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Psychological factors influencing customers' acceptance of smartphone diet apps when ordering food at restaurants

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ABSTRACT

This paper examines the adoption of smartphone diet apps by restaurant customers and, more specifically, the psychological factors that influence their intention to use such apps when ordering food at restaurants. Data was collected from 395 individuals and analyzed using partial least squares structural equation modeling. Results showed that customers' intention to use smartphone diet apps is predicted by expected performance of the application, anticipated effort of usage, social influence, and degree of user innovativeness. Following the Unified Theory of Acceptance and Use of Technology (UTAUT), this study proposes five determinants of mobile diet apps' usage intentions: performance expectancy, effort expectancy, social influence, facilitating conditions, and personal innovativeness. Based on the study results, theoretical and practical implications are provided for scholars, health professionals, restaurant operators, and smartphone application developers.

1. Introduction

Food service businesses play an important role in daily eating habits (Penney et al., 2016), providing 70 million meals a day for the 130 million Americans who dine out on a daily basis (Cho et al., 2013). On average, Americans dine out for 4.8 meals per week and spend approximately 46% of their total food budget in restaurants (FDA, 2015). This is a public health concern because larger portion sizes and unhealthy dishes are associated with a number of diseases, including obesity and diabetes (Crino et al., 2015; Escaron et al., 2016; Munt et al., 2017). In the past decade, ischaemic heart disease, stroke, chronic lung disease, and lower respiratory infections were the leading causes of death across the globe (WHO, 2017). Obesity in particular is a significant contributor to mortality levels, accounting for 18% of all deaths in the United States (Masters et al., 2013). In addition to obesity and diabetes, food allergies and sensitivities are also associated with diet choices (Okumus et al., 2015). About 30% of Americans have specific dietary preferences, 20% have food sensitivities, and 5% have food allergies, suggesting that many people face challenges in following their particular diets when dining out (Levere, 2014). It is crucial to follow an appropriate diet to maintain a healthy lifestyle and reduce the risk of the chronic illnesses mentioned above (Malik et al., 2013).

To avoid these issues, Patrick et al. (2014) suggest displaying nutritional information and implementing weight-control interventions via smartphone apps. Smartphones and smartphone apps are convenient and simple tools

for education and connection among Americans (Sarcona et al., 2017), two-thirds of whom are smartphone owners (Smith, 2015). Smartphones are deeply embedded into the daily contours of Americans' lives. Americans use smartphones for navigating important life activities, from researching health conditions to accessing educational resources (Smith, 2015). This trend is also seen in advanced and emerging economies (Poushter, 2016). In one survey, over half of smartphone users had downloaded a health application (Krebs and Duncan, 2015). The most commonly used health apps relate to fitness and nutrition, and are used daily. The same survey showed that 47% of users downloaded the application to track what they ate, while 46% downloaded the app to lose weight (Krebs and Duncan, 2015). In line with this trend, consumers' use of restaurant technology options, such as online ordering, is on the rise (NRA, 2017). For example, while tech-driven millennials (age 18–34) have higher overall usage than baby boomers (age 55–64), the difference is not as large among those who frequently use their smartphones. Twenty percent of consumers prefer to use technology than interact with restaurant staff, and 42% choose a restaurant over others if it offers online ordering (NRA, 2017).

In short, smartphones offer appropriate and cost-effective media for health interventions. Smartphone apps can help people control and monitor their fitness health (Brzan et al., 2016). Furthermore, advances in smartphone capability and increased development of apps provide opportunities to expand the variety of health care delivery options. Such apps include Fooducate, Restaurant Nutrition, Zestar, and

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Table 1
Similarity of UTAUT to Other Related Theories.

Constructs	Definition	Similarity to
Performance expectancy	The degree to which an individual believes that using the system will help him or her improve the performance of a task or work.	Perceived use (TAM & DTPB), Extrinsic motivation (MM), Task adjustment (MPCU), Relative advantage (IDT), and Performance expectancy (SCT).
Effort expectancy	The degree of ease associated with the use of the system.	Perceived ease of use (TAM), Complexity (MPCU), and Actual ease of use (IDT).
Social influence	The degree to which an individual perceives that important people believe he or she should use the system.	Subjective norm (TPB, DTPB), The social factors (MPCU), and The social image (ICT).
Facilitating conditions	The degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system.	Perceived behavioral control (DTPB), Facilitating conditions (MPCU), and Perceived compatibility (IDT).

TAM (Technology Acceptance Model – Davis et al., 1989); TPB (Theory of Planned Behavior – Ajzen, 1991); DTPB (Decomposed Theory of Planned Behavior – Taylor and Todd, 1995); MM (Motivational Model – Davis et al., 1992); MPCU (Model of PC Utilization – Thompson et al., 1991); IDT (Innovation Diffusion Theory – Moore and Benbasat, 1991); SCT (Socio Cognitive Theory – Compeau and Higgins, 1995).

HealthyOut, covering various aspects of healthy eating and food choices, including nutritional values, food allergies, vegetarian choices, exercise and weight loss progress. Smartphone apps can assist customers in making more informed decisions when ordering food by providing timely and accurate nutritional information, which can have a positive impact on food ordering behavior (Tran et al., 2012; Luxton et al., 2011; Sarcona et al., 2017). Consumers can also use these apps to identify healthier and diet-appropriate dining options (Okumus et al., 2015). For example, HealthyOut helps individuals identify and select food items aligned with their dietary preferences (Levere, 2014). Another smart app, Restaurant Nutrition, enables consumers to record and track their eating choices, calories, and other related information (Kratzke and Cox, 2012). The emergence of new and innovative technologies has led scholars to conduct research on technological advances in the restaurant industry. Previous studies have mainly examined content generated by online users (Parikh et al., 2015), users' acceptance of kiosks (Kim and Qu, 2014), smartphones as restaurant recommenders (Gallego et al., 2013), and habitual and addictive smartphone behavior (van Deursen et al., 2015). Nevertheless, it has yet to be studied how users' beliefs and attitudes towards smartphone diet apps affect their food selection and consumption.

This study aims to examine psychological factors that influence users' acceptance of smartphone diet apps when ordering food and beverages in restaurants. To our knowledge, the only similar study was conducted by Okumus et al. (2015) and examined the precursors of diet smartphone app usage following the Technology Acceptance Model, or TAM (Davis et al., 1989). However, that study has been criticized for using TAM, which is considered outdated, and ignoring users' individual characteristics (Holden and Karsh, 2010). Our study adopts a more comprehensive approach to examine users' acceptance of smartphone diet apps when ordering food in restaurants by using the Unified Theory of Acceptance and Use of Technology (UTAUT) as a theoretical basis (Venkatesh et al., 2003). UTAUT is a more integrative theory than TAM and has greater predictive ability (Ali et al., 2016). Moreover, this study integrates users' personal innovativeness as an additional determinant of their acceptance of smartphone diet apps. Previous studies have shown that higher innovativeness in individuals is associated with positive beliefs and attitudes towards technology (Ali et al., 2016; Bilgihan et al., 2014). Thus, personal innovativeness may be an essential determinant of customers' acceptance of diet apps. In summary, the purpose of this study is to examine how psychological factors affect consumers' intentions to use smartphone diet apps and how personal innovativeness moderates such relationships.

2. Literature review

2.1. Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT is the theoretical framework for this study. Compared to other widely-used theories, such as Theory of Planned Behavior (TPB)

and Technology Acceptance Model (TAM), UTAUT is a newer and more integrative approach, combining variables from existing theories as predictors of technology acceptance and usage (Ali et al., 2016; San Martin and Herrero, 2012). UTAUT, proposed by Venkatesh et al. (2003), is a comprehensive model that incorporates several previous theories, including Theory of Reasoned Action (Fishbein and Ajzen, 1981), TAM (Davis et al., 1989), Motivational Model (Davis et al., 1992), TPB (Ajzen, 1991), Decomposed Theory of Planned Behavior (Taylor and Todd, 1995), Model of PC Utilization (Thompson et al., 1991), Innovation Diffusion Theory (Morre and Benbasat, 1991), and Socio-Cognitive Theory (Compeau and Higgins, 1995). As it incorporates these existing theories, UTAUT has better predictive value compared to any one individual theory (San Martin and Herrero, 2012). UTAUT includes four main determinants of information systems adoption: performance expectancy, effort expectancy, social influence, and facilitating conditions. Table 1 presents definitions and similarities of the four main variables in UTAUT to components of previous theories.

Previous research suggests that intention to use a system is the most significant predictor of its adoption and actual usage (Ali et al., 2016; San Martin and Herrero, 2012; Venkatesh et al., 2012; Venkatesh et al., 2003). Consequently, Ajzen (1991) assumes individuals' intentions capture the motivational aspects that effect their behavior and indicates individual' willingness to develop an action. Similar to other information system adoption models, UTAUT was originally established to explain technology adoption and acceptance in organizational contexts (Slade et al., 2015). Consequently, studies based on UTAUT emphasize acceptance of organizational social networks, learning virtual technologies, human resources databases, and electronic commerce apps. However, considering the similarities between UTAUT and other theories of technology acceptance (see Table 1), UTAUT has been adopted to explain and predict private users' acceptance of online purchasing (San Martin and Herrero, 2012), online banking (Abushanab and Pearson, 2007), and smartphone services and internet (Wang and Wang, 2010), although its application to consumer behavior is still in its infancy (San Martin and Herrero, 2012). Moreover, to our knowledge, there are no studies that have focused on this theory to explain and predict consumers' acceptance of smartphone diet apps in restaurants.

Effort expectancy is the extent to which a smartphone user believes that using an application is free of effort. It relates to perceived ease of use in TAM, which shows that a system perceived to be easier to use is more likely to induce behavioral intention (Chiu and Wang, 2008). Therefore, effort expectancy should have a direct effect on diet app usage intention. Also important is performance expectancy, which is the extent to which a smartphone user believes that a diet application enhances his or her performance in following a healthier diet.

Previous studies have shown that intention to use a technological advancement or system is significantly predicted by performance expectancy (Ali et al., 2016; Eckhardt et al., 2009; Slade et al., 2015; Wang et al., 2009) and effort expectancy (Abushanab and Pearson, 2007; San Martin and Herrero, 2012; Van Raaij and Schepers, 2008;

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