

A Systematic Review of Mobile Phone Interventions (SMS/IVR/calls) to improve Adherence and Retention to Antiretroviral Treatment in Low and Middle-Income Countries

Supplemental Appendices for publication in AIDS Patient Care and STDs

B.A. Demena^a, PhD; L. Artavia-Mora^a, MA; D. Ouedraogo^b, PhD; B. A. Thiombiano^b, PhD; N.

Wagner^{a,c}, PhD

^a *Institute of Social Studies, Erasmus University Rotterdam, Kortenaerkade 12, The Netherlands.*

^b *Université Nazi Boni (Former Université Polytechnique de Bobo-Dioulasso), 01 BP 1091 Bobo-Dioulasso
01, Burkina Faso.*

^c *Corresponding author: Natascha Wagner, [contact at: wagner@iss.nl](mailto:wagner@iss.nl)*

Keywords: HIV/AIDS Patient Care, Mobile Health Technology (mHealth), Antiretroviral Treatment, Short Message Service, Low- and Middle-Income Countries



Appendix #1 – PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2-3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3-5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Not applicable
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	7-10
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4 - 5; Table 1
Search	8	Present full electronic search strategy for at least one database, including any limits used	Appendix 2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review)	4-5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5-6
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	6
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	Not applicable

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Not applicable
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	Not applicable
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7; Fig. 1; appendix 3
Study characteristics	18	For each study, present characteristics for which data were extracted and provide the citations.	7-10
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	11; appendix 4
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Table 3 (a)Table 4
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	Not applicable
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	11; Fig. 3
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	13 (RCT designs); Table 4
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	12-16
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	16-17
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	17-18
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	18

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097 For more information, visit: www.prisma-statement.org.

Appendix #2 – General search query

*("Mobile phone" OR "*mPhone" OR "cellular phone" OR "text message" OR "cell phone" OR "SMS" OR "short message service" OR "simple message service" OR "pager" OR "two*way electronic message* system" OR "voice call*" OR "IVR" OR "interactive voice *") AND ("HIV*" OR "*HIV" OR "AIDS" OR "people living with HIV*AIDS" OR "human immunodeficiency virus" OR "PLWHA") AND ("*ART" OR "antiretroviral therapy" OR "highly active antiretroviral therapy" OR "ARV") AND ("Adheren*" OR "medication * adherence" OR "retention" OR "medication * retention" OR "CD4" OR "biomarker") AND ("low* and middle * income countr*" OR "developing countr*").*

Appendix #3 – Reports excluded based on title and abstract with justification

Author(s), title, journal/publisher and publication year	Source	Justification for Exclusion
Sherman, E., Clauson, K. A., Elrod, S., Eckardt, P., Alkhateeb, F., & Jacobs, R. (2018). Patient Perceptions of Text Messaging to Improve Antiretroviral Therapy Adherence: A Qualitative Study of Patients in a Ryan White Clinic. <i>Journal of the International Association of Providers of AIDS Care (JIAPAC)</i> , 17, 2325958218759209.	PubMed/ Medline	Qualitative research
Ossemame, E. B., Moon, T. D., Were, M. C., & Heitman, E. (2018). Response to Rejoinder to “Ethical issue in the use of SMS messaging in HIV care and treatment in low-and middle-income countries: case examples from Mozambique”. <i>Journal of the American Medical Informatics Association</i> .		Ethical issues in the use of SMS messaging
Patel, A. R., Kessler, J., Braithwaite, R. S., Nucifora, K. A., Thirumurthy, H., Zhou, Q., ... & Marra, C. A. (2017). Economic evaluation of mobile phone text message interventions to improve adherence to HIV therapy in Kenya. <i>Medicine</i> , 96(7).		Cost-effectiveness of SMS-based adherence interventions
Sutton, R., Lahuerta, M., Abacassamo, F., Ahoua, L., Tomo, M., Lamb, M. R., & Elul, B. (2017). Feasibility and acceptability of health communication interventions within a combination intervention strategy for improving linkage and retention in HIV care in Mozambique. <i>Journal of Acquired Immune Deficiency Syndromes (1999)</i> , 74(Suppl 1), S29.		Feasibility and acceptability of health communication interventions
Atukunda, E. C., Musimenta, A., Musinguzi, N., Wyatt, M. A., Ashaba, J., Ware, N. C., & Haberer, J. E. (2017). Understanding patterns of social support and their relationship to an ART adherence intervention among adults in rural Southwestern Uganda. <i>AIDS and Behavior</i> , 21(2), 428-440.		Understanding patterns of social support and their relationship to an ART adherence intervention
Adetunji, A. A., Muyibi, S. A., Imhansoloeva, M., Ibraheem, O. M., Sunmola, A., Kolawole, O. O., ... & Irabor, A. E. (2017). Mobile phone use for a social strategy to improve antiretroviral refill experience at a low-resource HIV clinic: patient responses from Nigeria. <i>AIDS care</i> , 29(5), 575-578.		A qualitative study to provide insight into modifiable gaps between patients' expectations and experiences of the use of mobile phones
Wagner, N., Ouedraogo, D., Artavia-Mora, L., Bedi, A., & Thiombiano, B. A. (2016). Protocol for a randomized controlled trial evaluating mobile text messaging to promote retention and adherence to antiretroviral therapy for people living with HIV in Burkina Faso. <i>JMIR Research Protocols</i> , 5(3).		Study protocol for RCT
Awiti, P. O., Grotta, A., van der Kop, M., Dusabe, J., Thorson, A., Mwangi, J., ... & Ekström, A. M. (2016). The effect of an interactive weekly mobile phone messaging on retention in prevention of mother to child transmission (PMTCT) of HIV program: study protocol for a randomized controlled trial (WELTEL PMTCT). <i>BMC Medical Informatics and Decision Making</i> , 16(1), 86.		Study protocol for RCT
Glasner-Edwards, S., Patrick, K., Ybarra, M. L., Reback, C. J., Rawson, R. A., Garneau, H. C., ... & Venegas, A. (2016). A cognitive behavioral therapy-based text messaging intervention		Study protocol for RCT

Author(s), title, journal/publisher and publication year	Source	Justification for Exclusion
versus medical management for HIV-infected substance users: Study protocol for a pilot randomized Trial. <i>JMIR Research Protocols</i> , 5(2).		
de Lima, I. C. V., Galvão, M. T. G., de Oliveira Alexandre, H., Lima, F. E. T., & de Araújo, T. L. (2016). Information and communication technologies for adherence to antiretroviral treatment in adults with HIV/AIDS. <i>International Journal of Medical Informatics</i> , 92, 54-61.		Evaluate the efficacy of information and communication technologies in the adherence to antiretroviral treatment in adults with HIV/AIDS.
Saberri, P., Siedle-Khan, R., Sheon, N., & Lightfoot, M. (2016). The use of mobile health applications among youth and young adults living with HIV: focus group findings. <i>AIDS Patient Care and STDs</i> , 30(6), 254-260.		To conduct focus groups with youth (18-29 years old) living with HIV (YLWH) to better understand preferences for mobile applications
Lippman, S. A., Shade, S. B., Sumitani, J., DeKadt, J., Gilvydis, J. M., Rathagana, M. J., ... & Saberri, P. (2016). Evaluation of short message service and peer navigation to improve engagement in HIV care in South Africa: study protocol for a three-arm cluster randomized controlled trial. <i>Trials</i> , 17(1), 68.		study protocol for a three-arm cluster randomized controlled trial
Ware, N. C., Pisarski, E. E., Tam, M., Wyatt, M. A., Atukunda, E., Musiimenta, A., ... & Haberer, J. E. (2016). The Meanings in the messages: how SMS reminders and real-time adherence monitoring improve antiretroviral therapy adherence in rural Uganda. <i>AIDS (London, England)</i> , 30(8), 1287.		Qualitative study
Koole, O., Denison, J. A., Menten, J., Tsui, S., Wabwire-Mangen, F., Kwesigabo, G., ... & Van Praag, E. (2016). Reasons for missing antiretroviral therapy: results from a multi-country study in Tanzania, Uganda, and Zambia. <i>PLoS One</i> , 11(1), e0147309.		Identify the reasons patients miss taking their antiretroviral therapy (ART)
Kim, J., Zhang, W., Nyonyitono, M., Lourenco, L., Nanfuka, M., Okoboi, S., ... & Moore, D. M. (2015). Feasibility and acceptability of mobile phone short message service as a support for patients receiving antiretroviral therapy in rural Uganda: a cross-sectional study. <i>Journal of the International AIDS Society</i> , 18(1).		Studied the receptiveness of patients in a rural Ugandan setting to the use of SMS communication for such purposes
Campbell, J. I., & Haberer, J. E. (2015). Cell phone-based and adherence device technologies for HIV care and treatment in resource-limited settings: recent advances. <i>Current HIV/AIDS Reports</i> , 12(4), 523-531.		Provides an overview of recent advances in cell phone-based and adherence monitoring technologies
Kamal, A. K., Shaikh, Q. N., Pasha, O., Azam, I., Islam, M., Memon, A. A., ... & Jan, M. (2015). Improving medication adherence in stroke patients through Short Text Messages (SMS4Stroke)-study protocol for a randomized, controlled trial. <i>BMC Neurology</i> , 15(1), 157.		Study protocol for a randomized, controlled trial
Kebede, M., Zeleke, A., Asemahagn, M., & Fritz, F. (2015). Willingness to receive text message medication reminders among patients on antiretroviral treatment in North West Ethiopia: A cross-sectional study. <i>BMC Medical Informatics and Decision Making</i> , 15(1), 65.		Willingness to receive text message medication reminders among patients on antiretroviral treatment in North West Ethiopia
Nhavoto, J. A., Grönlund, Å., & Chaquilla, W. P. (2015). SMSaude: design, development, and implementation of a remote/mobile patient management system to improve retention in care for HIV/AIDS and tuberculosis patients. <i>JMIR mHealth and uHealth</i> , 3(1).		To design, develop, and implement an integrated mobile phone text messaging system
Elul, B., Lahuerta, M., Abacassamo, F., Lamb, M. R., Ahoua, L., McNairy, M. L., ... & Gurr, D. (2014). A combination strategy for enhancing linkage to and retention in HIV care among		Study protocol for a site-randomized implementation science study

Author(s), title, journal/publisher and publication year	Source	Justification for Exclusion
adults newly diagnosed with HIV in Mozambique: study protocol for a site-randomized implementation science study. <i>BMC Infectious Diseases</i> , 14(1), 549.		
Rodrigues, R., Bogg, L., Shet, A., Kumar, D. S., & De Costa, A. (2014). Mobile phones to support adherence to antiretroviral therapy: what would it cost the Indian National AIDS Control Programme?. <i>Journal of the International AIDS Society</i> , 17(1).		To study the costs of mobile phone reminder strategies
Montoya, J. L., Georges, S., Poquette, A., Depp, C. A., Atkinson, J. H., Moore, D. J., & Translational Methamphetamine AIDS Research Center (TMARC) Group. (2014). Refining a personalized mHealth intervention to promote medication adherence among HIV+ methamphetamine users. <i>AIDS Care</i> , 26(12), 1477-1481.		To understand patient perspectives of barriers and facilitators of ART adherence among people with HIV
Smillie, K., Van Borek, N., Abaki, J., Pick, N., Maan, E. J., Friesen, K., ... & Murray, M. (2014). A qualitative study investigating the use of a mobile phone short message service designed to improve HIV adherence and retention in care in Canada (WeTel BC1). <i>Journal of the Association of Nurses in AIDS Care</i> , 25(6), 614-625.		A qualitative study
Sidney, K., Antony, J., Rodrigues, R., Arumugam, K., Krishnamurthy, S., D'souza, G., ... & Shet, A. (2012). Supporting patient adherence to antiretrovirals using mobile phone reminders: patient responses from South India. <i>AIDS Care</i> , 24(5), 612-617.		To study perceptions on preference with this intervention. Not retention/adherence
King, E., Kinvig, K., Steif, J., Qiu, A. Q., Maan, E. J., Albert, A. Y., ... & Lester, R. T. (2017). Mobile text messaging to improve medication adherence and viral load in a vulnerable Canadian population living with human immunodeficiency virus: a repeated measures study. <i>Journal of Medical Internet Research</i> , 19(6).		Mobile Text Messaging to Improve Medication Adherence and Viral Load in a Vulnerable Canadian Population Living With Human Immunodeficiency Virus: A Repeated Measures Study.
Nhavoto, J. A., Grönlund, Å., & Klein, G. O. (2017). Mobile health treatment support intervention for HIV and tuberculosis in Mozambique: perspectives of patients and healthcare workers. <i>PloS One</i> , 12(4), e0176051.		Mobile health treatment support intervention for HIV and tuberculosis in Mozambique: Perspectives of patients and healthcare workers.
Georgette, N., Siedner, M. J., Zandoni, B., Sibaya, T., Petty, C. R., Carpenter, S., & Haberer, J. E. (2016). The acceptability and perceived usefulness of a weekly clinical SMS program to promote HIV antiretroviral medication adherence in KwaZulu-Natal, South Africa. <i>AIDS and Behavior</i> , 20(11), 2629-2638.		The acceptability and perceived usefulness of a weekly clinical SMS program
Garofalo, R., Kuhns, L. M., Hotton, A., Johnson, A., Muldoon, A., & Rice, D. (2016). A randomized controlled trial of personalized text message reminders to promote medication adherence among HIV-positive adolescents and young adults. <i>AIDS and Behavior</i> , 20(5), 1049-1059.		In Chicago, United States. Not low- or middle-income country.
Swendeman, D., Jana, S., Ray, P., Mindry, D., Das, M., & Bhakta, B. (2015). Development and pilot testing of daily interactive voice response (IVR) calls to support antiretroviral adherence in India: a mixed-methods pilot study. <i>AIDS and Behavior</i> , 19(2), 142-155.		Development and Pilot Testing of Daily Interactive Voice Response (IVR) Calls to Support Antiretroviral Adherence in India: A Mixed-Methods Pilot Study.
Perera, A. I., Thomas, M. G., Moore, J. O., Faasse, K., & Petrie, K. J. (2014). Effect of a smartphone application incorporating personalized health-related imagery on adherence to		Effect of a smartphone application incorporating personalized health-related imagery on adherence to antiretroviral therapy: a randomized clinical trial.

Author(s), title, journal/publisher and publication year	Source	Justification for Exclusion
antiretroviral therapy: a randomized clinical trial. <i>AIDS Patient Care and STDs</i> , 28(11), 579-586.		
Dowshen, N., Kuhns, L. M., Gray, C., Lee, S., & Garofalo, R. (2013). Feasibility of interactive text message response (ITR) as a novel, real-time measure of adherence to antiretroviral therapy for HIV+ youth. <i>AIDS and Behavior</i> , 17(6), 2237-2243.		Not low- or middle-income country (in USA)
Furberg, R. D., Uhrig, J. D., Bann, C. M., Lewis, M. A., Harris, J. L., Williams, P., ... & Kuhns, L. (2012). Technical implementation of a multi-component, text message-based intervention for persons living with HIV. <i>JMIR research protocols</i> , 1(2).		Technical implementation of a multi-component, text message-based intervention
Yard, S. S., Huh, D., King, K. M., & Simoni, J. M. (2011). Patient-level moderators of the efficacy of peer support and pager reminder interventions to promote antiretroviral adherence. <i>AIDS and Behavior</i> , 15(8), 1596.		Patient-level moderators of the efficacy of peer support and pager reminder interventions
Bardosh, K. L., Murray, M., Khaemba, A. M., Smillie, K., & Lester, R. (2017). Operationalizing mHealth to improve patient care: a qualitative implementation science evaluation of the WelTel texting intervention in Canada and Kenya. <i>Globalization and Health</i> , 13(1), 87.	ISI web of knowledge	A comparative qualitative case study design
Ippoliti, N. B., & L'Engle, K. (2017). Meet us on the phone: mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries. <i>Reproductive Health</i> , 14(1), 11.		No measurement for retention/adherence.
Evans, C., Turner, K., Suggs, L. S., Occa, A., Juma, A., & Blake, H. (2016). Developing a mHealth intervention to promote uptake of HIV testing among African communities in the UK: a qualitative study. <i>BMC Public Health</i> , 16(1), 656.		A qualitative study
Higgs, E. S., Goldberg, A. B., Labrique, A. B., Cook, S. H., Schmid, C., Cole, C. F., & Obregon, R. A. (2014). Understanding the role of mHealth and other media interventions for behavior change to enhance child survival and development in low-and middle-income countries: an evidence review. <i>Journal of Health Communication</i> , 19(sup1), 164-189.		mHealth intervention for behavior change - No measurement for retention/adherence.
Mbuagbaw, L., Ongolo-Zogo, P., & Thabane, L. (2013). Investigating community ownership of a text message programme to improve adherence to antiretroviral therapy and provider-client communication: a mixed methods research protocol. <i>BMJ Open</i> , 3(6), e002816.		Investigating community ownership of a text message programme
Bond, N.G. (2015). Understanding the Emergence of HIV-2 Group F, a Novel, Pathogenic HIV-2 Indigenous to Sierra Leone (Doctoral dissertation, Tulane University, School of Public Health and Tropical Medicine).	Proquest Dissertations & Theses	Conducted an HIV survey. No measurement for retention/adherence.
Aiyedun, A. (2014). Predictors of high levels of knowledge of the HIV window period among diverse men: An online study that includes evaluation of an avatar video intended as e-health on the HIV window period (Doctoral dissertation, Teachers College, Columbia University).		Design and evaluation of e-health using avatar videos designed to serve as a brief online intervention

Author(s), title, journal/publisher and publication year	Source	Justification for Exclusion
Braga, C. M. T. (2012). "Death is destiny": Sovereign decisions and the lived experience of HIV/AIDS and biomedical treatment in central Mozambique. State University of New York at Buffalo.		Ethnographic field research
Fazen, L. E. (2015). Mobile Clinical Decision Support for the Quality Improvement of Maternal, Neonatal and Child Health Services Delivered by Community Health Workers in Kosirai, Kenya. Yale University.		No measurement for retention/adherence.
Golin, C. E., Knight, K., Carda-Auten, J., Gould, M., Groves, J., White, B. L., ... & Mugavaro, M. J. (2016). Individuals motivated to participate in adherence, care and treatment (imPACT): development of a multi-component intervention to help HIV-infected recently incarcerated individuals link and adhere to HIV care. <i>BMC Public Health</i> , 16(1), 935.	WHO Global Health Library	Study in US state prison systems.
Schwartz, S. R., Clouse, K., Yende, N., Van Rie, A., Bassett, J., Ratshefola, M., & Pettifor, A. (2015). Acceptability and feasibility of a mobile phone-based case management intervention to retain mothers and infants from an option B+ program in postpartum HIV care. <i>Maternal and Child Health Journal</i> , 19(9), 2029-2037.		Already included from Medline/PubMed
Peterson, J., Cota, M., Gray, H., Bazerman, L., Kuo, I., Kurth, A., & Beckwith, C. (2015). Technology use in linking criminal justice reentrants to HIV care in the community: a qualitative formative research study. <i>Journal of Health Communication</i> , 20(3), 245-251.		Qualitative as well as study in Washington
John-Stewart, G. (2018). eHealth and Prevention of Mother-to-Child Transmission of HIV. <i>Current HIV/AIDS Reports</i> , 1-8.		Describe areas in prevention of mother-to-child transmission of HIV (PMTCT)
Elul, B., Lamb, M. R., Lahuerta, M., Abacassamo, F., Ahoua, L., Kujawski, S. A., ... & Jani, I. (2017). A combination intervention strategy to improve linkage to and retention in HIV care following diagnosis in Mozambique: A cluster-randomized study. <i>PLoS Medicine</i> , 14(11), e1002433.		Already included from Medline/PubMed
McNairy, M. L., Lamb, M. R., Gachuhi, A. B., Nuwagaba-Biribonwoha, H., Burke, S., Mazibuko, S., ... & El-Sadr, W. M. (2017). Effectiveness of a combination strategy for linkage and retention in adult HIV care in Swaziland: The Link4Health cluster randomized trial. <i>PLoS Medicine</i> , 14(11), e1002420.		Already included from Medline/PubMed
Belzer, M. E., Kolmodin MacDonell, K., Clark, L. F., Huang, J., Olson, J., Kahana, S. Y., ... & Adolescent Medicine Trials Network for HIV/AIDS Interventions. (2015). Acceptability and feasibility of a cell phone support intervention for youth living with HIV with nonadherence to antiretroviral therapy. <i>AIDS Patient Care and STDs</i> , 29(6), 338-345.		Acceptability and Feasibility of a Cell Phone Support Intervention
L'Engle, K. L., Green, K., Succop, S. M., Laar, A., & Wambugu, S. (2015). Scaled-Up mobile phone intervention for HIV care and treatment: Protocol for a facility randomized controlled trial. <i>JMIR Research Protocols</i> , 4(1).		Study protocol
McNairy, M. L., Gachuhi, A. B., Lamb, M. R., Nuwagaba-Biribonwoha, H., Burke, S., Ehrenkranz, P., ... & El-Sadr, W. M. (2015). The Link4Health study to evaluate the		Study protocol

Author(s), title, journal/publisher and publication year	Source	Justification for Exclusion
effectiveness of a combination intervention strategy for linkage to and retention in HIV care in Swaziland: protocol for a cluster randomized trial. <i>Implementation Science</i> , 10(1), 101.		
Smillie, K., Borek, N. V., Kop, M. L. V. D., Lukhwaro, A., Li, N., Karanja, S., ... & Lester, R. T. (2014). Mobile health for early retention in HIV care: a qualitative study in Kenya (WelTel Retain). <i>African Journal of AIDS Research</i> , 13(4), 331-338.		Qualitative study
Finocchiaro-Kessler, S., Gautney, B. J., Khamadi, S., Okoth, V., Goggin, K., Spinler, J. K., ... & Preidis, G. A. (2014). If you text them, they will come: using the HIV infant tracking system to improve early infant diagnosis quality and retention in Kenya. <i>AIDS (London, England)</i> , 28(0 3), S313.		To evaluate the impact of the HIV Infant Tracking System (HITSsystem) for quality improvement of early infant diagnosis (EID) of HIV services
Kurth, A., Kuo, I., Peterson, J., Azikiwe, N., Bazerman, L., Cates, A., & Beckwith, C. G. (2013). Information and communication technology to link criminal justice reentrants to HIV care in the community. <i>AIDS Research and Treatment</i> . 2013(547381), 6		Study from United State
van der Kop, M. L., Ojaka, D. I., Patel, A., Thabane, L., Kinagwi, K., Ekström, A. M., ... & Marra, C. (2013). The effect of weekly short message service communication on patient retention in care in the first year after HIV diagnosis: study protocol for a randomised controlled trial (WelTel Retain). <i>BMJ Open</i> , 3(6), e003155.		Study protocol
Scanlon, M. L., & Vreeman, R. C. (2013). Current strategies for improving access and adherence to antiretroviral therapies in resource-limited settings. <i>HIV/AIDS (Auckland, NZ)</i> , 5, 1.		Reviews the literature to reveal current strategies for improving access and adherence to antiretroviral
Mbuagbaw, L., Thabane, L., Ongolo-Zogo, P., Lester, R. T., Mills, E. J., Smieja, M., ... & Kouanfack, C. (2012). The Cameroon Mobile Phone SMS (CAMPS) trial: a randomized trial of text messaging versus usual care for adherence to antiretroviral therapy. <i>PloS One</i> , 7(12), e46909.		Already included from Medline/PubMed
Mbuagbaw, L., Thabane, L., Ongolo-Zogo, P., Lester, R. T., Mills, E., Volmink, J., ... & Ndongo, J. S. (2011). The Cameroon mobile phone SMS (CAMPS) trial: a protocol for a randomized controlled trial of mobile phone text messaging versus usual care for improving adherence to highly active anti-retroviral therapy. <i>Trials</i> , 12(1), 5.		Study protocol
Lester, R. T., Mills, E. J., Kariri, A., Ritvo, P., Chung, M., Jack, W., ... & Estambale, B. (2009). The HAART cell phone adherence trial (WelTel Kenya1): a randomized controlled trial protocol. <i>Trials</i> , 10(1), 87.		Study protocol
Odeny, T. A., Onono, M., Owuor, K., Helova, A., Wanga, I., Bukusi, E. A., ... & Abuogi, L. L. (2018). Maximizing adherence and retention for women living with HIV and their infants in Kenya (MOTIVATE! study): study protocol for a randomized controlled trial. <i>Trials</i> , 19(1), 77.		Study protocol
Drake, A. L., Unger, J. A., Ronen, K., Matemo, D., Perrier, T., DeRenzi, B., ... & John-Stewart, G. (2017). Evaluation of mHealth strategies to optimize adherence and efficacy of Option B+		Already included from Medline/PubMed

Author(s), title, journal/publisher and publication year	Source	Justification for Exclusion
prevention of mother-to-child HIV transmission: Rationale, design and methods of a 3-armed randomized controlled trial. <i>Contemporary Clinical Trials</i> , 57, 44-50.		
Mavhu, W., Willis, N., Mufuka, J., Mangenah, C., Mvududu, K., Bernays, S., ... & Cowan, F. M. (2017). Evaluating a multi-component, community-based program to improve adherence and retention in care among adolescents living with HIV in Zimbabwe: study protocol for a cluster randomized controlled trial. <i>Trials</i> , 18(1), 478.		Study protocol
Davey, D. J., Nhavoto, J. A., Augusto, O., Ponce, W., Traca, D., Nguimfack, A., & De Sousa, C. P. (2016). SMSaude: evaluating mobile phone text reminders to improve retention in HIV care for patients on antiretroviral therapy in Mozambique. <i>Journal of Acquired Immune Deficiency Syndromes</i> (1999), 73(2), e23.		Already included from Medline/PubMed
Ramdas, N., Meyer, J. C., & Cameron, D. (2015). Factors associated with retention in HIV care at Sediba Hope Medical Centre. <i>Southern African Journal of HIV Medicine</i> , 16(1).		To identify factors conducted to a low Lost to follow-up rate
Joseph, D.D., Nhavoto, J.A., Augusto, O., Ponce, W., Traca, D., Nguimfack, A. and de Sousa Palha, C. (2016). SMSaúde: Evaluating Mobile Phone Text Reminders to Improve Retention in HIV Care for Patients on Antiretroviral Therapy in Mozambique. <i>Journal of Acquired Immune Deficiency Syndromes</i> (1999), 73(2), pp.e23-30.		Already included from Medline/PubMed

Appendix# 4 – Risk of bias assessment for each included study

Author and publication year	Selection bias		Performance bias	Detection bias	Attrition bias	ITT analysis	Reporting bias	Other biases
	Random sequence generation	Allocation concealment						
Bigna et al., 2014	+	+	+	+	+	+	+	+
da Costa et al., 2012	+	+	-	-	+	-	?	+
Davey et al., 2016	+	+	-	-	+	+	-	+
Elul et al., 2017	+	+	-	-	+	+	+	+
Haberer et al., 2016	+	?	-	-	+	+	?	+
Huang et al., 2013	+	+	-	-	+	+	+	+
Kassaye et al., 2016	?	?	-	-	-	?	+	+
Lester et al., 2010	+	+	-	-	+	+	+	+
Linnemayr et al., 2017	+	+	-	+	+	+	+	+
Maduka and Tobin-West 2013	+	+	-	?	+	+	?	+
Mbuagbaw et al., 2012	+	+	+	+	+	+	+	+
McNairy et al., 2017	+	+	-	-	+	+	+	+
Nsagha et al., 2016	+	?	?	-	+	+	?	?
Orrell et al., 2015	+	+	-	-	+	+	+	?
Pop-Eleches et al., 2011	+	+	-	-	+	+	+	+
Ruan et al., 2017	?	?	-	-	+	-	+	+
Sabin et al., 2015	+	+	-	-	+	+	?	+
Shet et al., 2014	+	+	-	+	+	+	+	+
Uzma et al., 2011	+	+	-	-	+	+	+	+
Wang et al., 2010	?	+	-	-	+	+	+	+

+ Low risk of bias
- High risk of bias
? Unclear risk of bias