

# Mobile applications in HIV self-management: A systematic review of scientific literature

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**Supplementary Table 1. Characteristics of the included articles**

ID	The first author (reference)	Title	Publication date	Country	App's name
1	Clouse et al., 2020 <sup>40</sup>	CareConekta: Study protocol for a randomized controlled trial of a mobile health intervention to improve engagement in postpartum HIV care in South Africa	2020	South Africa	CareConekta
2	Barroso et al., 2020 <sup>34</sup>	A Feasibility Study to Develop and Test a Cognitive Behavioral Stress Management Mobile Health Application for HIV-Related Fatigue	2020	USA	CBSM mHealth
3	Pang et al., 2020 <sup>41</sup>	Preliminary Effects of a Mobile Interactive Supervised Therapy Intervention on People Living With HIV	2020	Singapore	The MIST app
4	Songtaweessin et al., 2020 <sup>42</sup>	Youth-friendly services and a mobile phone application to promote adherence to pre-exposure prophylaxis among adolescent men who have sex with men and transgender women at-risk for HIV in Thailand: a randomized control trial	2020	Thailand	Project Raincoat
5	Suryavanshi et al., <sup>43</sup>	A mobile health-facilitated behavioral intervention for community health workers improves exclusive breastfeeding and early infant HIV diagnosis in India: A cluster randomized trial	2020	India	mHealth application
6	Escobar-Viera et al., 2020 <sup>44</sup>	The Florida Mobile Health Adherence Project for People Living with HIV (FL-mAPP): Longitudinal Assessment of Feasibility, Acceptability, and Clinical Outcomes	2020	USA	Care4Today
7	Safdari et al., 2020 <sup>45</sup>	Developing "Aysoo": A mobile-based self-management application for people living with HIV	2020	Iran	Aysoo
8	Cho et al., 2019 <sup>51</sup>	Use of the FITT framework to understand patients' experiences using a real-time medication monitoring pill bottle linked to a mobile-based HIV self-management app: A qualitative study	2019	USA	Wise App
9	Beauchemin et al., 2019 <sup>50</sup>	A Multi-Step Usability Evaluation of a Self-Management App to Support Medication Adherence in Persons Living with HIV. Int J Med Inform	2019	USA	WiseApp
10	Erguera et al., 2019 <sup>54</sup>	WYZ: A pilot study protocol for designing and developing a mobile health application for engagement in HIV care and medication adherence in youth and young adults living with HIV	2019	USA	WYZ
11	Velloza et al., 2019 <sup>57</sup>	A clinic-based tablet application to support safer conception among HIV serodiscordant couples in Kenya: Feasibility and acceptability study	2019	Kenya	SCIP-App
12	Schnall et al., 2018 <sup>46</sup>	Mobile Health Technology for Improving Symptom Management in Low Income Persons Living with HIV	2018	USA	m VIP app
13	Cho et al., 2018 <sup>47</sup>	A multi-level usability evaluation of mobile health applications: A case study	2018	USA	mVIP
14	Cho et al., 2018 <sup>48</sup>	Understanding the predisposing, enabling, and reinforcing factors influencing the use of a mobile-based HIV management app: A real-world usability evaluation.	2018	USA	mVIP
15	Dillingham et al., 2018 <sup>36</sup>	Positive Links: A Mobile Health Intervention for Retention in HIV Care and Clinical Outcomes with 12-Month Follow-Up	2018	USA	Positive Links
16	Leah et al., 2018 <sup>49</sup>	Automated SMS in international settings use of an Android phone application for automated text messages in international settings--A case study in an HIV clinical trial in St. Petersburg, Russia	2018	USA	SMS Messenger
17	Schnall et al., 2017 <sup>58</sup>	Predictors of willingness to use a smartphone for research in underserved persons living with HIV	2017	USA	--
18	Lucero et al., 2017 <sup>52</sup>	The relationship between individual characteristics and interest in using a mobile phone app for HIV self-management: Observational cohort study of people living with HIV	2017	USA	--
19	Schnall et al., 2016 <sup>33</sup>	A user-centered model for designing consumer mobile health (mHealth) applications (apps)	2016	USA	--
20	Levy et al., 2015 <sup>38</sup>	Acceptability of a Mobile Smartphone Application Intervention to Improve Access to HIV Prevention and Care Services for Black Men Who Have Sex with Men in the District of Columbia	2015	USA	PRISM
21	Jongbloed et al., 2015 <sup>55</sup>	Recent Evidence for Emerging Digital Technologies to Support Global HIV Engagement in Care	2015	USA	--
22	Schnall et al., 2015 <sup>53</sup>	Trust, perceived risk, perceived ease of use, and perceived usefulness as factors related to mHealth technology use	2015	USA	--
23	Schnall et al., 2015 <sup>56</sup>	mHealth Technology as a Persuasive Tool for Treatment, Care and Management of Persons Living with HIV	2015	USA	--

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Supplementary Table 2. Characteristics of the apps used in the research articles

Reference number	App's name	Objective	Target Population	Operating system	Cost	Other details
(40)	CareConekta	ART facilities using current location and a pre-loaded list of health facilities	Women living with HIV who are in the third trimester of pregnancy	Android	Free	--
(34)	CBSM mHealth	Cognitive Behavioral Stress Management (CBSM mHealth)	PLHIV	iOS	Free	RCT study, the study aimed to adapt, develop, and assess the feasibility of a Cognitive Behavioral Stress Management Mobile Health (CBSM mHealth) application (app) for HIV-related fatigue
(41)	The MIST app	To evaluate the efficacy of a mobile app, Mobile Interactive Supervised Therapy (MIST), for improving adherence to oral HIV medications among HIV-infected adults	Adult PLHIV	Android	Free	--
(42)	Project raincoat	Assessing the impact of mobile phone application (app) on adherence to pre-exposure prophylaxis (PrEP) in YMSM and YTGW in Thailand	Adolescent men who have sex with men and transgender women	Android	Free	--
(43)	mHealth application	Assessing the impact of Mobile Health on the uptake of PMTCT (prevention of mother-to-child transmission)	Health workers	Android	Free	--
(44)	Care4Today	Improve medication adherence	Adult people with HIV	Android and iOS	Free	Care4Today Mobile Health Manager, a commercially available, bi-programmatic medication adherence app that operates with both iOS and Android operating systems, as well as SMS, was found feasible and acceptable for improving ART adherence among PLHIV during a 3-month longitudinal study. Further clinical research needs to address user fatigue to improve platform usage.
(45)	Aysoo	Design and develop an HIV self-management mobile application	PLHIV	Android	Free	"Aysoo" is expected to help manage HIV conditions and increases medication adherence of PLHIV.
(51)	Wise App	For analysis to understand patients' experiences using a real-time medication monitoring pill bottle linked to an HIV self-management app.	PLHIV	Android and iOS	Free	Usability evaluation in a real-world setting enabled us to measure users' actual experiences when interacting with the app during their everyday lives. Our work highlights the importance of using mobile technology for persons living with HIV, specifically those with low income/housing instability, and adds to the body of literature on the potential for implementation and dissemination of symptom self-management strategies through a mobile platform.
(50)	WiseApp.	Adherence to antiretroviral therapy to HIV management and sustaining viral suppression	PLHIV	Android	\$20,000	The results of the cognitive walkthrough with both experts and end-users informed iterative refinements to the WiseApp and finalization of a mHealth app for PLHIV to better self-manage their health.
(54)	WYZ	Improved engagement in HIV care ART adherence	Youth ages 18-29 living with HIV (YLWH)	Android and iOS	Free or low cost	As noted above, we plan to test the efficacy of WYZ in a subsequent large-scale randomized trial. If found to be feasible and acceptable, WYZ may be one of the first mHealth applications using individual, dyadic, and community-level approaches for improved engagement in HIV care and ART adherence, grounded in a theoretical framework and created using an HCD approach.
(57)	SCIP-App	Support safer conception among HIV serodiscordant couples	Heterosexual HIV serodiscordant couples	Android	Free	--
(46)	mVIP	Examine the impact of a mHealth application (app) comprised of evidence-based self-care strategies on the symptom experience of PLHIV	Low Income PLHIV	Android and iOS	Free	--
(47)	mVIP	HIV-related symptom self-management	PLHIV	Android and iOS	Free	Findings from the interviews showed that first, mVIP is useful for HIV-related symptom self-management and has the potential for being used as a communication tool with healthcare providers; and second, mVIP is easy to use to monitor symptom experience over time. At the same time, participants suggested mVIP be more sensitively tailored based on years from initial diagnosis of HIV, an individuals' age, and conditions.
(48)	mVIP	For analysis of users' experiences using an HIV self-management app.	PLHIV	Android and iOS	Free	Usability evaluation in a real-world setting enabled us to measure users' actual experiences when interacting with the app during their everyday lives. Highlights the importance of using mobile technology for PLHIV, specifically for those persons from low-income groups, and adds to the body of literature on the implementation and dissemination of mobile technology interventions for improving outcomes in PLHIV.
(36)	PositiveLinks	Improve engagement in care	PLHIV	Android and iOS	Free	-
(49)	SMS Messenger	Adherence to ART	HIV-infected with heavy drinking	Android	Minimal cost	The SMSMessenger application uses an existing clinical trial database and can receive real-time updates. All communications between the application and server are encrypted and phone numbers are stored in a secure database behind a firewall. No sensitive data are stored on the phone, as outgoing messages are sent through the application, and not by messaging features on the phone itself. Messages are sent simultaneously to study participants, which reduces the burden on local study staff.
(58)	--	For the everyday self-management needs of persons living with HIV (PLHIV)	PLHIV	Android	Free	We found increased age, HIV stigma, and social isolation were negatively associated with smartphone use, which supports the use of smartphones for researching with PLHIV but also suggests that age, stigma, social integration functions, and social isolation need to be considered in research involving PLHIV. We found increased age, HIV stigma, and social isolation were negatively associated with smartphone use suggesting that future mHealth interventions targeting this population should be, in part, tailored to these unique aspects of PLHIV. Findings from this work support the use of smartphones for researching with PLHIV but also suggest that age, stigma, social integration functions, and social isolation need to be considered in this research.
(52)	--	HIV self-management	PLHIV	Android	Free	A majority of PLHIV are interested in using a free mobile phone app to self-manage their condition
(33)	--	HIV prevention, treatment, and care	PLHIV	Android	Free	We identified barriers and facilitators to the use of mHealth technology for HIV prevention for high-risk MSM, developed "use cases'," and identified relevant functional content and features for inclusion in a design document to guide future app development. Findings from this study support the use of the ISR framework as a guide for future mobile health (mHealth) app development.
(38)	PRISM	Improve Access to HIV Prevention and Care Services	Black Men who have Sex with Men (MSM)	Android	25\$	--
(55)	--	Engagement in HIV care to end the epidemic in 2030	PLHIV	Android	Free	--
(53)	--	Self-monitoring and self-management	PLHIV	Android	Free	We used the four constructs of the EAM to understand factors related to mHealth use in PLHIV. Our focus group findings were organized according to the four broad constructs: trust, perceived risk, perceived usefulness, and perceived ease of use
(56)	--	Treatment, Care, and Management	PLHIV	Android	Free	mHealth app was focused on the PLHIV's views of the functional specifications and features for inclusion in a mobile app for PLHIV. Using Fogg's functional triad and the SDT, we were able to identify the salient content and features desired by PLHIV for improving the management and treatment of the disease.