Journal of Food Science and Technology (Iran)

Homepage:www.fsct.modares.ir

Scientific Research

Factors Affecting the Willingness of Students at Agricultural Sciences and Natural Resources University of Khuzestan to Consume Probiotic Products

Hossein Jooyandeh•[1], Moslem Savari[2], Sara Bavi Hassanpouri[3]

1- Professor, Department of Food Science and Technology, Agricultural Sciences and Natural Resources University of Khuzestan, Mollasani, Iran

2- Associate Professor, Department of Agricultural Extension and Education, Agricultural Sciences and Natural Resources University of Khuzestan, Mollasani, Iran.

3- M.Sc. Student, Department of Food Science and Technology, Agricultural Sciences and Natural Resources University of Khuzestan, Mollasani, Iran

ARTICLE INFO

Article History:

Received:2025/5/18

Accepted:2025/10/19

Keywords:

Functional products,
probiotic,
students,
healthy food,
intention

DOI: **10.48311/fsct.2026.84055.0**

*Corresponding Author E-

hosjooy@asnrukh.ac.ir

ABSTRACT

Consumer awareness of the benefits of consuming probiotic foods has a significant impact on individuals' willingness to purchase and consume these products. Studies show that knowledge about probiotics is related to factors such as gender, marital status, and educational background. This study was conducted to identify the factors influencing the willingness of students at the Agricultural Sciences and Natural Resources University of Khuzestan- an informed and significant segment of society- to consume probiotic products. The statistical population included undergraduate, graduate, and doctoral students. Based on the Krejcie and Morgan table, a stratified sample of 350 students was selected with proportional allocation. Data analysis was conducted in both descriptive and inferential methods with SPSS and Smart PLS software. The primary research instrument was a questionnaire, validated by a panel of experts and confirmed for reliability through Cronbach's alpha coefficient. Health belief theory served as the study's theoretical framework. The findings indicate that perceived susceptibility and severity, perceived benefits and barriers, self-efficacy, and action cues significantly impact students' intention to consume probiotic products. These components collectively account for 66.2% of the variance in the dependent variable—students' intention. Based on the results of this research, it is essential to promote the consumption of probiotics in society and highlight the benefits of using these beneficial compounds for the health of the people of our country.

1- Introduction

With advances in human societies—particularly the development of sophisticated technologies in the food industry and nutrition sciences—and the increasing prevalence of chronic diseases, the role of food has shifted from merely meeting energy needs to actively promoting public health, preventing disease, and supporting treatment efforts [1]. Functional foods, which form part of the daily diet, not only meet nutritional requirements and provide energy but also exert health‑promoting effects beyond their basic nutritional value [2]. Probiotic food products fall within this category and constitute a major segment of functional foods [3]. Probiotics play an important role in protecting the body against harmful microorganisms and strengthening the host immune system. In addition to their health benefits, probiotics can reduce or eliminate mycotoxins in food; therefore, the consumption of probiotic dairy products is particularly recommended in regions where milk contamination with these toxins is significant [4].

The term probiotic is derived from the Greek phrase pro bio, meaning “for life.” Probiotics are living microorganisms that exert beneficial effects on human health by helping maintain the microbial balance of the intestine. Regular consumption of foods containing probiotic microorganisms is therefore recommended to support a favorable balance of beneficial microbes in the intestinal flora [5–7]. Probiotic microorganisms primarily include strains of the genera Lactobacillus and Bifidobacterium, although strains of Bacillus, Pediococcus, and certain yeasts have also been identified as beneficial [8]. Some researchers argue that the viability of these microorganisms at the time of consumption is not essential, and that foods containing non‑living microbial components may still be considered probiotic if they confer health benefits [9]. Based on this perspective, the term paraprobiotics—also referred to as “non‑living probiotic cells” or “probiotic ghosts”—has been introduced to describe crude cell extracts and complex biochemical components of probiotic microbes that may provide health benefits when consumed in sufficient quantities [8]. A more comprehensive definition of probiotics includes criteria such as resistance to gastric acidity and pancreatic secretions (enzymes and bile salts), adhesion to epithelial cells, antimicrobial activity, inhibition of pathogen adhesion, evaluation of antibiotic resistance, tolerance to food additives, stability within the food matrix, and compatibility with host immunity [10]. However, because only living microorganisms can adhere to intestinal epithelial cells, their ability to grow and survive remains essential. In addition to adhesion to epithelial and mucosal surfaces, probiotic microorganisms must be able to multiply and persist in the digestive tract, thereby exerting positive effects on the gut microbiota [11]. Accordingly, the number of viable probiotics at the time of consumption is critical. Based on the World Health Organization’s definition, a product qualifies as a probiotic food only if it contains at least 10^7 log cfu/g of viable probiotic organisms at the time of consumption [12].

Many factors during production and storage can influence the viability of probiotic microorganisms [13]. Probiotics are produced and marketed in three main forms: functional foods, dietary

supplements, and pharmaceutical products. In the production of probiotic foods, the type of food matrix is a critical factor. Beyond pH, foods may contain antimicrobial or bioactive compounds that interact with probiotics and affect their activity. Fat content, protein type, and carbohydrate composition can also influence the growth and survival of probiotic organisms. Therefore, when purchasing or consuming a probiotic product, attention should be paid to key factors such as the characteristics of the food, the production date, the types of probiotic microorganisms present, and potential competitive interactions among them. Dairy products—particularly cheese, yogurt, and ice cream—are considered ideal carriers for delivering probiotic bacteria to the human digestive tract [12]. The type and form of the food also play an important role in consumer acceptance, and some studies suggest that the product type is the most influential factor in choosing a probiotic functional food [14]. Today, probiotic products are produced and marketed in diverse forms and varieties. Although considerable research has examined consumer attitudes toward functional foods and dietary supplements [8, 14], relatively few studies have focused specifically on probiotics. For example, previous research has reported a negative association between the consumption of fermented dairy products and smoking, as well as positive associations between the consumption of probiotic functional foods and physical activity, the use of vitamin supplements, and individuals' perceptions of their health effects [14, 15].

Despite projections indicating continued growth in probiotic products and their increasing importance in the future, relatively few practical and empirical studies have examined consumer acceptance of these products. The first step toward expanding production is identifying the target group—consumers—because the primary driver of growth in any economic system is management grounded in an understanding of consumer behavior, the factors influencing it, and the ability to predict future behavior [16]. Thus, the consumer community represents the first and most essential link in an economic system [17]. To evaluate consumers' intentions and preferences, behavioral models commonly used in the health domain can be applied. One of the most prominent models in this field is the Health Belief Model, which has been widely used in studies related to healthy nutrition [18, 19].

The Health Belief Model was introduced by Hochbaum and Rosenstock in 1950 [20] and is one of the oldest and most widely applied models in health psychology. It represents one of the first comprehensive efforts to explain health behavior based on value‑expectancy principles [21]. The model emphasizes the role of beliefs, as changes in beliefs are understood to lead to changes in behavior. Overall, research has shown that the Health Belief Model is one of the most important theoretical frameworks for explaining and predicting preventive behaviors in response to health risks [22]. According to the model, individuals are more likely to adopt health‑promoting behaviors when they have a desire to remain healthy and believe that such behaviors will improve or maintain their health status [18]. Health education supports this process by providing information, shaping health attitudes, and

fostering motivation for behavioral change [23]. Researchers argue that motivation to initiate a health behavior—such as consuming probiotic products—is essential and plays a fundamental role [24]. The model is based on the assumption that individuals will engage in a health‑related action if they believe it will protect them from disease. In this framework, individuals hold a positive expectation that following recommended behaviors will prevent illness, and they possess the confidence that they can successfully carry out these behaviors to achieve the desired health outcome [25]. The Health Belief Model centers on two key components of health behavior: perceived threat (an individual's understanding of the health problem) and behavioral evaluation (the balance between perceived benefits and perceived barriers) [26].

The Health Belief Model is an intrapersonal framework that assumes individuals' decisions to adopt health behaviors are based on four core beliefs: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. These constructs are grouped into two broader categories—perceived threat and behavioral appraisal (Figure 1). The key conceptual definitions are outlined below.

Perceived susceptibility refers to an individual's subjective assessment of their risk of experiencing a health problem as a result of unsafe behaviors [26]. Research has shown that higher perceived susceptibility increases the likelihood of adopting protective health behaviors [27, 28]. In essence, it reflects the extent to which a person feels vulnerable to a disease or health condition [26]. In this study, perceived susceptibility represents students' beliefs about the potential health risks associated with not consuming probiotic products, given the role these products play in maintaining intestinal microbial balance and supporting immune function. Accordingly, it was hypothesized that perceived susceptibility has a positive and significant effect on students' intention to use probiotic products (Hypothesis 1).

Perceived severity refers to an individual's belief about the seriousness of a health threat and its potential consequences [28, 29]. It encompasses the understanding that a health problem may lead to severe outcomes, including serious complications or even death [30]. If students recognize that failing to consume probiotics may negatively affect nutrient absorption and contribute to digestive or skin problems, this awareness may strengthen their intention to use probiotic products. Therefore, it was hypothesized that perceived severity has a positive and significant effect on students' intention to use probiotic products (Hypothesis 2).

Perceived benefits refer to an individual's belief in the advantages of engaging in preventive behaviors [31] and reflect a person's subjective evaluation of the value or usefulness of adopting a health‑related action [32]. They also encompass the belief that taking appropriate action can reduce health risks [26]. In the present study, it is expected that if students recognize the positive outcomes associated with consuming probiotic products, they will show greater willingness and inclination to use them. Therefore, it was hypothesized that perceived benefits have a positive and significant effect on students' intention to use probiotic products (Hypothesis 3).

Perceived barriers refer to an individual's assessment of the costs, obstacles, and difficulties associated with performing a particular behavior. They represent the belief that a specific action may be harmful, risky, or burdensome [32]. Research indicates that the greater the perceived barriers, the lower the likelihood of engaging in protective or health‑promoting behaviors [33]. Common barriers to adopting health behaviors include lack of knowledge, insufficient time, discomfort, and difficulty performing the behavior [34]. Accordingly, it was assumed that if students perceive significant barriers to consuming probiotic products, they will be less likely to do so. Thus, it was hypothesized that perceived barriers have a significant negative effect on students' intention to use probiotic products (Hypothesis 4).

In addition, the Health Belief Model incorporates other cognitive and motivational components that influence or predict behavior, such as cues to action and self‑efficacy. These constructs function as cognitive drivers that encourage health‑related behaviors and enhance individuals' readiness to engage with health issues [24, 32, 33, 35–38].

Cues to action are stimuli that accelerate decision‑making when individuals feel the need to perform a particular action or behavior. Media, friends, and neighbors can all serve as influential cues in this regard [39]. Action guides function as reminders that enhance individuals' motivation to act [38]. Hochbaum argued that readiness to take action can be strengthened through factors such as media advertising. In this context, students may not intend to use probiotic products unless they receive consistent advertising or cues encouraging their use [40]. Therefore, it was hypothesized that action guides have a positive and significant effect on students' willingness to use probiotic products (Hypothesis 5).

Self‑efficacy was later added to the Health Belief Model by Rosenstock et al. (1988) as a component of perceived behavioral control. This concept refers to an individual's belief in their ability to adopt recommended behaviors in order to perform necessary actions and achieve desired outcomes. In other words, self‑efficacy reflects a person's confidence in their capacity to generate the motivation, cognitive resources, and sustained effort required to successfully complete a specific task [24, 32, 39, 41]. Buglar et al. (2009) argued that self‑efficacy enhances the model's predictive power for health behaviors [42]. In the present study, self‑efficacy was defined as individuals' perceptions of their ease, confidence, and ability to use probiotic products. Accordingly, it was hypothesized that self‑efficacy has a positive and significant effect on students' intention to use probiotic products (Hypothesis 6).

Although numerous studies have examined the production and quality of probiotic products, as well as consumer attitudes toward functional foods and dietary supplements, relatively few have focused specifically on consumer perceptions of probiotics—particularly among students, who represent an educated and informed segment of society. Therefore, this study was conducted to identify and explain the factors influencing the willingness of students at Agricultural Sciences and Natural Resources University of Khuzestan to consume probiotic products.

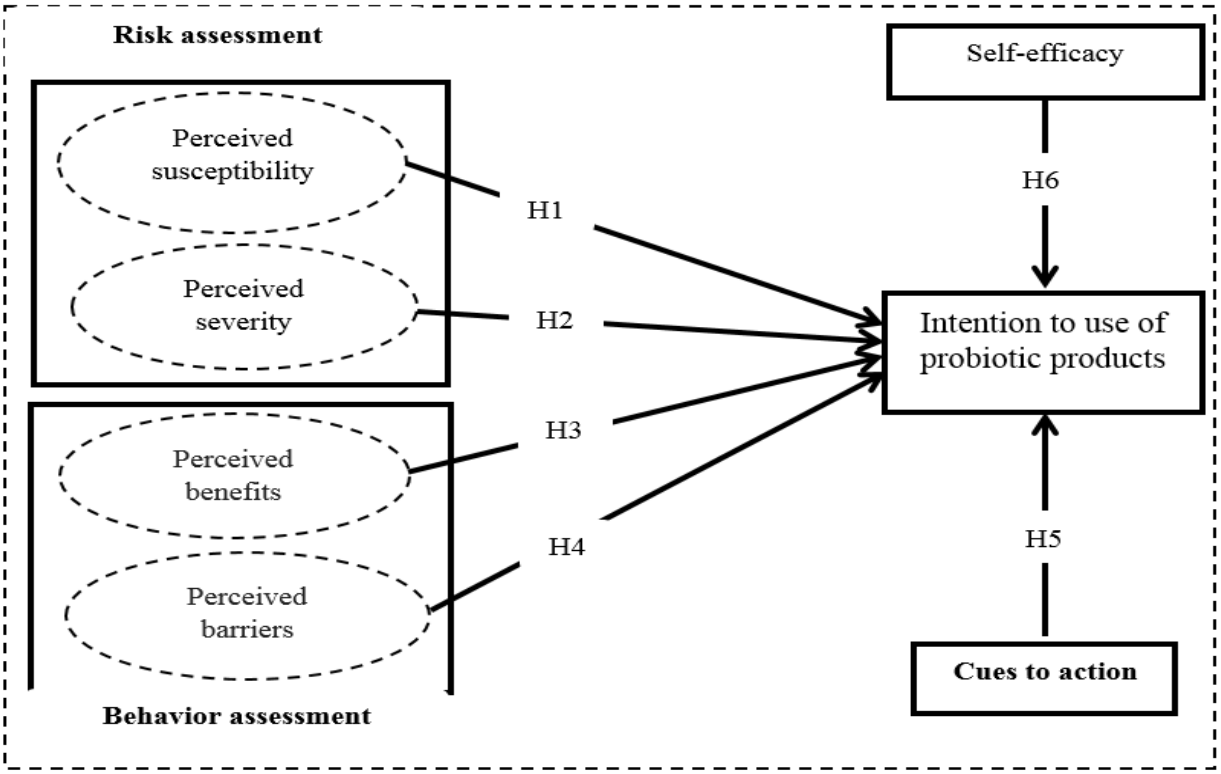

Figure 1. Conceptual framework of the research

2- Materials and methods

This study was applied quantitative research, descriptive–correlational in terms of data collection, and cross-sectional in terms of timing. The study population consisted of all undergraduate, graduate, and doctoral students at Khuzestan University of Agricultural Sciences and Natural Resources. Using the Krejcie and Morgan (1970) table, the sample size was determined to be 350 students, selected through stratified sampling with proportional allocation.

The primary research instrument was a questionnaire composed of two main sections. The first section included demographic variables such as age, education level, income, household size, gender, and knowledge of probiotic products. The second section contained 25 items measuring the components of the Health Belief Model, developed based on the theoretical literature. A five-point Likert scale (1 = very low to 5 = very high) was used for all items [39].

The validity of the research variables was assessed by an expert panel consisting of faculty members in food science and engineering, social sciences, and agricultural extension and development. Construct validity was further examined using the Average Variance Extracted (AVE) index, which reflects the extent to which the measurement items represent the theoretical constructs. Reliability was evaluated using Cronbach's alpha and composite reliability. Cronbach's alpha is based on data dispersion, with standard deviation serving as a key indicator of reliability, whereas composite reliability assesses the internal consistency of items

within each construct and is considered a more precise measure (Table 1). Given that Cronbach's alpha exceeded 0.7, composite reliability exceeded 0.6, and AVE values were above 0.5, the research instrument demonstrated acceptable validity and reliability.

Data analysis was conducted using SPSSWin27 and SmartPLS software in two stages: descriptive and inferential statistics. Descriptive statistics included mean, standard deviation, and coefficient of variation. Inferential analysis employed structural equation modeling (SEM). SEM allows researchers to determine the extent to which empirical data support the theoretical model, to examine how latent variables are represented by observed variables, and to analyze the relationships among latent constructs [43]. Latent variables are those that cannot be measured directly and are instead assessed through observable indicators [43–45], which in this study correspond to questionnaire items [46]. Partial Least Squares Structural Equation Modeling (PLS-SEM), considered the third generation of SEM, was used due to its advantages, including reduced sensitivity to sample size and data normality [47]. Its popularity also stems from its ability to analyze complex models involving multiple constructs, indicators, and structural paths without strict distributional assumptions [44, 48]. The updated version of the software also features an improved graphical user interface [49]. Accordingly, PLS-SEM was employed to test the theoretical framework of the study and evaluate the hypothesized relationships (Figure 1).

3-Research Results

3-1. Examining the Personal and Professional Characteristics of the Respondents in the Study

The results regarding the personal and demographic characteristics of the respondents showed that the average age was 23.12 years, with a standard deviation of 2.01 years, indicating that most participants were between 20 and 26 years old. The average monthly household income was 28.44 million Tomans, and the average household size was 4.60 members. In addition, 60.1% of respondents reported that they had not participated in any proper nutrition training courses. The educational status of the respondents' parents showed that the majority held a high school diploma. Finally, the findings indicated that 59% of the participants had prior experience consuming probiotic products, and most respondents (36%) had an intermediate level of knowledge about these products.

3.2. Research Measurement Model

To evaluate the measurement model, three stages must be examined: unidimensionality, validity and reliability, and discriminant analysis, as described below.

3.2.1. Unidimensionality:

Unidimensionality is assessed by examining the standardized factor loadings (λ) and t-values of each observed indicator. If the factor loading exceeds 0.5 and the t-value is greater than 1.96, the indicator is considered unidimensional [45]. Based on the results presented in Table 1, the observed indicators were appropriately selected and demonstrate sufficient accuracy in measuring the latent variables.

3.3.2. Validity and reliability:

In the second stage, the validity and reliability of the latent variables are

evaluated. This involves examining the Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's alpha, with standard thresholds of 0.5, 0.6, and 0.7, respectively [44, 45]. According to the values reported in Table 1, all AVE, CR, and Cronbach's alpha values exceed their respective thresholds. Therefore, the research constructs exhibit acceptable validity and reliability, and the measurement items demonstrate adequate precision.

Table 1. Review of the validity and reliability of the research instrument

Structures	Measurement items	λ	Validity and reliability
Intention	INT1	0.803	Construct validity: 0.689 Combined reliability: 0.893 Cronbach's alpha: 0.863
	INT1	0.827	
	INT1	0.736	
	INT1	0.881	
Self-efficacy	SE1	0.702	Construct validity: 0.519 Combined reliability: 0.813 Cronbach's alpha: 0.706
	SE2	0.755	
	SE3	0.689	
	SE4	0.681	
Perceived susceptibility	PS1	0.876	Construct validity: 0.621 Combined reliability: 0.837 Cronbach's alpha: 0.713
	PS1	0.859	
	PS1	0.571	
Perceived severity	PSV1	0.729	Construct validity: 0.638 Combined reliability: 0.872 Cronbach's alpha: 0.801
	PSV1	0.826	
	PSV1	0.874	
	PSV1	0.718	
Perceived barriers	PBA1	0.844	Construct validity: 0.639 Combined reliability: 0.842 Cronbach's alpha: 0.714
	PBA1	0.907	
	PBA1	0.597	
Perceived benefits	PB1	0.744	Construct validity: 0.673 Combined reliability: 0.863 Cronbach's alpha: 0.764
	PB1	0.855	
	PB1	0.852	
Cues to action	CA1	0.842	Construct validity: 0.692 Combined reliability: 0.906 Cronbach's alpha: 0.852
	CA1	0.868	
	CA1	0.832	
	CA1	0.771	

3-2-3- Discriminant validity:

The third stage of evaluating the measurement model involved assessing discriminant validity. Discriminant validity is established when the square root of the Average Variance Extracted (AVE) for each construct is greater than the correlations among the constructs [50]. Based on the results presented in Table 2, the square root of the AVE values for the research constructs ($0.720 < AVE < 0.831$) exceeded the correlations between them ($0.382 < r < 0.536$). This finding indicates that the constructs in the

proposed research model possess acceptable discriminant validity.

Table 2. Correlation and root mean square of extracted variance of research constructs

Variables	1	2	3	4	5	6	7
Cues to action	0.831						
Intention	0.526	0.830					
Perceived barriers	0.473	0.481	0.799				
Perceived benefits	0.463	0.536	0.382	0.820			
Perceived severity	0.517	0.337	0.438	0.536	0.798		
Perceived susceptibility	0.546	0.359	0.416	0.505	0.503	0.788	
Self-efficacy	0.519	0.419	0.536	0.415	0.416	0.472	0.720

After confirming the measurement model, the next step involved conducting path analysis (structural model assessment) to test the research hypotheses within the framework of the proposed model. The structural path model is presented in Figures 2 and 3, along with the standardized and significant factor loadings. As shown by the results, the research variables collectively explain 66.2% of the variance in students' intention to use probiotic products.

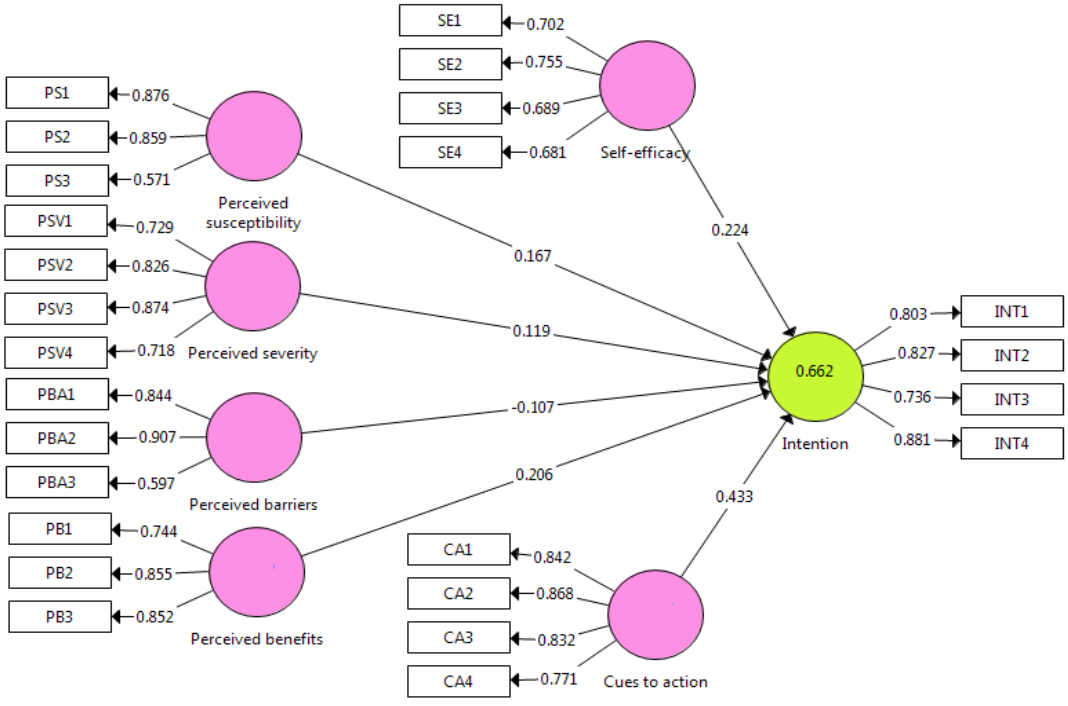

Figure 2. Model in standard mode

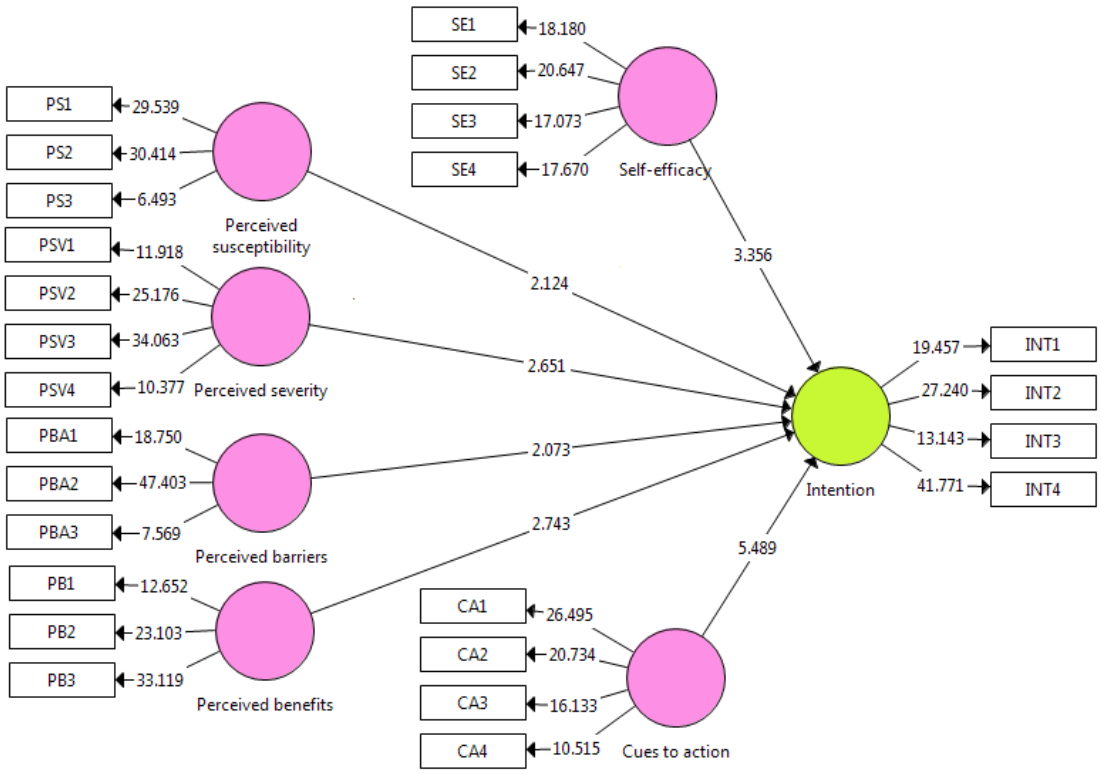

Figure 3. Model in significant state (t-value)

3-3- Testing research hypotheses:

Before testing the structural equations, collinearity among the research constructs was examined using the Variance Inflation Factor (VIF) and tolerance values to ensure that multicollinearity did not adversely affect the results [45]. The findings indicated that all VIF values were below 5 and all tolerance values exceeded 0.1, confirming the absence of collinearity among the constructs. In the next step, to test the research hypotheses, a bootstrapping procedure was conducted using two resampling sizes of 3,000 and 5,000. The results showed no change in the significance levels of the path coefficients, indicating that the relationships among the constructs were stable, significant, and robust [48]. Overall, the findings demonstrated that all components of the Health Belief Model had a significant effect on students' intention to use probiotic products.

Table 3. Results of testing research hypotheses

hypotheses	ƛ	t	Result	R^2
Perceived severity → Intention to consume probiotic products	0.167	2.124	Confirmed	0.662
Perceived susceptibility → Intention to consume probiotic products	0.119	2.651	Confirmed	
Perceived benefits →	0.206	2.743	Confirmed	

Intention to consume probiotic products				
Perceived barriers → Intention to consume probiotic products	-0.107	2.073	Confirmed	
Cues to action → Intention to consume probiotic products	0.433	5.489	Confirmed	
Self-efficacy → Intention to consume probiotic products	0.224	3.356	Confirmed	

4- Discussion

This study was conducted with the overall aim of identifying the factors influencing the intention of students at Agricultural Sciences and Natural Resources University of Khuzestan to use probiotic products. As one of the first efforts in Iran to examine this topic, the study contributes to reducing the existing research gap and offers valuable insights for policymakers seeking to promote the development and consumption of probiotic products. To achieve the research objective, the Health Belief Model was employed as the theoretical framework. The results indicated that this framework was effective, as it explained 66.2% of students' intention to use probiotic products.

Structural equation modeling was used to test the research hypotheses, and the findings showed that perceived susceptibility had a positive and significant effect on students' intention to use probiotic products (confirming Hypothesis 1). This result is consistent with previous studies [51, 52]. In interpreting this finding, it can be argued that individuals who believe their health is at risk are more likely to engage in protective health behaviors to prevent potential harm [53]. The Health Belief Model posits that people generally seek to reduce health risks, but they must first recognize their vulnerability and perceive themselves to be at risk [51]. Not consuming probiotic products may negatively affect health over time, as these products play an important role in maintaining intestinal microbial balance and supporting immune system function. One of the most common problems associated with insufficient probiotic intake is digestive discomfort. Without adequate beneficial bacteria, individuals may experience bloating, constipation, diarrhea, and indigestion, all of which can reduce quality of life. A weakened immune system is another potential consequence. Research has shown that a healthy gut microbiota contributes significantly to immune function; therefore, reduced probiotic intake may increase susceptibility to infections and illnesses. As a result, students who are aware of these potential consequences may be more motivated to consume probiotic products.

Consistent with previous studies [32, 33, 35, 36], the results showed that perceived severity has a positive and significant effect on students' intention to use probiotic products (confirming Hypothesis 2). From a psychological perspective, individuals are more likely to engage in health-promoting behaviors when they believe that the consequences of not performing such behaviors are

serious [54]. In this context, the perceived severity of a risk—such as failing to consume probiotic products—is a key determinant of protective behavior, encouraging individuals to adopt more health‑conscious practices [55]. Research indicates that the more individuals understand the consequences of not consuming probiotics, the more likely they are to use them. Reduced probiotic intake may negatively affect nutrient absorption, as beneficial bacteria support the uptake of essential vitamins and minerals such as calcium, iron, and vitamin B12. A decline in these bacteria can lead to nutrient deficiencies, reduced energy levels, general weakness, and impaired functioning of vital organs. Additionally, skin problems may worsen in the absence of adequate probiotics. Microbial imbalance can increase skin inflammation, contribute to acne, and exacerbate conditions such as eczema. Some studies have shown that probiotics play an important role in regulating immune responses to skin irritants. Overall, the findings suggest that the more students recognize the seriousness of health problems associated with insufficient probiotic consumption, the more likely they are to adopt probiotic products as part of their diet.

The perceived benefits of consuming probiotic products had a positive and significant effect on students' intention to use these products, confirming Hypothesis 3. This finding is consistent with previous studies [26, 27, 32, 56]. Perceived benefits relate to individuals' beliefs about the effectiveness of recommended actions and health programs designed to reduce disease risks [26]. This component highlights that recognizing the risks associated with a disease plays an important role in motivating individuals to adopt protective behaviors [34]. Probiotic products contribute significantly to human health and offer numerous physiological benefits. They contain beneficial bacteria that help maintain intestinal microbial balance and support optimal digestive function. Regular consumption of probiotics can reduce digestive problems such as bloating, constipation, and diarrhea, while also improving nutrient absorption. In addition, probiotics strengthen the immune system. A balanced gut microbiota enhances the body's immune response to infections and diseases, and consistent probiotic intake may reduce the risk of certain inflammatory conditions and allergies [4]. Therefore, when students understand the benefits of probiotic consumption for both personal and public health, these perceived advantages can facilitate behavioral change and increase their motivation to use such products.

Perceived barriers had a negative and significant effect on the intention to adopt protective or health‑related behaviors, confirming Hypothesis 4. This result aligns with previous studies [26, 39, 41, 57]. Despite the many benefits of probiotic products, several obstacles may hinder their widespread use. One major barrier is insufficient knowledge about the benefits of probiotics and how they should be consumed. Many individuals have limited awareness of the health effects of these products, which may lead to hesitation or uncertainty when choosing them. Lack of awareness is therefore one of the most significant barriers to adopting healthy dietary behaviors [18]. Cost is another important barrier. Some probiotic products—particularly specialized formulations and pharmaceutical

supplements—are relatively expensive and may not be affordable for all consumers. As a result, some individuals may prefer natural probiotic sources such as yogurt or fermented vegetables. Additionally, the wide variety of probiotic products on the market and the absence of standardized formulations can create confusion. Different products contain varying combinations of probiotic strains, each with potentially different effects. This diversity can make product selection difficult and may discourage consumers from using probiotics.

The results showed that action guides have a positive and significant effect on the intention to consume probiotic products, thereby supporting Hypothesis 5. This finding is consistent with studies [20, 23, 27], although it does not align with the results of studies [18, 20, 26]. Action guides typically reinforce behavior because mass media, workshops, and educational lectures help individuals understand how to adopt new and safe health behaviors [20]. Accordingly, when individuals are exposed to promotional campaigns and educational videos related to healthy consumption, these cues act as action guides and facilitate the adoption of new behaviors [18]. Educational videos and training courses play an important role in increasing awareness and promoting the consumption of probiotic products. These tools can present scientific information in an engaging and accessible manner, which is particularly valuable for individuals with limited knowledge about the benefits of probiotics. One of the most important effects of educational videos is the improvement of public understanding of probiotics. Such videos can explain how beneficial bacteria function, outline their health advantages, and guide consumers in selecting appropriate products. They also demonstrate correct consumption methods through simple visuals and explanations. Increasing trust in probiotic products is another benefit of educational interventions. Many individuals are skeptical about the effectiveness of probiotic supplements, but exposure to real examples and scientific evidence in educational videos can reduce these concerns and encourage consumption. Specialized training courses, often conducted by nutritionists, physicians, or researchers, further support informed decision‑making by providing accurate scientific information and opportunities for participants to ask questions and update their knowledge. The expansion of digital platforms has also increased access to educational resources, enabling individuals to easily obtain online training and videos. This increased accessibility contributes to greater public awareness and helps promote a culture of probiotic consumption.

Consistent with Hypothesis 6, the results showed that students' self‑efficacy has a positive and significant effect on their intention to consume probiotic products. Self‑efficacy reflects an individual's perception of the ease or difficulty of performing a new behavior [36] and is conceptually similar to the self‑efficacy construct in Bandura's (1997) social cognitive theory [48]. Within the Health Belief Model, self‑efficacy is considered one of the most important variables influencing the adoption of health behaviors [36, 39]. According to Bandura, verbal encouragement and supportive communication can strengthen individuals' belief in their ability to perform a behavior, thereby increasing their sense of efficacy [58]. This variable

reflects individuals' level of self-confidence; those with higher self-confidence are more likely to adopt new behaviors, whereas those with lower self-confidence are less likely to change their actions [59]. Students' self-efficacy plays a critical role in the selection and consumption of probiotic products. It reflects their belief in their ability to manage health-related behaviors and directly influences nutritional decision-making. Students with higher self-efficacy are more likely to seek scientific information about probiotic products, consult reliable sources, and make informed choices. This reduces the likelihood of improper use and enhances the positive health effects of these products. Self-efficacy also contributes to sustained probiotic consumption.

5- Conclusion

Public awareness—particularly among students, who represent an informed and influential segment of society—regarding their dietary experiences and the health challenges they face is highly important. This study was conducted to identify the key factors influencing the willingness of students at Khuzestan University of Agricultural Sciences and Natural Resources (350 undergraduate, master's, and doctoral students) to consume probiotic products through the design and administration of a structured questionnaire. The validity of the questionnaire was confirmed by an expert panel, and its reliability was verified using Cronbach's alpha. The findings confirmed all research hypotheses and showed that perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and action guides significantly affect students' intention to use probiotic products. Together, these components explained 66.2% of the variance in the dependent variable, namely students' intention to consume probiotics. The results indicated that students who are confident in their ability to maintain a healthy lifestyle are more likely to use probiotic products regularly and benefit from their long-term effects. In contrast, individuals with lower levels of self-efficacy may lose motivation and discontinue probiotic use after a short period. Self-efficacy also influences students' ability to manage barriers and challenges related to consumption. Many students avoid probiotics due to high costs, insufficient information, or limited access to quality products. However, those who believe in their ability to find appropriate solutions are more likely to overcome these barriers and maintain probiotic products in their dietary routines.

6- Acknowledgements

The current paper is adapted from a research assigned in Agricultural Sciences and Natural Resources University of Khuzestan, with a Grant Number of 1403.39, and financially supported by the university, thereby we declare our appreciation for their help.

7-References

[1] Tripathi, M. K. and Giri, S. K. (2014). Probiotic functional foods survival of probiotics during processing and storage. Journal Functional Foods. 9: 225-241.

[2] Rivera-Espinoza, Y., and Gallardo-Navarro, Y. (2010). Non-dairy probiotic products. Food Microbiology. 27(1): 1-11.

[3] Granato, D., Branco, G. F., Nazzaro, F., Cruz, A. G., and Faria, J. A. (2010). Functional foods and nondairy probiotic food development: trends, concepts, and products. Comprehensive Reviews in Food Science and Food Safety. 9(3): 292-302.

[4] Mosallaie, F., Jooyandeh, H., Hojjati, M., and Fazlara, A. (2020). Biological reduction of aflatoxin B1 in yogurt by probiotic strains of Lactobacillus acidophilus and Lactobacillus rhamnosus. Food Science and Biotechnology, 29(6): 793–803.

[5] Jooyandeh, H. and Alizadeh Behbahani, B. (2024). Development of a probiotic low-fat set yogurt containing concentrated sweet pepper extract. Food Science & Nutrition, 12(7): 4656-4666.

[6] Jooyandeh, H., Momenzadeh, S., Alizadeh Behbahani, B. and Barzegar, H. (2023). Effect of Malva neglecta and lactulose on survival of Lactobacillus fermentum and textural properties of symbiotic stirred yogurt. Journal of Food Science & Technology. 60(3): 1136–1143.

[7] Jooyandeh, H. and Alizadeh Behbahani, B. (2025) Investigation on some quality parameters of probiotic UF-Iranian white cheese containing caffeine, Journal of Agriculture and Food Research, 21: 101805.

[8] Jooyandeh, H. (2024). Novel & Functional Foods, 1st ed., Khuzestan Agricultural Sciences and Natural Resources University Press. (In Persian)

[9] Alizadeh Behbahani, B., Jooyandeh, H., Taki, M., and Falah, F. (2024). Evaluation of probiotic, safety, and anti-pathogenic properties of Levilactobacillus brevis HL6, and its potential application as bio-preservatives in peach juice. LWT-Food Science & Technology, 207: 116676.

[10] Havenaar, R., Ten Brink B., and Huis in't Veld, J. H. J. (1992). Selection of Strains for Probiotic Use. In: Probiotics: The Scientific Basis, R. Fuller (Ed.), Chapman & Hall, London, UK, 151–170.

[11] Soccol, C.R., de Souza Vandenberghe, L.P., Spier, R., Medeiros, A.B.P., Yamaguishi, C,T., Lindner, J.D.D., et al. (2010). The Potential of Probiotics: A Review. Food Technology and Biotechnology, 48 (4): 413–434.

[12] Torabi, F., Jooyandeh, H., and Noshad, M. (2021). Evaluation of physicochemical, rheological, microstructural, and microbial characteristics of synbiotic ultrafiltrated white cheese treated with transglutaminase. Journal of Food Processing and Preservation, 45: e15572: 1-11.

[13] Kneifel, W., and Shanahan, F. (2011). Probiotics and health claims. John Wiley and Sons Ltd. Blackwell Publishing Ltd, United Kingdom. P. 211.

[14] Annunziata, A., and Vecchio, R. (2013). Consumer perception of functional foods: A conjoint analysis with probiotics. Food Quality and Preference, 28(1): 348-355.

[15] Jacobs, S., Verbeke, W. and Sas, B. (2014). Mode of delivery of probiotics: Consumers' preference and its determinants. Agro Food Industry Hi Tech., 25(6): 6-9.

[16] McFarlane, C., Kelly, J. T., Conley, M., Johnson, D. W., and Campbell, K. L. (2023). Consumers' perspectives and experiences of prebiotics and probiotics for gut health in chronic kidney disease. Journal of Renal Nutrition, 33(1): 116-125.

[17] Carneiro, G. R., and Pimentel, T. C. (2025). Unraveling the potential of ultrasound processing from the consumer perspective: A review on sensory characteristics and perception. Food Bioscience, 106789.

[18] Rezaei, R., and Mianaji, S. (2019). Using the Health Belief Model to Understand Farmers' Intentions to Engage in the On-Farm Food Safety Practices in Iran. Journal of Agricultural Science and Technology, 21(3): 561-574.

[19] Peruzzolo, M., Ceni, G. C., Junges, A., Zeni, J., Cansian, R. L., and Backes, G. T. (2025). Probiotics: Health benefits, microencapsulation, and viability, combination with natural compounds, and applications in foods. Food Bioscience, 106253.

[20] Barley, E., and Lawson, V. (2016). Using health psychology to help patients: theories of behaviour change. Br J Nurs., 25(16): 924-7.

[21] Jeong, J. Y., and Ham, S. (2018). Application of the Health belief model to customers' use of menu labels in restaurants. Appetite, 123: 208-215.

[22] Martin, S. M., and Lorenzen, K. (2016). Livelihood diversification in rural Laos. World Development, 83: 231-243.

[23] Hanson, J. A., and Benedict, J. A. (2002). Use of the Health Belief Model to examine older adults' food-handling behaviors. Journal of Nutrition Education and Behavior, 34: S25-S30.

[24] Groenewold, G., de Bruijn, B., and Bilsborrow, R. (2012). Psychosocial factors of migration: Adaptation and application of the health belief model. International Migration, 50(6): 211-231.

[25] Sheppard, J., and Thomas, C. B. (2021). Community pharmacists and communication in the time of COVID-19: Applying the health belief model. Research in Social and Administrative Pharmacy. 17(1): 1984-1987.

[26] Vassallo, M., Saba, A., Arvola, A., Dean, M., Messina, F., Winkelmann, M., et al. (2009). Willingness to use functional breads. Applying the Health Belief Model across four European countries. Appetite, 52(2): 452-460.

[27] Al-Ani, A., Hammouri, M., Sultan, H., Al-Huneidy, L., Mansour, A., and Al-Hussaini, M. (2024). Factors affecting cervical screening using the health belief model during the last decade: A systematic review and meta-analysis. Psychooncology, 33(1): e6275.
[28] Karami, R., Tabibian, S., Ahmadi, N., and Sharghi, T. (2024). Protective Behavior Analysis of Gardeners in Zanjan County: A Development on the Health Belief Model. Environmental Education and Sustainable Development, 12(2): 145-164.
[29] Abraham, C., and Sheeran P. (2015). Predicting and Changing Health Behavior, In: Mark Conner, Paul Norman, eds., The Health Belief Model, 3rd ed., McGraw-Hill.
[30] Carpenter, C. J. (2010). A meta-analysis of the effectiveness of health belief model variables in predicting behavior. Health communication, 25(8): 661-669.
[31] Savari, M., Amghani, M. S., and Malekian, A. (2025). Treated wastewater irrigation: A bridge between water scarcity, a healthy environment, and safe food production. One Health, 101251.
[32] Savari, M., Ghezi, M., and Molavi, H. (2025). Encouraging low-water-use crops: behavioral drivers and policy recommendations for sustainable water management. Environmental and Sustainability Indicators, 100711.
[33] Savari, M., Damaneh, H. E., and Damaneh, H. E. (2025). Ethical evolution in the management of water resources: The role of developed norms on decreasing groundwater usage in Iranian agricultural practices. Agricultural Water Management, 318, 109714.
[34] Sapbamrer, R., and Thammachai, A. (2020). Factors affecting use of personal protective equipment and pesticide safety practices: A systematic review. Environmental research, 185: 109444
[35] Savari, M., and Khaleghi, B. (2025). Analysis of psychological and social factors affecting climate change adaptation and mitigation behaviors among Iranian rice farmers. Scientific Reports, 15(1), 30431..
[36] Nasiri, A. R., Shahangian, S. A., Kerachian, R., and Zobeidi, T. (2024). Exploring socio-psychological factors affecting farmers' intention to choose a low-water-demand cropping pattern for water resources conservation: Application of the health belief model. Agricultural Water Management, 295: 108768.
[37] Bakhtyari, A., Makarem, M. A., and Rahimpour, M. R. (2017). Light olefins/bio-gasoline production from biomass. In Bioenergy systems for the future (pp. 87-148). Woodhead Publishing.
[38] Wang, M., Huang, L., Pan, C., and Bai, L. (2021). Adopt proper food-handling intention: An application of the health belief model. Food Control, 127: 108169.
[39] Savari, M., Eskandari Damaneh, H., and Damaneh, H. E. (2021). Factors influencing farmers' management behaviors toward coping with drought: evidence from Iran. Journal of Environmental Planning and Management, 64(11): 2021-2046.
[40] Hochbaum, (1958). Public participation in medical screening programs: A sociopsychological study [WWW Document]. Dep. Heal. Educ. Welf. public Heal. Serv.
[41] Devitt, A. L., Tippett, L., Schacter, D. L., and Addis, D. R. (2016). Autobiographical memory conjunction errors in younger and older adults: Evidence for a role of inhibitory ability. Psychology and Aging, 31(8): 927.
[42] Buglar, E. T. (2009). Load curtailment on isolated power systems (Doctoral dissertation, Memorial University of Newfoundland).
[43] Schumacker, R. E., and Lomax, R. G. (2004). A beginner's guide to structural equation modeling. Psychology press.
[44] Hair, J. R. A., Babin, B., and Black, W. (2010). Multivariate Data Analysis. Pdf. Aust.
[45] Hair, J. F., Hult, G. T. M., and Ringle, C. M. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).
[46] Sarstedt, M., Hair, J. F., Pick, M., Liengaard, B. D., Radomir, L., and Ringle, C. M. (2022). Progress in partial least squares structural equation modeling use in marketing research in the last decade. Psychology & Marketing, 39(5): 1035-1064.
[47] Tabachnick, B. G., and Fidell, L. S. (1996). SPSS for Windows workbook to accompany large sample examples of using multivariate statistics. HarperCollins College Publishers.
[48] Hair, J. F., Risher, J. J., Sarstedt, M., and Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1): 2-24.
[49] Chin, W. W., Marcolin, B. L., and Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. Information Systems Research, 14(2): 189-217.

[50] Fornell, C., and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1): 39-50.
[51] Moradhaseli, S., Ataei, P., Van den Broucke, S., and Karimi, H. (2021). The process of farmers' occupational health behavior by health belief model: Evidence from Iran. Journal of Agromedicine, 26(2): 231-244.
[52] Morowatisharifabad, M. A., Bayati, F., Rahaei, Z., Ebrahimzadeh Ardakani, M., and Namayandeh, S. M. (2017). Attitude to, knowledge and practice of skin care in older adults in Sarakhs city, and prevalence of some skin problems among them. Elderly health Journal, 3(2): 67-73.
[53] Raingruber, B. (2014). Health promotion theories. Contemporary Health Promotion in Nursing Practice, 53: 53-94.
[54] Glanz, K. E., Lewis, F. M. E., and Rimer, B. K. (1990). Health behavior and health education: Theory, research, and practice. Jossey-Bass/Wiley.
[55] Khan, M., Husnain, M. I. U., Mahmood, H. Z., and Akram, W. (2013). Understanding pesticide use safety decisions: Application of health behavior theory. Journal of Agricultural and Environmental Sciences, 13(4): 440-444
[56] Savari, M., Sheheytavi, A., and Amghani, M. S. (2023). Factors underpinning Iranian farmers' intention to conserve biodiversity at the farm level. Journal for Nature Conservation, 73: 126419.
[57] Straub, C. L., and Leahy, J. E. (2014). Application of a modified health belief model to the pro-environmental behavior of private well water testing. JAWRA Journal of the American Water Resources Association, 50(6): 1515-1526.
[58] Bandura, A., and Wessels, S. (1997). Self-efficacy (pp. 4-6). Cambridge: Cambridge University Press.
[59] Empidi, A. V. A., and Emang, D. (2021). Understanding public intentions to participate in protection initiatives for forested watershed areas using the theory of planned behavior: a case study of Cameron Highlands in Pahang, Malaysia. Sustainability, 13(8): 4399.

مجله علوم و صنایع غذایی ایران

سایت مجله: www.fsct.modares.ac.ir

مقاله علمی_پژوهشی

عوامل مؤثر بر تمایل دانشجویان دانشگاه علوم کشاورزی و منابع طبیعی خوزستان به مصرف محصولات پروبیوتیک

حسین جوینده[۱]، مسلم سواری[۲]، سارا باوی حسن‌پوری[۳]

۱- استاد گروه علوم و صنایع غذایی، دانشکده علوم دامی و صنایع غذایی، دانشگاه علوم کشاورزی و منابع طبیعی خوزستان، ملاثانی، ایران.

۲- دانشیار گروه ترویج و آموزش کشاورزی، دانشکده مهندسی زراعی و عمران روستایی، دانشگاه علوم کشاورزی و منابع طبیعی خوزستان.

۳- دانشجوی کارشناسی ارشد گروه علوم و صنایع غذایی، دانشگاه علوم کشاورزی و منابع طبیعی خوزستان، ملاثانی، ایران.

اطلاعات مقاله

تاریخ های مقاله :

تاریخ دریافت: ۱۴۰۴/۲/۲۸

تاریخ پذیرش: ۱۴۰۴/۷/۲۷

کلمات کلیدی:

محصولات عملگرا،

پروبیوتیک،

دانشجویان،

غذای سالم،

قصد

DOI: 10.48311/fsct.2026.84055.0

* مسئول مکاتبات:

hosjooy@asnrukh.ac.ir

چکیده

آگاهی مصرف‌کننده نسبت به فوائد مصرف مواد غذایی پروبیوتیکی، در تمایل افراد به خرید و مصرف این محصولات بسیار تأثیرگذار است. مطالعات نشان می‌دهد که دانش در مورد پروبیوتیک‌ها به عواملی نظیر جنسیت، وضعیت تأهل و رشته تحصیلی مرتبط است. این پژوهش با هدف کلی عوامل مؤثر بر تمایل دانشجویان دانشگاه علوم کشاورزی و منابع طبیعی خوزستان به عنوان بخشی مهم و آگاه از جامعه به مصرف محصولات پروبیوتیک انجام شد. جامعه آماری پژوهش شامل کلیه دانشجویان در سه مقطع کارشناسی، ارشد و دکتری بودند. با استفاده از جدول کرجسی و مورگان، ۳۵۰ نفر از دانشجویان با روش نمونه‌گیری طبقه‌ای با انتساب متناسب برای مطالعه انتخاب شدند. تجریه و تحلیل داده‌ها در دو بخش توصیفی و استنباطی توسط نرم‌افزارهای SPSS و Smart Pls انجام شد. ابزار اصلی تحقیق پرسشنامه‌ای بود که روایی آن توسط پانل متخصصان و پایایی آن توسط ضریب آلفای کرونباخ تأیید شد. در این پژوهش از تئوری اعتقاد سلامت به عنوان چارچوب نظری تحقیق استفاده شد. نتایج نشان داد که مؤلفه‌های حساسیت و شدت درک شده، منافع و موانع درک شده، خودکارآمدی و راهنمای عمل اثر معنی‌داری بر قصد دانشجویان به استفاده از محصولات پروبیوتیک دارند. به عبارت دیگر این مؤلفه‌ها قادرند ۶۶/۲ درصد از واریانس متغیر وابسته تحقیق یعنی قصد دانشجویان را تبیین نماید. براساس نتایج این پژوهش، ترویج مصرف هر چه بیشتر پروبیوتیک‌ها در جامعه و برجسته کردن مزایای استفاده از این ترکیبات مفید برای سلامت مردم کشورمان ضروری است.