Informed Health Choices

Use of the Informed Health Choices digital resources for teaching lower secondary school students in Rwanda to think critically about health: protocol for a process evaluation

Mugisha M et al.

Working paper, July 2022

www.informedhealthchoices.org

Colophon

Title Use of the Informed Health Choices digital resources for teaching lower secondary school students in Rwanda to think critically about health: protocol for a process evaluation (Version 3)

Authors Mugisha, Michael
Nyirazinyoye, Laetitia
Oxman, Andrew D.
Simbi, Clarisse Marie Claudine
Chesire, Faith
Ssenyonga, Ronald
Oxman, Matt
Nsangi, Allen
Semakula, Daniel
Dahlgren, Astrid
Kaseje, Margaret
Sewankambo, Nelson K.
Rosenbaum, Sarah
Lewin, Simon

Corresponding authors Michael Mugisha: mmugisha@nursph.org
Andy Oxman: oxman@online.no

Keywords critical thinking, process evaluation, adolescents, treatment claims, health literacy, Rwanda

Citation Mugisha M, Nyirazinyoye L, Oxman AD, Simbi CMC, Chesire F, Ssenyonga R, et al. Use of the Informed Health Choices digital resources for teaching lower secondary school students in Rwanda to think critically about health: protocol for a process evaluation (Version 3). IHC Working Paper. 2022. https://doi.org/10.5281/zenodo.6874985

Date July 2022

Abstract

Background: The Informed Health Choices (IHC) network is a group of researchers aiming to develop the public's critical thinking skills and help them make informed health choices. We started with young people and developed the primary and secondary school resources for teaching critical thinking about health choices. The "*Be Smart about your Health*" secondary school resources are designed for lower secondary students and will be evaluated in randomized trials in three countries: Kenya, Rwanda, and Uganda. This protocol is for a process evaluation that will be conducted alongside the trial in Rwanda. The aim is to assess the implementation process, impacts of the intervention, and factors affecting the impacts and scaling up use of the resources.

Methods: We will follow the UK Medical Research Council's guidance for designing process evaluations of complex interventions alongside randomized trials. We will use quantitative and qualitative methods. We will collect quantitative data to assess lessons taught (dose), students' attendance (reach) and any alterations in how the intervention (adaptation) is delivered in all schools allocated to the intervention arm (n=42). We will explore the intended and unintended effects, and transfer of learning through focus group discussions (FGDs) with students (n=8-10 FGDs), their parents/guardians (n=5 FGDs) and their teachers using key informant interviews (KIIs) (n=8-10 KIIs). We will also explore factors affecting the effective delivery and scaling up of the intervention through interviews with teachers (n=8-10 KIIs), school administrators (n=8-10 KIIs), district authorities (n=5 KII) and policymakers in education (n=5 KIIs). We will collect qualitative data in about 8-10 schools varying by district, school ownership, and school performance. We will analyse quantitative data using descriptive statics and qualitative data using thematic content analysis and framework analysis.

Background

Most of the time when we decide what to do for our health, we face claims suggesting what to believe. In this paper, we define a health claim as a statement or argument suggesting what to do for your health and which can be true or false. Young people are increasingly exposed to both reliable and unreliable health claims from the Internet, social and mass media. For example, a person searching for an appropriate malaria treatment on the Internet is likely to be overwhelmed with information on both effective and ineffective treatments. There is therefore a need to teach young people the skills to assess the reliability of health claims that they encounter [1].

Most health information, education, and communication activities tell young people what to do or not do but rarely focus on how to judge the reliability of that information or other conflicting information. Making decisions based on misleading claims can lead to unnecessary suffering and wasted resources [2, 3]. Making good decisions about health depends on critical thinking – the ability to think clearly and rationally about what to do or what to believe [4]. However, secondary education in Rwanda lacks the capacity and resources to teach critical thinking about health to the young people [5]. Teaching young people to think critically about health choices could help them cope with overwhelming information from social and mass media.

To respond to this need, the Informed Health Choices (IHC) network is developing and evaluating resources to enable young people think critically about health claims in primary and secondary schools [6–8]. We started with primary school resources and later focused on the development of secondary school resources. We have explored the need and context of teaching critical thinking about health in secondary schools in East Africa [5, 9]. We have worked closely with teachers, students, curriculum specialists, government officials in education and health, and other stakeholders to develop digital secondary school resources, using human centred design [10, 11]. We are focusing on digital resources because the cost of scaling up their use is low compared to printed materials, given that they can be used with available, low-cost technology.

We are evaluating the impact of the resources on critical thinking in randomized trials in Rwanda, Kenya, and Uganda. We will conduct process evaluations [12, 13] alongside the

trials to explore why the "*Be smart about your Health*" secondary school resources had or did not have an effect on students' ability to think critically about health choices. Process evaluations help to explore other process factors of the intervention beyond the outcome measure [13].

A process evaluation alongside the Rwandan trial is important for several reasons. First, the *"Be Smart about your Health"* intervention will be implemented in multiple schools with different resources, students' and teachers' reception. In addition, the school environments in which the trial will be conducted vary in terms of use of ICT by teachers and students and in leadership support and teaching resources. These factors might affect the implementation, fidelity, and effects of the intervention. Second, teachers who will implement the intervention might have varying skills and interest in teaching critical thinking about health. In addition, the content is new to both teachers and students. Furthermore, the intervention targets behaviour changes among students which may conflict with their own beliefs.

A prior process evaluation of teaching critical thinking about health among primary schools children in Uganda helped to show the barriers to the use and scaling up of learning resources, such as the lack of their integration in the curriculum and the high costs of printing books for students [14]. Previous process evaluations of educational interventions have also helped to explore the fidelity, dose, reach of the intervention and students and teachers' reception of the intervention [15, 16]. Furthermore, these evaluations have helped to explore appropriate modes of intervention delivery and external factors affecting educational interventions in school contexts [17].

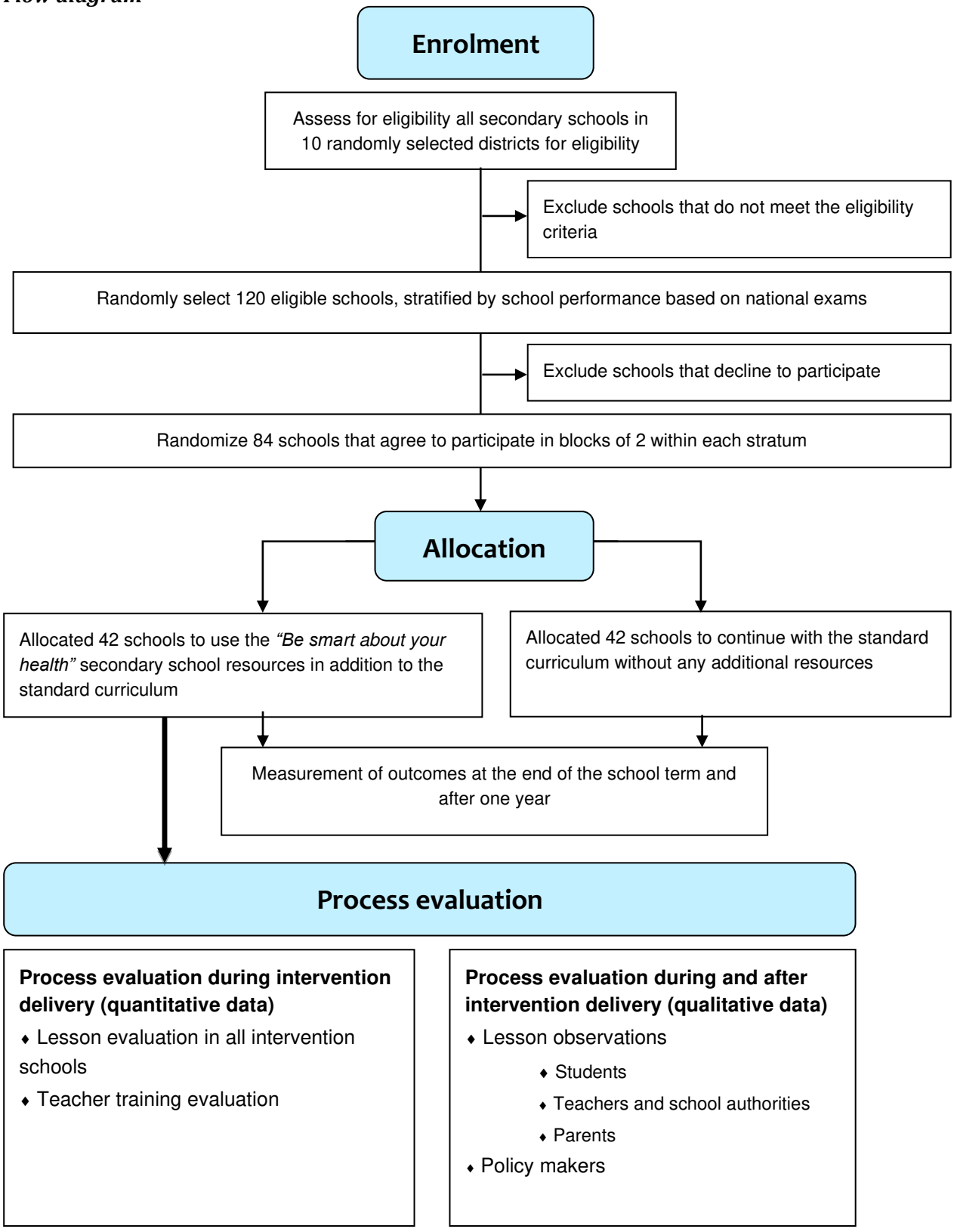
This proposed study aims to explore the implementation process of the *"Be Smart about your Health"* secondary school resources, their impacts, and factors affecting the impact and scaling up use of the resources.

Method

Design

We will conduct the process evaluation alongside a two-arm, pragmatic cluster-randomized trial as illustrated in the flow diagram (Figure 1). We will use both qualitative and quantitative methods. Quantitative methods will include monitoring intervention delivery during the trial. Qualitative methods will include key informant interviews (KIIs), focus group discussions, (FGDs) and observations to explore the process of using the "*Be Smart about your Health"* secondary school resources.

Figure 1. Flow diagram



Research questions

The study will answer the following questions:

- To what extent was the "*Be Smart about your Health"* secondary school resources delivered as intended?
- What are desirable and undesirable effects of using the "*Be Smart about your Health"* secondary school resources among secondary school students and their teachers?
- What factors affect the effective delivery and scaling up use of the "*Be Smart about your Health"* secondary school resources?

Study setting and location

The study will be conducted in lower secondary schools randomly allocated to the intervention arm of a trial to assess the effects of the "*Be Smart about your Health"* secondary school resources in Rwanda (these are described in detail elsewhere [18]). The schools will be recruited from 10 randomly selected districts representing all the five provinces in Rwanda. The districts are responsible for the governing school curriculum delivery, staffing, and resource support. We selected schools with a lower secondary section, which is the first three years of secondary education (S1-S3). Lower secondary schools are expected to have students from 13-15 years-old (official age range). The teachers who teach in lower secondary schools must have completed at least the advanced level (two-year education at the University) or university degree in education. Most secondary schools have computers with Internet access (85.7%) and grid electricity (76.6%). In lower secondary schools, students learn core subjects including science (mathematics, physics, chemistry, biology and health sciences, information and communication technology), languages (English, French, Kinyarwanda, Kiswahili), and humanities (history and citizenship, geography and environment, and entrepreneurship) [19]. The subjects are taught within 41 periods (each period is 40 minutes) in a week and number of periods in a specific lesson depend on the weight of the subject. All subjects cover generic competences of higher order thinking including critical thinking, creativity and innovation, research and problem solving, communication, co-operation, interpersonal relations, life skills and lifelong learning.

Study population

The target populations for this process evaluation will be students in senior two classes, their science teachers, and school administrators from schools in intervention arm of the trial. In addition, we will include parents of students, policy makers, and stakeholders in education.

Recruitment strategy

We will recruit students to participate in the process evaluation through teachers in the intervention arm. In each school, we will contact teachers and school directors who participated in the intervention arm to invite those who will participate in the process evaluation. Through school administration and students in the intervention arm, we will recruit parents to participate in the focus group discussions. We will contact Rwanda Education Board to identify its staff to participate in the process evaluation. We will identify and invite other key policy makers to participate through our national advisory group. The details of the recruitment and sampling are described in detail in table 3.

Content of the intervention, delivery of the intervention, and theory of change

A detailed description of the intervention is provided using the GREET checklist for describing educational interventions (Appendix 1).

The content

Intervention schools: Schools allocated to the intervention will use the "*Be Smart about your Health"* secondary school resources for teaching critical thinking about health. We have developed the intervention iteratively using a human-centred design approach [10]. This entails designing the content and engaging end users to provide input and feedback to come up with a final product that is fit for use in the intended context by the end users. We have worked closely with students, teachers, and curriculum developers in Rwanda, Uganda, and Kenya to develop the resources [20]. The resources cover nine key concepts that people need to understand and apply to critically appraise healthcare choices [21, 22]. Table 1 below shows the 10 lessons with corresponding lesson goals.

Table 1. Outline of ten lessons with corresponding learning goals

No	Lesson titles	Goals By the end of the lesson, students should be able to:
1	Health actions*	• Identify health actions • Explain why it is important to think critically about health actions (why these lessons are important)
2	Health claims	• Identify claims about the effects of health actions
3	Unreliable claims	• Identify claims about the effects of health actions that are only based on personal experiences, how commonly used something is, or how new or expensive something is • Explain why most such claims are unreliable
4	Reliable claims	• Explain why knowledge about the effects of health actions depends on comparisons • Explain why we need researchers to make the comparisons
5	Using what we learned (1)	• Remember what they learned in Lessons 1 to 4 • Use what they learned in these lessons in their daily lives • Recognize limits to what they have learned
6	Randomly created groups	• Explain why groups of people in a comparison should be similar at the start
7	Large-enough groups	• Explain what it means for comparisons between health actions to be large enough.
8	Personal choices	• Identify advantages and disadvantages of health actions, for individuals
9	Community choices	• Identify advantages and disadvantages of health actions, for communities
10	Using what we learned (2)	• Remember what they learned in Lessons 1 to 9 • Use what they learned in these lessons in their daily lives • recognize limits to what they have learned

**In the resources we use the term "health actions" instead of "treatment". A health action is defined as something that someone does to care for their health or the health of others.*

Delivery of the content: The resources include 10 lessons that will be delivered to students in a classroom setting during a single school term of 12 weeks. Each lesson will be delivered during a single 40-minute period. We will contact participating schools in the intervention arm before the start of the school term and invite all teachers to attend a 3-day training workshop. In the workshop, we will describe to the teachers the trial process, roles and expectations from schools and teachers, and provide an overview of the 10 lessons in the teaching resources. In addition, we will explain the process of data collection at the end of the term as well as the consent process.

Control schools: Schools in the control arm will continue with the usual class instruction following the national curriculum without additional training or the resources. The usual

class instruction includes critical thinking in each subject [5]. We will invite heads of school in the control group to a meeting to explain the trial and to ensure that they are prepared to administer the assessment tool (the *Critical Thinking about Health Test*) in their respective schools. At the end of the trial, we will ensure that schools in the control arm receive the "*Be Smart about your Health"* secondary school resources used in the intervention arm.

Theory of change

Our starting point for developing the intervention is that young people are exposed to many claims, some misleading, about health treatments. They therefore need to learn key concepts that may help them to understand and critically appraise claims about treatment effects to make informed choices [21, 22]. In collaboration with teachers and curriculum specialists from East Africa (Kenya, Rwanda, and Uganda), we prioritized key concepts to be taught to secondary school students. We then developed the resources with 10 lessons focusing on these concepts to be delivered in a single term by teachers. We expect that students and teachers will obtain competencies in the lessons and be able to apply them to decision-making scenarios. The outcome of learning the lessons during the intervention will be to improve critical thinking about health choices among students (and teachers). This will consequently help students to think critically and make informed health choices. Figure 2 and Table 2 below describe our logic model for the intervention and corresponding assumptions.

Figure 2. Logic model of the Be Smart about your Health secondary school resources for teaching students to think critically about health

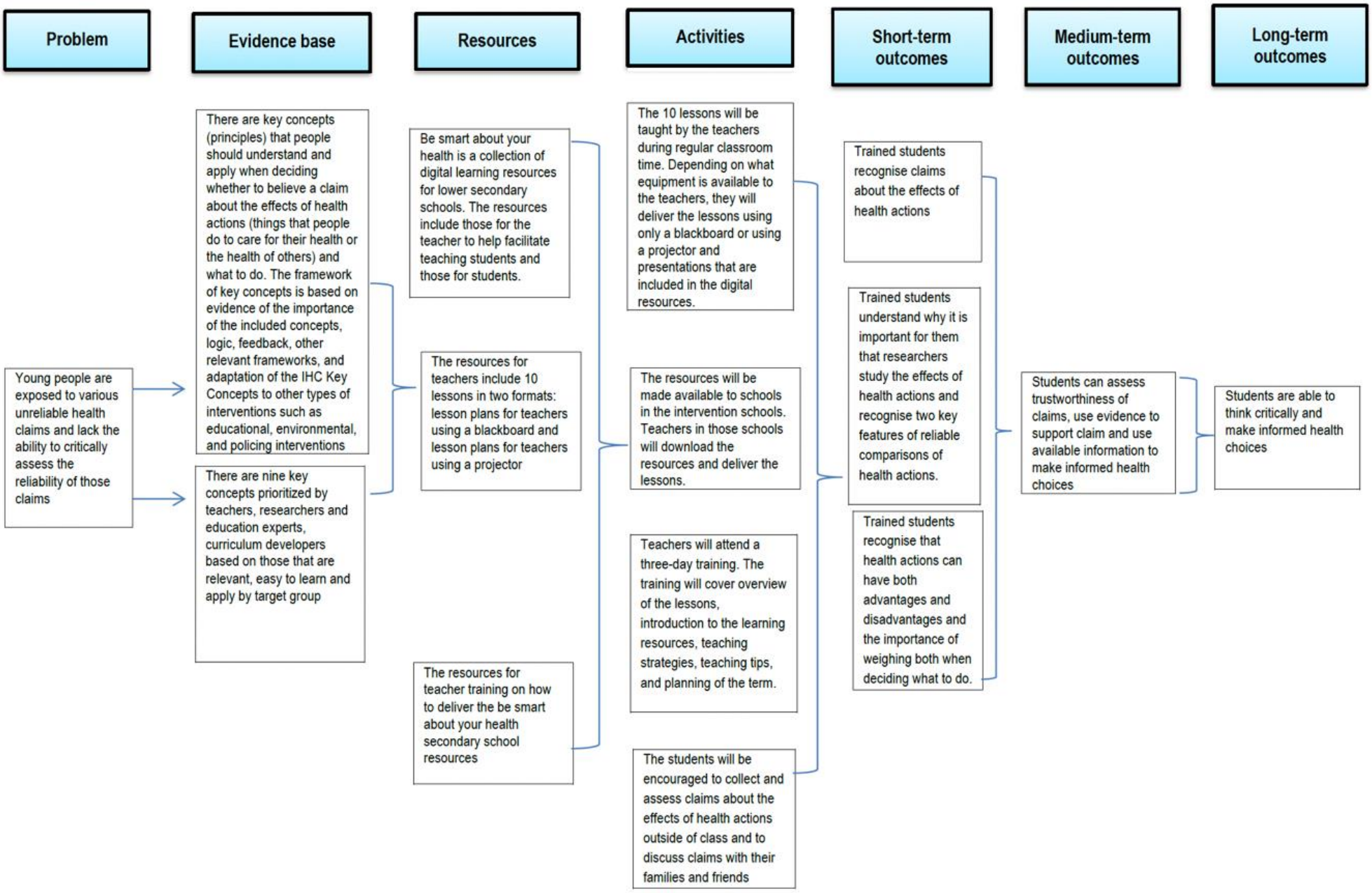


Table 2. Logic model assumptions and external factors affecting the intervention

ASSUMPTIONS	EXTERNAL/CONTEXTUAL FACTORS
1. Lessons developed are useful and fit for the context. 2. Teacher training enables them to deliver the intervention as intended. 3. Teachers can teach lessons with support of the lesson plan. 4. Students participate fully in learning the resources. 5. Schools are willing to dedicate time and resources for learning the content.	1. ICT factors (computers, projectors, internet) and their use for teaching and learning 2. School administration support (avail class, dedicate time, support teacher in lesson delivery) 3. National curriculum and demand for the teaching critical thinking skills 4. Educational leaders at the district and national level support the intervention delivery. 5. Parents and home members discuss the content of the intervention with students.

Data collection process

We will collect data using five methods including structured lesson evaluations by teachers, evaluation of the teacher training workshop by teachers, non-participatory observation, key informant interviews, and focus group discussions. The method, source of data, timing, target population and sample, and links to the data collection tools, are summarized under each objective in Table 3 below.

Table 3: Process evaluation source of data, timing, sample, data collection methods, and process

Objective 1: to explore to what extent the "*Be Smart about your Health"* secondary school resources was delivered as intended.					
Source		**Timing**	**Target population and sample**	**Data collection methods and tool**	**Data Collection process**
School	Lessons taught (dose)	During the intervention delivery	All schools in the interventions arm (n=42)	Lesson evaluation using structured lesson evaluation form (additional file 2).	The teacher will fill the lesson evaluation form after each lesson and submit the form electronically to the central server at the University of Rwanda.
	Students' attendance (reach)	During the intervention delivery	All schools in the interventions arm (n=42)	Lesson evaluation using structured lesson evaluation form (additional file 2).	The teacher will record attendance of each class session and submit the number of students attended each lesson using lesson evaluation form.
	Delivery of the lesson (adaptation)	During the intervention delivery	All schools in the interventions arm (n=42)	Lesson evaluation using structured lesson evaluation form (additional file 2).	The teacher will record any alterations made to the intervention delivery to achieve the lesson objective in the school context using a lesson evaluation form
Teachers	Delivery of the lesson (fidelity)	During the intervention delivery	In 8-10 schools from the intervention arm purposively selected based on varying characteristics (private, public, government aided, high performing and low performing)	Non participatory observation using observation tool (additional file 3).	The PhD fellow together with a research assistant will observe lessons delivery in a class setting and take notes on how the intervention is delivered as intended
	Delivery of the lesson (adaptation factors)	After the intervention delivery	In 8-10 schools from the intervention arm purposively selected based on varying characteristics (private, public, government aided, high performing and low performing)	Key informant interview using Semi-structured interview guide (additional file 4)	The PhD fellow together with a research assistant (one lead the discussion and another taking notes) will conduct interviews with teachers at school

Objective 2: To explore the intended and unintended potential effect of the "*Be Smart about your Health"* secondary school resources among secondary school students.					
Source		**Timing**	**Target population and sample**	**Data collection methods and tool**	**Data Collection process**
Students	Intended and unintended potential effect of the intervention	During and after intervention delivery	About 10 students randomly selected from 8-10 schools in the intervention arm purposively selected based on varying characteristics (private, public, government aided, high performing and low performing)	Focus group discussions using semi-structured interview guide (additional file 5) and non-participatory observation using observation form (additional file 3).	The PhD fellow together with a research assistant will conduct FGD with students at school where the fellow will lead the discussion and the research assistant will take notes and record the discussion. They will observe lessons delivery in a class setting and take notes on any intended effect
Parents	Intended and unintended potential effect of the intervention	After intervention delivery	Five focus group discussions with parents of children selected from schools that participated in intervention arm of the trial	Focus group discussions using semi-structured interview guide (additional file 6)	The PhD fellow together with a research assistant will conduct the discussion with parents where the fellow will lead the discussion and the research assistant will take notes and record the discussion
Teachers	Intended and unintended potential effect of the intervention	After the intervention delivery	In 8-10 schools from the intervention arm purposively selected based on varying characteristics (private, public, government aided, high performing and low performing)	Key informant interview using Semi-structured interview guide (additional file 4)	The PhD fellow together with a research assistant will conduct interviews with teachers at school where the fellow will lead the discussion and the research assistant will take notes and record the discussion

Objective 3: To understand factors affecting the effective delivery and scale up of the "*Be Smart about your Health*" secondary school resources.					
Source		**Timing**	**Target population and sample**	**Data collection methods and tool**	**Data Collection process**
Teachers	Contextual factors	During teacher training	All teacher from the schools in intervention arm who were trained on intervention delivery (n=42)	Training evaluation using structured training evaluation form (additional file 7)	After training of teachers from the intervention arm, we will give them a structured training evaluation form to explore their readiness to deliver the intervention
Teachers	Contextual factors	After the intervention delivery	In 8-10 schools from the intervention arm purposively selected based on varying characteristics (private, public, government aided, high performing and low performing)	Key informant interview using Semi-structured interview guide (additional file 4)	The PhD fellow together with a research assistant will conduct interviews with teachers at school where the fellow will lead the discussion and the research assistant will take notes and record the discussion
Schools	Contextual factors	During the intervention delivery	All schools in the interventions arm	Baseline school characteristics form (additional file 8)	A research assistant at the school will fill electronic structured observation checklist after each lesson
Head teacher/Director of studies	Contextual factors	After the intervention delivery	8-10 head teachers/directors of studies in the intervention schools purposively selected based on varying characteristics (private, public, government aided, high performing and low performing)	Key informant interview using Semi-structured interview guide (additional file 9)	The PhD fellow together with a research assistant will conduct interviews with head teachers/director of studies at school where the fellow will lead the discussion and the research assistant will take notes and record the discussion
Parents	Contextual factors	After intervention delivery	Five focus group discussions with parents of children from schools that participated in intervention arm of the trial	Focus group discussions using semi-structured interview guide (additional file 6)	The PhD fellow together with a research assistant will conduct the discussion with parents where the fellow will lead the discussion and the research assistant will take notes and record the discussion
Policy makers	Contextual factors	After the intervention delivery	Three to five policy makers at the national level purposively selected from key informants from Rwanda Education board	Key informant interview using Semi structured interview guide (additional file 10)	The PhD fellow together with a research assistant will conduct interviews with policy makers at their offices where the fellow will lead the discussion and the research assistant will take notes and record the discussion

Quantitative data collection

Lesson and training evaluation. We will collect quantitative evaluation using data from structured lesson and teacher training evaluation forms. Also, a training evaluation form will be provided digitally to the trained teachers. It will be used to explore the extent to which the training achieved its objective, each teacher's competence, and their readiness to deliver the intervention. During teacher training, we will orient teachers on how to complete and submit the lesson evaluation form. Data will be stored in the central database housed at the School of Public Health, University of Rwanda. The form will be reviewed by the IHC network and be piloted before use in the study.

Qualitative data collection

Non-participatory observation. We will collect data on the actual delivery of the lessons by observing how lessons were taught in at least 10 schools sampled from the intervention arm. We will sample schools varying by school performance and mode of lesson delivery as described in detail in table 3 above. We will sit in on classes during lesson delivery and use a structured observation form (additional file 3) to record how the lesson is taught. In a class, we will note how the teacher delivered the lesson and how students responded. After the end of the lesson, we will reflect on what we noted and summarize key findings from our observations.

Key informant interviews. We will use a semi-structured interview guides (additional files 4, 9 and 10) to conduct key informant interviews. We will sample key informants from various groups including teachers, headteachers, and the policy makers at the national level as summarized in the Table 3 above. We will interview participants at a place of their convenience to ensure privacy and quality recording of discussions. We anticipate that interviews will last no more than an hour to an hour and a half. At least two researchers will conduct each interview. One person will guide the discussion, and another will take notes and record the discussion. Interviews will be audio-recorded, transcribed verbatim, and translated to English if the interview is conducted in Kinyarwanda.

Focus group discussions. We will use focus group discussion guides (additional file 5 and 6) to conduct discussions with students and their parents from the intervention arm. Each focus group discussion for students or parents will be composed of 8-10 participants. We will select participants in a two-stage sampling process. First, we will purposively 10 schools participated in the intervention arm of the trial based on their geographical location, school performance (as determined by National Examination and School Inspection Authority). Second, we will use purposively sample 8-10 students from each sampled school. We will sample students to ensure variation in terms of their performance and sex.

We will purposively sample 8-10 parents of students from sampled schools. We will sample parents who have had at least some discussion with their child about the *"Be smart about your health"* learning resources. We identify these parents by asking students from sampled schools. We will conduct focus group discussions with parents at the school at which their children are studying.

Two people will moderate each focus group discussion: one moderator and one note taker who will also record the discussion. The duration of each focus group discussion will be an hour to an hour and a half. All the discussions will be transcribed verbatim and translated to English.

Data analysis

We will analyse all the data collected under each proposed objective. For the first objective, we will use descriptive statistics to calculate the frequencies, percentages, mean and standard deviation for quantitative data. We will summarize the proportion of lessons taught, the number of students who attended each lesson and the extent to which the lessons were delivered as intended. Then we will analyse all qualitative data from the lesson evaluation, training evaluation, non-participatory observation, key informant interviews, and focus group discussions. We will read notes and inductively code the transcripts. We will derive initial codes from the notes and then summarize themes and subthemes.

In the second objective, we will analyse all qualitative data from observations, key informant interviews and focus group discussions. We will read all notes and transcripts to familiarize ourselves with the data and code all transcripts inductively. We will index all the data using the initial themes and rearrange the data within and across the themes (charting). The final themes will be classified under the categories of intended and unintended effects of the "Be smart about health secondary school resources".

For the third objective, we will analyse data using framework analysis method [23] which involves analysing, classifying and summarizing data in a thematic framework [24, 25]. We will read all notes and transcripts to familiarize ourselves with the data. Then we will analyse the data based on the coding scheme derived from the "Framework for factors that could affect the implementation, impact, and scaling up of the school resources" [14]. We will index all the data using the initial themes and rearrange the data within and across the themes (charting). We will map the themes and make interpretation of the themes to make a summary of findings under objective 3.

At the start, one researcher will code the transcripts and another one will review the codes. Any disagreements will be discussed and agreed upon to determine the final themes.

Trustworthiness of findings

We will ensure the trustworthiness of the findings by analysing data from multiple sources and triangulating the findings. During the analysis and interpretation of data, we will engage more than one member of our team to help ensure credibility. We will make detailed descriptions of results to ensure that they are meaningful to outside readers. We will publish this research protocol and note any deviations from the protocol.

We will assess confidence in the main findings using a version of the Confidence in the Evidence from Reviews of Qualitative research (GRADE-CERQual) approach [26, 27]. GRADE-CERQual, which was developed for qualitative evidence syntheses, will be modified for use in a single primary qualitative study[14, 28]. GRADE-CERQual is a systematic and transparent method for assessing confidence in evidence from reviews of qualitative research through the lens of four components: methodological limitations, data adequacy, coherence and relevance [29]. Although CERQual has been designed for findings emerging from qualitative evidence syntheses, the components of the approach are suitable for assessing findings from a single study with multiple sources of qualitative data. We will modify the components slightly, as follows:

- Methodological limitations: the extent to which there are concerns about the sampling and collection of the data that contributed evidence to an individual finding
- Coherence of the finding: an assessment of how clear and compelling the fit is between the data and the finding that brings together these data
- Adequacy of the data contributing to a finding: an overall determination of the degree of richness and quantity of data supporting a finding
- Relevance: the extent to which the body of evidence supporting a finding is applicable to the context (perspective or population, phenomenon of interest, setting) specified in the study question

Two authors will apply the modified GRADE-CERQual approach to each finding and make a judgement about the overall confidence in the evidence supporting the finding. We will judge confidence as being high, moderate, low, or very low. All findings will start as high confidence and will be downgraded if there are important concerns regarding any of the components described above[30].

Ethical considerations and informed consent

The study will follow regulatory requirements, guidelines, and principles for conducting studies involving human subjects in Rwanda. This protocol received ethics approval as part of the entire project entitled “Development and testing

digital learning resources for informed health choices in Rwanda". The project received approval in 2019 (No. 691/RNEC/2019) and the project received annual renewal of approval in 2020 (No. 1019/RNEC/2020) and 2022 (No. 41/RNEC/2022).

The Head of each participating school will provide written informed consent for the school and for participation of students in the trial and process evaluation. A list of participating students will be attached to the consent form (Additional file 11). Participating teachers, parents and policy makers will provide written informed consent for their participation (Additional file 12), and participating students will sign a written informed assent (Additional file 13).

Funding

The trial is funded by the Research Council of Norway, project number 284683. Michael Mugisha is co-funded by the University of Rwanda's Centre of Excellence of Biomedical Engineering and E-health (UR-CEBE).

Stakeholder engagement

We have engaged key stakeholders in developing the intervention and throughout this project[11]. We will engage education authorities in recruiting study participants. We will seek feedback on this protocol from the Rwanda Basic Education Board, members of our National Advisory Group. Before publishing the process evaluation results, we will discuss the findings and their interpretation with those stakeholders.

Competing interests

All authors declare that there is no competing interest.

Availability of data

All de-identified data will be made available in a public repository with an identifiable URL.

Contributions to the protocol

Conceptualization, MM, NL, FC, SR, OM, NA, SD, MK, SN, SER, AO and LS; Methodology, MM, NL, SCMC, FC, SR, OM, NA, SD, AA, MK, SKN, SER, AO and LS; Writing—original draft, MM; Writing—review & editing, All authors.

References

1. Sandoval WA, Sodian B, Koerber S, Wong J. Developing children's early competencies to engage with science. Educ Psychol. 2014;49:139–52. doi:10.1080/00461520.2014.917589

2. Frass M, Strassl RP, Friehs H, Müllner M, Kundi M, Kaye AD. Use and acceptance of complementary and alternative medicine among the general population and medical personnel: a systematic review. Ochsner J. 2012;12:45–56. https://www.ncbi.nlm.nih.gov/pmc/articles/pmc3307506/

3. Ernst E. Prevalence of use of complementary/alternative medicine: A systematic review. Bull World Health Organ. 2000;78:252–7. https://www.ncbi.nlm.nih.gov/pmc/articles/pmc2560678/

4. Sharples JM, Oxman AD, Mahtani KR, Chalmers I, Oliver S, Collins K, et al. Critical thinking in healthcare and education. BMJ. 2017;357:1–3. doi:10.1136/bmj.j2234

5. Mugisha M, Uwitonze AM, Chesire F, Senyonga R, Oxman M, Nsangi A, et al. Teaching critical thinking about health using digital technology in lower secondary schools in Rwanda: a qualitative context analysis. PLoS One. 2021;16 3. doi:10.1371/journal.pone.0248773

6. Nsangi A, Semakula D, Rosenbaum SE, Oxman AD, Oxman M, Morelli A, et al. Development of the informed health choices resources in four countries to teach primary school children to assess claims about treatment effects: a qualitative study employing a user-centred approach. Pilot Feasibility Stud. 2020;6. doi:10.1186/s40814-020-00565-6

7. Nsangi A, Semakula D, Oxman AD, Austvoll-Dahlgren A, Oxman M, Rosenbaum S, et al. Effects of the Informed Health Choices primary school intervention on the ability of children in Uganda to assess the reliability of claims about treatment effects: a cluster-randomised controlled trial. Lancet. 2017;390:374–88. doi:10.1016/s0140-6736(17)31226-6

8. Informed Health Choices Group. IHC around the world. Informed Health Choices Newsletter, March 2022, 9-26. doi:10.5281/zenodo.6505129

9. Ssenyonga R, Sewankambo NK, Mugagga SK, Nakyejwe E, Chesire F, Mugisha M, et al. Learning to think critically about health using digital technology in Ugandan lower secondary schools: A contextual analysis. PLoS One. 2022;17:e0260367. doi:10.1371/journal.pone.0260367

10. Rosenbaum S, Oxman M, Oxman A, Chelagat F, Mugisha M, Ssenyonga R, et al. Human-centred design development of Informed Health Choices (IHC) learning resources for secondary school students: protocol. IHC Working Paper. 2019. doi:10.5281/zenodo.4748445

11. Nsangi A, Oxman AD, Oxman M, Rosenbaum SE, Semakula D, Ssenyonga R, et al. Protocol for assessing stakeholder engagement in the development and evaluation of the Informed Health Choices resources teaching secondary school students to think critically about health claims and choices. PLoS One. 2020;15:e0239985. doi:10.1371/journal.pone.0239985

12. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process evaluation of complex interventions: Medical Research Council guidance. BMJ. 2015; 350:h1258. doi:10.1136/bmj.h1258

13. Oakley A, Strange V, Bonell C, Allen E, Stephenson J. Process evaluation in randomised controlled trials of complex interventions. BMJ. 2006;332:413–6. doi:10.1136/bmj.332.7538.413

14. Nsangi A, Semakula D, Glenton C, Lewin S, Oxman AD, Oxman M, et al. Informed health choices intervention to teach primary school children in low-income countries to assess claims about treatment effects: process evaluation. BMJ Open. 2019;9:e030787. doi:10.1136/bmjopen-2019-030787

15. Visser MJ. Life skills training as HIV/AIDS preventive strategy in secondary schools: Evaluation of a large-scale implementation process. Sahara J. 2005;2:203–16. doi:10.1080/17290376.2005.9724843

16. Brinker TJ, Buslaff F, Suhre JL, Silchmüller MP, Divizieva E, Wilhelm J, et al. Process evaluation of a medical student-delivered smoking prevention program for secondary schools: protocol for the education against tobacco cluster randomized trial. JMIR Res Protoc. 2019;8(4):e13508. doi:10.2196/13508

17. Power R, Langhaug LF, Nyamurera T, Wilson D, Bassett MT, Cowan FM. Developing complex interventions for rigorous evaluation - a case study from rural Zimbabwe. Health Educ Res. 2004;19(5):570–5. doi:10.1093/her/cyg073

18. Mugisha M, Nyirazinyoye L, Simbi CMC, Chesire F, Ssenyonga R, Oxman M, et al. Effects of using the Informed Health Choices digital secondary school resources on the ability of Rwandan students to think critically about health: protocol for a cluster-randomised trial. 2022. doi:10.5281/zenodo.6562788

19. Ministry of Education (Rwanda), Rwanda Education Board. Competency Based Curriculum. 2015.

20. Nsangi A, Oxman AD, Oxman M, Rosenbaum SE, Semakula D, Ssenyonga R, et al. Protocol for assessing stakeholder engagement in the development and evaluation of the Informed Health Choices resources teaching secondary school students to think critically about health claims and choices. PLoS One. 2020;15(10):e0239985. doi:10.1371/journal.pone.0239985

21. Oxman AD, Chalmers I, Austvoll-Dahlgren A, group IHC. Key Concepts for assessing claims about treatment effects and making well-informed treatment choices. F1000Research. 2018;7. doi:10.12688/f1000research.16771.2

22. Agaba JJ, Chesire F, Mugisha M, Nandi P, Njue J, Nsangi A, et al. Prioritisation of Informed Health Choices (IHC) Key Concepts to be included in lower-secondary school resources: a consensus study. medRxiv. 2022. doi:10.1101/2022.04.11.22273708

23. Ritchie J, Spencer L. Qualitative data analysis for applied policy research. In: Huberman AM, Miles MB, editors. The Qualitative Researcher's Companion. Thousand Oaks, CA: Sage Publications, 2002;305-30.

24. Pope C, Ziebland S, Mays N. Qualitative research in health care: analysing qualitative data. BMJ. 2000;320: (7227):114-6. doi:10.1136/bmj.320.7227.114

25. Green J, Thorogood N. Qualitative Methods for Health Research. London: Sage Publications, 2018.

26. Lewin S, Glenton C, Munthe-Kaas H, Carlsen B, Colvin CJ, Gülmezoglu M, et al. Using qualitative evidence in decision making for health and social interventions: an approach to assess confidence in findings from qualitative evidence syntheses (GRADE-CERQual). PLoS Med. 2015; 12(10):e1001895. doi:10.1371/journal.pmed.1001895

27. Lewin S, Booth A, Glenton C, Munthe-Kaas H, Rashidian A, Wainwright M, et al. Applying GRADE-CERQual to qualitative evidence synthesis findings: introduction to the series. Implement Sci. 2018; 13(Suppl 1):2. doi:10.1186/S13012-017-0688-3

28. Semakula D, Nsangi A, Oxman A, Glenton C, Lewin S, Rosenbaum S, et al. Informed Health Choices media intervention for improving people's ability to critically appraise the trustworthiness of claims about treatment effects: a mixed-methods process evaluation of a randomised trial in Uganda. BMJ Open. 2019; 9(12):e031510. doi:10.1136/bmjopen-2019-031510

29. Lewin S, Bohren M, Rashidian A, Munthe-Kaas H, Glenton C, Colvin CJ, et al. Applying GRADE-CERQual to qualitative evidence synthesis findings—paper 2: how to make an overall CERQual assessment of confidence and create a Summary of Qualitative Findings table. Implement Sci. 2018;13 Suppl 1. doi:10.1186/S13012-017-0689-2

30. Lewin S, Bohren M, Rashidian A, Munthe-Kaas H, Glenton C, Colvin CJ, et al. Applying GRADE-CERQual to qualitative evidence synthesis findings-paper 2: How to make an overall CERQual assessment of confidence and create a Summary of Qualitative Findings table. Implement Sci. 2018; 13(Suppl 1):10. doi:10.1186/s13012-017-0689-2

Additional files

A list of addtional files	
Additional file 1	Greet checklist describing the ‘’Be smart about your health’’ intervention
Additional file 2	Lesson evaluation form to be completed by the teachers after teaching each lesson
Additional file 3	Non-participatory observation form for use in a lesson observation
Additional file 4	Teachers’ interview guide
Additional file 5	Focus group discussion guide for students
Additional file 6	Focus group discussion guide for parents
Additional file 7	Training evaluation form to be completed by teachers after training on the intervention
Additional file 8	Form for collecting school characteristics
Additional file 9	Interview guide for school authorities
Additional file 10	Interview guide for policy makers
Additional file 11	List of students who will participate in the process evaluation
Additional file 12	Consent form for adults
Additional file 13	Assent form for children