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Use of the informed health choices educational intervention to improve secondary students' ability to think critically about health interventions in Uganda: A cluster-randomized trial

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Abstract

Aim:: The aim was to evaluate the effect of the Informed Health Choices (IHC) educational intervention on secondary students' ability to assess health-related claims and make informed choices.

Methods:: In a cluster-randomized trial, we randomized 80 secondary schools (students aged 13–17 years) in Uganda to the intervention or control (usual curriculum). The intervention included a 2-day teacher training workshop, 10 lessons accessed online by teachers and delivered in one school term. The lesson plans were developed for classrooms equipped with a blackboard or a blackboard and projector. The lessons addressed nine prioritized concepts. We used two multiple-choice questions for each concept to evaluate the students' ability to assess claims and make informed choices. The primary outcome was the proportion of students with a passing score (≥9 of 18 questions answered correctly).

Results:: Eighty schools consented and were randomly allocated. A total of 2477 students in the 40 intervention schools and 2376 students in the 40 control schools participated in this trial. In the intervention schools, 1364 (55%) of students that completed the test had a passing score compared with 586 (25%) of students in the control schools (adjusted difference 33%, 95% CI 26%–39%).

Conclusions:: The IHC secondary school intervention improved students' ability to think critically and make informed choices. Well-designed digital resources may improve access to educational material, even in schools without computers or other information and communication technology (ICT). This could facilitate scaling-up use of the resources and help to address inequities associated with limited ICT access.

KEYWORDS
critical health literacy, critical thinking, randomized trial, secondary school, teaching and learning resources

1 | INTRODUCTION

Increased access to health information through the Internet and other sources creates opportunities for people to use evidence when making choices. But it also increases the risk of being misled by unreliable information. People need to be able to appraise and use information about the effects of health actions (interventions that might affect our health). People's beliefs in unreliable claims can lead to unnecessary suffering and wasted resources. Conversely, failure to believe and act on reliable claims also can lead to unnecessary suffering and inefficient use of resources.

Health professionals and public health campaigns typically tell people what they should do without empowering them to assess the basis for those recommendations. But mistrust of researchers, research, and health professionals is common.[1–3] Moreover, experts frequently disagree, and their opinions often are not based on reliable evidence.[4] Consideration of who makes a claim is not a reliable basis for assessing the trustworthiness of the claim.[5]

The effect of education on health and decision-making appears to be related to critical thinking.[6] Critical thinking about health actions (and other types of actions) depends on understanding and using principles (concepts) to guide the assessment of claims about health actions and health choices.[7,8]

Teaching critical thinking is widely advocated,[9] and Uganda recently rolled out a lower secondary school competence-based curriculum that includes critical thinking as one of seven generic skills. However, science education in Ugandan schools has tended toward rote learning and teaching to pass the exam rather than critical thinking.[10] Exam scores determine which schools a student attends when moving from lower to upper secondary school and admission to university. Consequently, people are frequently unable to assess the trustworthiness of treatment claims and make informed health choices.[11,12]

Focusing on secondary schools has the potential to improve health decisions taken by teenagers while taking advantage of the time students have for learning compared to adults, who have increased demands on their time. A previous randomized trial of a primary school intervention in Uganda showed that children in grade 5 (13–17 years) can learn and apply key concepts for thinking critically about health claims.[11] In a process evaluation conducted alongside that trial,[13] and in a contextual analysis in secondary schools,[10] students, teachers, and policymakers expressed a need for resources to improve students' ability to think critically about health actions. However, the cost of the printed primary school resources, was a major barrier to scaling up their use.[10] Using digital rather than printed resources could substantially reduce the cost of distribution, provided they can be accessed in schools with limited information and communication technology (ICT).

The aim of this trial was to evaluate the effect of using digital IHC educational resources on the ability of lower secondary school students to assess the reliability of claims about the effects of health actions and to make informed health choices. The teaching resources were developed in the neighboring countries of Kenya, Rwanda, and Uganda,[14] and their use was evaluated in parallel trials in those countries.

2 | METHODS

2.1 | Study design

For this cluster-randomized trial in Uganda, we randomly allocated a representative sample of schools to the intervention or control (the usual curriculum). We obtained ethics approval from the School of Medicine's Research Ethics Committee at Makerere University College of Health Sciences and the Uganda National Council of Science and Technology. We also obtained permission from the Ministry of Education and Sports, and all six district education offices. We obtained consent from all participating schools (head teachers and teachers). A protocol for this trial was published prior to recruiting participants.[15]

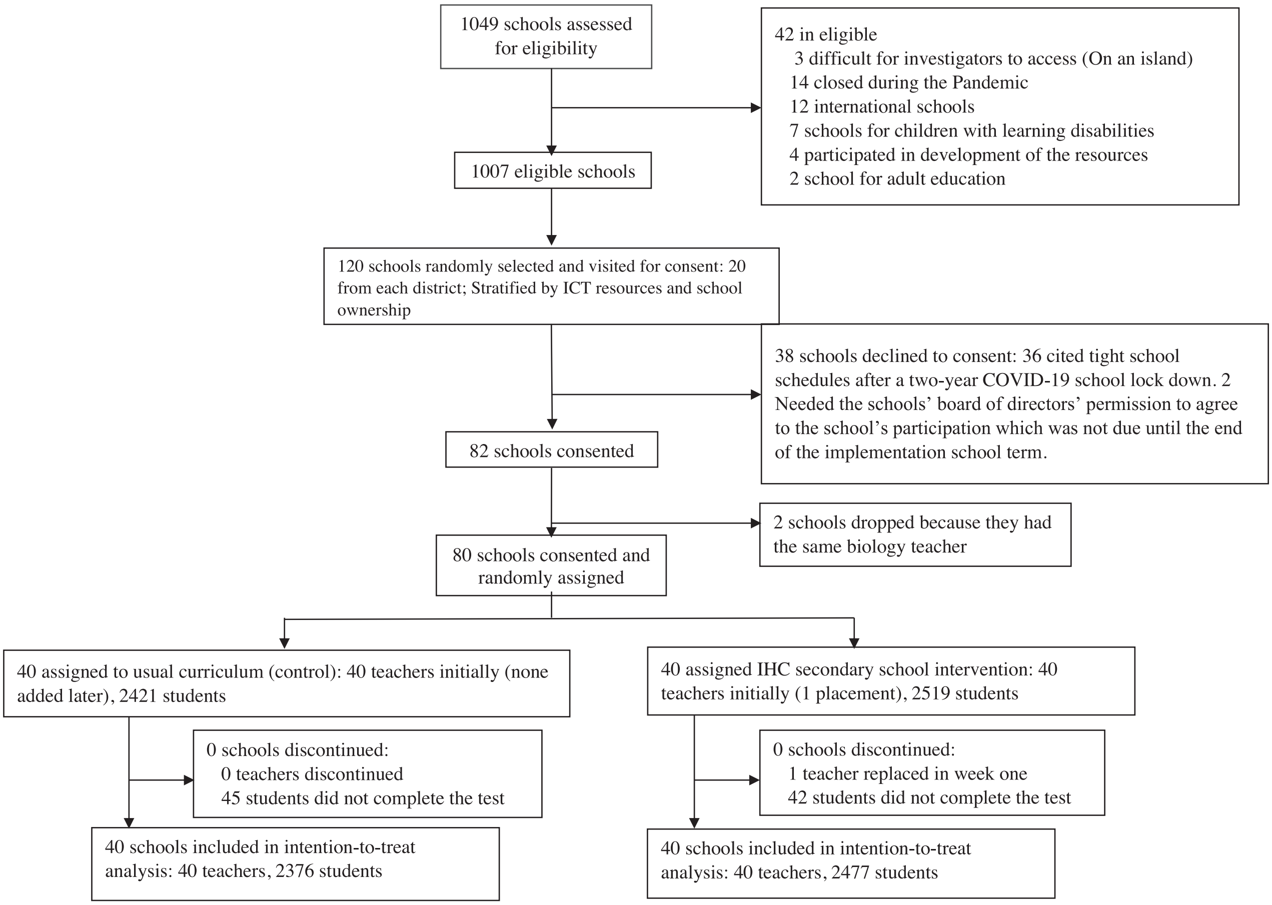

FIGURE 1 Flow diagram.

2.2 | Data sources and inclusion criteria

We conducted the trial in six administrative districts randomly selected from the 24 districts in the central region of Uganda. We obtained an introductory letter from the Permanent Secretary at the Ministry of Education introducing us to the district education officers. We reviewed the list of schools with the district education officers to remove ineligible schools (Figure 1).

2.3 | Participant characteristics

A randomly selected class of year 2 students. The head teachers at the participating schools identified a year 2 biology teacher for those classes. We did not obtain assent from students or consent from their parents.

2.4 | Random allocation and masking

A statistician who was not a member of the research team randomly allocated schools to the intervention or control group. He used Sealed Envelope[16] to generate a block stratified random sequence with block sizes of four and eight and equal allocation ratios within each block. The stratification ensured a fair distribution of schools on two variables: school ownership (public vs. private) and ICT resources (blackboard only vs. blackboard and a projector). No alterations were made to the list during or after the randomization process.

The teachers knew whether they were in the intervention or control group. We did not share the Critical Thinking about Heath (CTH) test, which was used to measure outcomes with the teachers before the end of the school term during which the intervention was delivered. We generated unique identifiers for all the students at the beginning of the trial and used them when the CTH test was administered. The registration form included the name of student so that the test scores could be shared with the teachers and students. The unique IDs were used to deidentify the data. The statistician that conducted the analysis was initially blinded to treatment allocation, but the groups became obvious due to the magnitude of the effect.

2.5 | Intervention characteristics

Together with teachers and curriculum developers in Uganda, Rwanda, and Kenya, we prioritized nine key concepts that people need to understand and apply when assessing claims about health actions and deciding what to do.[17] We used human-centered design to develop the educational resources for those concepts,[14] which are available online.[18] They include dual versions of 10 lesson plans: one version for classrooms without a projector and one for classrooms with a projector. The projector version included slides for the lessons. The resources also included a teachers' guide, background information, an overview of each lesson, and extra resources for the teachers, including the teacher training materials used at a 2-day workshop. A description of the intervention using the guideline for reporting evidence-based practice educational interventions and teaching (GREET) checklist can be found in Supplementary material.

We informed the participating head teachers of their allocation and invited the selected year 2 biology teachers allocated to the intervention to the teacher training workshop. Before the workshop the teachers received the link to the educational resources and asked not to share the link with others. Thirty-six of the 40 biology teachers attended the workshop. Four were unable to attend because of illness or a tight schedule preparing for the beginning of school term. The teacher training was like training offered by the curriculum office when new educational material is introduced. Teachers from the pilot study and a workshop to train the trainers delivered the workshop. Teachers that participated in the teacher training workshop trained their colleagues that had not attended the workshop.

The teachers in the control group were invited to a half-day workshop where we provided general information about the trial and plans for administering the CTH test. They were told that we would give them access to the intervention if found effective.

There are three terms per school year in Ugandan secondary schools, each lasting between 12 and 14 weeks. A teaching session referred to as a period lasts 40 min. We designed the lessons to be taught in 10 weeks, one period per week, and a double period (80 min) to complete the CTH test at the end of the term. The teachers mostly used time (40 min per day per school week) allocated to students' independent research to deliver the IHC lessons.

The teachers decided how to compensate for missed IHC lessons and this varied from school to school. The missed lessons arose on days when the teacher called in sick or when students were involved in other school activities at the time of the IHC lesson. Some teachers delivered catch-up lessons after formal school hours (evenings or early morning). Others used time that became available due to timetable rescheduling. In addition to the introductory workshop for the teachers in the intervention group, we also encouraged teachers to prepare before each lesson and plan on an average of 30 min for lesson preparation, based on the experience of teachers who pilot tested the resources.[14]

We monitored delivery of the intervention in accordance with guidelines of the Ministry of Education and Sports. These allow for follow-up of newly introduced programs within schools. In addition to the principal investigator (RS) and research assistants, six officials from the Ministry of Education and Sports, district offices, and the curriculum office each observed a lesson in the intervention schools. The observers did not provide feedback or advice to the teachers.

To improve retention of schools during follow up, we created two WhatsApp groups: one for teachers in the intervention group and the other for teachers in the control group. In both groups, the interactions focused on general school activities. For example, coverage of the national biology curriculum in the current school term; teaching strategies used in delivering biology lessons; and challenges faced in implementing the new lower secondary school curriculum. We also made individual phone calls to teachers who were not responsive in the WhatsApp groups in both trial arms checking on the coverage of the national biology curriculum.

Students completed the CTH test in their classrooms at the end of the second term. Research assistants administered and invigilated the test, and collected the tests immediately after they were completed. All the participating teachers completed the test on the same date as their students. After teachers submitted their own answer sheets, the teachers and research assistants reviewed the answer sheets to ensure that students had marked their answers appropriately and answered all the questions. Students were given a few extra minutes (3–5 min) to make changes in a few cases where they had not completed the answer sheets appropriately. For choices where the student had shaded more than one response, the teacher or research assistant asked the student to cross out what they did not intend to choose, and we edited these responses when the answer sheets were scanned and the data were cleaned. We used Zipgrade an optical scanner software for grading paper multiple choice assessments to scan and score the answer sheets.[19] We gave the teachers the results for their class within three weeks of administering the test.

2.6 | Outcomes

The CTH test (Supplementary material) was used to measure the students' ability to apply the nine key concepts addressed by the intervention. The test includes two multiple-choice questions (MCQs) for each of the concepts with three response options for each question. The primary outcome was the proportion of students with a passing score (≥9 out of 18 questions answered correctly). The criterion for passing was determined by an independent group of judges.[20] Secondary outcomes included the proportion of teachers with a passing score, the proportions of students and teachers with mastery score (≥14 out of 18), mean scores for students and teachers, the proportions of students that answered both questions correctly for each of the nine concepts, and measures of students' intended behaviors and self-efficacy. We will repeat these measurements after 1 year to assess retention of what was learned. Additional outcomes that we will measure after 1 year include self-reported behaviors, potential adverse effects, and overall academic performance in the O-level compulsory subjects, biology, chemistry, physics, mathematics, English, history & political education, and geography. We are exploring how students used what they learnt in their daily lives and potential adverse effects of the intervention in a process evaluation.[21]

We developed the CTH test using questions from the Claim Evaluation Tools item bank.[22] The item bank was developed based on extensive qualitative and quantitative feedback from methodological experts, health professionals, teachers, and members of the public. To ensure the applicability and acceptability of the questions, we conducted cognitive interviews with students, adults, and people with methodological expertise in Kenya, Rwanda, and Uganda. Based on the interviews, we made minor revisions to some of the questions and selected three MCQs for each concept. We validated the test using Rasch analysis.[22]

We asked teachers to report unexpected negative consequences of the intervention to RS or to the School of Medicine, Research Ethics Committee at Makerere University College of Health Sciences. Teachers were encouraged to record these in a notebook or share them via a web link that we made available at the workshop and subsequently in the WhatsApp groups.

2.7 | Statistical analysis

We powered this trial for the primary outcome using the University of Aberdeen Health Services Research Unit's Cluster Sample Size Calculator[23] and the following assumptions: 75 students per cluster (one class in each school), a 20% difference in proportions between intervention and control schools, a type I error probability of 1%, 90% power, an intraclass correlation coefficient (ICC) of 0·19,[11] and loss to follow-up of up to 10% (i.e., schools where it might be impossible to administer the CTH test). Based on these assumptions, we calculated a sample size of 80 schools (40 in each arm).

We estimated odds ratios and differences in means for binomial and continuous outcomes, respectively. Odds ratios were estimated using mixed effects logistic regression or exact logistic regression if outcomes were nearly or completely determined due to sparse outcomes. Differences in means were estimated using mixed effects linear regression. For outcomes measured at the level of students, we accounted for the cluster-randomized design using random intercepts at the level of school (the unit of randomization). Except where noted, all analyses were adjusted for the variables used in the stratified randomization (public vs. private schools, and schools that had a projector vs. those that did not). To aid interpretation, we reexpressed odds ratios as adjusted differences, accounting for uncertainty of the control odds as well as the odds ratios. Missing test answers were counted as wrong answers. We followed the intention-to-treat principle throughout: all students and teachers who completed the test were included and analyzed in the group to which they were randomized. We report 95% confidence intervals and two-sided p values, where appropriate, throughout. Upper confidence interval limits on exact estimates of odds ratios greater than 1000 are reported as infinitely large. All statistical analyses were performed using Stata 16 (Stata Corp LLC, College Station, Texas, USA).

We performed sensitivity analyses to explore the risk of bias due to missing outcome data for students. We computed Manski type[24] and Lee bounds[25] for the primary outcome and the mean scores, respectively. These estimates provide sharp bounds on intervention effects under conditions in which missing outcomes maximally favor or disfavor the intervention.

We also estimated the effect of the intervention on students' ability to correctly answer each of the nine concepts and assessed whether the students in the intervention schools liked the lessons and how easy and helpful they found them (Supplementary Methods).

The trial protocol was registered with the Pan African Clinical Trial Registry (number PACTR202204861458660) prior to recruiting participants.

2.8 | Role of the funding source

The funder had no role in study design, data collection, data analysis, data interpretation, or writing of the report. RS as the principal investigator had full access to all the data in the study and had final responsibility for the decision to submit for publication.

3 | RESULTS

3.1 | The characteristic of included schools

We assessed a total of 1049 lower secondary schools for eligibility between February 24, 2022 and April 22, 2022. We found 1007 schools to be eligible, and we randomly sampled 20 schools from each district stratified by ICT resources and school ownership. The 120 schools were approached to obtain consent form their head teachers. Eighty-two schools consented to participate in the trial. On reaching out to the proposed teachers for consent, the researchers found that two schools had identified the same biology teacher for participation. We excluded both of those schools. The remaining 80 schools were randomly assigned to either the intervention (n = 40) or control group (n = 40). The flow of the schools, teachers, and students through the trial is shown in Figure 1.

There were 19 (47.5%) public schools in both the control and intervention groups and similar numbers of schools in each of the six districts (Table 1). Performance on the 2021 national exam also was similar between the control and intervention groups.

The teachers in the in the control and intervention groups were similar with respect to training and experience. In both groups, most of the teachers were men, but there were more female teachers in the intervention group than in the control group. All teachers in both groups completed the CTH test at the end of the school term.

Of the 4940 students enrolled at the start of the school term, 4853 (98.2%) completed the CTH test. A similar proportion of students completed the CTH test in the control (98.1%) and intervention (97.1%) groups. The median class size, proportion of female students, and average age were similar in the control and intervention schools.

All but one teacher in the intervention group delivered all 10 lessons to the students. In the school where less than 10 lessons were delivered, the teacher reported that changes in the school schedule made it difficult to complete the 10 lessons and only five lessons were delivered.

TABLE 1 Characteristics of participants.

	Control group *N* (%)	Intervention group *N* (%)
Schools		
Schools (selected from the central region of Uganda)	40	40
District		
Kampala	5 (12.5%)	5 (12.5%)
Kayunga	7 (17.5%)	8 (20.0%)
Luwero	8 (20.0%)	9 (22.5%)
Mpigi	9 (22.5%)	7 (17.5%)
Mukono	6 (15.0%)	4 (10.0%)
Wakiso	5 (12.5%)	7 (17.5%)
Ownership		
Public	19 (47.5%)	19 (47.5%)
Private	21 (52.5%)	21 (52.5%)
Performance of the 2021 national exam		
Low (<50%)	16 (40.0%)	19 (47.5%)
Moderate (50%–69%)	8 (20.0%)	5 (12.5%)
High (70% passed)	16 (40.0%)	16 (40.0%)
Teachers[a]		
Teachers (Identified by head teachers)	40	40
Completed tests	40 (100.0%)	40 (100.0%)
Education		
Certificate	0 (0.0%)	1 (2.5%)
Diploma	9 (22.5%)	13 (32.5%)
Degree	31 (77.5%)	26 (65.0%)
Years of experience: median (IQR)	9 (4 to 18.5)	8 (4.5–16.5)
Sex		
Female	6 (15.0%)	12 (30.0%)
Students		
Students (enrolled in year 2 of secondary at start of the school term)	2421	2519
Completed tests	2376	2477
Completed tests per class: median (IQR)	66 (50–87)	69 (52–87)
Class size: median (IQR)	70 (50–87)	72 (52–87)
Sex		
Female	1345 (56.6%)	1346 (54.3%)
Age in years: mean (SD)	16.0 (1.2)	15.8 (1.0)

[a]Across all schools, head teachers were asked to identify teachers who taught biology.

3.2 | Primary outcomes and sensitivity analyses

In the intervention schools, 55.1% of students achieved passing scores compared to 24.7% in the control schools (adjusted odds ratio 4.9, 95% CI 3.4—6.8, $p < 0.0001$). This corresponds to an additional 32.6% (95% CI 26.0—39.2) of students achieving passing scores (Table 2). In the intervention schools, 18.0% of students achieved mastery scores compared to 1.1% in the control scores (adjusted odds ratio 23.9, 95% CI 11.5—49.3, $p < 0.0001$). This corresponds to an additional 16.4% (95% CI 11.4—21.3) of students achieving mastery scores. Mean scores were 52.4% in intervention schools compared to 36.2% in control schools (adjusted mean difference 17.0%, 95% CI 13.5—20.5, $p < 0.0001$). These findings are robust to sensitivity analyses performed to explore risk of bias due to missing outcome data (Supplementary materials). Students in the intervention schools were more likely than students in control schools to answer both questions correctly for all nine key concepts (adjusted differences from 9.5% (95% CI 5.2–13.8) to 26.0% (95% CI 20.0–32.1)) (Figure 2).

3.2.1 | Students' intended behaviors and self-efficacy

Students in the intervention schools were more likely to consider it easy or very easy to assess whether a claim is based on research (adjusted difference 12.4%, 95% CI 8.7—16.2) compared with students in the control schools (Supplementary materials). Compared to students in the control schools, students in the intervention schools were 23.3% (95% CI 18.1—28.3) more likely to consider it easy or very easy to assess the trustworthiness of the results of a research study comparing treatments. There was little difference between students in the intervention and control schools in how easy it was for them to find research studies comparing treatments or to judge whether results of a research study comparing treatments was relevant to them. There was little difference in intended behaviors, including how likely they were to find out what a claim was based on or whether it was based on a research study comparing treatments, and how likely they were to agree to participate in a study comparing treatments.

3.2.2 | Self-reported behaviors

Most of the students in the intervention schools (93.8%) liked the lessons, found them to be easy to understand (68.3%), and thought the lessons were helpful (96.5%).

3.3 | Teacher's scores on the primary outcome

The proportion of teachers with a passing score in the intervention schools (95.0%) was larger than in the control schools (62.5%) (Table 2). The adjusted difference was 32.1% (95% CI 15.7–48.6, $p = 0.0025$).

TABLE 2 Effect of the intervention.

	Control schools (40 schools, 2376 students)	Intervention schools (40 schools, 2477 students	Adjusted difference	Odds ratio	*p* Value	ICC
Primary outcome[a]						
Students with a passing score (≥9/18)[b]	586 (24.7%)	1364 (55.1%)	32.6% (26.0–39.2)	4.8 (3.4–6.8)	<0.0001	0.13
Secondary outcomes[a]						
Students with a mastery score (≥14/18)[b]	26 (1.1%)	446 (18.0%)	16.4% (11.4–21.3)	23.9 (11.5–49.3)	<0.0001	0.28
Mean score for students[c]	36.2% (15.8)	52.4% (22.0)	17.0% (13.5–20.5)		<0.0001	0.16
Teachers[d]						
Teachers with a passing score (≥9/18)[b]	25 (62.5%)	38 (95.0%)	32.1% (15.7–48.6)	11.2 (2.3–53.3)	0.0025	
Teachers with a mastery score (≥14/18)[e]	1 (2.5%)	35 (87.5%)	82.6% (64.3–97.4)	185.4 (24.6–∞)	<0.0001	
Mean score for teachers[c]	50.6% (17.3)	85.7% (17.6)	35.0% (27.4–42.6)		<0.0001	

Note: Data are % (SD), % (95% CI), or *n* (%).
ICC: intraclass correlation coefficient.
[a]The cluster design was accounted for using random intercepts at the level of school.
[b]Logistic regression was used to estimate an adjusted odds ratio, which is reexpressed as an adjusted risk difference.
[c]Linear regression was used to estimate an adjusted difference in means.
[d]Teachers were treated as equivalent to the units of randomization (schools), so these models did not include random intercepts.
[e]Exact logistic regression was used to estimate an odds ratio, accounting for the almost completely determined outcome in the control arm; a very large upper confidence interval bound is presented as being infinitely large. The stratification variables were modeled as fixed effects in all analyses. Wald-type confidence intervals and two-sided normal *p* values were computed in all analyses except for the exact logistic regression, which uses conditional distributions of sufficient statistics.

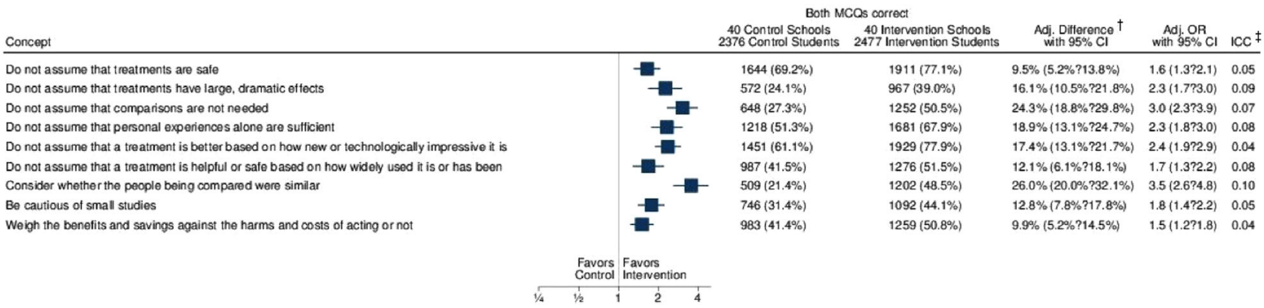

FIGURE 2 Results for each key concept. $p < 0.0001$ for all comparisons. *Number (%) of students answering both MCQs correctly. †Adjusted odds ratios are reexpressed as adjusted risk differences. ‡Intraclass correlation coefficient.

Teachers in the intervention schools were also more likely to have a mastery score (87.5% vs. 2.5%; adjusted difference 82.6%, 95% CI 64.3–97.4, $p < 0.0001$).

4 | DISCUSSION

The IHC secondary school intervention improved students' ability to assess claims about the effects of health interventions, compared to students who did not receive the intervention. This difference was seen across all nine key concepts. The percent of students that achieved a passing score was just over a half in the intervention group, indicating that more work is needed to ensure that all students benefit from the intervention. However, this needs to be interpreted in the context of schools having to fit the IHC secondary school intervention in an already packed school schedule that followed 2 years of school closure due to the COVID-19 pandemic, and a strike by science teachers at the start of the school term.

The educational resources can be accessed with a smartphone and are automatically downloaded. Thus, the intervention is not dependent on schools having computers or other ICT. Use of an iterative human-centered design process in collaboration with curriculum developers, educational policy makers, teachers, and students helped to ensure that the educational resources are well suited for secondary schools in East Africa. The accessibility, low cost, and suitability of these educational resources may facilitate scaling up their use.

The intervention also improved the teachers' ability to think critically about health and enabled them to deliver the lessons. This is consistent with findings of the randomized trial of the IHC primary school intervention in Uganda.[11] It is also consistent with findings from other studies, which indicate that many adults do not understand and apply many key concepts for assessing treatment claims and making informed health choices.[12,26]

A systematic review found that educational interventions with key concepts can improve people's understanding of evidence in evaluating claims about health interventions, but the evidence is limited.[27] The effect of the IHC secondary school intervention in Uganda (an adjusted difference of 32.6%, 95% CI 26.0–39.0) is similar to what was found in the randomized trials of this intervention in Kenya (an adjusted difference of 27.3%, 95% CI 20.0–35.0) and Rwanda (an adjusted difference of 37.2%, 95% CI 29.0–45.0). It is also similar to that of the IHC primary school intervention in Uganda.[11] That intervention utilized printed resources that included a textbook for the children and a teachers' guide.

Strengths of this study include recruitment of a representative sample of schools, which helps to ensure the applicability of the findings, random allocation, and minimal loss to follow-up, which minimize the risk of bias. A limitation of this study is that both the intervention and the outcome measure were developed by our group. We were unable to find another outcome measure suitable for our study.[28] We took several steps to ensure the validity of the outcome measure. We used MCQs from a database of questions that independent research methodologists judged to have face validity.[29] We conducted cognitive interviews to ensure the questions were understandable and acceptable, and we used Rasch analysis, which showed that the questions fit the Rasch model and were reliable.[22,29] The scoring was done by trained research assistants using the Zipgrade,[19] and the cut offs for passing and mastery scores were determined by an independent group of curriculum specialists, teachers, and researchers.[20] Neither the teachers nor the students were shown the test or similar multiple-choice questions before taking the test.

The outcome measure also was treatment inherent. That is, it measured content taught in the intervention group and not in the control group. In education research, treatment-inherent measures are associated with larger effect sizes than treatment independent measures, which measure content taught in both comparison groups.[30] Thus, it may be misleading to compare the effects observed in these trials with treatment independent outcome measures.

A potential limitation of the intervention is that it did not include digital or printed resources that students could access directly. This minimized the cost of the intervention but may limit its effectiveness. We pilot tested a computer-based version of the resources that could be used in schools with computer labs. However, we found that it was difficult to use that version and teachers preferred the projector version.[14]

Retention of what was learned, use of what was learned in daily life, and potential adverse effects remain uncertain. We will assess these outcomes in the 1-year follow-up study and process evaluation.[21]

For young people to make better health choices and participate effectively in health policy debates, their education needs to include critical thinking skills. These skills are essential for patients and citizens as well as for future health professionals and policy makers. We have shown that well-designed education interventions such as the IHC secondary school intervention can effectively teach students to think critically about health claims and choices.

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CONFLICT OF INTEREST STATEMENT

All authors except for CJR participated in both development and evaluation of the intervention.

DATA AVAILABILITY STATEMENT

Deidentified data from this trial and the data dictionary will be available on Zenodo with publication of this report, together with the protocol, informed consent forms, Critical Thinking About Health Test.[15]

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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