never wanted to be one of them because they are my friends.	Male EAM user, age 40
Quote 13	R: … yes surely that is why I refused [the wireless EAM] because I told you, I was moving up and down and I knew that I would be busy and I delay to open the device and [if] she found out about this she would feel bad about me.	Female EAM non-user, age 46

Abbreviations: RA – research assistant; I – interviewer; R – respondent; EAM – electronic adherence monitor.

could lead to feelings of shame, because it was seen as a repudiation of the adherence support that RAs were perceived to be offering (Table 2, Quote 11).

Monitoring and efforts to conceal non-adherence

Some participants attempted to maintain the semblance of good adherence by manipulating the wireless EAM. One participant explained that he opened the device even when not taking medications, precisely to "impress" RAs with his adherence, and to help them appear successful to their supervisors (Table 2, Quote 12). Another participant refused to use the device, fearing that frequent non-adherence reports might damage her relationship with her RA (Table 2, Quote 13).

Discussion

In this qualitative study of experiences of longituinal EAM for ART, we found that study participants cared greatly about researchers' perceptions of their adherence, which influenced the participants' feelings about being monitored and behaviors within the study. Our findings delineate how EAM affected participants' second-order perceptions of RAs' trust in and approval of them. The strength of participants' relationships with RAs

underpinned the importance of these second-order perceptions.

Recent anthropological research has shed light on how participant-researcher interactions affect data-gathering and everyday ethics of research in RLS. Kamuya and colleagues explore how personal relationships between participants and field workers in an epidemiological study in Kenya had implications for ongoing consent to participate in the study, as well as for participants' trust in the research program (Kamuya et al., 2013). In another ethnographic study, Kingori and colleagues found that RAs involved in multiple medical studies in Kenya may prioritize immediate participant needs (e.g., additional money for food) over study outcomes or abstract ethical notions like autonomy (Kingori, 2013). Such prioritizations may in part reflect the personal relationships that RAs develop with participants whose private information they gather (Gouda et al., 2016), especially in long-term household visit-based studies. Our results extend these findings to adherence monitoring studies, introducing remote monitoring as a distinct form of interaction between participants and RAs.

Participants felt frustrated and mistrusted when self-reported and device-reported adherence disagreed, despite being told that the device did not always work perfectly and that blood draws did not indicate lack of trust. However, RAs' fears that discrepancies between EAM-measured and self-reported adherence could lead to study drop-out seem not to have been borne out; only 6 of 750 UARTO participants (~1%) chose to leave the study after enrolling.

Prior qualitative research in rural Uganda by Ware and colleagues explored participant experiences with EAMs that were linked to short messaging system (SMS) adherence reminders and notifications in a 9-month pilot randomized controlled trial (Ware et al., 2016). They found that monitoring was perceived as "being seen adhering", which allowed participants to demonstrate to clinic staff their commitment to their own health and therapy. Ware and colleagues found that observation created both pressure to be adherent and the impression that the clinic cared for participants.

In contrast to Ware, we interviewed participants enrolled in a long-term, longitudinal adherence monitoring study, with enrollment lasting up to several years and without a mechanism designed to improve adherence (UARTO was designed strictly as an observational study). Like Ware, we found that monitoring allowed participants to demonstrate their adherence and encouraged pill taking. However, in UARTO, adherence pressure arose specifically from participants' relationships with RAs, and participants' concern with how RAs would perceive them if they did not take their medications. Importantly, UARTO participants described adherence incentivization without the use of an adherence improvement tool, suggesting that participants' second-order perceptions are in themselves an important promoter of adherence.

Our results have a number of practical implications for EAM-based ART studies and for other longitudinal, medical behavioral studies. First, participants' second-order perceptions of research staff may affect study results, because they affect participants' behaviors within the study. While EAMs are typically thought to reduce social desirability bias in adherence measurements, our results reveal that participants' second-order perceptions drive some participants to manipulate monitoring systems in order to convey socially desirable adherence. Second, because discrepancies in EAM-reported and self-reported adherence could lead to ill feelings, our results indicate the importance of EAM technology optimization to reduce false EAM reports of non-adherence. These findings also highlight the need for education for EAM users about the limitations of the EAMs upon enrollment. Third, the importance that participants placed on RAs' impressions of them underscores the substantial social role that study participation played in our participants' lives. Not only did participants glean concrete social support from study participation (J. Campbell, Burns, et al., 2015), but they also often gained (or lost) a sense of interpersonal well-being from participation.

Our study had several limitations. First, we could not interview participants who declined enrollment in UARTO. Second, others have described potentially unique social dynamics of people living with HIV in southwestern Uganda, often characterized by stigma and economic vulnerability (McGrath et al., 2014), that may have predisposed our participants to seek close relationships with RAs. Third, participants in our study had the same disease – HIV – and their experiences with monitoring was likely colored by factors distinct to this condition, such as HIV-related stigma.

Conclusion

We found that study participants' perceptions of RAs' perceptions of them affected participants' experiences with adherence monitoring, as well as their adherence to ART and to UARTO's protocol. Often guided by their second-order perceptions, participants were happy to prove optimal adherence through the EAM, but were offended by what they saw as mistrust when the EAM revealed non-adherence. We also found that second-order perceptions served as a foundation for

the large role that study participation played in our participants' lives. As use of health monitoring technologies expands in research settings, examining the effects of participants' second-order perceptions on participants' behaviors and experiences will be vital to conducting studies and understanding their results.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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Ethics statement

This qualitative study was reviewed and approved by the institutional review board (IRB) at Partners Healthcare/Massachusetts General Hospital, the Research Ethics Committee at MUST, and the Uganda National Council of Science and Technology. All participants provided written informed consent prior to being interviewed.

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