Original Research Paper

Teaching medical students to assess genetic risk: evaluation of a multimedia family health history intervention in Vietnam

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Abstract
Background: Family health history (FHH) is the cornerstone of genetic counseling and risk assessment, yet medical curricula often fail to adequately prepare future clinicians to utilize it effectively. This study evaluated the effectiveness of a multimedia educational intervention on medical students' familiarity, knowledge, and attitude regarding FHH. **Methods:** We conducted a quasi-experimental study with three groups within a larger cohort of 116 third-year medical students at a university in Southern Vietnam from January to May 2024. Participants were non-randomly assigned to control (n=39), book-only (n=38), or book-and-video (n=39) groups. Outcomes were assessed using a self-administered questionnaire. To estimate the intervention effects while reducing bias and accounting for baseline differences, the primary analysis used doubly robust difference-in-differences (DR–DID) estimators to compute the average treatment effects on the treated (ATT), with p-values adjusted for multiple comparisons and Hedges' g as the standardized effect size. **Results:** After covariate adjustment, the book-and-video intervention produced a statistically significant improvement in FHH knowledge compared to the control group (DR–DID ATT = 1.60, adjusted p = .005; Hedges' g = 0.80, 95% CI 0.34 to 1.25). The book-only intervention was not statistically significant after adjustment. No significant between-group effects were observed for familiarity or attitude. **Discussion:** A short, theory-based multimedia educational package significantly improved medical students' FHH knowledge. This demonstrates its feasibility as a scalable model for strengthening FHH competence in medical curricula and enhancing the foundational genetic risk assessment skills necessary for effective collaboration with genetic counseling services.

Keywords: Family health history, Generic risk assessment, Education, medical, Multimedia learning; Quasi-experimental study, Vietnam

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BACKGROUND

Family health history (FHH) is a cost-effective, valuable tool for identifying inherited risk and guiding preventive care, yet clinicians and other health professionals frequently lack the knowledge and confidence to utilize it in practice.[1,2] A recent study found that Vietnamese medical students possessed rather low FHH knowledge despite their high willingness to engage.[3] This may leave future clinicians underprepared to use FHH as a primary tool in genetic counseling and patient care in Vietnam.

Internet-based, focused educational interventions, especially those using multimedia, may efficiently improve knowledge without large time investments. Multimedia Learning Theory suggests that learners learn better when verbal and visual channels are integrated.[4] Past evidence suggests potential improvement of awareness, knowledge, attitudes, behaviors and self-efficacy among the health professionals and students after participating in the internet-based multimedia educational interventions.[5–8]

This study's conceptual design is mainly based on two frameworks. The selection of our primary outcomes is guided by the Knowledge-Attitude-Practice (KAP) model, which provides a logical pathway for behavior change in health education.[9] We therefore measured changes in students' knowledge and attitudes as an essential foundation to their future clinical practice.

The design of the educational intervention itself is based on Social Cognitive Theory (SCT).[10] SCT emphasizes that learning is accelerated through observing others; therefore, our video content was designed to provide a relatable case study demonstrating the clinical utility of collecting FHH. According to SCT, this observational learning is a key method for building a learner's confidence and shaping positive attitudes, while the book provides the foundational knowledge necessary for future practice.

Despite a recognized need for FHH education, the existing interventional literature has significant limitations. A recent systematic review found that most FHH interventions lack a theoretical foundation and evaluation design, while also underutilizing modern educational formats, such as web- or computer-based delivery.[11] Even one of the few studies that have compared video to text for FHH education has been limited by a lack of objective assessments and statistical rigor.[6] This research gap is particularly noticeable in Vietnam, where no such interventional study addressing the mentioned limitations has been conducted. Our study therefore aimed to fill this gap by developing and evaluating a theory-based, multimedia FHH intervention using a quasi-experimental design with objective measures and rigorous statistical analysis.

The primary objective of this study is to evaluate the effectiveness of an educational intervention designed to enhance the familiarity with FHH, knowledge of FHH, and attitude toward FHH among third-year medical students at a university in Southern Vietnam.

INTERVENTION

The intervention materials consisted of two primary components: a 24-page digital book and a 7.5-minute animated video. The digital book provided a comprehensive overview of FHH. Key contents included definitions and the role of FHH in risk assessment; a guide to genetic diseases and inheritance patterns; specific instructions on collecting information from three generations; practical steps for overcoming barriers; and detailed guidance on drawing pedigree charts. The book was developed and provided by the Medical Genetics Institute, Ho Chi Minh City.

The animated video, developed by the authors based on the book's content, presented a case-based narrative of a couple with a history of miscarriage seeking genetic counseling. The video modeled the doctor–patient interaction, introduced the concept of FHH and explained its role and importance, and demonstrated the practical steps of collecting information using an online tool, highlighting the clinical utility of FHH for identifying hereditary risks (the video uses thalassemia as an example).

Materials were distributed electronically via university email in late April 2024. The book-and-video group received both the digital book and the video link; the book-only group received the digital book; and the control group received no materials during the study period. Participants were instructed to complete reading the book and/or watching the video at least once.

Engagement was self-directed and recorded as the self-reported number of times each student read or watched the materials. Students in all groups were asked if they self-learnt FHH during the study period at posttest. Participants received reminders and technical support via a local social media platform. A small monetary incentive (local currency equivalent of US$1.15) was provided as a token of appreciation upon completion of the posttest. The control group received the educational book after the study concluded.

METHODS

This study is reported following the TREND statement for nonrandomized evaluations of behavioral and public health interventions.

Ethics statement
This study was approved by the Ethical Review Committee, School of Medicine, Vietnam National University Ho Chi Minh city (approval no. 06/QĐ-IRB-VN01.017). Written informed consents were collected from the students prior to data collection. The authors followed the ethical principles of the Declaration of Helsinki when conducting the study.

Study design
We employed a non-equivalent control group pretest-posttest quasi-experimental design to evaluate two educational packages (book only, book & video) aimed at improving FHH familiarity, knowledge, and attitudes among medical students.

Setting
The study was conducted at a university in Southern Vietnam. Baseline assessments were conducted in person on campus in early January 2024 to maximize participation during the students' final academic gathering. Intervention materials (book and video) were distributed online in late April 2024 upon finalization of the video production, and posttest assessments were completed at participants' clinical placement sites at variable times, on average 10 days after distribution.

Participants
All students enrolled in the third-year medical cohort for the 2023–2024 academic year were eligible to participate. Inclusion criteria were: (1) currently enrolled as a third-year medical student at a university in Southern Vietnam during the study period; (2) aged ≥18 years; (3) provided written informed consent. We invited all eligible students from the cohort; 116 students were informed, consented and completed both baseline and posttest assessments and were therefore included in the analyses. No students were excluded for medical or other reasons.

Third-year students were chosen because they had sufficient foundational medical knowledge to engage with FHH content but had not yet received formal FHH instruction, while first- and second-year students lacked comparable background, and senior students' clinical schedules and potential FHH exposures from their clinical practices made them unsuitable.

Outcome
Primary outcomes were familiarity with FHH, knowledge of FHH, and attitude toward FHH. The outcomes were analyzed as total scores at pretest and posttest. Higher scores indicate greater familiarity, better knowledge, or more positive attitudes.

The outcomes and baseline characteristics were measured using a self-constructed questionnaire. The FHH scales were developed based on the book provided by the MGI HCMC (familiarity and knowledge) and adapted the concept from the previous study by Madhavan et al.[6] (attitude) in the local language (Vietnamese).

The questionnaire consisted of two main parts. Part 1 collected background information including age, sex, GPA, residential area, number of family members, and whether family members worked as medical personnel. Part 2 measured the three primary outcomes. Familiarity was assessed using a 10-item scale (total score 10–30) where participants rated their familiarity with key terminology (e.g., "genetic counseling," "consanguineous marriage") on a 3-point Likert scale (1=I have not heard about, to 3=I am very familiar with this phrase).

Knowledge was evaluated using 10 true/false/do-not-know items assessing factual understanding of FHH definitions, scope, and clinical utility (e.g., distinction from genealogy, information collected for FHH). During the data analysis phase, one item (item 2) was excluded because it was determined to assess a general sociological definition of family rather than the specific clinical application of FHH. This decision to refine the scale's content validity was supported by item analysis, which showed a low item-total correlation ($r = .13$) and a slight improvement in internal consistency upon its removal. The final scale resulted in a total score range of 0–9.

Attitude was measured using a 9-item scale (total score 9–45) assessing perceptions of value, necessity for screening, and willingness to collect or share FHH; responses were on a 5-point Likert scale

(1=Completely disagree to 5=Completely agree). Internal consistency was measured at both time points using Cronbach's α, indicating acceptable to good internal consistency across all measures (Cronbach's α = .63 - .91). To ensure content validity, the scales underwent review by a subject matter expert.

Bias

Selection bias was a major concern in this study since the students were not randomly assigned to the study groups. To mitigate the bias effects, we employed the baseline balance check to determine the difference between the groups and included the baseline characteristics with group difference (age, sex, GPA, residential area, family size, medical family member, and pretest scores) as covariates in the statistical analyses.

Study size

Sample size was calculated using power analysis for two-group independent sample t-test, performed by G*Power software ver. 3.1.9.7 (Heinrich-Heine-Universität, Düsseldorf). The power, significance level and effect size used for calculation were .80, .05 and 0.60 respectively, resulting in 45 students per group or 135 students in total. The effect size, which is a Cohen's d estimated with a pooled standard deviation, was determined by the group sizes, means and standard deviations derived from the pre-post-differences results of a previous study.[8] Because the available cohort consisted of only 116 students, the achieved sample is smaller than planned.

Assignment method

The unit of assignment was the individual student. Participants were assigned non-randomly by sequential roster order (based on the ascending numerical order of the clinical site assignment lists provided by the university) into three groups: control (n = 39), book (n = 38), and book & video (n = 39). Assignment followed the clinical-site roster ordering with the aim of assigning as many students from the same clinical site as possible to the same intervention group; this approach minimized the number of different clinical sites represented within each group and therefore reduced the risk of contamination from day-to-day contact, shared patients, and informal material-sharing across groups.

Blinding (masking)

No participant, deliverer, or outcome assessor blinding was implemented due to the nature of the intervention and remote delivery.

Unit of analysis

The unit of analysis is the individual student. All effect estimates accounted for within-student clustering where appropriate (cluster-robust inference or bootstrap clustered by student).

Statistical methods

Normality of outcome distributions was assessed using the Shapiro–Wilk test. Continuous variables were summarized as means ± standard deviations for parametric data, and medians [interquartile range, IQR] for non-parametric data. Categorical variables were presented as frequencies (percentages). Group differences at baseline were described using standardized differences.

For unadjusted comparisons, within-group changes were analyzed using paired t-tests or Wilcoxon signed-rank tests. Between-group differences in change scores were assessed using Kruskal–Wallis tests, followed by Dunn's post-hoc tests with Holm-Bonferroni adjustment.

The primary analysis, following the intention-to-treat principle, used doubly robust difference-in-differences (DR–DID) estimators to estimate the average treatment effect on the treated (ATT) for pairwise comparisons. This method combines outcome regression with propensity score weighting, ensuring consistent estimates if either the outcome model or the treatment assignment model is correctly specified, thus providing a "double" protection against bias.[12] Standard errors and 95% confidence intervals were estimated using a cluster bootstrap procedure (2,000 replicates). To account for multiple testing, p-values for primary comparisons were adjusted using the Benjamini-Hochberg method. To facilitate interpretation, ATTs were converted to Hedges' g as standardized effect sizes using the pooled pretest standard deviation.

Robustness checks included analysis of covariance (ANCOVA) on posttest scores, two-way fixed-effects models, and permutation tests. Secondary analyses included: (1) exploratory as-treated analysis; (2) outlier sensitivity analysis for the attitude outcome; (3) dose–response analysis using ANCOVA; and (4) item-level analysis for knowledge using linear probability models (LPMs). All analyses were conducted in R version 4.5.1.

Declaration of using Artificial Intelligence Generated Content tools

During the preparation of this work, the authors used ChatGPT (OpenAI) and Gemini (Google) as Artificial Intelligence Generated Content (AIGC) tools to assist with English language editing, improving readability, and troubleshooting R code for statistical analysis. After using these AIGC tools, the authors reviewed and edited the content as needed to ensure the accuracy of the information. The authors take full responsibility for the content of the publication.

RESULTS

Participants

As detailed in Figure 1, the entire cohort of 116 third-year medical students enrolled and completed the intervention (no loss to follow-up), facilitated by peer-led data collection at shared clinical placement sites, with no missing data across primary outcomes. Participants were analyzed as assigned: 39 in the book-and-video group, 38 in the book group, and 39 in the control group. There were no deviations from the study protocol, and no adverse events were reported. Baseline characteristics are summarized in Table 1. Standardized differences ranged approximately 0.15–0.30, indicating small imbalances of baseline demographic characteristics and pretest outcome scores between groups. These baseline differences were accounted for in the primary analysis using DR–DID estimation.

Figure 1: Participant flow diagram

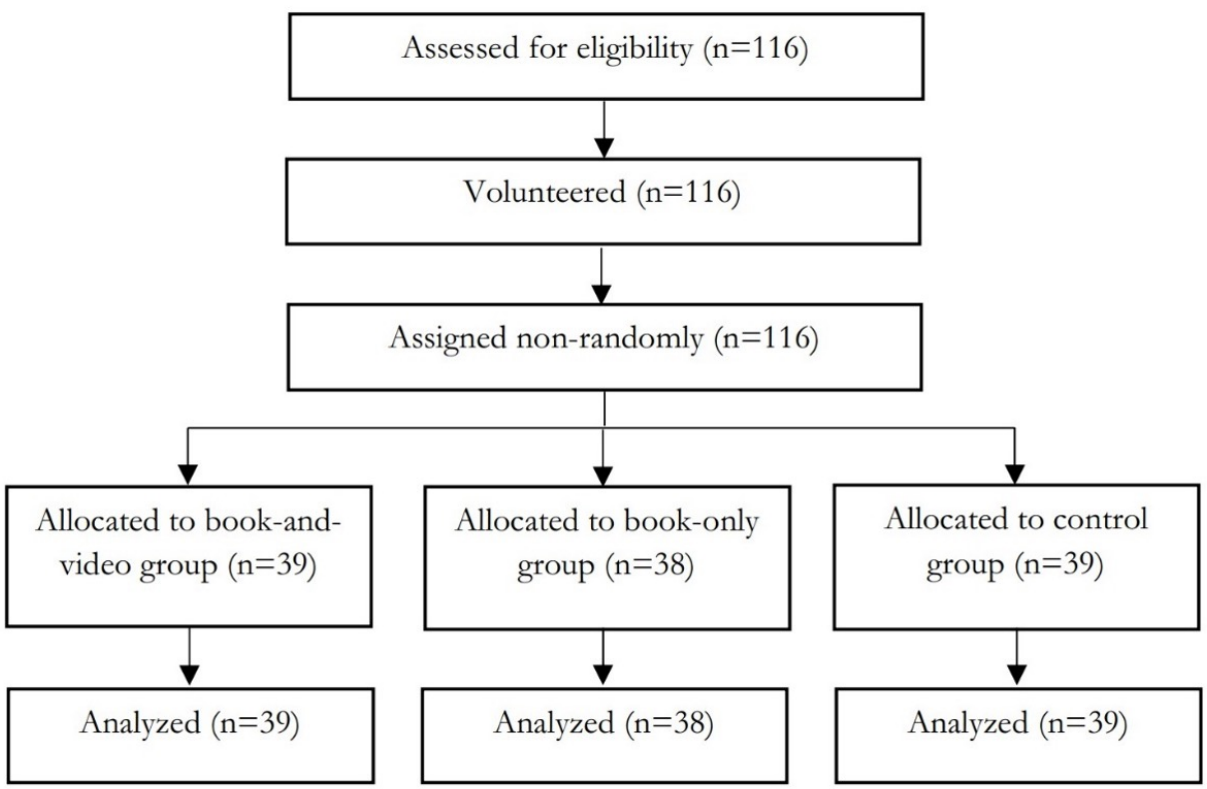

Table 1: Baseline characteristics of study participants by group

Characteristic	Book & video (n = 39)	Book (n = 38)	Control (n = 39)	p-value	Standardized difference
Age	22.56 ± 1.43	22.13 ± 0.34	22.56 ± 2.56	.601	0.218
Sex				.163	0.299
Male	20 (51.3)	16 (42.1)	25 (64.1)		
Female	19 (48.7)	22 (57.9)	14 (35.9)		
GPA				.568	0.271
Average and below	5 (12.8)	3 (7.9)	5 (12.8)		
Good	20 (51.3)	26 (68.4)	25 (64.1)		
Very good and above	14 (35.9)	9 (23.7)	9 (23.1)		
Residential area				.870	0.155
Suburban/Rural	3 (7.7)	1 (2.6)	2 (5.1)		
Urban	36 (92.3)	37 (97.4)	37 (94.9)		
Number of family members	4.03 ± 0.93	4.16 ± 1.44	3.90 ± 0.99	.816	0.151
Family member as medical personnel				.509	0.179
No	28 (71.8)	29 (76.3)	25 (64.1)		
Yes	11 (28.2)	9 (23.7)	14 (35.9)		
Familiarity total score	25.26 ± 2.37	24.53 ± 3.13	23.95 ± 3.94	.488	0.276
Knowledge total score	4.10 ± 2.14	4.47 ± 2.35	4.64 ± 1.84	.631	0.172
Attitude total score	36.23 ± 4.47	34.82 ± 6.02	34.79 ± 6.47	.752	0.176

Values are frequency (%) or mean ± standard deviation.
p-values are from Kruskal-Wallis test for continuous variables or Fisher's Exact Test for categorical variables.
Standardized difference is a metric that quantifies the magnitude of difference between groups independent of sample size. It is maximum pairwise absolute standardized mean difference computed using tableone package (smd option) in R. Its value > 0.1 typically indicate a significant imbalance.
No missing data.

Main results

Knowledge increased within both book & video and book-only groups ($p < .05$), whereas the control group showed no within-group improvement. Familiarity showed statistically significant within-group increases for book & video and control ($p < .05$), and attitude did not change significantly in any group (Table 2). Unadjusted between-group comparisons of change scores indicated that the knowledge improvements of both intervention groups were larger than those of control group ($p < .05$), while differences between the two intervention groups were non-significant. For familiarity and attitude measures, we observed no significant between-group differences (Table 3).

After covariate adjustment, the book-and-video intervention produced a statistically significant

Table 2: Within-group changes from baseline to posttest

Outcome & intervention group	Baseline	Posttest	Difference	p-value
Familiarity				
Book & video (n = 39)	26.00 [24.00, 27.00]	27.00 [24.00, 28.50]	2.00 [-1.00, 3.00]	.048[a]
Book (n = 38)	24.53 ± 3.13	25.68 ± 3.32	1.16 ± 3.69	.061[b]
Control (n = 39)	23.95 ± 3.94	25.44 ± 2.74	1.49 ± 4.42	.042[b]
Knowledge				
Book & video (n = 39)	4.10 ± 2.14	5.95 ± 2.08	1.85 ± 2.36	<.001[b]
Book (n = 38)	4.47 ± 2.35	5.84 ± 2.14	1.37 ± 2.93	.007[b]
Control (n = 39)	5.00 [3.50, 6.00]	4.00 [3.00, 6.00]	0.00 [-1.50, 1.00]	.560[a]
Attitude				
Book & video (n = 39)	34.79 ± 6.47	35.08 ± 4.56	0.28 ± 7.12	.837[b]
Book (n = 38)	35.00 [32.00, 38.00]	36.00 [33.00, 37.00]	-1.00 [-3.00, 3.00]	.994[a]
Control (n = 39)	35.00 [33.00, 39.50]	36.00 [33.00, 42.50]	1.00 [-3.50, 4.00]	.895[a]

Values are mean ± standard deviation for paired samples t-test and median [interquartile range] for Wilcoxon signed-rank test.
a) Wilcoxon signed-rank test p-value.
b) Paired samples t-test p-value.

Table 3: Between-group comparison of unadjusted pre-post change scores

Outcome & group comparison	p-value	Effect size (Hedges' g)	Effect size (Cliff's Δ)
Familiarity	.954[a]		
Book vs. control	-	-0.09	0.04
Book & video vs. control	-	-0.21	0.01
Book & video vs. book	-	-0.13	-0.03
Knowledge	.002[a]		
Book vs. control	.025[b]	0.74	0.31
Book & video vs. control	.002[b]	1.02	0.47
Book & video vs. book	.340[b]	0.21	0.11
Attitude	.781[a]		
Book vs. control	-	0.06	-0.01
Book & video vs. control	-	-0.01	0.09
Book & video vs. book	-	-0.09	0.07

The overall group difference was tested using Kruskal-Wallis test.
Pairwise comparisons use Dunn's test with Holm-Bonferroni p-value adjustment.
Hedges' g is parametric effect size standardized by the pooled pre-test standard deviation.
Cliff's Delta (Δ) is non-parametric effect size.
a) Kruskal-Wallis test p-value.
b) Dunn's test p-value with Holm-Bonferroni p-value adjustment method.

improvement in knowledge relative to control (DR–DID ATT = 1.60; 95% CI 0.60, 2.60; adjusted p = .015), corresponding to Hedges' g = 0.80 (95% CI 0.34–1.25). The book-only versus control comparison had a positive ATT but was not statistically significant after p-value adjustment (ATT = 1.10; 95% CI 0.12, 2.09; adjusted p = .126). No statistically significant effects were observed for familiarity or attitude in adjusted DR–DID models (Table 4). Robustness checks, including ANCOVA, two-way fixed effects models and permutation tests, produced consistent point estimates of knowledge for book & video vs control comparison.

Secondary analyses provided deeper insights into the intervention's effects. An item-level analysis revealed that the knowledge gains were driven by significant improvements on several key items, notably item no. 10. The exploratory as-treated analysis showed larger knowledge gains among adherents relative to true control. This was further supported by the dose-response models, which, despite being imprecise, suggested a potentially positive dose-response relationship between engagement with the book and gains in all three outcomes within the book-and-video. Finally, the null finding for the attitude outcome was robust to the exclusion of potential outliers.

DISCUSSION

Key results

In this quasi-experimental study of 116 third-year medical students, the combined book & video intervention produced a statistically significant

Table 4: Doubly robust difference-in-differences estimations with standardized effect sizes for pairwise comparisons

Outcome & group comparison (book & video n=39, book n=38, control n=39)	DR-DID ATT [95% CI]	Hedges' g [95% CI]	p-value
Familiarity			
Book vs. control	0.43 [-1.08, 1.94]	0.12 [-0.32, 0.56]	.845
Book & video vs. control	0.83 [-0.57, 2.24]	0.25 [-0.19, 0.69]	.551
Book & video vs. book	1.92 [-0.53, 4.37]	0.69 [0.23, 1.14]	.371
Knowledge			
Book vs. control	1.10* [0.12, 2.09]	0.52 [0.07, 0.97]	.126
Book & video vs. control	1.60** [0.60, 2.60]	0.80 [0.34, 1.25]	.015
Book & video vs. book	0.17 [-0.97, 1.30]	0.07 [-0.37, 0.52]	.871
Attitude			
Book vs. control	-0.11 [-2.03, 1.82]	-0.02 [-0.46, 0.43]	.914
Book & video vs. control	0.53 [-1.81, 2.86]	0.09 [-0.35, 0.53]	.845
Book & video vs. book	0.89 [-1.89, 3.67]	0.17 [-0.28, 0.61]	.845

DR–DID ATT: The average treatment effect on the treated in difference-in-differences design (cluster bootstrap with 2,000 replicates), controlling for baseline covariates, representing the unstandardized effect.
Hedges' g is a standardized mean difference, computed using the DR–DID ATT and the pooled pretest standard deviation.
p-values are adjusted for multiple comparisons using the Benjamini-Hochberg method.
Significance stars based on unadjusted p-values: * p<.05, ** p<.01, *** p<.001.

improvement in knowledge of FHH compared with the control group (DR–DID ATT = 1.60; Hedges' g = 0.80). While the effect of the book-only intervention was also positive, it was not statistically significant after adjusting for multiple comparisons. For the familiarity and attitude outcomes, there were no statistically significant between-group differences for any comparison.

Interpretation

The observed knowledge gain for the book-and-video group indicates that adding a short video to the written material increased factual knowledge relative to no intervention. This finding is consistent with Multimedia Learning Theory, which suggests benefits from integrated visual and verbal channels.[4] While the direct comparison between intervention groups was not statistically significant, the video appeared to be a beneficial addition, as only the combined book-and-video group produced a significant effect against the control. This interpretation is also supported by our exploratory dose-response analysis, which suggested that the video, though not being the key driver, amplified the book's educational impact. Furthermore, because our primary intention-to-treat analysis includes participants with varying engagement, the true effect on fully engaged students is likely even greater; this is supported by the larger knowledge effects among adherents produced from our exploratory as-treated analysis.

The absence of significant between-group effects on attitude and familiarity is likely due to several factors, such as a potential ceiling effect. At baseline, participants' familiarity scores were already high (mean ≈ 25 out of 30), leaving little room for substantial improvement. Similarly, attitude scores were also high at pretest (mean ≈ 35 out of 45).

In addition to this high starting point, deeper constructs like attitudes often require more intensive interventions to change compared to factual knowledge, a point supported by our exploratory dose-response models. Though imprecise, these models suggested the potential associations between greater book engagement and larger effects, implying that a higher book "dose" may be required to influence these deeper constructs. Furthermore, the short follow-up period of approximately 10 days may have been insufficient time for such changes to solidify. Notably, for familiarity outcome, the direct comparison between the two intervention groups yielded a large, albeit imprecise, point estimate (DR–ATT = 1.92); this may suggest the study's limited statistical power to detect a potentially existing meaningful difference between these intervention formats.

Comparison with previous studies

The significant improvement in knowledge observed in our study aligns with previous research on theory-driven, remote educational interventions. Our observed effect size (Hedges' g = 0.80) is consistent with a large meta-analysis confirming the effectiveness of internet-based learning for health professionals.[7] More specifically, our study suggests similar results with an evaluation of theory-based FHH training program, which also produced significant knowledge gains.[5] Furthermore, the observed advantage of our dual-modality intervention is supported by prior research indicating that video is a valuable educational tool. In the specific context of FHH, video is demonstrably more effective than written materials for improving attitudes,[6] while in broader health education, video-assisted learning has been demonstrated to enhance key psychological factors to learning, such as student engagement and self-efficacy.[8]

Limitations

The study's primary limitations include its non-randomized design and single-site setting, which limit causal inference and generalizability, respectively. Second, the achieved sample size was smaller than planned, which reduced the study's statistical power and resulted in a wider margin of error for the effect estimates. Third, a short follow-up period prevents measurement of longer-term outcomes, such as practice or behaviors, and any conclusions about the lasting durability of the observed knowledge gains. Furthermore, the internal consistency of the 9-item knowledge scale was modest at pretest (α = 0.63). A recent meta-analysis by Edelsbrunner et al. highlights that lower internal consistency is common and acceptable for short domain-specific knowledge tests, particularly prior to an intervention when learners' knowledge is often fragmented.[13] Nevertheless, from a statistical perspective, this lower reliability reduces precision and may attenuate effect estimates toward the null, suggesting the true impact of the intervention could be even greater than observed. Lastly, the three-month delay between baseline assessment and material distribution may have introduced maturation effects, though these should be similar across groups given the homogeneous cohort.

Generalizability and implications

The findings are most directly applicable to third-year medical students in similar preclinical or early clinical placements at single-center settings. Because the sample was drawn from one cohort at a single university, caution is warranted when generalizing to students at other training stages, institutions with different curricula, or different cultural contexts.

Nevertheless, the intervention's features, such as short duration, low cost, theory-informed content, and remote deliverability, suggest good potential for scalability and adaptation. If replicated, these materials could be integrated into medical curricula or brief preparatory modules to strengthen FHH literacy. In particular, the observed rapid knowledge gains suggest that these materials could be explored as an adjunct to training for basic FHH tasks relevant to genetic counselling. With appropriate contextual adaptation and evaluation, the approach could also be useful for other health professionals who require compact, practice-oriented FHH training.

Recommendations

Future research should replicate this intervention in larger, multi-site and more diverse samples and, where feasible, use randomized designs to improve causal inference. Future studies should assess (a) knowledge retention at longer follow-up intervals; (b) transfer to practiced skills (e.g., observed pedigree collection or simulated counselling encounters); and (c) downstream impacts on clinical behavior and patient outcomes. Additionally, implementation outcomes, such as acceptability, feasibility, and cost, should be evaluated alongside effectiveness.

Also, stakeholders should consider integrating brief, theory-based multimedia FHH modules into curricula or as pre-rotation training for students who will conduct family history-taking with proper adaptation.

Conclusions

In this cohort of third-year medical students, a brief, theory-based multimedia package (book and short animated video) produced a statistically significant and practically meaningful improvement in FHH knowledge. These results support the feasibility of using compact, low-cost educational materials to improve foundational FHH knowledge rapidly, and suggest a promising model for preparatory training relevant to genetic-counselling tasks. Future studies should confirm these findings in larger, controlled, and multi-site evaluations that also measure skill acquisition and retention. If validated, this approach could provide an efficient, scalable addition to formal genetics and genetic-counseling training.

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