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Mobile services use and citizen satisfaction in government

integrating social benefits and uses and gratifications theory

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Mobile services use and citizen satisfaction in government: integrating social benefits and uses and gratifications theory

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Abstract

Purpose – Citizen satisfaction with the government is a longstanding and continuous concern in public administration. However, past research did not investigate the effect on satisfaction with the government in the context of mobile government (m-government). The purpose of this paper is to evaluate how the social benefits of citizens using m-government affect their satisfaction with the government.

Design/methodology/approach – Grounded in the uses and gratifications theory (UGT), the authors suggest that the satisfaction in m-government should be constructed in terms of the satisfaction with m-government and the satisfaction with the government. The research model of citizen satisfaction in the context of m-government is tested through partial least squares (PLS) (SmartPLS 2.0) based on data collected from a survey study in China.

Findings – The results indicate that the three important social benefits, e.g. convenience, transparency and participation, are positively associated with process gratification, whereas only convenience is positively associated with content gratification. The results suggest that both process gratification and content gratification are positively associated with citizen satisfaction with the government. Furthermore, the research suggests that process and content gratification have a mediating role, whereas compatibility has a moderating role.

Practical implications – This research provides insights to practitioners on how to facilitate citizen satisfaction by increasing citizens' social benefits and improving process and content gratification.

Originality/value – This study contributes to the literature by offering a framework for analyzing the impact of citizens' use of m-government on their satisfaction with the government. The work also contributes to UGT by categorizing user gratifications into process gratifications, content gratifications and citizen satisfaction with the government.

Keywords Citizen satisfaction, Mobile government, E-government, Uses and gratifications theory, Transparency, Participation, Compatibility

Paper type Research paper

1. Introduction

Citizen satisfaction with the government is a longstanding and core concern in public administration (Verdegem and Verleye, 2009; James, 2007). Many government agencies and public sector leaders have been increasingly concerned about the decline of citizen satisfaction over the last several years (Alawneh *et al.*, 2013). This decline often results in a loss of public trust and confidence in governments (Welch *et al.*, 2005). The need for citizen satisfaction is placing increasing demands on public administration to become more user-centered. Consequently, the crisis of citizen satisfaction with governments faced by the public sector has become increasingly prevalent in both developed and developing countries (Waldron-Moore, 1999). On the other hand, in recent years, governments have increasingly invested in information and communication technologies (ICTs) (Kurfalı *et al.*, 2017; Al-Hujran *et al.*, 2015; Al Mansoori *et al.*, 2018) to improve their service model by becoming more citizen-centric (Dwivedi *et al.*, 2017; Rana *et al.*, 2016, 2017; Shareef *et al.*, 2011). Extant research indicated that citizen satisfaction is an appropriate dependent variable to measure IT use success in the public sector (e.g. Chen *et al.*, 2016; Chan *et al.*, 2010). The issue of how to engender citizen satisfaction with governments via the use of ICT, especially mobile technology (m-technology), remains a challenge facing governments today (Gutierrez *et al.*, 2019; Yang *et al.*, 2018; Chen *et al.*, 2016).

With the rise of m-technologies and the popularity of smartphones, the government departments at all levels have used m-technologies to provide more and more public services to stakeholders (e.g. employees, citizens, businesses and other organizations) anytime and anywhere in recent years (Hu *et al.*, 2011; Shareef *et al.*, 2016a; Dwivedi *et al.*, 2018). This phenomenon is named mobile government (m-government) that can be viewed as a subset of e-government where access to government services is provided to citizens using mobile devices, such as mobile phones (Shareef *et al.*, 2012, 2014, 2016b, c). For example, as of June 2020, Baidu Company's m-government service search volume was 10.779 billion times, and m-government and people's livelihood services (government and people's livelihood smart applets) totaled 5.515 billion. All 31 provinces (autonomous regions and municipalities) in China have implemented m-government and adopted WeChat public and Weibo accounts (CNNIC, 2020).

We reviewed the extant research on mobile services use, and we found that previous studies have focused primarily on the factors that drive users to adopt m-government, as well as the key success factors for m-government (Wang *et al.*, 2020). We also found that there were only a few empirical studies on citizen satisfaction in the m-government context. These existing studies focus on citizen satisfaction with m-government systems (e.g. Veeramootoo *et al.*, 2018; Chen *et al.*, 2016; Rana *et al.*, 2015; Wang, 2014) and not on satisfaction with the government. Although some studies have emphasized the important impact of m-government on government satisfaction (e.g. Chen *et al.*, 2016; Wang *et al.*, 2020), they have failed to build a chain "from citizen satisfaction with m-government to citizen satisfaction with government", making it difficult to understand the forming process of citizen satisfaction with government. More specifically, previous research usually considered m-government satisfaction as a single-dimensional variable, they failed to distinguish the satisfaction in the use of m-government from the technical level (i.e. the satisfaction with the m-government system itself) and the satisfaction with the government represented behind the m-government system. Giving that the government provides public services to citizens through the m-government system as a media, rather than directly providing face-to-face services to citizens, and extant studies have shown that citizen satisfaction with the government is conducive to enhancing citizens' trust in the government (e.g. Grimsley and Meehan, 2007; Welch *et al.*, 2005), we infer that citizen satisfaction with m-government may affect their satisfaction with the government Against the backdrop of declining public trust, improving citizen satisfaction with the government is conducive to eliminating the barriers

between citizens and the government, reducing transaction costs and enhancing public trust (Bertot *et al.*, 2010), it is necessary to study the formation process of citizens' satisfaction with the government in the context of m-government.

Researching citizen satisfaction in the m-government context is of great significance for both theory and practice. *From a theoretical view*, understanding the formation process of citizens' satisfaction with the government is benefit to provide a theoretical basis for improving citizen satisfaction via citizen satisfaction with the new technology. M-government shows similar advantages over e-government, including avoiding corruption and low productivity of governmental agencies, increasing efficiency and effectiveness (Trimi and Sheng, 2008) and has the potential to improve citizen satisfaction with the government (Janssen *et al.*, 2018; Tolbert and Mossberger, 2006). Given the proliferation of m-government, more empirical studies on this topic are necessary. The significance of new ICT as a salient driver of citizen satisfaction with the government is found in various areas, including the use of websites (e.g. Lee *et al.*, 2020; Hong, 2013; Chan *et al.*, 2010), e-government (e.g. Morgeson *et al.*, 2010) and social media (e.g. Demircioglu and Chen, 2019; Aladwani and Dwivedi, 2018; Demircioglu, 2018). How the application of mobile technologies can improve citizen satisfaction with governments is still unclear. *From a practical point*, conducting this research can provide specific strategies for the government to improve citizen satisfaction in the m-government context. Governments in both developed and developing countries are actively developing digital technologies, and m-government is becoming an innovative complement to e-government (Shareef *et al.*, 2012, 2014, 2016b, c; Trimi and Sheng, 2008). Service providers (e.g. public agencies) must ensure an adequate interface to citizens to improve citizen satisfaction with the government.

The habits, experiences and values that e-government users have formed may affect their satisfaction with m-government, and in turn, affect their satisfaction with the government. This relationship is named compatibility. *Compatibility* refers to "the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential users" (Moore and Benbasat, 1991, p. 195). Compatibility with the norms and experiences, such as past habits, values and experience, is found as an important factor affecting citizens' adoption of new technologies. Past studies often regarded compatibility as an antecedent of intention to use e-government (e.g. Carter and Bélanger, 2005; Chan *et al.*, 2010) and m-government (Shahzad *et al.*, 2019; Hung *et al.*, 2013). Other studies indicated that compatibility moderated the relationship between ICT use and outcomes (e.g. Groß, 2018; Islam, 2016). However, empirical evidence regarding the moderating role of compatibility in the formation process of citizen satisfaction remains scarce. Given that m-government utilizes new technology, we use compatibility as a moderator in our study to examine its role in citizen satisfaction.

In summary, there is a dearth of research on the impact of users' social benefits on citizen satisfaction in the context of m-government use. Hence, the objective of this study is to examine the relationship between m-government benefits and satisfaction within the government. The present study has utilized *uses and gratifications theory* (UGT) to construct a theoretical model of citizen satisfaction with the government in the m-government context to examine the factors affecting citizen satisfaction with the government. The model hypothesizes that citizens use m-government services provided by the public sector and experience the benefits of convenience, transparency and participation, which are positively associated with citizens' gratifications (in terms of process gratification and content gratification) with m-government. In turn, gratifications are positively associated with citizen satisfaction with governments. Compatibility moderates the relationship between citizen gratifications and citizen satisfaction.

This study contributes to the extant literature in three aspects. First, we offer a framework and theorize the mediating mechanisms that link the benefits of m-government to citizen satisfaction with governments. Second, we contribute to the UGT by categorizing

gratifications into three categories, namely, process gratifications, content gratifications and citizen satisfaction with the government and analyzing the relationships among these three categories. Third, we propose three important aspects of social benefits of m-government use, namely, convenience, transparency and participation. Finally, we find compatibility positively moderates the relationship between process gratification (but not content gratification) and citizen satisfaction with the government.

The remaining sections of this paper are organized as follows. The next section (section 2) introduces UGT, briefly reviews prior studies on m-government service and affordance and develops our research model. The following section (section 3) addresses the instrument development and data collection procedures (including the context of the study, pilot test and sample). Partial least squares (PLS) (*SmartPLS* 2.0) using the two-step approach recommended by Anderson and Gerbing (1988) was used to test the research hypotheses. The empirical results are presented in section 4. A discussion of results, research implications, limitations and future research direction are presented in section 5. Finally, section 6 presents the key conclusions emerging from this research.

2. Theory development
This section provides an overview of the literature on the UGT, social benefits of using m-government services and proposes the research model and hypotheses.

2.1 Uses and gratifications theory (UGT)
UGT is an audience-centric approach that focuses on people's behavior in communication media, rather than the media's behavior toward people (Sutanto *et al.*, 2013). UGT can be used as a theoretical framework to understand why people prefer to select particular types of media from a user-level perspective (e.g. traditional media—newspapers, telephones and TV and computer/mobile-mediated communication media—the Internet) and what gratifications they obtain from their involvement (Ruggiero, 2000). Previous UGT studies have indicated that users employ a medium for three main categories of gratifications: content gratification, process gratification and social gratification (Stafford *et al.*, 2004). According to different media used, gratifications have different meanings. For example, in the context of the Internet, *content* gratification refers to being satisfied with content acquired from the Internet, *process* gratification refers to users gaining satisfaction from the experience of functional process (e.g. playing with the Internet) (Han *et al.*, 2015), whereas *social* gratification refers to users gaining satisfaction from social ties.

UGT is a suitable framework for our research for four reasons. First, we take the citizen perspective, which is consistent with UGT's audience-centered approach. Second, recently, scholars have tended to use UGT to explain and predict user behavior in the social media environment (e.g. Li *et al.*, 2018; Sutanto *et al.*, 2013). Considering m-government as providing new communication tools, our research objective is to examine the impacts of m-government use on citizen satisfaction with the government, we can use UGT to explain and predict citizens' m-government usage behavior. Third, the basic logic of UGT is that individuals choose specific media based on their psychological and social motivations (Leung and Wei, 2000). In our study, convenience, transparency and participation are regarded as the social benefits of using m-government services (see section 2.2). Moreover, existing empirical studies have shown that content, process and social gratification drive user behavior (e.g. Sutanto *et al.*, 2013; Leung and Wei, 2000). Finally, previous research usually considered m-government satisfaction as a single-dimensional variable. To better understand citizen satisfaction with the government in the m-government context, we distinguish two levels of satisfaction in the use of m-government. The first is the technical level referring to the satisfaction with the m-government system itself. This level refers to the process and content gratification. The second level is the satisfaction with the government represented by

the m-government. This level represents social gratification. Social gratification with the internet includes four dimensions: chatting, friends, interactions and people (Stafford *et al.*, 2004). Based on this definition, social satisfaction in our study refers to the satisfaction formed during the process of citizens using m-government to communicate and interact with government staff. This represents whether they are satisfied with the government. Hence, it is logical to use citizen satisfaction with the government to replace social gratification.

The operational definitions and resulting measures of three gratifications are based on extant studies (e.g. Stafford *et al.*, 2004; Yang *et al.*, 2018), but modified for m-government. Social gratification is replaced by citizen satisfaction with the government for the following three reasons. First, social gratification involves a wide range of forming and deepening social ties between users and other stakeholders. Specific to the m-government context, social ties mainly refer to the relationship between users and governments. Second, our approach is consistent with prior research on citizen satisfaction with the government in extant e-government (e.g. Welch *et al.*, 2005) and m-government studies (e.g. Chen *et al.*, 2016). Third, citizen satisfaction with the government can appropriately reflect the government's social goal of developing m-government, which can be used to measure the m-government success for public institutions. Hence, the gratifications of uses of m-government contain content gratification, process gratification and citizen satisfaction with the government. Content gratification refers to being satisfied with information and services provided by m-government, whereas process gratification refers to being satisfied with the use experience of m-government. Finally, citizen satisfaction with the government refers to being gratified with the government. Prior work using UGT has mainly regarded process, content and social gratifications as antecedents of media use (e.g. Li *et al.*, 2017, 2018) and paid little attention to the antecedents of these gratifications. Consequently, we analyze the benefits of the application of m-government from a social perspective.

2.2 Social benefits of m-government services

In recent years, adopting m-government in the public sector is becoming one of the major trends. For example, in China, government departments vigorously promote mobile phone mobile clients, WeChat public numbers and QR codes in approval service applications. They also actively promote the wide coverage and high availability of government services on mobile phones to encourage. The government is increasingly investing in m-government to improve relationships with citizens. M-government has several advantages, such as mobility, localizability, personalization and security (Wang *et al.*, 2020). Most prior research focused on their advantages from the technology perspective and the resulting satisfaction with the m-government system (e.g. Ahmad and Khalid, 2017; Chen *et al.*, 2016). Little attention has been paid to social benefits, such as convenience, transparency and participation, and how these benefits affect citizens' satisfaction with the government. Social benefits are often key in policy-making and improving the relationships between the government and citizens. Although these social benefits also exist in PC-based e-government, m-government can provide citizens with personalized services anytime and anywhere as access to mobile phones is more conducive than access using desktops. Based on the extant research on e-government and m-government services, we summarize three important aspects of social benefits of using m-government services, namely, convenience, transparency and participation (see Table 1). We choose these three aspects of the social benefits of m-government for the following reasons. First, these three aspects are often mentioned in the prior literature when analyzing the non-monetary benefits of government system use (e.g. Chen *et al.*, 2016; Mergel, 2013). Second, in the past research literature, these three aspects are regarded as important dimensions of public value (e.g. Scott *et al.*, 2016). Finally, the public sector is more concerned about realizing social goals rather than economic goals. We will elaborate on these three aspects and form hypotheses in the next section.

2.3 Research model and hypotheses

Figure 1 shows that the research model is constructed based on UGT and includes the three social benefits of using m-government, e.g. convenience, transparency and participation, the three categories of use gratifications, e.g. content gratification, process gratification and citizen satisfaction with the government. Compatibility is used as a moderator in our model.

2.3.1 Convenience. Convenience refers to the ability to receive m-government services how and when the individual wants (Scott *et al.*, 2016). In the m-technology literature, convenience has often been termed as accessibility or ubiquity and is defined as the degree of access to services regardless of time and location (Kim and Ammeter, 2014; Ashraf *et al.*, 2017). These characteristics allow users to download and use real-time information and services wherever they are. Mobile-mediated communication services differ from other computer-mediated communication services in that they provide more convenience and instant connectivity at any time and any place (Clarke, 2001). Hence, convenience is considered a key attribute of mobile technology services and a key driver of use gratifications (Chen *et al.*, 2016). This ability to obtain information and services anytime and anywhere is convenient and enhances content gratifications (Sutanto *et al.*, 2013). Consequently, we hypothesize the following:

H1a. Convenience in accessing m-government services is positively associated with citizen process gratification.

H1b. Convenience in accessing m-government services is positively associated with citizen content gratification.

2.3.2 Transparency. Transparency refers to acting openly toward all stakeholders on procedures and decisions (Chen *et al.*, 2016). Many governments have worked to increase the transparency to improve citizen satisfaction with the government and build public trust (Song and Lee, 2016). Prior research indicates that ICTs are regarded as a cost-effective and convenient means to increase transparency and to reduce corruption (Bertot *et al.*, 2010;

Dimensions	Definition	References
Convenience	The ability to receive m-government services at any time and location	Scott *et al.* (2016), Stamati *et al.* (2015), Norris and Reddick (2013), Picazo-Vela *et al.* (2012), Chan *et al.* (2010)
Transparency	Acting openly toward all stakeholders on procedures and decisions	Chen *et al.* (2016), Song and Lee (2016), Stamati *et al.* (2015), Gunawong (2015), Mergel (2013), Bertot *et al.* (2010)
Participation	Involved and exert influence by taking part in public services	Scott *et al.* (2016), Stamati *et al.* (2015), Gunawong (2015), Mergel (2013)

Table 1.
Social benefits of using m-government

Figure 1.
Research model
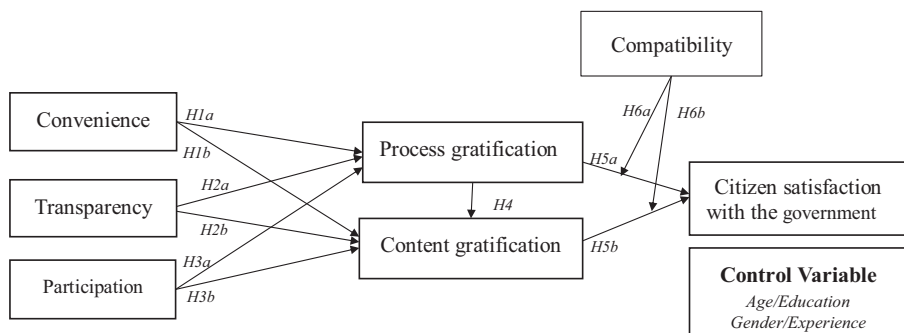
Srivastava *et al.*, 2016; Amrollahi and Rowlands, 2017). There is evidence in the previous literature suggesting the importance of transparency (Gunawong, 2015) as an antecedent to use gratifications in e-government (Jun *et al.*, 2014).

M-government is more conducive to the disclosure of government information to better respond to public concerns. The public sector uses m-government to deliver real-time information and services to citizens, enhancing both the breadth and depth of information disclosure. Extant work suggests that governments providing information to citizens in a timely manner is the most important indicator of government transparency (Song and Lee, 2016). M-government can provide citizens with mobile communication, mobile information searching and mobile business services based on time-critical function originating from mobility, which is beneficial in improving the breadth and timeliness of information disclosure (Gunawong, 2015). Given these advantages of m-government, transparency is expected to increase citizen's process gratifications. Due to location-sensitive function rooted in GPS technology, m-government can easily locate citizens and provide them with location-based services (Chen *et al.*, 2016), which enable the government to provide in-depth, personalized content and services to citizens. As such, transparency should increase user content gratification. Hence, it follows that:

H2a. Transparency in information is positively associated with citizen process gratification.

H2b. Transparency in information is positively associated with citizen content gratification.

2.3.3 Participation. Participation refers to increasing opportunities to be involved in policy-making and to provide the government with the benefits of citizen collective expertise and information (Mergel, 2013). In recent years, governments increasingly use new ICTs to enhance citizen participation in decision-making (Scott *et al.*, 2016; Naranjo-Zolotov *et al.*, 2019) and to increase citizen satisfaction with the government and advance public trust (Lim *et al.*, 2012).

M-government is a good tool to enable citizens to better engage and participate in decision-making through the introduction of social media (Trimi and Sheng, 2008). Further, it can also assemble citizens and public managers in a creative and deliberative process by creating interactive and collaborative platforms (Hui and Hayllar, 2010). M-government offers users the ability to receive information, communicate with the government and participate in decision-making independent of the users' location and time (Trimi and Sheng, 2008). In this way, increasing opportunities are created for citizens to take part in policy-making and share their collective knowledge, ideas and expertise. In turn, this improves the quality of governmental decision and policy-making. These advantages are important in enhancing procedural justice (Chen *et al.*, 2016) and may increase process gratification. M-government can provide recommendations to citizens (e.g. providing policy information and enabling citizen feedback) based on their preferences or usage behavior. In this way citizens can better participate in government decision-making, thereby increasing citizen content gratification. Therefore, it follows that:

H3a. Participation is positively associated with citizen process gratification.

H3b. Participation is positively associated with citizen content gratification.

2.3.4 Use gratifications and citizen satisfaction. Use gratification is broadly divided into two complementary dimensions: process gratification and content gratification (Sutanto *et al.*, 2013). From a goal perspective, process gratification reflects the process goal related to the experience, whereas content gratification reflects the consumption goal that captures the functional benefits favored by citizens in consuming a product or service (Tan *et al.*, 2013).

In general, people prefer online services when the IT is functionally advanced enough for their needs and technically easy to use (Grönroos *et al.*, 2000; Wang *et al.*, 2018).

In the context of m-government, process gratification reflects how well m-government services are provided to citizens for achieving their process goals, and content gratification reflects how well m-government services are provided for attaining their consumption goals. Generally, the lack of good process experience will increase the perception of difficulty in obtaining high-quality content (Cenfetelli *et al.*, 2008; Bélanger and Carter, 2008; Nourikhah and Akbari, 2016). Conversely, the availability of superior service content will be rendered if it is made accessible to customers through efficient delivery. Therefore, citizen process gratification may be beneficial to enhance his/her content gratification. Hence, we hypothesize the following:

> *H4.* Citizen process gratification is positively associated with citizen content gratification.

From a utilitarian perspective, citizen gratification with the process experience and content provided by m-government will increase the likelihood of individuals obtaining desirable outcomes (Chen *et al.*, 2016) and becoming satisfied with m-government services. The extant research indicates that the government has the potential to increase citizen satisfaction with the government through the appropriate utilization of ICTs (Bélanger and Carter, 2008; Welch *et al.*, 2005). Given that m-government has the advantage of mobility, localizability and personalization, m-government provides process experience use and service content. Hence, better and more convenient services, which are better accessible and having complete information may reduce the information gap and improve citizen satisfaction with government. Therefore, it is hypothesized that:

> *H5a.* Citizen process gratification is positively associated with citizen satisfaction.

> *H5b.* Citizen content gratification is positively associated with citizen satisfaction.

2.3.5 Compatibility. The theory of task-technology fit suggests that if the requirement of tasks matches with available technologies, then the users are likely to use technologies to perform the tasks (Goodhue and Thompson, 1995). Hence, we argue that if citizens believe that m-government fits their lifestyles, values and past usage experiences, then they are more likely to employ these services. Further, the level of work outcomes is determined by the degree of fit between the task and technology (Goodhue and Thompson, 1995). This suggests that the more the technology fits the specific task characteristics, the higher the likelihood that the technology will improve task outcomes (Islam, 2016). In the m-government context, when the compatibility is high, the process and content of obtaining m-government services are highly consistent with citizens' past habits, values and experiences. Higher comparability with current habits, values and experiences, result in higher citizen satisfaction. Hence, we suggest that citizens' perception regarding compatibility will moderate the relationship between process and content gratifications with citizen satisfaction. Consequently, we propose the following hypotheses.

> *H6a.* Compatibility positively moderates the relationship between citizen process gratification and citizen satisfaction.

> *H6b.* Compatibility positively moderates the relationship between citizen content gratification and citizen satisfaction.

3. Research method
3.1 Instrument development
All measures in our model were adapted from validated instruments from extant studies (see Table 2).

Constructs	Items	References
Convenience	CON1: It is important that I can use m-police around the clock CON2: It is important that I can access m-police from a number of different locations (e.g. home, office) CON3: M-police allows me to be able to find desired information quickly	Scott *et al.* (2016)
Transparency	Through m-police, the police station provides TRA1: Reliable information about its decision-making TRA2: Reliable information about how its decisions affect me TRA3: Timely information about its actions	Chen *et al.* (2016)
Participation	PAR1: M-police allows me to have my say about things that matter to me PAR2: M-police allows me to monitor the illegal activities of government employees PAR3: M-police makes me feel that decision-makers listen to me PAR4: M-police makes me feel that I am being consulted about important issues	Scott *et al.* (2016)
Process gratification	PGR1: M-police use is interesting PGR2: M-police use is enjoyable PGR3: M-police use is pleasant	Li *et al.* (2017)
Content gratification	CGR1: The use of m-police is advantageous for my work CGR2: The use of m-police makes my work more efficient CGR3: The use of m-police improves the quality of the work I do	Li *et al.* (2017)
Compatibility	COM1: Using m-police is compatible with all aspects of my needs COM2: Using m-police fits well with my values COM3: Using m-police fits into my past experience	Chan *et al.* (2010)
Citizen satisfaction with the government	How do you feel about the police station overall by using m-police services? CSG1: Very dissatisfied/very satisfied CSG2: Very displeased/very pleased CSG3: Very frustrated/very contented CSG4: Absolutely terrible/absolutely delighted	Chen *et al.* (2016)

Table 2.
Measurements and
references

The wordings of all items were adapted to fit the m-government context when we translated the items into Chinese using a back-translation method (Brislin, 1970). Transparency and citizen satisfaction with the government were adapted from Chen *et al.* (2016). Convenience and participation were measured using the items suggested by Scott *et al.* (2016). Process gratification and content gratification were adapted from Li *et al.* (2017), and compatibility was adapted from Chan *et al.* (2010). A seven-point Likert scales was used to measure all variables, with the anchors being "1 = strongly disagree" and "7 = strongly agree". Prior studies have indicated that individual demographic differences have effects on usage behavior (Shao and Kwon, 2019; Teo, 2001). Therefore, respondents' education and experience were used as controls in the research model.

3.2 Data collection procedures

3.2.1 Context of the study. Communication between the police department and citizens (hereafter calls m-police) is mediated by an m-police app developed by Zhengzhou Public Security Bureau of Henan Province in 2018. M-police is regarded as a typical representative of m-government because the following three reasons. First, popular public services are provided by m-police, such as police news, vehicles-related business, citizenship-related

business, case inquiry and online alarm related business and online public security business consulting. These services are also available through offline services, as well as PC-based online services. However, citizens tend to use their mobile phones to access m-police or WeChat applets rather than go to the on-site counter or via the desktop computer. M-police can be used to make an appointment to apply for an ID card and a passport and deal with motor vehicle violations online. Further, m-policy can be used to check the progress of the business transactions by providing online business processing progress inquiries, publicizing the deadline for handling relevant transactions and disclosing law enforcement actions. The m-police app provides online business processing progress inquiries, publicizes the deadline for handling relevant transactions and discloses all law enforcement actions. Second, m-police also facilitates public participation in police affairs. The app has a reporting center where citizens can report violations of the police; there is also a column of citizen opinions, and citizens can advise on upcoming policies and suggestions for police work. Third, the most important point is that it can provide services related to hukou (household registration). Hukou is a legal document that records the household population's basic information, including the person's name, date of birth, relatives and marital status in China. Depending on their hukou, urban and rural citizens are assigned to different health insurance and education programs. A hukou is a key identification document for Chinese citizens and is an important administrative tool for the government to monitor its population. The information system of China's administrative hukou belongs to the police station at all levels. In China, citizens need to go to the police station registration hukou where the residence is located to register their newborn. Chinese citizens use ID cards in their daily lives, such as for services related to motor vehicles, e.g. driver's licenses, annual inspections and traffic fines. All these services are handled by the police station. Not surprisingly, the police station is one of the most contacted government departments for Chinese citizens.

3.2.2 Pilot test. The questionnaire was piloted among 40 citizens, who were not included in the main survey. In the pilot results, the Cronbach's α values of all variables were between 0.76 and 0.87 (Cronbach, 1970), and factor loadings for all observed variables were above 0.75. This is considered as being acceptable by the thresholds recommended by Fornell and Larcker (1981). Construct validity was evaluated using factor analysis, and all the items were loaded onto their expected constructs (with loadings > 0.7).

3.2.3 Sample and data collection. We sought the assistance of the m-police service provider to collect data. The m-police provider randomly invited 500 citizens across Henan province who come to the company to handle the business to fill out the questionnaire. One reason for selecting users from Henan province in central China is that it is typical of a microcosm of Chinese society in China (Wang *et al.*, 2020). We collected responses from 250 citizens within one month via a tax information provider. There were 207 valid questionnaires as 43 questionnaires had missing data. A *T*-test between valid and invalid responses results indicated no significant differences in terms of gender, age, education and experience between different groups. Harman's (1976) one-factor test was used to assess the common method variance (CMV). The results showed that no single factor accounted for the majority of variance, e.g. the most covariance explained by one factor is 27.9%. We also followed the recommended procedural and statistical remedies as suggested by Podsakoff *et al.* (2003). The results suggested that there was no difference between the research model (the average factor loading is 0.932) and the marker variable model (the average factor loading is 0.27). This indicates that CMV was not a problem in our study. The demographics of our respondents are shown in Table 3.

4. Results
We use *Smart PLS 2.0* to test our measurement model and structural model because it is recognized as an effective method for measuring construct reliability and validity, and it

Characteristics		Frequency	Percentage
Gender (GEN)	Male (0)	121	58.5
	Female (1)	86	41.5
Age (years)	<20	22	10.6
	20–29	68	32.9
	30–39	84	40.6
	≥40	33	15.9
Education (EDU)	Below college	90	43.5
	College and above	117	56.5
M-government using experience (Yeas)	<0.5	42	20.3
	0.6–1	97	46.9
	>1	68	32.9

employs a component-based approach with less restriction on sample size and residual distributions (Chin *et al.*, 2003).

4.1 Measurement model

For assessing the quality of the constructs, the reliability and validity of the measurement items were used to test the measurement model. Reliability (Cronbach's α), composite reliability (CR), average variance extracted (AVE) and factor analysis were used to evaluate convergent validity. For each of the constructs, the values of CR, AVE and Cronbach's α exceeded the thresholds of 0.7, 0.5 and 0.7, respectively (Fornell and Larcker, 1981). Table 4 shows the measurement model results, including information about reliability, validity, correlations and factor loadings. In Table 4, all items have high factor loadings (ranging from 0.78 to 0.91) in their corresponding constructs, and Cronbach's alpha values are between 0.76 and 0.89 in our model, which is well above the 0.70 criterion for internal consistency reliability. To test discriminant validity, we compared the square roots of AVEs with the correlations among the constructs. The average variance extracted (AVE) was greater than 0.50 (ranging from 0.76 to 0.87) in all cases and greater than the square of the correlations, and all AVEs' square roots (in italic) are greater than the correlations among constructs, suggesting discriminant validity (Chin *et al.*, 2003).

4.2 Structural model

Figure 2 shows the standardized path coefficients in our model. Our model accounted for 42% ($R^2 = 0.42$) of the variance in citizen satisfaction. All hypotheses were supported with the exception of H2a and H3b. H1a and H1b were supported because the results indicated that convenience was positively associated with the process gratification ($b = 0.36$, $p < 0.001$) and content gratification ($b = 0.29$, $p < 0.01$), respectively. H2a was supported as transparency was positively associated with process gratification ($b = 0.27$, $p < 0.001$). Interestingly, transparency was not significantly positively associated with content gratification ($b = 0.08$, $p > 0.05$); thus, H2b was not supported. H3a was supported because participation was positively associated with process gratification ($b = 0.12$, $p < 0.01$). H3b was not supported since the results suggested that participation was not significantly positively associated with content gratification ($b = 0.05$, $p > 0.05$). H4 was supported because process gratification was positively associated with content gratification ($b = 0.32$, $p < 0.001$). H5a and H5b were supported because process gratification ($b = 0.39$, $p < 0.001$) and content gratification ($b = 0.16$, $p < 0.01$) were positively associated with citizen satisfaction with the government. Altogether, the model accounts for 39% of the

	Mean	SD	AVE	CR	Alpha	Item loadings	1	2	3	4	5	6	7
1. CON	5.21	1.24	0.79	0.83	0.82	0.87/0.82/0.91	*0.89*						
2. TRA	4.98	1.08	0.82	0.79	0.76	0.86/0.83/0.78	0.34	*0.91*					
3. PAR	4.24	1.39	0.78	0.82	0.88	0.82/0.88/0.82/0.85	0.51	0.55	*0.88*				
4. PGR	5.56	1.24	0.76	0.84	0.85	0.92/0.81/0.87	0.72	0.42	0.53	*0.87*			
5. CGR	4.56	1.16	0.87	0.89	0.89	0.86/0.89/0.84	0.56	0.43	0.47	0.56	*0.93*		
6. COM	5.03	1.09	0.83	0.86	0.86	0.82/0.89/0.87	0.32	0.39	0.38	0.35	0.37	*0.91*	
7. CSG	4.38	1.02	0.85	0.83	0.85	0.86/0.79/0.82/0.89	0.49	0.42	0.46	0.47	0.47	0.53	*0.92*

Note(s): (1) Alpha represents Cronbach's α, (2) AVE > 0.50; CR > 0.70 and α > 0.70

Table 4.
Correlations between
constructs

variance in citizen satisfaction with the government. Moreover, the model with (without) control variables explained 41.9% (40.6%) variance of reactance, which indicated that all the control variables showed non-significant effects. We also examined the research model when all the control variables were precluded, and the results indicated no difference. This suggests that all the control variables do not affect path weights among the major constructs in the research model.

For further analysis, we examined the mediating effects of content gratification and process gratification. First, we tested the direct relationship between convenience, transparency and participation with citizen satisfaction with the government. The results indicated that convenience ($b = 0.48, p < 0.001$), transparency ($b = 0.39, p < 0.001$) and participation ($b = 0.21, p < 0.01$) were positively associated with citizen satisfaction with the government. Second, as shown in Figure 2, we tested the structural model. Finally, the Sobel test was used to test the mediating effect (Sobel, 1982). The results indicated that process gratification partially mediated the relationships between convenience *(T = 27.35, p < 0.001)*, transparency *(T = 22.59, p < 0.01)* and participation *(T = 26.23, p < 0.01)* with citizen satisfaction with the government. The results also suggested that content gratification partially mediated the relationship between convenience *(T = 32.62, p < 0.01)* and citizen satisfaction, but did not mediate the relationships between transparency *(T = 28.17, p > 0.05)* and participation *(T = 19.86, p > 0.05)* with citizen satisfaction with the government.

We also tested the moderating role of compatibility. We utilized a multiple-group approach, in which the groups were divided into high compatibility (*N1 = 105*) and low compatibility (*N2 = 92*) groups using the median (Baron and Kenny, 1986). Further, we used the Sobel test to examine whether the moderating effect was significant (Sobel, 1986). The results (see Table 5) indicated that H6a (*t = 30.41, p < 0.001*) was supported, but H6b (*t = 12.34, p > 0.051*) was not supported.

We summarize the results of our hypotheses testing in Table 6.
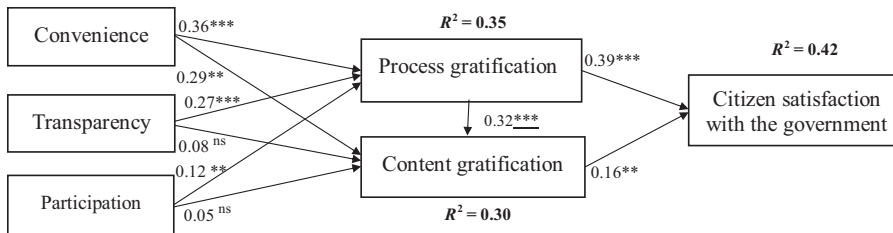
Figure 2.
The results of
research model

Paths coefficients	Full sample ($N = 207$)	High compatibility ($N = 105$)	Low compatibility ($N = 92$)	t statistics (high vs. low)
Process gratification → Citizen satisfaction with the government	0.39***	0.49***	0.21^{ns}	30.41***
Content gratification → Citizen satisfaction with the government	0.16**	0.15***	0.18**	12.34^{ns}
Note(s): **$p < 0.01$, ***$p < 0.001$, ns = not significant				

Table 5.
Comparison of paths
for the high and low
compatibility group

H1a	Convenience in accessing m-government services is positively associated with citizen process gratification	Supported
H1b	Convenience in accessing m-government services is positively associated with citizen content gratification	Supported
H2a	Transparency in information provided by m-government services is positively associated with citizen process gratification	Not supported
H2b	Transparency in information provided by m-government services is positively associated with citizen content gratification	Not supported
H3a	Participation is positively associated with citizen process gratification	Supported
H3b	Participation is positively associated with citizen content gratification	Not supported
H4	Citizen process gratification is positively associated with citizen content gratification	Supported
H5a	Citizen process gratification is positively associated with citizen satisfaction	Supported
H5b	Citizen content gratification is positively associated with citizen satisfaction	Supported
H6a	Compatibility positively moderates the relationship between citizen process gratification and citizen satisfaction	Supported
H6b	Compatibility positively moderates the relationship between citizen content gratification and citizen satisfaction	Not supported

Table 6.
Summary of results on hypotheses testing

5. Discussion

5.1 Main findings

Few studies had focused on the social benefits of using e-government. Most studies address the impact of these benefits on citizen trust (e.g. Song and Lee, 2016; Kim and Lee, 2012; Welch *et al.*, 2005). Further, there is limited work in m-government despite its significance. We developed a research model encompassing social benefits of using m-government services and gratifications in m-government. Our field study of 207 m-government users suggested that citizens used m-government services provided by the public sector resulting in the social benefits of convenience, transparency and participation. These were associated with citizen process and content gratifications with m-government. In turn, process and content gratifications were positively associated with citizen satisfaction with the government. We also found that process gratification fully mediated the relationships between social benefits of using m-government with citizen satisfaction with the government. Content gratification fully mediated only the relationship between convenience and citizen satisfaction. Apart from the link from transparency (H2b), participation (H3b) to content gratification and compatibility moderating citizen content gratification and citizen satisfaction (H6b), all the hypothesized relationships were supported.

We found that the effect of process gratification on government satisfaction is significantly greater than that of content gratification, which suggests that it is more necessary to improve the satisfaction of citizens' process gratification when the government uses m-government to improve the government satisfaction. Previous research on UGT is mainly used to explore the relationship between technical features and satisfaction of users with social media in the business sector (e.g. Ray *et al.*, 2019; Han *et al.*, 2015). Few studies have used this as a theoretical framework to study the impact of service quality on citizens' continuance intention to use m-government. For example, the extant studies finds that the process and content gratification of the above studies had a positive effect on the dependent variable (e.g. continuance intention), and content gratification showed a greater effect on continuance intention than that of process gratification (e.g. Ding *et al.*, 2019; Li *et al.*, 2018). In contrast, our research showed that process gratification had a greater effect on citizen satisfaction than content gratification. Future research could use different research scenarios (e.g. m-tax, m-traffic and m-learning) to verify which kind of gratification has a greater impact on government satisfaction.

An unexpected result is that the relationship between transparency and content gratification was not found to be significant. Meanwhile, our result indicated that transparency is positively related to process gratification. This means that citizens are more concerned about the transparency of information, and the government can use the improvement of information transparency to increase their process gratification. Extant studies indicated that the relationship between transparency and satisfaction was inconsistent. For example, transparency was found to be positively related to citizen satisfaction (e.g. Yang, 2018), but transparency and satisfaction were also found to be negatively related (e.g. Porumbescu, 2017). One possible reason for our result is that although the content catalogs provided by m-government in China are relatively complete (such as decision-making disclosure, management service disclosure, implementation and results disclosure, policy interpretation and response concerns), the specific content of the disclosure needs to be more detailed, timely and convenient. For example, although the Chinese government has made great progress in data disclosure, there are still many factors hindering the in-depth opening of government data, such as institutional barriers, data integrity and quality barriers and user participation barriers (Huang *et al.*, 2017).

Another unexpected result is that the relationship between participation and content gratification was not supported, which is inconsistent with existing research (Alawneh *et al.*, 2013; Kim and Lee, 2012). One plausible reason is that citizens in China mainly use m-government to obtain information and complete transaction, rather than to participate (Xie *et al.*, 2017). Convenience, transparency and participation are positively and significantly associated with citizen satisfaction with the government. These results show that we still need to pay attention to user participation in improving government satisfaction, because participation have significant effects on process gratification and government satisfaction, although the positive effect on content satisfaction is not significant. It may be necessary to further verify the validity of the results in different contexts in the future research, or improve the way citizens participate in m-government.

5.2 Theoretical contributions

First, we contribute to m-government literature by offering a framework and theorizing the mediating mechanisms that link the social benefits of m-government use to citizen satisfaction. We extended UGT for the m-government context and use it to understand the factors affecting citizen satisfaction. Prior research on satisfaction in the e-government and m-government context has maintained a strict focus on citizen satisfaction with ICT (e.g. Chen *et al.*, 2016; Welch *et al.*, 2005). Our study utilized UGT to examine the factors affecting citizen satisfaction with the government in the context of m-government, which provides new insights to enhance citizen satisfaction with the government. We found that process gratification fully mediated the relationship between social benefits of using m-government and citizen satisfaction with the government, but content gratification only mediated the relationship between convenience and citizen satisfaction. This result is important for two reasons. One is that the ultimate goal of governments to develop m-government is to create public value and citizen satisfaction (Grimsley and Meehan, 2007). Our result can provide guidance to evaluate m-government success. The other is that we have examined the factors affecting citizen satisfaction with the government, which provides insights into factors influencing citizen satisfaction.

Second, we contribute to UGT by categorizing user gratifications into three categories, namely, process gratification, content gratification and citizen satisfaction with the government and analyzed the relationships among them. Previous UGT studies have suggested that users employ content, process and social gratification (Stafford *et al.*, 2004), and that they are independent of each other. More importantly, although our research model

is based on UGT, we substituted social gratification with citizen satisfaction to be consistent with prior research on citizen satisfaction in public administration research (e.g. Morgeson, 2012; Van Ryzin, 2005). We also added process gratification and content gratification into our model to better understand how to engender citizen satisfaction with the government. More importantly, we analyzed the relationships between them. Our results help decision-makers to take targeted measures to improve citizen satisfaction. For example, decision-makers need pay more attention to advance citizens' process gratification (relative to content gratification) because our results indicates that process gratification shows greater effect on government satisfaction than that of content gratification.

Third, we propose three important social benefits of m-government, namely, convenience, transparency and participation. Prior research on the benefits of e-commerce (Wu *et al.*, 2018), e-government use, or m-government use, primarily focuses on technology's perspective. For example, Venkatesh *et al.* (2012) identified the key service attributes driving the use of e-government services, namely, usability, computer resource requirement, technical support provision and security provision. Our study summarizes the three benefits of m-government use from the social perspective, which provides a new perspective for studying m-government value. This helps us better understand the government's social goals, because for the government, achieving social goals may be far more important than achieving economic goals (Grimsley and Meehan, 2007).

Finally, we used compatibility as a moderator. Our results indicate that process is more important than content in m-government. Our study examined the role of compatibility in moderating the relationships between process and content gratifications and citizen satisfaction. The results indicate that process gratification has a greater effect on citizen satisfaction for high compatibility groups. Beyond our expectation, the relationship between content gratification and citizen satisfaction was not moderated by compatibility. This confirms the literature that found that public services require a focus on the citizen use process and experience (Verdegem and Verleye, 2009; Bertot *et al.*, 2010).

5.3 Practical contributions

Our results provide practitioners with rich insights on how to facilitate citizen satisfaction with the government via m-government. First, to enhance citizen satisfaction with the government, our research suggests that m-government vendor (governments) should improve citizens' gratifications with the process and content gratifications of m-government service, as our results indicated that citizens' content and process gratifications were positively related to citizen satisfaction with the government. For improving citizen satisfaction with the government from the perspective of process gratification, we suggest public management should increase the joy of m-government use. For example, reduce user anxiety by increasing the ease of use, facilitating people feeling confident about their ability to successfully acquire m-government services via training and relieving privacy concerns by providing a safe use environment. For improving citizen satisfaction from the perspective of the content gratification, we suggest to improve the information and service quality. For example, on the one hand, governments should ensure information delivered to citizens is characterized by accuracy, completeness, consistency, timeliness and uniqueness. On the other hand, governments should provide personalized information and services to meet users' real needs and the preferences of different citizens.

Second, to enhance gratifications with m-government services from the social perspective, we suggest governments to increase the social benefits of m-government usage. For example, to enhance process gratification with m-government, governments should improve the convenience, transparency and participation features. Although the relationships between the two social benefits of m-governments uses (i.e. transparency and participation) were not

supported, further analysis indicated that both of them were positively related to citizen satisfaction with the government. Hence, to enhance content gratification with m-government, governments should also improve the convenience, transparency and participation. Specific measures to increase social benefits include increasing service channels (e.g. online, offline, integration) and self-service to facilitate citizens' access to information and services, increasing transparency by delivering information and increasing interaction and increase public participation by creating interactive and collaborative m-government systems that facilitate user reviews, voices and co-production.

Finally, we suggest m-government service providers should focus on improving citizen process gratification because our results indicate that the process gratification has a greater effect on citizen satisfaction than content gratification. Compatibility positively moderates the relationship between process gratification and citizen satisfaction. Hence, on the one hand, service providers should strengthen the service experience in the process of using m-government. On the other hand, they should pay attention to the compatibility with the citizen experience, values and habits when designing m-government.

5.4 Limitations

There are a few limitations and future research directions. First, the generalizability of our results may be limited due to the specific setting of our research. Data were collected from China based on an m-police app, and the sample size is relatively small. Future studies could examine this model in other settings (e.g. m-tax, m-traffic and m-health) and use a larger sample size. Second, our results were based on cross-sectional data, where causality cannot be inferred. Future research could use longitudinal data to test this model (Malaquias *et al.*, 2018). Third, convenience, transparency and participation are regarded as important aspects of the social benefits of m-government use in our model. Future research could add trust (Verkijika and De Wet, 2018), accountability and well-informedness into the social benefits to validate our model. Fourth, we have analyzed the impact of process and content gratifications on citizen satisfaction with the government. Future research could examine the impact of citizen satisfaction with the government on process and content gratifications. Last but not least, future studies can also investigate whether there is a significant difference in citizen satisfaction with the government via different service channels, such as desktops and mobile phone use (Raphaeli *et al.*, 2017).

6. Conclusion

Citizen satisfaction with governments is becoming one of the major concerns in public administration research and governments worldwide. Although prior research has addressed the potential of m-government for enhancing citizen satisfaction with the government, most researchers have focused on the technical dimensions of m-government (e.g. task-technology fit), while the social aspects have not attracted equal attention. Building on extant research, we developed a research model of citizen satisfaction with the government based on UGT. The results indicate that citizens use m-government services provided by the public sector resulting in convenience, transparency and participation. These social benefits are, in turn, associated with process and content gratification. Both process and content gratification will then enhance citizen satisfaction with the government. We substituted social gratification by citizen satisfaction to be consistent with prior research on citizen satisfaction in public administration research. Process gratification fully mediates the relationships between social benefits of using m-government and citizen satisfaction with the government, but content gratification only mediates the relationship between convenience and citizen satisfaction. Moreover, we examine the role of compatibility, which positively

moderates the relationship between process gratification (but not content) and citizen satisfaction. This study advances citizen satisfaction research by examining the factors affecting citizen satisfaction from the social perspective in m-government.

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Appendix

Items	CON	TRA	PAR	COM	PGR	CGR	CSG
CON1	*0.87*	0.34	0.46	0.65	0.53	0.32	0.49
CON2	*0.82*	0.31	0.49	0.68	0.49	0.34	0.44
CON3	*0.91*	0.33	0.45	0.63	0.56	0.29	0.42
TRA1	0.35	*0.86*	0.43	0.43	0.43	0.43	0.41
TRA2	0.30	*0.83*	0.35	0.40	0.40	0.41	0.39
TRA3	0.32	*0.78*	0.42	0.38	0.38	0.38	0.40
PAR1	0.45	0.44	*0.82*	0.48	0.40	0.30	0.42
PAR2	0.42	0.45	*0.88*	0.43	0.42	0.34	0.49
PAR3	0.48	0.47	*0.82*	0.47	0.45	0.35	0.48
PAR4	0.46	0.39	*0.85*	0.46	0.44	0.43	0.46
COM1	0.63	0.40	0.49	*0.82*	0.53	0.36	0.49
COM2	0.67	0.37	0.52	*0.89*	0.45	0.30	0.39
COM3	0.58	0.35	0.46	*0.87*	0.47	0.33	0.42
PGR1	0.58	0.43	0.42	0.48	*0.92*	0.33	0.46
PGR2	0.53	0.42	0.39	0.52	*0.81*	0.34	0.48
PGR3	0.55	0.38	0.43	0.43	*0.87*	0.37	0.40
CGR1	0.36	0.37	0.36	0.41	0.38	*0.86*	0.37
CGR2	0.29	0.41	0.34	0.38	0.36	*0.84*	0.32
CGR3	0.32	0.34	0.38	0.32	0.29	*0.89*	0.35
CSG1	0.47	0.41	0.42	0.46	0.43	0.45	*0.86*
CSG2	0.42	0.34	0.53	0.38	0.38	0.42	*0.79*
CSG3	0.39	0.39	0.47	0.42	0.44	0.48	*0.82*
CSG4	0.45	0.36	0.39	0.46	0.40	0.46	*0.89*

Table A1.
Item loadings and cross-loadings

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