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Effectiveness of nutrition education podcasts for behavior change among young adults in online food ordering

Efektivitas podcast pendidikan gizi untuk mendorong perubahan perilaku gizi pada kelompok usia dewasa muda dalam pemesanan makanan secara online

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Abstract

The rapid development of digital technology has driven an increase in the utilization of online food ordering services in Indonesia, particularly among young adults, who constitute 45% of the users. This trend presents nutritional challenges that necessitate intervention through digital media education. Podcasts are regarded as effective and accessible educational mediums; however, previous studies have primarily focused on their impact on knowledge and attitudes. This quasi-experimental study aimed to analyze the influence of podcast-based nutrition education on improving nutritional knowledge and altering online food ordering intentions, frequency of orders, and food choices. This study employed a pretest-posttest control group design involving 128 non-health students from Muhammadiyah University of Semarang (December 2024 to March 2025), divided equally into experimental and control groups. The experimental group received four podcast episodes, each under 10 minutes, over four weeks, whereas the control group received no intervention. Data were collected through pre- and post-test assessments and engagement evidence, with purposive sampling based on inclusion and exclusion criteria. Data analysis using the Mann-Whitney U test revealed significant improvements in nutritional knowledge ($p < 0,001$), changes in ordering intentions aligned with the Theory of Planned Behavior constructs ($p < 0,001$), decreased ordering frequency ($p < 0,001$), and healthier food choices ($p < 0,001$). In conclusion, the findings suggest that podcasts have the potential to be an innovative strategy in nutrition education to promote healthy eating habits in the digital era.

Keywords: Audiovisual, food provision, health behavior, nutrition education, young adults

Abstrak

Perkembangan teknologi digital mendorong peningkatan penggunaan layanan pemesanan makanan online di Indonesia, terutama di kalangan dewasa muda yang mencakup 45% pengguna. Tren ini menimbulkan tantangan gizi yang perlu diatasi melalui edukasi berbasis media digital. Podcast dinilai sebagai media edukasi yang efektif dan mudah diakses, namun sebagian besar studi sebelumnya hanya menilai dampaknya terhadap pengetahuan dan sikap. Penelitian ini bertujuan untuk menganalisis pengaruh pendidikan gizi berbasis *podcast* terhadap peningkatan pengetahuan gizi, perubahan niat pemesanan makanan *online*, frekuensi pemesanan, serta jenis makanan yang dipesan. Desain penlitian *quasi experimental* dengan *pretest-posttest control group*. Sebanyak 128 mahasiswa non-kesehatan Universitas Muhammadiyah Semarang, pada Desember 2024 sampai Maret 2025 yang dibagi seimbang ke dalam kelompok ekperimen dan kontrol. Kelompok ekperimen menerima intervensi berupa empat episode podcast berdurasi <10 menit selama empat minggu, sementara kelompok kontrol tidak menerima intervensi. Data dikumpulkan melalui

pretest-posttest dan bukti keterlibatan, dengan pemilihan sampel purposive berdasarkan kriteria inklusi-eklusi. Analisis data menggunakan uji *mann-whitney test*. Hasil, menunjukkan *podcast* meningkatkan pengetahuan gizi secara signifikan (p <0,001), perubahan niat dalam penggunaan layanan pemesanan makanan berdasarkan ketiga kontruk TPB (p <0,001), penurunan frekuensi pemesanan (p <0,001), serta mendorong pemilihan jenis makanan ke arah lebih sehat (p <0,001). Kesimpulan, *Podcast* berpotensi sebagai strategi inovatif dalam pendidikan gizi guna mendorong kebiasaan makan sehat di era digital.

Kata Kunci: Audiovisual, dewasa muda, pendidikan gizi, perilaku kesehatan, penyediaan makanan

Introduction

Digital technology has influenced various aspects of life, including food consumption patterns. One impact is the increased use of online food ordering applications via smartphones, which makes it easier for people to obtain food without having to leave their homes. However, this convenience also has the potential to cause negative health consequences, particularly an increased risk of being overweight (Willie et al., 2024).

The types of food commonly ordered through this service are generally fast foods or foods high in calories, sugar, salt, and fat, all of which contribute to obesity risk. Research in Indonesia has reported a significant relationship between fast-food consumption and nutritional status in university students. These findings are reinforced by Yetmi et al. (2021), who revealed that 69% of urban residents in Indonesia consume fast food, with a trend that continues to increase over time. This confirms that online food ordering services not only provide convenience but also have the potential to cause public health problems.

According to a 2022 report, 1,75 billion people worldwide ordered food online, and this number increased to 1.85 billion by 2023 (We Are Social, 2022; 2023). In Indonesia, the number of users of online food ordering services reached 57,2 million in 2023, with a projected increase to 63,9 million in 2024 (Statista, 2024). This service is very popular among all age groups, but young adults are the highest users, accounting for 43% of the total (Tenggara Strategics, 2022).

Online food ordering services are now very popular among students because they are considered practical and efficient, especially for those with busy schedules or those who want to avoid traffic jams. However, this convenience can potentially affect a person's eating patterns, both in terms of the amount and type of food ordered, thus posing a risk of weight gain (Romlah, 2023). Previous research by Alyami & Alharbi (2023) also showed that there is a high intention to use online food ordering services because of convenience and comfort.

Improving nutritional knowledge is an important strategy for promoting healthy eating behaviors (Nurfitriani & Kurniasari, 2023). Through nutrition education, individuals can gain a better understanding of how to choose balanced meals, including when ordering food online (Almansour et al., 2020). The intention to use online food ordering services can be explained through the Theory of Planned Behavior (TPB), which states that a person's intention is influenced by their attitude toward the behavior, subjective norms, and perceived behavioral control (PBC).

Podcasts are a popular and easily accessible medium on the Internet, making them a potentially widespread educational tool. Indonesia ranks second among countries that frequently listen to podcasts (38,2%), after Brazil (39,7%) (We Are Social, 2024). The majority of podcast listeners in Indonesia are young people aged 15-24, accounting for 44,3% of the total (Sari & Sazali, 2023).

Several studies have shown that podcast episodes can be an effective tool for delivering easy-to-understand, nutrition education. Adrianto et al. (2023) found that groups that received nutrition education through podcasts experienced a significant increase in nutrition knowledge. This is in line with the findings of Muthmainnah et al. (2021), who stated that podcasts can increase knowledge and attitudes towards obesity. Roi et al. (2021) also emphasized that delivering nutrition messages using podcasts is effective for young adults, especially students, because they can be listened to while doing other activities, such as exercising, traveling, cooking, or doing homework.

Although various studies have shown that nutrition education through podcasts can improve knowledge and attitudes, few have specifically

evaluated the effect of podcast interventions on online food-ordering behaviors. Most studies still focus on cognitive aspects, while actual behavioral changes have not been widely explored. Furthermore, in Indonesia, especially among students who are active users of food-ordering services, there is no scientific evidence to test the effectiveness of podcasts in influencing online food-ordering behavior. Therefore, this study aimed to analyze the effects of nutrition education through podcast episodes on nutrition knowledge, intention, frequency of ordering, and types of food ordered online.

Methods

This study used a quasi-experimental pretest-posttest design with a control group. The respondents were divided into experimental and control groups, both of which were given a pretest. The experimental group received an intervention in the form of podcasts uploaded to the YouTube platform, each lasting <10 min for four weeks on different topics: (1) the concept of My Plate; (2) balanced consumption of sugar, salt, and fat; (3) ordering nutritionally balanced food online; and (4) the importance of choosing food online wisely. Podcast material was compiled based on the latest nutritional literature and underwent an internal review process to ensure the content's suitability.

To ensure active engagement, respondents were asked to summarize the podcast content and submit screenshots as evidence. Compliance was assessed based on the completeness of evidence collection in each intervention session, where respondents who submitted evidence for all topics (four times) were categorized as having 100% compliance. The control group did not receive any intervention. At the end of the study, both groups were given a post-test for analysis.

This study was conducted at Muhammadiyah University Semarang from December 2024 to March 2025, with a population of 4,000 non-health students participating. The location was chosen based on accessibility, ease of coordination, and student characteristics, in line with the intervention targets. However, as it was conducted at only one university, limitations in generalizing the results to the national student population remain.

The sampling technique used purposive sampling based on inclusion criteria, namely students aged 18-25 years, who had an online food ordering application, and exclusion criteria, namely students who did not have an online food ordering application and did not complete the entire research series until the end.

The sample size was determined using the following formula (Adiputra et al., 2021):

$$n = \frac{Z^2 p(1 - pI)}{Nd^2 + Z^2\ p\ (1 - p)}$$

$$n = \frac{4000\ x\ 1{,}96^2\ 0{,}8\ (1 - 0{,}8)}{4000\ (0{,}1)^2 + (1{,}96)^2\ \ x\ 0{,}8\ (0{,}8)}$$

$$n = \frac{4000\ x\ (3{,}84)\ 0{,}16}{40 + 3{,}84.\ 0{,}64}$$

$$n = \frac{2457{,}6}{42{,}4576}$$

$$n = 57{,}88 = 58 + 10\% = 64$$

Explanation:
n = sample size
N = population size
p = proportion
Z = 95% confidence level (1,96)

The study involved 128 students who were divided into experimental and control groups (1:1 ratio). All respondents completed the study, with no dropouts.

The research data collected included informed consent, respondent identity, anthropometric measurements, physical activity using the GPAQ questionnaire, which has been tested for validity and reliability; dietary patterns using the FFQ questionnaire; emotional eating using a questionnaire developed by Strien et al. (1998) with modifications that have been tested for validity and reliability; nutritional knowledge using a multiple-choice questionnaire developed by Mikhail et al. (2020) with modifications to 30 questions and validated and reliable; and intention to use online food ordering using a Likert scale questionnaire developed by Alyami & Alharbi (2023) with modifications that have been validated and reliable. The frequency and types of online food orders were obtained from screenshots of the respondents' online food ordering application history sent via WhatsApp.

Data analysis was conducted in several stages. First, a univariate analysis was performed to describe the respondents' characteristics. Normality tests were used to determine the distribution of data for each variable. Based on the normality test, the Mann-Whitney test was used because the data were not normally distributed. The results were considered significant ($p < 0,05$).

This study was approved by the Ethics Committee of Muhammadiyah University Semarang, Indonesia (No. 041/KE/01/2025). The entire data collection process was conducted in accordance with research ethics principles. This included providing clear explanations to respondents before requesting consent, ensuring the confidentiality of personal information, and ensuring that participation was voluntary. Evidence of participation, in the form of screenshots of podcast summaries and food order histories, was stored using participant initials and was used only for research analysis. Data were not shared with third parties; therefore, the participants' privacy and confidentiality were maintained.

Result and Discussion

Table 1 presents the characteristics of respondents in the experimental and control groups. The mean age of the participants was comparable between the two groups, with the experimental group averaging 19,14 ± 1,41 years and the control group averaging 19,75 ± 1,58 years, The average monthly pocket money was slightly higher in the control group (1,096,093,75 ± 692,207,45 IDR) than in the experimental group (1,054,687,50 ± 467,577,23 IDR), In terms of nutritional status, as measured by body mass index (BMI), both groups fell within the normal range, with mean BMI values of 22,09 ± 4,35 kg/m^2 in the experimental group and 21,17 ± 4,03 kg/m^2 in the control group.

With respect to the place of residence, the majority of respondents lived in boarding houses, accounting for 67,2% of the experimental group and 75,0% of the control group, respectively. Regarding transportation modes, a greater proportion of the control group respondents reported walking (51,6%) than the experimental group (28,1%). Conversely, motorcycle use was more common in the experimental group (70,3%) than in the control group (45,2%). The use of public transportation was relatively low in both groups (1,6% and 3,1%, respectively).

Overall, the distribution of sociodemographic characteristics, financial resources, and lifestyle factors such as residence and transportation modes appeared relatively balanced between the two groups, ensuring comparability for subsequent intervention analyses.

Table 1. Characteristics of respondents in experimental and control groups

Characteristics	Experimental (n = 64)	Control (n = 64)
Age (years)*	19,14 ± 1,41	19,75 ± 1,58
Pocket money (IDR)*	1,054,687,50 ± 467,577,23	1,096,093,75 ± 692,207,45
Body Mass Index (kg/m^2)*	22,09 ± 4,35	21,17 ± 4,03
Place of residence		
Home	21 (32,8%)	16 (25,0%)
Boarding house	43 (67,2%)	48 (75,0%)
Mode of transportation		
Walking	18 (28,1%)	33 (51,6%)
Motorcycle	45 (70,3%)	29 (45,2%)
Public transport	1 (1,6%)	2 (3,1%)

*Data are presented as mean ± standard deviation (SD)

Based on the results in Table 2, nutrition education intervention through podcast episodes significantly improved nutrition knowledge ($p < 0,001$). The increase in knowledge was greater in the experimental group than in the control group. This effectiveness can be explained by the fact that podcasts are flexible digital media that are easily accessible at any time (Roi et al., 2021), and are in line with the

audiovisual learning style of students or young people who are familiar with technology (Sari & Sazali, 2023). The majority of respondents in this study were young adults (>18 years), making podcast episodes a suitable choice.

Table 2. Differences in nutritional knowledge and intention to order food online between experimental (n= 64) and control groups (n= 64)

Variable	Group	Pre-test Mean ± SD	Post-test Mean ± SD	Difference (Δ) Mean ± SD	p-value
Nutrition Knowledge	Experimental	55,36 ± 17,07	91,78 ± 8,26	36,42 ± 8,81	< 0,001
	Control	67,79 ± 10,76	66,96 ± 10,10	0,83 ± 0,65	
Intention to Order Food Online (TPB Theory)					
Attitudes Toward the Use of Food Apps	Experimental	35,05 ± 5,16	33,88 ± 3,84	1,17 ± 1,32	< 0,001
	Control	33,89 ± 5,51	33,87 ± 5,47	0,02 ± 0,04	
Subjective Norm (Sociocultural Factors)	Experimental	13,11 ± 2,75	12,97 ± 2,56	0,14 ± 0,19	0,014
	Control	13,05 ± 2,56	13,09 ± 2,65	0,04 ± 0,09	
Perceived Barriers and Triggering Factors	Experimental	21,94 ± 2,23	21,42 ± 1,71	0,52 ± 0,52	< 0,001
	Control	21,64 ± 2,13	21,56 ± 2,08	0,08 ± 0,05	

These findings are consistent with those of Adrianto et al. (2023) and Robins et al. (2024), who showed that podcasts can increase nutritional knowledge and awareness. Denny et al. (2024) reported that podcast-based interventions improved students' understanding of health issues. However, the effectiveness of these podcast episodes has been inconsistent. Whittaker et al. (2025) emphasized that the impact of podcasts is highly dependent on duration, intensity, and active listener engagement. Kratzer et al. (2024) show that most digital educational interventions on campus are short-term and not yet strong enough to produce sustainable behavioral change.

This increase in knowledge contributed to a change in the intention to use online food ordering applications, which was analyzed using the Theory of Planned Behavior (TPB) framework. The test results showed a significant effect on the three TPB constructs, including attitude ($p < 0,001$), subjective norms ($p = 0,014$), and perceived barriers and facilitators ($p < 0,001$), indicating a higher and more positive change in the experimental group than in the control group. According to the Theory of Planned Behavior (TPB), changes in intention are influenced by three main components: attitudes, subjective norms, and perceived control. According to Ajzen & Kruglanski (2019), attitudes are formed through experience, knowledge, and individual beliefs related to the expected outcomes of a behavior.

Research Concari et al. (2023) supported the notion that educational interventions can improve attitudes toward healthy behaviors. Liu et al. (2021) emphasized the importance of subjective norms, perceived barriers, and triggers in changing behavior, for example, in smoking cessation interventions among young adult men.

The results in Table 3 show that the nutritional education intervention through podcast episodes significantly reduced the frequency of online food orders ($p < 0,001$). This decrease indicates that students have become more selective and prudent in their use of digital services. Although the control group also experienced a decrease, the magnitude of the change in the experimental group was much higher, demonstrating the effectiveness of the intervention.

These changes can be influenced by various factors, including expectations regarding promotions and ease of service. These results are consistent with tests on the intention to order food online based on the Theory of Planned Behavior (TPB) construct, in which the three dimensions (attitude, subjective norm, and perceived behavioral control) experienced higher and more positive increases in the experimental group than in the control group, thereby encouraging the formation of actual behavior.

In addition to order frequency, the type of food ordered also had a significant effect, with healthy foods, such as one-dish meals ($p = 0,003$), animal-side dishes ($p = 0,008$), and

fruit preparations (p = 0,003) being ordered more frequently. This indicates that exposure to nutritional information through podcasts can encourage students to choose nutritious foods. Conversely, there was a significant decrease in the consumption of unhealthy foods, such as junk food (p = 0,019), fast food (p = 0,002), and soft drinks (p = 0,023), after the intervention. This decrease indicates the effectiveness of the intervention in reducing the tendency to consume foods and beverages high in fat, sugar, and salt, while also reinforcing the role of podcasts in shaping healthier habits.

Table 3. Differences in the frequency and types of food ordered online between experimental (n= 64) and control groups (n= 64)

Variable	Group	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference (Δ)	p-value
Frequency of online orders	Experimental	5,86 ± 2,90	3,09 ± 2,11	2,77	< 0,001
	Control	4,70 ± 3,03	3,55 ± 2,46	1,15	
Types of food ordered online					
Healthy food					
One-dish meal	Experimental	0,70 ± 0,70	0,86 ± 0,81	0,16	0,003
	Control	0,63 ± 0,66	0,45 ± 0,66	0,18	
Animal-based side dishes	Experimental	0,23 ± 0,61	0,30 ± 0,55	0,07	0,008
	Control	0,06 ± 0,30	0,08 ± 0,27	0,02	
Processed fruit	Experimental	0,19 ± 0,43	0,33 ± 0,53	0,14	0,003
	Control	0,14 ± 0,35	0,09 ± 0,29	0,05	
Unhealthy food					
Junk food	Experimental	2,06 ± 0,90	1,06 ± 0,85	1	0,019
	Control	1,95 ± 1,01	1,41 ± 0,77	0,54	
Fast food	Experimental	0,98 ± 0,93	0,42 ± 0,63	0,56	0,002
	Control	0,66 ± 0,80	0,69 ± 0,77	0,03	
Soft drinks	Experimental	0,89 ± 0,81	0,28 ± 0,45	0,61	0,023
	Control	0,81 ± 0,75	0,50 ± 0,56	0,31	

The effectiveness of podcasts in changing consumption behavior can be explained by audience engagement mechanisms, flexibility of access, and the suitability of audio-visual learning styles. The concise narrative format and accessibility allow students to absorb information without disrupting their main activities (Adrianto et al., 2023). Other studies have also shown that nutrition education through podcast episodes can improve nutritional knowledge and attitudes, which can influence eating patterns (Adlu & Fayasari, 2023). These results are supported by Femyliati et al. (2023), who state that increased nutrition knowledge in the intervention group can influence the choice of more nutritionally balanced food orders online.

Educational media have become important in supporting changes in consumption, especially among young people exposed to digital lifestyles. Sekti & Fayasar (2019) showed that the use of audio-visual media is effective in increasing knowledge, while encouraging healthy food consumption. Podcasts are an increasingly popular form of audiovisual media in the digital age. Podcasts are considered effective and easily accessible on YouTube, enabling them to reach a wider audience with the digital habits of younger generations.

However, few studies have directly evaluated changes in food consumption after podcast interventions. Most previous studies have focused on improving nutritional knowledge and attitudes in the initial stages of behavioral change.

This study proves that nutritional education through podcasts on topics such as healthy eating, balanced sugar and salt consumption, the importance of balanced nutrition when ordering food online, and wise menu choices to prevent obesity can have a real impact. The results showed a decrease in the consumption of junk food, fast food, and soft drinks in the experimental group. Thus, podcast episodes can be an innovative strategy for increasing nutritional awareness and

shaping healthier eating habits among young people.

However, this study has limitations because the intervention lasted only four weeks, and respondents were limited to one university; therefore, the generalization of the results is limited. Further research with a longer duration and more diverse samples is required to strengthen these findings.

Conclusion

As a nutrition education medium, podcasts can increase nutrition knowledge, reduce the frequency of online food ordering, and encourage students to choose healthy food.

Podcasts can be used as supporting modules in nutrition courses or campus health promotion programs, and students are encouraged to create educational nutrition playlists that can be accessed repeatedly to reinforce healthy habits. Online food ordering service providers can collaborate with nutritionists to provide podcast-based educational content for consumers.

This study has limitations in that it was conducted at only one university and the intervention lasted only four weeks; therefore, the long-term effects are not yet known. Further research is recommended to explore other digital media, such as educational videos or interactive applications, as well as involving samples of students from different universities and longer intervention periods to compare their effectiveness.

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