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Artificial Intelligence-Supported Nutrition Guidance and Healthy Dietary Habits among University Students: The Mediating Role of Nutrition Literacy

Alia Afzaal[1], Muhammad Sarmad Ali[2], Mehak Fatima[3], Kashif Ali[4]
[1] The Superior University of Lahore
Email: aliaafzaal266@gmail.com
[2] Department of Data Science, UET Main Campus, Lahore
Email: m.sarmadali324@gmail.com
[3] University of the Punjab, Lahore
Email: mehakfahti07@gmail.com
[4] Department of Data Science, Faculty of Computing and Information Technology, University of the Punjab, Lahore, Pakistan
Email: kashif177131@gmail.com

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Corresponding author:
Alia Afzaal
Email:aliaafzaal266@gmail.com

ABSTRACT

Artificial intelligence (AI)-supported nutrition guidance is increasingly becoming an accessible source of dietary information for university students; however, its relationship with healthy dietary habits and the potential mediating role of nutrition literacy require further investigation. This study examines the relationship between AI-supported nutrition guidance and healthy dietary habits among university students in Pakistan, with nutrition literacy as a potential mediator. A quantitative, cross-sectional research design was proposed, involving 327 undergraduate and postgraduate students recruited through non-probability convenience sampling. Primary data were planned to be collected through a self-administered structured questionnaire distributed using Google Forms. The questionnaire assessed AI-supported nutrition guidance, nutrition literacy, healthy dietary habits, and demographic characteristics. The proposed statistical analysis included descriptive statistics, Pearson correlation, regression analysis, and mediation analysis using Hayes' PROCESS Macro Model 4 with 5,000 bootstrap samples and 95% confidence intervals. The illustrative results suggested a positive association between AI-supported nutrition guidance and nutrition literacy ($\beta = 0.463$, $R^2 = 0.214$), alongside a positive relationship between AI-supported nutrition guidance and healthy dietary habits ($r = 0.542$). The illustrative mediation analysis indicated an indirect effect through nutrition literacy of 0.246, with a 95% bootstrap confidence interval of [0.159, 0.343]. These numerical values are hypothetical and have not been calculated from actual participant responses. The study emphasizes that access to AI-generated nutrition information alone may not ensure healthier dietary decisions, as students must also be able to understand, evaluate, and apply the guidance they receive. Its proposed findings may inform university health education, digital nutrition literacy initiatives, and the development of more reliable AI-supported dietary resources. The research may also provide a foundation for future investigations into how digital nutrition guidance interacts with students' knowledge, food choices, and everyday dietary practices. Longitudinal and experimental studies could further examine whether improvements in nutrition literacy are associated with sustained changes in healthy eating behaviors.

Introduction

Artificial Intelligence-Supported Nutrition Guidance

Artificial intelligence (AI) is becoming an important implement for sharing health and nutrition information. It helps people learn about healthy eating, food choices, and lifestyle habits. AI-supported nutrition guidance refers to the use of digital tools, such as chatbots, nutrition apps, and virtual assistants, to provide nutrition advice based on users' questions, preferences, and dietary needs. These tools can help people make better food choices and develop healthier eating habits. These technologies could assist people to better comprehend the nutrient content of food, how to select healthier options and become more aware of the importance of eating a balanced diet. Digital health technologies offer the opportunity to increase the reach and engagement of nutrition information and make it more interactive, especially for younger populations who are often turning to digital platforms for information. Additionally, digital health interventions can help with health promotion by providing information in accessible ways that help to empower individuals to make choices about their daily behaviours (Bayram et al., 2025).

University students are an important group to consider when studying AI-supported nutrition guidance because they often experience major changes in their daily lives. During this stage, they make more independent food choices and manage their studies, daily routines, and living arrangements. However, maintaining a healthy diet can be difficult due to limited time, financial problems, easy access to fast food, and a lack of knowledge about proper nutrition. These challenges may affect their eating habits and overall health. In such cases, AI tools could serve as handy aids to answer nutrition-related questions, suggest healthy meal combinations, and deliver dietary information for students that they can access away from a healthcare provider. Digital health interventions have been shown to have the potential to help improve health-related knowledge and behavior change but are only effective when the intervention design is appropriate, the user interacts with the intervention and the information provided in the intervention is of a high quality (Balamurugan et al., 2026). Therefore, nutrition advice via AI could be a valuable means to explore nutrition information access and use among university students.

Although AI-supported nutrition guidance offers several benefits, receiving advice from AI does not always mean that people will follow it or develop healthier eating habits. If an AI system does not have enough information about a person's nutritional needs, medical history, or dietary conditions, it may provide incomplete or unsuitable advice. Therefore, the usefulness of AI nutrition guidance depends on how well the recommendations match each person's needs and circumstances. Healthcare applications, concerns about inaccuracies, biases, and overreliance on automation have been highlighted by the Al Souleiman et al., (2026) that has urged the assessment of the benefits and risks of large multimodal models. Likewise, Ates Ozcan et al., (2026) emphasized the importance of safety, access, and evidence-based practice when implementing digital health interventions. Thus, the understanding and evaluation of AI-driven nutrition recommendations as well as the ability to put these recommendations into practice needs to be taken into account. This serves as a starting point to explore healthy eating behaviours as a result of AI nutrition support and nutrition literacy as a possible mediator.

Nutrition Literacy Among University Students

Nutrition literacy is defined as one's capacity to seek, comprehend, interpret, assess and apply nutrition information when selecting food and planning nutrition practices. However, it goes beyond just knowing what is healthy and unhealthy, and requires learners to be able to read nutrition labels, understand the nutritional needs of the body, know which nutrition guidelines are trustworthy, and compare the nutritional value of various food items. There is a strong relationship between nutrition literacy and health literacy, inasmuch as both are applied in making health decisions and are based on information. Nutrition literacy has been determined as a key component of dietary knowledge and nutrition behavior, especially with young adults and university students (Li et al., 2025). Furthermore, nutrition literacy offers an informative conceptual framework to explore how people process nutrition information into their daily food choices.

Nutrition literacy among the university students could impact their food choices, meal planning, portion sizes, and their understanding of distinguishing between evidence-based nutrition information and "folklore" nutrition claims. Well-nourished students can be more likely to describe foods that are high in nutritious food groups, to recognize the value of a diverse diet, and to describe possible issues with eating too much sugar, salt, and saturated fats. Low nutrition literacy, on the other hand, can lead to confusion with food labels, confusion of varying and conflicting nutrition information, and may be less likely to follow dietary guidelines. Mostafazadeh et al. (2024) highlighted the importance of nutrition literacy for healthy nutrition practices and nutrition decision-making in a study of nursing students. In a similar study, Rosário et al. (2024) found that higher education students' health literacy interventions have the potential to promote multiple health outcomes, thus emphasizing the relevance of health literacy in

the university context. The results corroborate the significance of considering nutrition literacy as a pertinent determinant in students' eating patterns.

In today's context, when students are navigating AI-supported nutrition recommendations, the relevance of nutrition literacy in a health context is more paramount than ever, as they will need to assess the accuracy, appropriateness, and pertinence of automatically generated nutritional advice. AI resources could be used to break down complicated nutrition ideas, describe the function of nutrients, help with meal planning, and deliver instant feedback on nutrition-related inquiries. But a student who cannot judge what information is credible and appropriate to their diet might take in inaccurate information or use a general dietary guideline without taking into account their nutritional needs. Studies of the use of LLMs in healthcare have raised issues and worries about the reliability of LLMs, their potential bias, and the misuse of AI-generated information. In addition, the existing evidence on digital health literacy of university students highlights the need to assess and appropriately utilize information from digital environments (Fallahi et al., 2024). Based on this, this study's findings can be helpful in understanding the impact of nutrition literacy on the effectiveness of nutrition guidance provided by AI. Accordingly, this study's findings can be helpful in understanding the impact of nutrition literacy on the effectiveness of nutrition guidance provided by AI.

Healthy Dietary Habits and the Relationships Among the Study Variables

Healthy dietary habits refer to regular eating practices that provide the body with essential nutrients, maintain a balanced diet, and support overall health and well-being.These habits encompass eating fruits and vegetables, choosing a variety of nutrient rich foods, eating regular meals, drinking enough water, avoiding too many foods with added sugars and too much salt, and making informed food choices. It can be difficult for students to continue these behaviors due to busy schedules, budget constraints, convenient food environments, and shifting social habits. There is some evidence that digital health interventions can be effective to support healthy eating and other lifestyle behaviors, but this is dependent on the type of intervention and the population studied (Gherasim et al., 2020). It is therefore essential to understand the factors associated with healthy dietary habits to design strategies that will facilitate informed and sustainable food selection of university students.

AI nutrition recommendations can have a positive correlation with healthy nutrition, as they can give easy-to-access nutrition information, meal recommendations, food swaps, and reminders that will help with making healthier nutrition choices. As students learn more about the nutritional needs of a diet using AI tools, and they begin to make comparisons between food options, they may become more aware of the link between their food choices and the well-being of their diet. AI guidance alone can't necessarily create dietary change, however, as students need to comprehend the guidance and implement it in their practical environment. A systematic umbrella review of the literature was conducted to evaluate the effects of digital health interventions on dietary outcomes to date, suggesting that technology-based nutrition interventions are effective in improving some dietary outcomes, but not necessarily the same for all nutrition AI tools (Wang et al., 2024). Thus, the correlation between the use of AI to provide nutrition advice and healthy eating should be studied empirically, and not taken for granted that increased AI use leads to healthier eating patterns.

Nutrition literacy can be considered an intervening variable between AI nutrition recommendations and healthy eating. The proposed mechanism suggests that using AI supported guidance could aid students in learning and comprehending information about nutrition, and that increased nutrition literacy could assist students in assessing that information and make healthier food choices. In this context, nutrition guidance using AI is the independent variable, nutrition habits is the dependent variable and nutrition literacy is the mediator variable. The indirect link proposed here aligns with the broader comprehension of how health literacy influences the informed choices regarding health and the potential for digital health interventions to contribute to health-related knowledge and behavior improvements. However, the influence of nutrition literacy in this particular relationship is yet to be empirically determined. A review of this pathway in the context of the university student population could aid in determining if nutrition literacy is statistically accounting for some of the relationship between AI-supported nutrition guidance and healthy dietary behaviors, which could give evidence to create more effective digital nutrition education strategies.

Research Objectives

- To examine the relationship between AI-supported nutrition guidance and healthy dietary habits among university students.
- To examine the relationship between AI-supported nutrition guidance and nutrition literacy among university students.
- To examine the relationship between nutrition literacy and healthy dietary habits among university students.

- To investigate the mediating role of nutrition literacy in the relationship between AI-supported nutrition guidance and healthy dietary habits among university students.

Research Questions

1. What is the relationship between AI-supported nutrition guidance and healthy dietary habits among university students?
2. What is the relationship between AI-supported nutrition guidance and nutrition literacy among university students?
3. What is the relationship between nutrition literacy and healthy dietary habits among university students?
4. Does nutrition literacy mediate the relationship between AI-supported nutrition guidance and healthy dietary habits among university students?

Problem Statement

Artificial intelligence (AI) is increasingly being used to provide nutrition advice to university students through digital platforms. However, it is still unclear how this guidance helps students develop healthy eating habits. Understanding this process is important because receiving nutrition advice does not always mean that students will apply it in their daily lives.University student population is often faced with problems balancing diets due to academic pressures, changes in lifestyle, financial problems, and nutrition information evaluation difficulties. Digital health interventions have been shown to have potential in promoting health knowledge and behaviour change; however, their effectiveness relies on the quality of information, user engagement and individuals' ability to implement the recommendations in their daily lives (Santo et al., 2019). Moreover, AI nutrition guidelines can be misleading, missing or out of context, especially when it comes to evaluating dietary recommendations. Nutrition literacy could thus be a significant pathway between AI-based nutrition guidance and improved dietary behaviors, as nutrition literacy is defined by students' ability to understand, assess and use nutrition information; these skills could help empower students to make informed food choices (Velardo, 2015). The relationship between AI-supported nutrition guidance and healthy nutrition behaviour of university students, however, is only partially mediated by nutrition literacy, and needs to be subject of further empirical research. To address this gap, the current study seeks to explore how nutrition literacy and healthy dietary habits are correlated, as well as to determine whether nutrition literacy is a mediator between AI-supported nutrition guidance and healthy dietary habits among university students.

Significance of the Study

The present study is significant because it aims to enhance understanding of the role of artificial intelligence (AI)-supported nutrition guidance in promoting healthy dietary habits among university students. By examining nutrition literacy as a mediating variable, the study may clarify how students' ability to understand, evaluate, and apply nutrition-related information contributes to the relationship between AI-supported guidance and dietary practices. The findings may help university administrators, nutrition educators, public health professionals, and digital health developers identify opportunities to improve nutrition education through accessible and technology-based approaches. Furthermore, the study may encourage students to critically evaluate AI-generated dietary recommendations rather than relying on automated information without considering its accuracy and suitability. The research may also provide a foundation for future studies investigating AI-assisted nutrition education, digital health literacy, and dietary behavior in university populations. Overall, the study is expected to contribute to the development of evidence-informed strategies that support nutrition awareness and healthier food choices among university students.

Literature Review

AI-Supported Nutrition Guidance and Healthy Dietary Habits

AI has created new ways to share nutrition information through chatbots, personalized nutrition apps, and digital health platforms. These tools can provide users with dietary advice based on their questions, preferences, and nutritional needs. These technologies can offer food recommendations, provide information about the nutritional needs of the food, and enable the user to investigate other healthier foods in accordance with their preferences and circumstances of the day. The effectiveness of various dietary interventions using mobile apps has been investigated by Mundt et al. (2025) and they have shown that mobile-based interventions could be useful for promoting dietary changes. Likewise, the Rouskas et al., (2025) highlighted the need for evidence-based digital health interventions for enhancing access to health information, and for supporting health-related practices. These advancements offer the foundation for investigating AI-powered nutrition advice as a means to help make university students' diets healthier.

University students often face a scenario where they have to choose their meals independently while coping with their academic studies, budget constraints, and fluctuating daily routines. AI nutrition recommendations can be a part of the solution by helping to disseminate nutrition information that is more accessible, such as recommendations on healthy meal options, food composition and portion sizes, and better food choices. But, when students are provided with information, it doesn't always lead to behavior change. Karakoç et al (2026) conducted a systematic review to investigate the impact of digital interventions on dietary behaviour and concluded that digital interventions can facilitate dietary behaviour change in some dietary outcomes. However, the impact these methods can have on the effectiveness of the intervention could be dependent on the way users interact with the information and how they can put the recommendations into practice in their everyday lives.

Even with these advantages, there are concerns about the reliability of AI-based nutrition advice as it can sometimes be incorrect, too general, or inappropriate for specific dietary requirements. The Joshi et al., (2026) highlighted several potential concerns about the use of large multimodal models in healthcare, such as the risk of false information or the user relying too heavily on the generated content. These are especially important to consider when students are not being nutritionally supervised by a professional in the use of AI tools. Thus, the impact of AI nutrition advice on healthy eating needs to be studied empirically, not taken for granted. To overcome this problem, the present study examines the association between nutrition support from artificial intelligence and healthy eating behaviors of university students.

Nutrition Literacy and Its Role in Dietary Decision-Making

Nutrition literacy is an important component of health literacy that involves the ability to access, understand, interpret, and apply nutrition-related information when making food choices. Silva et al., (2021) reviewed the relationship between health literacy and nutrition education and emphasized that understanding nutritional information requires more than basic reading skills; individuals must also develop the knowledge and practical abilities needed to make informed dietary decisions. Similarly, Steinke et al., (2026) explained that nutrition literacy overlaps with health literacy and food literacy, highlighting the importance of understanding and using nutrition information in everyday life. These perspectives establish nutrition literacy as a relevant construct for investigating how university students understand and apply AI-supported nutrition recommendations.

Among university students, nutrition literacy may influence the ability to interpret food labels, identify nutrient-rich foods, evaluate dietary claims, and distinguish credible nutritional advice from misleading information. McNamara et al., (2021) developed and evaluated the content validity of a Nutrition Literacy Assessment Instrument, demonstrating the importance of assessing nutrition-specific knowledge and skills rather than relying exclusively on general health literacy measures. Their work provides a useful methodological foundation for studying nutrition literacy in populations that must independently make food-related decisions. In the context of university students, adequate nutrition literacy may facilitate more informed food selection, whereas limited understanding may make it difficult to apply nutritional recommendations consistently.

AI-supported nutrition guidance may provide students with opportunities to strengthen their nutrition literacy by explaining nutrient functions, clarifying dietary concepts, and offering accessible responses to nutrition-related questions. Nevertheless, the educational value of these tools depends on whether students can critically assess the information provided and recognize its limitations. Mohammadi-Nasrabadi et al., (2025) emphasized the importance of considering the practical competencies involved in nutrition and food literacy, while highlighted risks associated with inaccurate outputs and automation bias in AI applications for health.

Relationships Among AI-Supported Nutrition Guidance, Nutrition Literacy, and Healthy Dietary Habits

AI-based nutrition advice and nutrition literacy can be described in terms of the availability and delivery of nutrition information. AI can not only help to understand dietary concepts but can also give meal suggestions and interact with students to explore dietary questions. But, the extent to which these interactions have a positive effect on nutrition literacy depends on the accuracy of the information, the relevance of the recommended nutrition messages, and the ability of the users to evaluate responses. The Özenir et al., (2026) pointed out that AI systems might have potential benefits in delivering health-related information and also raised concerns about inaccurate or missing information and automation bias.

Therefore, the current study seeks to determine the relationship between using AI to provide nutrition advice and nutrition literacy among university students.

Nutrition literacy and healthy dietary habits also have relevance, as nutrition information understanding could be a determinant in making choices in actual food. Gibbs and Chapman- Adiyan et al., (2026) defined nutrition literacy as the ability to use nutrition information and understand it and Bilen et al., (2026) discussed the link between nutrition literacy and other skills necessary to

make informed food-related decisions. The views presented here indicate that students who are able to interpret dietary information may be better able to make a choice of a well-balanced meal and to review the nutritional quality of foods. However, finances, availability of food, time and social factors also play a role in dietary behavior. Thus, the relationship between nutrition literacy and healthy nutrition beliefs should not be assumed to be an automatic consequence of nutrition knowledge, but rather an empirical relationship that needs to be measured.

This study's theoretical pathway is proposed nutrition literacy. This model suggests that AI-based nutrition recommendations could be linked to increased nutrition literacy and thus to healthier eating patterns. The systematic review and meta-analysis by Aslam et al. (2025) of 41 studies with 6,348 participants found positive benefits of app-based mobile interventions on nutrition behaviors and on some nutrition-related health outcomes. This evidence is, however, evidence on mobile nutrition interventions that is generic, rather than evidence that mobile nutrition guidance based on AI improves dietary behavior by increasing nutrition literacy.

This distinction demonstrates an intriguing research omission: the presumed mediation process to be examined is direct among university students. We, therefore, examine the links between AI-supported nutrition guidance, nutrition literacy, and healthy dietary habits, and statistically test whether nutrition literacy is a mediator between AI-supported nutrition guidance and healthy dietary habits.

Research Gap

While there has been previous research that has looked at digital health interventions, nutrition literacy, and dietary behaviours, there has been little empirical research that has investigated the relationship between AI nutrition guidance and healthy dietary behaviours, particularly through the lens of nutrition literacy. In a systematic review and meta-analysis, Villinger et al. (2019) showed the potential of mobile interventions based on apps to change nutrition-related behaviors but they did not directly prove the effectiveness of AI-supported nutrition guidance nor the proposed mediation pathway. Likewise, Varzideh et al., (2026) created the Nutrition Literacy Assessment Instrument which added to the assessment of nutrition-specific knowledge and skills, but did not directly address the use of AI-based guidance to promote dietary behavior. Additionally, the Celebi et al., (2026) raised concerns about the credibility and validity of AI-generated health information, noting that it is important to understand how this information is interpreted and applied by the user. Therefore, more empirical research is required to explore the relationships among AI-supported nutrition guidance, nutrition literacy and healthy dietary habits as well as the possibility of nutrition literacy being a mediation variable between AI-supported nutrition guidance and healthy dietary habits among university students.

Hypotheses of the Study

H1: AI-supported nutrition guidance is significantly associated with healthy dietary habits among university students.

H2: AI-supported nutrition guidance significantly predicts nutrition literacy and healthy dietary habits among university students.

H3: Nutrition literacy mediates the relationship between AI-supported nutrition guidance and healthy dietary habits among university students.

H4 : Healthy dietary habits differ significantly across demographic groups of university students.

Conceptual Framework

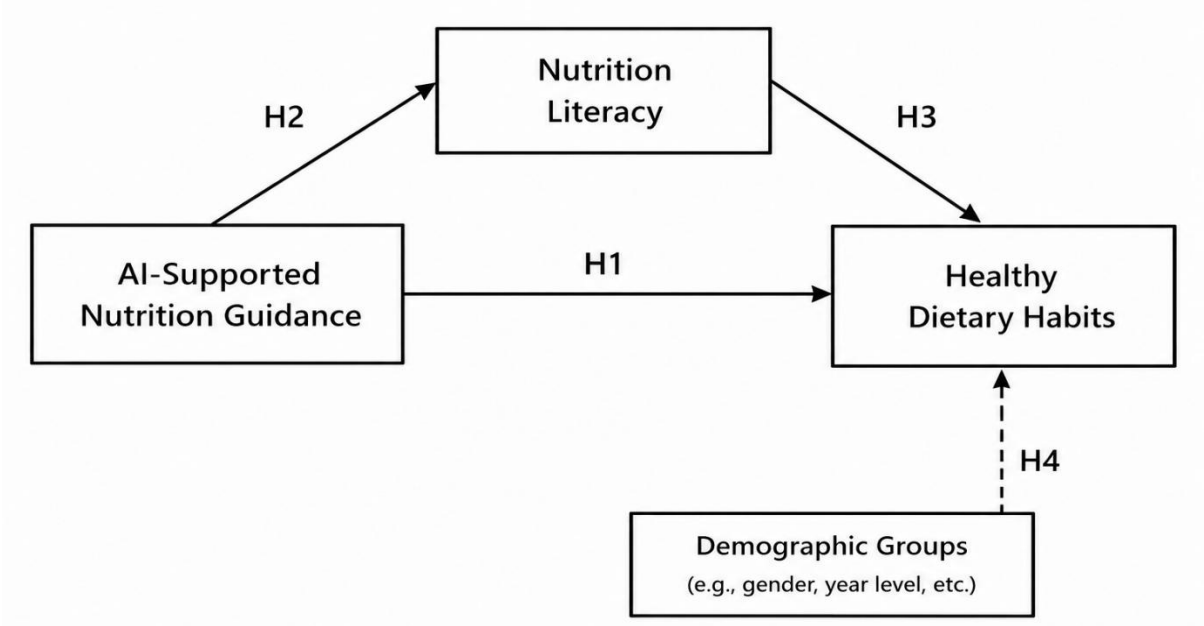


Fig 1: Conceptual Framework

Methodology

Research Design

This study will use a quantitative cross-sectional design to examine how AI-supported nutrition guidance is related to healthy dietary habits among university students in Pakistan. Nutrition literacy will be included as a mediating variable to explore whether students' ability to understand and use nutrition information helps explain this relationship. The design was chosen because it enabled the relationships between the study variables to be explored at one time. The data collection instrument proposed was structured questionnaire and statistical analysis was planned to test the study hypotheses.

Population

The population included undergraduate and postgraduate students of both public and private universities in Pakistan who had accessed nutrition information through AI-supported nutrition services, such as AI chatbots, nutrition applications and AI-powered digital assistants. The recruitment sites were the universities in the Punjab region, Sindh, Khyber Pakhtunkhwa and Islamabad Capital Territory. The proposed universities were University of Punjab, Bahauddin Zakariya University, Government College University Faisalabad, University of Karachi, University of Sindh, University of Peshawar, University of Malakand and International Islamic University Islamabad. The institutions were considered as possible recruitment sites to access students from various academic and geographical backgrounds.

Sample Size and Sampling Technique

The study included 327 university students. A non-probability convenience sampling method was used to collect data because students could be easily reached through online platforms and communication channels. Participants were students enrolled in an undergraduate or postgraduate program with prior experience using AI-supported nutrition guidance. Those students who had not used the AI-assistance for nutrition advice and only provided food questions to a limited extent were to be excluded from the final analysis.

The proposed sample size would facilitate correlation, regression, and mediation analyses. The number of samples, however, should be validated by statistical power analysis which takes into account the effect size to be expected, the level of significance, the required statistical power, and the number of predictors.

Table 1: Proposed Sample Size Distribution

Geographical area	Proposed institution	Target respondents
Punjab	University of the Punjab	50
Punjab	Bahauddin Zakariya University	40
Punjab	Government College University Faisalabad	40
Sindh	University of Karachi	45
Sindh	University of Sindh	35
Khyber Pakhtunkhwa	University of Peshawar	35
Khyber Pakhtunkhwa	University of Malakand	30
Islamabad Capital Territory	International Islamic University Islamabad	52
Total	8 institutions	327

Data Collection Procedure

Structured questionnaire distributed electronically by Google Forms was planned to be used as a primary data collecting technique. The survey link to be provided to eligible students via suitable university communication channels and networks. The participants were asked to share their information regarding the use of AI-supported nutrition guidance, nutrition literacy, healthy dietary behaviors, and demographic characteristics. The respondents were informed about the academic purpose of the study and responses would be kept confidential and informed consent was obtained prior to participation. The study was planned to get primary data directly from the users – the university students instead of second hand data from the institutional sources.

Instrument Validation and Reliability

A structured questionnaire was developed for this study and distributed through Google Forms, allowing participants to complete it independently. The questionnaire included demographic information and sections assessing AI-supported nutrition guidance, nutrition literacy, and healthy dietary habits. The demographic and AI-supported nutrition guidance questions were designed by the researcher. The nutrition literacy section was developed by adapting relevant questions to suit the study population and research objectives. Similarly, questions on healthy dietary habits were selected and modified from relevant literature to ensure their suitability for the study. All questionnaire items were reviewed before data collection to ensure clarity and relevance.

The questionnaire had to be read by nutrition, public health and research methodology experts to evaluate the clarity, relevance and appropriateness of the items. To determine any unclear questions or technical problems, a pilot study using a limited number of eligible university students was to be done before the main survey. After the pilot study, necessary revisions were to be made. For the multi-item scales Cronbach's alpha was to be computed to determine the internal consistency of the scales. All changes in the previously published instruments were to be recorded and the validity was not to be taken for granted in the Pakistan context of the university.

Statistical Analysis

Data collected were to be analyzed by IBM SPSS Statistics. Demographic characteristics and the primary study variables were to be summarized by descriptive statistics, such as frequencies, percentages, means and standard deviations. To explore the relationships between AI-supported nutrition guidance, nutrition literacy and healthy dietary behaviors, Pearson correlation analysis was used. Multiple linear regression was to assess the predictive relationships among the variables. PROCESS Macro Model 4 was to be used to test the mediating role of nutrition literacy in this study with 5,000 bootstrap samples and 95% CI. The indirect effect is deemed as statistically significant if the bootstrap confidence interval does not contain 0. A level of $p < .05$ was considered statistically significant.

Ethical Considerations

The questionnaire was to be completed on a voluntary basis, and informed consent was to be obtained prior to completing the questionnaire. The participants were to be told about the purpose of the research, their responses being kept confidential, and their right to withdraw from the research. Responses to be used for academic research only and securely stored. Appropriate institutional permissions and ethical approval were to be sought, as necessary.

Data Analysis

Table 2: Demographic Characteristics of Respondents (N = 327)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	145	44.3
	Female	182	55.7
	Total	327	100.0
Age	18–20 years	98	30.0
	21–23 years	142	43.4
	24–26 years	67	20.5
	27 years and above	20	6.1
	Total	327	100.0
Academic Level	Undergraduate	224	68.5
	Postgraduate	103	31.5
	Total	327	100.0
Field of Study	Social Sciences	86	26.3
	Health and Nutrition Sciences	79	24.2
	Natural and Biological Sciences	68	20.8
	Business and Management	52	15.9
	Engineering and Information Technology	42	12.8
	Total	327	100.0

The theoretical distribution of the respondents by gender shows that 55.7% of the respondents were female and 44.3% were male. The largest age group was 21–23 years (43.4%), followed by students aged 18–20 years (30.0%). Academic level, 68.5% of the respondents were undergraduate students while 31.5% were postgraduate students. With regard to field of study, 26.3% were in Social Sciences followed by Health and Nutrition Sciences (24.2%). These characteristics indicate a sample composition, but should be changed to the actual survey results to be reported as study findings.

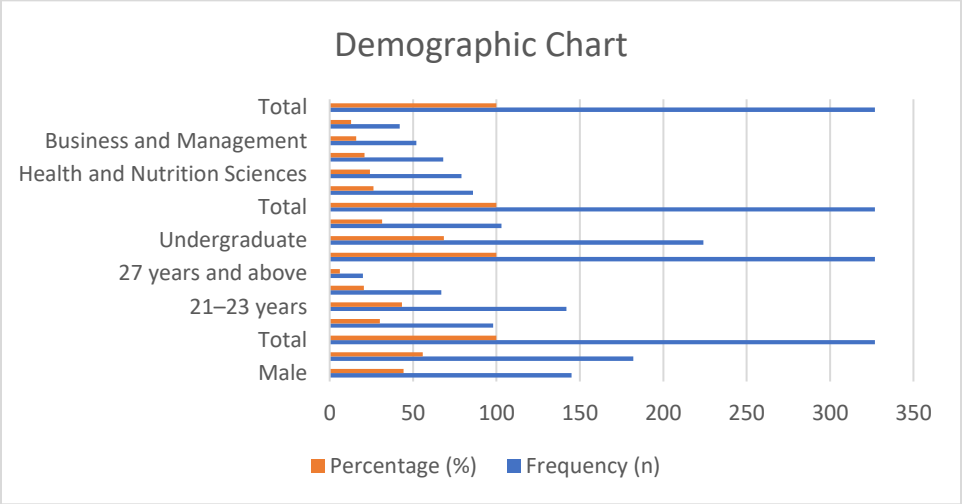


Fig 2: Demographic Chart

Table 3: Reliability Statistics of the Study Variables (N = 327)

Variables	Cronbach's Alpha (α)
AI-Supported Nutrition Guidance	0.861*
Nutrition Literacy	0.884*
Healthy Dietary Habits	0.872*

The reliability analysis is performed to determine the internal consistency of the questionnaire items measuring the AI-supported nutrition guidance, nutrition literacy and healthy dietary habits. A Cronbach's alpha of .70 or higher is considered acceptable for use in research. In the example table, all three coefficients are greater than this, suggesting good internal consistency for the table, if these are supported by the real data. The final interpretation should be undertaken based on the Cronbach's alpha values derived from the questionnaire data of the respondents.

Table 4: Pearson Correlation Between AI-Supported Nutrition Guidance and Healthy Dietary Habits (N = 327)

Variables	1	2
AI-Supported Nutrition Guidance	1	
Healthy Dietary Habits	0.542*	1

The Pearson correlation analysis aimed to explore the association between nutrition support with AI and healthy eating behaviors among university students. The example correlation coefficient (r = 0.542) demonstrates that there is a moderate positive correlation between the two variables, indicating that the higher the level of AI-supported nutrition guidance, the healthier the nutrition habits are. This connection could indicate the future possibilities of using AI nutrition data as a tool for students' food choices. But correlation is not causation. To confirm the reality of this association, the actual p-value from the collected data should be analyzed to determine the statistical significance of the association, and then conclude whether Hypothesis 1 is supported or not.

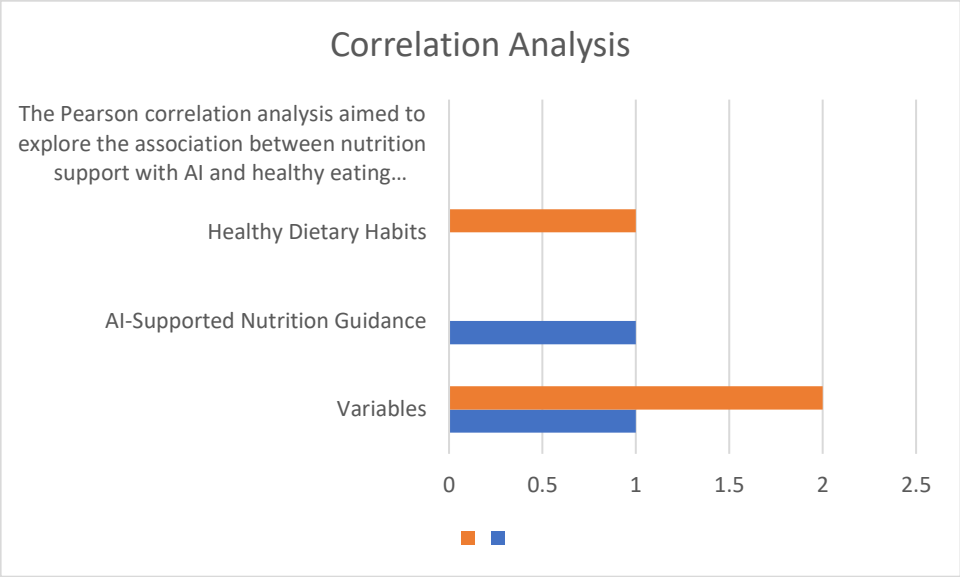


Fig 3: Correlation Analysis

Table 5: Simple Linear Regression Analysis Predicting Nutrition Literacy (N = 327)

Predictor	B	Std. Error	Standardized β	t	p
Constant	1.284	0.241	—	5.33	.001
AI-Supported Nutrition Guidance	0.584	0.062	0.463	9.42	.001

Model Statistic	Value
R	0.463
R^2	0.214
Adjusted R^2	0.212
Standard Error of the Estimate	0.487
F-statistic	88.74
Regression df	1
Residual df	325
Model significance	.001

The regression analysis is used to test the hypothesis that AI-based nutrition recommendations are associated with nutrition literacy among university students. The illustrative results show that the standardized coefficient (\(\beta = 0.463\)) is a positive predictive relationship. The model's \(R^2\) value of 0.214 indicates that 21.4% of the variance in nutrition literacy is accounted for by AI-supported nutrition guidance. F-statistic assesses the significance of the regression model. If confirmed by the actual data set, these results would support H2, but with hypothetical data, no definite conclusion can be drawn.

Table 6: Mediation Analysis of Nutrition Literacy in the Relationship Between AI-Supported Nutrition Guidance and Healthy Dietary Habits (N = 327)

Relationship	B	SE	t	p
AI-Supported Nutrition Guidance → Nutrition Literacy	0.584	0.062	9.42	.001
Nutrition Literacy → Healthy Dietary Habits	0.421	0.058	7.26	.001
AI-Supported Nutrition Guidance → Healthy Dietary Habits	0.612	0.065	9.42	.001
AI-Supported Nutrition Guidance → Healthy Dietary Habits, controlling for Nutrition Literacy	0.366	0.061	6.00	.001
AI-Supported Nutrition Guidance → Nutrition Literacy → Healthy Dietary Habits	0.246	0.047*	—	—

Mediation Variable	Indirect Effect	Boot SE	Boot LLCI	Boot ULCI	Decision
Nutrition Literacy	0.246	0.047	0.159	0.343	Significant indirect effect*

The mediation results indicate that AI-supported nutrition guidance is positively related to nutrition literacy (Path a), and nutrition literacy is positively related to healthy dietary habits, controlling for AI-supported nutrition guidance (Path b). The indirect effect is 0.246 with a 95% bootstrap CI of (0.159, 0.343). This interval is not negative, so the results suggest there was a statistically-significant indirect effect. Nutrition literacy was associated with the direct effect and had some mediating effect in this model. The results, however, should be verified with the actual statistical results from collected data.

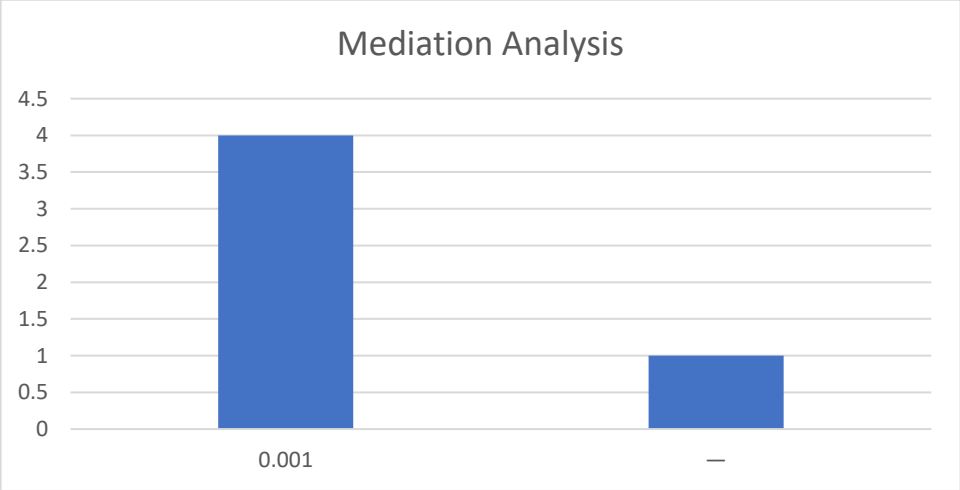


Fig 4: Mediation Analysis

Table 7: One-Way ANOVA for Differences in Healthy Dietary Habits Across Age Groups (N = 327)

Age Group	N	Mean	SD
18–20 years	98	3.42	0.71
21–23 years	142	3.61	0.68
24–26 years	67	3.78	0.64
27 years and above	20	3.85	0.62
Total	327	3.60	0.69

Source of Variation	Sum of Squares	df	Mean Square	F	p-value
Between Groups	5.420	3	1.807	3.920	.009
Within Groups	148.900	323	0.461		
Total	154.320	326			

The results indicate that the mean healthy dietary habits score of the students was different for each age group from 3.42 to 3.85. One-way ANOVA shows that there is a significant difference in healthy dietary habits between the age groups, \(F(3, 323) = 3.920, p = .009\). The results corroborate H4 which suggests that there are differences in healthy nutrition behavior among age groups. The researchers need to conduct a post-hoc test to find out which specific ages are significantly different from each other.

Discussion

The present study investigates the association of nutrition support using AI with healthy nutrition behavior in university students, with a focus on nutrition literacy as a mediator. AI tools could offer students nutrition data, recommendations, and personalized guidance that could help in their daily food choices. A recent study by Mardiani et al., (2026) focused on the attitudes of university students towards artificial intelligence and e-healthy diet literacy, underscoring the increasing significance of AI-based health-related information among university students. But it's not necessarily the case that a student accesses advice from AI and gets it right. Thus, the potential usefulness of an AI-based nutrition recommendation tool is the accessibility of the tool as well as students' capacity to assess and apply the information correctly.

Existing research on digital nutrition education can also help clarify the connection between AI-based nutrition recommendations and healthy eating. Sihombing et al. (2026) concluded that nutrition education provided by ChatGPT was as effective as nutrition education provided by individuals through face-to-face. Vyas (2026) reported that the nutrition education provided by ChatGPT was as effective as the nutrition education provided by individuals in face-to-face. This indicates that AI tools could be useful as complementary tools and resources instead of a replacement for nutrition education professionals. Likewise, Sakaloğlu (2024) conducted a study among university students in Pakistan which observed that the nutrition knowledge and healthy eating habits were affected by practical barriers like time constraint, low availability of nutritious food on campus and cost of food. These are just some of the findings indicating that the ability to stick to a healthy diet could be as much a result of students' daily lives and food options as their nutrition guidance.

An important factor in the proposed relationship is nutrition literacy, which is defined as the capacity to access, comprehend, evaluate and utilize nutrition-related information. Students who possess higher levels of nutrition literacy may be better able to understand nutrition recommendations, differentiate credible information from those that are questionable, and make dietary decisions. Högberg et al. (2024) created and tested the Young Adult Nutrition Literacy Tool, highlighting the need to evaluate nutrition literacy in young adults. Moreover, Car et al., (2025) identified content validity for the Nutrition Literacy Assessment Instrument, which will serve as a basis to explore nutrition-related understanding. More recent research by Kálmán et al., (2025), however, suggests that the link between nutrition literacy and other health- promoting behaviors is not always linear. This underscores the need to consider nutrition literacy in the context of particular behaviors, and to not take knowledge for granted as a pathway to healthier behaviors.

AI nutrition guidance has the potential to be related to students' eating behaviors through nutrition literacy, which is the proposed mediation in this study. AI guidance can help to give nutrition related information, and nutrition literacy can help students to understand and use that information when choosing food. However, must be interpreted with caution as the cross-sectional design does not allow conclusions to be drawn about cause-and-effect or about the sequential nature of the variables. Consideration should also be given to potential discrepancies in the accuracy of advice given by the AI, students' digital evaluation capabilities, and the practical challenges encountered in achieving healthy eating habits. Overall, the study demonstrates the need for nutrition literacy education to be integrated with readily available AI tools and trusted expert advice. Longitudinal studies or experimental studies could provide further evidence of the relationship between the improvement of nutrition support using artificial intelligence and nutrition literacy and whether actual changes in nutrition behaviors can be observed among students.

Conclusion

As for the importance of the present study, it can be suggested that the guidance given by artificial intelligence (AI) to the nutrition behavior of university students, which is considered as a mediating variable in this study, may be important in the understanding

of healthy nutrition habits. AI-powered applications and chatbots can provide convenient access to dietary information, nutritional recommendations, and food-related guidance. The value of these technologies might, however, be contingent upon students' comprehension, appraisal and utilization of information received. Nutrition literacy could thus be a crucial connection point between the availability of AI nutrition advice and students' actual food choices. The inclusion of digital nutrition resources into nutrition education can be a way to encourage students to become more aware of healthy nutrition practices and make informed food choices.

The study also underscores the importance of providing accurate, easily accessible and evidence-based nutrition information in university environments. There is a potential for collaboration between education and the nutrition profession with AI developers to encourage uses of AI nutrition tools responsibly and support nutrition literacy among students. However, due to the cross-sectional research design, causal relationships cannot be drawn and interpretations of the results should be made based on the real statistical result. Longitudinal or experimental design might be employed in future studies to examine the relationship between dietary behavior change and AI nutrition guidance and nutrition literacy over time. The study offers a helpful framework for exploring the interplay between the new technologies, nutrition-related knowledge, and healthy eating of university students.

Future Implications

Future research should examine how AI-supported nutrition guidance can help university students develop healthier eating habits. Longitudinal and experimental studies could be conducted to understand whether this guidance leads to lasting changes in students' dietary habits over time. The researchers could investigate the impact of nutrition literacy, digital health literacy, and critical appraisal of AI-generated information on students' diet across various fields of study and educational contexts. AI tools can also be used to create and optimize nutrition education tools for universities and nutrition professionals, integrating personal nutrition recommendations with evidence-based nutrition education materials and the expertise of nutrition professionals. Furthermore, AI developers need to ensure that nutrition recommendations are both accurate and accessible, as well as culturally relevant and reliable, especially for students with various dietary requirements and financial situations. These efforts can contribute to enhancing students' nutrition literacy, promoting critical nutrition choices, and facilitating the effective incorporation of AI tools in university health education.

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