Effectiveness of A Religion-Based Digital Intervention in Enhancing Nutrition Literacy and Dietary Behaviours Among Malaysian University Students

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Abstract

This study evaluated the effectiveness of a Religious-Based Digital Intervention Tool (RB-DIT) developed based on Halalan-Toyyiban principles to improve nutritional knowledge, attitudes, and dietary practices among university students. The rising prevalence of diet-related non-communicable diseases, particularly among young adults, calls for culturally sensitive and innovative health education strategies. Integrating religious teachings within digital learning platforms offers a promising approach to enhance relevance, motivation, and engagement. A quasi-experimental pre- and post-test design was employed among undergraduate students at the International Islamic University Malaysia (IIUM), with 56 participants in the intervention group and 43 in the control group. The intervention group accessed RB-DIT modules over three weeks through Moodle, encompassing educational texts, infographics, quizzes, and reflective activities. Paired sample t-tests revealed significant improvements among the intervention group across all domains: knowledge (M = 4.756, SD = 2.058, p < 0.001), attitudes (M = 2.805, SD = 1.430, p < 0.001), and practices (M = 2.049, SD = 2.058, p = 0.018). No significant changes were observed in the control group. These findings underscore the potential of faith-integrated digital interventions to bridge cognitive, emotional, and behavioral gaps in health education. The RB-DIT demonstrates that merging religious values with digital technology can foster sustainable health behavior change among youth, offering a scalable and culturally resonant model for public health promotion in Muslim-majority contexts.

Key Words: Halalan-Toyyiban, digital, Islamic, dietary

Cite This Article:

Introduction

The global burden of non-communicable diseases (NCDs), particularly those linked to poor dietary practices, has been rising sharply over the past decades. The World Health Organization

(WHO, 2021) has consistently highlighted diet-related conditions such as obesity, diabetes, cardiovascular diseases, and certain types of cancer as leading causes of morbidity and mortality worldwide. This trend is particularly alarming among young adults and university students, who are in a transitional phase of establishing lifelong dietary behaviors. Factors contributing to these unhealthy trends include increased accessibility to energy-dense, nutrient-poor foods; sedentary lifestyles; lack of structured health education; and socio-cultural influences that deprioritize balanced nutrition (Bailey, Tompkins, & Davis, 2020). Religious teachings, particularly the Islamic concept of halalan-toyyiban, offer a rich foundation for promoting healthy dietary behavior. This concept encompasses lawful consumption alongside principles of wholesomeness, safety, and quality (Hashim & Abdul Halim, 2023). Recent research emphasizes the potential of faith-based approaches in health promotion, suggesting that aligning interventions with religious values can increase relevance, acceptance, and behavioral commitment (Koenig, 2012; Ali & Ushakov, 2020).

In Malaysia, the National Health and Morbidity Survey (NHMS, 2019) revealed that over half of the adult population is either overweight or obese, with concerning statistics emerging among university populations. University students, often living away from parental supervision for the first time, face unique challenges in maintaining healthy eating habits due to academic pressures, limited time for meal preparation, financial constraints, and the pervasive availability of fast foods. Despite growing awareness of the importance of healthy eating, actual practice often falls short due to environmental, behavioral, and psychological barriers (Yun, Ahmad, & Quee, 2018).

Addressing these challenges requires culturally relevant and context-specific interventions that resonate with students' values and lived experiences. Religious teachings, particularly those rooted in Islam, offer a rich, largely untapped resource for health promotion. The Islamic dietary framework of halalan-toyyiban emphasizes not only the permissibility (halal) of foods but also the wholesomeness (toyyib) that ensures safety, quality, and health benefits (Hashim & Abdul Halim, 2023). Integrating such religious concepts into health interventions can potentially bridge the gap between knowledge and action by appealing to intrinsic spiritual motivations. Recent studies have demonstrated that when health behaviors are framed through religious or faith-based lenses, there is a higher likelihood of acceptance, adherence, and sustainability (Koenig, 2012; Ali & Ushakov, 2020).

In parallel, digital technologies have revolutionized health education by offering scalable, accessible, and engaging platforms for knowledge dissemination. Digital interventions, such as Learning Management Systems (LMS) and mobile applications, allow for tailored content delivery, interactive learning experiences, and greater autonomy for users (Suárez-López, 2023; Alsaqqa & Alwawi, 2023). Particularly in post-pandemic contexts, where remote learning and e-health solutions have become increasingly normalized, digital platforms present a promising avenue for delivering innovative public health interventions.

The integration of religious values into digital health education represents a novel and culturally sensitive approach to address the persistent dietary challenges among Muslim university students. However, there remains a paucity of empirical evidence on the effectiveness of such integrated models. Most existing nutrition interventions focus either on general knowledge dissemination or behavioral modification strategies without fully leveraging the motivational

power of religious teachings.

This study aimed to evaluate the effectiveness of a Religious-Based Digital Intervention Tool (RB-DIT) developed using halalan-toyyiban principles to enhance nutritional knowledge, attitudes, and practices among university students. By embedding Islamic dietary teachings into a structured digital learning platform, the RB-DIT aspires to foster not only cognitive improvements but also attitudinal shifts and behavioral changes that align with religious and public health goals. The findings from this research contribute valuable insights into the potential of faith-based digital interventions to promote sustainable health behavior change in culturally diverse educational settings.

METHODOLOGY

Study Design

This study adopted a quasi-experimental pre- and post-test design with a non-randomized control group. This design allowed assessment of changes over time while accommodating the logistical constraints of educational research settings (Creswell & Creswell, 2018). Unlike randomized controlled trials, quasi-experiments offer flexibility when random assignment is impractical, thus enhancing ecological validity in naturalistic contexts such as university campuses.

By including both intervention and control groups, the study strengthened causal inferences, reducing threats to internal validity such as maturation, history, and testing effects (Ross & Willson, 2017). The temporal separation between pre- and post-tests ensured that any observed changes could reasonably be attributed to the RB-DIT intervention rather than external factors. The study protocol adhered to the ethical standards of the institutional research committee.

Participants and Setting

Participants were undergraduate students recruited from multiple faculties at the International Islamic University Malaysia (IIUM) using convenience sampling techniques. Recruitment efforts were carried out via:

- **Email invitations** through the university mailing list,
- **Social media posts** on official student platforms,
- **Posters were** displayed around high-traffic areas like cafeterias and libraries.

Eligibility criteria included:

- Age 18–25 years
- Full-time enrolment
- No prior formal training in nutrition sciences
- Access to smartphones, tablets, or laptops
- Ability to commit to the three-week program duration

A total of 99 students enrolled, with 56 allocated to the intervention group and 43 to the control group. Group assignments were determined based on students' willingness and availability to

engage with Moodle-based learning activities.

Attrition was minimal, with 100% post-test survey completion among enrolled participants.

Development of the Religious-Based Digital Intervention Tool (RB-DIT)

The RB-DIT was meticulously developed based on the Halalan-Toyyiban dietary principles identified through expert consultations involving Islamic scholars, nutritionists, and public health educators. Content development included careful integration of Islamic teachings (Qur'anic verses, Hadith) related to food consumption, health, and ethical eating practices alongside scientific nutritional guidelines. To ensure a seamless and efficient dissemination process, the RB-DIT intervention tool was integrated into an online learning management system (LMS) using Moodle, a popular open-source LMS, and Gnomio, a free hosting service for Moodle. This allowed for the delivery of the tool to the target audience of university students in a structured and accessible manner. The chosen platforms for integration were Gnomio and Moodle, both widely recognized and utilized learning management systems (Quansah and Essiam, 2021).

The RB-DIT was conceptualized through an evidence-based instructional design model involving several iterative phases:

- Content Identification: Based on the halalan-toyyiban framework through expert panels comprising Islamic scholars, nutritionists, and digital pedagogists.
- Content Development: Integration of Qur'anic verses, Hadith references, and contemporary health information across 8 learning modules.
- Peer Review: Content underwent theological verification and scientific validation to ensure dual accuracy.
- Instructional Strategy: Application of multimedia learning theory principles, ensuring text, images, and quizzes complemented cognitive load management.
- SCORM Packaging: Modules were SCORM-compliant, enabling interactive tracking of participants' progress on Moodle.
- Pilot Testing: Prior to rollout, a small pilot test (n=10) was conducted to troubleshoot usability issues.

Each module contained:

- Reading materials
- Dynamic infographics
- Short video explainers
- Self-reflection prompts
- Quizzes with instant feedback

Weekly learning progress was monitored via the Moodle Learning Management System, allowing facilitators to track logins, page views, and module completion rates. Refer to Figure 1 for an overview of steps in developing, integrating, and administering RB-DIT.

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Figure 1: Diagram shows overview of steps in Developing, Integrating and Administrating RB-DIT
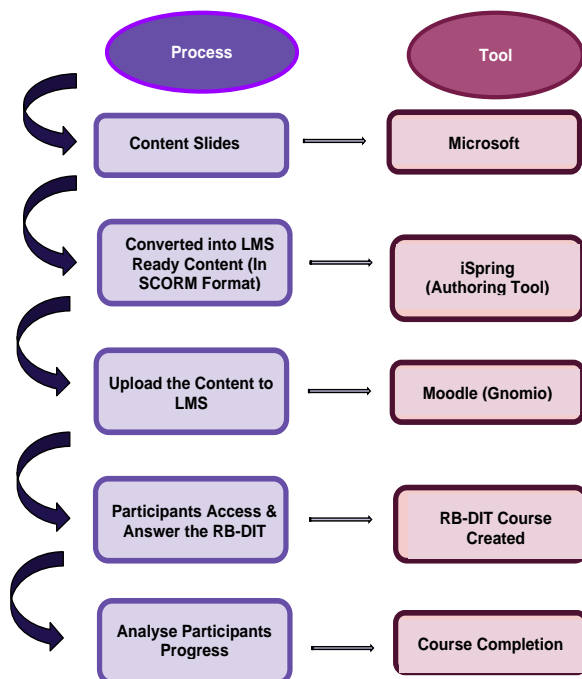
Intervention Delivery and Engagement

Participants in the intervention group were provided structured access to the Religious-Based Digital Intervention Tool (RB-DIT) through the university's Moodle Learning Management System (Moodle-Version 4.2) over a three-week period. The intervention comprised eight interactive modules, each carefully designed to build upon the preceding one, covering a wide range of topics that intertwined Islamic dietary principles with modern nutrition knowledge. The modules were sequentially arranged to facilitate progressive learning, starting with the foundational concepts of halalan-toyyiban, moving into balanced nutrition from an Islamic perspective, and culminating in practical strategies for applying these teachings in everyday life.

Participants were required to complete two to three modules per week, with each module incorporating a blend of textual readings, interactive infographics, self-reflective activities, and quizzes designed to reinforce critical concepts. New modules were released according to a predetermined schedule to maintain a steady learning pace while preventing cognitive overload. The content delivery emphasized both cognitive engagement and affective involvement, aiming to not only impart knowledge but also to cultivate a personal sense of responsibility towards healthier and religiously compliant eating behaviors.

To sustain participant motivation and minimize attrition, weekly reminder emails were sent summarizing expected activities and encouraging timely module completion. Mid-week motivational messages were also dispatched through WhatsApp to maintain momentum and engagement. The Moodle system tracked participants' logins, time spent per module, and quiz completion rates, allowing researchers to monitor adherence closely. Badges and recognition elements were integrated within the platform to provide positive reinforcement upon module completion, promoting a sense of achievement and progression.

Interactive discussion forums were embedded within the platform, offering participants opportunities to share reflections, raise questions, and engage in peer-to-peer dialogue. These forums were lightly moderated by facilitators to ensure that discussions remained respectful, focused, and enriching. The intervention emphasized reflective learning, encouraging participants to internalize Islamic teachings related to diet and health within their personal contexts rather than perceiving the modules as mere academic tasks.

Throughout the intervention, technical support was made readily available via a dedicated Telegram group and direct email contact. Any issues related to platform access, content loading, or user interface navigation were addressed promptly, ensuring minimal disruption to the learning experience. Participants were assured that their engagement data would be used solely for research purposes and that their personal information would remain confidential.

Upon completing all modules, participants were invited to complete the post-test survey, mirroring the pre-test instrument in structure and content. The design of the intervention thus prioritized accessibility, interactivity, and culturally sensitive engagement, seeking to create a learning environment that respected participants' religious values while promoting scientifically grounded health behaviors.

Data Collection Instruments

Pre- and post-intervention surveys were administered to both intervention and control groups using structured questionnaires. The instruments measured three key domains:

- Nutritional Knowledge: Assessed understanding of dietary recommendations, food safety, and Islamic dietary laws.
- Attitude Towards Dietary Practices: Evaluated beliefs, motivations, and perceived importance of adopting healthy, halal-compliant eating behaviors.
- Dietary Practices: Captured self-reported frequency of healthy eating behaviors and adherence to Islamic dietary principles.

Each domain was assessed using validated scales, and the full questionnaire achieved a high level of internal consistency (Cronbach's alpha = 0.892).

Statistical Analysis

Data were analyzed using IBM SPSS Statistics Version 26 (IBM Corp., 2024). Descriptive statistics (means and standard deviations) were computed for participant characteristics and outcome variables. Paired sample t-tests were conducted within groups to assess changes from pre- to post-intervention, while independent sample t-tests compared changes between groups. The assumptions of normality and homogeneity of variance were tested prior to conducting t-tests.

A p-value of less than 0.05 was considered statistically significant. Effect sizes (Cohen's d) were also calculated to provide an indication of the practical significance of observed changes.

RESULTS

A total of 99 participants completed the study, with 56 students assigned to the intervention group and 43 to the control group. Table 1, Table 2, and Table 3 present the pre- and post-intervention mean scores for the Knowledge, Attitude, and Practices domains, respectively. Baseline demographic characteristics were similar across groups, with no significant differences detected in terms of age, gender distribution, or field of study (data not shown).

The outcome measures of nutritional knowledge, attitudes towards dietary behavior, and dietary practices were assessed pre- and post-intervention. Results are presented in the subsections below.

Knowledge Domain

In the domain of nutritional knowledge, the intervention group demonstrated substantial improvements following exposure to the RB-DIT modules. The mean pre-intervention score was 13.000 (SD = 2.675), which significantly increased to 17.756 (SD = 2.058) after the three-week intervention (p < 0.001). This marked gain reflects the effectiveness of the faith-integrated digital learning experience in enhancing students' understanding of both Islamic dietary teachings and general nutritional principles. By contrast, the control group exhibited minimal change, moving from a pre-test mean of 13.023 (SD = 2.599) to a post-test mean of 13.419 (SD = 2.602), with the difference not reaching statistical significance (p = 0.195). An item-level analysis revealed that participants in the intervention group showed notable improvements in areas such as knowledge of halal certification processes, a deeper understanding of the toyyiban (wholesomeness) component, recognition of balanced meal composition, increased awareness of food safety measures, and critical knowledge regarding processed food risks from an Islamic ethical standpoint. These results suggest that the RB-DIT did not merely impart factual knowledge but fostered deeper conceptual learning and meaningful cognitive engagement with the dietary teachings central to the Halalan-Toyyiban framework.

The significant increase in knowledge scores among the intervention group reflects the effectiveness of embedding religious principles into digital nutrition education, supporting

previous findings that culturally and religiously contextualized interventions are more impactful in enhancing learning outcomes (Amoore et al., 2023).

Table 1: Comparison of Pre- and Post-Intervention Knowledge Scores

Group	Pre-Mean (SD)	Post-Mean (SD)	p-value
Intervention	13.000 (2.675)	17.756 (2.058)	<0.001
Control	13.023 (2.599)	13.419 (2.602)	0.195

One of the most significant findings from this study was the marked improvement in participants' nutritional knowledge following the intervention. The substantial increase in knowledge scores among the intervention group highlights the power of culturally and religiously contextualized education in promoting deeper learning. Unlike generic health education models that often struggle to capture sustained attention among youth populations, the RB-DIT capitalized on participants' intrinsic motivations, aligning health messages with their spiritual values and ethical worldviews. This approach is consistent with previous research, which emphasized that culturally tailored interventions enhance cognitive engagement and improve knowledge retention compared to standard educational practices (Amoore et al., 2023; Alsaqqa & Alwawi, 2023). Knowledge acquisition serves as the critical first step in the hierarchy of behavior change models, such as Bloom's Taxonomy and the Theory of Planned Behavior (Ajzen, 1991), laying the essential foundation for subsequent attitudinal shifts and behavioral enactments. The improvement in knowledge observed in this study suggests that faith-integrated digital tools can bridge gaps left unaddressed by purely secular or generalized health education efforts, particularly in Muslim-majority societies where religious values are deeply interwoven into daily life.

Attitude Domain

Attitudinal changes towards healthy and religiously compliant eating behaviors were also significant. Participants in the intervention group recorded a rise in mean attitude scores from 23.122 (SD = 2.544) pre-intervention to 25.927 (SD = 1.430) post-intervention, with the change achieving statistical significance (p < 0.001). In contrast, the control group demonstrated a slight, non-significant increase, from a mean of 22.953 (SD = 2.736) to 23.302 (SD = 2.731) (p = 0.237). The most notable shifts in attitude among the intervention group involved a heightened perceived importance of halal and wholesome eating, increased motivation to verify food ingredients for religious compliance, greater willingness to prioritize nutritional quality over convenience, stronger personal responsibility towards maintaining health as a spiritual obligation, and a growing valuation of mindful eating practices. These attitudinal transformations indicate that participants not only absorbed information but also reconfigured their belief systems and motivations regarding dietary behaviors, reinforcing the notion that faith-based framing enhances emotional resonance and moral commitment in health-related behavior change.

The significant attitudinal improvements observed in the intervention group are consistent with earlier findings that religious framing can enhance personal motivation and perceived relevance

of health behaviors (Hashim & Abdul Halim, 2023; Ali & Ushakov, 2020).

Table 2: Comparison of Pre- and Post-Intervention Attitude Scores

Group	Pre-Mean (SD)	Post-Mean (SD)	p-value
Intervention	23.122 (2.544)	25.927 (1.430)	<0.001
Control	22.953 (2.736)	23.302 (2.731)	0.237

Beyond knowledge gains, the RB-DIT intervention also demonstrated a significant positive shift in participants' attitudes towards healthy, halal-compliant eating behaviors. Attitudinal change represents a critical mediating factor between knowledge and behavior within health promotion frameworks, yet it remains notoriously difficult to achieve. The significant enhancement in attitude scores among the intervention group underscores the emotional and motivational depth achieved by embedding Islamic dietary teachings into the educational content. Framing healthy eating not merely as a medical imperative but as a religious obligation appears to have strengthened participants' intrinsic motivation, reframing dietary choices as acts of spiritual devotion rather than mere health compliance. This phenomenon echoes findings from previous faith-based intervention studies, which showed that religious framing amplifies personal relevance and moral obligation, enhancing individuals' willingness to adopt and maintain health-promoting behaviors (Hashim & Abdul Halim, 2023; Ali & Ushakov, 2020). Such attitudinal transformations are particularly important because they contribute to internalization of health behaviors, making lifestyle changes more sustainable over time rather than externally driven or temporary.

Practices Domain

Dietary practices, the most challenging domain to shift within a short intervention period, also showed promising improvements. The mean practices score for the intervention group rose from 21.610 (SD = 3.162) at baseline to 23.659 (SD = 2.058) post-intervention (p = 0.018), whereas the control group experienced only a slight, non-significant increase from 21.674 (SD = 3.330) to 22.047 (SD = 3.422) (p = 0.187). Participants reported positive changes in their daily routines, including a greater intake of fruits and vegetables, more consistent avoidance of processed and additive-laden foods, increased vigilance regarding halal certifications when purchasing food, a reduction in the frequency of fast-food consumption, and a more disciplined practice of reading nutrition labels before eating. Although behavioral shifts were somewhat less dramatic than changes in knowledge and attitude, the statistically significant improvements observed indicate that the RB-DIT intervention succeeded in moving participants towards healthier, religiously aligned eating practices even within the relatively short three-week engagement window.

These results align with previous research indicating that digital interventions that integrate behavioral, educational, and motivational strategies can promote early-stage changes in health practices (Suárez-López et al., 2023; Zakaria et al., 2024).

Table 3: Comparison of Pre- and Post-Intervention Practices Scores

Group	Pre-Mean (SD)	Post-Mean (SD)	p-value
Intervention	21.610 (3.162)	23.659 (2.058)	0.018
Control	21.674 (3.330)	22.047 (3.422)	0.187

Although behavioral change is typically the most challenging outcome to achieve within short-term interventions, this study nevertheless found statistically significant improvements in participants' self-reported dietary practices following exposure to the RB-DIT. Participants reported adopting healthier eating habits, such as increasing fruit and vegetable intake, exercising greater vigilance over halal food certifications, and reducing consumption of fast foods and processed foods. The magnitude of change in practices, while smaller than the changes observed for knowledge and attitude, remains meaningful given the complexity of behavior modification, especially in the face of entrenched lifestyle habits, environmental cues, and peer influences that characterize university settings. The progression from knowledge to attitude to behavior observed in this study mirrors theoretical expectations outlined in models such as the Health Belief Model and the Transtheoretical Model of Change (Alyafei & Easton-Carr, 2024). These models posit that behavior change typically evolves gradually, beginning with increased awareness, followed by attitudinal restructuring, and culminating in sustained action. The fact that dietary practices shifted significantly within a relatively short three-week intervention window suggests that religious-based digital interventions hold substantial promise for catalyzing initial stages of health behavior change among young adults.

The findings mirror earlier studies that reported positive changes in dietary practices following culturally tailored digital interventions (Suárez-López et al., 2023; Ramadas et al., 2018). However, it is noteworthy that while the magnitude of practice improvement was statistically significant, it was somewhat less pronounced than knowledge and attitude changes. This underscores the well-established notion that behavior change is typically slower and often requires longer-term reinforcement.

Effect Size Analysis

The effectiveness of the RB-DIT intervention was further confirmed by effect size calculations. The Cohen's d values for knowledge (d = 1.92), attitude (d = 1.41), and practice (d = 0.70) indicate large effects for knowledge and attitude domains and a medium-to-large effect for dietary practices (Table 4). This reinforces that the observed improvements were not only statistically significant but also practically meaningful in real-world terms.

Table 4: Effect size calculation

Domain	Cohen's d	Effect Size Interpretation
Knowledge	1.92	Large
Attitude	1.41	Large
Practices	0.70	Medium to Large

The effect size analysis further corroborated the practical significance of the RB-DIT intervention. Large effect sizes observed for knowledge and attitude domains and a medium-

to-large effect for practices indicate that the intervention produced meaningful, real-world impacts rather than trivial statistical effects. This reinforces the argument that digital faith-integrated interventions are not only theoretically sound but also practically potent, capable of producing educational and behavioral outcomes that matter in the lived experiences of participants. The use of effect size calculations, alongside traditional significance testing, enhances the robustness of the findings and provides important context for interpreting the magnitude of change achieved (Cohen, 1988).

Future interventions could incorporate booster sessions, continuous digital engagement, or community-based reinforcement strategies to sustain and amplify behavioral improvements.

Strengths and Limitations of the Study

This study possesses several strengths that contribute to its value within the field of health promotion and digital education. First and foremost, the integration of religious principles into a digital intervention represents a novel and culturally sensitive approach that addresses an often-neglected dimension in public health strategies (Chen et al., 2020). By aligning health promotion with participants' intrinsic religious motivations, the RB-DIT not only conveyed knowledge but also nurtured attitudinal and behavioral shifts rooted in deeply held values, enhancing the potential for sustained impact.

The methodological rigor employed also strengthens the credibility of the findings. The use of a quasi-experimental design with a control group allowed for meaningful comparisons, increasing confidence that the observed changes were indeed attributable to the intervention (Nianogo, Benmarhnia, & O'Neill, 2023). High internal consistency in the measurement instruments, alongside the application of effect size calculations, further bolstered the reliability and practical relevance of the results. The fully digital delivery model, leveraging Moodle's capabilities, demonstrated that faith-based interventions could be effectively scaled and adapted to diverse learning environments, offering a flexible blueprint for future initiatives.

Despite these strengths, several limitations must be acknowledged. The reliance on self-reported data for assessing dietary practices introduces the possibility of response biases, particularly social desirability bias, which may have led participants to report more favorable behaviors than were practiced. Future studies could address this limitation by incorporating more objective measures, such as food diaries, dietary recalls, or biomarker assessments. Another limitation lies in the relatively short duration of the intervention, which, while sufficient to detect early-stage changes, may not have allowed for the full consolidation of long-term behavioral transformations. Longitudinal studies extending follow-up assessments over several months or even years are needed to determine the sustainability of the observed improvements (Banati & Oyugi, 2019).

Additionally, the use of convenience sampling and the single-institution setting may limit the generalizability of the findings. Although IIUM offers a diverse student body reflective of Malaysia's multicultural landscape, extending the intervention to multiple institutions and demographic settings would enhance the external validity of future research. Lastly, while the study incorporated Islamic teachings as a central motivational component, it is recognized that the diversity of interpretations within Islamic dietary laws could influence the reception and

applicability of the intervention across different cultural subgroups. Future iterations of the RB-DIT could benefit from regional customization to reflect local religious practices and dietary norms more precisely.

By acknowledging these strengths and limitations, the study contributes a balanced and transparent perspective, providing a strong foundation for subsequent research and practice in the fields of digital health promotion, nutrition education, and religiously framed public health interventions.

Implications for Practice and Policy

The findings of this study have important implications for health promotion practice and public policy. Faith-integrated digital interventions, such as the RB-DIT, offer scalable, culturally sensitive solutions for addressing the rising burden of diet-related non-communicable diseases in Muslim-majority societies. Public health agencies and educational institutions could benefit from incorporating religiously framed health education into their broader health promotion strategies, particularly in contexts where secular messaging alone has struggled to achieve behavioral traction. The flexibility of digital platforms further allows for customization, scalability, and wide reach, offering significant advantages in resource-limited settings.

Moreover, collaborations between healthcare professionals, religious scholars, digital education specialists, and policymakers could yield synergistic models that not only respect cultural values but also rigorously promote scientific health standards. Such multidisciplinary approaches may bridge existing gaps between health knowledge and practice more effectively than siloed interventions. The success of the RB-DIT demonstrates that respecting participants' religious and cultural frameworks does not dilute scientific integrity but rather enhances it by fostering greater engagement, trust, and internalization.

CONCLUSION

This study provides robust and timely evidence of the effectiveness of RB-DIT in enhancing nutritional knowledge, attitudes, and dietary practices among Malaysian university students. By embedding halalan-toyyiban principles within a structured digital education platform, the intervention successfully addressed multiple facets of behavior change, moving participants beyond mere awareness towards meaningful cognitive, emotional, and behavioral transformation. The significant improvements observed across all three domains, coupled with the large effect sizes, affirm that religiously aligned, digitally delivered education holds significant promise as a public health strategy, particularly in Muslim-majority societies where faith values play an integral role in shaping daily life choices.

The integration of Islamic teachings into health education did not detract from scientific rigor; rather, it enriched participants' engagement and internalization of the content, suggesting that faith-based framing can serve as a powerful catalyst for health behavior change. This finding holds important implications for the design of future interventions targeting other domains of health beyond nutrition, including mental health, physical activity, and preventive medicine, where moral and ethical considerations are equally relevant.

Despite certain limitations, the overall strength of the findings indicates that the RB-DIT model is both scalable and adaptable. Future initiatives could explore embedding such interventions into university curricula, public health campaigns, or community outreach programs, leveraging digital platforms to achieve broader population reach. The potential to customize modules according to local dietary habits, religious interpretations, and technological access further enhances the feasibility of large-scale deployment.

Moreover, the success of the RB-DIT points to the critical importance of interdisciplinary collaboration in health promotion. Engaging religious authorities, nutrition experts, behavioral scientists, and digital technologists in co-creating culturally resonant interventions can ensure that public health efforts are not only evidence-based but also emotionally and spiritually meaningful to target populations.

In conclusion, the RB-DIT intervention represents an important step forward in reimagining how public health education can be delivered in culturally pluralistic societies. By merging religious values with digital innovation, it offers a new paradigm for fostering healthier, more spiritually fulfilling lifestyles among young adults. Future research building upon these findings can solidify faith-based digital interventions as a vital component of comprehensive, culturally sensitive public health strategies, contributing to healthier societies grounded in both scientific knowledge and moral purpose.

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REFERENCES

Alyafei, A., & Easton-Carr, R. (2024). The health belief model of behavior change. In StatPearls. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK606120/

Alsaqqa, H. H., & Alwawi, A. (2023). Digital intervention for public health: Searching for implementing characteristics, concepts and recommendations: Scoping review. *Frontiers in Public Health, 11*, 1142443. https://doi.org/10.3389/fpubh.2023.1142443

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Ali, S., & Ushakov, D. (2020). Religion and health promotion: The importance of aligning interventions with religious beliefs. Journal of Religion and Health, 59(4), 1801–1814. https://doi.org/10.1007/s10943-019-00932-0

Amoore, B. Y., Gaa, P. K., Amalba, A., & Mogre, V. (2023). Nutrition education intervention

improves medical students' dietary habits and their competency and self-efficacy in providing nutrition care: A pre, post and follow-up quasi-experimental study. Frontiers in Nutrition, 10, 1063316. https://doi.org/10.3389/fnut.2023.1063316

Banati, P., & Oyugi, J. (2019). Longitudinal Research for Sustainable Development. Zeitschrift für Psychologie. https://doi.org/10.1027/2151-2604/A000368.

Bailey, C., Tompkins, C., & Davis, J. (2020). College campuses' influence on student weight and related behaviors: A review of observational and intervention research. Obesity Science & Practice, 6(6), 694–707. https://doi.org/10.1002/osp4.445

Chen, Y., Kim, E., & VanderWeele, T. (2020). Religious-service attendance and subsequent health and well-being throughout adulthood: evidence from three prospective cohorts. International Journal of Epidemiology, 49, 2030 - 2040. https://doi.org/10.1093/ije/dyaa120.

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.

Hashim, K., & Abdul Halim, A. (2023). A Maqasid Syariah perspective on the importance of food safety during Covid-19 pandemic. Journal of Halal Industry and Services, 6(1), 51–56.

IBM Corp. (2024). IBM SPSS Statistics for Windows (Version 29.0) [Computer software]. IBM Corp. https://www.ibm.com/analytics/spss-statistics-software

International Islamic University Malaysia. About IIUM. International Islamic University Malaysia. https://www.iium.edu.my/page/about-iium

Koenig, H. G. (2012). Religion, spirituality, and health: The research and clinical implications. ISRN Psychiatry, 2012, 278730. https://doi.org/10.5402/2012/278730

Moodle Project, (2020a). Moodle statistics. https://stats.moodle.org/. Accessed 20 Oct 2020.

Nianogo, R., Benmarhnia, T., & O'Neill, S. (2023). A comparison of quasi-experimental methods with data before and after an intervention: an introduction for epidemiologists and a simulation study.. International journal of epidemiology. https://doi.org/10.1093/ije/dyad032.

Quansah, R., & Essiam, C. (2021). The use of learning management system (LMS) Moodle in the midst of covid-19 pandemic: Students' perspective. Journal of Educational Technology and Online Learning, 4(3), 418–431. https://doi.org/10.31681/jetol.934730

Ramadas, A., Tham, S., Lalani, S., & Shyam, S. (2021). Diet Quality of Malaysians across Lifespan: A Scoping Review of Evidence in a Multi-Ethnic Population. Nutrients, 13. https://doi.org/10.3390/nu13041380.

Ross, S. M., & Willson, V. L. (2017). Experimental research methods. SAGE Publications.

Suárez-López, L. M., Pollitt, E., & Sternberg, R. J. (2023). Influence of nutrition on mental health: A scoping review. Healthcare, 11(15), 2183. https://doi.org/10.3390/healthcare11152183

World Health Organization (WHO). (2021). World health statistics 2021: Monitoring health for the SDGs, sustainable development goals. World Health Organization. https://www.who.int/publications/i/item/9789240027053

Yun, T. C., Ahmad, S. R., & Quee, D. K. S. (2018). Dietary habits and lifestyle practices among university students in Universiti Brunei Darussalam. The Malaysian Journal of Medical Sciences, 25(3), 56–66. https://doi.org/10.21315/mjms2018.25.3.6

Zakaria, R., Ahmad, A. N., Nordin, N. F. H., Samsudin, N., Elgharbawy, A. A., & Pengiran Haji Hashim, P. H. N. (2024). Halalan-Toyyiban concept as religious-based intervention for healthy diet among youth. IIUM Press.