DO MHEALTH APPS INFLUENCE CONSUMERS' SAFE FOOD CHOICE DECISIONS? ROLE OF TECHNOLOGY AFFORDANCES

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ABSTRACT

Health information technology (HIT) plays a vital role in augmenting users' health conditions and facilitating the self-management of health. Mobile health apps (MHAs) are a type of HIT that run on mobile devices (e.g., wearables and mobile phones). Their primary role is to instruct users on proper food intake. The existing literature has not examined how these devices help users learn to make safe food choices. Based on the technology affordance theory and the theory of reasoned action, this research presents a model for users' safe food choice behavior in MHA. This study reveals how MHA influences a user's safe food choice decision. Through empirical research, the results of this study report that the technology affordance of MHA has a significant positive impact on safe food knowledge acquisition and provision, which in turn influences attitudes toward safe food consumption. The attitude affects users' safe food choice intentions. We discuss the theoretical and practical implications of examining the process by which people learn to make safe food choices using MHAs.

Keywords: Technology affordance; Knowledge acquisition; Knowledge provision; MHealth app

1. Introduction

Health information technology (HIT), such as mobile health apps (MHAs), refers to technologies that augment and facilitate users' health management (Buntin et al., 2011). MHAs (such as MoreHealth, FoodSwitch, Boohee, and Betterme) are health-related applications that run on mobile devices (e.g., wearables and mobile phones) (Zhu et al., 2017). MHAs alert users regarding food intake, physical activity, and weight management (Mao et al., 2020). Users use them to collate reliable personal health and fitness data anytime and anywhere (Tong and Laranjo, 2018). These apps use the collected data to alert users about undesirable and unhealthy habits (Adriaanse et al., 2011; Wong et al., 2022). They also provide users with appropriate health-related recommendations and nudge them toward adopting safe habits (Akter et al., 2013; Geissbuhler, 2008). For example, they alert users about proper food intake and help them improve their food consumption (Leonardi and Meyer, 2015). Some MHAs are designed for specific medical purposes, such as diabetes and hypertension, which educate users about improving their health (Gay and Leijdekkers, 2015). Thus, they are a valuable source of real-time information and a guide for proper food intake (Aboelmaged et al., 2021; Mao et al., 2020). By scanning the barcode of a food item, users can obtain a wealth of information about its safe food attributes in various formats (audio, video, image, and text). These apps also encourage users to share the knowledge gained within their network (Fulk and Yuan, 2013). Thus, various MHAs educate users on health and

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related practices to learn about "consuming a healthy diet throughout their life-course" (World Health Organization, 2019).

However, the mechanism by which MHAs influence users' health is unclear. Specifically, it is unclear how and why MHAs affect knowledge transfer about safe food (Mao et al., 2020). Some studies argue that MHAs promote individuals' physical and psychological health. For example, according to Li et al. (2020), MHAs satisfy patients' fundamental needs for autonomy, competence, and relatedness, enhancing their IT-enabled self-esteem and reducing physical symptoms. Previous studies have examined the safe food choice decision from the perspective of *protective motivation theory* and the *theory of reasoned action* and have reported knowledge about safe food as an important antecedent of consumer food choice (Chen, 2016; Wang et al., 2020). We find two prominent missing links in previous studies. First, the mechanism by which consumers gain knowledge about safe food is unclear. Second, the role of HIT in the entire process is unclear (Buntin et al., 2011). We argue that any technology provides specific affordances that facilitate its use by users; thus, its role in influencing safe food choice decisions should be examined.

Therefore, in this study, we examine the role of MHAs in influencing users' safe food choice decisions from the perspective of technology affordances and the theory of reasoned action. We specifically examine the following: (1) *How do the technical attributes of MHAs help users build their knowledge base about safe food habits*? and (2) *How does such safe food knowledge help them make safe food choices*? Understanding these questions will help policymakers design appropriate policy interventions. At the same time, this study will benefit mobile information technology providers and researchers in promoting the design and development of MHAs.

The rest of the paper is organized as follows. In Section 2, we review the relevant literature on safe food choice decisions and the theoretical basis of this study. We present our research model based on affordance theory and the theory of reasoned action in Section 3. We then discuss the methodology in Section 4, followed by the data analysis and results in Section 5. Finally, we discuss the findings and their implications in Section 6 and conclude in Section 7.

2. Literature Review

2.1. Research on Safe Food Choice Decision

The two main concepts regarding safe food choice decisions include gaining knowledge about safe food and the decision to consume safe food. Safe food choice refers to users proactively selecting safe foods and eliminating potentially harmful foods from their diet (Taha et al., 2020). Table 1 presents a summary of the studies on safe food choice decisions.

We can note from Table 1 that most studies have examined the safe food choice decision from the perspective of protective motivation theory and the theory of reasoned action and have focused on food purchase, food choice, and food handling decisions. These studies have identified knowledge of safe food as an important antecedent of consumer food choice decisions. However, they did not examine the role of HIT in consumers' food intake and food choice decisions (Buntin et al., 2011). In this study, we examine the antecedents of safe food choice decisions by considering the role of MHAs.

Table 1: Research on Safe Food Choice Decision

Research Topics	Source	Theoretical foundation	Influencing Factors
Organic food purchase decision	(Aitken et al. 2020)	Theory of reasoned action	Purchase attitude, subjective norm, perceived behavioral control, food labeling
Safe food choice decision	(Chen 2016)	Protection motivation theory	Food safety risk, vulnerability, response efficacy, self-efficacy, protection motivation, safe food choice behavior
Food safety self-protection behavior	(Wang et al. 2020)	Protection motivation theory, grounded theory	Self-protection consciousness, food safety knowledge, personality, social environment
Safe food handling behavior	(Mullan et al. 2016)	Protection motivation theory	Food safety severity, response efficacy, self-efficacy, protective motivation
Organic food purchase intention	(Yu et al. 2021)	Stimulus-organism-response model	Corporate ability image, corporate social responsibility image, consumer trust
Eco-friendly food purchase intention	(He et al. 2019)	Responsible environmental behavior	Personal responsibility, knowledge of issues, action skills, environmental attitude
Healthy food purchase intention	(Lim and An 2021)	Theory of Planned Behavior	Attitude, subjective norm, perceived behavioral control

2.2. Understanding Knowledge Transfer about Safe Food

Knowledge is a summarized and condensed systematic understanding acquired by humans from practice. It includes facts, descriptions of information, and skills acquired through education and practice (Grant, 1996). Knowledge transfer refers to the propagation of knowledge from one entity to another. It is a two-way exchange between knowledge providers and receivers between two or more individuals, between two or more groups, or between individuals and groups (Kim et al., 2011; Szulanski, 1996). Knowledge transfer comprises two aspects: knowledge acquisition and knowledge provision. Knowledge acquisition refers to individuals' absorption and use of knowledge (Reinholt et al., 2011). Individuals acquire and store knowledge and apply it wherever and whenever necessary (Yli-Renko et al., 2001). Knowledge provision refers to the sharing of knowledge possessed by an individual with a potential recipient (Reinholt et al., 2011). Both knowledge acquisition and knowledge provision enable knowledge transfer among users.

Knowledge transfer about safe food refers to the process of knowledge exchange to ensure food hygiene and safety during processing and storage (Sharif et al., 2013). MHAs facilitate users who gather knowledge about safe food (Aboelmaged et al., 2021; Mao et al., 2020). They also help users improve their health and related behavior by widening their health knowledge (Mao et al., 2020). They generate alerts and prompt users regarding healthy foods (Michie et al., 2013). Additionally, they encourage users to exchange knowledge about food, thus widening their knowledge base and making safe food choice decisions (Beh et al., 2021). An MHA catalyzes the adequate transfer of knowledge about safe food (e.g., pharmacological support and instruction on how to perform healthy behavior) to increase users' safe food choices (Michie et al., 2013). Because MHAs enable the transfer of knowledge about safe food among users, this study further explores how the technical features of MHA allow for such a transfer.

2.3. Role of MHAs in Knowledge Transfer about Safe Food

Technology affordance implies that technology allows an individual to perform a specific task (Faraj et al., 2011). Affordances characterize how technology features afford users fulfillment of their purposes (Majchrzak et al., 2013). Affordance theory has been widely used in studying IT and user behavior (Cabiddu et al., 2014). Research has identified various dimensions of IT affordances (association, visibility, persistence, and editability) in different contexts (Sun et al., 2020): social commerce affordance (visibility, metavoicing, and guidance shopping) (Sun et al., 2019) and social network affordance (accessibility, information retrieval, editability, and association) (Chan et al., 2019). However, few studies have characterized MHA affordances.

MHAs are essentially technological artifacts that provide specific affordances to their users in health-related aspects. MHA affordances refer to the affordances that an MHA provides to nudge users toward health-oriented actions (Şahin et al., 2007; Steffen et al., 2019). MHA affordances offer a lens through which to examine how the technological features of MHAs help users fulfill their goals. Users aim to address health- and fitness-related problems using an MHA's dietary guidance (Leijdekkers and Gay, 2013; Mollee et al., 2017). This also makes MHAs popular among users concerned about their physical health.

As an HIT, an MHA provides users with several affordances to make their technology choices. For example, its association affordance helps users connect with other individuals who know about safe foods (Kim et al., 2011). Such networking with other users facilitates the self-management of health among users. Its visibility affordance allows MHAs to send alerts about unsafe foods on a user's mobile device (Treem and Leonardi, 2013). Such alerts can help users quickly access knowledge about safe foods. Third, its metavoicing affordance encourages users to actively share personalized resource requirements (Ma and Agarwal, 2007). Thus, MHA helps users obtain more personalized and focused knowledge of safe foods. Based on these characteristics of MHAs, we consider association, visibility, and metavoicing dimensions of the MHA technology affordance (Mao et al., 2020). How do these affordances influence users' knowledge of safe food and further safe food choice decisions? We understand and explain this process through the theory of reasoned action.

2.4. Theory of Reasoned Action

The theory of reasoned action suggests that people rationally consider the various information available before making behavioral decisions and then evaluate their behavior (Fishbein, 1980). The theory of reasoned action is widely used to study consumers' behavioral intentions regarding safe food – ethical consumption and organic food consumption (Al-Swidi et al., 2014; Yadav and Pathak, 2016). Behavioral intention and attitude are the key influencing factors of rational behavior (Ajzen, 1980). Behavioral intention is an individual's intention to engage in a particular behavior, while attitude is a positive or negative emotion held by an individual toward a specific object (Ajzen, 1991; Fishbein and Ajzen, 2011). Ajzen (1991) also argued that attitude results from deeply held beliefs about any entity or artifact. Applying the theory of reasoned action, we argue that users develop certain beliefs about MHAs based on their affordances. These beliefs influence their attitudes toward MHAs and their intention to use them.

3. Research Model and Hypotheses

Based on the above discussion, we present our research model in Figure 1. We propose that technology affordances influence users' beliefs about safe food. According to the theory of reasoned action, these beliefs influence their attitude towards safe food consumption and intention to choose safe food. Now we discuss the hypotheses in detail.

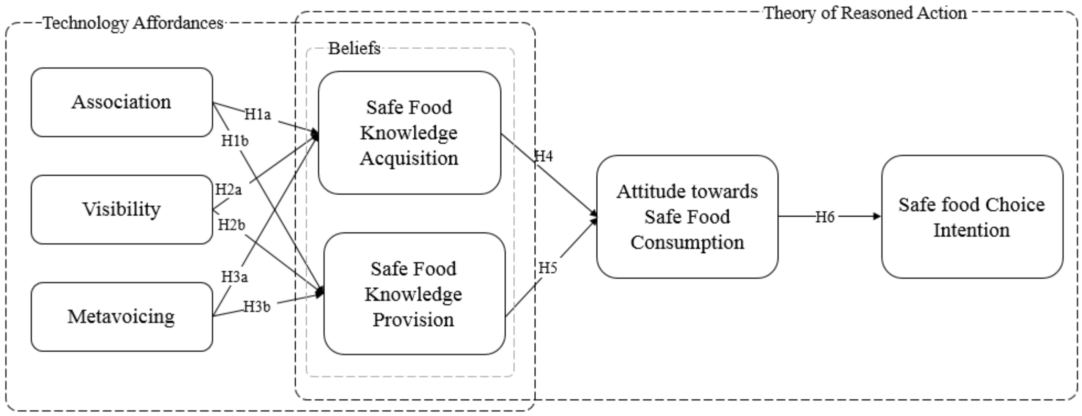

Figure 1: Research Model

3.1. Influence of MHA Affordances on Users' Beliefs about Safe Food

As stated earlier, users develop beliefs about safe food through the knowledge they gather from MHAs (knowledge acquisition) and the knowledge they exchange with others about safe food on MHAs (knowledge provision). The question is how MHAs influence such beliefs in users. We argue that this happens through the specific affordances of MHAs: association, visibility, and metavoicing.

Association affordance refers to the possibility of making connections with individuals who possess knowledge about safe foods, either directly or through related content (Pee, 2018; Treem and Leonardi, 2013). The MHAs' association affordance includes both content association and relationship association. Content association means that users can establish content relevance based on their age, gender, usage habits, and other health-related characteristics (Kim et al., 2011). Relationship association means that users can strike relationships with other users who know about safe foods through features such as following and friending. An extensive network of relationships expands the scope for users to acquire and share knowledge regarding safe food (Pee, 2018; Subramani, 2004). Users develop firm beliefs about food being safe for consumption by sharing knowledge. Hence, we hypothesize the following:

H1a. MHA association is positively associated with safe food knowledge acquisition.

H1b. MHA association is positively associated with safe food knowledge provision.

Visibility affordance refers to the possibility of users discovering or using the content (Treem and Leonardi, 2013). In MHAs, users share knowledge about safe food with others using various multimedia formats, such as images, text, video, and audio. An MHA's visibility affordance usually makes knowledge about safe food visible on a user's mobile device. Thus, users are alerted about safe food even if they are not actively looking for it. They can now easily access knowledge about safe foods (Fulk et al., 2004). Thus, visibility also allows users to discover knowledge about safe food and thus strengthen their beliefs about it (Alavi and Leidner, 2001; Sun et al., 2020). Hence, we hypothesize the following:

H2a. MHA visibility is positively associated with safe food knowledge acquisition.

H2b. MHA visibility is positively associated with safe food knowledge provision.

Metavoicing affordance refers to the possibility that MHAs provide users with active conversation in the app by reacting to others' presence, profiles, content, and activities (Dong et al., 2016; Hamilton et al., 2014). When other users share their content about safe food, users can react to that content by liking, commenting, or sharing it. MHAs encourage users to be online for a long time and actively upload personalized and original content, comment, retweet, like, and mark the content of interest as favorites. Such participation strengthens users' beliefs, and they can obtain more personalized knowledge on safe foods and share valuable feedback and related content with other users (Ma and Agarwal, 2007). Hence, we hypothesize the following:

H3a. MHA metavoicing is positively associated with safe food knowledge acquisition.

H3b. MHA metavoicing is positively associated with safe food knowledge provision.

3.2. Influence of Safe Food Knowledge Transfer on Attitude

Knowledge, culture, concepts, and other content reserves are important factors that influence attitude formation regarding safe food consumption (Flamm, 2009; Kaiser et al., 1999). Studies (e.g., Sockett, 2010) report that knowledge regarding safe food positively influences attitude toward safe food consumption. When MHA users receive alerts or updates about safe food, they become self-protective, leading to attitude toward safe food consumption (Rogers et al., 1983). At the same time, when MHA users share the information they receive, they deepen their understanding of safe food and become more conscious of strengthening their attitudes toward safe food (Al-Swidi et al., 2014; Tarkiainen and Sundqvist, 2005). According to the theory of reasoned action, beliefs about an object or entity strengthen one's attitude toward that entity or object. Two important beliefs formed through interaction in MHAs are safe food knowledge acquisition and safe food knowledge provision. These beliefs influence users' attitudes toward safe food. For example, users may not always be keen on going for safe food. However, when others share their beliefs and experiences, one may become more careful about consuming unsafe foods. Hence, we hypothesize the following:

H4. Safe food knowledge acquisition is positively associated with attitude toward safe food consumption.

H5. Safe food knowledge provision is positively associated with attitude toward safe food consumption.

3.3. Influence of Attitude Toward Safe Food Consumption on Safe Food Choice Intention

Behavioral intention refers to a state of preparation before a behavioral action (Sapp, 1991). The theory of reasoned action integrates the decision-making process of an actor (Milne et al., 2000). According to the theory of reasoned action, attitude influences behavioral intention (Floyd et al., 2010). Safe food choices refer to consumers' willingness to choose safe foods actively. Attitude toward safe food would influence their safe food choice intentions (Sk et al., 2019). Hence, we hypothesize the following:

H6. Safe food attitude is positively associated with safe food choice intentions.

4. Research Methodology

4.1. Scale Development

This study used a quantitative survey to empirically validate the research model. The data were collected using an online survey. We adapted the scales from previous studies to ensure content validity for designing the questionnaire. As the original scales were in English, we used the back translation method to translate them into Chinese. Second, we invited three experts in the field of safe food and five postgraduates with extensive knowledge of safe food to review the content validity of the questionnaire. Based on the feedback, the survey instrument was revised to make the questionnaire accurate and easy to understand. Then, a pilot study was conducted on 50 college students. Based on their feedback, the survey instrument was further improved. All constructs were measured on a 7-point Likert scale, with 1 representing 'strongly disagree' and 7 representing 'strongly agree'.

We used reflective measures to measure the constructs in our research model. The scale for association was adapted from Rice et al. (2017) and Treem and Leonardi (2013). The measures for visibility were adapted from Dong et al. (2016), measures for metavoicing from Dong and Wang's (2018) scale for measuring metasound, measures for safe food knowledge acquisition and safe food knowledge provision from Reinhoult et al. (2011), measures for attitude toward safe food consumption from Yazdnpanah and Forouzani (2015), and measures for safe food choice intention from Chen and Mei-Fang's (2016) behavioral intention scale and Lin et al.'s (2017) purchase intention measurement scale. Table 2 presents the sources of specific measurement items for each construct.

Table 2: Measurement Scales

Variable and source	Item content
Association (AS) (Rice et al. 2017； Treem and Leonardi 2013)	MHA allow me to… AS1: connect with other knowledgeable members of MHA AS2: use Web links from the knowledge I know or am aware of to find new knowledge I did not know or was not aware of AS3: use Web links from people I know or am aware of, to find new people I did not know or was not aware of
Visibility (VI) (Dong et al. 2016)	VI1: MHA provides me with detailed pictures of the safe food. VI2: MHA makes the safe food attributes visible to me. VI3: MHA makes information about how to use safe food visible to me. VI4: MHA helps me to visualize safe food like in the real world.
Metavoicing (ME) (Dong and Wang 2018)	ME1: MHA allows me to comment on safe food ME2: MHA allows me to share some opinions about safe food ME3: MHA allows me to join in the communal discussions on safe food

Safe food knowledge acquisition (KA) (Reinholt et al. 2011)	KA1: I received knowledge from other users on MHA. KA2: I used knowledge provided by other users on MHA. KA3: I received knowledge from other users on MHA. KA4: I used knowledge provided by other users on MHA.
Safe food knowledge provision (KP) (Reinholt et al. 2011)	KP1: Other users on MHA have received knowledge from me. KP2: Other users on MHA have used knowledge provided by me. KP3: Other users on MHA have received more knowledge from me.
Attitude towards safe food consumption (FSA) (Yazdanpanah and Forouzani 2015)	FSA1: Food safety knowledge makes me feel good. FSA2: Food safety knowledge is good for the environment. FSA3: Food safety knowledge is good for health. FSA4: Food safety knowledge is part of how I want to live my life.
Safe food choice intention (SFC) (Chen and Mei-Fang 2016; Lin et al. 2017)	SFC1: I plan to choose safe foods SFC2: I prefer to choose safe foods SFC3: I intend to choose safe foods SFC4: I will try to choose safe foods

4.2. Data Collection

We used the mHealth management application – MoreHealth – as the platform for collecting data. MoreHealth supports over 90% of smart wearables, which provide users with customized health-related alerts by tracking one's food consumption, exercise, and other user-provided data. MoreHealth has modules such as 'Nutrition Knowledge Hall' and 'Health Grocery Store' to promote safe food knowledge and health maintenance methods. As of December 2020, MoreHealth had more than 80 million registered users. Therefore, it was easy to find a good number of subjects for our study. The survey was published as a web link on MoreHealth's virtual community – 'MoreHealth Circle.' Respondents were asked to fill out the survey only if they browsed and shared food-safety content on the MoreHealth platform within the last three months. We obtained a total of 463 questionnaires in this study over one month. After excluding those who did not meet the screening criteria, we were left with 438 valid questionnaires. Table 3 shows the demographic information of the sample. Among the respondents, males (n = 143) accounted for 32.65%, and females (n = 295) accounted for 67.35%. Most respondents (88.59%) were between 18 and 40 years old, and 92.47% of the respondents had a college degree or above; 61.64% had a monthly income of less than RMB 3,000, and 71% were students and corporate employees. Among the commonly used MHAs, MoreHealth, Boohee, and FoodSwitch account for 40.41%, 21.00%, and 18.72%, respectively.

5. Data Analysis and Results

We used partial least squares regression (PLS) to empirically test the research model. PLS has no strict requirements on the sample data size and can perform accurate model-fitting tests that are particularly suitable for empirical research (Chin et al., 2003; Kim, 2012). We first examined the measurement model, followed by analyzing the structural model.

Table 3: Demographic Characteristics of the Respondents

Variable	Category	Number	Ratio
Gender	Male	143	32.65%
	Female	295	67.35%
Age	18～22	182	41.55%
	23～25	73	16.67%
	26～30	85	19.41%
	31～40	48	10.96%
	41～45	31	7.08%
	＞45	19	4.34%
Career	Student	222	50.68%
	Corporate Employee	89	20.32%
	Individual	30	6.85%
	Public employee	33	7.53%
	Teacher	32	7.31%
	Worker	27	6.16%

	Other	5	1.14%
Education	High School and below	33	7.53%
	College	94	21.46%
	Undergraduate	273	62.33%
	Master's degree (or equivalent)	37	8.45%
	Doctorate and above	1	0.23%
Average monthly income（RMB）	＜1000	101	23.06%
	1000-2999	169	38.58%
	3000-4999	100	22.83%
	5000-6999	40	9.13%
	＞7000	28	6.39%

Table 4: Results on Reliability and Convergent Validity.

Factor	Item	Standard loading	AVE	CR	Cronbach's α
Association (AS)	AS1	0.906	0.781	0.914	0.859
	AS2	0.852			
	AS3	0.892			
Visibility (VI)	VI1	0.917	0.831	0.936	0.898
	VI2	0.910			
	VI3	0.908			
Metavoicing (ME)	ME1	0.876	0.765	0.907	0.847
	ME2	0.861			
	ME3	0.888			
Safety Food knowledge acquisition (KA)	KA1	0.845	0.732	0.916	0.878
	KA2	0.857			
	KA3	0.856			
	KA4	0.864			
Safety Food knowledge provision (KP)	KP1	0.877	0.766	0.907	0.847
	KP2	0.854			
	KP3	0.894			
Attitude towards Safe Food Consumption (FSA)	FSA1	0.831	0.698	0.902	0.856
	FSA2	0.854			
	FSA3	0.841			
	FSA4	0.815			
Safe food choice intention (SFC)	SFC1	0.812	0.721	0.912	0.871
	SFC2	0.849			
	SFC3	0.860			
	SFC4	0.874			

5.1. Common Method Bias Test

Common method bias may affect our results, as we measured the independent and dependent variables simultaneously on the same scale. Therefore, a common method bias test was conducted using Harman's single factor (Podsakoff et al., 2003). Exploratory factor analysis was performed using SPSS 23.0. The largest overall variance by any single factor in the unrotated factor solution was less than 40%. This implies that common method bias was not an issue in our study.

5.2. Measurement Model

Table 4 presents the results of the confirmatory factor analysis. Again, the standard loadings of the first-order variables were all higher than 0.7, indicating that the internal reliability of the scale was good.

The average variance extracted for each construct was greater than 0.5, indicating that the variable's convergence validity was good; the composite reliability was higher than 0.7, indicating that the scale had good confirmatory factor reliability. Next, we tested for discriminant validity. The heterotrait–monotrait criterion is more reliable than the Fornell–Larcker criterion in addressing discriminant validity (Henseler et al., 2015). Table 5 presents the results of the HTMT. We can note that all constructs fulfilled the conservative threshold of 0.85.

Table 5: Discriminant Validity (HTMT).

Factor	ME	AS	VI	KP	KA	FSA	SFC
ME							
AS	0.806						
VI	0.808	0.845					
KP	0.805	0.805	0.798				
KA	0.842	0.843	0.800	0.843			
FSA	0.761	0.690	0.704	0.739	0.810		
SFC	0.593	0.462	0.535	0.538	0.593	0.832	

5.3. Structural Model

Figure 2 and Table 6 present the structural model results using SmartPLS 3.0 and data analysis.

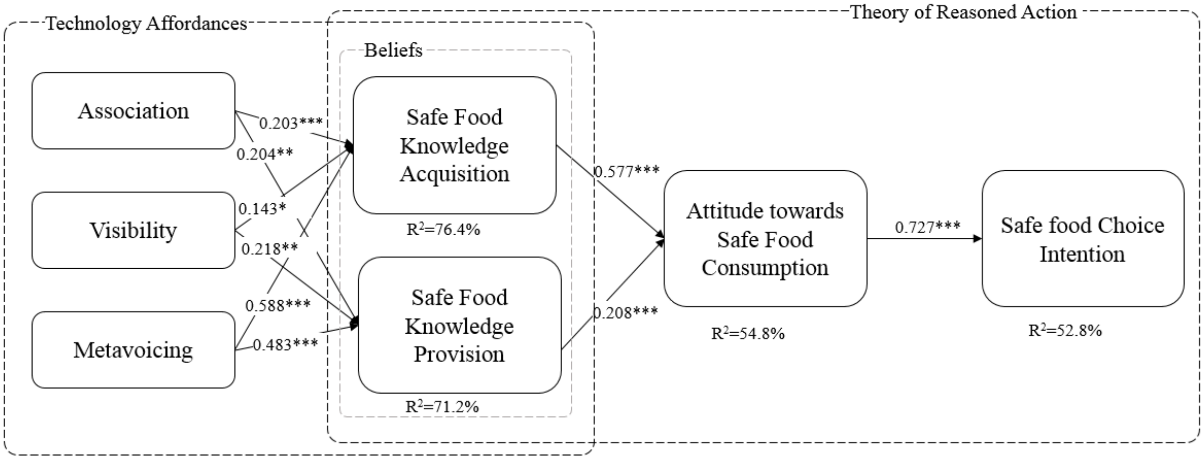

Figure 2: Path Diagram (*p< 0.05; ** p< 0.01； ***p< 0.001).

Figure 2 shows that association has a significant positive effect on both safe food knowledge acquisition (β = 0.203, p < 0.001) and knowledge provision (β = 0.204, p < 0.01), visibility has a significant positive effect on safe food knowledge acquisition (β = 0.143, p < 0.05) and knowledge provision (β = 0.218, p < 0.01), metavoicing has a significant positive effect on safe food knowledge acquisition (β = 0.588, p < 0.001) and knowledge provision (β = 0.483, p < 0.001), safe food knowledge acquisition (β = 0.577, p < 0.001) and knowledge provision (β = 0.208, p < 0.001) have a significant positive effect on attitude towards safe food, and attitude towards safe food has a significant positive effect on behavioral intention (β = 0.727, p < 0.001). Therefore, hypotheses H1a, H1b, H2a, H2b, H3a, H3b, H4, H5, and H6 were all supported. The explained variances for safe food knowledge acquisition, safe food knowledge provision, attitude toward safe food consumption, and safe food choice intention were 76.4%, 71.2%, 54.8%, and 52.8%, respectively.

Table 6: Results of Hypotheses Testing

Hypotheses	Path	Path coefficient	T-value	Conclusion
H1a	Association → Safe food knowledge acquisition	0.203	3.249	Significant
H1b	Association → Safe food knowledge provision	0.204	2.981	Significant
H2a	Visibility → Safe food knowledge acquisition	0.143	2.163	Significant
H2b	Visibility → Safe food knowledge provision	0.218	2.662	Significant
H3a	Metavoicing → Safe food knowledge acquisition	0.588	10.607	Significant
H3b	Metavoicing → Safe food knowledge provision	0.483	7.911	Significant

H4	Safe food knowledge acquisition → Attitude toward Safe food consumption	0.577	7.610	Significant
H5	Safe food knowledge provision → Attitude towards safe food consumption	0.208	2.670	Significant
H6	Attitude towards safe food → Safe food choice intention consumption	0.727	23.027	Significant

6. Discussion and Implications

6.1. Discussions of the Findings

Previous studies have mainly analyzed safe food choices from the perspectives of subjective norms, food labeling, perceived risk, self-protective behavior, corporate image, and cultural climate (Sun et al., 2020). However, it is unclear whether the safe food knowledge obtained through MHAs affects their choice decisions. This study used technology affordance theory and the theory of reasoned action to develop a model to understand how MHAs influence users' safe food choice decisions. The results revealed that safe food knowledge gained through MHAs significantly affected users' safe food choice decisions. The results also revealed that the association significantly affected food safety knowledge transfer. This conclusion shows that MHAs' content association and relationship association functions can promote users' acquisition and provision of food safety. This is consistent with Sun et al.'s (2020) findings on social media affordances. The combination of MHA and social media facilitates the spread of knowledge about safe food consumption (Preciado et al., 2020). This finding is consistent with the functionalities of mobile technologies that assist users in communicating and interacting with other users, gratifying their information demands, and exchanging user-generated content (Tong and Laranjo, 2018; Wang et al., 2022).

Visibility significantly affects safe food knowledge transfer. This shows that the visibility of MHA can promote users' acquisition and provision of knowledge regarding safe food. Visibility makes implicit safe food knowledge explicit, making it easier for users to discover and share safe food knowledge (Ambrosini and Bowman, 2010). In addition, visibility impacts safe food knowledge provision (ß = 0.230) more than safe food knowledge acquisition (ß = 0.164). In MHA, users share their knowledge of safe food in multimedia formats, such as images, text, video, and audio. This approach to improving knowledge visibility facilitates the provision of knowledge about safe food. However, due to the increased concentration of content on MHA, it is much more difficult for users to discover and acquire knowledge (Chathika et al., 2021).

Metavoicing significantly affects safe food knowledge transfer. This implies that metavoicing in MHA facilitates users' acquisition and provision of knowledge of safe food. Metavoicing refers to the possibility that MHAs provide users with active communication. Users communicate online through MHAs and participate extensively in creating and delivering content on safe food, thereby promoting users' discovery and provision of safe food (Dong and Wang, 2018; Hsu et al., 2022; Hu et al., 2017).

Safe food knowledge significantly affects attitude toward safe food. Previous studies have mainly explored the mechanism of attitude formation toward safe food in terms of subjective norms, food labeling, perceived risk, self-protective behavior, corporate image, and cultural climate (Go and Sundar, 2019; Kasilingam, 2020), while ignoring the role of the knowledge transfer process in facilitating attitude formation (Meng et al., 2021). This study bridges the gap in the previous literature.

Attitude toward safe food consumption significantly affects safe food choice intentions. This finding is consistent with the theory of reasoned action and the conclusions of previous research (Huang and Shiau, 2015; Hung et al., 2016). Our study extends their findings to the domain of safe food consumption.

6.2. Theoretical Implications

Based on technology affordance theory and the theory of reasoned action, this study reveals the mechanism of the role of MHA in users' safe food choice decisions from the perspective of knowledge transfer. It has some interesting implications for theory. First, this study expands the application of affordance theory. Previous research has applied affordance theory to social commerce and social media (Lin et al., 2020; Pee, 2018). We investigate the technical characteristics of MHA in terms of its affordances, namely association, visibility, and metavoicing, and reveal the mechanism behind the formation of beliefs about MHAs. Technology affordances influence users' beliefs about any entity, which in turn influences their attitudes toward that entity, as per the theory of reasoned action. It also reveals the influence of MHAs on users' safe food choices. Thus, we extend the scope of technology affordance theory to the field of mobile health and integrate it with the theory of reasoned action to explain knowledge transfer about safe food in MHAs.

We clarify the role of mobile IT in promoting knowledge transfer (Li et al., 2020; Tian et al., 2020). Based on technology affordance theory and the theory of reasoned action, this research reveals the mechanism of mobile IT for safe food knowledge acquisition and safe food knowledge provision. Additionally, this research shows that mobile IT is a new and important method of knowledge transfer.

We started the research on the mechanism of safe food choice decisions. Previous studies have mostly revealed consumers' safe food decision-making mechanisms based on subjective norms, food labeling, perceived risk, self-protection behavior, corporate image, and cultural atmosphere. They ignore the impact of knowledge transfer on safe food choice decisions (Chen and Lin, 2018). Therefore, this study provides a new perspective for studying the decision-making mechanisms for consumers' safe food choice behaviors.

6.3. Practical Implications

The results of this study guide the improvement of MHA functionality. The association, visibility, and metavoicing of MHAs significantly affect knowledge transfer. This implies that MHAs should follow a targeted approach to improve their functionality. We recommend using social media to establish the most useful relationships and content associations to strengthen MHA association. To improve MHA visibility, we recommend that MHAs further visualize safe food knowledge and motivate users to share it. Finally, to improve MHA metavoicing, we recommended that MHAs improve the human–computer interaction interface and optimize the real-time interactivity of the app.

The results of this study also have implications for optimal safe food management. On average, 50,000 people are poisoned by food in China each year (Chen et al., 2013). Previous research has primarily focused on improving safe food management through aspects such as the traceability of the food chain. However, this study reveals the mechanism of the role of MHA in users' safe food choice decisions from a knowledge transfer perspective. This suggests that promoting MHA and facilitating safe food knowledge transfer are important for improving safe food management.

6.4. Limitations and Future Research

The results of this study should be interpreted considering its limitations. First, the survey respondents were all from MoreHealth. Future surveys and comparative analyses of foreign applications could examine the cross-cultural impact on safe food choice decisions. Second, safe food choice decisions may be influenced by the affordance and knowledge transfer processes of MHA and uncertainties, such as the social environment and public emergencies. It is necessary to add additional influencing factors to explore patterns of safe food choice decisions. For example, scholars may consider more features of mobile technologies that may influence users' beliefs.

7. Conclusions

Based on the technology affordance theory and the theory of reasoned action, this study presents a model of safe food choice behavioral decision-making in MHAs from the perspective of knowledge transfer. Furthermore, it reveals the mechanism of the effect of MHA on safe food decision-making. The results of the empirical study show that the technology affordance of MHA has a significant positive impact on safe food knowledge acquisition and knowledge provision; safe food knowledge transfer significantly impacts users' safe food choice behavioral decisions.

Acknowledgment

This work was supported by a grant from the NSSFC (19BGL262).

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