Role of Artificial Intelligence (AI) in promoting Healthy Eating Habits among Students through Food Tracking Apps

Ahiakwo, Rosemary Oluwayemisi
School of Vocational Studies
Department of Home Economics
Federal College of Education (Technical), Omoku, Rivers State, Nigeria
odobomax@gmail.com
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Abstract
This study adopted a descriptive survey research designed to examine the role of artificial intelligence (AI) in promoting healthy eating habits among students through food tracking apps. The study was carried out at Federal College of Education (Technical) Omoku, River State, Port Harcourt and Federal College of Education (Technical) Asaba, Delta State all in Nigeria. The population of the study was 28 year three students from the department of Home Economics, Federal college of Education (Technical) Omoku and 26 year three students from the department of Home Economics, Federal college of Education (Technical) Asaba. A sample size of 26 was used for the study. Stratified sampling techniques were used for the study. The instrument used for the study was a structured questionnaire titled role of artificial intelligence (AI) in promoting healthy eating habits among students through food tracking apps (RAIPHEHSFTA) with 20 items. Face and content validity was used for the study, reliability co-efficient of 0.74 was obtained. Mean and t-test were the statistical tools used for the study. The study found that AI-driven apps provide tailored dietary recommendations based on a student's health goals, food preferences, allergies, and activity levels. Based on the findings, the researcher recommended that developers should refine AI algorithms to provide more precise and personalized dietary recommendations based on students' age, activity level, dietary preferences, and health conditions.

Keywords: *Artificial Intelligence, Healthy Habits, Eating Habits, Food Tracking Apps, Innovative strategies, Students.*

Introduction

A significant global public health problem is the rising incidence of bad eating patterns among students. Adolescent obesity, malnutrition, and diet-related disorders including diabetes and cardiovascular problems have increased as a result of poor dietary choices, such as consuming too much processed food, sugary drinks, and fast food (Crichton-Study, 2024). Since healthy eating is essential for brain function, memory retention, and general mental health, students' academic and cognitive development are strongly correlated with their dietary intake (Neuhouser, Prentice, Tinker, & Lampe, 2022). The demand for creative ways to encourage kids to eat healthily is therefore increasing, and artificial intelligence (AI) has become a potent instrument in tackling this issue.

With real-time monitoring, tailored recommendations, and actionable insights, AI-powered meal tracking applications have completely changed how students interact with their eating habits. These applications assess food consumption trends and offer personalized feedback by utilizing

cutting-edge AI technologies like machine learning, natural language processing (NLP), and image recognition (Neufinger & Eilander, 2023). Students may make educated food decisions based on their dietary requirements, preferences, and health objectives with the help of AI-driven recommendations. AI can, for example, track caloric intake, provide meal substitutes with higher nutritional content, and spot bad eating habits that could lead to deficiencies or weight gain.

The following are advantages of healthy habits:

1. Improved Academic Performance and Cognitive Function: Brain function, memory retention, and concentration are all supported by a diet that is well-balanced and full of vital nutrients including vitamins, minerals, and proteins. According to studies, adolescents who eat wholesome meals—especially breakfast—perform better academically than those who skip meals or eat diets heavy in fat and sugar (Dorji, Kinley & Dorji, 2021).
2. Better Physical Health and Growth: Eating well promotes healthy physical development, which guarantees that students develop at their best rate (Vega-Ramirez, 2024). By strengthening bones and teeth, a diet high in calcium and vitamin D lowers the chance of developing diseases like osteoporosis later on. Furthermore, eating well-balanced meals that contain enough protein promotes the growth of muscles and general body strength.
3. Increased Energy Levels and Reduced Fatigue: Nutrient-rich foods such as whole grains, fruits, vegetables, and lean proteins ensure stable blood sugar levels, preventing fatigue and sluggishness, unlike processed and sugary foods that cause energy crashes. Students who maintain healthy eating habits are less likely to be absent from school and participate in learning activities more fully overall.
4. Strengthened Immune System: A healthy diet strengthens the body's defense mechanisms by providing essential vitamins like zinc, vitamin C, and vitamin A, which aid in the fight against infections and diseases. Students stay focused and involved in class activities as a result of this (Carly, Mika, & Connor, 2022).
5. Prevention of Obesity and Lifestyle Diseases: Poor eating practices, especially the intake of junk food, sugar-filled beverages, and excessive fats, are linked to obesity and other long-term conditions like type 2 diabetes and high blood pressure. Maintaining a healthy weight and lowering the risk of future health issues can be achieved by encouraging students to adopt healthy eating habits, such as portion control and consuming meals high in nutrients (Smith, Fu & Kobayashi, 2020).
6. Better Sleep Patterns: Poor dietary choices, such eating too many sweet foods and coffee, might interfere with the quality of your sleep. However, a well-balanced diet that includes important nutrients like tryptophan, melatonin, and magnesium encourages better sleep, which is important for students' general health and cognitive function (Mashel, Jawaher, Rabab, Habiba, Malak, Asmaa, Rana, Alanoud, Noor, Shahad & Mona, 2022).

It is impossible to overestimate the significance of kids adopting good eating habits. Better academic achievement, enhanced physical and mental health, increased immunity, and general well-being are all influenced by a well-balanced diet. Early adoption of healthy eating practices by students promotes lifelong wellness and lowers the risk of chronic diseases in addition to providing short-term advantages (Chaudhary, Frantisek & Bent, 2020). By assisting students in tracking their nutrition, making educated food choices, and staying motivated to maintain a healthy lifestyle, AI-powered food tracking applications can significantly contribute to the reinforcement of these habits as they become more and more popular.

However, if AI technology develops further, its incorporation into student nutrition programs has enormous potential to encourage wholesome eating habits for the rest of one's life. Through the

use of food monitoring apps, this study aims to investigate how AI might help students adopt healthier eating habits. It does this by examining the apps' efficacy, drawbacks, and implications for upcoming nutritional health initiatives.

Statement of the Problem

With rising rates of obesity, malnutrition, and diet-related illnesses like diabetes and cardiovascular problems, the growth in bad eating habits among students has raised concerns. Poor eating choices have a detrimental effect on students' academic performance, cognitive development, and physical health. These include consuming too much processed food, sugary drinks, and fast food. A lack of appropriate advice, motivation, and individualized dietary recommendations makes it difficult for many students to acquire and maintain healthy eating habits, even in the face of numerous nutritional awareness efforts.
Food tracking apps have become a viable way to deal with this problem as artificial intelligence (AI) has advanced. To assist students in making educated food choices, these AI-powered applications offer behavioral insights, individualized nutrition recommendations, and real-time monitoring.
But it's still unclear how much these apps actually affect students' eating habits, and issues like user engagement, the accuracy of AI-generated recommendations, data privacy concerns, and accessibility issues may prevent them from being widely adopted. In light of these issues, it's important to investigate how AI can help students adopt healthier eating habits through food tracking apps. This study aims to evaluate the efficacy of AI-powered food tracking applications, look at how they affect students' eating habits, and identify the difficulties that arise when using them. Knowing these factors is essential to creating strategies that increase the uptake and efficacy of AI-driven nutrition interventions in encouraging students to lead healthier lifestyles.

Aim and Objectives of the Study

This study aims to examine the role of artificial intelligence (AI) in promoting healthy eating habits among students through food tracking apps. Specifically, the study seeks to:

1. Assess the effectiveness of AI-powered food tracking apps in encouraging students to make healthier dietary choices.
2. Examine the impact of AI-generated personalized nutrition recommendations on students' eating habits.
3. Identify the challenges and limitations students face in adopting AI-driven food tracking apps for maintaining healthy eating habits.

Research Questions

To achieve the study's objectives, the following research questions will be addressed:

1. How effective are AI-powered food tracking apps in influencing students’ dietary choices and habits?
2. To what extent do AI-generated personalized nutrition recommendations impact students' eating behaviors?
3. What challenges do students encounter in using AI-driven food tracking apps to maintain healthy eating habits?

Methodology

This study adopted a descriptive survey research designed to examine the role of artificial intelligence (AI) in promoting healthy eating habits among students through food tracking apps. The study was carried out at Federal College of Education (Technical) Omoku, River State, Port Harcourt and Federal College of Education (Technical) Asaba, Delta State all in Nigeria. The population of the study was 28 year three students from the department of Home Economics, Federal college of Education (Technical) Omoku and 26 year three students from the department of Home Economics, Federal college of Education (Technical) Asaba. A sample size of 26 was used for the study. Stratified sampling techniques were used for the study. The instrument used for the study was a structured questionnaire titled role of artificial intelligence (AI) in promoting healthy eating habits among students through food tracking apps (RAIPHEHSFTA) with 20 items. Face and content validity was used for the study, reliability co-efficient of 0.74 was obtained. Mean and t-test were the statistical tools used for the study.

Results

Research Question 1: How effective are AI-powered food tracking apps in influencing students' dietary choices and habits?

Table 1: AI-powered food tracking apps influencing students' dietary choices and habits

S/N	Items AI-powered food tracking apps influencing students' dietary choices and habits	SA	A	D	SD	X Mean	SD	Total No of Respondents
1	AI-driven apps provide tailored dietary recommendations based on a student's health goals, food preferences, allergies, and activity levels.	25	1	-	-	3.96	0.34	26
2	AI-powered coaching can provide insights into eating patterns, helping students identify unhealthy habits.	20	6	-	-	3.76	0.43	26
3	AI chatbots and virtual assistants offer on-demand nutrition advice, reducing misinformation.	15	11	-	-	3.57	0.50	26
4	Some apps integrate with wearable devices to track physical activity and metabolic rates.	19	7	-	-	3.73	0.44	26
5	Some apps allow users to join communities, share progress, and participate in challenges, which can positively influence dietary habits.	12	14	-	-	3.46	0.54	26
6	Image recognition and barcode scanning improve food logging accuracy.	16	10	-	-	3.61	0.48	26

7	Real-time feedback and reminders encourage mindful eating and adherence to dietary plans.	23	3	-	-	3.88	0.38	26
8	AI analyzes meal patterns and suggests healthier alternatives.	20	5	1	-	3.73	0.52	26
9	Social accountability may increase adherence to healthier eating plans.	10	16	-	-	3.38	0.56	26
10	Apps like MyFitnessPal and Cronometer help students learn about calorie intake, macronutrient distribution, and portion control.	18	8	-	-	3.68	0.46	26
	Average Mean					**3.67**	**0.46**	

Table 1 showed that with the mean score of 3.67, the table revealed that AI-driven apps provide tailored dietary recommendations based on a student's health goals, food preferences, allergies, and activity levels.

Research Question 2: To what extent do AI-generated personalized nutrition recommendations impact students' eating behaviors?

Table 2: AI-generated personalized nutrition recommendations impacts students' eating behaviors

S/N	**Items AI-generated personalized nutrition recommendations impacts students' eating behaviors**	**SA**	**A**	**D**	**SD**	**X Mean**	**SD**	**Total No of Respondents**
1	AI explanations of food choices enhance students' ability to make informed decisions about meals and snacks.	24	2	-	-	3.92	0.38	26
2	Real-time, customized meal plans help students stick to healthier diets, aligning with their fitness and academic performance goals.	22	4	-	-	3.84	0.41	26
3	AI-driven recommendations encourage gradual habit formation by suggesting small, achievable dietary adjustments (e.g., swapping soda for water, adding vegetables to meals).	25	1	-	-	3.96	0.36	26

4	AI-based apps gamify nutrition tracking with streaks, rewards, and social challenges, reinforcing positive eating behaviors.	15	10	1	-	3.53	0.58	26
5	Peer challenges and AI-driven goal tracking boost motivation and accountability among students.	17	9	-	-	3.65	0.47	26
6	AI adjusts recommendations based on a student's progress, preferences, and lifestyle, making dietary changes more practical and sustainable.	11	15	-	-	3.42	0.54	26
7	AI-based nutrition apps provide real-time insights into food choices, portion sizes, and dietary balance, helping students make more informed decisions.	13	13	-	-	3.50	0.52	26
8	By tracking calorie intake, macronutrients (proteins, fats, carbohydrates), and micronutrients (vitamins, minerals), students gain a better understanding of their dietary needs.	20	3	3	-	3.65	0.67	26
9	AI-powered dietary plans suggest small, gradual changes that make it easier for students to adopt healthy eating patterns over time.	14	10	2	-	3.46	0.66	26
10	Some AI-driven platforms analyze past food intake and suggest healthier alternatives based on nutritional deficiencies or weight management goals.	16	10	-	-	3.61	0.48	26
	Average Mean					**3.65**	**0.50**	

Table 2 shows that with the mean score of 3.65, the table revealed that AI-driven recommendations encourage gradual habit formation by suggesting small, achievable dietary adjustments (e.g., swapping soda for water, adding vegetables to meals).

Research Question 3: What challenges do students encounter in using AI-driven food tracking apps to maintain healthy eating habits?

Table 3: Challenges students encounter in using AI-driven food tracking apps to maintain healthy eating habits

S/N	Items Challenges students encounter in using AI-driven food tracking apps to maintain healthy eating habits	SA	A	D	SD	X Mean	SD	Total No of Respondents
1	Many apps use image recognition and barcode scanning to track food intake, but inaccuracies in portion estimation or database errors can lead to incorrect nutritional data.	21	5	-	-	3.80	0.44	26
2	AI algorithms may misidentify homemade meals or ethnic foods, making it difficult for students to track diverse diets accurately.	13	10	3	-	3.38	0.71	26
3	Students using multiple health platforms may struggle to synchronize data across different apps, making dietary tracking less effective.	12	14	-	-	3.46	0.52	26
4	Many students start using food tracking apps with enthusiasm but lose motivation after a few weeks.	16	10	-	-	3.61	0.48	26
5	Some students may become too dependent on AI recommendations, losing their ability to eat based on hunger cues and nutritional intuition.	22	4	-	-	3.84	0.43	26
6	AI-based tracking can sometimes encourage rigid eating behaviors, leading to stress around food choices.	25	1	-	-	3.96	0.40	26
7	AI-generated recommendations are often generalized and may not consider a student's unique motivation levels, emotions, or external circumstances.	17	-	9	-	3.30	0.99	26
8	Without proper habit formation techniques, students may not develop long-term healthy eating behaviors.	13	10	2	1	3.34	0.82	26

9	Students with limited budgets may be unable to access these features, reducing the effectiveness of AI recommendations.	20	5	1	-	3.73	0.53	26
10	Lack of access to fresh fruits, vegetables, and whole grains can prevent students from following AI-generated meal plans.	20	5	-	1	3.69	0.67	26
	Average Mean					**3.61**	**0.59**	

Table 3 shows that with the mean score of 3.61, the table revealed that AI-based tracking can sometimes encourage rigid eating behaviors, leading to stress around food choices.

Hypotheses

HO1: There is no significant difference between Federal college of education (Technical) Omoku and Federal college of Education (Technical) Asaba's AI-powered food tracking apps influencing students' dietary choices and habits

Table 4: Table of analysis to determine the significant difference between Federal college of education (Technical) Omoku and Federal college of Education (Technical) Asaba's AI-powered food tracking apps influencing students' dietary choices and habits

Group	Mean	SD	N	Df	Standard Error	t – Cal	t-Crit	Decision
Federal College of Education (Technical) Omoku	4.00	26.00	13	24	0.52	1.19	2.10	Accepted
Federal College of Education (Technical) Asaba	3.38	17.23	13					

Students' eating habits and choices are not significantly influenced by the AI-powered food tracking applications from Federal College of Education (Technical) Omoku and Federal College of Education (Technical) Asaba. Considering that the computed t-value (1.19) is below the crucial t-value (2.10), the null hypothesis (HO1) is accepted. This finding implies that students' eating habits and choices are influenced by AI-powered food tracking applications in a comparable way at the two universities. It suggests that even while the settings of the two campuses may differ, students at both use AI-powered meal tracking in a similar way. Future developments or additions to AI-powered food tracking should therefore concentrate on broad upgrades rather than adjustments unique to a given institution.

HO2: There is no significant difference between Federal college of education (Technical) Omoku and Federal college of Education (Technical) Asaba's AI-generated personalized nutrition recommendations impacts students' eating behaviors

Table 5: Table of analysis to determine the significant difference between Federal college of education (Technical) Omoku and Federal college of Education (Technical) Asaba's AI-generated personalized nutrition recommendations impacts students' eating behaviors

Group	Mean	SD	N	Df	Standard Error	t – Cal	t-Crit	Decision
Federal College of Education (Technical) Omoku	3.84	23.69	13	24	0.54	1.00	2.10	Accepted
Federal College of Education (Technical) Asaba	3.30	22.77	13					

The impact of AI-generated tailored nutrition recommendations on students' eating habits is not significantly different between Federal College of Education (Technical) Omoku and Federal College of Education (Technical) Asaba. Since the computed t-value (1.00) is less than the crucial t-value (2.10), the null hypothesis (HO2) is accepted. This result suggests that students' eating habits at both schools are similarly impacted by AI-generated tailored nutrition advice. This implies that students at both universities react similarly to individualized nutrition advice powered by AI. Instead of modifying AI nutrition advice for particular college environments, organizations might concentrate on making them better overall.

HO3: There is no significant difference between Federal college of education (Technical) Omoku and Federal college of Education (Technical) Asaba student challenges encountered in using AI-driven food tracking apps to maintain healthy eating habits

Table 6: Table of analysis to determine the significant difference between Federal college of education (Technical) Omoku and Federal college of Education (Technical) Asaba student challenges encountered in using AI-driven food tracking apps to maintain healthy eating habits

Group	Mean	SD	N	Df	Standard Error	t– Cal	t-Crit	Decision
Federal College of Education (Technical) Omoku	3.38	25.09	13	24	0.59	2.74	2.10	Rejected
Federal College of Education (Technical) Asaba	5.00	30.77	13					

The difficulties faced by Federal College of Education (Technical) Omoku and Federal College of Education (Technical) Asaba students in using AI-driven food tracking applications to uphold good eating practices are not substantially different. Since the computed t-value (2.74) is higher than the crucial t-value (2.10), the null hypothesis (HO3) is rejected. This finding implies that students at the two institutions encounter rather different difficulties when it comes to using AI-powered food tracking applications to sustain a balanced diet. The fact that Federal College of Education (Technical) Asaba's mean score (5.00) is higher than Federal College of Education (Technical) Omoku's (3.38) suggests that Asaba students have greater challenges. These obstacles might include lack of awareness, accessibility problems, or technical limitations. This suggests

that in order to lower obstacles to the implementation of AI-driven food tracking, Federal College of Education (Technical) Asaba has to implement focused interventions.

Discussion of Findings

Research Question 1: How effective are AI-powered food tracking apps in influencing students' dietary choices and habits?

The present study revealed that AI-driven apps provide tailored dietary recommendations based on a student's health goals, food preferences, allergies, and activity levels.

The study supports the findings of Nogueira-Rio, Vazquez, Lopez-Santamarina, Mondragon-Portocarrero, Karav, and Jose Manuel (2024), who discovered that by measuring their food consumption, evaluating nutrient composition, and establishing dietary objectives, digital technology can be used to enhance their nutritional intake. Sook, Lee, Wen-Li, Nurul, Navin, and Amin-Nordin (2021) discovered that, although to varying degrees, a technological integration-based intervention promoted healthy improvements in household food purchases, healthy food intake, and healthy eating outcomes. According to Braga, Nguyen, Aberman, Doyle, Folson, Nga, Phuong, Bastien, Peter, Lan, David, and Aulo (2021), a phone app prototype can assist teenage girls from low- and middle-income nations in choosing healthier foods that are accepted, likable, and practical. Public health nutrition programs are becoming more effective and efficient thanks to AI technologies. AI systems can identify at-risk people, track nutritional status globally, and assess the effects of dietary changes by utilizing data analytics.

Research Question 2: To what extent do AI-generated personalized nutrition recommendations impact students' eating behaviors?

The present study revealed that AI-driven recommendations encourage gradual habit formation by suggesting small, achievable dietary adjustments (e.g., swapping soda for water, adding vegetables to meals).

The current study supports the findings of Hanin, Aneesha, Gadeer, Ismail, and Dimitrios (2025), who discovered that one innovation has been in the field of dietary assessment, where artificial intelligence has greatly decreased errors that are frequently made using conventional techniques. The nutrient content of meals may now be precisely determined thanks to tools that combine deep learning, visual recognition, and mobile applications. According to Sadique, Ojamalia, and Ijiga (2024), AI technologies have increased the efficacy and efficiency of nutrition programs for public health. AI systems can detect people at risk, track nutritional status globally, and assess the effects of dietary interventions by utilizing data analytics. This skill is especially useful in areas like India that are dealing with serious nutritional issues, as AI can help to better focus interventions and optimize national nutrition programs. According to Tagne, Kintoh, Jung-In, and Hee-Cheol (2024), there has been a paradigm shift in the way that nutritional research provides innovative tools and insights that have promising potential for enhancing public health programs and improving individual health outcomes.

Research Question 3: What challenges do students encounter in using AI-driven food tracking apps to maintain healthy eating habits?

AI-based tracking can sometimes encourage rigid eating behaviors, leading to stress around food choices.

The current study confirms the findings of Andrea, Park, Kembra, Surya, Leslie, and Oldewage-Theron (2024), who discovered that, in comparison to other fields like medicine, health

improvement, artificial intelligence validation, accuracy, and patient satisfaction in nutrition, AI in the nutrition field still lags and requires much more research. Clinical research is required to ascertain the effectiveness of interventions utilizing AI, and ethics are among the primary concerns regarding AI's use. Using a qualitative analysis of semi-structured in-depth interviews, Hauptmann, Leipold, Madenach, Wintergerst, Lurz, Georg, Markus, Kurt & Helmut (2024) identified limitations such a lack of diversity, mistrust in healthiness and personalization, real-life circumstances, and personal user characteristics (Barreiro, Garcia-Soidan, Alvarez-Sabucedo, & Santos-Gago, 2024).

According to Alvarez-Sabucedo & Santos-Gago (2024), some of the unresolved problems in this area concern algorithm decision-making transparency, guaranteeing that the results are consistently safe for the user, and protecting the privacy of the data itself.

Conclusion

Through meal tracking apps, artificial intelligence (AI) is revolutionizing the promotion of good eating habits among students. These apps enable students to make educated food choices by utilizing AI-driven features like behavior tracking, real-time nutritional analysis, and personalized meal recommendations. Through interactive and gamified components, AI improves engagement and makes nutrition education more enticing and approachable. Predictive analytics powered by AI can also spot harmful eating trends and offer prompt treatments, promoting long-term good habits. To optimize the advantages of these technologies, however, issues like data protection, the precision of AI-generated suggestions, and digital literacy need to be resolved. All things considered, AI-enabled meal tracking applications hold great promise for promoting healthier eating habits among students in a world growing more digitally connected.

Recommendations

Based on the findings, the researcher recommended that:

1. Developers should refine AI algorithms to provide more precise and personalized dietary recommendations based on students' age, activity level, dietary preferences, and health conditions.
2. Strict data protection guidelines should be established by legislators and app developers to guarantee the security of students' personal and nutritional information.
3. AI-powered food tracking applications ought to be integrated into health and nutrition initiatives at educational establishments like schools. Students' knowledge and incentive to maintain good eating habits can be increased by interactive features including gamified challenges, virtual coaching, and real-time feedback.

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